Healthy Coastal Ecosystems

Focus Team Report 2013

This Focus Team report is a collection of "impact statements" (impacts) submitted by each Sea Grant (SG) Program via the National SG Office reporting process (PIER). These impacts describe significant and verifiable economic, societal and/or environmental benefits of SG work in the Healthy Coastal Ecosystems (HCE) Focus Area, according to the SG National Strategic Plan (Plan).
The purpose of this report is to review impacts from the SG network, assess progress toward the Plan and SG's national impact. This report is organized by the four critical functions that serve this objective:

I. Identify national impacts that should be highlighted in communication products and reporting;
II. Assess SG's progress towards its strategic plan focus area goals and outcomes;
III. Pinpoint gaps to achieve the focus area goals outlined in the National Strategic Plan;
IV. Identify emerging issues and new opportunities for Sea Grant.

This report is based on compilation and analysis of impacts reported during the 2012 report year. Impacts are categorized into goals and strategies within the HCE focus area. Using a predetermined set of criteria to ensure consistency, this compilation process serves several objectives across the sections of this report: In section 1, "national impacts" are identified and highlighted according to thematic areas identified during the review process. In section 2 of the report, we assess progress toward the Plan, by analyzing the completeness with which SG is addressing the goals (and associated strategies) set forth in the Plan. Sections 3 and 4 serve to guide future SG programming efforts by identifying gaps and assessing new opportunities for SG.

I. Identification of impacts that should be highlighted in communication products and reporting

The HCE Focus Team identified 52 "national impacts" which were highlighted from the 2012 submissions. Three working definitions of a national impact were used:

1. An impact that has relevance on a national scale and shows that SG is a national program, and/or;
2. An impact that is ripe for expansion to a national scale and, if expanded; will clearly show that SG is addressing national needs, and/or;
3. An impact that demonstrates an appropriate level of innovation and novelty.

Given the above definitions, some of these were individual program impacts and some were network-wide efforts addressing similar topics. In addition to addressing the three goals within the Plan, HCE impacts reported in 2012 were found to address diverse topical areas, which are listed below.

1. Education, outreach and training (4)
2. Living marine resources (2)
3. Water quality (7)
4. Invasive species (15)
5. Restoration (7)
6. Sustainable development (5)
7. Tool development (3)
8. Climate change impacts (4)
9. Citizen science (5)

The Focus Team examined the impacts within each topic area found notable impacts from multiple Sea Grant programs addressing similar issues, indicating that Sea Grant is working on a national scale. Below are the national impacts.

1. **Education, outreach and training:** Sea Grant educates future environmental professionals and leaders, teachers, students and the public on coastal ecosystems and provides opportunities to enhance marine and aquatic literacy to all. To accomplish this, Sea Grant uses sound science to engage people of all ages in a variety of topics and issues through programs, workshops, and training and stewardship opportunities pertinent to their coastal communities.
    a. Sea Grant collaborated to provide on the job training in marine resource science to retain local workforces. Impact 16430 from HI SG.
    b. Sea Grant provided coastal education and restored coastal habitat through master naturalist programs. Impacts 17304, 17266 from FL SG, TX SG.
    c. Sea Grant collaborated with state government and local fishing clubs to train anglers how to minimize discard mortality. Impact 17297 from FL SG.
    d. Sea Grant used science, history, and games in an interactive program to communicate the value of healthy estuaries. Impact 16568 from MN SG.

2. **Living marine resources:** Conservation of diverse living marine resources is recognized by Sea Grant as critical component of healthy and sustainable coastal ecosystems, under Goal 2 of the HCE Focus Area. Sea Grant's research and outreach mission provides vital science-based information to improve management of living marine resources with special conservation status, cultural significance and economic importance to coastal communities.
    a. Sea Grant funded state fellows whose work lead to changes in shipping lanes and voluntary speed limits to reduce whale strikes. Impact 16673 from CA SG.
    b. Sea Grant research developed DNA sequencing technology to assess the effects of pollutants on salmon reproduction. Impact 17504 from WA SG.

