

Impact and Accomplishment Statements

Michigan Sea Grant Annual Report (FY 2020-2021)

FOCUS AREA: Healthy Coastal Ecosystems

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

ACCOMPLISHMENT: Research team video highlights importance of coastal wetlands in improving Saginaw Bay water quality and tourism appeal

Recap: A MISG-funded research team created a video about the importance of Saginaw Bay's Tobico Marsh to complement their assessment of nuisance algae "muck" in Bay City State Park.

Relevance: Nuisance algae has been accumulating and decomposing along the shores of Saginaw Bay since at least the 1960s. Triggered by several environmental factors, this layer of "muck" affects environmental and human health, as well as economic and social activity. In 2016, MISG funded an Integrated Assessment project team to synthesize existing data and work with stakeholders to understand the muck issue and identify possible solutions for Bay City State Park.

Response: The project team assessed community values and perceptions about muck-affected beaches on Saginaw Bay, and investigated possible methods of reducing muck's impact. They found that even drastic actions to improve water quality and manually clean up recreational beaches may not be enough to reduce muck impacts and heighten tourist activity in Bay City State Park. They recommended that staff focus instead on drawing visitors' attention to the park's wetland resources.

Results: In 2020, the project team used additional research funding from MISG to develop a video spotlighting the park's Tobico Marsh, one of the largest coastal wetlands on the Great Lakes. The video emphasizes the importance of coastal wetlands in reducing nutrient input into Saginaw Bay, one factor that could help limit the prevalence of nuisance muck. The video will be seen by the public at Bay City State Park's Saginaw Bay Visitor Center.

Partners: Wayne State University; University of Michigan (U-M); Limno-Tech, Inc.; Michigan Department of Natural Resources; Michigan State University (MSU); Michigan Department of Natural Resources (MI DNR); Partnership for the Saginaw Watershed; Friends of Bay City State Recreation Area; Saginaw Valley State University.

Project Number Index: R/SS-2; M/PM-64; A/AS-25

Goal #2: Ecosystem-based approaches are used to manage land, water, and living resources.

ACCOMPLISHMENT: MISG-funded researcher conducts first known species inventory of vulnerable West Michigan wetlands

Recap: A MISG-funded researcher conducted the first known species inventory of amphibians, reptiles, and macroinvertebrates in Lake Michigan's interdunal wetlands, a series of delicate and transient coastal habitats in West Michigan.

Relevance: Many of West Michigan's coastal dunes house sensitive and complex interdunal wetland ecosystems. These rare and hydrologically unique wetlands support some of Michigan's vulnerable, threatened, and endangered plants, insects, and animals. Despite their ecological significance and susceptibility to harm from lake level changes and human interference, interdunal wetlands on the eastern coast of Lake Michigan had never been thoroughly inventoried. Such an inventory would mark an important step toward understanding and safeguarding these delicate ecosystems.

Response: In 2016, MISG funded Tiffany Schriever, an assistant professor of biological sciences at Western Michigan University, to study the distribution patterns of amphibians, reptiles, and aquatic macroinvertebrates in Lake Michigan's interdunal wetlands. Schriever and her student research assistants conducted acoustic and transect surveys in 38 interdunal wetlands across five lakeshore parks. They also genetically sequenced macroinvertebrate samples to trace gene flow and distribution among species found in multiple wetlands.

Results: Schriever identified 110 species overall. Species richness tended to be higher in southern regions and wetlands with forest cover. Schriever's work led to four journal articles in preparation, generated several conference and seminar engagements, and were linked to four student theses or dissertations and a student showcase art project. This research will help shoreline managers make informed decisions about how and why to educate about and protect these ecosystems.

Partners: Michigan Natural Features Inventory; Michigan Department of Natural Resources - Waterways Commission; Michigan Dune Alliance; University of Michigan (U-M), Michigan Sea Grant College Program; Western Michigan University (WMU); US Forest Service (USDA, USFS); City of Saugatuck.

Project Number Index: R/CGLH-5; C/CC-19; A/AS-25; M/PM-64

Goal #2: Ecosystem-based approaches are used to manage land, water, and living resources.

IMPACT: Graduate fellow finds challenging future for Michigan's black terns

Recap: Jennifer Fuller, a MISG graduate research fellow, studied the effects of climate change and invasive species on rapidly declining black tern colonies in southeast Michigan.

Relevance: Black terns, a threatened bird species in Michigan, nest in places prone to flooding and water level fluctuations. Great Lakes breeding colonies of black terns have plummeted since the 1960s, due to wetland habitat loss and degradation. Southeast Michigan houses one of the largest remaining black tern colonies in the Great Lakes, in a wetland area vulnerable to high water levels, climate change, and invasive species.

Response: In 2020, MISG funded University of Michigan graduate student Jennifer Fuller to study the effects of climate change and invasive species on black terns in southeast Michigan. She collaborated with the Audubon Society to access colony surveys and aerial imagery of tern habitat to compare nest success against local weather and water level patterns and invasive species distribution.

Results: Fuller's results demonstrate that the interaction between climate change-driven lake level rise, invasive species, and coastal development are accelerating the loss of safe nesting habitat for black terns. Fuller presented her fellowship work through Detroit Audubon's webinar series in December 2020, and her findings are being incorporated into the Black Tern Conservation Initiative's ongoing planning and priorities. Fuller graduated from the University of Michigan in April 2021 with a master's degree in conservation ecology.

Partners: National Audubon Society; Audubon Great Lakes; University of Michigan School for Environment and Sustainability (SEAS); Michigan Department of Natural Resources (MI DNR).

Project Number Index: R/CGLH-12; M/PM-64

Goal #3: Ecosystems and their habitats are protected, enhanced, or restored.

IMPACT: Restoration collaborations bring native lake sturgeon back to Saginaw Bay

Recap: Several years after MISG and partners began a concerted effort to reintroduce native lake sturgeon into the Saginaw Bay watershed, juvenile sturgeon are once again being spotted by anglers in their historical range.

Relevance: Lake sturgeon, a native Great Lakes fish that can reach 3-6 feet long and 50-150 years old, were once abundant in Michigan rivers and lakes. After European colonization, a century of overfishing and habitat destruction decimated lake sturgeon populations. Efforts are now underway by many organizations, including MISG, to restore historical lake sturgeon habitat, raise juvenile fish, release them into Michigan's rivers, and track their success as adults.

Response: MISG has played a major role in efforts to reintroduce lake sturgeon to Saginaw Bay and its tributary rivers. MISG coordinated and executed riverside releases of juvenile fish in 2018 and 2019, recruiting substantial interest and participation among community organizations and members of the public. MISG also helped develop a pilot adopt-a-sturgeon program in 2019 to raise funds for hatchery care.

Results: After decades of lake sturgeon absence, anglers are once again beginning to report catching lake sturgeon in the Saginaw Bay watershed. January 2021 saw multiple reports of juvenile sturgeon being caught and released through the ice in the Saginaw River. These reports are a highly encouraging sign of lake sturgeon survival and repopulation, and an affirmation of the value of decades of restoration work planned.

Partners: Bay County Environmental Affairs and Community Development; City of Frankenmuth; Chippewa Nature Center; Flint River Watershed Coalition; Frankenmuth Morning Rotary Club; Friends of the Shiawassee River; Michigan Department of Natural Resources; Michigan State University (MSU) Department of Fisheries and Wildlife; MSU Extension; Saginaw Bay Watershed Initiative Network; Saginaw Chippewa Indian Tribe; Saginaw Field and Stream Club; Sturgeon for Tomorrow – Black Lake Chapter; The Conservation Fund; and U.S. Fish and Wildlife Service.

Project Number Index: A/AS-25; C/CC-19

Goal 3: Ecosystems and their habitats are protected, enhanced, or restored.

ACCOMPLISHMENT: MI Paddle Stewards pivots to online course for paddlers learning to fight aquatic invasive species

Recap: By creating an online learning module, the MI Paddle Stewards program trained 120 additional paddlers to identify, report, and avoid transporting aquatic invasive species in their favorite waterways.

Relevance: Whether they use a kayak, canoe, or paddleboard, paddlers are a vector for transporting aquatic invasive plant species between water bodies. They are also well positioned to detect and report signs of new or increasingly established invasive species along their favorite waterways. With increasing numbers of people using Michigan's designated water trails and informal waterways, educational programs that target paddlers can play a vital role in minimizing the spread of invasive species.

Response: MISG launched the MI Paddle Stewards program in 2019 with a series of educational workshops about aquatic invasive species for paddlers around the state. Participants learned to identify common aquatic invasive species, report sightings through a mobile app, and properly clean their paddling equipment. When the COVID-19 pandemic made in-person workshops unfeasible in 2020, MISG created an online module so more paddlers could learn this important information at their own pace.

Results: In 2020, 234 users registered for the five-session MI Paddle Stewards online learning module, and 120 completed the material. The module was made available again in early 2021 and will likely persist alongside future in-person training workshops. As Michigan's water trails movement grows, the MI Paddle Stewards virtual and in-personal training programs are poised to become an important tool in the fight against invasive species.

Partners: MSU Extension; Michigan Invasive Species Grant program; Land Information Access Association; Michigan Clean Boats, Clean Waters; Huron Pines; St. Clair County; Eastern Upper Peninsula Regional Planning & Development Council; Paddle Antrim; Southwest MI Planning Commission; Friends of the St. Clair; Clinton River Watershed Council; Downriver Linked Greenways; Upper Peninsula Resource Conservation & Development Council; Jackson County Drain Commission; Oakland County CISMA; Blueways of St. Clair; Lake to Lake CISMA; CAKE CISMA; Wild Rivers Invasive Species Coalition; Lake St. Clair CISMA; Three Shores CISMA; Jackson Lenawee and Washtenaw CISMA; SW x SW Corner CISMA.

Project Number Index: A/AS-25; C/CC-19

FOCUS AREA: Sustainable Fisheries and Aquaculture

Goal #4: Seafood supply meets public demand and is safe, secure, and sustainable.

ACCOMPLISHMENT: MISG and Great Lakes Sea Grant partners host virtual Great Lakes Aquaculture Day conference

Recap: MISG and Great Lakes Sea Grant partners hosted a one-day virtual conference for new and current aquaculture farmers and other interested participants to raise the profile of this growing fish production industry.

