PIER 2019 Annual Report

Puerto Rico Sea Grant

Official Level of Effort - Only Approved Funding

Report Generated by YULISSA GARCIA on 12/13/2021

Back to Top

2019 Level of Effort

National Focus Area Name	SG Federal	Match	Pass Thru	Federal + Match + Pass Thru	LOE without Leverage (%)	Leveraged (Managed)	LOE with Leverage (%)
Healthy Coastal Ecosystems	$409,899	$220,683	$0	$630,582	31 %	$20,432	31 %
Sustainable Fisheries and Aquaculture	$240,722	$152,432	$0	$393,153	19 %	$20,432	20 %
Resilient Communities and Economies	$339,720	$152,432	$3,500	$495,652	24 %	$23,932	25 %
Environmental Literacy and Workforce Development	$288,167	$152,432	$71,500	$512,099	25 %	$20,432	25 %
TOTAL ALL FOCUS AREAS:	$1,278,508	$677,979	$75,000	$2,031,486	100 %	$85,228	100 %

Back to Top

2019 Impacts & Accomplishments

Close to Two-Thousand Students from the Dominican Republic School System Benefitted from the Adoption of Puerto Rico Sea Grant Coral Reef Educational Tool

National Focus Areas: Environmental Literacy and Workforce Development

- Impact
- Approved

Recap: Puerto Rico Sea Grant coral reef educational tool has been adopted in the Dominican Republic to educate students about the importance of conserving coral reefs and its relationship to the local economy and quality of life.

Program Focus Areas: Environmental Literacy and Workforce Development

Relevance: Coral reefs function as a coastal barrier, provide food and habitat for many marine species, produce sand, and afford many social and economic benefits to coastal communities. However, marine ecosystems in the Caribbean are under constant threat from several factors including, coastal development, human resource use and climate change. It is fundamentally important to raise awareness among resource users about the importance of its conservation.

Response: Puerto Rico Sea Grant is collaborating with the Dominican Republic Bezos Educational/Reefs of the Future Program, a joint effort between the Dominican Reef Network and the Center for Conservation and Eco-Development of Samaná Bay, to facilitate the implementation of our educational tool at their schools. The goal of this effort is to educate close to three thousand (3,000) students between the ages of 6 to 18, about the value of coral reefs to the marine environment and its importance to local communities and to their quality of life. The Puerto Rico Sea Grant tool provides coral reef scientific content and field activities to aid teachers at all educational levels.

Results: The Dominican Republic Reefs of the Future Educational Program is utilizing the Puerto Rico Coral Reef curriculum educational tool in 20 public and private schools at the municipalities of Samaná del Mar, Samaná, Sánchez, Miches, Juan Dolio and Santo Domingo. To date, 1,851 students from all levels benefited from the activities and fieldtrips offered.

Partners: Dominican Reef Network and the Center for Conservation and Eco-Development of Samana Bay;

Associated Project(s):
Communications and Publications (2018 - 2021)

Back to Top

Student Exposure to Research Process Leads to Acceptance into an Important Internship in the Health Field

National Focus Areas: Environmental Literacy and Workforce Development

- Impact
- Approved

Recap: PRSG educational advice facilitates opportunity for internship to high school student, a unique experience aiding in the student's academic and professional success

Program Focus Areas: Environmental Literacy and Workforce Development

Relevance: Promoting scientific research is important since it helps to increase knowledge, make discoveries, explain the world around us, find effective solutions to different situations and improve our quality of life. Research components are fundamental in school curriculums since they provide students essential analytical, critical thinking and problem-solving skills to effectively function in our society. In Puerto Rico, many of our students do not feel motivated to perform research projects, because of the lack of resources or effective leadership.

Response: Puerto Rico Sea Grant supports students interested in scientific research projects by providing orientation, information, materials, instruments, facilities, and guidance through the process. During 2019, our program advised a student from a public school in Mayaguez on the development of a Science Fair research project about the impact of Hurricane Marla in the sand composition of several beaches in western Puerto Rico.

Results: The student observed important changes happening in our coasts as a result of extreme events like hurricanes. She placed fourth in the competition. After this experience the student competed and was selected among 15,000 students from the American Nation, to a health summer internship INTO 2019 Step Up from the National Institute of Diabetes and Digestive and Kidney Disease. As part of her research experience she collaborated on a paper titled Hydrogen Sulfide Reactivity with Oxy Myoglobin: Sulfmyoglobin formation with Dr. Juan López Garriga, from the University of Puerto Rico at Mayaguez, which was later successfully presented in Washington.

Partners: Puerto Rico Department of Education;

Associated Project(s):
Communications and Publications (2018 - 2021)

Back to Top

Puerto Rico Sea Grant Provides Marine Science Professional Development Opportunities to Local Teachers to Enhance Ocean Literacy

National Focus Areas: Environmental Literacy and Workforce Development; Healthy Coastal Ecosystems

- Impact
- Approved

Recap: Puerto Rico Sea Grant developed a successful teacher-training model to instruct interested educators about marine topics, provide educational tools and materials, and motivate them to collaborate to enhance ocean literacy in the archipelago. The model received high marks from participant educators.

Program Focus Areas: Environmental Literacy and Workforce Development; Healthy Ecosystems and Habitats

Relevance: Puerto Rico's K-12 students' deficiencies in ocean literacy skills result from scarce training opportunities and educational materials and resources. There is an urgent need to provide teachers with educational tools, materials, and ocean literacy capacity building opportunities (workshops, field trips, stewardship activities).

Response: Puerto Rico Sea Grant developed and conducted workshops for K-12 teachers and educators to address marine science topics including coastal ecosystems processes and interactions, wise use, conservation, and resilience. P

Results: One-hundred and twelve (112) teachers from K-12 levels were trained in marine science topics including the structure and function of coastal and marine ecosystems. This effort represents savings of $19,040.00 to the Puerto Rico Department of Education if they were to pay for the teachers training. Teachers and educators received updated information and educational materials to enrich the instructional experience of students. Pre and post assessment of participants' knowledge gain was of 82.7%. It is anticipated that 15,023 students will benefit from this effort.

Partners: Puerto Rico Department of Education;

Associated Project(s):
Towards potential beach nourishment in Rincon: RTK beach mapping, sediment compatibility analysis and an online tool for data sharing (2014)

Back to Top

Puerto Rico Sea Grant Marine Ecosystems Curriculums Successfully Embraced by Public and Private Schools as Educational Tools to Advance Ocean Literacy

National Focus Areas: Environmental Literacy and Workforce Development

- Impact
- Approved

Recap: Puerto Rico Sea Grant Marine Grass Beds, Mangroves and Coral Reefs curriculums were successfully embraced as educational tools by thirty (30) private and public schools proving to be effective in the education of one-hundred and fifty thousand (150,000) elementary, middle and high school students. Students from Puerto Rico learned about marine ecosystems through the application of Puerto Rico Sea Grant educational tools, validating that the integration of coastal and marine ecosystems as natural learning environments is a top priority for our students.

Program Focus Areas: Environmental Literacy and Workforce Development

Relevance: Marine and coastal resources of Puerto Rico are increasingly threatened by overdevelopment, pollution and other inappropriate uses, climate change impacts and by the harmful effects of natural extreme events. Educating and increasing students' awareness about the proper, sustainable, and wise use of our coastal and marine resources from an early age, is crucial to their conservation. Curricular marine science materials and capacity development opportunities for teachers in these topics are scarce, making imperative the insertion of these topics into school curriculums.

Response: Puerto Rico Sea Grant developed three coastal and marine ecosystems educational tools which were endorsed by the Puerto Rico Department of Education (PRDE) to be used as the source of ocean literacy development at private and public schools. These guides aim to educate about the ecological importance and conservation of mangrove forests, marine seagrass beds and coral reefs. An essential component to guarantee the success of this effort is the training of participant teachers through the coordination of workshops, field trips and educational activities, to assist them in the incorporation of these topics. These tools can be adapted to different educational levels and are being translated to English to be used at the US Virgin Islands.

Results: Puerto Rican schools successfully integrated PRSG marine ecosystems educational tools as part of their Science curriculum. Approximately seven hundred fifty-five (755) teachers and educators from thirty (30) public and private schools and educators from natural resources management agencies, integrated these tools in their educational efforts. Close to one hundred and fifty thousand (150,000) elementary, middle, and high school students pre and post-tests show a significant ocean literacy educational gain. Teachers trainings and workshops offered by Puerto Rico Sea Grant represent savings of $124,440 to the Puerto Rico Department of Education.

Partners: Puerto Rico Department of Education; Puerto Rico Department of Natural and Environmental Resources;

Associated Project(s):
Communications and Publications (2018 - 2021)

Back to Top

Puerto Rico Sea Grant Develops Crucial Component for Marine Education

National Focus Areas: Environmental Literacy and Workforce Development; Healthy Coastal Ecosystems

- Impact
- Approved

Recap: Puerto Rico Sea Grant developed educational guides on the topics of mangroves, sea grass beds, and coral reefs that are being used by 30 schools as part of a pilot project to augment ocean literacy among students.

Program Focus Areas: Environmental Literacy and Workforce Development; Healthy Ecosystems and Habitats

Relevance: Schoolteachers are in great need for resources to educate their students about topics relevant to marine and coastal ecosystems, its conservation and sustainable use.

Response: The curriculum is a crucial component of any education process and taking advantage of this opportunity Puerto Rico Sea Grant got involved in the design and development of three educational guides of essential coastal and marine habitats: mangroves, sea grass beds, and coral reefs. Each guide contains background information about the ecosystem, pre and post-tests, plans, educational activities and exercises, complementary and supplementary materials, pictures, illustrations, stories, and music, all aligned with the Federal standards and those of the Puerto Rico Department of Education.

Results: Guides have been approved by the Department of Education and have been implemented in over 30 schools, together with the hands on workshops to educate teachers about these three marine and coastal habitats and how to use the guides in their education efforts.

Partners: None listed in Database

Associated Project(s):
Communications and Publications (2018 - 2021)

Back to Top

Addressing Decompression Sickness Crisis of Commercial Fishermen

National Focus Areas: Sustainable Fisheries and Aquaculture

- Impact
- Approved

Recap: Puerto Rico Sea Grant and partners develop extension effort to change artisanal subaquatic fishermen diving practices and reduce vulnerability to decompression sickness.

Program Focus Areas: Sustainable Fisheries and Aquaculture

Relevance: Loss of essential fish habitats, as a result of natural extreme events, pollution, overfishing and an austere economic situation, compel commercial fishermen of Puerto Rico to adopt SCUBA as the preferred and most effective fishing practice due to its high level of selectivity, specially to catch lobsters and conch. However, without adequate diving training or equipment, mishaps and accidents are common because of excessive repetitive deep dives that surpass appropriate bottom time. For these reasons, fishermen are increasingly suffering from decompression sickness, which requires treatment at the sole Hyperbaric Chamber in the archipelago, located at the Puerto Rico Department of Health (PRDH) in San Juan, congesting the facilities which patrons other clients.

Response: At the request of the medical staff of the Hyperbaric Chamber of the PRDH, PRSG developed an extension project, to understand the root of the decompression sickness in artisanal diving fishermen issue and elaborate measures to reduce health risks to artisanal diver fishermen and the economic burden to the DH. Dive profiles were documented to learn about improper diving practices and develop actions needed to reduce them as well as health vulnerabilities. Educational efforts were conducted including visits to fishermen diving centers, select divers to develop the profile, interview fishermen divers, design the instrument to evaluate the dive profiles, interview hyperbaric chamber personnel, and contact elected officials at municipalities where fishermen divers live and conduct their fishing activities.

Results: Puerto Rico Sea Grant produced an analysis of diving profiles by convincing fishermen divers to wear a diving computer for two weeks to record diving practices. Information gathered included diving days, number of dives per day, depth, and bottom time of each dive. Since these divers do not use depth or time gauges, a map of preferred fishing grounds for each region was produced to be used as a reference tool to aid doctors in estimating depth dives for the selection of the Hyperbaric Chamber treatment protocols. An educational video about safe diving practices for fishermen was produced in collaboration with NOAA's Caribbean Fisheries Management Council. Puerto Rico Sea Grant also successfully secured collaboration from mayors of the municipalities of Cabo Rojo (West coast) and Humacao (East coast) who allocated $10,000 each to provide formal SCUBA trainings to be designed by the UPR Department of Marine Sciences.

