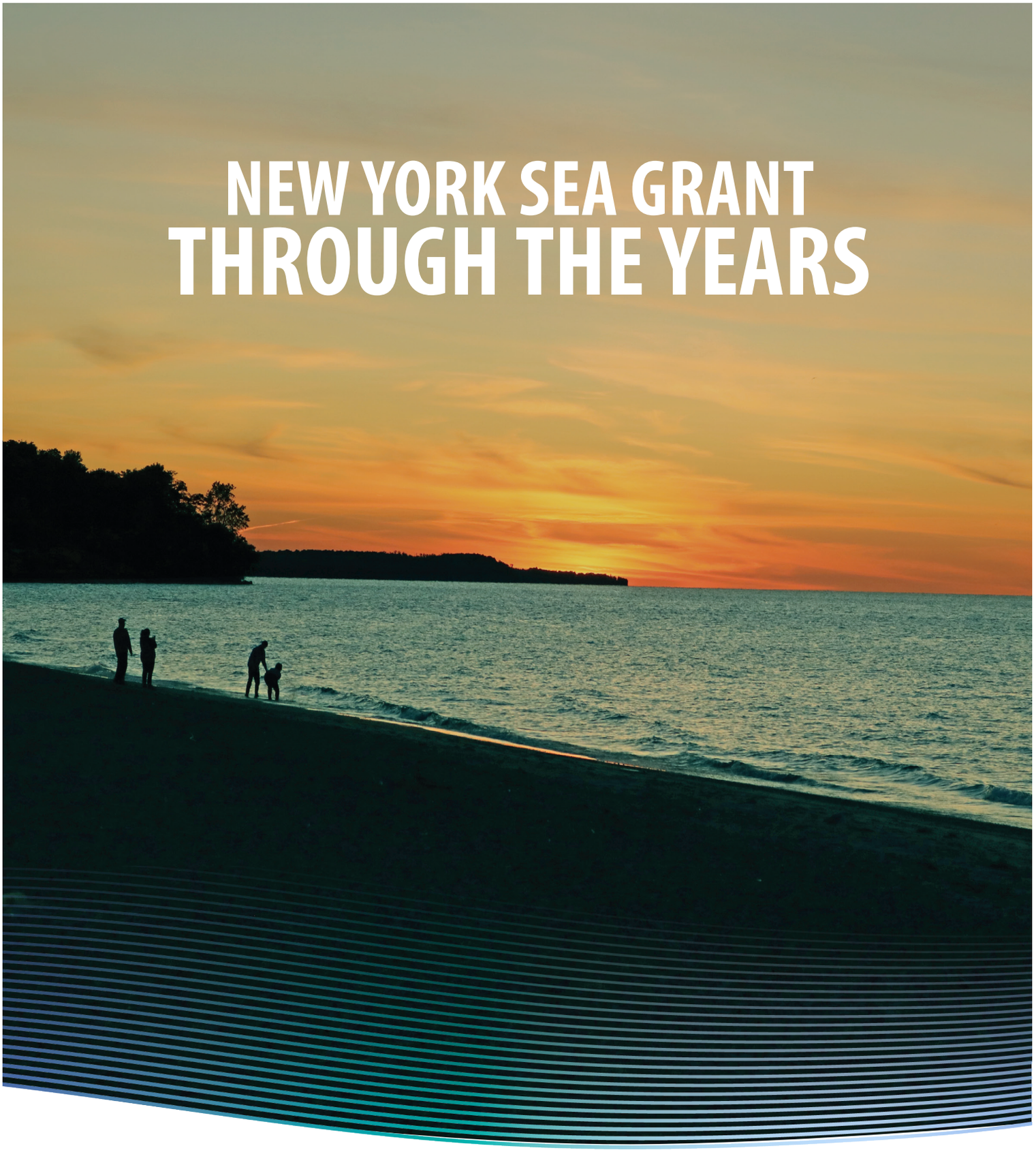
NEW YORK SEA GRANT
THROUGH THE YEARS



1971-2021 Sea Grant New York 50 BRINGING SCIENCE TO THE SHORE

NOAA · National Oceanic and Atmospheric Administration · U.S. Department of Commerce

Cornell University · Founded A.D. 1865

SUNY

WHO WE ARE

New York Sea Grant (NYSG) is a university-based Federal-state partnership program of the State University of New York, Cornell University, and the National Oceanic and Atmospheric Administration (NOAA) that has a storied 50 year history of *"Bringing Science to the Shore"* in support of the diverse coastal communities, economies, and environments of New York State (NYS).