Relevance: While poised to meet untapped potential for local food production, aquaculture remains a niche market in the Great Lakes region and is often misunderstood or overlooked by consumers. In 2019, MISG and other Great Lakes Sea Grant programs formed the grant-funded Great Lakes Aquaculture Collaborative (GLAC) to pursue grants, projects, and events that could support existing and potential aquaculture practitioners and generate interest among consumers.

Response: In October 2020, GLAC and additional MISG staff hosted the first Great Lakes Aquaculture Day (GLAD). This one-day virtual conference provided educational sessions and workshops for new and current aquaculture farmers, as well as interested members of the public. The event ended with recorded culinary demonstrations and a live cooking competition.

Results: GLAD had over 260 registered attendees from 23 U.S. states and seven countries. Each of the 12 live presentations had over 65 viewers. Event evaluations strongly agreed GLAD was valuable for potential, new, and existing aquaculture producers. Presentation recordings were edited, captioned, and uploaded to MISG's YouTube channel, where they gained nearly 500 views in three months. The recordings were shown during the Thunder Bay International Film Festival in January 2021.

Partners: Illinois-Indiana Sea Grant; Minnesota Sea Grant; New York Sea Grant; Ohio Sea Grant; Pennsylvania Sea Grant; Wisconsin Sea Grant; Michigan State University; Loyola University.

Project Number Index: A/AS-25

Goal #4: Seafood supply meets public demand and is safe, secure, and sustainable.

IMPACT: MISG leverages COVID-19 rapid response funding to support Michigan fish producers

Recap: With rapid-response funding from the National Sea Grant Office, MISG conducted listening sessions, needs assessments, and surveys with Michigan’s fish producers and charter operators, which played a role in securing federal relief funding for these industries.

Relevance: In 2020, businesses dependent on Great Lakes fish struggled to remain viable amidst the COVID-19 pandemic. State-licensed and tribal fishers and processors saw demand from restaurants and wholesalers plummet and had to implement new safety and sanitation guidelines. Many charter fishing operators, whose profits hinged on a lively tourist season and full boats, struggled to stay afloat. However, Great Lakes fisheries were omitted from the first round of CARES Act federal relief funding.

Response: MISG successfully applied for a \$100,000 COVID-19 rapid response grant from the National Sea Grant Office. These funds allowed MISG to collaborate with industry associations and other Sea Grant programs to assess and address the needs of fish producers and the charter industry. MISG also used the funding to support projects that connected Great Lakes fish producers directly with consumers.

Results: With the funding, MISG conducted needs assessments and listening sessions with fish producers. MISG partnered with an organization that connects consumers with local food producers. Funds also allowed MISG to expand existing plans for surveying charter captains to document economic impacts across the season. Partners indicate that this work was helpful in securing \$15 million in the second round of CARES Act funding for commercial, aquaculture, processor, and charter fishery participants in Great Lakes states.

Partners: Michigan Charter Boat Association; Michigan Aquaculture Association; Michigan Department of Natural Resources (MI DNR); Michigan Fish Producers Association; Great Lakes Sea Grant Network; Keweenaw Bay Indian Community.

Project Number Index: A/AS-27; C/CC-22; A/AS-25; C/CC-19

FOCUS AREA: Resilient Communities and Economies

Goal #6: Coastal economies are vibrant and resilient.

ACCOMPLISHMENT: MISG report showcases economic impact of Great Lakes related jobs

Recap: A MISG report shows that the Great Lakes support more than 1.3 million jobs that generate \$82 billion in wages annually, underscoring the need to protect these resources for the economic wellbeing of coastal communities and the region as a whole.

Relevance: The Great Lakes provide food, transportation, recreation, drinking water, and other services to the eight states along their borders, an economic engine often called the “blue economy.” In 2011, MISG produced a report on economic impacts of the Great Lakes blue economy. Great Lakes leaders and communities have used this analysis as rationale for protecting these crucial natural resources. Updating the report would help keep this argument relevant and fresh.

Response: MISG hired a graduate student research assistant to update the 2011 report about the regional impact of the Great Lakes blue economy. The study analyzed all industries that rely on the lakes for inputs, transportation, or influence. The analysis included data from 2009 through 2018 across 83 counties in eight states bordering the Great Lakes. The results include job recovery after the 2008 recession but not changes due to the COVID-19 pandemic.

Results: The report was released in October 2020 and showed that the Great Lakes support more than 1.3 million jobs that generate \$82 billion in wages annually. The coastal counties of the eight Great Lakes states produce 21 percent of the gross domestic product in the region and nearly six percent of the U.S. GDP. The report, available on the MISG website, underscores the importance of continued stewardship over these valuable natural assets.

Partners: University of Michigan (U-M) Water Center; U-M Graham Sustainability Institute; U-M Research Seminar in Quantitative Economics; U-M School for Environment and Sustainability; Carriers’ Association, Transportation Institute.

Project Number Index: M/PM-64; C/CC-19

Goal #7: Communities and water-dependent businesses use comprehensive planning to make informed strategic decisions.

ACCOMPLISHMENT: Updates to Michigan Clean Marina Program expand access to Great Lakes-friendly certification program

Recap: MISG, a primary partner in the Michigan Clean Marina Program, used state grant funding to assess and reduce barriers preventing marinas from joining the voluntary certification program, resulting in an updated certification process and new online management system.

Relevance: The Michigan Clean Marina Program (MCMP) is a voluntary certification program to help marinas maintain and improve Michigan's waterways by reducing or eliminating releases of harmful substances and choosing practices that can protect aquatic environments. To date, 80 marinas in Michigan have received MCMP certification. However, estimates put the state at over 1,000 marina facilities, indicating that the program has substantial room to grow.

Response: MISG, one of the primary partners behind the MCMP, received grant funding from the Michigan Department of Natural Resources and Michigan Department of Environment, Great Lakes, and Energy to assess and address barriers preventing marinas from becoming certified through the MCMP.

Results: In 2020, MISG worked with partners to revise the MCMP website, update the certification process and requirements, and design and launch a new online certification management system. The new system will reduce barriers to joining the MCMP and result in more widespread adoption of Great Lakes-friendly practices at Michigan's coastal marinas.

Partners: Michigan Clean Marina Program (MCMP); Michigan State University Extension (MSUE); Michigan Boating Industries Association (MBIA); Michigan Department of Natural Resources; Michigan Department of Environment, Great lakes, and Energy (DNR-EGLE).

Project Number Index: M/PM-64; C/CC-19; A/AS-25

Goal #8: Improvements in coastal water resources sustain human health and ecosystem services.

IMPACT: With MISG’s guidance, Au Gres city officials and local students make improvements at public waterfront park

Recap: Using guidance and grant-writing assistance from MISG, the city of Au Gres installed safety and accessibility upgrades at the newly acquired Riverside Park, while local students planted a green infrastructure bioswale to reduce stormwater runoff.

Relevance: A 2015 MISG-funded research project, led by Don Carpenter (Lawrence Technological Institute), conducted a community visioning process in Au Gres that identified potential improvements for public waterfront access and sustainability. In 2019, MISG assisted the city in obtaining state funding to support improvements at the public waterfront Riverside Park. The city also recognized the importance of using green infrastructure principles in the park to reduce stormwater runoff into the Au Gres River and Lake Huron.

Response: In 2020, Au Gres installed fishing piers, dark sky lighting, and safety handrails at Riverside Park, using funds MISG helped secure. Local students applied for grant funding to install a native plant bioswale at Riverside Park, inspired by a similar grant-funded installation MISG helped guide them through the previous year. After receiving the second grant, the students hosted a Riverside Park community visioning meeting in February 2020 and installed the park bioswale in September 2020.

Results: The Riverside Park improvements make it a safer, more accessible destination for tourists and residents. The new 600-square-foot native plant bioswale reduces stormwater runoff and contamination into nearby waters. High school students gained invaluable experience in writing grants, conducting public meetings, and undertaking a major green infrastructure installation. “Place-based education makes students responsible for the communities they live in,” says Au Gres-Sims High School teacher Luke Freeman about his class.

Partners: City of Au Gres; Michigan Office of the Great Lakes: Coastal Zone Management Program; Huron Pines; Au Gres-Sims School District; NEMIGLSI network.

Project Number Index: R/CCD-37; M/PM-64; A/AS-25; C/CC-19

Goal #9: Resilient coastal communities adapt to the impacts of coastal hazards and climate change.

ACCOMPLISHMENT: Community health dashboard helps identify algal bloom vulnerability and adaptive capacity along Lake Erie

Recap: A new dashboard helps communities along western Lake Erie assess their vulnerability to harmful algal blooms, an important asset for targeting outreach programs and emergency assistance resources.

Relevance: Western Lake Erie is vulnerable to seasonal population surges of cyanobacteria species, some of which may produce toxins that affect human and animal health. These harmful algal blooms (HABs) can interrupt drinking water supplies, sicken pets, and harm the wellbeing of people who live or recreate in or near affected waterways.

Response: MISG and partners developed an online dashboard to help scientists, policymakers, and the public understand HABs water quality and community health data. The dashboard covers census tracts in five Michigan and Ohio counties along western Lake Erie. The dashboard illuminates a tract's risk of experiencing HABs, the likelihood that residents may be vulnerable to HAB-related illnesses due to underlying health sensitivities, and residents' resource capacity to adapt if a HAB occurs.

Results: Until nutrient management programs can eliminate HABs from Lake Erie, this tool will help equip communities to weather them. The results of this tool may inform existing Lake Erie community engagement efforts, such as the Great Lakes Center for Fresh Waters and Human Health. The tool can help community organizers target outreach and education campaigns, and identify locations where individuals may be in need of emergency water supplies if a HAB affects municipal water systems.

Partners: National Science Foundation; National Institute of Environmental Health Sciences; Bowling Green University Great Lakes Center for Fresh Waters and Human Health; Michigan Department of Health and Human Services; Michigan State University (MSU) University Outreach and Engagement; MSU Institute of Water Research and MSU Extension Community, Food & Environment Institute.

Project Number Index: A/AS-25; C/CC-19

Goal #9: Resilient coastal communities adapt to the impacts of coastal hazards and climate change.

ACCOMPLISHMENT: MISG offers expertise, presentations on high water levels affecting the Great Lakes region

Recap: During a year of record-breaking high water levels in the Great Lakes, MISG provided expertise and leadership to coastal communities, local leaders, and media outlets.