Partners: Autonomous Municipality of Cabo Rojo, PR; Puerto Rico Health Department; Caribbean Fishery Management Council (CFMC); Hyperbaric Medicine;

Associated Project(s):
Marine Outreach Program (2018 - 2021)

Back to Top

Puerto Rico Sea Grant Trained Artisanal Fishermen to Benefit from Economic Opportunities in Recreational Fishing

National Focus Areas: Sustainable Fisheries and Aquaculture

- Impact
- Approved

Recap: Puerto Rico Sea Grant motivated a group of local artisanal fishermen from Guánica to take advantage of their fishing knowledge launching into the marine recreation industry providing fishing lessons to recreational anglers. This economic opportunity has significantly contributed to the wellbeing of these fishermen, who confronted difficult times after hurricanes Irma and María and during the seasonal conch closures.

Program Focus Areas: Sustainable Fisheries and Aquaculture

Relevance: A combination of declining fish stocks, degraded habitats, high operational costs, natural hazards (hurricanes, earthquakes) and economic austerity has affected the socioeconomic status of Puerto Rico's artisanal fishermen forcing them to find other means of making a living and reduce uncertainty.

Response: Puerto Rico Sea Grant enabled leaders from the Salinas Providencia Ward Fishing Association in Guánica to take advantage of the economic opportunities offered by marine recreational fishing by increasing their self-confidence and providing opportunities to volunteer as trainers. Fishermen were assured of their mastery of the trade and that this experience and knowledge qualified them to provide services to recreational fishermen. As part of their training, fishermen presented in the third Sea Grant/4-H Fisheries and Aquaculture Summer Camp. They offered participants an introduction to recreational fishing based on their experiences and professional knowledge. This opportunity provided them the needed self-assurance and self-esteem to consider chartering and teaching recreational fishermen as a genuine alternative for income generation.

Results: Guánica fishermen are already generating income by providing access to basic hook and line fishing, developing fishing skills and techniques and chartering fishing services. They are serving a diverse clientele from Boy Scout troops to local school groups.

Partners: Salinas Providencia Ward Fishing Association, Inc.;

Associated Project(s):
Marine Outreach Program (2018 - 2021)

Back to Top

Sea Grant/4-H Fisheries and Aquaculture Summer Camp Participants are Accepted at the UPR Aquaculture Program

National Focus Areas: Sustainable Fisheries and Aquaculture

- Impact
- Approved

Recap: Three talented economically-disadvantaged high school students were positively impacted and recruited through positive experiences and individual attention to the exciting aquaculture, sustainable fisheries and scientific research fields

Program Focus Areas: Sustainable Fisheries and Aquaculture

Relevance: Issues like lack of foreign exchange, political unrest, or lack of transportation are food security major concerns that have been exacerbated by climate variability, price volatility and overconsumption. Over the next decades, food production systems will have to provide appropriate foods for a nutritious diet to a world population of 9 billion people.

Response: Puerto Rico Sea Grant designed and coordinated a summer camp to recruit potential new college students to the areas of fisheries and aquaculture sciences by facilitating access and educational experiences to a marine science research field station, an agricultural experimental station and a private aquaculture farm.

Results: Twenty-five (25) students from the 4-H Youth organization with interest in fisheries and aquaculture sciences and academic potential were selected to participate and benefit from instructional experiences about the crucial role fisheries and aquaculture research will play during the next decades with regards to world food security and coastal and marine ecosystems management. Three of the participants interested in the food security and fisheries and aquaculture topics were recruited and accepted to the University of Puerto Rico, Department of Agricultural Sciences Aquaculture Program.

Partners: Caribe Fisheries, Inc.; Puerto Rico Department of Natural and Environmental Resources; University Of Puerto Rico, Mayaguez (UPR); Astronomic Society of the Caribbean; Puerto Rico Department of Education; 4-H Clubs Program; University of Puerto Rico, Agricultural Extension Service 4-H Youth Club; University of Puerto Rico, Department of Marine Science;

Associated Project(s):
Marine Outreach Program (2018 - 2021)

Back to Top

Responsible Consumers are Essential for Sustainable Fisheries: Is that fish edible?

National Focus Areas: Sustainable Fisheries and Aquaculture

- Impact
- Approved

Recap: Puerto Rico Sea Grant marketing efforts have developed an interest in the consumption of underappreciated fishes, creating new nutritional alternatives for consumers, economic opportunities for fishers and restaurant owners, and developing shifts in consumer preferences away from unsustainable, depleted fisheries stocks.

Program Focus Areas: Sustainable Fisheries and Aquaculture

Relevance: Even though the Archipelago of Puerto Rico is rich in diversity of commercially important fisheries, many of the species marketed by fishmongers and restaurants are subjected to seasonal closures to protect their populations during the spawning season. While Puerto Rican seafood consumers prefer well known species, there is room in the seafood system for underutilized fish, provided it is marketed effectively.

Response: Partnering with the Caribbean Fisheries Management Council and The Nature Conservancy, Puerto Rico Sea Grant developed the educational and gastronomical campaign Responsible Consumer Leads to Sustainable Fisheries. Educational materials including placemats and posters depicting some of our edible fishes, were created and disseminated in seafood restaurants, fish markets and fishers associations. A five-course dinner at a local restaurant was coordinated to promote the consumption of underappreciated fish species.

Results: The education of fish consumers about underappreciated fish species reached thousands of consumers through the dissemination of 8,660 colorful, educational and reusable placemats; presentations and publications; conversations with 62 restaurant owners and chefs; visits to fish markets and fishers associations.

Partners: Caribbean Fishery Management Council (CFMC); The Nature Conservancy;

Associated Project(s):
Marine Outreach Program (2018 - 2021)

Back to Top

Puerto Rico Sea Grant Effort Motivates Thirty-Five Restaurants to Market Lionfish, Preventing Further Spread and Controlling Existing Populations

National Focus Areas: Sustainable Fisheries and Aquaculture

- Impact
- Approved

Recap: Puerto Rico Sea Grant develops marketing effort to generate an alternative economic opportunity for artisanal fishermen from fishing and selling lionfish while preventing further spread and control existing populations.

Program Focus Areas: Sustainable Fisheries and Aquaculture

Relevance: Lionfish is an invasive species that has adapted very successfully in Caribbean marine ecosystems. They are known as voracious predators, whose expanding populations continue to threaten the well-being of coral reefs and other marine ecosystems through the consumption of juvenile fish from important commercial fisheries. It has very few natural predators in our waters, making its propagation extremely successful, dramatically swelling in the past 15 years.

Response: Puerto Rico Sea Grant developed an educational effort to create a lionfish food market for seafood consumers and economic opportunities for fishers and restaurants. This effort included workshops and meetings to promote lionfish removal activities and cookout festivals, chef competitions and seafood demonstrations, and providing lionfish fishing equipment to artisanal fishermen divers. An invasive lionfish food fish market effort was promoted among restaurant owners and chefs, and an alternative economic opportunity was developed f or artisanal fishermen. This economic opportunity has been adopted by more than 35 restaurants, which agreed to offer lionfish on their menus and close to 20 fishermen who are fishing this invasive species.

Results: The 20 fishermen who received the Zookeepers and Hawaiian slings are fishing and selling lionfish to restaurants in southwest Puerto Rico. Puerto Rico Sea Grant has become a clearing house for lionfish information providing lionfish posters, cookbooks and information to fishermen, restaurant owners, fish consumers, students and the general public.

Partners: Caribbean Fishery Management Council (CFMC); Isla Mar Research Expeditions;

Associated Project(s):
Marine Outreach Program (2018 - 2021)

Back to Top

Puerto Rico Sea Grant Helps Eradicate Lionfish Invasive Species from the Tres Palmas Marine Reserve

National Focus Areas: Sustainable Fisheries and Aquaculture

- Impact
- Approved

Recap: Puerto Rico Sea Grant efforts eradicate lionfish from the Tres Palmas Marine Reserve enhancing more than 200 acres of this marine protected area.

Program Focus Areas: Sustainable Fisheries and Aquaculture

Relevance: Lionfish is an invasive species that has adapted very successfully in our marine ecosystems. They are also voracious predators that consume juvenile fish from important commercial fisheries. Since they have very few natural predators and because its propagation is extremely successful, there is a great concern about how these species are threatening the ecological dynamics of marine protected areas, including the Tres Palmas Marine Reserve (TPMR).

Response: Puerto Rico Sea Grant developed an educational effort to create a lionfish food market for seafood consumers and economic opportunities for fishermen and restaurants including how to fish it safely and where to sell it.

Results: In September 2019, Puerto Rico Sea Grant coordinated the Lionfish Festival at Tres Palmas Marine Reserve. Community members and volunteers participated in a lionfish removal activity which provided fresh fish for the cooking contest. More than 200 acres of marine protected areas were enhanced by this two-day event . This was a joint effort with the Caribbean Fisheries Management Council, Isla Mar Research Expeditions, the Department of Natural and Environmental Resources and the NGO Amigos de Tres Palmas.

Partners: Isla Mar Research Expeditions; Puerto Rico Department of Natural and Environmental Resources; Amigos de Tres Palmas; Caribbean Fishery Management Council (CFMC);

Associated Project(s):
Marine Outreach Program (2018 - 2021)

Back to Top

Puerto Rico Sea Grant Sparks Marine Species Restoration Program at the DNER's Fisheries Resources Lab

National Focus Areas: Sustainable Fisheries and Aquaculture

- Impact
- Approved

Recap: Puerto Rico Sea Grant advisory efforts improved practical aquaculture techniques of private land-based aquaculture entrepreneurs and were the spark to initiate the Puerto Rico Department of Natural and Environmental Resources (DNER) marine species stock restoration program at the Fisheries Resources Laboratory.

Program Focus Areas: Sustainable Fisheries and Aquaculture

Relevance: Since wild-capture of fish will not be able to meet global future demands, aquaculture offers a viable solution for the production of seafood products. The most appropriate solution to this problem is the development of cultured systems based on artificial fish spawning and juveniles production in commercial hatcheries for grow-out with artificial feeds under controlled physical/chemical conditions.

Response: Puerto Rico Sea Grant provided specialized outreach advisory to expand and improve the understanding of marine and freshwater aquaculture, aquaponics and population restocking, to general stakeholders, private entrepreneurs and resource managers (Puerto Rico Department of Natural and Environmental Resources).

Results: As a result of these efforts, nine (9) general stakeholders and three (3) private entrepreneurs modified their practices applying the gained knowledge in aquaculture trainings for freshwater aquaponics, shrimp reproduction and ornamental aquarium settings for educational outreach purposes. Projects on stock restoration for two commercial species have been initiated by the Puerto Rico Department of Natural and Environmental Resources under close consultation with Puerto Rico Sea Grant. These species are the mutton snapper (Lutjanus analis), a marine species categorized as near threatened, and the freshwater fish species Sicydium plumieri, the larvae of which is known as "Setí", which develops in the marine environment and is commercially fished at the mouth of rivers while migrating upstream.

Partners: Caribbean Fishery Management Council (CFMC); Caribe Fisheries, Inc.; Puerto Rico Department of Natural and Environmental Resources; US Fish and Wildlife Service (US DOI, FWS); Puerto Rico Department of Agriculture;

Associated Project(s):
Marine Outreach Program (2018 - 2021)

Back to Top

Anticipating Extreme Events and Climate Change Impacts, PRSG Provides Eleven Formal Training/Workshops to Improve Management, Planning and Adaptation Strategies to Reduce Vulnerability and Increase Resiliency in 46 Municipalities

National Focus Areas: Resilient Communities and Economies

- Impact
- Approved

Recap: Puerto Rico Sea Grant and partners coordinated eleven (11) certified training/workshops on coastal inundation mapping, flood hazards, planning for disaster recovery, natural disaster awareness, and planning for disaster debris removal. Three hundred (300) planners,

engineers, emergency managers, community leaders and architects from thirty (30) coastal municipalities and sixteen (16) non-coastal municipalities of Puerto Rico benefitted from these trainings and educational opportunities.

Program Focus Areas: Resilient Communities and Economies

Relevance: Hurricanes Irma and Maria devastated Puerto Rico and the US Virgin Islands and highlighted the need to educate and train professionals in the areas of coastal inundation mapping, flood hazards, planning for disaster recovery, natural disaster awareness and planning for disaster debris removal to underscore awareness of the impacts of future natural disasters. Capacity building and professional training can provide essential information and tools to develop awareness to natural disasters, climate change adaptation, and resilience and mitigation strategies.

Response: Puerto Rico Sea Grant in collaboration with NOAA Office for Coastal Management and the National Disaster Preparedness Training Center of the University of Hawaii provided formal training in Puerto Rico for planners, engineers, emergency managers, community leaders, architects and public workers to improve management, planning and adaptation strategies related to natural disasters.

Results: Puerto Rico Sea Grant coordinated eleven (11) certified training/workshops related to coastal inundation mapping, flood hazards, planning for disaster recovery, natural disaster awareness, and planning for disaster debris removal. Over 300 participants from 30 coastal municipalities and 16 non-coastal municipalities of Puerto Rico were certified. Pre and post-test assessments indicated a significant improvement of 70% in participant content knowledge.

