

# Sea Grant Program Impacts: 2012 Biennial Report to Congress

Impacts are alphabetical by program. Focus Areas are also denoted.

*Focus Area key:*

Healthy Coastal Ecosystems (**HCE**)

Safe and Sustainable Seafood Supply (**SSSS**)

Hazard Resilient Coastal Communities (**HRCC**)

Sustainable Coastal Development (**SCD**)

## **Sea Grant research contributes data on endangered Steller sea lions to federal resource managers**

The extreme remoteness of Alaska's coastline requires that federal, state and university researchers partner to collect data essential for managing endangered Steller sea lions. Alaska Sea Grant's marine mammal specialist is an important partner in this ongoing research collaborative. In 2010, specialist Kate Wynne provided four shore-based counts of sea lions on Long Island rookery near Kodiak Island by recording the location and activity of 13 to 21 branded sea lions per survey, including 54 sightings of branded pups and three branded mothers with pups. Federal managers use the data to determine mortality, birth-rate, age at first reproduction, age at weaning, and other population health indicators to try to understand why Steller sea lions are not recovering quickly in parts of the Gulf of Alaska. The data are being incorporated directly into federal management decisions on fisheries and ecosystem health, policy and regulation. (**Alaska, HCE**)

## **Sea Grant technical expertise helped to expand 12 businesses and establish four new businesses**

Alaska Sea Grant provides technical assistance to Alaska seafood processors by developing new seafood products, and ensuring that new and existing seafood operations have access to food safety and product development expertise. Alaska Sea Grant's seafood quality and seafood marketing specialists worked with small Alaska seafood processors to develop food products such as smoked salmon, dried salmon jerky, mustards and BBQ sauces, canned herring, military Meals-Ready-to-Eat salmon entrees, salsas, dried pollock, halibut skin dog treats, pickled fish, crab tails and salmon oil. Sea Grant analyzed food and seafood products to assure food safety and accurate labeling, measuring salt, water phase salt, water activity, additive levels and other factors critical to product safety. As a result of Sea Grant's engagement with entrepreneurs, 12 existing businesses expanded their product offerings, and four new businesses were established. (**Alaska, SSSS**)

## **Sea Grant information benefits policymakers and the aquaculture industry**

California Sea Grant provided information to the aquaculture industry, the state legislature and other key stakeholders regarding proposed legislation to establish a regulatory structure governing ocean finfish aquaculture in California. The proposed legislation would have resulted in significant constraints and regulatory costs to the future development of marine aquaculture in the state. Sea Grant's efforts resulted in better legislation that will less severely constrain aquaculture development, while at the same time protecting the environment. The final Bill was sufficiently revised so that the California Aquaculture Association withdrew its opposition. Information provided by Sea Grant benefited policymakers and the aquaculture industry. (**California, SSSS**)

## **Sea Grant monitors recovery of endangered coho salmon in Russian River**

California Sea Grant is overseeing a captive broodstock program for coho salmon in the Russian River system north of San Francisco Bay. The river appears to be re-establishing self-sustaining runs of the federally protected, endangered species. In March 2011, an estimated 192 adults returned to the region to spawn, compared with 3 or 4 adults per year for the last decade. By November 2011, there were 5,375 wild "young-of-the-year" coho in 18 of 23 tributaries surveyed between May and September. This compares with 715 wild fish counted on seven of 11 streams in 2010, and a total of only 637 wild juveniles counted collectively during the five years prior on four of nine streams. The project is a collaboration with the California Department of Fish and Game, National Marine Fisheries Service, Sonoma County Water Agency, U.C. Cooperative Extension, and U.S. Army Corps of Engineers. In

addition to benefiting biodiversity and conservation goals, the return of coho to the region stands to benefit landowners, notably grape growers, who face severe cuts in water allocations if the fish remain imperiled. (**California, SSSS**)

#### **Sea Grant research leads to first commercial enterprise cultivating edible kelp in U.S.**

Worldwide, seaweed production eclipses the production of shellfish, finfish and other marine organisms. However, U.S. production contributes only about one percent. Sugar kelp is a cold temperate brown seaweed native to the New England area. While similar kelp species have been cultivated for decades in Asian countries, the U.S. depends on wild harvests for this resource. Connecticut Sea Grant researchers adapted techniques developed in China and Japan for this species, and built upon them by utilizing results from several Sea Grant projects. Their goal is to develop scalable technology for mass culture of the kelp. The researchers established a kelp culture to serve as a seed bank for aquaculturists. For the first time ever, they were able to grow sugar kelp in culture through an entire life cycle. Partnering with Ocean Approved LLC (Portland, ME) and students from Connecticut's Bridgeport Vocational Aquaculture School, they tested three culture systems and grew kelp seeded on ropes suspended in the water column. Ocean Approved, a sea vegetable company established in 2009, is the first U.S. company to receive permission to cultivate edible kelp. The company now grows and harvests kelp for products such as kelp noodles and kelp pickles, available through Whole Foods and a dozen other food retailers in New England, New York and California. (**Connecticut, SSSS**)

#### **Sea Grant input leads to inclusion of aquacultured species in 2010 U.S. Dietary Guidelines**

The Dietary Guidelines for Americans (DGA), created jointly by the U.S. Department of Agriculture (USDA) and the U.S. Department of Health and Human Services, establishes healthy eating and physical activity patterns. The Guidelines encourage people to make informed food choices to attain and maintain healthy weight, reduce their risk of chronic disease, and promote overall health. During a workshop organized by the Northeast Sea Grant programs and Land Grant Extension professionals, and hosted by Delaware Sea Grant, science-based information on the benefits and risks of seafood consumption was shared among participants. The workshop led to the development of a network of extension professionals. These seafood professionals were asked to provide expert comment and clarification to the U.S. Dietary Guidelines Advisory Committee regarding the safety of consuming aquaculture products. Their comments were documented through the federal Public Comment process. As a result, the 2010 Dietary Guidelines for Americans now includes aquacultured species such as catfish, salmon, trout, clams, mussels, oysters and shrimp, alongside other recommended seafood protein choices. (**Connecticut, SSSS**)

#### **Sea Grant citizen science volunteer monitoring efforts helped Delaware beaches achieve "superstar" status**

In 2010, Delaware beaches were among the highest rated in the nation by the Natural Resources Defense Council (NRDC) in its annual rating of beach water quality. Delaware's Rehoboth and Dewey beaches were given a superlative "Super Star" Beach ranking—two of only four beaches in nation cited with perfect scores. The University of Delaware Citizen Monitoring Program, run by Delaware Sea Grant, and involving trained citizen volunteers, helps the Department of Natural Resources monitor the state's waterbodies for signs of pollution. Volunteer water quality monitors are trained by Sea Grant staff to perform both simple and complex testing of ocean waters in support of the state's testing program. Since the program's inception, nearly 300 volunteers have contributed 25,000 service hours (time estimated to be worth \$550,000). Not only have these volunteers played a critical role in statewide watershed protection efforts by filling in monitoring gaps with reliable data, they have saved state and federal resources. Delaware's ocean beaches are important tourism assets for many coastal towns in the state. Knowing that Delaware's coastal waters are safe for swimming and other activities reassures Delaware citizens and coastal visitors who bring over \$800 million to the state economy each year. (**Delaware, HCE**)

#### **Sea Grant identifies and develops a marketable, salt-tolerant crop with biofuel potential**

Sea level rise is costing coastal farmers through crop and land loss due to flooding and increasing salinity of farmland. Projections used by the state of Delaware predict a one meter rise in sea level over the next

