

GULF OF MAINE RESEARCH INSTITUTE

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# 2017 Annual Report



**Gulf of Maine  
Research Institute**

Science. Education. Community.

## Outside the Lab with GMRI Researchers

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2017 was a busy year for the Research team, both inside and outside the lab. On top of all the modeling, dissections, otolith milling, fishing gear analysis, and other daily lab activities, our scientists also reached out beyond our walls to demonstrate thought leadership and engage the public on a national, state, and local stage.

During the spring, *Discovery* aired a new documentary focusing on cod in the Gulf of Maine. If you've been following our research for a while, you probably remember Chief Scientific Officer Dr. Andy Pershing's study on the impacts of warming on cod in the Gulf of Maine. The report, published in the journal *Science*, showed that rapid warming of Gulf of Maine waters — faster than 99 percent of the global ocean over the last 10 years — reduced the capacity of cod to rebound from fishing, leading to a collapse of the fishery.

The documentary, *Sacred Cod*, profiles and explores the impacts of this collapse on fishing communities. The film features a variety of perspectives on the future of New England's groundfishing industry — including an interview with Dr. Pershing.

Summer provided a busy field season, which offers our scientists an opportunity capture and share unique moments on the water. All summer long, our scientists shared some of the amazing activity the encounter as part of their research. Short videos and photos ocean activity — hake “walking” the seafloor, basking sharks cruising at the surface, alewives running up coastal rivers — all give us a chance to show the public what the Gulf of Maine has to offer.

This was also the fifth year of our Snap-A-Striper citizen science initiative, a project which demonstrates the power of engaging the public in science. Each year, striped bass migrate from Chesapeake Bay and the Hudson River to Maine. The first migratory stripers tend to show up around late May, and our researchers are interested in how that population relates to resident striped bass that spawn in the Kennebec River. Our scientists rely on a network of public partners to gather the data. These partners include the Maine chapter of Coastal Conservation Association, local anglers, and charter captains.

## Outside the Lab with GMRI Researchers (continued)

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**During the fall**, we shared the contribution our scientists were making as part of the National Climate Assessment — a public report published every four years by the federal government.

A team of experts from around the country gathers to create this report, which summarizes the present and future impacts of climate change on the United States. Both Chief Scientific Officer Dr. Andrew Pershing and Research Scientist Dr. Kathy Mills contributed to this process. At the time, Dr. Pershing shared:

“I’m proud to contribute to the National Climate Assessment this year. It’s a huge honor to work alongside this group of the nation’s top scientists, who have dedicated their time to this project.

Our job is to understand how climate change affects marine ecosystems and, ultimately, the people of the United States.

Throughout our work, we’ve tried to identify strategies to help coastal communities adapt to a changing climate. Here in New England, we’re focused on how the changing mix of species will affect fisheries and fishing communities.”

Throughout the entire year, our scientists deepened their personal connections to our community, both in print and on the web. In our new video series, *Gulf of Maine, Explained*, several members of our research team set aside time to explain complex-but-important scientific concepts. Not only do these videos provide an educational resource, but they’re also an easy way to get to know the scientists who support the Gulf of Maine ecosystem and economy with their research.

Further efforts to build these personal connections in our community included a couple personal profiles. Dr. Lisa Kerr and Dr. Steve Eayrs each sat down with the Portland Press Herald’s Mary Pols for her Meet column. Each piece offers an inside look at what drives Lisa and Steve in their daily work.

At the core of all these outreach efforts is a shared understanding that science doesn’t happen in isolation. For our research to have an impact, it’s important to build personal connections and share our stories. That’s why our research team is dedicated to sharing our work widely to benefit the Gulf of Maine and the many communities who value it.

# Bluefin Blitz



Each summer, things get pretty fishy around our lab when it's time for the Sturdivant Island Tuna Tournament. Our researchers partner with fishermen to collect the heads of landed fish throughout the year, and our participation in the tournament is part of a broader effort to collect samples.

Research Scientist Dr. Walt Golet serves on the tournament's board and is also one of the weighmasters for the event, which celebrated its 20th anniversary this year. Dr. Golet is jointly appointed with the University of Maine School of Marine Sciences and the Gulf of Maine Research Institute.

"As one of the weighmasters, my job is to certify the weights of all the landed fish," said Dr. Golet. "In addition, of course, we get some valuable samples."

Back in the lab, the researchers extract the otoliths from these fish to answer questions about their age and origin. Dr. Lisa Kerr, who works with this data to model Bluefin distribution, explains the value of this data in a recent video.