NYS boasts 3,400 miles of coastline encompassing two Great Lakes (Erie and Ontario), two major river systems (the St. Lawrence and Niagara Rivers); the Hudson River Estuary, which is tidally influenced from New York City (NYC) north to Troy, NY; the Atlantic Ocean; and Long Island Sound, as well as several other estuaries on Long Island.

Eighty-one percent of New York's (NY) nearly 20 million people live, work, and recreate along the State's coasts. Coastal industries contribute significantly to NY's economy. NY ranks third among 30 coastal states in terms of the coastal economy contribution to the Gross Domestic Product (GDP), with a value of $33.6 Billion (2018, latest available data from NOAA Economics: National Ocean Watch). Approximately 7.5 Million people are employed along the coasts of NY, with a cumulative income of about $566 Billion.

Nearly 405,000 people are employed in coastal industry sectors of NY such as living resources and tourism and recreation, with wages of $15.2 Billion. The emerging offshore renewable energy sector is poised to provide 6,800 jobs and more than $12.1 Billion of combined economic activity.

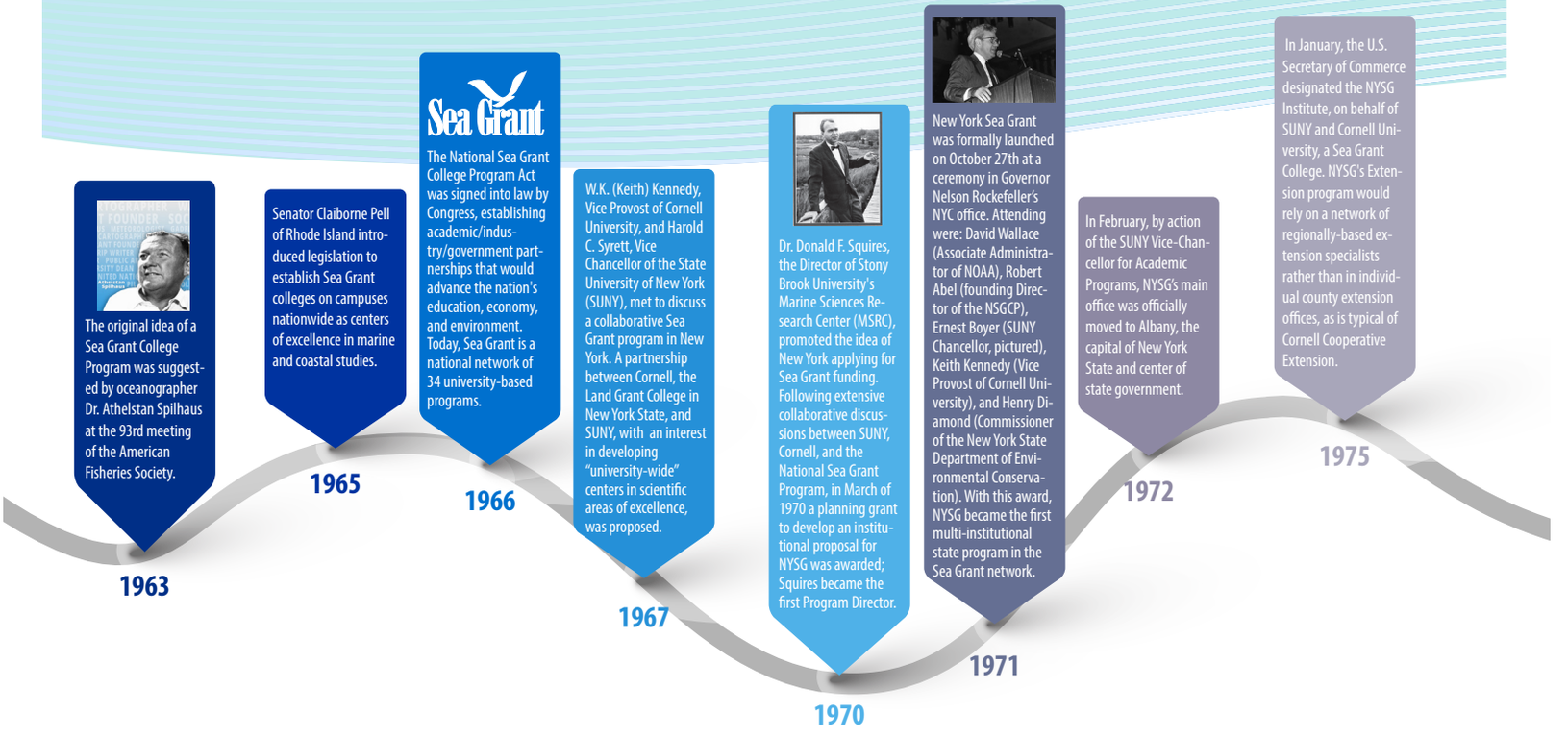
NYSG's community- and science-based programming addresses diverse stakeholder objectives across multiple sectors of NY's coastal economy, balancing the non-mutually exclusive co-priorities of economic and environmental sustainability and resilience. The program's portfolio is large and dynamic, requiring a robust, highly-skilled, and dedicated staff to manage, coordinate, plan, and execute the full suite of NYSG activities.