Partners: University of Hawaii at Manoa, National Disaster Preparedness Training Center; NOAA-Office for Coastal Management (OCM);

Associated Project(s):
Marine Outreach Program (2018 - 2021)

Back to Top

Puerto Rico Sea Grant Collaborates with NOAA and Community Members in Stony Coral Tissue Loss Disease Rapid Assessment at Tres Palmas Marine Reserve

National Focus Areas: Healthy Coastal Ecosystems

- Impact
- Approved

Recap: Community members participate in Stony Coral Tissue Loss Disease rapid assessment at Tres Palmas Marine Reserve to collect up to date data on the current state of coral reefs

Program Focus Areas: Healthy Ecosystems and Habitats

Relevance: During the 2019 NOAA Coral Reef Monitoring Program cycle, researchers from Puerto Rico identified two sites at the Tres Palmas Marine Reserve that exhibit signs of what they thought might be a Stony Coral Tissue Loss Disease outbreak (SCTLD). To confirm or dismiss this presumption, NOAA and the Atlantic and Gulf Rapid Reef Assessment (AGRRA) suggested that additional monitoring was necessary.

Response: In October 2019, Puerto Rico's Department of Natural and Environmental Resources requested Puerto Rico Sea Grant's collaboration to help them coordinate a Stony Coral Tissue Loss Disease rapid assessment at Tres Palmas Marine Reserve (TPMR), specifically at the two sites previously identified by local researchers. Special attention to D. cylindrus, M. meandrites, M. jacksoni colonies was requested.

Results: On November 10, 2019, a total of 10 volunteers participated in the Stony Coral Tissue Loss Disease rapid assessment at Tres Palmas Marine Reserve. Puerto Rico Sea Grant's role included volunteer recruitment, facilitation of equipment and the coordination of safety logistics. The divers were able to cover an area of 26,664 square meters within the Tres Palmas Marine Reserve. Rapid assessment results will be part of the Map of Stony Coral Tissue Loss Disease Outbreak in the Caribbean (https://www.agrra.org/coraldisease-outbreak) and will be used by NOAA's Puerto Rico Coastal Zone Management Program in the design of strategies to address this issue.

Partners: Amigos de Tres Palmas; Puerto Rico Department of Natural and Environmental Resources; Sociedad Ambiente Marino;

Associated Project(s):
Marine Outreach Program (2018 - 2021)

Back to Top

Puerto Rico Sea Grant Collaborates with Mi Playa Limpia Removing 3,355 Pounds of Trash from Coastal Habitats Educating Resource Users on Solid Debris Disposal and Removal

National Focus Areas: Healthy Coastal Ecosystems

- Impact

- Approved

Recap: Puerto Rico Sea Grant empowered local community leaders to develop an educational effort to educate resource users about the proper disposal of solid debris to improve ecosystem health and enhance recreational beach activities

Program Focus Areas: Healthy Ecosystems and Habitats

Relevance: Marine recreation and tourism is Cabo Rojo's largest industry. The accumulation of debris on public beaches and neighboring marine ecosystems continues to threaten ecosystem function, public health, recreational activities, and beach-related economic opportunities. Despite the recognition that marine debris is a deterrent to recreational and economic opportunities, community members need technical, environmental and logistical assistance to become part of the solution.

Response: Cabo Rojo community members identified Buye beach as the preferred natural attraction to kick-off the educational efforts to improve solid waste disposal irresponsible practices, and create awareness about the impacts of marine debris in coastal ecosystems and the local economy. In April 2019 Puerto Rico Sea Grant, community members and the Cabo Rojo municipality carried out the first "Basura Challenge Buye". A total of 554 pounds of debris were collected and appropriately disposed.

Results: Given the huge success of the first "Basura Challenge Buye" event, community members incorporated a non-profit organization called "Mi Playa Limpia Inc." and carried out the second "Basura Challenge Buye" in which a total of 288 pounds of debris were collected, and 360 volunteer hours were donated, enhancing 11.8 acres of coastal habitats. Since Mi Playa Limpia Inc. was incorporated, 2,513 additional pounds of marine debris have been removed from Cabo Rojo's beaches.

Partners: Autonomous Municipality of Cabo Rojo, PR; Mi Playa Limpia, Inc.;

Associated Project(s):
Marine Outreach Program (2018 - 2021)

Back to Top

Developing a Solution to the Dilemma of Household Waste: Transforming Waste into Food?

National Focus Areas: Resilient Communities and Economies

- Impact
- Approved

Recap: Puerto Rico Sea Grant instructed over 80 families on alternatives to separate and transform organic household and fanning waste into food for plants. This effort resulted in a 16% reduction on household waste disposal and 44% increase in the reutilization of materials by participant families.

Program Focus Areas: Resilient Communities and Economies

Relevance: Puerto Rico generates large amounts of solid waste, has a very low recycling rate, and has not established incentives for waste reduction for citizens and industries. This situation is affecting our natural environment and negatively impacting the tourism industry.

Response: PRSG and the NGO ACRES, Inc. developed an outreach project, financed by the Toyota Foundation ($16,740) to educate and change attitudes about proper waste management practices. During the project implementation, an organic demonstration farm was established in the municipality of San German as a field demonstration to educate about the transformation of organic waste into food for plants (by composting and vermicomposting) and animals (like fly larvae "Black Soldier") in a closed cycle, recycling all the organic material.

Results: Over 80 families were trained on alternatives to separate and transform organic household and farming waste into food for plants (as organic fertilizer) and animals (birds, cattle, pigs, fish and house pets). A 16% reduction in household waste disposal and 44 % increase in material re-use was documented by participant families.

Partners: Guama Comunidad Agro ecoturística (GCA); Agricultura con Conciencia Rural, Ecologica y Sustentable (ACRES, Inc.);

Associated Project(s):
Marine Outreach Program (2018 - 2021)

Back to Top

Youth Ocean Explorers Summer Program Promotes the Broadening of Participation in STEM

National Focus Areas: Environmental Literacy and Workforce Development; Healthy Coastal Ecosystems; Resilient Communities and Economies

- Impact
- Approved

Recap: The Youth Ocean Explorers Summer Program engaged 62 students in middle and high school on St Croix and St. Thomas. Combined efforts have helped to train the next generation of marine scientists and promote the broadening of participation in STEM.

Program Focus Areas: Environmental Literacy and Workforce Development; Healthy Ecosystems and Habitats; Resilient Communities and Economies

Relevance: Key points have been identified when students lose interest in STEM (Science, Technology, Engineering, Mathematics); primarily around middle school. This leaky STEM pipeline can be attributed to numerous causes such as a lack of engagement in science concepts and limited science professionals that could serve as role models for these students. As a result, many local Virgin Islanders do not envision themselves holding a career in the sciences which further intensifies this gap in science participation.

Response: Since 2017, the Youth Ocean Explorers Summer Program immerses enrolled students into: 1) project-based learning activities, 2) authentic, place-based research opportunities, and 3) possible career paths in the sciences. YOE has received additional support and program guidance from the National Science Foundation's INCLUDES program to better structure the program content around the geosciences. Partnering with the Coki Dive Shop, 24 program participants have been able to receive scuba training to prepare them for careers in marine science.

Results: The Youth Ocean Explorers Summer Program has engaged to date 131 middle and high school aged students. Employment has been provided to 20 high school and college level students to assist with the facilitation of the program. Continued community support has surpassed $60,000 each year since 2018 which has aided in the expansion of the program. These combined efforts have helped to train the next generation of marine scientists and promote the broadening of participation in STEM.

Partners: University of Virgin Islands; Virgin Islands Department of Education; Virgin Islands Department of Planning and Natural Resources; National Park Service (US DOI, NPS); USVI Coki Dive Center; USVI Youths Diving with a Purpose; USVI Coastal Estuarine Research Federation; USVI-Coral World Ocean Park; USVI-Established Program to Stimulate Competitive Research (VI-EPSCoR);

Associated Project(s):
Virgin Islands Marine Advisory Service (2018 - 2021)

Back to Top

Teachers Apply and Evaluate Puerto Rico Sea Grant's Educational Tools as a Master's Degree Research Topic

National Focus Areas: Environmental Literacy and Workforce Development

- Impact
- Approved

Recap: Two high school teachers completed their degrees by applying and evaluating Puerto Rico Sea Grant curricular tools, materials, and experiences to their instructional efforts

Program Focus Areas: Environmental Literacy and Workforce Development

Relevance: In Puerto Rico, there is a great need for ocean literacy education resources, videos curricula, lesson plans and teacher training opportunities. Most teachers, as part of their jobs, are constantly searching for ways to increase their knowledge in order to provide quality experiences for students. Many of them opt for graduate studies (Masters and Ph.D.) to face educational challenges and the instructional demands from the population served.

Response: PRSG designed and developed four (4) curriculum guides that provide teachers with the tools needed to teach about marine and coastal ecosystems, and climate change. Furthermore, our program provides teacher trainings to integrate curriculum content into their classrooms. Educators and students are also offered the opportunity to collaborate in special projects that provide analytical development, critical thinking and research skills including UNESCO's Sandwatch Project.

Results: Two (2) teachers completed their master's degree by successfully integrating Puerto Rico Sea Grant marine ecosystems curricular guides in their instructional efforts. Prof. Denys R. Rios Grafals created a Marine Sciences course based on Puerto Rico Sea Grant marine ecosystems curriculum guides and the Sandwatch Project. The course has been offered since 2017 in Robinson School in San Juan. Prof. Brenda Estevez presented a portfolio demonstrating the efforts made in several environmental projects based on Puerto Rico Sea Grant curriculum guides educational tools.

Partners: Puerto Rico Department of Education;

Associated Project(s):
Communications and Publications (2018 - 2021)

Back to Top

Puerto Rico Sea Grant Publishes New Climate Change Curricular Tool Impacting Over 20,000 Students and Saving the Puerto Rico Department of Education over $2,000,000

National Focus Areas: Environmental Literacy and Workforce Development

- Impact
- Approved

Recap: Puerto Rico Sea Grant educational tools impacted 20,250 students educating them about global warming and the importance of building capacity to face extreme situations and enhance resiliency. Savings for the PRDE reach $2,000,000 in teacher training and curriculum development.

Program Focus Areas: Environmental Literacy and Workforce Development

Relevance: Climate change, global warming, and their effects are increasingly prevalent on our planet. Increased temperatures, glacial melting, sea-level rise, droughts, floods, more powerful hurricanes and coastal erosion are causing serious damage to both ecological and social systems alike. In 2017, our archipelago was struck by hurricanes Irma and María, which devastated our country and fundamentally, exposed the need to educate our decision makers and general population about climate change and the importance of building capacity to face extreme situations and become more resilient.

Response: Puerto Rico Sea Grant designed a curricular guide about climate change that contains scientific background, a Power Point presentation with notes for the teachers, daily lesson plans, field activities, laboratory assignments, assessment tools, pre and post-tests. This educational tool also includes a student manual, a children's storybook, and an activity book. The curriculum is aligned with the educational standards established by the Federal Department of Education and the Puerto Rico Department of Education (PRDE). It also provides the flexibility to be adapted for different levels. Training workshops and field trips are part of the educational package provided to educators by our program.

Results: The Puerto Rico Department of Education (PRDE) endorsed Puerto Rico Sea Grant's three Marine Ecosystems Curriculums and the Climate Change Curriculum educational tools and is a collaborator in the implementation of these curriculums in public schools. The PRDE shared with PRSG that they typically pay a fee of $170 per teacher per hour for teacher training, and that their cost for developing a curriculum is about $100,000. Sea Grant was able to provide these services at no cost to the schools. One hundred and eighty-two (182) teachers from public and private schools have been trained on the implementation of these educational tools, representing savings to the PRDE of about $372,000 in teacher training at market value ($170/hr *2,188 training hours). Furthermore, close to fifteen hundred (1,430) Science educators have been trained on the climate change curriculum through lectures and workshops offered by PRSG. This represents further savings of close to a million and a half dollars ($1,458,600) to the PRDE if they were to pay for the training at current market value ($170/hr * 8,580 training hours) and over two hundred thousand dollars ($200,000) savings on the cost for curriculum development (2 curriculums developed that would typically have a cost of $100,000 each) which were developed by PRSG. The latest numbers show that 20,250 students have increased their ocean literacy by the implementation of the PRSG educational tools and understand the importance of marine ecosystems and climate change to humankind, can communicate about marine ecosystems and climate change in a meaningful way and are able to make informed and responsible decisions regarding marine ecosystems and climate change.