Brenda Rudnicky, a graduate research assistant in Dr. Golet's lab summarized a "crazy" field season in an update to staff this fall:

"This field season was certainly a crazy one. With only a few (roughly 40) fish trickling in during June, July took a turn as we sampled around 700 fish in just 30 days! A few more months and two fishery closures later, we ended the season on October 5th sampling a whopping 1,400 fish! To put this in perspective, the 2016 season barely broke 1,000 fish, though lasting into the first week of November."

Despite its culinary popularity, several misconceptions surround Bluefin. In November, Dr. Golet and Dr. Kerr presented a Sea State Lecture entitled "Tuna, Debunked: Myths and Misconceptions About Atlantic Bluefin Tuna." In their presentation, they discussed their research and dispelled some common myths.

2017 was a big year for Bluefin, and that work will continue in the years to come. Stay tuned for more tuna stories as our scientists contribute to our collective understanding of this important Gulf of Maine species.

## New Nets Show Progress



**For years, Research Scientist Dr. Steve Eayrs has worked to design and build fishing gear that helps fishermen and benefits the environment.**

Together with teams of colleagues from both academia and the fishing industry, he has designed new nets that reduce fuel consumption and improve selectivity. In 2017, much of Dr. Eayrs's work focused on an Ultra-Low Opening Trawl (ULOT). This unique design features a smaller vertical opening than a typical trawl net — just over 2 feet compared to the 6-foot opening in standard nets.

This design allows for cod to swim up and over the net, escaping capture. After centuries of targeting Gulf of Maine cod, groundfish fishermen are now looking for ways to avoid catching it. For many fishermen, drastically reduced catch quotas for Gulf of Maine cod are making it difficult to target other species that are more abundant.

In tests on the water, the ULOT reduced cod catch by 45% while having no significant impact on catch of other species such as yellowtail flounder, dabs, grey sole, skate, monkfish, and whiting. In addition to these impressive results, the ULOT also boasted a nearly 7% reduction in fuel consumption.

The project team included fishermen Jim Ford, Tom Testaverde, Carl Bouchard, and Dan Murphy; scientists Mike Pol, Steve Eayrs, Chris Glass, and Pingguo He; and net builder Jon Knight of Superior Trawl.

In addition to these exciting results, Dr. Eayrs is committed to helping others understand what trawling looks like in the Gulf of Maine. While many of us enjoy fresh local seafood, we don't often get to see how that fish is harvested. In the video above, Dr. Eayrs describes his focus on reducing environmental impacts of trawling, while also helping fishermen continue to earn a living on the water within the confines of a heavily regulated industry.

Many myths and misconceptions surround trawling, despite its long cultural and economic history in our region. In an effort to dispel some of these myths, Dr. Eayrs presented "The Truth About Trawling: Are Bottom Trawls the Bulldozers of the Sea" as part of our Fall Sea State Lecture Series.

Moreover, Steve's work has been featured prominently in the local and national media, which further helps to show the promise of improved trawl gear in the Gulf of Maine.

## New LabVenture on the Horizon



On a chilly fall morning in 2015, CEO and President Don Perkins took to a press conference podium to announce the largest grant in our organization's history: \$6.5 million from NASA to support Real World, Real Science. These funds, distributed to GMRI and project partners, will facilitate the next evolutionary step for our keystone education program, *LabVenture*.

The grant announcement itself made headlines, but the real work was just about to begin. Our education team has made huge strides in the time since then. Here's how the project is beginning to take shape.

### What is Real World, Real Science anyway?

The goal of Real World, Real Science is to help students explore the impacts of climate and weather by combining local stories with NASA data resources. We'll deliver this new content through our *LabVenture* program. The next iteration of our classic two-and-a-half-hour experience will focus on the impacts of climate and weather on the Gulf of Maine ecosystem and its key species.

The program is designed to increase students' data skills and climate knowledge. Data literacy will prepare students to thrive in a 21st century economy, and a better understanding of our climate will prepare them to become the next generation of ocean stewards. An associated suite of classroom activities will help students and teachers carry what they learn in our lab back into their classrooms.

We'll also extend this learning experience beyond the walls of our lab by partnering with science centers throughout the region. Just like Maine *LabVenture* participants, visitors to these science centers will use locally relevant NASA data — including sea surface temperature and precipitation records — to learn about the impacts of climate and weather in their own backyards.

### Building the Team

To implement this five-year project, our education team welcomed Project Manager Jeff Bate. Jeff works with the teams developing both the technology and the new content for Real World, Real Science.