NYSG's research, extension, outreach and education programming results in tangible impact for the coastal communities, economies, and environments of NYS; and ensures that our State is better prepared for the challenges and opportunities related to climate change, has access to healthy shorelines and sustainable seafood, and has vibrant and resilient working waterfronts.

WHAT WE DO AND WHERE WE'VE BEEN

NYSG's programing provides innovative, science-based, stakeholder-driven knowledge, information, and tools to empower sustainable and resilient communities, economies, and environments across four integrated focus areas:

- Healthy Coastal Ecosystems
- Sustainable Fisheries, Aquaculture, and Seafood Businesses
- Resilient Communities and Economies
- Environmental Literacy and Workforce Development



Over the past 50 years, NYSG has brought nearly $180 Million to NYS to support coastal environmental sustainability, coastal economic vitality, and coastal citizens' awareness and understanding through research, extension, outreach and education. Extension professionals work with diverse stakeholder groups who provide input, along with that of the research community, to advance state-of-the-art research and coastal management for the benefit of NY's varied coastal environments and communities.

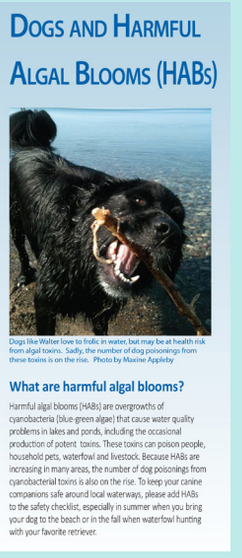
NYSG has supported nearly 870 graduate and undergraduate students and over 1,100 researchers across over a dozen NYS colleges and universities. NYSG also reaches hundreds of K-12 teachers and thousands of students, exposing them to STEM (Science Technology Engineering and Mathematics) career opportunities and developing the next generation of coastal environmental stewards, researchers, and decision-makers.

RESEARCH: HEALTHY COASTAL ECOSYSTEMS

- For five decades, NYSG has conducted innovative research on the State's diverse aquatic ecosystems and habitats, both saltwater and fresh. NYSG has funded numerous research projects to help understand the status of ecosystem components, the mechanisms and processes driving that status, and solutions to address identified challenges. Following are select examples looking into the causes and mitigation of ecosystem disruptors such as harmful algal blooms and aquatic invasives like zebra mussels.
- In 1985, brown tide, a very small algae that grows in dense populations, took a foothold in Long Island's Peconic Bay, leading to a collapse of the bay scallop fishery. In the Great South Bay, an estuary that hosts habitat that provided the nation with half its hard clams, brown tide caused a reduction in the quality and quantity of clam harvests. NYSG-funded researchers conducted multiple studies into the causes and mitigation of harmful algal blooms including mapping the genome of the brown tide algae (found mainly in south shore LI bays), and identifying environmental factors such as temperature and nutrients that occur before and after blooms. The environmental factors that accompany the occurrence of red tide (in north shore LI bays) and blue-green algae (appearing throughout the Great Lakes and marine district) have been closely studied leading to more effective mitigation when blooms occur.
- The nonindigenous bivalve species, zebra and quagga mussels, invaded the Hudson River then the Erie Canal and Lake Ontario. Without natural predators, the mussels' unchecked growth led to choked waterways, interfered with the Great Lakes food web, impacted the recreational fishing and boating industries, and disrupted water infrastructure. Some research projects sought ways to mitigate mussel growth. A funded research project found success in creating and marketing a product that could halt zebra mussel growth in its tracks. Other projects investigated the changes in the Great Lakes food web caused by the invasive mussels, such as altered populations of crustaceans and economically important fish species.