Partners: None listed in Database

Associated Project(s):
Communications and Publications (2018 - 2021)

Back to Top

Puerto Rico Sea Grant Sponsored High School Students Win Second Place in Robotics Competition

National Focus Areas: Environmental Literacy and Workforce Development

- Accomplishment
- Approved

Recap: Puerto Rico Sea Grant sponsors high school students team apply math, science, technology, and engineering concepts to win second place in robotics tournament

Program Focus Areas: Environmental Literacy and Workforce Development

Relevance: Robotics is increasingly becoming an important and useful learning tool for our children and youths, developing skills to incorporate knowledge from Sciences, Mathematics, Engineering and Technology. These skills, allow students to analyze different situations, develop their critical thinking, increase their research capabilities, stimulate their curiosity and reinforce their ability for teamwork. In Puerto Rico, more opportunities are needed for students to integrate this type of technology into their learning process.

Response: PRSG sponsored a group of high school students in a robotics tournament as part of the National Aeronautics and Space Administration's (NASA) 60th anniversary, and the 50th anniversary of the first trip to the moon. Their research project identified ways to grow plants in microgravity and the design and programming of a LEGO EV-3 robot to perform a series of missions centered around the main theme.

Results: After competing with 29 other teams, the Galalions - Sea Grant Team achieved second place in the general development evaluation for their research project as well as for their performance in the robotics competition. Students employed scientific, mathematical, technological, and engineering concepts to build and program the robot, using their creativity, intellects and capacity for research and investigation. It was a very thorough project that doubtless motivated their desire to keep striving for their goals.

Partners: Monserrate León de Irizarry School; Puerto Rico Department of Education;

Associated Project(s):
Communications and Publications (2018 - 2021)

Back to Top

Puerto Rico Sea Grant Book "Fresh Water Fishes of Puerto Rico" Highlights Unsustainable Human Development Actions and Practices that Broke and Modified Fresh Water Fishes Migratory Patterns

National Focus Areas: Environmental Literacy and Workforce Development; Healthy Coastal Ecosystems; Sustainable Fisheries and Aquaculture

- Accomplishment
- Approved

Recap: PRSG publishes the book "Fresh Water Fishes of Puerto Rico" that highlights unsustainable human development actions and practices that broke and modified fresh water fishes migratory patterns and the need to reverse these practices

Program Focus Areas: Environmental Literacy and Workforce Development; Healthy Ecosystems and Habitats; Sustainable Fisheries and Aquaculture

Relevance: Puerto Rico has nine native freshwater fish species, all of which require contact with marine environments during some phase of their life cycle. Unsustainable human development has considerably impacted freshwater ecosystems and native freshwater fish face a variety of threats. Flooding control strategies strongly impacted the distribution and composition of fish species and their communities by altering movement pathways of sediments in water systems due to land-use changes and stream channelization projects in urban areas. These practices broke and modified the migratory patterns and life cycles associated with the development of freshwater species and thus the native species assemblages became overtaxed, while the establishment of exotic species remains rampant.

Response: Puerto Rico Sea Grant produced a book on fresh water fishes of Puerto Rico with illustrations and information about habitat, reproduction, feeding, and population. The book provides information regarding the need to reverse practices that broke and modified the migratory patterns and life cycles associated with the development of freshwater species. The book was written by University of Puerto Rico, Mayaguez Campus professors Sean A. Locke, Ph.D. and Carlos Santos, Ph.D.

Results: The book has already been completed and is available in electronic version for free at the Puerto Rico Sea Grant Web Page.

Partners: None listed in Database

Associated Project(s):
Communications and Publications (2018 - 2021)

Back to Top

Development of a Cost-Efficient Assessment Tool to Prevent the Establishment of Invasive Marine Species in Puerto Rico

National Focus Areas: Healthy Coastal Ecosystems

- Accomplishment
- Approved

Recap: This PRSG project provides resource managers with a practical tool kit to help prevent local ecosystem damage and economic losses from invasive species, while integrating outreach activities to increase stakeholder awareness and stewardship of Puerto Rican waters.

Program Focus Areas: Healthy Ecosystems and Habitats

Relevance: Biological invasions have been estimated to cost $314 billion per year to the US economy. Critical to management are cost-efficient assessment tools to quickly detect the arrival of new species, monitor the spread of established ones, understand the introduction pathways utilized by invasive species, and design adequate containment and eradication plans.

Response: PRSG funded a project that focuses on ascidians as bioindicators of invasive species introductions, spread and ecosystem impacts. Through extensive on-site surveys, researchers have constructed a Puerto Rican ascidian 'Species Catalogue', a 'Watch List', and will design an accessible, web-based 'Assessment Tool' to identify, monitor and manage species introductions along the Puerto Rican coastline.

Results: Researchers identified 45 ascidian species in Puerto Rican harbors and marinas: 12 native, 12 cryptogenic (of unknown origin), 12

introduced, and 9 unclassified. Stakeholder involvement is now critical to ensure continuous species monitoring and long-term mitigation of the negative impacts of species introductions. Invasion processes are dynamic and new species can arrive and spread at any time. Accordingly, researchers are now focusing this effort on results dissemination and outreach efforts targeting diverse stakeholder groups.

Partners: University of North Carolina, Wilmington (UNCW);

Associated Project(s):
Development of a Cost-efficient Assessment Tool to Prevent the Establishment of Invasive Marine Species in Puerto Rico (2018 - 2019)

Back to Top

Benthic foraminifera and the FORAM Index: application and implementation in the coral reef monitoring plan in Jobos Bay National Estuarine Research Reserve System in Puerto Rico

National Focus Areas: Healthy Coastal Ecosystems

- Accomplishment
- Approved

Recap: Foram Index values show that most of the fore reef and lagoonal sites between Cayo Caribe, Cayo Barca, Cayo Morrillo, and Cayo Pajaros are "conducive for reef growth". In particular, the fore reef side of Cayo Caribe is an "environment not conducent for reef growth and unsuitable for recovery".

Program Focus Areas: Healthy Ecosystems and Habitats

Relevance: Implementing benthic foraminifers (shelled protists) and its associated FORAM-Index as an indicator of coral health and provides stakeholders a fast response bioindicator that will serve as an "early" warning system for coral reef monitoring.

Response: PRSG research project is currently evaluating the application of benthic foraminifera (shelled protists) as a proxy of coral reef water quality. By engaging in a multi-year seasonal study, researchers aim to identify the optimal sampling sites, as well as the best time of the year, to maximize the efforts of Jobos Bay National Estuarine Research Reserve personnel.

Results: Although no relation is observed between the recorded abiotic variables and Foram Index, preliminary results are of importance for the resource managers (primary stakeholders) since it is indicating that the conditions for Cayo Caribe are much stressed and they can take proactive action. Once all the data is gathered and analyzed, discussions will take place with regards to the feasibility of the Foram Index and the possibility of amending current monitoring policies in Jobos Bay to use this index to monitor and assess coral health.

Partners: Jobos Bay National Estuarine Research Reserve, Department of Natural and Environmental Resources; Florida A&M University (FAMU);

Associated Project(s):
Benthic Foraminifera and the FORAM Index: Application and Implementation in the Coral Reef Monitoring Plan in Jobos Bay National Estuarine Research Reserve System in Puerto Rico (2018 - 2019)

Back to Top

Invasive Species Helps Prove Marine Reserve Efficiency

National Focus Areas: Healthy Coastal Ecosystems; Sustainable Fisheries and Aquaculture

- Accomplishment
- Approved

Recap: Preliminary analysis of lionfish abundance inside and outside two large marine protected areas in the US Virgin Islands showed 20% - 30% higher densities of lionfish inside both marine protected areas.

Program Focus Areas: Healthy Ecosystems and Habitats; Sustainable Fisheries and Aquaculture

Relevance: This research provided one of the first assessments of the effectiveness of marine protected areas in providing natural control of lionfish abundance on mesophotic coral reefs (30m - 50m depth) in the US Caribbean. This is important because more than 60% of US Virgin Islands coral reefs are mesophotic but the majority of lionfish removals occur on reefs less than 30m depth. Thus a large biomass of lionfish are still present and will require different approaches to reduce their potential impact of deep reef fish native populations.

Response: This project provided important data on lionfish populations on deep coral reef habitats and inside and outside marine protected area boundaries. This will provide natural resource managers with the data to make informed decisions regarding the invasive lionfish. It also provided excellent technical diver training opportunities for student divers in the Marine and Environmental Science master's degree program, many of which are using technical diving in their thesis research.

Results: The data collected from this research is still being analyzed so conclusions from this study will be forth coming.

Partners: University of Virgin Islands; Center for Marine and Environmental Studies-UVI; NOS Coral Reef Conservation Program;

Associated Project(s):
Are the two largest Marine Protected Areas in the United States Virgin Islands working? (2018 - 2019)

Back to Top

Understanding Direct and Indirect Land-based Sources of Pollution on Early Life History Stages of Corals

National Focus Areas: Healthy Coastal Ecosystems

- Accomplishment
- Approved

Recap: This project quantifies how differences in water quality may impact the earliest life history stages of reef-building corals, with the goal to inform coral reef management options in the face of coral reef degradation due to coastal land-use patterns

Program Focus Areas: Healthy Ecosystems and Habitats

Relevance: Vulnerable early life history stages of corals, such as settlers and juveniles, are particularly susceptible to both anthropogenic stressors and competitive interactions, which may act synergistically to amplify any negative outcomes. There has been little work done on quantifying impacts to early life history stages of corals in the US Virgin Islands, and this project aims to fill that research gap and inform management strategies related to impacts of multiple stressors on coral recruitment success.

Response: PRSG research addresses gaps in our knowledge of coral recruitment rates and juvenile abundance and survival by quantifying recruitment and juvenile success at sites exposed to different levels of impact from human development. Researchers will assess water quality at these sites by measuring sediment accumulation rates and nutrient signatures, and determine how water quality and associated benthic communities differ between coral reefs near highly developed watersheds (high impact) compared with less developed watersheds (low impact).

Results: Information from this study will help us to understand how human development affects the early life history of reef-building corals and identify management strategies to conserve reefs and maintain their contributions to ecosystem function and economies.

Partners: University of Virgin Islands; University of Mississippi (OLE MISS); University of Alabama (UA);

Associated Project(s):
Understanding Direct and Indirect Impacts of Land-based Sources of Pollution on Early Life History Stages of Corals (2018 - 2019)

Back to Top

Ciguatoxin Detection and Model Predictions for Use in Fisheries Management in Puerto Rico

National Focus Areas: Sustainable Fisheries and Aquaculture

- Accomplishment
- Approved

Recap: Though we know a good deal about the actual Ciguatoxi (CTXs) found in fish, we know relatively little about how these toxins accumulate in food webs. Researchers mapping effort will help predict these ciguatera areas and the ECOPATH model will produce a time course after an algal bloom is detected.

Program Focus Areas: Sustainable Fisheries and Aquaculture

Relevance: Ciguatoxin is a serious human health issue in tropical areas where people consume reef fishes. Ciguatera losses in the US are estimated at $15 to $22 million annually due to increased hospitalizations, lost work and lost fisheries. Globally, there are about 25,000 - 50,000 cases reported annually, with many of these cases occurring in Puerto Rico and the U.S. Virgin Islands (USVI) alone (Tosteson,1995).

Response: PRSG researchers mapped CTX hotspots in Puerto Rico and St. Thomas, USVI through various key informants from the commercial and recreational fishing sector and seafood dealers in the region with expert knowledge of the fisheries and species involved.

Results: Hotspots in Puerto Rico and USVI for ciguatoxin (CTX) have been identified by ethnographic fieldwork, with species of fishes commonly associated with the disease enumerated. Fishes from CTX hotspots and cold spots have been tested using the neuroblastoma N2A cellular bioassays. Hotspot areas have toxic fishes (great barracuda and hogfish), but the cold spot areas have no toxin in the fishes tested so far (great barracuda and hogfish among others). Gambieridiscus sp. dinoflagellates have been positively identified from hotspot areas. Species and strains are being characterized now with the PCR reaction, and cell counts are being determined for use in the food web model.

Partners: East Carolina University (ECU); University of Puerto Rico, Ponce;

Associated Project(s):

Puerto Rico Sea Grant Empowers Coastal Municipalities K-12 Students Through Tsunami Awareness Education and Preparation to Take Positive Action Rather than Feel Fear

National Focus Areas: Environmental Literacy and Workforce Development; Resilient Communities and Economies

- Accomplishment
- Approved

Recap: Puerto Rico Sea Grant, with the logistical assistance of its collaborators, developed a two-day professional development workshop for k-12 teachers to help them teach about tectonics and earthquakes specific to the Caribbean region, while empowering them to take positive actions rather than feel fear before, during and after the tsunamis.