100 years, which would cause 1,100 acres of prime farmland in the state to be lost, estimated at \$23,309,000 annually. Development of alternate crops for wetter, more salty soils will provide farmers on Delmarva with means for continuing their livelihoods. Delaware Sea Grant funded research into the identification and cultivation of seashore mallow to provide farmers with a marketable alternative to current salt-intolerant crops. Biofuels can be engineered from oils extracted from seashore mallow seeds, hay baled from the plant stems, and, the mallow may help protect coastal marshes as waters rise. (Delaware, HCE)

### **Sea Grant research and outreach sustains 150 jobs and the economic viability of Florida's \$3M commercial sponge fishery**

Florida's commercial sponge fishery employed traditional harvesting practices that impaired the ability of sponges to re-grow, making the industry unsustainable. Florida Sea Grant developed a new harvesting protocol (one that harvests sponges by cutting rather than hooking) that allows the sponges to regenerate. This method is now used by the industry to harvest sponges sustainably, demonstrating that changes to harvesting techniques can greatly increase the sustainability of Florida's commercially valuable marine sponges. It is estimated that Florida Sea Grant's recommended approach to sponge harvesting has resulted in the retention of 150 jobs and \$3 million in annual earnings to the Florida commercial sponge industry. In addition, an area that had historically been closed to sponge harvesting was reopened following Sea Grant research that showed a current harvesting effort would be sustainable. (Florida, SSSS)

### **Sea Grant trainings help sustain Florida's seafood industry and maintain seafood quality**

Seafood, including shellfish, is among the most perishable of foods due to the enzymes and bacteria found on fish and the effects of oxygen, which can cause the "fishy smell" that is a sign of spoilage. The Hazard Analysis Critical Control Point (HACCP) System is a process control system that identifies where hazards might occur in the food production process, and puts stringent actions in place to prevent contamination and food poisoning. This is particularly important for seafood which, unlike beef and poultry, typically arrives at the processing plant, dead. Florida Sea Grant's seafood safety specialist developed a new HACCP curriculum and trained almost 300 individuals from seafood processing, retail operations, and government agencies, on new seafood safety regulations. It is estimated that new HACCP certifications earned by participants has sustained an estimated 70 businesses and 5,000 jobs in the industry. (Florida, SSSS)

### **Sea Grant educates hard-to-reach audience about sustainable development**

Georgia Sea Grant partnered with the Southeastern Building Trades Associates to teach contractors, builders, developers, and architects about sustainable building, infrastructure and site planning. The course differs from most green building courses in two ways: 1) it satisfies continuing education requirements necessary for these professionals to stay in business, and, 2) it emphasizes economic incentives. Attendees are not those typically found at green building workshops; these professionals are often hearing about sustainability and low-impact development for the first time. The presentation presumes that they are not environmentalists and emphasizes the economic opportunities of the growing niche of green development. This year, 10,190 (5225 online, 4965 classroom) students took the courses and received continuing education credits. (Georgia, SCD)

### **Sea Grant continues to address Deep Water Horizon impacts**

During the summer of 2010, the potential effects of the Deep Water Horizon spill (DWH) on the South Atlantic coast were of great concern. Georgia Sea Grant organized two scientific workshops to characterize the threat: the first gathered regional physical oceanographers to assess the risk of material from the spill becoming entrained in the Gulf Stream and entering in-shore waters; and, the second gathered bio- and geo-chemists to assess what condition the oil would be in if and when it arrived. Georgia Sea Grant produced white papers and shorter, citizen-oriented reports from each workshop. These reports were distributed to coastal communities, legislators, managers and other scientists in the South Atlantic region. In August 2010, Georgia Sea Grant Director Chuck Hopkinson testified before the Georgia State Senate regarding the state's vulnerability to oil from the DWH spill. Georgia Sea Grant was subsequently called upon by the state's Department of Natural Resources to develop a monitoring plan for Georgia's coastal waters. (Georgia, HCE)

### **Sea Grant supports Hawai'i's tourism industry through beach restoration**

Historically, Hawai'i's response to coastal erosion has been to armor the shoreline and this has impacted large sections of beach in Hawai'i. Past efforts of beach restoration have focused on Waikiki and involved large truck-hauled fill. While not viable for all areas, beach restoration may provide a viable alternative to hardening the shoreline, restoring the nearshore ecosystem, and supporting the state's tourist industry. To support this effort, Sea Grant developed a statewide small-scale beach nourishment permit for the State of Hawaii Department of Land and Natural Resources to streamline the regulatory process and make beach restoration a more attractive alternative to armoring the shoreline. Sea Grant was responsible for advising applicants on project design, data needs, monitoring requirements, and ultimately reviewing the application on behalf of the state. In 2007, Sea Grant managed the beach nourishment project in partnership with the state that added 10,000 cubic yards of sand to the Kuhio basin in Waikiki. Another effort by Sea Grant and the state is underway in February of 2012 that will add 24,000 cubic yards to the beach fronting the Royal Hawaiian hotel in Waikiki. In a study commissioned by the Waikiki Improvement Association, the beaches in Waikiki were valued at \$2 billion. Sea Grant efforts to streamline the beach restoration application process and support beach restoration efforts contributed to the support of Hawai'i's number one economic driver. ([Hawai'i](#), [SCD](#))

### **Sea Grant research develops three-dimensional tsunami model**

A model developed by Sea Grant-funded researchers in Hawai'i is setting a new standard for tsunami inundation mapping and is being used by an international community of scientists for tsunami research and hazard mitigation. NEOWAVE (Non-hydrostatic Evolution of Ocean WAVE) is capable of taking into account wave breaking, wave dispersion and more, using alternative theoretical formulations and numerical schemes. After winning the 2009 Benchmark Challenge at Oregon State University, the tsunami model has received worldwide attention. Hawai'i, Puerto Rico, American Samoa, and the Gulf coast states have adopted NEOWAVE as the standard model for tsunami inundation mapping under the National Tsunami Hazard Mitigation Program. Chile has adopted NEOWAVE as the national standard for tsunami inundation mapping. A visiting professor from Korea Maritime University and a Fulbright Scholar from the University of Canterbury are currently conducting tsunami research at the University of Hawai'i with the intention of adopting NEOWAVE at their respective institutions. The UNESCO International Tsunami Information Center is planning to assist with its distribution. ([Hawai'i](#), [HRCC](#))

### **Sea Grant helps guide dam removal decision process**

Dams built in Illinois and Indiana over the past 200 years have stood well beyond their life spans. Sea Grant sponsored a series of workshops to inform natural resource managers and others about a variety of stream restoration options and techniques. Local officials used Sea Grant information to remove or modify old dams. With funding from the Great Lakes Fishery and Ecosystem Restoration Program, a section of the dam at Red Mill Pond was removed, the original stream channel was restored, and more than 100 acres of high quality wetlands were preserved. These wetlands serve as the headwaters to the Little Calumet River and are critical to the health of the watershed. ([Illinois-Indiana](#), [HCE](#))

### **Sea Grant discovers that chemicals from x-rays may be toxic in drinking water**

University of Illinois geneticist Michael Plewa's recent studies have revealed that pharmaceuticals that accumulate in drinking water sources can lead to toxic side effects during the disinfection process. The Sea Grant-funded researcher found that hospital wastewater can contain disinfection by-products due to iodinated contrast media (ICM), which is used during the x-ray process. Wastewater treatment plants are unable to completely remove ICM from drinking water. While ICM is nontoxic, it is converted into toxic materials during the drinking water disinfection process. ([Illinois-Indiana](#), [HCE](#))

### **Sea Grant and Regional Planning Commission lead effort to use bioengineering to stabilize shorelines in local communities**

Specialists from Lake Champlain Sea Grant and the Northwest Vermont Regional Planning Commission (NWRPC) held workshops for town and municipal officials on using bioengineered methods for shoreline stabilization and erosion control, and prepared an award winning guidebook on using bioengineering for shoreline stabilization. Although it is an accepted erosion control practice in New England, bioengineering was little used in the Lake Champlain Basin. The education activities had significant impacts:

Isle La Motte and Ferrisburgh, VT, built bioengineered shoreline stabilization structures. Additional projects are being implemented in Westport, NY, and Ferrisburgh, VT. The towns of Colchester and Isle La Motte, VT and Moriah, NY, changed zoning regulations & coastal construction guidelines to require future shoreline construction to use the Sea Grant/NWRPC bioengineering methods. And, the City of Burlington, VT, designed a bioengineered shoreline stabilization project to protect the city's lakeshore bike path & is seeking funding for construction. (Lake Champlain, HRCC, SCD)

#### **Middle school students work to restore impaired brook through Watershed Alliance Program**

Portions of Allen Brook in Williston, VT have been listed on the 303(d) List of Impaired Waters since 1992 due to stormwater runoff and bacteria. A section of the brook near Williston Central School is degraded due to streambank erosion and sedimentation. During the spring of 2009, approximately 90 students worked to improve the habitat along Allen Brook by planting native saplings, installing brush mats and tree tubes, removing honeysuckle and garlic mustard, and sand painting mature trees to prevent damage from beavers. In the spring of 2010, Williston Central School students returned to the site to remove invasive species and reinforce the saplings planted the previous spring. Their 5th -8th grade science teacher has decided to adopt the site with his students to become more permanent stewards of it with support from the Watershed Alliance and Town of Williston Planning Department. On-going restoration work at this site will: Help to improve water quality of & habitat surrounding Allen Brook - Give this group of students the opportunity to know & experience exactly what it means to be stewards of their watershed. (Lake Champlain, HCE, education)

#### **Sea Grant's Marsh Maneuvers camp increases aquatic literacy and trains a new generation of scientists**

Marsh Maneuvers is a memorable educational experience for high school students that has influenced the educational and career decisions of alumni. The goal of the camp is to raise student awareness and appreciation for Louisiana's coastal environment. For the past 25 years, Marsh Maneuvers has provided the opportunity for students to visit the coastal environment, to learn about its natural resources, to appreciate its cultural significance and to realize how the coast affects their lives no matter where they live. High school students are selected from 4H programs for the four-week camp. Pre and post camp test results show that the camp is able to realize its goal of raising students' awareness of and appreciation for the state's coastal environment. Last summer, post camp test scores improved by 17%, overall. Several alumni are employed by state and federal agencies and private environmental companies. Five former camp students are currently pursuing marine degrees; and, two will continue into graduate school. One alumna with her MS in Marine Science was recently hired as a Louisiana Sea Grant Marine Extension Agent. (Louisiana, education)

#### **Sea Grant works to stabilize marsh areas using recycled materials**

Louisiana Sea Grant is working with Floating Islands Environmental Solutions, Inc. (FIES) in Baton Rouge to develop a floating matrix composed of recycled plastic drinking bottles that will help stabilize marsh and island areas. Sea Grant has provided expertise on surface water treatments, regulatory issues and additional markets (e.g., hydroponic plant pollution mitigation). Sea Grant and the Louisiana State University AgCenter also helped evaluate the nutrient removal capacity of these floating islands containing wetlands plants and rhizomes. As a result, FIES has grown and now employs eight full-time employees, with plans to expand. FIES also has contracts in most of the southern states and has deployed products at Disney World and the Chicago Zoo. (Louisiana, HCE, SCD)

#### **Regional Sea Grant research leads to remote detection of invasive marine species in New England**

Sea Grant programs in the Northeast region are assessing whether the invasive marine species *Didemnum vexillum* (a sea squirt) possesses a specific optical signature that could be detected by radiometers on MIT Sea Grant remotely operated vehicles (ROVs) that are used to map organism distributions on the hard bottom within the Gulf of Maine. Preliminary results suggest that this sea squirt possesses a unique reflectance signature that may enhance resource managers' ability to rapidly inventory the distribution of this benthic invasive species and assess its potential impact on ecosystem and fishery resources. (Maine/NE Region, HCE)

### **Sea Grant mapping research lays the groundwork for planning efforts and enhancing navigational safety**

Maine Sea Grant research is developing ways for fishermen and other marine resource users to participate in ocean mapping and to influence planning efforts. Sea Grant and partners have combined place names, direct observations and amended navigational charts into a geographic information system (GIS) to produce a visual representation of fishing and other working areas along the coast of Maine that can then be used in coastal and marine spatial planning efforts (as promoted by the National Ocean Policy). Participatory maps developed as part of this project were used in meetings about offshore wind development, informing discussions with visual layers of compact and accurate data that had been generated by, instead of presented to, the audience. Maine's Island Institute intends to communicate the results to decision-makers to ensure that the maps of marine uses and the communities they represent are included in planning and management initiatives. (Maine, HCE)

### **Sea Grant freezing technique extends the shelf life of blue crabs**

Maryland Sea Grant worked with the Chesapeake Bay Seafood Industries Association on flash freezing as a technique to extend the shelf life of blue crabs. Blue crab seafood processors needed a faster and cheaper technique than pasteurizing for extending the shelf life of blue crab meat and creating a year-round product that could compete with imported crabs. The team tested procedures and performed cost-benefit analyses. A total of six processing companies now use the team's cryogenic freezing techniques, three with equipment purchased through Disaster Relief Funds. It was a "fantastically successful operation," said the executive director of the Chesapeake Seafood Industries Association. (Maryland, SSSS)

### **Maryland Sea Grant Extension improves the science training and job skills of at-risk youths**

Maryland Sea Grant organized workshops to train Maryland Department of Juvenile Services (DJS) teachers to operate an aquaculture system to train at-risk students in a variety of sciences, including biology, chemistry, mathematics, nutrition and small-scale engineering. Five separate Juvenile Youth Centers in Western Maryland now use Aquaculture-in-Action to train juveniles in science and job skills. An average of 100 students per year have earned their General Equivalency Diploma (GED) through the program. The Maryland Department of Labor and Licensing now awards an Aquatic Sciences Certificate to an average of 50 students per year. (Maryland, education)

### **Sea Grant helps whitefish processors turn byproducts into profits**

Commercial whitefish producers in the Great Lakes have struggled to stay in business. Commercial fish producers and processors have recently had challenges meeting regulatory requirements related to the disposal of fish waste. Michigan Sea Grant specialists began working with producers and processors to develop new strategies for managing their waste. A workshop, organized by Sea Grant, focused on fish waste composting and repurposing unused parts of the fish. A new protocol for handling and selling unused fish parts for kosher products was developed. Also, Sea Grant helped establish a business relationship with a large seafood processing company outside of Michigan. Beginning in fall of 2010, Michigan whitefish producers began selling fish frames, pin bone meat, and small fish for use in kosher products, as well as fish heads for lobster bait. The large seafood processing company covers transportation costs and pays \$12,000 per truckload. This new revenue has allowed Michigan fishers to make a profit from waste they had previously been paying to store and send to the landfill. (Michigan, SSSS)

### **Sea Grant researchers examine public attitudes about wind energy development**

Michigan Sea Grant supported a research team to evaluate public concerns about wind energy in coastal regions. Although the public is generally supportive of wind power investments, local residents are often opposed to wind farms in their area. State and local leaders wanted help understanding the basis of public resistance to wind energy, creating productive dialogues, and deciding whether or not to support wind development proposals. Sea Grant conducted a random survey of Michigan residents to better describe public attitudes, and facilitated 16 focus groups in three regions to promote discussion and evaluate strategies for engaging the public. Survey results indicated that attitudes toward wind farm development are shaped by expected economic benefits to the community. The focus groups engaged

public leaders, as well as 60 residents. Leaders provided information about developing wind farms and potential impacts. An evaluation of the effect of these public informational events showed that the events changed the substance and quality of participants' attitudes. Attitudes toward wind farm development became more positive, and confidence in those attitudes grew stronger in comparison with a control group. Project partners are developing educational materials for state and local decision-makers. (Michigan, SCD)