HABS and Dogs

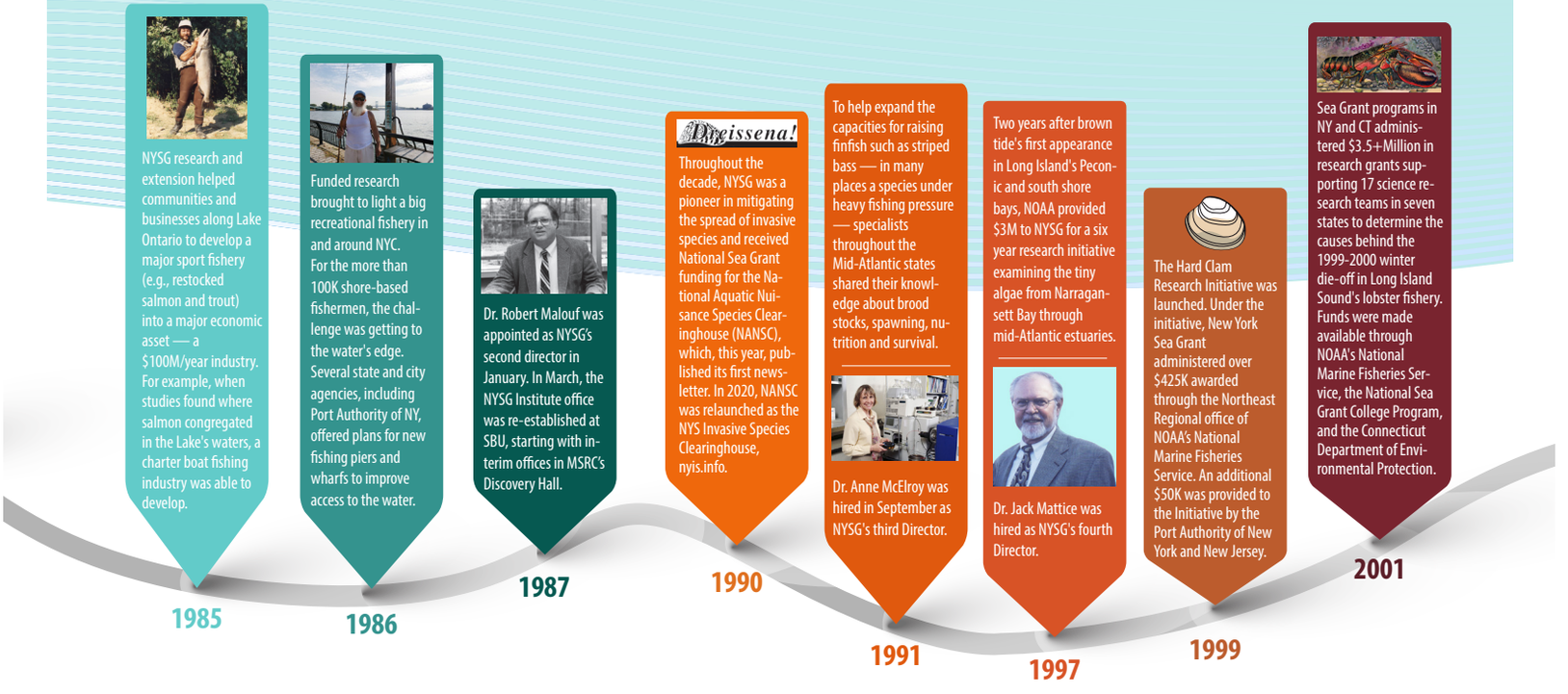
When it was discovered that blue-green algae toxins can cause illness and even death in pets, a collaboration between research and extension yielded a NYSG publication, Dogs and Harmful Algal Blooms. It became NYSG's most popular brochure, being picked up by NOAA, other Sea Grant programs and numerous non-governmental organizations.