3. **Water quality:** Due to myriad human activities many aquatic ecosystems are stressed and degraded. Sea Grant is working to restore these water bodies through development and implementation of restoration techniques to improve coastal health and ensure continued enjoyment and use of coastal resources by the public.
    a. Sea Grant researchers tested the ability of desalination systems to remove neurotoxins produced by algae during harmful algal blooms. Impact 17477 from USC SG.
    b. Sea Grant conducted research and outreach on chemical water pollutants and the use of copper-free bottom paints. Impacts 17151, 16651 from ME SG, CA SG.
    c. Sea Grant helped educate the public and coordinated collection events to keep pharmaceutical products out of the environment. Impacts 16919, 16610 from NY SG, PA SG.
    d. Sea Grant participated in the Water Quality Taskforce to address land use practices and reduce pollution loading. Impact 16751 from LA SG.
    e. Sea Grant Law Center research lead to reform of Virginia laws on septic system financing. Impact 16587 from SG Law.

4. **Invasive Species:** Sea Grant realizes that invasive species are one of the most pervasive problems in the marine environment and elsewhere. Knowing that it is practically impossible to eradicate a species once it has become abundant, efforts are ongoing to reduce numbers, where practical, develop tools for early detection of new arrivals, and to conduct numerous outreach, training, and awareness campaigns to educate the public.
    a. Sea Grant developed control methods for invasive plant species and coordinated a volunteer program for invasive species removal. Impacts 16653, 18128, 17921, 16611 from CA SG, NY SG, MI SG, PA SG.
    b. Sea Grant researchers assessed the impacts of invasive mussels and shrimp on local food webs and developed a genetic testing method to identify invasive jellyfish. Impacts 17045, 17915, 18129 from WI SG, MS-AL SG, NY SG.
    c. Sea Grant engaged a coordinated numerous outreach, training, and awareness campaigns to educate constituents and increase stewardship against invasive species. Impacts 17390, 17626, 16915, 17199, 18059, 16575 from CT SG, MIT SG, NY SG, OR SG, OH SG, MN SG.

d. Sea Grant Law facilitated a working group to ban invasive plant species and collaborated to conduct a workshop for policy and management professionals. Impacts 17741, 16586 from SG Law, IL-IN SG.

5. **Restoration:** Under goal 3 of the HCE Focus Area, Sea Grant research and outreach is committed to providing science based information for restoring coastal ecosystems that have experienced lost or impeded function by natural or anthropogenic influences. Sea Grant develops practical information to identify ecosystem stressors, and develops solutions to restore or improve ecosystem function and protect coastal ecosystems from future threats.
    a. Sea Grant led restoration efforts through funding research and restoration in altered waterways, and engaging in post-restoration efforts. Impacts 17016, 17918, 17213 from ME SG, MI SG, WA SG.
    b. Sea Grant collaborated to develop a management plan to use dredge materials to restore barrier islands and ecosystems, and Sea Grant's restoration work on the Ashtabula River led to its removal from the list of Areas Of Concern. Impacts 16668, 18044 from OH SG, WI SG.
    c. Sea Grant provided legal information that led to the creation of a new coastal zone boundary. Impact 16765 from LA SG.
    d. Sea Grant research supported new restoration technology and methods, assisting in restoration and provide economic benefits to restoration businesses. Impacts 16861, 17307 from NH SG, FL SG.

6. **Sustainable development:** In accordance with goals 1 and 2 in the Plan, Sea Grant encourages sustainable development by providing information, research, and coordination. Through this work Sea Grant helps demonstrate the importance of maintaining healthy ecosystems and minimizing the impact of development.
    a. Sea Grant collaborated with local government to research, implement, and monitor the effects of a habitat friendly alternative to traditional seawall designs. Impact 17595 from WA SG.
    b. In a national effort, Sea Grant helped minimize pollution from commercial and recreational vessels and encourage stewardship through the "Clean Marinas" program. Impacts 18053, 16608, 17280, 16667 from OH SG, PA SG, WA SG, WI SG.