### **Sea Grant helps to improve U.S. ballast water policies and management**

Ballast water legislation in the U.S. was becoming a patchwork of state policies driven by lawsuits and the absence of a federal ruling. Responding to shipping industry requests for assistance to better understand ballast water regulations, Minnesota Sea Grant helped develop the Great Lakes Ballast Water Collaborative (GLBWC), co-sponsored by the International Joint Commission and the Great Lakes St. Lawrence Seaway Development Corp. Through the Collaborative, Sea Grant influenced state and federal ballast water policies by facilitating meetings that clarified the realities surrounding ballast water management; discussing science led industry, governments, agencies, and other stakeholders toward a unified understanding. Minnesota Sea Grant drafted meeting reports that have been cited by the U.S. Geological Survey, EPA-Science Advisory Board, Environment Canada, and other agencies and state governments, as well as the International Maritime Organization of the U.N. The State of Wisconsin credits its 2010 ballast water regulations as an outcome of the work of the GLBWC. The California Lands Commission revised its regulations based on Collaborative documents. The GLBWC created a receptive atmosphere for incorporating science and reason into rule making and prevented costly lawsuits. Collaborative discussions inspired scientists and industry to pursue new solutions for freshwater ballast management issues, including developing best practices that will exceed proposed ballast water discharge standards. The GLBWC co-sponsors commended Minnesota Sea Grant's role in creating and conducting the Collaborative and documenting its progress. (Minnesota, SCD, HCE)

### **Sea Grant examines genetic biocontrol of invasive fish**

This first of its kind international symposium addressed the potential use of genetic biocontrol against invasive finfish and the risks associated with its use. Genetic biocontrol refers to release of genetically manipulated organisms designed to disrupt the survival or reproduction of a targeted invasive species. Genetic biocontrol strategies have the capability to be more effective and targeted than current control methods. Prior to the symposium, eight focus groups were held in six Great Lakes states to assess stakeholder knowledge and concerns regarding the release of genetically modified organisms into the Great Lakes to control invasive species. Results of this effort were reported at the symposium and will be published in *Biological Invasions*. At the symposium organized by Minnesota Sea Grant, nearly 80 participants from seven countries learned about the current status of biocontrol technology and the issues surrounding its use. A special issue of the journal *Biological Invasions* will include two synthesis papers. The first will focus on genetic biocontrol technologies, including a research and development agenda. The second synthesis will include an environmental risk assessment and the regulatory and economic decisions regarding use of genetic biocontrol technologies. In addition to two synthesis papers, several other papers presented at the symposium will be included in the special issue. Synthesis papers will provide decision support for future uses of genetic biocontrol. (Minnesota, HCE)

### **Sea Grant's Living Shorelines Program offers natural erosion control to protect shoreline properties**

Erosion caused by wind and water results in loss of residential and commercial property and terrestrial habitat, reduced storm buffering capacity and water quality degradation. Mississippi-Alabama Sea Grant's Living Shorelines Program educates the public, state and federal regulatory agencies, and private contractors about the benefits of installing natural erosion control structures as an alternative to seawalls and bulkheads (which can create a loss of natural habitat) to protect shoreline properties. A living shoreline uses living plant material, oyster shells, earthen material or a combination of natural structures with riprap or offshore breakwaters to protect property from erosion. Since 2004, Sea Grant personnel have planned and conducted six living shorelines workshops in Mississippi, Alabama and Florida, published three extension publications and made numerous presentations throughout the Northern Gulf of Mexico. The Gulf of Mexico Alliance Training Program adopted the structure and content of these

workshops and has conducted multiple trainings, reaching over 504 participants. As a result of five separate living shoreline projects, more than 2,000 linear feet of living shorelines was installed, protecting 25 acres of salt marsh. The workshops also have proven influential in facilitating change in shoreline protection regulatory policy. In October 2011, the Mobile District of the U.S. Army Corps of Engineers adopted a new Living Shorelines General Permit (GP-10). The general permit will make it easier for businesses, landscape and marine contractors, and shoreline property owners to install natural structures to protect their eroding shorelines as opposed to bulkheads or seawalls. The general permit is applicable within the state of Alabama and will become effective within the state of Mississippi in September 2012. **(Mississippi-Alabama, HRCC)**

### **Gulf of Mexico Sea Grant programs develop unified approach to address regional issues**

The Gulf of Mexico has experienced numerous technological (oil spills) and natural disasters (hurricanes) over the last 10 years, confirming the need for federal and state agencies, universities, non-government organizations and others to collaborate. The four Gulf Sea Grant programs have been responsive to current and emerging regional needs and have developed a unified approach to address regional issues by partnering with multiple NOAA groups, the NOAA Gulf of Mexico Regional Collaboration Team and other federal agencies, as well as serving in leadership positions in several regional collaboration efforts including the Gulf of Mexico Alliance (the coastal regional governance structure). Here are several examples of regional Sea Grant activities:

- Sea Grant and the NOAA Gulf of Mexico Coastal Storms Program are partnering to improve coastal community resilience across the Gulf.
- Sea Grant led the development of the Gulf of Mexico Research Plan (GMRP) and is addressing regional research priorities identified in the plan and has brought many partners and additional resources to address these priorities.
- The programs have expanded a single regional research competition to five regional competitions that address a wide range of research areas, such as restoration, coastal resilience, sea-level rise, ecosystem service valuation, marine mammal interactions and more. These competitions represent approximately \$3.3 million in Gulf of Mexico regional research and outreach funding.
- The Gulf Sea Grant oil spill database has been accessed by 5,700 unique visitors (<http://gulfseagrant.tamu.edu/oilspill/database.htm>).
- Sea Grant extension agents have successfully brought regional tools and services, such as the Sea Grant-developed Coastal Community Resilience Index, peer listening training, seafood safety training and hydrological restoration indicators, to more than 72 communities across the region.

**(Mississippi-Alabama/Gulf of Mexico Region, multiple focus areas)**

### **Sea Grant models are used by industry and agencies to predict coastal change**

Long-term records in Massachusetts show a regional warming trend. Nutrient and pollutant loading in Massachusetts coastal waters has altered the ecosystem and contributed to beach closures. The ability to predict shifts in a complex ecosystem is key to effective management of fisheries, and to maintaining beach health and near-shore water quality. MIT Sea Grant researchers are using a Finite-Volume Community Ocean Model (FVCOM) to provide an accurate picture of coastal changes to support effective ecosystem-based management. FVCOM improved sea level simulation for the state's coast with a readily accessible system. Several private companies have successfully used this model for water quality assessment and resource management. The model has been recognized nationally and used by NOAA (Gulf of Mexico and San Francisco Bay forecast systems) and others. **(MIT, HCE)**

### **Sea Grant helps Cape Ann Fresh Catch expand customer base**

Community Supported Fisheries (CSF) is a new economic model, based on the Community Supported Agriculture model that has transformed urban locations into thriving produce markets. Cape Ann Fresh Catch (CAFC), based on a vibrant historical fishing community, is modeled after a similar CSF operation in Maine. MIT Sea Grant established safe handling requirements for member boats to ensure high quality seafood. MIT Sea Grant also helped CAFC expand its marketing reach and delivery into Boston and surrounding areas. CAFC now serves thousands of customers in 17 Massachusetts communities. The CAFC's business model provides fishers with greater flexibility and a much higher share of the profit (3 -5 times) from their catch. The approach encourages sustainable fishing and minimizes waste. This model has spread to other states. **(MIT, SSSS)**