Program Focus Areas: Environmental Literacy and Workforce Development; Resilient Communities and Economies

Relevance: Tsunami hazard is a reality in Puerto Rico. In 1867 and 1918, two tsunamis affected our coastal region, causing death and destruction. Vulnerability to this natural hazard is very high because Puerto Rico has a very high population density near the coast and recreational and tourist activities are concentrated at the coast. Recent tsunami events around the world have shown the value of tsunami education and preparedness in saving lives of students and staff. The demography of each school and its surrounding area add to the necessary uniqueness of each school's tsunami preparedness plan to include hazard education, evacuation training and practice.

Response: Puerto Rico Sea Grant with the logistical assistance of its collaborators developed a two-day professional development workshop for k-12 teachers to help them teach about tectonics and earthquakes specific to the Caribbean region, while empowering them to take positive actions rather than feel fear before, during and after the tsunamis. Collaborators from the Puerto Rico Seismic Network, the Puerto Rico Department of Education and the University of Puerto Rico at Humacao Campus facilitated learning via practicing classroom activities, interactive lectures, and peer collaboration.

Results: A total of 15 educators attended the workshop, from which 90% registered in the 2019 Great Puerto Rico Shake Out. They practiced how to drop, cover, and hold on, during this drill. Consequently, 100% of the teachers incited a revision of the existing evacuation plans of their schools. Pre and post assessments reflected a 72% in participants' knowledge gain. It is anticipated that 1,024 students were reached through this effort.

Partners: Puerto Rico Department of Education; Puerto Rico Seismic Network;

Associated Project(s):
Marine Education (2018 - 2021)

Back to Top

Puerto Rico Sea Grant Launches Multidisciplinary STEM Approach to Illustrate Environmental Problems, Develop Science Applications, and Community Involvement Among K-12 Students

National Focus Areas: Environmental Literacy and Workforce Development; Healthy Coastal Ecosystems

- Accomplishment
- Approved

Recap: Puerto Rico Sea Grant launches students into the marine environment through exhibitions, laboratories, conferences, and field activities at diverse coastal nature reserves in Puerto Rico

Program Focus Areas: Environmental Literacy and Workforce Development; Healthy Ecosystems and Habitats

Relevance: Scientific knowledge of the sea and its importance on planet Earth should be part of the culture and general education in the school curriculum of the educational system of Puerto Rico. There is a need to enrich the science curriculum in schools to strengthen ocean literacy and the interest on marine environments. The participation of K-12 students in topics related to marine science and marine careers activities will contribute to the development of a work force acquainted with the environmental needs of Puerto Rico.

Response: PRSG developed the Marine Science Adventure Program for K-12 students, which includes a wide range of active, high-quality learning experiences with corresponding support services for school-aged children and their teachers. The program launches students into the marine environment through exhibitions, laboratories, conferences, and field activities at diverse coastal nature reserves in Puerto Rico.

Results: In 2019, the Marine Science Adventure Program for K-12 Students of PRSG offered 54 educational events impacting a total of 1,417 K-12 students, 159 teachers and 15 parents from 50 different schools in Puerto Rico. Fifty-six percent (55.96%) of the students expressed this was their first marine educational experience and had the opportunity to understand and appreciate the varied study fields in marine science.

Partners: Puerto Rico Department of Education; Puerto Rico Interamerican University, San German Campus; Pathstone, Inc.; Newton High School at Boston, Massachusetts;

Associated Project(s):
Marine Education (2018 - 2021)

Back to Top

NOAA's Caribbean Coastal Ocean Observing System (CariCOOS) and Puerto Rico Sea Grant Developed Mobile Phone Water Safety Apps for Boaters and Beach Users

National Focus Areas: Environmental Literacy and Workforce Development; Resilient Communities and Economies

- Accomplishment
- Approved

Recap: Puerto Rico Sea Grant joined forces with NOAA's Caribbean Coastal Ocean Observing System (CariCOOS) to bring about two excellent tools to promote beach and boating safety activities. "Pa' la Playa" and "CariCOOS Boating App" are free electronic beach and marine safety information resources that provide weather forecasts, waves, winds, water quality, marine currents, beach access facilities and services, tides, moon phases, and other information for the safety of boaters and beachgoers.

Program Focus Areas: Environmental Literacy and Workforce Development; Resilient Communities and Economies

Relevance: Weather preparedness for boaters and beach goers involves keeping a "weather eye" to keep the experience fun and safe. Drowning incidents and boat accidents are a big concern to coastal and marine resources managers in Puerto Rico and the U.S. Caribbean. Effective transfer of information about climate and ocean conditions is an essential element in any effort to promote water safety among coastal and marine resource users. Resource managers need to communicate and promote the use of accurate and reliable information about the safety of participants in oceanic or costal activities.

Response: Puerto Rico Sea Grant funded an applied research project conducted by CariCOOS, to develop an information system to increase safety of beach resource users. Two products developed by this project were electronic coastal weather apps for mobile phones to provide accurate and reliable information to boaters and beachgoers including: current weather conditions (Wind, Waves, Tides, Moon Phase, Cloud Coverage and Rain Probability); forecasts: (wind, wave, tides, moon phase, cloud coverage and rain probability); weather alerts from the NWS. An offline mode to is available to download and save data before heading into areas with no network coverage. The app can be downloaded in English or Spanish.

Results: CariCOOS Boating App and "Pa' la Playa" are ad-free apps that provide boaters and beachgoers an integrated view of beach and ocean conditions for Puerto Rico and the U.S. Caribbean. Everything you need to know before going to the beach or boating in coastal waters near Puerto Rico and the US Virgin Islands is featured in these two Apps. The "CariCOOS Boating App" and beach app "Pa' la Playa" are two examples of Sea Grant applied research efforts to increase water users' safety in the U.S. Caribbean. For more information visit www.caricoos.org

Partners: Caribbean Integrated Coastal and Ocean Observing System (CarICOOS);

Associated Project(s):
Marine Education (2018 - 2021)

Back to Top

Puerto Rico Sea Grant Efforts Shifted Traditional Education to Field Trips and Outdoor Experiences Providing K-12 Students Learning Environments through Observation, Recording and Data Collection

National Focus Areas: Environmental Literacy and Workforce Development; Healthy Coastal Ecosystems

- Accomplishment
- Approved

Recap: Five-hundred students, forty-three teachers and fifty-two volunteers were trained by the Puerto Rico Sea Grant Coastal Contact Program (CCP) to increase the understanding, appraisement, and stewardship of coastal natural areas through observation, recording and data collection

Program Focus Areas: Environmental Literacy and Workforce Development; Healthy Ecosystems and Habitats

Relevance: One of the reasons marine conservation efforts fail is Puerto Ricans' lack of awareness about the importance of the ocean to their daily lives. A considerable number of students from coastal municipalities are unaware of the valuable services provided by coastal and marine resources where they live, recreate and study. The Puerto Rico Department of Education implemented the Green Contact Act, which requires students to complete 10 semester hours studying topics related to natural areas but does not provide opportunities to actively exercise their learning skills in the outdoors.

Response: PRSG developed the Coastal Contact Program for public school students that live close to the Efrain Archilla Natural Reserve in Humacao. This program provides access to several research procedures including the development of experimental knowledge of the natural environment. Field trips shifted teaching from conventional classrooms to outdoor learning environments through observation, recording and data collection.

Results: The Coastal Contact Program event received 500 students, 43 teachers and trained 52 undergraduate volunteers developing field-teaching skills. More than 84.5% of the participants strongly agreed that the demonstrations and activities offered in the 10 stations, contributed significantly to the acquisition of relevant knowledge in the coastal and marine sciences. Eighty five percent (85%) of the students agreed that the topics discussed were relevant to their daily lives.

Partners: Puerto Rico Department of Natural and Environmental Resources; Puerto Rico Department of Education;

Associated Project(s):
Marine Education (2018 - 2021)

Back to Top

Georeferencing Puerto Rico's Coastal Aerial Photography to Educate about Planning, Conservation, Decision-Making, Coastal Development and Resilience

National Focus Areas: Environmental Literacy and Workforce Development

- Accomplishment
- Approved

Recap: Puerto Rico Sea Grant provides free access to georeferenced aerial photographs and opportunities for coastal land-use planning, management, education and decision-making through different coastal-related applications.

Program Focus Areas: Environmental Literacy and Workforce Development

Relevance: The Porto Rico 1930 Aerial Image Database website (http://pr1930.revistatp.com/) in JPEG format is an instrumental product for visualizing, monitoring, and tracking land change. However, this database is limited in the sense that the photographs are not georeferenced, consequently their use and applicability within a Geographic Information System (GIS) has serious limitations. Aerial photographs for coastal areas of Puerto Rico need to be georeferenced to the geographic coordinate system NAD 83 PR State Plane, to enable analysis with other geographic data of the Island.

Response: Puerto Rico Sea Grant and partners identified, edited, and georeferenced 800 aerial photographs for most coastal areas of Puerto Rico, specifically photographs within l km. from the coast.

Results: This product provides free access, through the Puerto Rico Sea Grant website, to georeferenced aerial photographs and opportunities for coastal land-use planning, management, education and decision-making through different coastal-related applications including: historical changes in Puerto Rico's coastal line; geomorphologic evolution of the coast; coastal erosion and changes in the coastal morphology, coastal ecosystems and coastal ecosystem processes; climate change studies; and coastal land transformation.

Partners: University Of Puerto Rico, Mayaguez (UPR); Puerto Rico Department of Natural and Environmental Resources; Centro Interdisciplinario de Estudios del Litoral (CIEL);

Associated Project(s):
Communications and Publications (2018 - 2021)

Back to Top

Puerto Rico Sea Grant Published Four Issues of Marejada and Four Educational Videos on Marine Topics

National Focus Areas: Environmental Literacy and Workforce Development

- Accomplishment
- Approved

Recap: In response to a lack of educational resources about coastal and marine resources in Puerto Rico, PRSG published four issues of Marejada and four educational videos on coastal and marine topics of interest.

Program Focus Areas: Environmental Literacy and Workforce Development

Relevance: Puerto Rico is in great need for educational information products related to the marine environment that communicate the importance of marine resources in terms of conservation and sustainable use. Through our magazines and videos, PRSG provides information about the function of marine and coastal ecosystems to help people understand the complexities of coastal environments, support management and decision-making processes, reduce user conflicts and raise awareness of economic contributions of coastal areas.

Response: Puerto Rico Sea Grant published four issues of Marejada and four videos on marine related topics that addressed the need for

information about marine and coastal resources and contributed to an increase in environmental education and ocean literacy. The four (4) videos highlight the importance of seafood safety and underutilized species, marine reserves, fishermen safety, and marine debris.

Results: The Marejada magazines can be accessed in electronic and printed formats and are disseminated and distributed among managers, scientists, public policy makers, teachers, decision makers, agencies, marinas, private entities, non-governmental organizations, and libraries. The videos altogether have more than 3,800 views and are available through Puerto Rico Sea Grant's YouTube channel: https://www.youtube.com/user/programaseagrantpr.

Partners: None listed in Database

Associated Project(s):
Communications and Publications (2018 - 2021)

Back to Top

Puerto Rico Sea Grant Increases its Visibility through Social Networks

National Focus Areas: Environmental Literacy and Workforce Development

- Accomplishment
- Approved

Recap: Social networks have evolved into an excellent tool for PRSG to aid in the dissemination of relevant information about the wise use of coastal and marine resources

Program Focus Areas: Environmental Literacy and Workforce Development

Relevance: Social networks improve communication skills, enhance participation as well as social commitment, reinforce peer support, and ensure realization of education, based on collaboration strategies. Social networks are inexpensive media resources that if used correctly, contribute substantially to educational purposes and the dissemination of relevant information.

Response: Since 2009, PRSG has been using Facebook, Twitter, and Flicker pages to share the information that our program produces and to promote events and activities. Through social networks, we share information about activities and communicate with our stakeholders via messages. In the PRSG Facebook, page people are free to comment and share information about conservation and sustainable use of marine and coastal resources, request information and communicate their concerns.

Results: For the period reported, Puerto Rico Sea Grant reached over 10,000 followers on Facebook, 1,126 followers on Instagram, 463 YouTube subscribers, 13,663 users in our Web Page and 1,780 followers in Twitter. Facebook continues to be the most successful social media network for PRSG.

Partners: None listed in Database

Associated Project(s):
Communications and Publications (2018 - 2021)

Back to Top

PRSG Published Six Issues of Fuete y Verguilla an Artisanal Fishers Magazine

National Focus Areas: Environmental Literacy and Workforce Development; Sustainable Fisheries and Aquaculture

- Accomplishment
- Approved

Recap: Puerto Rico Sea Grant continues publishing Fuete y Verguilla, keeping commercial fishers informed about regulations, management, social and cultural aspects of fishing, sustainable use of fisheries, and conservation of marine and coastal resources

Program Focus Areas: Environmental Literacy and Workforce Development; Sustainable Fisheries and Aquaculture

Relevance: Commercial fishers need relevant and reliable information on topics related to fishing regulations, fisheries management, social and cultural aspects of fishing, sustainable use, and conservation of marine and coastal resources, particularly, sustainability of fish stocks.