Relevance: In 2020, high water levels were a topic of conversation and concern around the Great Lakes. Several of the lakes met or set high-water records, and the rest still peaked at levels that damaged infrastructure, eroded vulnerable shorelines, hindered recreation, and threatened coastal homes. Communities expressed strong interest in understanding the mechanisms behind the high water levels, strategies for protecting shoreline resources, funding sources to assist recovery, and ways to build resilience against future fluctuations.

Response: MISG delivered multiple well-attended presentations and webinars about Great Lakes water levels. MISG staff also participated in the Governor’s High Water Summit, presented at the annual meeting of the Michigan Association of Conservation Districts, spoke frequently with media outlets for stories covering the impacts and future of water levels, and gave other virtual presentations.

Results: A February 2020 water levels presentation had 100 in-person attendees and 40 tuning in online; the event recording garnered 2,400 views on Facebook. A virtual presentation about shoreline protection and stabilization acquired 435 registrants from five states and one Canadian province. A recording of the presentation has over 1,000 YouTube views. Articles about high water levels quoting MISG staff have been published in many local news outlets.

Partners: US Army Corps of Engineers – Detroit District; University of Michigan; Michigan Department of Environment, Great Lakes, and Energy Coastal Zone Management Program and Water Resources Division; NOAA National Weather Service Weather Forecast Offices Grand Rapids and Gaylord; Manistee Conservation District; Benzie County Office of Emergency Management.

Project Number Index: A/AS-25

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 learning opportunities.

ACCOMPLISHMENT: MISG and Sea Grant partners develop resources to help recreational anglers ID popular salmon and trout species

Recap: MISG and partners at several Great Lakes Sea Grant programs developed a brochure and video to help recreational anglers distinguish among popular salmon and trout species.

Relevance: Recreational fishing in the Great Lakes is a popular pastime and important economic driver for coastal communities. However, even seasoned anglers may struggle to distinguish among popular types of salmon and trout, both native and introduced, which may have similar colorations and markings. Fishery managers benefit from accurate reports about recreational catches, so it is helpful for anglers to have tools for correctly identifying the species they encounter.

Response: MISG worked with colleagues at Sea Grant programs in Wisconsin, Illinois-Indiana, and New York to develop salmon and trout identification resources as part of a broader collaborative effort to provide tools that help anglers identify popular recreational fish species.

Results: MISG and Sea Grant partners produced a brochure in 2020 that provides a comprehensive guide to identifying Great Lakes salmon and trout species at various life stages. The brochure is available in digital and printed forms. The group also created a video showing the range of variation in each species. These will be important tools for anglers participating in valuable Great Lakes tourist activities, as well as agencies seeking to understand the fisheries they manage.

Partners: Wisconsin Sea Grant; Illinois-Indiana Sea Grant; New York Sea Grant.

Project Number Index: A/AS-25; C/CC-19

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

ACCOMPLISHMENT: #LakeEffect film series brings engaging Great Lakes content to viewers sheltering at home

Recap: MISG hosted a five-part virtual film series packed with Great Lakes content for viewers at home during the first few weeks of COVID-19 lockdowns.

Relevance: For its winter 2020 semester, the University of Michigan organized a series of seminars, special courses, and other events to highlight the Great Lakes. The themed semester aimed to raise the profile of the Great Lakes among the university community by celebrating research, art, history, and storytelling about this regional resource.

Response: MISG partnered with themed semester organizers and Detroit Public TV's Great Lakes Now program to run a five-night #LakeEffect film series, screening short and feature-length works about the Great Lakes. Originally conceived as an on-campus event, the series debuted in March 2020, during the first week of COVID-19 campus closures, and all screenings were held virtually over Zoom. Guest panelists, including filmmakers, scientists, and Great Lakes Now staff, answered audience questions after each session.

Results: Despite the abrupt pivot in format, MISG ran the five-part virtual #LakeEffect film series in March and April 2020 for a multi-state online audience watching from home. The sessions had between 14 and 55 participating viewer accounts, some representing families watching together. Pivoting to a virtual format enabled MISG to provide entertaining, thought-provoking, and educational Great Lakes content to an at-home audience, with significant cost savings in panelist travel costs and facility and equipment rentals.

Partners: University of Michigan (U-M) Water Center; U-M Graham Sustainability Institute; U-M School of Literature Science and the Arts (LSA); Detroit Public Television Great Lakes Now series; NOAA- Great Lakes Environmental Research lab (GLERL); NOAA Cooperative Institute for Great Lakes Research (CIGLR); USGS Great Lakes Science Center (GLSC); NOAA Thunder Bay National Marine Sanctuary; and Great Lakes Water Consortium.

Project Number Index: M/PM-64; C/CC-19

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

IMPACT: H.O.M.E.S. at Home broadcasts deliver educational content, help families and educators adapt to COVID restrictions

Recap: MISG’s popular “H.O.M.E.S. at Home” broadcasts brought high-energy Great Lakes lessons and activities into homes where families and educators were grappling with the initial weeks of COVID-19 lockdown.

Relevance: In March and April 2020, school closures and stay-at-home orders due to COVID-19 left parents searching for educational and reliable ways to entertain their children at home. MISG Extension educators also sought new ways to reach audiences after their in-person events were cancelled.

Response: Just weeks after Michigan schools closed in March 2020, MISG designed and delivered a virtual Great Lakes education program called “H.O.M.E.S at Home” (H@H), complete with a logo and webpage. The program included 13 half-hour webinars live-streamed over Zoom and Facebook Live. Each high-energy webinar featured MISG staff and guests delivering a kid-friendly Great Lakes lesson, an at-home craft or activity, and a live Q&A session.

Results: In March and April 2020, 1,250 participants engaged with H@H content. Live broadcasts each reached between 115 and 320 screens, and recordings have been viewed nearly 3,000 times on YouTube and over 8,800 times on Facebook. Many families wrote in to thank MISG for providing reliable, fun programming during a stressful time, and dozens of teachers in the Great Lakes region reported using the videos to supplement classroom instruction.

Partners: Minnesota Sea Grant.

Project Number Index: A/AS-25; C/CC-19

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

ACCOMPLISHMENT: MISG offers virtual Life of the Straits summer program to highlight hidden gems in northern Michigan

Recap: MISG and 4-H partners pivoted to create a virtual version of the Life of the Straits program, which connects families and children with northern Michigan's notable historical and natural features.

Relevance: The Straits of Mackinac mark the northern Michigan region where Lake Michigan and Lake Huron meet. The area is known for cultural and natural landmarks like the Mackinac Bridge, Mackinac Island, and the North Channel. MISG and 4-H programs in the five counties bordering the Straits region jointly host a program called the Life of the Straits, designed to connect families and children with northern Michigan's notable historical and natural features.

Response: Due to the pandemic, MISG and 4-H pivoted to create a virtual version of Life of the Straits in summer 2020. The six educational sessions were broadcast as webinars, each beginning with pre-recorded videos filmed at interesting locations in the Straits and ending with at-home activities and an interactive Q&A session with a subject-matter expert. MISG played a lead role in creating and shaping the video sessions and also hosted the webinars.

Results: The Life of the Straits organizers pre-recorded video footage in some special behind-the-scenes locations not usually open to the public. They also recruited a local tribal representative to lead a Q&A session. Post-event surveys showed a strong impact and positive feedback from participants. MISG captioned and uploaded the six sessions to YouTube, where they received between 40 and 340 views. Future programs will likely include a blend of virtual and in-person elements.

Partners: Michigan State University (MSU) Extension 4-H staff in Mackinac, Emmet, Cheboygan and Presque Isle counties.

Project Number Index: A/AS-25

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

IMPACT: MISG's summer interns pursue relevant research and stewardship projects, deliver presentations, accept job offers

Recap: MISG funded 16 undergraduate interns to pursue Great Lakes stewardship projects, some of whom benefitted from presentation and job opportunities based on their internship work and connections.

Relevance: MISG seeks to empower the next generation of environmental stewards by providing meaningful funded internship opportunities to Michigan undergraduate students. Each MISG intern works on a Great Lakes stewardship project alongside a host business, non-profit, government agency, or academic institution. Part of the National Sea Grant Community Engaged Internship program, the MISG program targets recruitment toward students underrepresented in environmental fields.

Response: In 2020, MISG funded 16 undergraduate interns from seven Michigan colleges and universities. The interns spent the summer working with fish hatcheries, studying native wetland plants, teaching high school students about green infrastructure, planting rain gardens in urban watersheds, and pursuing other stewardship projects in their communities. All were able to adapt their projects and goals to comply with COVID-19 limitations.

Results: All interns pursued Great Lakes research or stewardship projects that were directly useful to their host organizations, and all presented about their work at the 2020 MISG virtual internship symposium. Several interns leveraged their experiences into further opportunities. One presented at a Michigan American Fisheries Society meeting, and another was hired by Minnesota Sea Grant to assist with aquaculture outreach. Another intern accepted a position with his 2020 host organization after graduating from his program.

Partners: Michigan Department of Natural Resources (MI DNR); Lake Superior State University; The University of Toledo-Lake Erie Center; University of Michigan; Lynxnet LLC; USGS; Community Arborist for the Social Forestry Project; Herpetological Resource and Management (HRM); Au Sable Institute of Environmental Studies; Calvin University.

Project Number Index: R/ERA-1; M/PM-64; C/CC-19

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

ACCOMPLISHMENT: MISG expands commitment to diversity, equity, and inclusion through new committee, tribal programming grant

Recap: In 2020, MISG staff demonstrated their commitment to diversity, equity, and inclusion by forming a new internal committee, incorporating inclusivity into their work, and forming meaningful partnerships with tribal nations.

Relevance: In addition to the influence of COVID-19, 2020 was marked by global conversations about race and justice. Structural inequalities highlighted by the COVID-19 pandemic, coupled with high-profile protests against racial bias in policing, prompted U.S. institutions to grapple with their policies and internal cultures in new ways.

Response: In 2020, MISG staff formed an internal committee to discuss and lead activities related to justice, equity, diversity, and inclusion within the program and its policies, activities, and staffing and funding priorities. MISG staff also organized and facilitated a series of visioning sessions with tribal partners to discuss the history and present needs of Michigan's tribal nations and brainstorm how MISG can effectively partner with them in the future.