### **National Sea Grant Law Center informs consumer seafood choice program**

More than 200 sustainable seafood guides are available to consumers. Of them, the Monterey Bay Aquarium's *Seafood Watch Program* may be the most well-known and influential. In response to Virginia Sea Grant, the National Sea Grant Law Center examined whether NGO's expose themselves to liability for publishing/listing out-of-date strictures in consumer choice programs. For instance, Summer flounder remained listed as an item to avoid due to overfishing, despite the findings of NOAA Fisheries that overfishing was not occurring. The Law Center examined the basic requirements for a product disparagement claim and potential application to listing flounder as "seafood to avoid." In September 2010, the Law Center's legal memorandum was shared with the Monterey Bay Aquarium. In January 2011, Monterey Bay released its bi-annual *Seafood Watch* guide with Summer flounder listed as a "good alternative." Law Center research contributed to the new classification. This work has the potential to expand industry market share and increase profits. **(National Sea Grant Law Center, SSSS)**

### **Sea Grant identifies dangers of tar-based sealcoat**

New Hampshire Sea Grant research determined that stormwater samples collected from parking lots treated with coal-tar based sealcoat contained significantly higher polycyclic aromatic hydrocarbon (PAH) concentrations than those treated with asphalt-based sealcoat or those left unsealed. Sealcoat has been banned in Austin, Texas, Minneapolis/St. Paul, Minn., and the state of Washington, and several counties in Illinois and the state of Minnesota are considering banning sealcoat based in part on research conducted by the University of New Hampshire Stormwater Center using Sea Grant funding. **(New Hampshire, HCE)**

### **New Hampshire fishermen using conservation-minded fishing gear in the shrimp fishery**

New Hampshire Sea Grant has worked closely with state and regional scientists to develop shrimp fishing gear technologies that eliminate bycatch and significantly reduce the catch of small male shrimp vital to the sustainability of the fishery. In 2011, more than 30% of the shrimp fleet in New England used technology transferred by New Hampshire Sea Grant. **(New Hampshire, SSSS)**

### **Sea Grant research and extension leads to removal of invasive dune plant species in New Jersey and regional coastal states**

Invasive dune plant species degrade dune ecosystems through loss of biodiversity and changes in physical characteristics of dunes, resulting in reduced shore protection from storms. Several years ago, New Jersey Sea Grant hosted a conference to share its studies on *Carex Kobomugi* (Japanese sedge), along with information on other invasive dune plant species, with targeted scientists, managers and policy/decision makers. In response, New Jersey park leaders initiated an aggressive removal program within Forsythe National Refuge. The state has also since agreed to allow sedge removal from Island Beach; and, the Sea Grant researcher is working with the National Park Service to remove sedge from Sandy Hook, New Jersey. Additionally, two conference attendees from Rhode Island undertook a removal project designed to eliminate two sizeable populations of the sedge in that state. And, the work also reached the mid-Atlantic, when another attendee identified and removed Sea Beach Vitex on Chincoteague Island. **(New Jersey, HCE)**

### **Sea Grant research helps aquaculture programs to rear healthy oysters**

A New Jersey Sea Grant researcher successfully developed a 16-multiplex microsatellite assay for the first time in an aquaculture species. This is a breakthrough in microsatellite genotyping in oysters. The researcher genotyped and assigned all 1,072 progeny to 81 families. This high level of multiplexing greatly saves time and cost, making marker-assisted breeding feasible. This work made it possible to identify the best stock, best parents within a stock, and the best families, enabling aquaculturists to select oyster strains with a strong resistance to disease and a highly likelihood of survival. This research builds on a long body of work by this research team. Virtually every aquacultured oyster on the east coast has benefitted by some aspect of this body of research. **(New Jersey, SSSS)**

### **Sea Grant partners to develop East Coast Winter Storm Climatological and Forecasting Data Website**

New York Sea Grant worked with NOAA's Northeast Regional Climate Center at Cornell University to develop a forecasting website for northeast storms which cause major flooding and damage on the east

coast of the U.S. Sea Grant assembled a team of coastal managers and emergency personnel to help guide website content and design. The partners then developed a site that provides seasonal forecasts of storm activity, historical storm data and access to sites providing real-time environmental measurements. The site automatically matches forecasted storms with the most similar historical events and provides information on the impacts of these events. The website information is now used by three fire districts (covering the entire Nassau County south shore), six villages, and an amateur radio operators association that assists the Red Cross in emergencies (as mandated by the Department of Homeland Security). Two municipalities used information from the site to obtain \$1 million for storm damage restoration and mitigation projects. **(New York, HCE, HRCC)**

### **Sea Grant outreach brings needed research tools to help prevent Viral Hemorrhagic Septicemia virus (VHSV) in Great Lakes fish**

VHS, viral hemorrhagic septicemia, threatens global fisheries and culture as well as the \$1.4 billion sport fishing industry in New York State. Since 2007, New York Sea Grant has educated fish health and culture professionals about VHS in an effort to protect wild fish stocks and maintain the viability of aquaculture in the Northeast. With Sea Grant funding, fish disease experts at Cornell developed a molecular diagnostic tool and generated valuable research essential to prevent and/or contain the disease and its viral pathogen. During 2008-2010, Sea Grant partnered with the researchers and Rhode Island, Pennsylvania and Lake Champlain Sea Grant programs to organize regional workshops to disseminate research results to diverse stakeholder groups. Hatchery managers at Vermont's Fish and Wildlife Department immediately used this information to evaluate their practices and maintain their walleye stocking program. The Sea Grant Association recognized this research and outreach partnership success by presenting the first-ever Research to Application Award to Dr. Paul Bowser of Cornell University College of Veterinary Medicine and Sea Grant Fisheries Specialist David B. MacNeill in October 2010. As of January 2012, VHSV has not been found in any fish culture facility in the Northeastern U.S. **(New York, SSSS)**

### **Sea Grant administers marine mammal bycatch reduction research**

NOAA Fisheries continues to seek North Carolina Sea Grant's partnership to manage its Bycatch Reduction of Marine Mammals Program in the Mid-Atlantic. This is a competitive, peer-reviewed, proposal-based program that invites and funds research by teams including university researchers and stakeholders. Since 2005, nine projects have been funded to reduce bycatch of the protected species. In 2010, projects included a stock study of bottlenose dolphins in which the researchers refined the number of stocks and time they are in specific waters; an analysis of pilot whale entanglements with longlines, noting in particular the depths that the pilot whales favor; and a follow-up to a successful pound-net leader study in the Chesapeake. **(North Carolina, SSSS)**

### **Sea Grant develops efficient, effective electronic reporting method for collecting recreational fishing data**

Recreational fishing data is often difficult to collect, with mailed surveys traditionally utilized well after the angling experience. Finding a method for anglers to more easily submit data, in near real-time, would augment existing survey techniques and help managers get a clearer picture about the health of important fisheries. With funding from Sea Grant, a fishery specialist and a programmer designed a pilot project called RecText, to test their idea. Initially, six Wilmington-area charter boat captains used cell phones to text their fishing reports to an online database using Twitter. Additional testing funded by the state's Coastal Recreational Fishing License Program included offshore fishing tournaments in which the data was sent to a separate designated server. Data collected through RecText may contribute valuable information to state and federal resource managers seeking to improve assessment of gamefish populations. Testing of the system at several major offshore fishing tournaments attracted the attention of Maryland and federal fisheries managers, as well as those in North Carolina. Maryland state officials and NOAA Fisheries are utilizing RecText by testing operational adaptations of the system to receive fisheries data. The N.C. Division of Marine Fisheries continues to evaluate the tool. **(North Carolina, SSSS)**