Response: Puerto Rico Sea Grant continues publishing Fuete y Verguilla, a magazine for fishers that exposes topics about regulations, management, sustainable use, and conservation of marine and coastal resources in a simple format. For the period reported, Puerto Rico Sea Grant published three issues of Fuete y Verguilla.

Results: Issues were widely distributed among fishing villages and communities, managers, resource management agencies, non-governmental organizations, and libraries. Magazines are available through the PRSG webpage: http://seagrantpr.org/v2/communications-and-publications/fuete-yverguilla/.

Partners: Centro Interdisciplinario de Estudios del Litoral (CIEL);

Associated Project(s):
Communications and Publications (2018 - 2021)

Back to Top

Puerto Rico Sea Grant coordinates educational Efforts with the Interdisciplinary Center for Coastal Studies (CIEL) and the Center for Hemispheric Cooperation in Research and Education in Engineering and Applied Sciences (CoHEMIS)

National Focus Areas: Environmental Literacy and Workforce Development; Resilient Communities and Economies

- Accomplishment
- Approved

Recap: Puerto Rico Sea Grant collaborates with the Interdisciplinary Center for Coastal Studies (CIEL) and the Center for Hemispheric Cooperation in Research and Education in Engineering and Applied Sciences (CoHEMIS) in the development of lectures and workshops to augment research interest among university students and develop their communication and literacy skills.

Program Focus Areas: Environmental Literacy and Workforce Development; Resilient Communities and Economies

Relevance: Augmenting research and education interest, communication and literacy skills among university students and elected officials of Latin America is a high priority for the University of Puerto Rico, Mayaguez Campus and PRSG.

Response: With the collaboration of the CIEL and CoHEMIS a series of lectures, conferences and workshops devoted to: share research findings on topics related to the coast, climate change, increase ocean literacy and develop research and documentation skills among university students and elected officials of Latin America are conducted each semester. PRSG provides human resources (researchers, extension agents, marine specialists, educators), produces posters to announce the activities, promotes them through social networks and mailing lists, and provides the Marine Education and Information Resources Center and materials to coordinate the activities.

Results: Over 800 persons have been participating of the conferences, lectures and workshops coordinated through this collaboration.

Partners: Centro Hemisférico de Cooperación en Investigación y Educación en Ingeniería y Ciencia Aplicada (CoHemis); Centro Interdisciplinario de Estudios del Litoral (CIEL);

Associated Project(s):
Communications and Publications (2018 - 2021)

Back to Top

Puerto Rico Sea Grant, National Oceanic and Atmospheric Administration's Coastal Zone Management Program and Protectores de Cuencas Inc. Collaborate to Implement Green Infrastructure Practices for the Protection of Critical Conservation Areas at the Tres Palmas Marine Reserve

National Focus Areas: Resilient Communities and Economies

- Accomplishment
- Approved

Recap: Puerto Rico Sea Grant collaborates with National Oceanic and Atmospheric Administration's Coastal Zone Management Program and a local non-governmental organization to address the Tres Palmas Marine Reserve's sedimentation problem through the implementation of green infrastructure practices.

Program Focus Areas: Resilient Communities and Economies

Relevance: According to the 2015 Community Based Climate Change Vulnerability Assessment and Adaptation Plan for Rincón, sedimentation issues will exacerbate due to Rincon's severe erosion rates, incrementing hazardous conditions to the Tres Palmas Marine Reserve coral reefs and as a result, triggering very serious ecological disturbances.

Response: In May 2016, Puerto Rico Sea Grant, the Puerto Rico Department of Natural and Environmental Resources, National Oceanic and Atmospheric Administration's Coastal Zone Management Program, Protectores de Cuencas, Amigos de Tres Palmas Inc. coordinated a meeting to initiate a dialogue between stakeholders to identify and design projects that would not only address the sedimentation problem but also encourage the implementation of green infrastructure practices.

Results: In May 2019, Protectores de Cuencas was contracted by the Puerto Rico Department of Natural and Environmental Resources to develop a sediment control project called "Applying Green Infrastructure Practices to Restructure Public Access and Protect Critical Areas at Tres Palmas Marine Reserve". This project represents an allocation of $60,000 in funds by National Oceanic and Atmospheric Administration's Coastal Zone Management Program. Since then, Puerto Rico Sea Grant has been liaising between the contractor, Puerto

Rico Department of Natural and Environmental Resources and the community to adapt the design according to ecosystem management approaches and also taking into account the community and stakeholder's needs.

Partners: Amigos de Tres Palmas; Protectores de Cuencas; Puerto Rico Coastal Zone Management; Puerto Rico Department of Natural and Environmental Resources;

Associated Project(s):
Marine Outreach Program (2018 - 2021)

Back to Top

Climate Education for Virgin Islands High School Students

National Focus Areas: Healthy Coastal Ecosystems; Resilient Communities and Economies

- Accomplishment
- Approved

Recap: Puerto Rico Sea Grant's Virgin Islands Marine Advisory Service (VIMAS) in partnership with the United States Virgin Islands Storm Strong Program provided climate science education to 26 families on St. Thomas and will expand to St. Croix and St. John by year 2022.

Program Focus Areas: Healthy Ecosystems and Habitats; Resilient Communities and Economies

Relevance: Island communities are particularly vulnerable to the impacts of climate change. Small islands like St Croix and St. Thomas have a major portion of its population located in coastal areas threatened by increased sea level rise. Impacts from sea level rise, increasing sea water temperatures and increases in the intensity of hurricanes as well as other effects of climate change will continue and intensify in coming years. Despite its vulnerability, the local population has little knowledge or understanding of climate change science.

Response: A series of eight evening workshops were hosted that provided families with a better understanding of 1) National Oceanic and Atmospheric Administration online resources for tracking storms to examining sea level rise projections, 2) How to prepare for hazards such as hurricanes, 3) How to assess asset vulnerabilities, and 4) What are the effects of storm surge and how both built and green infrastructure can be used to reduce its impacts. Preceding the eight workshops, three selected families received funding support to facilitate community-based transfer projects to further aid in the dissemination of both information and resources into their communities specific to climate education and risk reduction.

Results: VIMAS assisted with the facilitation of eight workshops as part of the United State Virgin Islands Storm Strong Program that engaged 26 families to help begin the foundation for instilling a culture of preparedness and increasing the community's understanding of climate science.

Partners: Catalyst Miami;

Associated Project(s):
Virgin Islands Marine Advisory Service (2018 - 2021)

Back to Top

Reef Responsible - A Market-driven Approach to a Sustainable Commercial Fishing Industry in the Virgin Islands

National Focus Areas: Healthy Coastal Ecosystems

- Accomplishment
- Approved

Recap: Puerto Rico Sea Grant's Virgin Islands Marine Advisory Service has been working with local restaurants to certify new and update original restaurants in the Reef Responsible program.

Program Focus Areas: Healthy Ecosystems and Habitats

Relevance: The demand for seafood is increasing yet many populations of fish are being overfished, especially around the island of St Croix. This project promotes the purchasing and consumption of fish caught or fanned using environmentally friendly practices. It educates restaurant owners on purchasing fish that are legally caught using sustainable methods.

Response: VIMAS collaborates with staff from local agencies and NGOs to develop an education and outreach program that promotes a sustainable fishing industry. Due to the loss of key personnel responsible for facilitating the Reef Responsible Program through The Nature Conservancy, VIMAS has partnered with the Virgin Islands Conservation Society to 1) Source local and sustainable caught seafood and 2) Promote the consumption of the invasive lionfish during the 2019 Reef Pest event, engaging over 800 participants.

Results: Through education efforts to promote the consumption of lionfish, the USVI community is now more aware of the negative impacts

of this invasive species. The community is now receptive to the idea of consuming lionfish which in turn not only aids in their removal from reefs but also supports the partnership between restaurants and local fishermen.

Partners: Reef Jam; The Nature Conservancy; Virgin Islands Department of Planning and Natural Resources;

Associated Project(s):
Virgin Islands Marine Advisory Service (2018 - 2021)

Back to Top

Marine Debris Education and Community Engagement Project Effectively Influences Legislation in the USVI

National Focus Areas: Environmental Literacy and Workforce Development

- Accomplishment
- Approved

Recap: Puerto Rico Sea Grant's Virgin Island Marine Advisory Service continues to increase awareness of the issue of marine debris through routine beach cleanups and classroom presentations, these efforts combined with legislation support will continue to reduce coastal litter and instill environmental stewardship ethics throughout the larger United States Virgin Islands community.

Program Focus Areas: Environmental Literacy and Workforce Development

Relevance: Marine debris is a pervasive problem not only throughout the VI, but globally. It is a deterrent to tourism, a human health hazard, degrades marine habitats and can impact marine plants and animals. Past studies have shown that about 80% of VI marine debris comes from land-based sources. If we are to mitigate this problem, we must increase community awareness and engage the community in actions that will result in behavior change.

Response: Virgin Islands Marine Advisory Service coordinated the annual coastal cleanup event from September to October as well as provided marine debris presentations to students in grades 3-12. Approximately 1,600 pounds of debris were removed. Curriculum modifications to include the topic of marine debris were incorporated into the SCI 100 college course which is required for all incoming University of Virgin Islands freshmen to complete. Data collected during Coastweeks was provided to The Ocean Conservancy as well as used in testimonies to support legislation to ban single-use plastic straws which became effective as of October 2019.

Results: Through Coastweeks, Virgin Island Marine Advisory Service has provided the USVI with engagement opportunities to better understand the issue of marine debris. Removal of debris coupled with education has helped to improve the quality of coastal resources.

Partners: Ocean Conservancy; USVI Waste Management Authority (WMA); Virgin Islands Department of Education; Virgin Islands Department of Planning and Natural Resources; University of Virgin Islands; 31st Legislature of the Virgin Islands; Virgin Islands Department of Tourism (VIDOT); NOAA-Marine Debris Program;

Associated Project(s):
Virgin Islands Marine Advisory Service (2018 - 2021)

Back to Top

Puerto Rico Sea Grant's Virgin Islands Marine Advisory Service Increases Public Awareness of the Sea Grant Mission in the USVI

National Focus Areas: Environmental Literacy and Workforce Development

- Accomplishment
- Approved

Recap: Virgin Islands Marine Advisory Service is increasing public awareness and understanding of both Virgin Islands Marine Advisory Service and Sea Grant through participation in community events, routine field trips for students, and presentations to the media.

Program Focus Areas: Environmental Literacy and Workforce Development

Relevance: In order for the Virgin Islands Marine Advisory Service (VIMAS) to be effective, people must be aware of the program and the services it offers. To increase public awareness of PRSG VIMAS, and promote the program's goals, our agents participate in several community events, activities and boards. Objectives will be carried out through events such as community affairs and public presentations.

Response: Virgin Islands Marine Advisory Service has started to make more regular submissions to the local media in order to increase awareness of marine issues. During this reporting period, 11 newspaper articles were published to highlight VIMAS activities. Collaborations with researchers within University of Virgin Islands' Center for Marine and Environmental Studies have increased VIMAS participation in federally funded projects such as the University of Virgin Islands Storm Strong Program to increase community preparedness for storms as well as participation in several coastal mangrove cleanups and the creation of a Marine Debris Action Plan for the USVI. Funding support was received through the Water Resources Research Institute to implement a water quality education program throughout the territory and engage students in grades 3-12. Funding support received from the IGY Marinas supported scuba diving certifications for 15 high school

students to introduce them to careers in marine science.

Results: Through participation in community events, VIMAS is increasing awareness of Sea Grant and its mission in the USVI. The community is more aware of environmental issues present within the territory and how the Virgin Islands Marine Advisory Service and other organizations are addressing these concerns.

Partners: University of Virgin Islands; Virgin Islands Department of Planning and Natural Resources; USVI-Department of Sports Parks and Recreation; USVI-Hotel and Tourism Association; Virgin Islands Department of Tourism (VIDOT);

Associated Project(s):
Virgin Islands Marine Advisory Service (2018 - 2021)

Back to Top

Puerto Rico Sea Grant Helps Students and Teachers Understand Climate Change

National Focus Areas: Resilient Communities and Economies

- Accomplishment
- Approved

Recap: Puerto Rico Sea Grant coordinated guided educational field trips to familiarize teachers and students with climate change exploration through interactive and engaging activities.

Program Focus Areas: Resilient Communities and Economies

Relevance: During September 2017, hurricanes Irma and Maria devastated Puerto Rico and the United States Virgin Islands. Non-traditional education has proved to be an effective essential element to help students understand the need to adapt to global warming impacts and encourage attitude and behavior changes.