DOGS AND HARMFUL ALGAL BLOOMS (HABS)

Dogs like Walter love to frolic in water, but may be at health risk from algal toxins. Sadly, the number of dog poisonings from these toxins is on the rise. Photo by Maxine Appleby

What are harmful algal blooms?

Harmful algal blooms (HABs) are overgrowths of cyanobacteria (blue-green algae) that cause water quality problems in lakes and ponds, including the occasional production of potent toxins. These toxins can poison people, household pets, waterfowl and livestock. Because HABs are increasing in many areas, the number of dog poisonings from cyanobacterial toxins is also on the rise. To keep your canine companions safe around local waterways, please add HABs to the safety checklist, especially in summer when you bring your dog to the beach or in the fall when waterfowl hunting with your favorite retriever.



RESEARCH:

SUSTAINABLE FISHERIES, AQUACULTURE AND SEAFOOD BUSINESSES

- NYSG research helps to ensure the health and sustainability of NY's economically significant shellfish. Hard clams from NY waters, once supplying much of the country's clams, have been impacted by a mysterious infectious pathogen called QPX Disease. Over a decade of NYSG supported research provided knowledge of the life cycle, ecology and genetics of the parasite behind QPX that led to effective management and mitigation strategies to the benefit of the shellfish and hatchery industries.
- American lobsters in western Long Island Sound dramatically died off after a decades-long boom, destroying the Sound's lobster fisheries and impacting the livelihoods of lobster fishermen. Sea Grant was there, helping to get Federal emergency grants to financially aid lobstermen and then supporting research to find the cause of the die-off. A series of projects investigated the effects of pesticides, the occurrence of lobster diseases and other possible causes. Although these factors may have led to a decline in lobsters, the research determined that bottom water warm temperatures linked to climate change was the principal driver of the mortalities.
- Sea Grant-funded research into the genetic stock structure of Atlantic, shortnose, and Gulf sturgeon has provided information on the stock structure, natal origin, and migration of sturgeon populations on the U.S. East Coast. This information has been used by the U.S. Environmental Protection Agency to better inform decisions on listing or delisting specific populations based on distinct stocks under the Endangered Species Act and by Federal and state fisheries management agencies for stock specific management plans.
- A disease known as viral hemorrhagic septicemia or VHS had been causing mortality in economically important Great Lakes sportfish. Sea Grant supported innovative research that led to the qRT-PCR, a rapid and sensitive test for the presence of the virus (VHSV IVb). The test provided the fish health community with a diagnostic tool far more sensitive than cell culture techniques. Another study showed the efficacy of using iodine-based compounds to disinfect walleye eggs to prevent the introduction of the virus into aquaculture facilities.
- Research into genetic traits driven by size selection showed how fish populations such as silversides can evolve over several generations, favoring fish that are slow growers. This research, as reported in the journal *Science*, provided useful information for managers to consider when developing fisheries regulations. It suggested that regulations that enforce releasing smaller fish and keeping only larger ones may ultimately reduce the size at age through genetic selection.

RESILIENT COMMUNITIES AND ECONOMIES

- Storms, extreme weather and flooding events such as Superstorm Sandy have had devastating effects on NY communities. Joint research projects with other Sea Grant programs (i.e., CSAP or Coastal Storm Awareness Program) examined how people in areas affected by Sandy responded to storm warnings and how messaging before a life-threatening storm could be improved in the future. The threat of flash floods after storm events led to the development of the NYC Flood Watch program. Flood Watch has also become an important community-based tool for addressing the increasing occurrence of "Sunny-day" flooding events.
- A Sea Grant-funded research project captured the imagination and sparked debate by its proposal of using physical barriers or gates along three "choke points" surrounding NYC that could conceivably reduce the threat of devastating floods should seas rise dramatically. Researchers developed a computer modeling tool to support NYC managers considering such barriers as part of resilience planning efforts.
- Recent record-setting floods have left Lake Ontario shoreline communities unsure of how best to assess their flood risk and manage future flood events. Sea Grant-funded researchers have developed a suite of flood risk management tools for community planners and property owners which can provide actionable flood risk information for short-term emergency management at local scales.