### **Sea Grant tourism leadership academy provides tools to move Ohio forward**

Tourism is big business on Lake Erie's coastline, contributing \$10 billion in direct spending. The health of Lake Erie's tourism industry is vital for Ohio, as it represents nearly one-third of total tourism economic

impact. Recognizing the powerful role tourism industry leaders could play if they were armed with the necessary tools, contacts and knowledge to make informed decisions, Ohio Sea Grant helped the Ohio Travel Association launch the Ohio Tourism Leadership Academy (OTLA) in 2008. Sea Grant is one of the key partners developing the OLTA and making the OLTA a viable learning experience for selected tourism professionals. Ohio Sea Grant's OTLA coordinator was recognized as a top industry professional. The 16 members of the 2009 Inaugural Class have applied what they have learned, with 80% of participants accepting or pursuing tourism leadership positions. A second class of 13 graduated in the fall of 2010; and third class of 15 started in 2011. Leadership academy class members focus on five key topics: arts and culture; economic development; natural resources and outdoor recreation; legislative advocacy and heritage and culture. Tourism professionals have been able to develop increased confidence in their leadership skills. **(Ohio, SCD)**

### **Sea Grant helps marinas save money and reduce marine pollution**

Ohio Sea Grant's Clean Marinas Program provides an opportunity for marinas to voluntarily adopt EPA-approved pollution control practices that help minimize any potential for water pollution. As of 2010, the program has 42 Certified Ohio Clean Marinas and 30 pledged marina, which comprise 22% of all Ohio Lake Erie marinas, and encompass over 10,000 boat slips. In 2007, the program partnered with Mondo Polymers of Marietta, Ohio, to recycle shrink wrap into plastic blocks used to construct highway guardrails. Since then, more than 1.2 million pounds of shrink wrap and greenhouse plastic from over 120 coastal marinas have been recycled into guardrails that are now protecting over 225 miles of the state's highways. This effort has created jobs in an area outside Lake Erie; saved individual marinas an average of \$700 per year in disposal costs; and produced a reusable, cheaper product for Ohio taxpayers. With help from Ohio Sea Grant, five other states have replicated Ohio's innovative program to recycle their shrink wrap resulting in the collection of 500,000 pounds across the five states. **(Ohio, HCE, SDC)**

### **Sea Grant partners with college to develop the nation's first training program for professional aquarists**

Oregon Sea Grant's Aquatic Animal Health Program partnered with Oregon Coast Community College (OCCC) to develop a professional technical program in aquarium science. Since the program's first cohort in 2003, 55 students have graduated from the program. Over 50 percent of entering students already possess an undergraduate degree in the biological sciences. Ninety-eight percent of the program's graduates have jobs in this profession within six months of graduation whose employment contributes \$1.62 million annually. The program has raised \$6.5 million from federal, state, local, and private funds, including a local bond issue. In August 2011 the program opened a standalone, state-of-the-art aquarium science teaching facility on the OCCC campus. **(Oregon, education)**

### **Sea Grant safety training saves lives**

According to a 2008 study, the Oregon Dungeness crab fishery is the most deadly commercial fishery in the United States. In partnership with the United States Coast Guard, Oregon Sea Grant offers free drill conductor training classes. These classes teach life-saving skills such as marine firefighting, immersion suit donning, flare use, and abandon-ship exercises. Participants are also instructed on how to perform required monthly safety drills on their vessels. Since 1991 over 500 people have taken drill conductor training in Oregon. In 2010 the fishing vessel *Michelle Ann* was fishing off of Oregon during the opening of the commercial Dungeness crab season. Six persons were onboard. An exhaust fire started onboard the vessel and quickly spread into the engine room. The crew of the *Michelle Ann* had recently been through drill conductor training and responded calmly and correctly to the incident, with each person taking his or her pre-assigned post as designated during training. As a result, the vessel was able to make it back to port without any serious injuries to crew. After receiving repairs, the vessel was able to return to the crab grounds. The captain and crew of the fishing vessel *Michelle Ann* stated that it was the training offered by Oregon Sea Grant and the United States Coast Guard that saved their lives and the vessel. **(Oregon, SSSS)**

### **Sea Grant efforts help restore Presque Isle Bay and attract EPA support**

Presque Isle Bay is a 3,655 acre embayment located in northwestern Pennsylvania on the southern shore of Lake Erie. The bay's watershed drains a highly urbanized area of 26.22 square miles, including portions of five municipalities and Presque Isle State Park. In 1991, this bay was listed as a Great Lakes

Area of Concern. Following the listing, the bay continued transitioning from an industrial-dominated zone to one of tourism and recreation. Coordinated efforts to reduce pollution, protect and restore habitat and natural resources, and monitor the results are improving the health of the bay. Pennsylvania Sea Grant developed the Presque Isle Bay Watershed Restoration, Protection, and Monitoring Plan as a blueprint for these efforts. In October 2010, the Erie County Conservation District, in partnership with Sea Grant and others began implementing the Plan by with \$485,212 in U.S. EPA Great Lakes Restoration Initiative funds to complete the stabilization of 1,100 feet along Cascade Creek, planting 2,200 feet of riparian buffer along the stream to an average depth of 50 feet, providing fish habitat, and reducing sedimentation from erosion by an estimated 80.8 tons each year. **(Pennsylvania, HCE)**

#### **Sea Grant conservation efforts save 189 acres of watershed land**

Urbanization of the Lake Erie watershed has resulted in reduced population densities and sprawling intrusions into former natural areas. Conserving environmentally-significant properties protects wildlife habitat, fights sprawl, maintains water quality and aesthetics and, in most cases, provides public access for fishing, hunting, bird watching and other recreational activities. In 2010, efforts to conserve environmentally-sensitive lands have resulted in the successful purchase of property from three property owners, and funding for a fourth conservation project. Also, Sea Grant has engaged in conservation efforts on an additional six properties. In 2010, 189.75 acres of land including 980 linear feet of Lake Erie bluff and shoreline and 4,210 linear feet of tributary streams to Lake Erie were permanently conserved. The costs to purchase these four properties (fee simple and easement) totaled \$1,337,846. **(Pennsylvania, SCD)**

#### **Sea Grant works with Puerto Rico municipalities and EPA to enhance stormwater management**

Puerto Rico Sea Grant partnered with the EPA on stormwater management. Sea Grant provided capacity building to the 78 municipalities of Puerto Rico. As a result, to date, 70 Puerto Rico municipalities have active permits for stormwater management. **(Puerto Rico, HCE, HRCC)**

#### **Sea Grant works with coastal communities in Puerto Rico to improve evacuation routes**

Sea Grant held focus groups in the communities of San José, El Seco and El Maní. Participants provided information on their knowledge and practices regarding coastal hazards and response measures, such as: tsunamis, hurricanes, storm surges, evacuation routes, home safety protocols and resiliency. Among other concerns, they also identified climate change as a priority issue. Participants stated that current evacuation routes are not the best, due to their proximity to the sea and riverbanks. Discussions from the focus groups identified and located, for each community, the best routes and scenarios for evacuation in a map. Education programs and outreach from local and state agencies were also identified as a priority to develop together future evacuation and relocation plans based on the unique needs and socioeconomic and cultural characteristics of each community. **(Puerto Rico, HRCC)**

#### **Sea Grant integral to development of first federally-approved Ocean SAMP**

Rhode Island Sea Grant worked with the state's Coastal Resources Management Council to develop and implement a coastal and marine spatial planning tool known as Special Area Management Plans (SAMPs). SAMPs are scientific ecosystem-based management plans that comprehensively review ecosystems, regulatory environments and social structures, and propose guidance on regulations to be adopted by the state. On July 22, 2011, Rhode Island's 7th SAMP became the largest ever, covering nearly 1,500 square miles. The SAMP incorporates extensive research and input from state, federal, tribal and local agencies that address healthy habitats, commercial and recreational fishing, cultural heritage, recreation and tourism, renewable offshore wind energy, and global climate change. **(Rhode Island, HCE, SCD)**