Response: PRSG's Center for Education on Environmental Climate Change conducted field trips to educate high school students and teachers providing opportunities to explore climate change using interactive and engaging activities. A hundred and twenty-eight (128) high school students and twenty (20) teachers participated in these field trips and activities.

Results: Students and teachers had the opportunity to learn about climate change, its impacts in coastal ecosystems and the use of monitoring tools to keep track of local impacts.

Partners: Autonomous Municipality of Cabo Rojo, PR; US Fish and Wildlife Service (US DOI, FWS); Caribbean Integrated Coastal and Ocean Observing System (CarICOOS);

Associated Project(s):
Marine Outreach Program (2018 - 2021)

Back to Top

Cabo Rojo Salt Flats: Promoting Adaptation Measures to Address Sea Level Rise

National Focus Areas: Resilient Communities and Economies

- Accomplishment
- Approved

Recap: Puerto Rico Sea Grant teamed with local and federal partners to develop and implement strategies to protect and restore the natural habitat and cultural resources of the Cabo Rojo Salt Flats from climate change induced coastal erosion impacts.

Program Focus Areas: Resilient Communities and Economies

Relevance: Hurricanes Irma and Marla affected the health of the Cabo Rojo salt flats and surrounding mangrove forest ecosystems by flooding the coastal area and exacerbating a prevalent coastal erosion problem. Immediate negative impacts to the region include a significant reduction to the production of salt, a historical industry operating nonstop since 1511, and an evident decline on migratory birds that use these resources for their survival.

Response: The Autonomous Municipality of Cabo Rojo in collaboration with PRSG and the USFWS, requested a State of Emergency for the Cabo Rojo Salt Flats and surrounding ecosystems to tend coastal erosion affecting the area. A multidisciplinary workgroup was established to develop and implement erosion control strategies and mitigation projects to protect, restore and promote the conservation of the natural habitat and cultural resources provided by the Cabo Rojo Salt Flats.

Results: The Puerto Rico Department of Public Safety officially declared a State of Emergency to the Cabo Rojo Salt Flats and ordered the Puerto Rico Department of Natural and Environmental Resources to take the necessary actions to address this issue and protect the area.

Partners: Puerto Rico Coastal Zone Management; Protectores de Cuencas; Autonomous Municipality of Cabo Rojo, PR; US Fish and Wildlife Service (US DOI, FWS);

Associated Project(s):
Marine Outreach Program (2018 - 2021)

Back to Top

Risk Communication: Informational Fact Sheets for the Development of Resilient Coastal Communities

National Focus Areas: Resilient Communities and Economies

- Accomplishment
- Approved

Recap: PRSG, in collaboration with the Interdisciplinary Center for Coastal Studies (CIEL) of the University of Puerto Rico Mayaguez Campus, elaborated and disseminated a series of fact sheets on rapid cyclone intensification, alert and forecasting mechanisms, and an overview of 167 years of cyclones that passed through Puerto Rico, in hopes to increase resiliency and reduce coastal communities' vulnerability.

Program Focus Areas: Resilient Communities and Economies

Relevance: Hurricanes Irma and Maria exposed the vulnerability of Puerto Rico's coastal communities to extreme weather events. A well-informed population is stronger and less susceptible to negative impacts related to extreme natural atmospheric phenomena.

Response: A series of fact sheets with information on rapid intensification, forecasts and cyclone alerts were developed to promote better decision-making and timely preparation before hurricanes.

Results: Five fact sheets on cyclone rapid intensification, alert and forecasting mechanisms, and an overview of 167 years of cyclones that passed through Puerto Rico were developed and published. These fact sheets are used as part of the reference materials provided to coastal communities in different outreach activities.

Partners: Centro Interdisciplinario de Estudios del Litoral (CIEL);

Associated Project(s):
Marine Outreach Program (2018 - 2021)

Back to Top

Commercial and Recreational Fish Users Education

National Focus Areas: Sustainable Fisheries and Aquaculture

- Accomplishment
- Approved

Recap: PRSG has been a long-term outreach facilitator and a non-advocate advisor for a diverse group of local fishermen of Puerto Rico representing commercial, recreational sport-fishers, and wild ornamental fishers, including state and federal resource managers.

Program Focus Areas: Sustainable Fisheries and Aquaculture

Relevance: Commercial and artisanal fishermen lack advisory services to help them set priorities and develop long-range plans. Specialized advisories are needed to provide recommendations to resource managers, particularly to the Puerto Rico Department of Natural and Environmental Resources, and the PR-Department of Agriculture, on matters related to marine resources regulations and government incentive programs, including federal fisheries disaster relief efforts, among other critical fishers' needs.

Response: PRSG provided specialized assistance to commercial and recreational fishermen, resource managers and scientific researchers, through marine advisories, to promote the sustainable use of the fishery resources and applied science for resource conservation. Outreach efforts included technical support to maintain commercial and recreational fishers informed about fishing regulations, biological aspects of regulated species, and issues dealing with environmental conservation.

Results: PRSG serves as the Scientific Academy representative member to the Puerto Rico Department of Natural and Environmental Resources Fisheries Advisory Board. PRSG fisheries advisories have been extended providing specialized recommendations to ten (10) resource managers, and close to one-hundred (100) commercial and recreational fishers. PRSG also advises FEPDEMAR fishing Association which represents 180 fishermen. Other specialized advisories were provided through over 37 direct stakeholder interactions.

Partners: Caribbean Fishery Management Council (CFMC); Federación de Pescadores de Puerto Rico y Defensores Del Mar, Inc. (FEPDEMAR); Puerto Rico Department of Agriculture; Puerto Rico Department of Natural and Environmental Resources; Skin diver spearfishing recreational group (APNEA);

Associated Project(s):
Marine Outreach Program (2018 - 2021)

Back to Top

PRSG Coordinates NOAA's Caribbean SEAMAP Program Providing Essential Information for Sustainable Management Fisheries Decisions in PR and the USVI

National Focus Areas: Sustainable Fisheries and Aquaculture

- Accomplishment
- Approved

Recap: Puerto Rico Sea Grant coordinates the SEAMAP-C Program providing fisheries-independent populations' data acquisition on reef fish, conch and lobster, to support the Caribbean Management Fisheries Management Council (CFMC) and Puerto Rico Department of Natural and Environmental Resources (DNER) management plans, educational workshops on sampling methodologies, and outreach initiatives on fisheries scientific projects.

Program Focus Areas: Sustainable Fisheries and Aquaculture

Relevance: The Southeast Area Monitoring & Assessment Program (SEAMAP) contributes to the development of fisheries independent baseline data, standards, and indicators to support ecosystem-based approaches to land use, water, fisheries, and other resource management. The information obtained is shared with a wide variety of constituencies in Puerto Rico, the United States Virgin Islands, and the Caribbean, including the Gulf, South Atlantic and Caribbean Management Councils.

Response: Through SEAMAP-C, PRSG coordinated liaison activities, effective and efficient data collection surveys, and managed and disseminated fishery-independent data. The information collected included marine bottom habitat mapping, reef fish fisheries independent data, conch (Strombus gigas), lobster (Panulirus argus) puerulus settlement and juvenile abundance. The fisheries-independent data obtained from this long-term program is being used by students, scientists, and state and federal managers to describe population trends; explain responses to environmental factors; estimate stock abundance; and to track reproduction, recruitment and yields.

Results: The CFMC and the DNER developed local management plans for conch and reef fish, based on population independent data obtained by SEAMAP-C. These efforts have improved precision and accuracy of the long-term reef fish fisheries-independent data collection through quality control evaluations.

Partners: Puerto Rico Department of Natural and Environmental Resources; Puerto Rico Sea Grant; University Of Puerto Rico, Mayaguez (UPR); University of Virgin Islands; Virgin Islands Department of Planning and Natural Resources; Caribbean Fishery Management Council (CFMC); National Marine Fisheries Service (US DOC, NOAA, NMFS);

Associated Project(s):
Marine Outreach Program (2018 - 2021)

Back to Top

Marine Outreach Program Fisheries & Aquaculture Electronic Portal

National Focus Areas: Sustainable Fisheries and Aquaculture

- Accomplishment
- Approved

Recap: Puerto Rico Sea Grant fisheries web-portal provides detailed access and information on fisheries/aquaculture studies results and reports, including fishery independent studies, links to publication sources as well as relevant marine advisories to increase public awareness on sustainable fisheries.

Program Focus Areas: Sustainable Fisheries and Aquaculture

Relevance: According to the 2015 Community Based Climate Change Vulnerability Assessment and Adaptation Plan for Rincón, sedimentation issues will exacerbate due to Rincon's severe erosion rates, incrementing hazardous conditions to the Tres Palmas Marine Reserve coral reefs and triggering very serious ecological disturbances.

Response: In May 2016 PRSG, the Puerto Rico DNER, NOAA's CZMP, Protectores de Cuencas, and Amigos de Tres Palmas Inc., coordinated a meeting to initiate a dialogue between stakeholders to identify and design projects that would not only address the sedimentation problem but also encourage the implementation of green infrastructure practices.

Results: In May 2019, Protectores de Cuencas was contracted by the DNER to develop a sediment control project called "Applying Green Infrastructure Practices to Restructure Public Access and Protect Critical Areas at Tres Palmas Marine Reserve". This project represents an allocation of $60,000 in funds by NOAA's CZMP. Since then, PRSG has been liaising between the contractor, DNER and the community to adapt the design according to ecosystem management approaches and taking into consideration the community and stakeholders' needs.

Partners: Puerto Rico Department of Natural and Environmental Resources; Sociedad Ambiente Marino; Caribbean Fishery Management Council (CFMC); Federación de Pescadores de Puerto Rico y Defensores Del Mar, Inc. (FEPDEMAR); US Fish and Wildlife Service (US DOI, FWS); Puerto Rico Department of Agriculture; Pew Charitable Trusts; South East Area Monitoring and Assessment Program (SEAMAP); Food and Agriculture Organization of the United Nations (FAO); Florida Fish and Wildlife Conservation Commission (FL F&WLCC);

Associated Project(s):
Marine Outreach Program (2018 - 2021)

Back to Top

Puerto Rico Sea Grant Promotes Small-Scale Aquaponics Systems as a Sustainable Food and Nutrition Alternative

National Focus Areas: Sustainable Fisheries and Aquaculture

- Accomplishment
- Approved

Recap: Puerto Rico Sea Grant successfully fosters proliferation of small-scale aquaponic systems to deliver fresh vegetables and animal protein whilst conserving precious fresh water resources and virtually eliminating high nutrient effluent impacts to coastal and marine resources

Program Focus Areas: Sustainable Fisheries and Aquaculture

Relevance: With the looming global crisis in food security projected by 2050 along with global trends in urbanization with arable land being lost to housing, there is a clear need to look for sustainable food solutions including reintegrating food production into cities.

Response: PRSG refurbished an existing demonstrative aquaponic project at the University of Puerto Rico-Mayaguez Campus by refitting hurricane damaged equipment and restocking fish and plant components. In addition, PRSG recruited and trained a group of undergraduate volunteers on management and maintenance of aquaponic systems. This project enables visitors and workshop participants to envision and experience small-scale aquaculture systems as a clear path to food security.

Results: PRSG coordinated three (3) workshops at the project demonstration premises. Twenty volunteer undergraduate students and forty (40) adults were trained regarding aquaponic systems components, how to build and run your own small-scale system using easily accessible materials, and initial costs of building the system. Workshops were also offered at three (3) public schools and at three (3) major agricultural fairs. Close to five hundred (500) people have visited the project.

Partners: Agricultural Coop Extension Service, UPR;

Associated Project(s):
Marine Outreach Program (2018 - 2021)

Back to Top

Puerto Rico Sea Grant Develops and Motivates the Next Generation of Aquaculture Professionals

National Focus Areas: Sustainable Fisheries and Aquaculture

- Accomplishment
- Approved

Recap: Puerto Rico Sea Grant fosters the new generation of aquaculture professionals through the development of a formal undergraduate three credit course in the Animal Science Program.

Program Focus Areas: Sustainable Fisheries and Aquaculture

Relevance: Future increases in seafood availability and the varieties of aquatic species will depend on the continued development and expansion of aquaculture as an essential component of the world's food supply. However, there is an urgent need for information with respect to scientific and technical aspects of marine culture, including: nutrition and feeds, health and disease, spawning and larval rearing technology and genetics of cultured species.

Response: Puerto Rico Sea Grant collaborated with the University of Puerto Rico, Mayaguez Campus, Animal Science Program to design and offer a three-credit course focused on management practices used in the culture and production of important aquaculture species. Introduction to Aquaculture (CIAN 4050) seeks to develop a cadre of professionals with the necessary skills to work on established aquaculture businesses and stimulate graduate studies on this field.