EXTENSION:

HEALTHY COASTAL ECOSYSTEMS

- NYSG's watercraft inspection efforts empowered the public with how-to information on the removal of invasive species from various types of watercraft. Hundreds of watercraft inspection stewards, mainly college students, worked at boat launches throughout NY, encouraging recreational boaters to clean, drain and dry their watercraft before and after launch to prevent the spread of invasive species. The result of this ground-breaking program included a handbook, videos and webinars enabling communities to start or manage their own watercraft inspection programs.

- Nitrogen pollution has become a serious, recurring problem. In 2020, NYSG and Suffolk County Department of Health Services made available a "Suspicious Marine Harmful Algal Blooms" online reporting form, which complements NYS Department of Environmental Conservation reporting in NY's Great Lakes waters.

SUSTAINABLE NY FISHERIES, AQUACULTURE AND SEAFOOD BUSINESSES

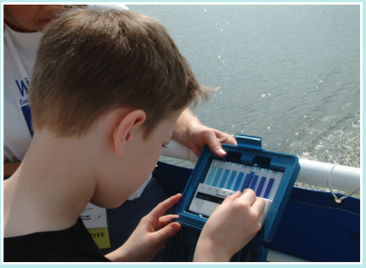
- Soon after the U.S. Food and Drug Administration began requiring processors of fish and fishery products to develop and implement a Hazard Analysis Critical Control Point or HACCP system to ensure the safety of seafood that consumers buy, NYSG became a leader in developing HACCP programs for seafood processors and business owners. NYSG worked with the world renowned Fulton Fish Market as well as seafood businesses to comply with HACCP requirements for storing and transporting finfish and shellfish at proper temperatures.
- NY's Seafood Summit has become an annual convening of enthusiastic professionals with vested interest in seafood — fishermen, seafood businesses, industry, and other seafood stakeholders— to build active communications between various sectors of NY's seafood industry. Each year the organizers highlight some of NY's bountiful seafood supply and introduce participants to the versatile seafood available locally.

- Aquaculture, the cultivation of finfish, shellfish, and aquatic plants, is an important and growing industry in NY. Aquaculture creates jobs and revenue for NY, which has a large market for aquacultured products. Sea Grant coordinated a series of "Meet Your Oyster Farmer" events which highlighted Long Island's oyster industry. Sea Grant has been working to assist aquaculturists in the cultivation of sugar kelp, a native species and viable marketable product that can be cultivated in the winter months.
- Trawling the bottom of the Great Lakes is widely used to provide fish abundance and behavior information to the managers of the $4 Billion Great Lakes fisheries. NYSG extension developed and held several International Trawl Design Workshops for biologists, managers and trawl vessel personnel. Attendees learned about trawl design parameters including ways to reduce mussel clogging and the use of sensing gear and underwater cameras to evaluate trawl performance.

RESILIENT COMMUNITIES AND ECONOMIES

- NYSG extension professionals have long helped coastal property owners by suggesting techniques to protect property from rising water levels in the Great Lakes. Using emerging technologies like drones and GIS, Sea Grant specialists can assess and customize the most economically sound and efficient way to protect property from flooding.
- For decades, NYSG has shared the benefits and challenges of using vegetation and other nature-based features and techniques as an alternative to hard coastal structures such as bulkheads to fight coastal erosion, climate change and severe storms. NYSG has developed story maps of flooding, conducted workshops, and provided information for testimony at hearings that empower and guide property owners as they mitigate the effects of climate change.

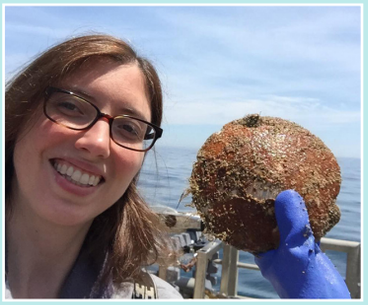
EDUCATION:



ENVIRONMENTAL LITERACY AND WORKFORCE DEVELOPMENT

- For several decades NYSG's "Teach the Teacher" training sessions have allowed hundreds of NY's teachers to experience hands-on science aboard NOAA's Great Lakes research vessels where they learned about the ecosystem, water quality and the effects of aquatic invasive species on the Great Lakes. Teachers then took this innovative curriculum back to thousands of their students.
- Administered by NYSG and the NYS Department of Environmental Conservation, NY's Great Lakes Ecosystem Education Exchange (NYGLEEE) partnered with educators in NY's Great Lakes watershed, providing materials and curricula for hands-on classroom and field experiences. Its goal is to ensure the next generation is prepared to make sound decisions about Great Lakes water quality, natural resources and social impacts and to encourage K-12 students to become stewards of the watersheds in which they live.
- Through Sea Grant and its partners, over 800 students have attended Marine Camp, a day camp held at nature centers along Long Island's south shore beaches that exposes youth from underserved communities to STEM career opportunities while creating experiences of a lifetime. Students practice wearing waders and using seine nets to capture marine fish. They observe coastal wildlife and local geological features on nature walks, use microscopes to identify plankton, and create artwork to reinforce what they've observed.
- The "Climate to Go" workshops for K-12 teachers from across NYC provided resources about climate science, climate action and mitigation strategies, as well as resilience; teachers created emergency preparedness "go-bags" for schools and families as recommended by NYC Emergency Management. Over 200 K-12 NY metro and mid-Hudson educators participating in the Visualizing Coastal Change project learned about climate change as they compared current and historic maps and photos of some 500 miles of NY coastal and estuarine environments including the Hudson Valley.
- NYSG works closely with Long Island Sound Study and partners, including the NYS Department of Environmental Conservation and NYS Office of Parks, Recreation & Historic Preservation, to develop citizen science research projects that allow students to learn about the problems facing Long Island Sound and ways to address those issues, while simultaneously collecting data that will be used by partner agencies.
- The Safety at Sea program educated hundreds of commercial fishermen on life-saving techniques including the use of immersion suits and control of vessel emergencies such as fire and engine failure. This program won commendation from the U.S. Coast Guard, a partner in the program.
- Via Sea Grant webinars, presentations, and the development of online mapping tools, state agencies and community-based organizations are learning about environmental justice that can help educate them about the disproportionate impacts of climate change on vulnerable populations and help these organizations plan programs more equitably.

PROMOTING EXCELLENCE IN UNDERGRADUATE AND GRADUATE STUDENTS:



NYSG has supported nearly 870 graduate and undergrad students. After completing their degrees, these students go on to such careers as researchers, senior scientists, resource managers, directors at research facilities and engineering firms, coastal engineers, environmental planners, meteorologists, international environmental consultants, and oceanographers, many in leadership roles.

SEA GRANT SCHOLARS

NYSG has funded hundreds of research projects and along with the project, supported nearly 700 capable graduate students who aid faculty researchers. These Sea Grant Scholars are fully involved as investigators and are often in the field or in the lab as the eyes, ears, and hands of NYSG research, allowing them to complete their master's or doctoral degrees. After degree completion, many Sea Grant Scholars go on to be post-docs or professors at prestigious universities or find impactful and fulfilling careers in government and industry.

JOHN A. KNAUSS MARINE POLICY FELLOWSHIP

Each year, graduate students from across the 34 Sea Grant programs are accepted into the John A. Knauss Marine Policy Fellowship program. This selective, year-long, paid fellowship program, named for one of Sea Grant's founders, former NOAA Administrator John A. Knauss, places graduate students in Federal executive and legislative branch host offices in Washington, D.C. Fellows may be assigned to Congressional offices and committees, while others play key roles at NOAA and other Federal agency offices. All Fellows help develop and implement national policies related to marine, coastal and Great Lakes resources. At the end of the Fellowship year, many alumni of the Knauss Fellowship have found successful careers in the Federal government.

NATIONAL MARINE FISHERIES SERVICE FELLOWSHIP

The National Marine Fisheries Service (NMFS) of NOAA supports a fellowship program in partnership with Sea Grant with a focus on Population and Ecosystem Dynamics and Marine Resource Economics. This competitive program places Ph.D. students in research-based fellowships that provide support for up to three years. The program is designed to fulfill workforce development needs identified by the NMFS and since 1999, has provided opportunities for hundreds of Ph.D. students nationwide, including many from NY.