Results: Throughout 2020, MISG staff met regularly to discuss best practices for incorporating diversity and inclusion principles into their work. Thanks to the tribal visioning sessions, MISG successfully applied for grant funding from Michigan State University that will support programming partnerships with Upper Peninsula tribal nations in coming years. Staff also created a series of documents about planning for inclusive communities.

Partners: Michigan State University (MSU) Extension.

Project Number Index: R/EU-26; A/AS-25; M/PM-64

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

IMPACT: Summer training program empowers teachers to bring place based stewardship education into their classrooms

Recap: After attending a 2019 summer training program hosted by MISG and education partners, 12 teachers involved more than 350 students in meaningful, hands-on, place-based stewardship education during the 2019-2020 school year.

Relevance: Students and teachers alike benefit from opportunities to put environmental literacy principles into practice. The place-based stewardship education (PBSE) paradigm empowers teachers to engage their students in meaningful, hands-on stewardship projects that link classroom with community. MISG partners with organizations like the Northeast Michigan Great Lakes Stewardship Initiative and the Center for Great Lakes Literacy to bring PBSE opportunities to Michigan's teachers and students.

Response: Each summer, MISG and education partners host the Lake Huron Watershed Place-Based Stewardship Education Summer Teacher Institute as a professional learning opportunity for educators. Participants explore Great Lakes-focused PBSE principles and projects that connect classroom learning to local environmental and social issues. They also tap into a network of community partners that support content learning and field experiences. Teachers may receive \$500 stipends to help them implement future PBSE projects with their students.

Results: Attending the 2019 summer teacher institute empowered 12 educators to bring Great Lakes literacy to life for their students in new ways. During the following 2019-2020 school year, these teachers leveraged \$500 stipends to engage more than 350 students in hands-on PBSE projects. Efforts included raising juvenile lake sturgeon in the classroom, managing a schoolyard forest, and preparing research projects that students presented during the Wayne State Jr. Science and Humanities Symposium in February 2020.

Partners: Northeast Michigan Great Lakes Stewardship Initiative, NOAA B-WET, Huron Pines.

Project Number Index: A/AS-25

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

ACCOMPLISHMENT: MISG’s leadership propels place based education and Great Lakes literacy groups to new heights

Recap: Through MISG’s leadership, several place-based education and Great Lakes literacy groups made substantial progress toward serving Michigan’s educators and students, despite abrupt shifts from the COVID-19 pandemic.

Relevance: MISG is committed to supporting Great Lakes literacy and learning through sustained support for educators and applied place-based education strategies that engage youth in stewardship within their communities. MISG provides pathways for formal and informal educators to seek out place-based stewardship professional development to expand their knowledge, network with peers, and find innovative ways to connect their students with their communities and environments.

Response: MISG achieves these goals as leaders of place-based education and Great Lakes literacy groups. In 2020, MISG staff assumed new co-leadership roles in the Sea Grant Center for Great Lakes Literacy (CGLL), where they coordinate educational efforts among regional Sea Grant programs as well as pursuing Michigan-specific education deliverables. MISG also co-leads the Michigan State University Extension Place-Based Education (MSUE PBE) team and NEMIGLSI, the northeast Michigan branch of the statewide Great Lakes Stewardship Initiative.

Results: Through MISG’s leadership, these education networks made great strides in 2020. The MSUE PBE team established a working group and produced professional development resources, including a whitepaper. MISG led NEMIGLSI’s internal teams through strategic visioning processes. NEMIGLSI programming served 1,292 students at 22 schools in 2020, despite the pandemic driving dramatic shifts in education strategies and virtual programming. 72 educators benefitted from NEMIGLSI’s professional development activities, including a virtual summer teacher training institute.

Partners: NOAA Thunder Bay National Marine Sanctuary; Northeast Michigan Council of Governments; Alpena-Montmorency-Alcona Education Service; AMA/Iosco Math Science Center; Cheboygan-Otsego-Presque Isle Education Service; Community Foundation of Northeast Michigan; Huron Pines; MSU Extension; 4-H Youth Programs; US Fish and Wildlife Service; Michigan STEM network; Great Lakes Stewardship Initiative; MDNR; Au Sable Valley Audubon Chapter; Friends of Thunder Bay National Marine Sanctuary; Land Information Access Association; Michigan Natural Features Inventory; Saginaw Chippewa Indian Tribe; Sturgeon for Tomorrow; Great Lakes Fishery Trust; EPA Great Lakes National Program Office; ILINSG; Macomb Intermediate School District; MNSG; MSU Department of Community Sustainability; NYSG; OHSG; PASG; USGS; SEAS; University of Wisconsin-Milwaukee; WISG; MSTA; Purdue University; Great Lakes Stewardship Initiative; GVSU; Michigan Department of Education; MTU; EMU; MSU Department of Fisheries and Wildlife.

Project Number Index: A/AS-25

National Performance Measures

Focus Area	Performance Measures		MISG Targets 2018-2021	MISG 2020 Actual 2/1/20-1/31/21
ALL	Economic (market and non-market) benefits derived from Sea Grant Activities	Economic Benefit	\$24,600,960	\$ 1,241,525
		Businesses Created	2	0
		Businesses Supported	386	0
		Jobs Created	0	2
		Jobs Supported	292	103
		Patents/Licenses	0	0
SFA	Number of fishermen, 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		756	78
RCE	Number of communities that implemented sustainable economic and environmental development practices and policies as a result of Sea Grant activities		86	24
HCE	Number of acres of coastal habitat protected, enhanced, or restored as a result of Sea Grant activities		220	45
ELWD	Number of people engaged in Sea Grant-supported informal education programs		14,180	4,476
ELWD	Number of Sea Grant-supported graduates who become employed in a job related to their degree within two years of graduation		26	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		640	175
Cross-Cutting	Number of communities that implemented hazard resiliency practices to prepare for, respond to, or minimize coastal hazardous events as a result of Sea Grant activities		88	22
Cross-Cutting	Number of Sea Grant products (i.e., tools technologies, and information services) that are used by our partners/customers to improve ecosystem-based management		70	4
Cross-Cutting	Number of Sea Grant products that are used to advance environmental literacy and workforce development		38	9

Economic Impacts and Benefits

The economic impacts and benefits – including market and non-market valuations and jobs and business created or sustained – derived from Sea Grant activities.

Economic Benefit of MISG	Economic Impact	Businesses Created	Businesses Supported	Jobs Created	Jobs Supported	Patents/Licenses
<p>Michigan Sea Grant awarded four graduate research fellowships to three PhD candidates and one Master's degree candidate. These fellowships provided recipients with the chance to conduct research projects on topics of their choice. All four fellows have since received their degrees and are now employed. Based on Koropecyk et al.'s conservative estimate showing a 6.1% increase in earning differential for advanced degrees compared to college degrees, we assume that the MISG Graduate Research Fellowship resulted in the following earning differentials for the fellowship recipients.</p> <p>The first fellow is now employed as a Social Scientist/Economist at Environmental Assessment Services LLC and we assume a \$5,331 earning differential based on a \$87,400 salary as a Social Scientist (https://www.bls.gov/oes/current/oes193099.htm). The second fellow is now employed as a Lake Superior Outreach Specialist for University of Wisconsin-Madison, Division of Extension and we assume a \$2,696 increase in earning differential based on a \$44,189 salary as an Outreach Specialist (https://www.payscale.com/research/US/Job=Outreach_Specialist/Salary). The third fellow is now employed as a Wetland Scientist and Ecologist at Fishbeck, Thompson, Carr & Huber, Inc. and we assume a \$3,807 increase in earning differential based on a \$62,410 salary as a Conservation Scientist (https://www.bls.gov/ooh/life-physical-and-social-science/conservation-scientists.htm). The fourth fellow is now employed as a GIS Analyst at Great Lakes Water Authority in Detroit and we assume a \$5,614 increase in earning differential based on a \$92,040 salary as a Geoscientist (https://www.bls.gov/ooh/life-physical-and-social-science/geoscientists.htm). Using the following equation and by equating these full-time, two year programs to the equivalent of two years of graduate education, we conservatively estimate the increased earnings for these four MISG Graduate Research Fellows over two years of work is a combined \$69,792.</p> <p>Social Scientist: (\$5,331 increased differential earning per year of work) x (2 years of salary) x (200% for two-year program) x (1 Fellow) = \$21,324 Outreach Specialist: (\$2,696 increased differential earning per year of work) x (2 years of salary) x (200% for two-year program) x (1 Fellow) = \$10,784 Conservation Scientist: (\$3,807 increased differential earning per year of work) x (2 years of salary) x (200% for two-year program) x (1 Fellow) = \$15,228 Geoscientist: (\$5,614 increased differential earning per year of work) x (2 years of salary) x (200% for two-year program) x (1 Fellow) = \$22,456</p> <p>\$69,792 total increased earnings for the MISG Graduate Research Fellows (\$21,324 + \$10,784 + \$15,228 + \$22,456)</p>	\$69,792	0	0	0	0	0