Results: Twenty (20) undergraduate students from the Animal Science Program of the College of Agricultural Sciences enrolled and approved the three-credit course Introduction to Aquaculture.

Partners: University Of Puerto Rico, Mayaguez (UPR); University of Puerto Rico, Mayaguez Campus Animal Science Program;

Associated Project(s):
Marine Outreach Program (2018 - 2021)

Back to Top

Puerto Rico Sea Grant Collaborates in the Establishment of a Fish Aggregating Device (FADs) System

National Focus Areas: Sustainable Fisheries and Aquaculture

- Accomplishment
- Approved

Recap: Puerto Rico Sea Grant collaborates with the Department of Natural and Environmental Resources and local fishermen to develop and establish a Fish Aggregating Device (FADs) program for the west and south coasts of Puerto Rico.

Program Focus Areas: Sustainable Fisheries and Aquaculture

Relevance: FADs provide an array of direct and indirect benefits to fishing communities and economies increasing catch per unit of effort, reducing pressure on reef resources, reducing reliance on imports, and increasing demand for tourism activities.

Response: PRSG submitted a proposal and was awarded $129,980 from the U.S. Fish and Wildlife Sports Fishing Restoration funds for the installation of four (4) fish aggregating devices (FADs) on the West and South coasts of Puerto Rico. FADs are expected to enhance recreation and economic opportunities in the area.

Results: PRSG leadership efforts have been essential in obtaining the formalization of a service contract agreement between University of Puerto Rico at Mayaguez and Puerto Rico's Department of Natural and Environmental Resources for making this project a reality.

Partners: US Fish and Wildlife Service (US DOI, FWS); Puerto Rico Department of Natural and Environmental Resources; Caribbean Integrated Coastal and Ocean Observing System (CarICOOS); Marina Pescaderia Puerto Real; Club Deportivo del Oeste; Balsas del Oeste, Inc.;

Associated Project(s):
Marine Outreach Program (2018 - 2021)

Back to Top

Historical Process: Vulnerability, Flooding and Resilience in Coastal Communities of the Western Area of Puerto Rico

National Focus Areas: Resilient Communities and Economies

- Accomplishment
- Approved

Recap: Puerto Rico Sea Grant funding provided a unique opportunity to study biophysical vulnerability and resilience characteristics of western Puerto Rico coastal communities

Program Focus Areas: Resilient Communities and Economies

Relevance: Puerto Rico, due to its geographical position, is susceptible to facing atmospheric events. Therefore, the island has an impressive history filled with hurricanes and tropical storms among others San Felipe II, Santa Clara, Eloisa, Hugo, Hortensia, Georges, Irma and Maria. These atmospheric events caused numerous effects including phycological impacts, floods, material and economic losses, and lack of public safety being one of the imminent threats affecting vulnerable communities. Due to the biophysical vulnerability to which coastal communities (under study) are exposed, it is necessary to identify the mitigation strategies that residents implement and thus, analyze the characteristics that limit their resilience.

Response: Sea Grant funding provided a unique opportunity to study biophysical vulnerability and resilience characteristic of coastal communities.

Results: Puerto Rico Sea Grant is collecting information and quantifying valuable statistical data on biophysical vulnerability and resilience characteristics of coastal communities. In addition, mitigation strategies that residents from coastal communities have implemented to mitigate the effects of Hurricane Maria have been identified. On the other hand, inventory maps were developed to show structural losses in the vulnerable coastal communities under study: El Mani, La Boquilla, Santa Rosa de Lima, Jardines del Caribe and La Via in the municipality of Mayagüez. An inventory on the coastal businesses in the municipalities of Cabo Rojo, Rincon, and Mayagüez was also conducted. Similarly, characteristics of Posttraumatic Stress Disorder (PTSD) were observed in residents living in the municipalities of Cabo Rojo, Rincón and Mayagüez, after the impact of Hurricane Maria.

Partners: None listed in Database

Associated Project(s):
Resiliency Attitudes and Characteristics of Flood Vulnerable Communities (2018 - 2021)

Back to Top

Puerto Rico Sea Grant Establishes the First Digital Environmental Legal Library for Puerto Rico

National Focus Areas: Environmental Literacy and Workforce Development

- Accomplishment
- Approved

Recap: PRSG establishes the first Digital Environmental Legal Library that serves as the principal legal source (digital repository) of rules and regulations on waste management and water/air quality.

Program Focus Areas: Environmental Literacy and Workforce Development

Relevance: During 2018, the legislature of Puerto Rico approved Law 171 to reorganize three environmental agencies of Puerto Rico, consolidating their functions and eliminating the internet site of two of them (Environmental Quality Board and the Solid Waste Authority) and leaving the citizenship devoid of the environmental and legal information enforced by these agencies.

Response: Puerto Rico Sea Grant established the web page Biblioteca Legal Ambiental, the first Digital Environmental Legal Library for Puerto Rico. The web page maintains approved up to date laws and regulations published and enforced by the environmental agencies of Puerto Rico. Many citizens, non-governmental organizations, lawyers, and students are informed on the legal environment of the Island and the library serves as a repository for public legal documents.

Results: Puerto Rico Sea Grant legal outreach effort "Biblioteca Legal Ambiental" contributed to maintain accessible for the local and international public more than 60 laws and regulations of the absent environmental agencies of Puerto Rico.

Partners: Agricultural Coop Extension Service, UPR;

Associated Project(s):
Marine Outreach Program (2018 - 2021)

Back to Top

Back to Top

2019 Leveraged Funding

Project Level

Source	Project	Title	Amount	Type
National Marine Fisheries Service (US DOC, NOAA, NMFS)	13194 - Marine Outreach Program (A/151-1-18)	SEAMAP-C	$81,729.00	Managed
NOAA in the Caribbean	14048 - Communications Supplement (C/161-2-18)	Communications Supplement	$3,500.00	Managed
		TOTAL:	$85,229	

Program Level

No Program Level Leveraged Funding for this year

Back to Top

Performance Measures

2019 Communities implementing hazard resiliency practices

County of the Coastal Community	Name of Coastal Community	Number of Resiliency Training/Tech Assistance provided	Community hazard resiliency improved
Puerto Rico	Mayaguez	3	Yes
Puerto Rico	Ponce	3	Yes
Puerto Rico	Salinas	2	Yes
Puerto Rico	San Juan	3	Yes

Back to Top

2019 Sea Grant Products - (tools, technologies, info services)

Description	Developed	Used
Revista Ambiental Marejada: Vol 17, Num 1 2019 End users: Teachers, students, resources managers, commercial fisherman and general public. Environmental magazine committed to educate resources users about its conservation,	Yes	Yes

sustainable development and applied research results.		
Fuete y Verguilla. End users: Commercial Fisherman, Fisheries and Resource Managers, Teachers and General Public. Inform about regulations, management, social and cultural aspects of fishing, sustainable use, and conservation of marine coastal resources.	Yes	Yes
Curriculo de cambio climatico. End Users: Teachers, ONG's, Resource Managers, students and general public. Guide approved by the Puerto Rico Department of Education. Contains background information, pre and post tests, plans, educational activities and exercises, complementary and supplementary materials, pictures, illustrations, stories and music.	Yes	Yes
Book: Fresh Water Fishes of Puerto Rico. End users: Resource managers, researchers, students and fresh water recreational fisherman. Contain information about habitat, reproduction, feeding and population of the fresh water fishes.	Yes	Yes
Puerto Rico Sea Grant and partners georeferenced aerial photographs of Puerto Rico providing free access to this invaluable resource for coastal land-use planning, management, and decision-making. This product promotes future research in different coastal-related applications, including, among others: historical changes in Puerto Rico's coastal line, geomorphologic evolution of the coast, coastal erosion and changes in the coastal morphology, changes in coastal ecosystems and coastal ecosystem processes, climate change studies, and coastal land transformation. http://pr1930.revistatp.com.	Yes	Yes
The fish identification undersater app, Artedi, was developed and is being used by UPRM's Department of Marine Sciences, consultants, marine science student associations, NGOs, among others to teach about fish identification to perform fish inventories.	Yes	Yes

Back to Top

2019 Economic (market and nonmarket) impacts

Description	Businesses Created / Retained	Jobs Created / Retained	Economic Benefit	Patents
PRSG efforts provided economic opportunities for fishermen by the development of a lionfish market at restaurants. Activities to develop a market for lionfish included providing fishermen with lion-fishing gear, and the creation of a recipe book on how to cook lionfish, to convince fishermen to start to fish for the species. Lionfish was considered a pest and is now caught by fishermen and sold at restaurants. Close to 30 fishermen are taking advantage of this opportunity and selling to 10 to 15 restaurants (before hurricane María there were close to 30 to 35 restaurants selling lionfish). Even though this may not look like a significant economic impact, each fisherman takes home an extra $50 weekly due to the sale of lionfish to restaurants. This represents increased revenue of $78,000 in 2019 ($50/week X 52 weeks per year X 30 fishermen = $78,000). The restaurants are also receiving an economic benefit from the sale of lionfish since customers are looking for places where they can taste this new delicacy. Measuring the economic gain of restaurants is more difficult but we know it is real. After the earthquakes and the pandemic many restaurants closed and PRSG is helping fishermen market lionfish to individual homes by directly connecting individuals.	/	/	$78000	
The Puerto Rico Department of Education (PRDE) endorsed Puerto Rico Sea Grant's three Marine Ecosystems Curriculums and the Climate Change Curriculum educational tools and is a collaborator in the implementation of these curriculums in public schools. The PRDE shared with PRSG that they typically pay a fee of $170 per teacher per hour for teacher training, and that their cost for developing a curriculum is about $100,000. Sea Grant was able to provide these services at no cost to the schools. One hundred and eighty-two (182) teachers from public and private schools have been trained on the implementation of these educational tools, representing savings to the PRDE of about $372,000 in teacher training at market value ($170/hr *2,188 training hours). Furthermore, close to fifteen hundred (1,430) Science educators have been trained on the climate change curriculum through lectures and workshops offered by PRSG. This represents further savings of close to a million and a half dollars ($1,458,600) to the PRDE if they were to pay for the training at current market value ($170/hr * 8,580 training hours) and over two hundred thousand dollars ($200,000) savings on the cost for curriculum development (2 curriculums developed that would typically have a cost of $100,000 each) which were developed by PRSG. The latest numbers show that 20,250 students have increased their ocean literacy by the implementation of the PRSG educational tools and understand the importance of marine ecosystems and climate change to humankind, can communicate about marine ecosystems and climate change in a meaningful way and are able to make informed and responsible decisions regarding marine ecosystems and climate change.	/	/	$2030600	

2019 National Performance Measures - General

Performance Measure	Annual	Reported	Program Comment

	Target		
Number of fishermen, seafood processing or aquaculture industry personnel who modify their practices using knowledge gained in fisheries sustainability and seafood safety as a result of Sea Grant activities	8,022	34	
Number of communities that adopt/ implement sustainable economic and environmental development practices and policies as a result of Sea Grant activities	216	14	
Number of acres of coastal habitat protected, enhanced, or restored as a result of Sea Grant activities	10,627	16	
Number of resource managers who use ecosystem-based approaches in the management of land, water, and living resources as a result of Sea Grant activities	1,161	2	
Number of people engaged in Sea Grant-supported informal education programs	815,294	148	
Number of Sea Grant-supported graduates who become employed in a job related to their degree within two years of graduation	244	1	

2019 Program Performance Measures

(No Data)

Back to Top

2019 Metrics

Staffing Numbers	Individuals	SG FTEs	non-SG FTEs
Administrative	6.00	4.53	1.33
Communications	17.00	4.36	7.71
Education	7.00	2.71	1.89
Extension	10.00	4.62	1.98
Research	52.00	6.56	2.90

Core Funding	Proposals	Institutions Involved	From Home Institution
Pre-Proposals	22	18	3
Full Proposals	12	12	2
Proposals Funded	7	7	2

Student Support	Number of New Students	Number of Continuing Students	Number of Degrees Awarded
Sea Grant Supported Undergraduate Students	22	9	4
Sea Grant Supported MS/MA Graduate Students	8	7	0
Sea Grant Supported PhD Graduate Students	0	0	0
Other Sea Grant Supported Professional Degree Graduate Students	0	0	0

Other Metrics	Amount
VolunteerHours	4122
Number of P-12 Students Reached Through Sea Grant-Trained Educators or Directly through Sea Grant Education Programs	61996
Number of P-12 Educators who participated in Sea Grant education programs	2096
SG-Sponsored/Organized Meetings/Workshops	118
Attendees in SG Meetings/Workshops	4956
Public or Professional Presentations	12
Attendees at Public or Professional Presentations	9976
Clean Marina Program -- Certifications	0
HACCP -- Number of people with new certifications	0