NY COASTAL RESILIENCE LAW AND POLICY PROGRAM SUMMER FELLOWSHIP

This program provides one student from each partner institution (law schools at CUNY, Cornell, Pace, and University at Buffalo) with an opportunity to collaborate with NYSG and interact with communities to provide environmental law and policy resource guides. Such guides help municipalities, property owners, and conservation groups better address comprehensive planning, local property rights and regulations, local resilience needs, and redevelopment opportunities related to the environment and climate change.

COMMUNITY ENGAGED INTERNSHIP

This fellowship for undergraduate students recruits, retains and engages diverse students from underrepresented and indigenous communities. This summer internship, designed to broaden participation in marine and coastal professions, provides training for the next generation of scientists and decision makers. Intern projects extend the knowledge of community stakeholders to address coastal, marine or Great Lakes issues of environmental, economic and/or social importance.

WHERE WE'RE HEADED

For 50 years NYSG has had the privilege to work both with and on behalf of the coastal communities, economies, and environments of NYS.

NYSG looks forward to continuing this legacy – to support existing stakeholder-driven and community-based priority objectives while being poised to be nimble, flexible, and responsive to ever evolving and emerging coastal challenges and opportunities, related to for example:

- Climate Change (e.g., living resources; coastal processes, hazards)
- Water Quality (e.g., contaminants of emerging concern; marine debris)
- Renewable Energy
- Aquaculture and NY-sourced wild seafood (e.g., changing and emerging market trends; seaweeds)
- Green infrastructure
- Cultural resources
- Expanded student fellowship programming
- Other as yet to be identified coastal priorities!

NYSG will continue to work with partners to develop and provide innovative, leading-edge research, extension, education, and outreach with a firm commitment to a diverse, equitable, inclusive and just workplace as well as research, education and extension programming that meets the needs of all of NYSG's stakeholders.

For the next 50 years, NYSG will aspire to maintain its long-standing role as a trusted, unbiased source of community-driven, science-based programming that results in tangible impacts to the health and vitality of NY's coastal communities, economies, and environments.

What Does NYSG Mean To You?

We would love to learn about your favorite moments or experiences with NYSG — perhaps a program or training you participated in? A staff member who made a positive impression? A partnership effort or research project we've supported? A NYSG scholar or fellow whose experiences helped further your career goals? A teacher who gained new insights to share with the next generation of coastal stewards?

Whatever the experience, we want to know: www.NYSeaGrant.org/WhatDoesNYSGMeanToYou

2006

In April, NYSG began bringing its "message" regularly to the morning masses at WWNYTV7, reaching ~10,000 viewers in New York's "North Country."

2007

NYSG-funded Buffalo State researchers examined how the invasive round goby has impacted tributaries and how readily it will expand upstream.

2008

A two-year NYSG-funded SUNY ESF study provides information to coastal businesses and tourism promotion organizations on the motivations and constraints associated with resident bass fishing.

Dr. James Ammerman was hired in October as NYSG's fifth Director.

2010

Over 180 invasive species now in the Great Lakes not only disrupt the food web, but cost billions of dollars in impacts to the State's economy.

2011

For its 40th anniversary, NYSG received a proclamation from NY Senator Lee Zeldin (1st District), in which he wished New York Sea Grant great success and many more years of prosperity. "Sea Grant New York values the formal and informal education of the next generation and has enhanced and enriched the lives of countless families in the local community and will continue to do so for many years to come."

2013

$1.8M funded NOAA's Coastal Storm Awareness Program. Sea Grant programs in NJ, NY and CT supported 10 social science research projects to improve public response to coastal storm hazard information.

2015

The New York Great Lakes Basin Small Grants program begins and continues to the present day, at which time more than $1M has been awarded to address needs of the Basin.

Bill Wise was appointed NYSG's sixth Director.

2019

One of NYSG's most recent rounds of coastal research — a two-year, $1.1M investment — spotlights a variety of marine, Hudson estuary, and Great Lakes topics and issues, including flood risk, harmful algal blooms, sea grass restoration, invasive species and seafood safety.

Dr. Rebecca Shuford was hired in June as NYSG's seventh Director.

2021

New extension specialists join NYSG to: (a) support coastal climate capacity with an initial focus on offshore renewable energy information needs; (b) protect the communities, economy, and environment of Long Island Sound. Also, Sound outreach grows beyond Long Island into New York City and Westchester County communities.

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