Jeff is familiar with the processes of scientific inquiry and data analysis, thanks to his years of product management and operations experience for a variety of cleantech companies. He reports to Chief Education Officer Leigh Peake, who holds ultimate accountability for successful delivery of the project.

## New LabVenture on the Horizon (continued)

In addition to education and technology experts at GMRI, we're engaged with a network of external partners around the country. These partners include:

- **Education Development Center** (Waltham, MA): EDC will drive the classroom activity development and project evaluation portions of Real World, Real Science.
- **Stanford University** (Palo Alto, CA): Stanford's AAALab is a learning research group focused on game-based learning assessments.
- **Science Centers:** The Maine Discovery Museum (Bangor, ME) and Montshire Museum (Norwich, VT) will help us design locally relevant content and resources for science centers. Then, seven science centers throughout the Northeast will provide feedback and pilot testing of these resources.
- **Upswell** (Portland, OR): Upswell is an experience design firm that specializes in creating interactive environments with a combination of digital and physical components.



At the end of February, we hosted a meeting for all project partners here at GMRI. That meeting left everyone excited about the work ahead of us this year.

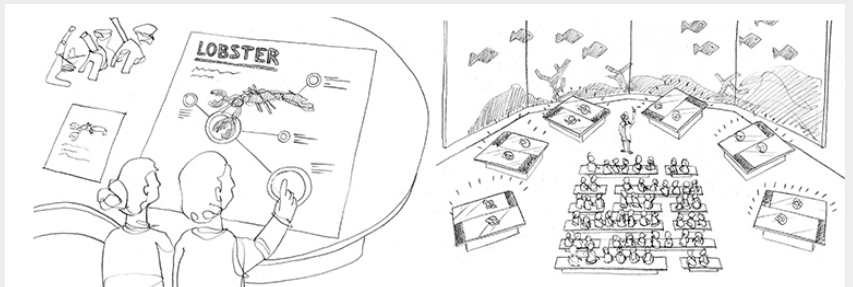
### Progress

Like all big projects, the early stages entail a lot of meetings, but the team has already begun building new technology and imagining new content.

The NASA data at the core of Real World, Real Science will not be a one-time, static download. Instead, students will use up-to-date data that is procured and displayed within a new digital platform, which our team is in the process of building.

The content development process is also underway, as the team wrestles with how to best distill a wide range of learning goals into a 2.5-hour experience. We want to make sure the experiences continue to engage and inspire kids, provide a combination of hands-on and virtual experiences, and give kids a sense of the special ecosystem that is the Gulf of Maine.

The look and feel of this new experience is also starting to come into focus. Upswell is responsible for leading the development of the *LabVenture* interface software, experience production, and updates to the physical space. The physical design will create an immersive and interactive environment to engage kids in small group activities and facilitate larger discussions. Students will interact with content through an interface that combines virtual and tangible components with a focus on using authentic tools of science to guide their inquiry. Concept drawings below reflect some of the early ideas for these updates.



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# New LabVenture on the Horizon (continued)

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## What's Next?

As *LabVenture* continues its statewide impact here in Maine, our education team is excited about this next evolutionary step. Data skills and climate knowledge are crucial to today's students, and partners from Palo Alto to Portland, ME are motivated by a shared desire to create a unique experience around these concepts. We're excited to watch this project come to life.

Every new year brings change, but 2018 will be truly transformative for our cornerstone education program. Next fall, we will unveil a totally updated *LabVenture* program, featuring new technology and a fully renovated space.

The 10,000 Maine middle schoolers who visit our lab each year will use real-life NASA data to explore the influence of climate change on the Gulf of Maine ecosystem and its key species. They'll investigate these scientific concepts using state-of-the-art interactive technologies, which the project team is currently prototyping.

"It's been so exciting to watch the plans for the whole experience emerge over the last year," said Chief Education Officer Leigh Peake. "It's been a true labor of love for everyone on the team."

The current *LabVenture* program will continue through the end of the 2017-2018 school year, and renovations to the Cohen Center for Interactive Learning will begin shortly thereafter. Once renovations are complete, the education team will pilot the new program in September and resume full activity in October.



# Establishing Regional Teacher Communities

For over a decade, our education team has served the students of Maine. During that time, we've learned that one of the best ways to support students is to support their teachers.