#### **Sea Grant aquaculture protocols turn nuisance algae into a marketable product**

Oyster aquaculture is a growing economic sector of Rhode Island's seafood industry, and is rapidly becoming a profitable niche market for both growers and restaurateurs. One limitation in the culture process is algae biofouling at oyster farms. Nuisance algae adds expense since it must be removed prior to bringing the oysters to market. Sea Grant funded a researcher and an innovative oyster grower to integrate a major nuisance alga, *Gracilaria* (an edible seaweed), into the growing process as a harvestable crop that could be marketed to consumers. The oyster grower and researcher developed

protocols for integrating the Gracilaria into ongoing oyster aquaculture processes, and the algae is now part of a multi-trophic aquaculture system. The grower is currently collaborating with researchers to perform nutritional assays and develop processing techniques to bring Gracilaria into restaurants and the marketplace. This kind of value-added product could help enhance the economic stability of oyster farming in Rhode Island waters. **(Rhode Island, SSSS)**

#### **Sea Grant leads development of ocean observing regional association in the Southeast**

The South Carolina Sea Grant Consortium developed, nurtured, and spun off the Southeast Coastal Ocean Observing Regional Association (SECOORA; [www.secoora.org](http://www.secoora.org)), one of 11 regional associations established through the Integrated Ocean Observing System (IOOS®) network. SECOORA coordinates coastal and ocean observing activities and facilitates dialogue among stakeholders in the southeastern United States. In 2002, the Sea Grant Consortium was asked by university and ocean leaders in the region to foster the development of the region's ocean observations program. The Consortium convened a diverse 10-member Steering Committee, consisting of representatives from state government, academia, industry, and business, to oversee and direct the growth of the organization. From 2002-2010, the Sea Grant Consortium and SECOORA successfully competed for more than \$6 million in federal NOAA funding to support the organization's growth and maturation, focusing on its ocean observing assets, data generation and integration, stakeholder engagement, and organizational and fiscal management. In 2010, SECOORA was spun off from the South Carolina Sea Grant Consortium and officially became an independent, nonprofit corporation. SECOORA consists of 46 dues-paying member organizations, and a host of partnering institutions. **(South Carolina, HCE)**

#### **Sea Grant's Beach Sweep/River Sweep removes tons of litter from South Carolina beaches and waterways each year**

South Carolina's natural resources account for billions of dollars in economic output for the state. Clean beaches, marshes, and waterways are critical to support commercial and recreational boating and fishing, wildlife viewing, tourism, and other industries. The South Carolina Sea Grant Consortium initiated Beach Sweep/River Sweep in 1988, and then partnered with the S.C. Department of Natural Resources in 1990 to extend this litter removal program statewide. Through the use of volunteers and funding provided by the private sector, this annual litter cleanup contributes to the economic, environmental, and societal well-being of the state. In 2010, 4,700 volunteers statewide collected 24 tons of litter from South Carolina's beaches, marshes, and waterways, recycling as much debris as possible. There were 125 coastal site captains covering 140 cleanup locations in each of the eight coastal counties. The estimated dollar value of Beach Sweep/River Sweep volunteers' time is \$200,784 (Independent Sector, 2010). Volunteers gained an increased awareness of the fragility of natural resources and the importance of keeping them litter-free. By participating in Beach Sweep/River Sweep, the public is more informed about natural resource issues, such as litter's detrimental effects on the landscape and wildlife, and people are empowered to take action and become environmental stewards. **(South Carolina, HCE, SCD)**

#### **Texas shrimp industry profitability boosted by fuel-saving trawl gear technology**

For Gulf of Mexico shrimp fishermen, fuel costs are a major operating expense. Gulf shrimp trawlers can use up to 80,000 gallons of diesel per vessel each year. Reducing operating expenses through reduced fuel consumption will improve vessel profitability and buoy an industry struggling to compete with less expensive shrimp imports and high fuel prices. Since 2008, Texas Sea Grant has provided technology transfer assistance to cooperating shrimp fishermen in the Gulf of Mexico and South Atlantic to expand the use of fuel-saving trawl gear. Reported fuel savings ranged from 20% to 39%. To date, more than 85% of the Cameron County, Texas shrimp fleet (132 vessels) has switched to the new fuel-saving trawl gear. Since 2008, county-wide fuel savings were estimated to be 7.3 million gallons of diesel, valued at \$17.8 million. Additional savings are accrued through reductions in both the frequency of oil and filter changes and major engine overhauls. An estimated 200 jobs were saved because without these fuel savings, many of the vessels would have remained idle. **(Texas, SSSS)**

#### **Trade Adjustment Assistance training improves the efficiency, competitiveness and long-term sustainability of the Texas shrimp fishery**

Wild U.S. shrimp stocks are healthy, but the Gulf and South Atlantic shrimp fisheries have been challenged by increasing worldwide supplies and a global supply chain that is rapidly being dominated by

imported farm-raised shrimp. Texas Sea Grant led a successful collaborative effort among the state Sea Grant programs from North Carolina to Texas, and various seafood organizations in those states, to qualify for Trade Adjustment Assistance (TAA) by the U.S. Department of Agriculture's Foreign Agricultural Service. TAA provides a variety of reemployment services and benefits to workers who have lost their jobs or suffered a reduction of hours and wages as a result of increased imports or shifts in production outside the United States. As a result of this federal assistance, Texas Sea Grant developed training materials for shrimp fishermen and conducted intensive workshops to provide technical and business support to the fishermen, with the goal of improving the efficiency, competitiveness and long-term sustainability of the fishery. To date, 857 shrimp fishermen have attended workshops from Port Arthur to Port Isabel, Texas. Upon completion of the initial course, applicants received \$4,000. An additional \$8,000 was provided once a long-term Business Adjustment Plan was approved. This program has the potential to bring in a total of \$10.2 million to support the Texas Gulf shrimp fishery. Furthermore, it will help the Texas shrimp fishery be better prepared to compete with foreign imports. **(Texas, SSSS)**

#### **Sea Grant low-impact development ordinance endorsed by Los Angeles mayor**

University of Southern California (USC) Sea Grant worked with the former Public Works Commissioner and the Bureau of Sanitation to develop a low-impact development ordinance that was endorsed by City Council. As a result of these efforts, Los Angeles Mayor Villaraigosa signed the ordinance. The ordinance seeks to balance multiple uses and to optimize environmental sustainability. Sea Grant's work is helping coastal communities make efficient use of land, energy and water resources and protect the resources needed to sustain coastal ecosystems and quality of life. **(Southern California, SCD)**

#### **Sea Grant partners with Aquarium of the Pacific to develop innovative educational film about the importance of marine transportation**

The Aquarium of the Pacific (AoP) attracts 1.3 million visitors annually and is located at the edge of the Port of Long Beach, the nation's second busiest seaport. In 2009, AoP leadership proposed a new exhibit using NOAA's "Science on a Sphere," an innovative education tool utilizing computers and video projectors to display planetary data onto a six foot diameter sphere, analogous to a giant animated globe. AoP contacted USC Sea Grant to help develop a film for "Science on a Sphere" about marine transportation and goods movement. Sea Grant's marine transportation expert served as a technical advisor on the film, participating on an advisory committee to help conceive, develop and produce the film. Over an 18-month period, he reviewed scripts and made contacts for the filming with seaport officials. The film is shown to thousands of visitors to the AoP, daily, and will be exhibited by other operators of NOAA's "Science on a Sphere," potentially reaching over one million visitors annually. Aquaria visitors are now better educated about the importance of marine transportation to local and national economies. **(Southern California, SCD)**