7. **Tool development:** As reflected in Goals 1 and 2 of the HCE Focus Area, Sea Grant recognizes that management of our complex marine and coastal ecosystems requires the development, refinement and use of effective, science-based tools. These tools provide critical predictive, mechanistic and analytical frameworks to better understand ecosystem dynamics for improved management and decision making.
    a. Sea Grant research developed an innovative biomarker screening tool for managers to evaluate environmental impacts of water quality on organisms. Impact 17322 from USC SG.
    b. Sea Grant funded research to investigate an improved methodology for sampling toxins from harmful algal blooms. Impact 17319 from USC SG.
    c. Sea Grant funded the development of a unique hydrologic model to manage lake water levels and protect downstream river health. Impact 17903 from MI SG.

8. **Climate change impacts:** The wide-reaching effects of climate change on people, property and living organisms in the coastal and marine environment are being increasingly recognized. Sea Grant supports research to understand the impacts of climate change and ocean acidification on coastal and marine species and environments, and works with communities and partners to plan for and adapt to the effects of climate change.
    a. Sea Grant funded research that developed models to forecast salmon abundance and ecological conditions based on climatic variation. Impacts 16652, 17600 from CA SG, WA SG.
    b. Sea Grant helped local government develop a climate adaptation plan, and developed outreach on climate change that includes a regular webinar. Impact 18093, 16609 from OH SG, PA SG.

9. **Citizen Science and Stewardship:** A relatively new area, citizen science programs enable Sea Grant to multiply its effectiveness in research and education across all three goals in the Plan. By including constituents in programming efforts, Sea Grant expands its research capacity, builds ecosystems stewardship, and encourages community involvement.
    a. Sea Grant formed the Coastal Research Volunteers group to pair local citizens with researchers, increasing monitoring and restoration capacity and decreasing staff costs. Impact 17186 from NH SG.
    b. Sea Grant coordinated a citizen science monitoring program to monitor water quality and storm drains. Impact 17142, 16599 from DE SG, NH SG.
    c. Sea Grant collaborated to create environmental education programs that train volunteers to assist with habitat enhancement and monitoring activities. Impact 17298 from FL SG.
    d. Sea Grant established the State of the Oyster Study, using resident citizen scientists to monitor shellfish. Impact 17388 from WA SG.

II. Assessment of SG's progress towards its strategic plan focus area goals and outcomes

Analysis of impacts reported during 2012 provides insight into SG's progress, as identified in the Plan. These figures indicate the majority of programming produces impacts aligned with goals 2 and 3, comprising 39% and 34% of reported impacts, respectively (see figure 1 below) and slightly fewer for goal 1, representing 27% of impacts.