Starting last year, we launched a new initiative to establish Regional Teacher Communities (RTCs). The goal of these communities is to connect rural and under-resourced teachers of STEM (science, technology, engineering, and math) subjects. By doing so, we enhance and diversify STEM curriculum through mentorship, idea sharing, and resource provision — with a focus on engaging students in deeper science investigations more frequently throughout the year. Teachers have shared resources and experiences related to field projects, which include salmon fry releases, caddisfly larvae monitoring, and much more. Teachers use these field projects to help students develop their own research questions and learn to work with data.



We connect and engage these teacher communities with an array of meetings, trainings, and online resources. Perhaps more importantly, these new relationships help teachers support each other. Every community has a lead teacher, who provides local guidance to other teachers in that region. These teacher-leaders have been crucial to the success of this initiative.

“Participating in this community supported my classroom work because it created a support system and an accountability system,” said one participating teacher. “With 30 years of teaching experience, I know how easy and tempting it can be to carry on with what is comfortable. Getting out in the field with a new experience definitely challenged my comfort level.”

Just over a year later, the model is proving effective. Our Western Maine hub is thriving in its second year, as are the newer RTCs in the Hancock County, Washington County, and Midcoast communities

There are currently four Regional Teacher Communities established:

- The Western Maine RTC is comprised of 12 teachers from 11 schools in Franklin and Oxford counties and was the pilot program for the initiative.
- The Midcoast RTC is comprised of 9 teachers from 7 schools in Lincoln, Waldo, and Knox counties.
- The Hancock County RTC is comprised of 9 teachers in 8 schools.
- The Washington County RTC is comprised of 9 teachers in 6 schools.

Each RTC begins with a launch event which introduces participating teachers. The launch event grounds them in the themes and practices involved in authentic science investigations. After the launch, teachers participate in four-to-five additional meetings, each with a focus that caters to the interests of the group. These shorter meetings allow time to share lessons, ask questions, and brainstorm collectively.

As positive feedback accumulates, our education team couldn't be more excited. Participating teachers cite increased student interest and positive learning outcomes in their praise of the program. We're looking forward to seeing the community impact of these teachers' efforts in the years to come.

## Recognizing Top Teachers

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We are connected to so many amazing educators doing great work around the state, and we love recognizing them when we get the chance. In 2017 year, we celebrated 10 nominees for our fourth annual McCarthy Education Innovation Award.

Each year, our education team presents this award to the Maine teacher who best embodies GMRI education principles. These teachers provide students with authentic science experiences and promote students' interest in, understanding of, and connection to science.

At the end of last school year, we announced the winner: Gorham Middle School teacher Angela Gospodarek.

Angela creatively introduces her Gorham Middle School students to the world of science by engaging them in hands-on learning — whether putting them in waders to explore the nearby river, or having them investigate the health of ecosystems on and around school grounds.

Angela's nominator said, "What Angela is doing in her classroom is what we want to happen in all classrooms — challenging students to think critically, while becoming responsible and involved citizens."

The McCarthy Award is named after retired Unum CEO Kevin McCarthy, a longtime supporter of science education in Maine. We're proud to honor Angela with this award.

Angela was selected from a field of amazing educators, whose accomplishments you can read more about below. Congratulations to all our nominees, and thank you for all you do to serve Maine's students.

## Japan Meets Maine in New Sashimi Project

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**Last year, we introduced a new initiative to build local markets for sashimi-grade Gulf of Maine seafood. In 2017, we made new progress on this initiative by hosting workshops and producing new training materials.**

The term *sashimi-grade* refers to high quality fish that can be consumed raw. Achieving this standard of quality requires specific handling techniques that most fishermen in the U.S. are unfamiliar with. While local fish is available, there are key differences in handling practices between Japanese fishermen and our local fleet. That's why leading sushi chefs pay top dollar for fish imported from Japan.

In 2017, we furthered our efforts to build a local sashimi-grade market by working with fishermen, chefs, restaurateurs, and distributors to support these regional markets and offer training workshops in Japanese handling practices. These practices include the *ike jime* method, a Japanese fish killing method that many high-end sushi restaurants require.

One of the expert trainers for these workshops is seafood quality handling expert and fish purveyor Mika Higurashi. Mika's perspective has been hugely valuable, and she and Sustainable Seafood Program Manager Jen Levin continue to work closely together.

"I believe proper catch handling can bring American fish industries to the next level," said Mika. "There is a huge opportunity here to build demand for more local species while also increasing their value. Proper catch handling including the *ike jime* method, onboard icing and bleeding, and careful packaging can all greatly affect fish quality. I am excited to be part of this initiative and look forward to working with similar minded people."