<p>The Michigan Sea Grant Internship Program funded one undergraduate intern that accepted a position that was created as a result of the internship with Herpetological Resource Management, LLC. With a salary of \$46,850 as an Environmental Science Technician (https://www.bls.gov/ooh/life-physical-and-social-science/environmental-science-and-protection-technicians.htm) we assume the full salary benefit as this intern would not have been placed in this new position if it were not for the Michigan Sea Grant Internship Program.</p> <p>Undergraduate Intern Job Placement = \$46,850 as Environmental Science Technician at Herpetological Resource Management</p>	\$46,850			1		
<p>Michigan Sea Grant provided funding to a regional research project led by Dr. Meadows to assess coastal resiliency for Lake Michigan communities. As part of this research, Dr. Meadows developed a technique/tool that increases the efficiency and cost-effectiveness of nearshore surveys, a tool that can be used for other coastal assessments of the impacts of changing water levels on Great Lakes coastal communities. Dr. Guy Meadows and his team maintain log books of all of their precision nearshore survey missions from 1987 to present. In the past, their original survey required a field crew of at least five people. The cost of five people in the field (salary, per diem, lodging, vehicles, fuel, etc.) was well over \$1,000 per day when they began and is now approximately \$2,000 today. Five survey lines a day along the Lake Michigan shoreline was a very productive day. With the new system in 2020, Dr. Meadows was able to do five lines in 2.5 hours by himself. We estimate the cost savings for 10 lines to be \$4,500. Using a survey of 10 lines with the new system will cost one person \$500 for 5 hours of field surveying and 1 hour for the automated digital data reduction. This compares to the old system that had five people working for two days (~12 hours) in the field along with these five people in the lab reducing and plotting the data for an additional day, totaling to \$5,000. This new procedure reduces labor costs and time in the field, allows for more efficient use of research time and funds, and could be used for similar surveys for all five Great Lakes.</p> <p>Cost of 10 survey lines doing work manually: (~\$2,000 for 5 lines in one day of work with five people) x (2 days of work) + (~\$1,000 for one day of work manually graphing) = ~\$5,000 in 3 days for five people</p> <p>Cost of 10 survey lines doing work with new automated digital data reduction: ~\$500 in 2.5 hours for one person</p> <p>Cost Savings by using new automated digital data reduction technology for 10 survey lines: (~\$5,000 and three days using 5 people) - (~\$500 in 2.5 hours for one person) = \$4,500 cost saving</p> <p><i>R/SD-5 - An Integrated Physical-Social-Community (PSC) Approach for Sustainable Shore Protection, Beach Integrity, and Bluff/Dune Stabilization Along Lake Michigan</i></p>	\$4,500	0	0	0	0	0
<p>MISG is heavily involved with outreach, education, and research efforts that are focused on stopping the spread of AIS throughout the GL. AIS are incredibly detrimental to both the biological and ecological health of the GL ecosystem, and has major economic impacts for MI as a whole. As a result of this growing problem, MISG has developed and implemented numerous programs focused on addressing the rise of AIS in the GL. The MI Paddle Stewards program teaches paddlers how to identify and report aquatic invasive species through an online self-paced course that began in July 2020. The new digital format allows us to reach audiences in the Great Lakes, connecting rivers, tributaries and beyond. In partnership with NOAA's Great Lakes Environmental Research Laboratory and USGS Wetland and</p>	\$1,000,000	0	0	0	0	0

<p>Aquatic Research Center, MISG also manages and staffs GL Aquatic Nonindigenous Species Information System (GLANSIS). The primary objective of GLANSIS is to provide a 'one-stop' information source for information on non-native species in the Great Lakes, providing a catalog of resources including species profiles, threat assessments, and AIS maps on a website that is openly available to researchers, managers, decision-makers, educators, and all interested stakeholders. The purpose of providing this wealth of information is to inform the management decisions that lead to prevention, rapid response, and control of AIS in the GL. Michigan Sea Grant staff provide advice and support to numerous groups at the Binational to local levels. (Great Lakes Panel on ANS, Regional AIS Collaboratives, Saginaw Bay CISMA, University Research Project committees, etc).</p> <p>A study published by Rosaen et al. in 2016 (https://www.andersoneconomicgroup.com/Portals/0/upload/AEG%20-%20AIS%20Impact_%209-20-2016%20Public%20new.pdf) estimates that the aggregate cost of AIS to the Great Lakes region is significantly over \$100 million annually. Given that Michigan has a coastline on four of the five great lakes, it is massively impacted by the rise of AIS. As a result of the many successful outreach, education, communication, and research efforts that MISG has undertaken with regard to AIS, we are confident that we have had an impact. While these have been major efforts, we are nonetheless conservative in our estimated impact with regard to cost savings for the state. We can comfortably state that MISG's efforts have resulted in a 1% cost savings for the state of Michigan in the fight against AIS.</p> <p>\$100,000,000 in costs of AIS to the Great Lakes x 1% cost savings as a result of MISG outreach, education, and research efforts = \$1,000,000 in cost savings</p>						
<p>MISG facilitates the certification and re-certification of Clean Marina facilities. This includes reaching out to the marinas and Hanover underwriters to confirm whether a marina received insurance savings or not. MISG staff also serve on the Michigan Clean Marina Foundation Board and Operations Committee. Based on the Hanover underwriter's estimate of a 10% savings or estimated ~\$1,500. Several Clean Marina facilities have received this annual insurance discount of this estimated ~\$1,500 as a result of obtaining the Clean Marina certification through MISG extension educators. Of the 22 new certifications and recertifications completed in 2020, 7 marinas confirmed that they have seen insurance savings as a result. This results in \$10,500 in insurance savings.</p> <p>7 Clean Marina reporting insurance savings x ~\$1,500 in estimated insurance savings/marina = \$10,500</p>	\$10,500	0	0	0	0	0
<p>Michigan Sea Grant co-facilitated the development of the "Michigan Catch and Cook" program in 2012 and had 2 new charter businesses register in 2020. The program brings together charter fishermen and local restaurants to allow anglers the opportunity to serve their own fresh-caught fish at participating restaurants. MISG Extension Educator Dan O'Keefe continues to play a critical role in promoting this program. With the additional 2 charter businesses, program involvement is now at a total of 103 charter businesses and 66 restaurants. While 2020 and the pandemic was a challenging year for both charters and restaurants, it is estimated that charters were close to back to normal by halfway through the season and restaurants were still participating in Catch and Cook but on a reduced level. While 2020 was a challenging year for both charters and restaurants, it is charter effort had returned to normal by halfway through the season while restaurants were still participating in Catch and Cook but on a reduced level. According to charter industry surveys conducted by Michigan Sea Grant in July and October, 77% of revenue losses realized by open water charter operators in Michigan occurred during the March-June</p>	\$48,583	0	0	0	103	0

<p>time period; during the July-October 2020 time period revenues were only 14% below what they were in 2019. Michigan DNR charter reporting further indicated that April 2020 charter trips were down 99.5%. By June, trips were only 4% below 2019 and August trips were actually 4% above 2019. A reasonable (and conservative) estimate of the economic impact of Catch and Cook for the 2020 year would be at 25 percent of the 2019/20 figures. Total economic benefit of the Catch and Cook program for 2020 is \$48,582.99.</p> <p>2019/20 \$194,331.96 x 0.25 = \$48,582.99</p>						
<p>Fish producers are under extreme pressure to keep up with process changes to safely produce and process fishing that complies with the rapidly changing health and safety protocols. Michigan Sea Grant provided consultation with a Michigan fish producer, Massey Fish Co., over the state's recent decision that they needed to stop production of smoked salmon due to a misinterpretation of a food safety rule. As a result of Michigan Sea Grant's consultation, Massey Fish Co. was able to re-start production of smoked salmon four weeks earlier than it would have without Michigan Sea Grant's consultation and saved \$22,500 by being able to continue selling their smoked fish. This outcome also supported six smoked fish production jobs that collectively make ~\$2,200 per week over that four week timeframe, resulting in a total ~\$8,800 more wages earned than if Michigan Sea Grant had not intervened.</p> <p>In addition to this, Michigan Sea Grant's consultation led Massey Fish Co. to create a new job as a sanitation control manager that would help avoid this situation in the future. The estimated salary for this position is \$30,000, and would have not been created if it were not for Michigan Sea Grant's consultation.</p> <p>Please see the following link for all estimated salaries at Massey Fish Co: https://docs.google.com/document/d/1ApVDEusX4doGFKvNhA40kgKTacOtfx--5277lebXw3s/edit?usp=sharing</p> <p>Total wages supported: (~\$2,200 total wages for six employees) x (4 weeks of earlier smoked fish production) = ~\$8,800 Revenue saved due to being able to open 4 weeks earlier: ~\$22,500 Total salaries created as a result of Michigan Sea Grant consultation: ~\$30,000 as a Sanitation Control Manager</p> <p>Total economic benefit for Massey Fish Co. and its employees: ~\$61,300</p>	\$61,300	0	0	1	0	0
Total	\$1,241,524.99	0	0	2	103	0

Fish and Seafood Professionals

The number of fishermen, 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.

Program/Initiative	# of People	Notes
Southern Lake Michigan Fishery Workshops: Structured Decision Making	37	Regional fisheries workshops for structured decision making designed for charter and recreational fisheries. These charter and recreational fishers that attended our workshops are more likely to advocate for more sustainable stocking practices as a result of their involvement. We accompany these workshops with an evaluation survey. For our 2020 Southern Lake Michigan workshop, we had 37 people respond to the question "modify practices using knowledge gained in fisheries sustainability" with agree or strongly agree that they would modify practices based on information from the workshop.
Lake Huron Fishery Workshops	39	In total, three virtual Lake Huron Regional Fisheries Workshops webinars – each with a different theme and focus - hosted online in April/May 2020 brought together over 418 anglers, charter captains, and others with fisheries researchers and managers from across Michigan. Participants gained better understanding of Lake Huron fisheries ecosystem changes, and connecting these stakeholders with information, research and management activities relating to Lake Huron and local communities. Workshop recordings are accessible online: https://bit.ly/misgfish . In survey results, from 71 surveys returned, 39 agreed with the statement: "As a result of participating in this workshop, I plan to modify practices using knowledge gained in fisheries sustainability as a result of participation in Sea Grant activities."
Michigan Catch and Cook	2	Two new charter captains registered with Catch and Cook for 2020. Charter captains must ensure food safety standards are adhered to by adequate cleaning, gutting and scaling of fish prior to delivery to food service operations.
Total	78	

Sustainable Coastal Development

The number of communities that implemented sustainable economic environmental development practices and policies as a result of Sea Grant activities.

Program/Initiative	Community Name	# of Communities	Notes Regarding Changes Observed
Field Research Program	City of South Haven	1	Dr. Guy Meadows' shared his Field Research Program with South Haven's City Manager and Harbormaster, Kate Hosier. She confirmed with Dr. Meadows that she has bolstered their cities resilience efforts due to the program's input.
Belle Isle Lake Okonoka restoration project	Detroit	1	Participated in restoration project for Lake Okonoka on Belle Isle. This project began in October 2017 and was completed in 2020 when the culvert connection from the lake to the Detroit River was made. In 2020, this project included restoration of 45 acres of aquatic and upland habitat. Lake Okonoka's enhancements combined with previous work will increase the availability of calm spawning and nursery habitat for Great Lakes fish.
Clean Marinas	Klave's Marina (Pinckney); Ryde Marine, Inc. (Alanson); South Shore Marine LLC (Whitehall; Eagle Pointe Harbor, Pier 33 (St. Joseph); Macatawa Bay Yacht Club (Macatawa); SkipperBud's Cass Lake (Waterford); Pentwater Municipal (Pentwater); Discovery Pier (Traverse City); Michigan Harbor Properties (St. Clair Shores); North Star Sail Club (Harrison Twp.)	11	New Clean Marina certifications
	Yacht Basin Marina (Holland); G. Marsten Dame/Northport Marina (Northport); City of Harbor Springs Marina (Harbor Springs); Mackinaw City Municipal Marina (Mackinaw City); All Seasons Marine (South Haven); Copper Harbor State Dock, Eagle Harbor State Marina, Lac Labelle State Dock (Copper Harbor); East Tawas State Dock (East Tawas); Port Austin State Dock (Port Austin); Miller Marina (St. Clair Shores)	11	Clean Marina recertifications
Total		24	

Acres Restored

The number of acres of coastal habitat protected, enhanced, or restored as a result of Sea Grant activities.