#### **Sea Grant provides access to capital, helping businesses thrive**

Technical assistance provided by Virginia Sea Grant has helped dozens of businesses, including marinas and boat yards, and hundreds of registered boaters, realize financial benefits. Sea Grant has supported the marine recreational boating industry by enhancing communications and trust between the government and private sector, and by providing research and training to support access to funds under Department of Interior Boating Infrastructure Grant Program (BIG). BIG competitive applications have helped generate almost \$1 million of new investment at Commonwealth marinas. That direct funding translated into \$2.1 million in economic impact to Virginia, which was further increased by \$600k in match from local marinas and communities, for a total impact of \$2.7 million during 2010-2011. This level of economic output in the marina sector is associated with 34 full time employments. **(Virginia, SCD, SSSS)**

#### **Sea Grant researchers show that management actions have led to blue crab recovery in the Chesapeake Bay**

In 2008 and 2009, Virginia regulatory agencies implemented tough new management actions to address a severe decline in the Chesapeake Bay blue crab population. These actions were met with skepticism by the commercial sector. Stakeholders felt that it was important to evaluate the effectiveness of the measures to gain confidence and to improve management efforts in the future. Virginia Sea Grant researchers implemented a study to quantitatively examine the effects of these management actions on the blue crab population in the Chesapeake Bay. The researchers demonstrated quantitatively that the

blue crab population in Chesapeake Bay has recovered from its severe decline due to management actions in 2008 and 2009. This information validated the management actions and reinforced the need to implement strong management when attempting to restore a fishery population in decline. (Virginia, SSSS)

### **Sea Grant research provides early support for the Ocean Observatories Initiative, a \$386M National Science Foundation program**

Understanding of seafloor processes has been hampered by the lack of real-time observations of the Juan de Fuca Ridge, a chain of hydrothermal vents (undersea volcanoes) off the ocean coasts of Washington and British Columbia. From 1984 through 1990, Washington Sea Grant funded oceanographers to explore the feasibility of creating a linked network of sensors, cameras and robots to monitor hydrothermal and other seafloor activities along the Juan de Fuca Ridge and other sites. Sea Grant's research investment provided early support for what has become the \$155 million regional scale node of the Ocean Observatories Initiative (OOI), a \$386 million National Science Foundation program. When completed, the network will gather real-time information on chemical, geological and biological activities 2.5 miles beneath the ocean surface. The OOI will enable powerful new scientific approaches for exploring the complexities of earth-ocean-atmosphere interactions, thereby accelerating progress toward the goal of understanding, predicting and managing our ocean environment. (Washington, HCE)

### **West Coast Sea Grant programs take action to address impacts of ocean acidification on Pacific shellfish operations**

For the past six years, the Pacific shellfish industry has suffered from oyster larval mortalities and recruitment failures in both hatcheries and wild populations. The problem may be linked to increasing ocean carbon dioxide levels along the West Coast and a corresponding decrease in the saturation state of the carbonate minerals that shellfish use to create their shells. However, understanding the role of ocean acidification requires the integration of ocean observing measurements, laboratory exposure studies, shellfish recruitment and other data in relation to ocean conditions. The West Coast Sea Grant programs partnered with regional ocean observing systems and the California Ocean Science Trust to convene a workshop in Costa Mesa, CA with 51 participants, including tribal, state and federal managers, industry representatives and leading academic researchers and oceanographers. The workshop produced recommendations for improving cross-disciplinary interactions, observing capacity and data accessibility. A steering committee was created to work on a sustainable observing system for ocean acidification that addresses the needs of the shellfish industry, resource managers and the academic research community. The steering committee received a Moore Foundation grant to develop a strategy and enhance communication among a variety of data collectors relevant to ocean acidification effects on shellfish. As a result of this work, modifications to hatchery operations have successfully reduced mortalities. (Washington/Regional SSSS, HCE)

### **Sea Grant scientist's groundbreaking spawning method earns patent**

Last year, the United States Patent Office awarded a Wisconsin Sea Grant scientist a patent for a yellow perch spawning method that enables the year-round production of perch fingerlings. This fish is native to the region, but depleted in Lake Michigan so that no further commercial harvest is allowed. Sea Grant partnered with Will Allen (one of Time Magazine's 100 most influential people) to provide expertise on aquaponics, water quality, fin fish husbandry and biology to raise yellow perch for Allen's non-profit, Growing Power. Growing Power's successful yellow perch model has been adapted into a for-profit called Sweet Water Organics, which also relies on Sea Grant technology and biology. Sweet Water Organics hired a workforce of 10 that they hope to triple by the end of 2012. Last year, the business sold 3,000 yellow perch, which can command more than \$16 a pound in the marketplace. Sea Grant's research and technical expertise have helped bolster "buy-local" food production and created a marketing phenomenon in the Great Lakes and other regions as well. (Wisconsin, SSSS)

### **U.S. EPA adopts Sea Grant model to track toxicity from heavy metals in aquatic environments**

There are 30 Areas of Concern (AOC) on the U.S. side of the Great Lakes border. These areas have been targeted for a watershed approach to ecosystem remediation and restoration. Metals such as mercury, copper and cadmium can have a negative impact on an ecosystem, but are historically difficult to measure in situ. A Wisconsin Sea Grant researcher developed an analytical approach to defining the

physicochemical forms of methylmercury, copper and cadmium in water. This model enables more accurate estimation of bioconcentration factors and toxicity of these metals. The model was adopted by the U.S. EPA to predict the toxicity of trace elements to various organisms in these Areas of Concern. (Wisconsin, HCE)

### **Sea Grant water quality data acquisition system benefits Massachusetts shellfish farmers and residents**

Water quality is of paramount importance, especially as it relates to water bodies that support aquaculture. Developing concerns about changing pH and subsequent ocean acidification, as well as increasing water temperatures make relevant the importance of sophisticated systems to measure water quality in order to better monitor trends and/or changes. In 2001, with additional Southeastern Massachusetts Aquaculture Center funding, Woods Hole Sea Grant and Barnstable County Extension staff purchased YSI brand multi-parameter sondes to monitor water quality over the long-term. Since YSI locations are adjacent to large-scale aquaculture zones, they provide data used to correlate with growing conditions, timing of oyster overwinter removal/deployments and disease events. By 2010, five units were deployed in four towns at locations in close proximity to aquaculture zones, representing more than 200 shellfish farmers. Additionally, two of the sites provide real-time data relay to a website. In addition to the continued data collection at the standard sites, one unit was redeployed closer to an area experiencing unexplained hard clam mortalities for about 25 growers. This in-situ placement was critical in documenting site conditions that may have been contributing to the mortalities. More than 200 shellfish farmers benefit from this information. Data are also made available to schools, marinas, and general public. (Woods Hole, HCE, SSSS)

### **Fifteen coastal communities participate in Barnstable County, MA Municipal Shellfish Propagation Program**

Through its municipalities, Barnstable County, Massachusetts strives to maintain shellfish resources for both commercial and recreational fishermen, as well as for natural resource enhancement. Woods Hole Sea Grant is overseeing implementation of the county-wide Municipal Shellfish Propagation Program, which provides bulk remote quahog and oyster seed designed to help towns avoid costly and late seed arrival problems, as well as to ensure continued shellfish resource enhancement. Fifteen coastal communities within Barnstable County participate in the program. Since 1999, on an annual basis, more than 145 million quahog seeds and over 19,000 oyster remote set bags have been purchased. In 2010 alone, combined funds purchased more than 12 million quahog seeds and 2,800 oyster remote set bags. If 50% of the 2010 quahog seed survive to harvest size, at \$.13 per clam, the potential total wholesale value would equal \$780,000. There are approximately 3.5 million oyster seeds in 2,800 remote set bags. If 50% of the 2010 seed oysters survive to harvest, at \$.50 per oyster, the potential wholesale value would equal \$875,000. (Woods Hole, SSSS)