Mika joined us recently to share her passion for this work in a Sea State Lecture here in the lab. Hear more from Mika by watching her recorded presentation, *Making the Grade: Leading the Way for Sashimi-Grade Seafood*.

As part of this initiative, we also developed a training video, which we've shared with interested members of the local seafood industry.

The simple training video was produced by Michelle Brown, another member our sustainable seafood team.

"This video captures the essence of what we're trying to do with this project," said Michelle. "It introduces the concept to fishermen with a resource they can go back to again and again. For those who attend the workshop, it's a great reminder, but it's also a perfect tool for folks who are just starting to explore this opportunity for their businesses."

## Electronic Monitoring Shows Promise

It's easy to imagine fishing as a *Wild West* landscape, with fishermen heading out to sea, catching as many fish as they can, and selling them all back at the dock in a straightforward process.

In reality, fishing in the Gulf of Maine is a complex, heavily-regulated industry. Federal fisheries managers set strict limits for how much fish can be harvested in a given year. Fishermen in New England are then required to report their catch data to ensure they don't exceed these limits. The catch is also monitored by human observers — people who ride along with the fishermen to verify their catch data.



Monitoring is important, but human observers can cause headaches for fishermen. First, it's expensive. While the federal government used to pay for monitoring, fishermen will soon be responsible for the cost of mandatory oversight. There are also safety concerns with human monitors. Many captains are uncomfortable with the often young-and-inexperienced strangers on their boats.

Technical Programs Manager Mark Hager helps fishermen understand and implement electronic monitoring — a system of cameras and computers mounted onboard fishing vessels. This suite of technology could replace the majority of human observers, who currently monitor catch data.

Electronic monitoring improves this process the same way electronic tolls have improved highway traffic. The technology provides an accurate alternative to human observers that is safer and more cost-effective.

Perhaps the most exciting aspect of electronic monitoring is the ability to collect more data. While human monitors are only deployed on a portion of fishing trips, the cameras used for electronic monitoring can run nonstop. This produces more data to improve fisheries management. It also builds trust in the management process, because fishermen can feel more confident about the data knowing that it comes directly from their boats.

Mark's work on electronic monitoring is a great example of a win-win outcome for both fishermen and fisheries managers. While questions still remain about electronic monitoring, early returns indicate that this could be a viable long-term solution to support economic and ecologic sustainability in the Gulf of Maine.

*Thanks to our many partners on this project, including The Nature Conservancy, Ecotrust Canada, Cape Cod Commercial Fishermen's Alliance, and Maine Coast Fishermen's Association.*

### By the Numbers: EM Impact in 2017

4

States

18

Vessels

228

Trips

1001

Hauls

30000

Fish

# A Year of Seafood Impact



**Sustainable Seafood.** Years ago, those words were considered a passing fad. Today, they are a business imperative. Successful seafood businesses depend on healthy fisheries and farms for consistent, reliable product.

Here in the Gulf of Maine, we are fortunate to have cold, clean waters rich with seafood, as well as strict management to ensure responsible harvest. And yet, our region's fishing industry still faces challenges in accessing markets.

The Gulf of Maine Research Institute Sustainable Seafood Program has always focused on the nexus of economic and ecologic sustainability. We're concerned with the long-term health of the ocean, as well as the long-term health of coastal communities, and we work hard to build business opportunities that reward responsible practices – on the water and throughout the supply chain. Of course, consumers are the ultimate judges, so our strategies include harnessing immense consumer interest in local, sustainable food, whether that's in a restaurant, a cafeteria, or a grocery store.

## Our Theory of Change

At GMRI, all of our work follows a theory about how we collectively realize systemic and long-lasting change in the seafood industry: change that contributes to positive economic and ecologic results that benefit the seafood industry, coastal communities, and the marine environment on which they depend.



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# A Year of Seafood Impact (continued)



## Our Impact: Market Demand

### Working with thought leaders

- The 27 chefs who participate in our Culinary Partners program commit to always having *Gulf of Maine Responsibly Harvested*® seafood on their menus, with particular emphasis on underutilized product. This increases local demand, while also exposing the restaurant-going public to what the region has to offer.
- Through the Conservation Alliance for Seafood Solutions, we actively network with environmental organizations that influence 80% of the North American retail and foodservice market's sourcing policies to ensure that their advice on Gulf of Maine seafood is accurate.