Locations	Project Description	# of Acres
Lake Okonoka	This project began in October 2017 and was completed in 2020 when the culvert connection from the lake to the Detroit River was made. In 2020, this project included restoration of 45 acres of aquatic and upland habitat. Lake Okonoka's enhancements combined with previous work will increase the availability of calm spawning and nursery habitat for Great Lakes fish.	45
Total		45

Informal Education Programming

The number of people engaged in Sea Grant-supported informal education programs.

Event Name	Total # Engaged
Traditional Ecological Knowledge Panel	100
Tribal Nations Sovereignty	20
Tribal Nations Sovereignty	130
Tribal Nations Sovereignty	40
A Tribal Visioning Dialogue with Michigan Sea Grant Extension Team (Part 1)	12
A Tribal Visioning Dialogue with Michigan Sea Grant Extension Team (Part 2)	8
National Seabird Action Week	40
Annual Black Tern Conservation Initiative Meeting	30
Annual Black Tern Conservation Initiative Meeting	32
Michigan Ecology and Evolutionary Biology Society Meeting	25
American Fisheries Society	50
Michigan Chapter of the American Fisheries Society	50
Lake Superior Technical Committee Meeting	50
Vessel-based educator (VBE) network learning session: "Digital Engagement"	8
GLRC Listening Session	17
Wayne State University Junior Science Humanities Symposium: Au Gres-Sims School District Student Research	2
Great Lakes Conference Educator Luncheon	52
Conservation on Tap	32
Environmental Justice Education Connections: Exploring "Hey, I live there!": Unpacking EJE and Whiteness in a rust belt city."	39
St Clair Detroit River System Webinar #3	65
MI Paddle Stewards D2L Course	234
St Clair Detroit River System Webinar #5	88
SEMCOG Partners for Clean Water Webinar	65
Vessel-based educator (VBE) network listening session	16
High Water on the Great Lakes: Options for Shore Protection & Stabilization Webinar	38
St Clair Detroit River System Webinar #1	77
St Clair Detroit River System Webinar #2	79
MI Water School	324
Lake Huron Regional Fisheries Workshop (Open Water Fisheries Session)	184
Lake Huron Regional Fisheries Workshops (Saginaw Bay Session)	161
Lake Huron Regional Fisheries Workshop (Les Cheneaux Island Session)	73
MI Rivers Steelhead Project Kickoff Meeting	51
MI Rivers Steelhead Project December Meeting	49
2020 April 29 MI Fish Producers Coffee Hour	37
Fish Producers Webinar: Sanitation during COVID	39
Fish Producers Webinar: Making the switch to direct marketing	47
Great Lakes Aquaculture Day 2020	246
Detroit River/Lake Erie Fishery Workshop	78

Great Lakes Sea Grant Network Aquaculture/Seafood Regional mtg w/ USDA	11
Lake Erie Citizen's Fish Advisory Council Webinar	49
Conversations and Coffee with Michigan Department of Natural Resources: Let's talk fish in Lake Huron	50
Lake Huron Citizens Fishery Advisory Committee Meeting	109
Michigan Fish Producers Annual Conference	81
Nov. Ottawa County Water Quality Forum	150
HOMES at Home	651
Wayne State University Junior Science Humanities Symposium: Alcona Community School Student Research	2
Life of the Straits 2020	32
2020-2021 BWET Teacher Virtual Kickoff (NEMIGLSI Watershed Education Project)	8
Lake Huron PBE Summer Teacher (virtual) Institute	31
NEMIGLSI (Alcona County): Students engaged in Place-Based Education Learning and Stewardship (2020-2021)	50
NEMIGLSI (Alpena County): Students engaged in Place-Based Education Learning and Stewardship (2020-2021)	268
NEMIGLSI (Alpena County): Students engaged in Place-Based Education Learning and Stewardship (2020-2021)	15
NEMIGLSI (Presque Isle County): Students engaged in Place-Based Education Learning and Stewardship (2020-2021)	72
NEMIGLSI NOAA Marine Debris "Taking a Bite Out of Lunchroom Waste	2
Getting to Know ArcGIS Online (Teacher Workshop)	16
Girl Scout Camp In Water Education Video	70
Boat 2 School	60
Dow Innovation Teacher Fellowship: 2020 Cohort	18
BEETLES - Bay Sci Virtual Open Space Conference: Great Lakes education breakout	26
Michigan Science Teachers Association Aquaculture Presentation	10
Wayne State University Junior Science Humanities Symposium	7
Total	4,476

Resource Managers

The number of resource managers who use ecosystem-based approaches in the management of land, water, and living resources as a result of Sea Grant activities.

Program/Initiative	People/Groups Participating	# of Resource Managers
Structured Decision Making (SDM) Workshops	Michigan Department of Natural Resources, Wisconsin Department of Natural Resources, Indiana Department of Natural Resources, Illinois Department of Natural Resources	4
An Integrated Physical-Social-Community (PSC) Approach	Water Resources Division, Michigan Dept of Environment, Great Lakes and EnergyCity of South Haven, MI	8
Black Tern Monitoring (St. Clair Flats)	Detroit Audubon and Audubon Great Lakes	3
Water School (webinar series)	Public officials (both elected and appointed) and their staff	138
Clean Marinas	Klave's Marina (Pinckney); Ryde Marine, Inc. (Alanson); South Shore Marine LLC (Whitehall; Eagle Pointe Harbor, Pier 33 (St. Joseph); Macatawa Bay Yacht Club (Macatawa); SkipperBud's Cass Lake (Waterford); Pentwater Municipal (Pentwater); Discovery Pier (Traverse City); Michigan Harbor Properties (St. Clair Shores); North Star Sail Club (Harrison Twp.)	22
	Yacht Basin Marina (Holland); G. Marsten Dame/Northport Marina (Northport); City of Harbor Springs Marina (Harbor Springs); Mackinaw City Municipal Marina (Mackinaw City); All Seasons Marine (South Haven); Copper Harbor State Dock, Eagle Harbor State Marina, Lac Labelle State Dock (Copper Harbor); East Tawas State Dock (East Tawas); Port Austin State Dock (Port Austin); Miller Marina (St. Clair Shores)	
Total		175

Hazard Resiliency Training

The number of coastal communities that have adopted or implemented hazard resiliency practices to prepare for, respond to, or minimize coastal hazardous events.

County of Coastal Community	Name of Coastal Community	Number of Resiliency Trainings Provided	Was Community Hazard Resiliency Improved?
Livingston	Pinckney	1	Yes
Emmet	Alanson	1	Yes
Muskegon	Whitehall	1	Yes
Berrien	St. Joseph	2	Yes
Ottawa	Macatawa	1	Yes
Oakland	Waterford	1	Yes
Oceana	Pentwater	1	Yes
Grand Traverse	Traverse City	1	Yes
Macomb	St. Clair Shores	2	Yes
Macomb	Harrison Twp.	1	Yes
Ottawa/Muskegon	Holland	1	Yes
Leelanau	Northport	1	Yes
Emmet	Harbor Springs	1	Yes
Emmet/Cheboygan	Mackinaw City	1	Yes
Van Buren	South Haven	1	Yes
Keweenaw	Copper Harbor	3	Yes
Iosco	East Tawas	1	Yes
Huron	Port Austin	1	Yes
Total		22	

Sea Grant Products Developed or Used

Tools, technologies, or informational services developed by Sea Grant staff that are used by partners and customers to improve ecosystem-based management.

Name of Product	Developed (Yes/No)	Used (Yes/No)
<p><i>Single Person Coastal Zone Mapping Technology:</i> Single person coastal zone mapping technology has been shared to attendees of the Lake Bed 2020 Tech Surge as well as our Sea Grant partners and programs in Wisconsin, Indiana, Illinois, and throughout Michigan. MISG funded researcher Dr. Guy Meadows and his team have improved on traditional nearshore data collection by using advanced technology both on the water and on the shore to allow a single person in both places to acquire highly accurate and rapid data. This can be used by researchers to be more efficient and produce faster results.</p> <p>End Users: Research Scientists, Post-Docs, graduate students, Sea Grant programs staff</p>	Yes	No
<p><i>Database Development & QA/QC for Audubon's long term monitoring dataset:</i> Audubon Long Term Monitoring Dataset. MISG funded graduate student Jennifer Fuller and Karen Alofs compiled historical data from 2013-2020 into a formal and accessible document that was shared and used with Audubon research team. It will also be used for future research at Audubon Great Lakes and Detroit Audubon.</p> <p>End Users: Audubon Conservationists, Environmental Conservationists, Research Scientists, Ecologists, Conservation Scientists.</p>	Yes	Yes
<p><i>Clean Marinas Automated Management System:</i> Updates to Michigan Clean Marina Program expand access to Great Lakes-friendly certification program. MISG worked with partners to revise the MCMP website, update the certification process and requirements, and design and launch a new online certification management system. The new system will reduce barriers to joining the MCMP and result in more widespread adoption of Great Lakes-friendly practices at Michigan's coastal marinas.</p> <p>End User: Marina stakeholders, Certification Specialists and MBIA Staff.</p>	Yes	Yes
<p><i>Great Lakes Angler Diary app:</i> The public version of the Great Lakes Diary app was adapted to river anglers and published in September. It is the first version to roll out to the public and includes a variety of educational and training materials produced by Michigan Sea Grant. More than 80 new users recorded 433 steelhead caught Oct.-Dec.</p> <p>End users: Anglers, scientists</p>	Yes	Yes
<p><i>Harmful Algal Bloom Community Health Project:</i> MISG helped develop a new online dashboard to help scientists, policy makers and the public understand and predict water quality and community health data as it relates to harmful algal blooms. The dashboard primarily visualizes data for four counties adjacent to Western Lake Erie. A fact sheet about the dashboard also is available. The fact sheet describing the online dashboard is available on the MISG website.</p> <p>End users: scientists, policy makers, public</p>	Yes	No
<p><i>Fish Hatchery Manual.</i> A Michigan Sea Grant (MISG) undergraduate intern developed a Fish Hatchery Manual that outlines procedures for Grayling Fish Hatchery employees to follow. Grayling Fish Hatchery benefits from this manual by having this intern develop the manual and not having to hire an external consultant to create the manual. She has shared the manual with the hatchery and its stakeholders and will help them be more efficient and consistent with their work. Her manual can be applied to other hatcheries and has been promoted on MISG's fellowship website for other's to use.</p> <p>End users: Fish Hatchery stakeholders</p>	Yes	Yes
Total	6	4