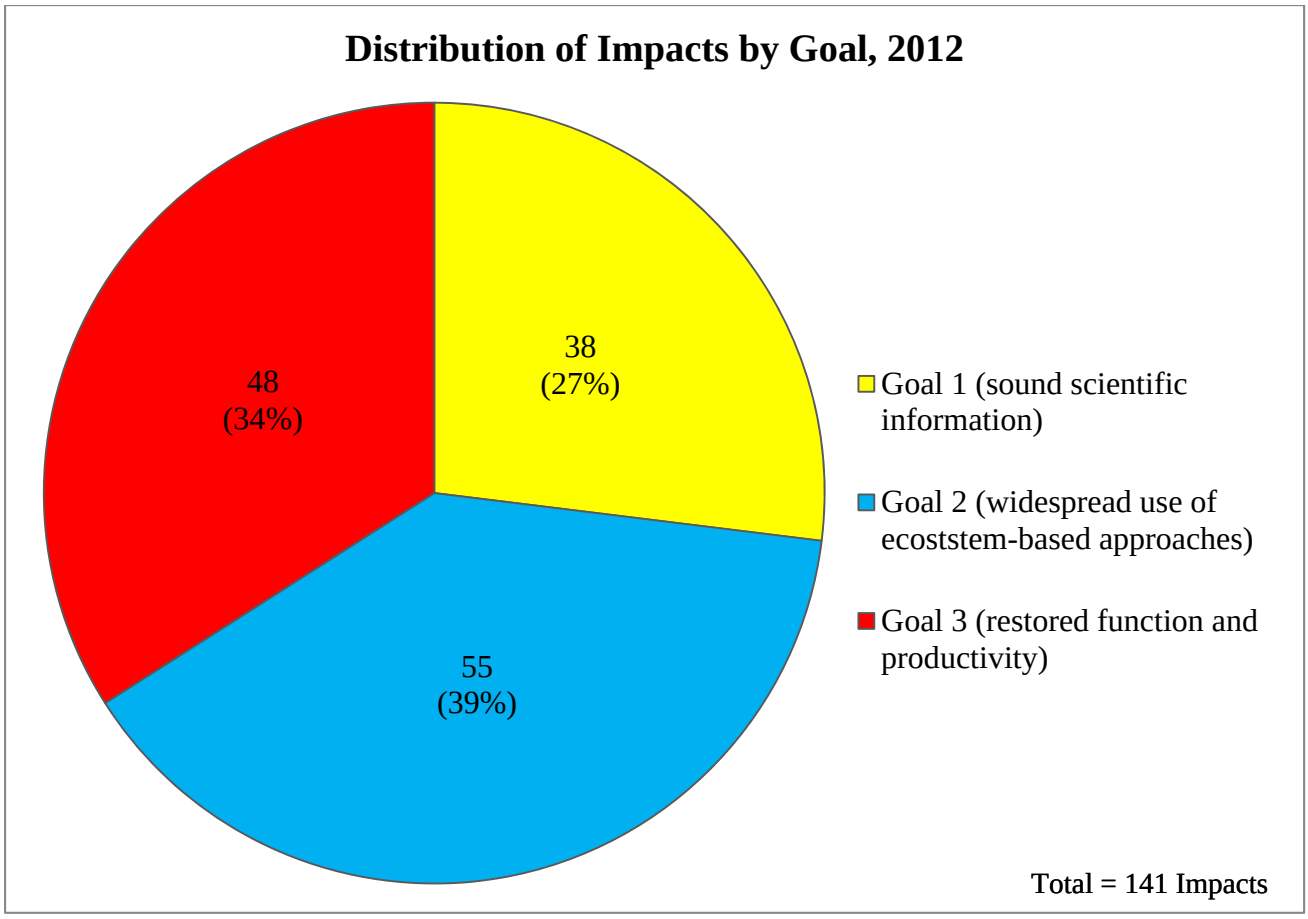

Figure 1. Distribution of 2012 HCE impacts by goal

These figures suggest that, for this reporting year; there are a greater number of impacts associated with the application of ecosystem based management methods, and restoration and water quality, and fewer impacts having to do with the research and development of restoration science and methods. This distribution is somewhat consistent with the 2012 report, though it appears that goal 3 counts for a larger share of impacts in 2013 versus 2012. Note that quantitative assessment of HCE impacts does not consider differences between them. Analyzing impacts in this manner therefore may not tell the full story, but is useful to indicate how HCE impacts are distributed into the strategic plan.

Assessment of SG's progress toward plan directs us to further examine the distribution of impacts among individual strategies within each of the HCE focus area goals. The following analyses provide further resolution and describe how impacts work toward the goals in the plan.

Under the National Strategic Plan, Sea Grant supports the following HCE national goals:

Goal 1: Sound scientific information to support ecosystem-based approaches to managing the coastal environment, 38 impacts (27%)

- **Strategy 1**: **Research ecosystem processes, 20 impacts (53%).** Conduct research on ecosystem processes, the relationships between coastal stressors water quality degradation, contaminants, harmful algal blooms, invasive species, and wetlands loss, and long-term human and ecosystem health, and communicate this information to public and private planners, decision-makers and managers.

- **Strategy 2**: **Develop information and data products to support ecosystem-based management, 12 impacts (32%)**. Contribute to the development of baseline data, standards, and indicators to support ecosystem-based approaches to land use, water, fisheries, and other resource management, working with programs such as NOAA's National Centers for Coastal Ocean Science, ocean observing programs, and others.