### Securing commitments from foodservice and institutions

- Sysco Northern New England, a major distributor, has recently committed to increase the amount of *Gulf of Maine Responsibly Harvested* seafood they source by 10% over the course of a year (by June 30, 2018).
- By 2020, campuses in Maine served by the foodservice management company Sodexo will serve flaky white fish only if it is *Gulf of Maine Responsibly Harvested*, with a focus on underutilized species, like dogfish, redfish, and pollock. As of July 2017, 71% of the white fish being served on those 11 campuses is Gulf of Maine Responsibly Harvested.

### Creating mainstream access in grocery stores

- At Hannaford Supermarkets, seafood labeled "Local" in the fresh case must be from the Gulf of Maine region, and Hannaford is working to increase the amount of seafood they have that meets their "Local" definition.
- \$90 million of *Gulf of Maine Responsibly Harvested* seafood has been sold since 2011 by seafood processors that participate in our ecolabel program. The program started out in the retail sector, and both Big Y and Shaw's Supermarkets have been participating since the beginning.

# A Year of Seafood Impact (continued)

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## Our Impact: The Supply Chain

### **Increasing supply chain communication and education**

- By the end of 2017, GMRI held 11 *Trawl to Table* workshops over five years. Roughly 300 seafood supply chain members have attended workshops in Portland, Portsmouth, Gloucester, Boston, and New Bedford. These events have inspired greater supply chain collaboration, bringing more local seafood to local markets.

### **Improving quality handling**

- In the past year, GMRI held quality handling workshops for fishermen in 9 ports around New England, from Port Clyde, ME, to Chatham, MA. Through these workshops, 30 New England fishermen have been trained on best on-board handling practices, including the “ike jime” style of handling for producing sashimi grade fish. We are now exploring developing Good Fisheries Practices for fishermen, modeled after Good Agricultural Practices for farmers.

### **Improving traceability**

- Licensed *Gulf of Maine Responsibly Harvested* dealers are required to provide evidence of 3rd party audits focused on traceability, giving consumers assurance that seafood with the label is traceable to our region. We recently worked with a cross-section of the seafood supply chain and two competing traceability technology providers to pilot seamless boat-to-retail traceability enabled by interoperable technology.

## A Year of Seafood Impact (continued)

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### Our Impact: Consumer Awareness

#### **Educating consumers**

- In the past year, GMRI's seafood team gave an average of three public presentations per month, both to seafood industry audiences and the general public, and at both national and regional events.
- GMRI is a key player in the seafood media landscape. Our work has been featured in over 1,000 seafood-related news stories over the course of the last year: on television (e.g. WCSH 207 and NECN), in newspapers (e.g. Portland Press Herald and The Boston Globe), and in trade publications (e.g. SeafoodSource, Undercurrent News, and National Fisherman).

#### **Creating opportunities to try new things**

- GMRI holds an annual Seafood Celebration, giving more than 200 ticket holders a chance to try Gulf of Maine seafood prepared by our Culinary Partners.
- GMRI staff participate in events like Harvest on the Harbor and working waterfront festivals, giving the public an opportunity to sample things like dogfish and redfish.

#### **Providing information at point of sale**

- The *Gulf of Maine Responsibly Harvested* label is available at 2 major grocery stores (Shaw's Supermarket and Big Y), and in over 20 schools, universities, and hospitals around New England.
- Our marketing kit for licensed dealers and their customers includes materials designed for print or digital use, like posters and fact cards on regional seafood, photos, and other visual and written content.



## Preparing for Sea Level Rise

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The impacts of climate change are becoming increasingly visible in our state and across the nation. You've probably noticed more frequent news coverage of intense storms, unusual temperatures, ocean warming, and coastal flooding.

This year, we began hosting workshops — here in our lab and along Maine's coast — to address these challenges in Maine's coastal communities.

In a 90-minute workshop, entitled "Preparing for Sea Level Rise," we explore the data behind this critical climate impact. Together with attendees, we examine models projecting impacts in their communities and discuss potential resiliency measures. Ensuring the region's resiliency to sea level rise requires a scientifically informed and engaged public, now and in the future.

In 2017, we reached 435 participants, who explored global and local data sets over the course of 18 separate workshops across the state. The interactive learning experience uses map-based software, which allows participants to focus on personal places such as their homes, work, favorite park, or school and to investigate how these places might be impacted by sea level rise. The program includes threads that focus on community resources such as transportation, green spaces, or wildlife habitat, as well as historic maps, impacts of coastal storms, and global resiliency options.

Science Education Program Manager Gayle Bowness leads the Sea Level Rise program. In addition to leading these in-person experiences, Gayle has appeared at other community events and in the media.