Sea Grant Products Developed or Used

Products developed by Sea Grant staff that are used to advance environmental literacy and workforce development

Name of Product	Developed (Yes/No)	Used (Yes/No)
<p><i>Webinar titled "The Response of the beach and nearshore region to extreme water levels":</i> this webinar was hosted by MISG and developed by MISG funded researcher Dr. Guy Meadows for the Lake Bed 2020 Tech Surge event. Approximately 200 people have access to this that attended the Lake Bed 2020 event. This presentation is currently being turned into a formal publication for the Marine Technological Society with co-author Ethan Theuerkauf of MSU.</p> <p>End Users: Research scientists and engineers, policy makers, and educators.</p>	Yes	No
<p><i>Webinar: Structured Decision Making Workshop: Dan O'Keefe Presentation.</i> Webinar titled "Southern Lake Michigan Fishery Workshop April 23, 2020." Dan O'Keefe presented a Michigan Sea Grant update in a Regional Fisheries Workshop series designed by Sea Grant extension educators and input from partners including Michigan Department of Natural Resources, U.S. Fish and Wildlife Services, and the U.S. Geological Survey Great Lakes Science Center. The webinar was attended by 137 participants and has since had 708 views on YouTube. It can be used by anglers as educational and to inform opinions on salmon and trout stocking policy.</p> <p>End Users: Anglers</p>	Yes	No
<p><i>Michigan Sea Grant Extension News Articles.</i> These article are created by the Michigan Sea Grant Extension Office and educators. They released 42 articles during 2020 covering topics related to science, Sea Grant programming, and environmental literacy. Many of the articles link to informational videos and provide information on how to attend various outreach programs and participate in ongoing data collection efforts with MISG Extension educators. These articles were shared on the MSU Extension (9,735 unique page views, avg time: 6:08) and MISG websites.</p> <p>End users: the public, educators, students</p>	Yes	Yes
<p><i>Fish Notes Newsletter (2 Editions).</i> The Fish Notes Newsletter (Spring & Fall 2020 editions): this newsletter produced by Michigan Sea Grant's Extension Office and Extension educators targets anglers and other individuals interested in fisheries. The goal of the newsletter is to increase industry knowledge of sustainability practices. The newsletters are sent out via email to subscribers and are also posted on the MISG website.</p> <p>End users: newsletter subscribers, including resource management professionals, anglers, and the public</p>	Yes	Yes
<p><i>Virtual Conference content: Great Lakes Aquaculture Day.</i> The Great Lakes Aquaculture Collaborative hosted the first Great Lakes Aquaculture Day (GLAD) on October 10, 2020. This virtual conference provided a series of educational sessions and workshops for new and current aquaculture farmers, and interested educators and students. Michigan Sea Grant staff presented and were on the organizing team for the event. The event ended with recorded culinary demonstrations and a live cooking competition. Webinar recordings from GLAD sessions were made edited with closed captioning and are listed on the Michigan Sea Grant YouTube channel for accessibility. GLAD had national and international reach with over 246 registered attendees from 23 US states and seven countries. Post event the videos have over 500 views. A selection of the culinary videos were also used in Jan. 2021 as part of the Thunder Bay International Film Festival and included a panel of speakers from the Aquaculture Day. Michigan Sea Grant organized and hosted the session.</p> <p>End users: Public, fish producers, aquaculture farmers, students, educators</p>	Yes	Yes
<p><i>Online course for MI Paddle Stewards.</i> MI Paddle Stewards, which was previously held as an in-person event, was developed as an online self-paced course to continue training and certifying paddlers in methods for detecting, reporting, and preventing spread of aquatic invasive species. This program and its</p>	Yes	Yes

<p>online course were designed by an MISG extension educator with assistance from the MISG communications team and in consultation with state invasive species professionals and Water Trail Managers. It consists of 5 units including MI Watch List species overview, Michigan Clean Boats, Clean Waters, proper cleaning methods for your craft, how to report an invasive species using the MISIN app, and additional resources. More than 200 people registered and 127 completed the course.</p> <p>End users: Public, paddle-sport enthusiasts</p>		
<p><i>YouTube series: Michigan Water School.</i> Michigan Water School, which was previously held as an in-person event, was developed into a webinar series by a MISG extension educator with support from the MISG communications team, which included developing recorded resources to use in future programming efforts. More than 300 registered for the series, including 138 elected or appointed officials. Participants were from 62 counties across Michigan. The webinar series has been posted to the Water School website and is actively being promoted to additional audiences.</p> <p>End users: Elected and appointed officials and their staff, interested members of the public.</p>	Yes	Yes
<p><i>Fact sheet: Harmful Algal Bloom Community Health Project.</i> A fact sheet on Harmful Algal Bloom Community Health Project is available on the Michigan Sea Grant website and explains a new online dashboard to help scientists, policy makers and the public understand and predict water quality and community health data as it relates to harmful algal blooms.</p> <p>End users: research scientists, policy makers, public</p>	Yes	No
<p><i>Flipped Classroom videos.</i> As part of a larger project, Michigan Sea Grant developed and produce a series of six videos to be used with coastal resilience training provided by the American Planning Association.</p> <p>End users: Resource managers, planners</p>	Yes	Yes
<p><i>YouTube series: HOMES at Home.</i> In the early days of the pandemic, MISG Extension educators pivoted quickly and developed and delivered a series of 13 programs from their own homes on a variety of ecological Great Lakes issues and education to over 1,200 individuals live during the event. Post event, YouTube videos have had over 12,000 views. Several teachers shared with Extension educators that they used the content for their classrooms. More than 50 individuals completed at least 5 of the stewardship challenges that were included in the lessons. Post event evaluations showed that this content helped viewers have a better understanding of our Great Lakes Natural Resources and provided inspiration to become better stewards of them. This quote from an audience member helps sum up the impact of the program:</p> <p>“I don't know if you realize the impact you are having on people during this difficult time, but from my family's experience I can say that you are not only giving them an opportunity to engage and learn about the Great Lakes region, but you are also giving families a way to connect from afar. My mom watches separately from her grandkids and then they talk about it afterwards and work on the activities. It has been a great way for her to stay connected to them.” – Ashley Moerke Director of the Center for Freshwater Research & Education</p> <p>End users: General public, families, students, teachers, non-formal educators</p>	Yes	Yes
<p><i>Webinar: High Waters on the Great Lakes: Options for Shore Protection & Stabilization.</i> This webinar was hosted by MISG extension educators. July 2020 program “High Waters on the Great Lakes: Options for Shore Protection & Stabilization.” This live program had 453 unique registrants from MI, MN, WI, IN, OH, NY and Ontario. The YouTube recording has had more than 1200 views.</p> <p>End users: Resource managers, public</p>	Yes	No
<p><i>New webpage, Instructional videos and training videos were created by MISG extension educators to support Great Lakes Angler Diary app</i> adapted for river anglers. In 2020, the Great Lakes Angler Diary online data reporting system was adapted for river anglers. Online instructions and help menu materials were updated and are included along with two new training videos on a new GL Angler Diary Resources web page. More than 80 new users were signed up by Fall 2020. They recorded 433 steelhead caught October-December. Perhaps more importantly, we laid the groundwork for more meaningful conversation</p>	Yes	Yes

among biologists, managers, and stream anglers on issues that affect steelhead management and began planning a 2021 Steelhead Fishery Workshop.		
End users: River anglers, scientists		
<i>Webinar: Modeling and Forecasting Hazardous Material Patterns.</i> On behalf of the Great Lakes Sea Grant crude oil transport group, Michigan Sea Grant hosted two webinars in June and July 2020 about modeling and forecasting hazardous material patterns. The content was largely aimed at professionals in the crude oil transport and clean-up industries, Sea Grant and other non-profit staff members, researchers involved with crude oil transport and risk mitigation, and members of state and local government bodies. The two webinars had about 60 registrants each and 30 attendees each. Recordings of the videos were archived on YouTube and Facebook, where they received a collective total of 356 views over the remainder of 2020.	Yes	No
End Users: Professionals in crude oil transport and clean-up industries, Sea Grant and other non-profit staff members, researchers involved with risk mitigation in crude oil transport, and members of state and local government bodies.		
<i>Webinar: Green Team Sessions.</i> Michigan Sea Grant undergraduate intern worked alongside the Plaster Creek Stewards organization to develop two videos designed to spread information related to tree planting inhibiting reed canary grass growth and watershed education. The videos have been viewed a total of 214 times since July 2020.	Yes	No
End Users: Public, K-12 Students		
<i>Effects of Rock Snot on Benthic Macroinvertebrates.</i> Michigan Sea Grant undergraduate intern worked alongside Lake Superior State University Center for Freshwater Research and Education to study and develop a website containing information about rock snot. The website has been posted on the university website and shared with the public. It's designed to spread information on this invasive stalk-producing alga found in the St. Mary's River, Michigan.	Yes	No
End Users: Public, Lake Superior State University faculty and students, St Mary's River stakeholders.		
<i>Distribution of New Zealand Mud Snails in the Boardman River.</i> Michigan Sea Grant undergraduate intern created a geographic information system (GIS) map of where invasive snail impacts the river. He worked alongside Au Sable Institute to develop this map that will help warn the public.	Yes	No
End Users: Public		
<i>Service Value of Tree Planting in Metro-Detroit.</i> Michigan Sea Grant undergraduate intern created an informational poster for city community development personnel. Partnering with the Social Forestry Project, this informational poster is being passed out and shared with residents of the community to show the positive environmental impact that can come from one planting event.	Yes	No
End Users: City community development personnel, public.		
<i>The Michigan Sea Grant Bookstore: the MISG bookstore houses various publications, products, and educational materials related to the Great Lakes.</i> The bookstore supplies museum-quality posters and maps, books, brochures, and booklets that are created by Michigan Sea Grant and Extension staff. The purpose of the bookstore is to provide a wide array of high-quality publications and educational materials at low or no cost to educators, scientists, resource managers, and the public. The bookstore can be accessed via the MISG website, but individuals can also call the MISG office to place an order, making this a useful tool for accessing various scientific and educational materials. During 2020, we introduced the Great Lakes Water Safety brochure in an English and Spanish version and have shipped approximately 30,000 brochures.	Yes	Yes
End users: educators, resource managers, state parks, county parks, DNR, local government entities, marinas, campgrounds, the public		
Total	18	9

Program Metrics

The Metrics page is used to report Michigan Sea Grant metrics data.