## NEW INITIATIVES

# Aquaculture Impact

As part of our new strategic plan, aquaculture has emerged as an opportunity for us to accelerate the growth of a diverse seafood economy. Our progress this year centers on fruitful partnerships, increased capacity, and local impact.



## FocusMaine Partnership

GMRI is one of two “backbone” organizations for the FocusMaine aquaculture job creation initiative, which uses a fact-based, disciplined approach to industry development. 2017 marked the transition from strategic planning to the implementation phase, as GMRI and its partners — the Maine Aquaculture Association (MAA) and FocusMaine — secured funding for a suite of initiatives designed to:

- facilitate growth of small aquaculture businesses,
- unlock access to capital, and
- develop internationally competitive in-state recruitment capacity.

We also partnered with the Maine Center for Entrepreneurs (MCE) and MAA to create a prototype aquaculture entrepreneur development program, building from MCE’s established Top Gun business accelerator program. The team worked together to tailor the existing Top Gun program, secure high-level seafood and business professionals as speakers, and recruit businesses. Aquaculture Top Gun 2018 includes 11 businesses representing early- and mid-stage oyster, mussel, and scallop producers and seafood distribution companies.

## Increased Capacity

In addition to our many partnerships, we’ve also grown our team internally. Julia Maine joined us this year to become our new Aquaculture Project Manager.

Julia comes to GMRI having graduated from Bowdoin College, interned on two sea farms, and organized the Chebeague Island aquaculture festival. Her familiarity with Maine’s aquaculture sector helped her hit the ground running in this new position.

## Portland Street Pier

This year, we also partnered with the City of South Portland to develop a master plan for the Portland Street Pier, located between the Sunset Grill and pipeline oil tanks in the Ferry Village Neighborhood. Early on, South Portland City Council and staff recognized the pier’s immense potential value for local aquaculture and commercial fishing industries, and set out to develop a long-term vision, or “master plan.”

Early in the year, our aquaculture team helped City staff secure a grant to hire an engineering firm. The engineering firm’s role is to assess the pier condition, develop three alternative designs, and determine the economic viability of the designs.

Meanwhile, our aquaculture team is conducting a comprehensive needs assessment of working waterfront infrastructure and services that would be most useful to local aquaculture farmers and commercial fishermen.

“GMRI has the expertise, relationships, and credibility to engage stakeholders and understand market needs,” said South Portland Assistant City Manager Josh Reny, “We greatly appreciate their support on this project.”

## Improving Climate-Readiness of US Fisheries

The National Oceanic and Atmospheric Administration (NOAA) has awarded the Gulf of Maine Research Institute \$1.1 million to investigate impacts of climate change on groundfish. Additionally, the researchers seek to understand how fisheries management practices might be improved to account for climate change impacts.

Over the course of a decade, the Gulf of Maine warmed faster than 99% of the global ocean, according to GMRI scientists. Despite this period of rapid warming, fisheries managers do not account for temperature impacts as they evaluate fish stocks. Instead, the targets for allowable harvest are set based on historic data — which sometimes fails to reflect the present reality in the Gulf of Maine.



“Those of us who study fish stocks in the Gulf of Maine are seeing significant changes due to warming waters,” said Dr. Lisa Kerr, Research Scientist at GMRI and lead researcher on the study. “Failure to account for these changes in the management process creates a frustrating scenario in which fishermen are playing by the rules, but fish stocks are still failing to rebound.”

This phenomenon was the chief observation of a 2015 study published by GMRI scientists and their colleagues. The study, published in the journal *Science*, identifies warmer waters as the primary factor in the failure of cod to rebound, despite fishermen’s adherence to strict management policies.

To explore solutions to this concern, this new three-year project aims to:

- Identify climate change impacts on key commercial species such as cod and haddock
- Evaluate new approaches to adapt fisheries management to account for climate change
- Project the potential economic and ecological impacts of these new approaches

The research team will use advanced computer modeling to evaluate potential “climate-responsive” fisheries management strategies. These models will use on-the-water data to compare today’s management strategies to alternative strategies which account for climate change.

“By utilizing computer modeling and simulations, we’re able to understand the economic impacts of various strategies before they have real-life consequences” said Dr. Kerr. “We know how many hard-working families and fishing communities depend on these fish stocks for their livelihoods, so it’s important to understand the impacts of new management strategies before they are implemented.”

Led by Dr. Kerr, the project also includes collaborators from NOAA (Dr. Sarah Gaichas), University of Massachusetts Dartmouth — School for Marine Science and Technology (Drs. Gavin Fay and Steve Cadrin), and GMRI (Dr. Andrew Pershing).

# Financials

The Gulf of Maine Research Institute (GMRI) had another successful year, with continued delivery of core programs and 13% growth in total expenses. Operations broke even, and the \$2,200,000 surplus of total revenue over expense reflects the growth in endowments and reserves.

Science, Education, and Community programs are funded primarily by federal grants, foundation grants, and individual contributions. Revenue was up \$900,000 over 2016, primarily arising from increases in federal grants, individual contributions, and investment market gains.

Fundraising and community relations activities are funded by unrestricted contributions. Most administrative costs are allocated as overhead to program and development costs, in compliance with federal cost guidelines. The balance of administrative expense is funded by income from administrative services contracted to our subsidiary.

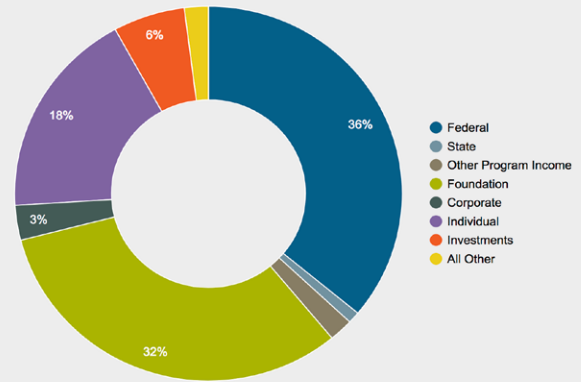
GMRI's wholly-owned subsidiary, Gulf of Maine Properties Inc. (GMPInc), owns and operates GMRI's facilities. GMRI rents 78% of the total space in the building and the remaining space is rented to other tenants.

Our 2017 external audit is underway and will be added to the website when available.

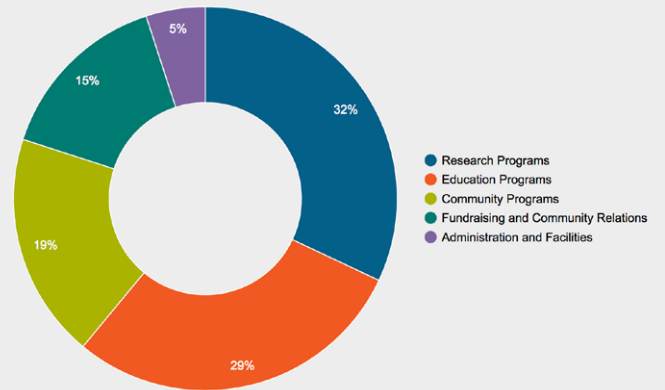
Most of the growth in our net assets is in endowments and reserves. We maintain our 2005 laboratory facilities in A-class shape. We have not made any major investment in capital expansion in the last 12 years, other than rebuilding the waterfront pier in 2010. The Science Literacy Fund for Maine and other GMRI-held endowment funds reflect a new phase of asset growth, starting in 2013.

Meanwhile, GMRI continues to grow its national and international reputation as a marine research institute, a leader in citizen science education, and a technical resource for the fishing industry.

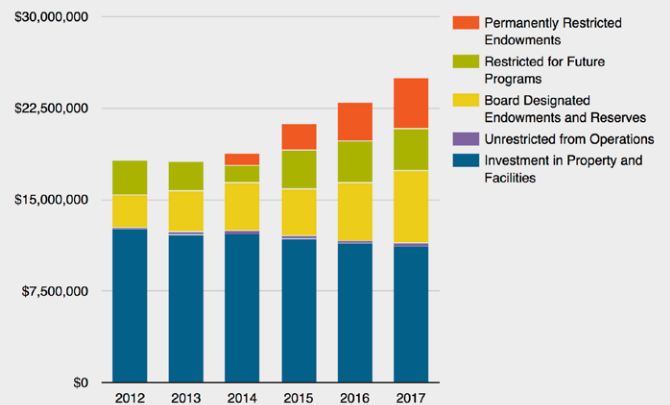
Revenue: \$12,400,000



Expenses: \$10,200,000



Total Net Assets



We deeply appreciate your support and enthusiasm for GMRI's mission. Your donations fuel our efforts to catalyze solutions to the complex challenges of ocean stewardship and economic growth in the Gulf of Maine bioregion.

## Wind Rose Society Gifts



We are grateful to the following members of the Wind Rose Society for their gifts in 2017. Wind Rose Society members lead the way in helping GMRI protect our ocean, sustain vibrant coastal communities, and prepare the next generation for active citizenship.

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