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

Annual Report Year: February 1, 2020 - January 31, 2021

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	7	2.89	3.61
Communications	5	2.45	1.10
Extension	20	8.27	8.13
Education	4	0.65	0.68
Research	32	5.73	1.87
Individuals Staffing the Program in All Areas	64		

Core Funding (not NSI's)	Number of Proposals	Number of Institutions Involved	Number from Home Institution
Pre-proposals Submitted	0	0	0
Full Proposals Submitted	0	0	0
Proposals Funded	0	0	0

	Number
Volunteer Hours	1,408

	Number of New Students	Number of Continuing Students	Number of Degrees Awarded
Sea Grant-Supported Undergraduate Students	15	1	8
Sea Grant-Supported MS/MA Graduate Students	2	5	4
Sea Grant-Supported PhD Graduate Students	2	3	1
Other Sea Grant-Supported Professional Degree Graduate Students	0	0	0

	Number
Number of P-12 Students Reached through Sea Grant-Trained Educators or Directly through Sea Grant Education Programs	1,147
Number of P-12 Educators Who Participated in Sea Grant Education Programs	282
SG-Sponsored/Organized Events	14
Attendees in SG Meetings/Workshops	973
Public or Professional Presentations	43
Attendees at Public or Professional Presentations	3,207
Clean Marina Program Certifications	22
HACCP Certifications	0

Leveraged Funding

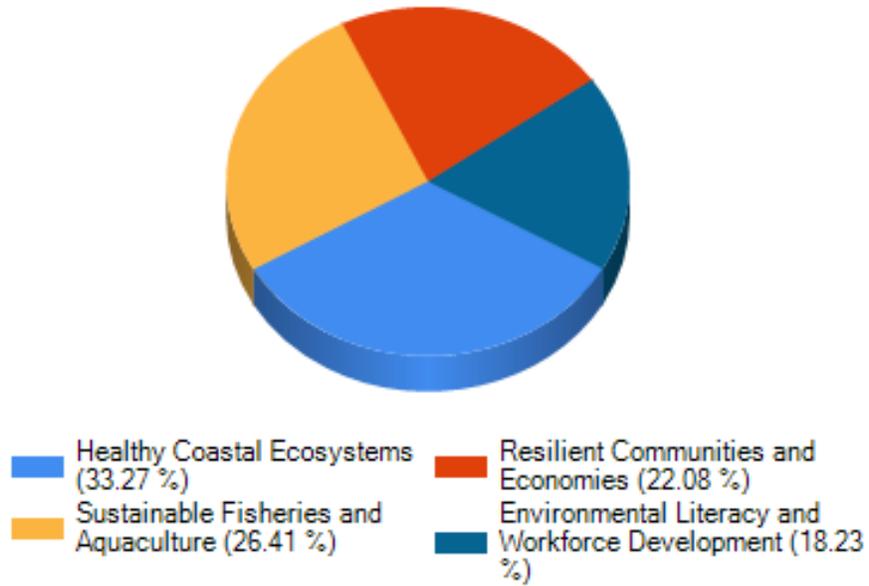
Managed by Michigan Sea Grant			
Title	Leveraged Amount	Fund Start Date	Fund End Date
Extending Impact of US EPA's GL National Program Office Using SG Outreach Capacity	\$28,500	5/1/2020	12/31/2021
Stakeholder and resource manager responses to the chinook salmon fishery collapse in Lake Huron: Informing future decision-making	\$2,718	2/1/2020	12/31/2020
Clean Vessel Act - Boating Pumpout Grants Program (Extension)	\$28,294	11/1/2020	10/31/2021
Community Engaged Scholarship Training for Scientist and Stakeholders	\$101,636	9/30/2020	6/30/2021
Enhancing the Water School	\$71,000	4/1/2020	3/31/2021
Extending Impact of US EPA's GL National Program Office Using SG Outreach Capacity - CGLL	\$55,281	5/1/2020	12/31/2020
Invasive Species paddling, Detection Reporting and Public Awareness Program - AIS Paddling	\$25,960	5/3/2020	3/31/2021
Stewardship Motivations and a Collaborative Governance Model for Great Lakes Coastal-Based Wildlife Management Areas for Waterfowl Hunting, Bird Watching, and Community Development	\$28,115	10/1/2020	9/30/2021
Clean Vessel Act - Boating Pumpout Grants Program	\$104,823	11/1/2020	10/31/2021
Using a Teacher Mentor Model to Expand the Impact of the Center for Great Lake's Literacy's Community of Practice	\$22,000	1/1/20	12/31/22
National Ocean Science Bowl 2020	\$9,000	11/1/19	6/30/20
NOSB Sponsorship	\$2,390	11/1/19	6/30/20
Total	\$479,717		

Influenced by Michigan Sea Grant			
Title	Leveraged Amount	Fund Start Date	Fund End Date
CIEG - Collaborating with Inland Seas Education Association & MI Tribal Nations to Develop and Implement Place-Vessel, and Experiential-Based Education Across MI's UP (GA100336)	\$19,800	9/1/2020	3/31/2021
NEMI GLSI - 5 Grants supported (Northeast Michigan Youth Advisory Council; Women's Giving Circle Grant; CFNEM Community Impact, MiSTEM Network)	\$13,000	1/1/2020	12/31/2020
CARES ACT II COVID-19 Relief for Great Lakes Fisheries	\$15,000,000	12/21/20	1/31/21
Total	\$15,032,800		

Estimated Level of Effort by Focus Area

National Focus Area Name	SG Federal	Match	Pass Through	Federal + Match + Pass Through	LOE without Leverage (%)	Leveraged (Managed)	LOE with Leverage (%)
Healthy Coastal Ecosystems	\$534,645	\$267,934	\$341,338	\$1,143,917	35%	\$105,322	33%
Sustainable Fisheries and Aquaculture	\$539,156	\$306,753	\$37,652	\$883,562	27%	\$108,046	26%
Resilient Communities and Economies	\$446,869	\$233,109	\$31,301	\$711,279	22%	\$117,842	22%
Environmental Literacy and Workforce Development	\$357,114	\$193,782	\$18,606	\$569,502	17%	\$115,118	18%
Unclassified	\$0	\$0	\$0	\$0	0%	\$0	0%
Total	\$1,877,784	\$1,001,578	\$428,897	\$3,308,260	100%	\$446,328	100%

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



Distribution of Effort across Focus Areas by Project

Project Title	Program Project ID	Federal + Match + Pass Through	Leveraged (Managed)	% HCE	% SFA	% ELWD	% RCE
Omnibus FY 2018-2021: Extension	A/AS-25	\$1,028,382	\$313,004	23%	26%	24%	27%
FY 2020 COVID-19 Related Rapid Response for Fish Producers and Charter Fishing Industries (MISG Extension)	A/AS-27	\$120,010		0%	100%	0%	0%
Omnibus FY 2018-2021: UM Communications	C/CC-19	\$340,138		30%	25%	20%	25%
Piloting Green Infrastructure BMPs at Clean Marinas in the Western Lake Erie Basin	C/CC-20	\$32,959		75%	0%	0%	25%
FY 2020 COVID-19 Related Rapid Response for Fish Producers and Charter Fishing Industries (MISG Communication)	C/CC-22	\$30,125		0%	100%	0%	0%
Omnibus FY 2018-2021: UM Administration	M/PM-64	\$379,819	\$133,323	25%	20%	30%	25%
Omnibus FY 2018-2021: MSU Administration	M/PM-65	\$45,108		45%	25%	30%	0%
Sea Grant - GLERL Liaison	R/AS-26	\$138,372		15%	30%	5%	50%
Effects of nutrient loading on nitrogen transformation in Great Lakes coastal ecosystems	R/CGLH-11	\$82,250		80%	0%	20%	0%
Characterizing Black Tern (<i>Chlidonias niger</i>) Nesting Response to Changing Water Levels and Flooding in the Lake St. Clair, MI: A Spatial Approach	R/CGLH-12	\$41,555		80%	0%	20%	0%
GLANSIS: Science and Management Support	R/CGLH-9	\$326,000		95%	0%	5%	0%
MISG Environmental Internship Program	R/ERA-1	\$75,000		25%	25%	25%	25%
NMFS/Sea Grant Population and Ecosystem Dynamics Graduate Fellowship (Emily Liljestrand): Using Simulation and Application to Evaluate the Performance of State Space Stock Assessment Models	R/NCF-3	\$55,325		0%	100%	0%	0%
Trophic Overlap and Growth of Lean and Siscowet Lake Trout Morphotypes Across Their Trophic Ontogeny: Does Overlap Matter?	R/NCF-4	\$85,318		10%	70%	20%	0%
Update Decision Analysis to Inform Multi-Species Salmonine Management in Lake Michigan	R/NCF-5	\$124,596		0%	80%	0%	20%
An Integrated Physical-Social-Community (PSC) Approach for Sustainable Shore Protection, Beach Integrity, and Bluff/Dune Stabilization Along Lake Michigan	R/SD-5	\$157,250		50%	0%	0%	50%
Anishinaabe-Gikendaasowin IA Research in the Keweenaw Bay Indian Community for Stewardship and Governance	R/SS-5	\$93,930		25%	20%	30%	25%
Determining how the ecophysiology of different <i>Microcystis</i> strains underpins succession and toxicity of harmful cyanobacterial blooms in Lake Erie	R/WQ-8	\$152,123		70%	0%	10%	20%