- **Strategy 3**: **Develop methods to evaluate ecosystem based management, 6 impacts (16%).** Develop methodologies that can be used to evaluate ecosystem-based management approaches to assess their effectiveness once they are in place, and to guide future management efforts, working with the National Marine Fisheries Service and other federal, state and local partners.

Goal 2: Widespread use of ecosystem-based approaches to managing land, water and living resources in coastal areas, 55 impacts (39%)

- **Strategy 1: Collaborate to disseminate tools and approaches for ecosystem planning and management, 31 impacts (56%).** Work with partners within and outside of NOAA to develop data, models, and training activities that support ecosystem-based planning and management approaches, and share these with a wide variety of constituencies.

- **Strategy 2: Advance ability to monitor and predict effects of human activities and environmental changes on coastal resources, 11 impacts (20%).** Support the development of regional coastal observation systems and other collaborative efforts that advance our capability to predict the effects of human activities and environmental changes on coastal resources in order to take steps to mitigate their effects.

- **Strategy 3**: **Education on coastal, ocean, and Great Lakes; and stewardship of healthy ecosystems, 13 impacts (24%).** Provide life-long learning programs for people of all ages that enhance understanding of coastal, ocean and Great Lakes environments and promote stewardship of healthy ecosystems.

Goal 3: Restored function and productivity of degraded ecosystems, 48 impacts (34%)

- **Strategy 1 Research to identify/improve restoration, 5 impacts (10%).** Support research to improve the effectiveness of ecosystem restoration and identify promising new restoration approaches and technologies.

- **Strategy 2: Develop and disseminate tools to address impacts of water quality and AIS in coastal, ocean, and great lakes, 30 impacts (63%).** Invest in the development and dissemination of new information, policies, technologies and methods to address water quality degradation, prevent the introduction and spread of aquatic non-native species, and minimize the negative impacts of these on coastal, ocean and Great Lakes food webs.

- **Strategy 3**: **Give technical support for specific restoration/mitigation, 13 impacts (27%).** Provide technical support for citizens and businesses that need help with specific mitigation/restoration problems, giving them access to the latest information and techniques.

In total, 142 impacts were reported under HCE national goals. We note that program impacts only give a snapshot of Sea Grant's work in HCE, but based on the distribution of impacts across the goals, it is evident that the network is making progress towards the three goals.

III. Pinpointing gaps to achieve the focus area goals outlined in the National Strategic Plan

In this section we assess Sea Grant's ability to address "Gaps", which represent critical areas of need where Sea Grant can make a significant and national contribution. We use reported impacts to inform progress toward gaps identified in the 2012 Focus Team report, and to identify "New Gaps". This introspective analysis shows that Sea Grant is working toward the following gaps:

Addressing Existing Gaps

1. **Pre and post-restoration monitoring of restoration efforts**

Figures indicate that SG is involved in monitoring of restoration efforts, particularly in connection to emerging impacts from citizen science programs and the use of cost-benefit analysis tools. As the SG network produces impacts related to water quality and coastal marine and fresh water habitat restoration, continued work to assess the value and success of these projects is necessary to ensure effective restoration practices and programs.

2. **Regional approach to addressing ecosystems issues**

Analysis of SG programming in this area shows that the network is using regional partnerships and collaborations to address ecosystems issues. Efforts such as collaborations and partnerships in aquaculture

and STEM education, and the continuation of pharmaceutical disposal programs illustrate SG's ability maximize effectiveness by reaching out to form working relationships.

3. **Use of communications technologies to provide education on ecosystems-based approaches to coastal issues**

Results from programming indicate that SG continues the use of technology resources in education efforts. Utilizing technologies such as web-based resources, GIS and GeoQuest tools, SG is able to strengthen its education efforts by increasing its reach to various constituent groups. As technology continues to increase in this area, so will opportunities for SG to address this gap by taking advantage of new methods of communication.

4. **Baseline habitat research**

It has been noted in past reports that this gap does not fit well into SG reporting. However, SG activity in this area indicates that there has been a gradual increase in efforts within the SG network to address baseline habitat research. SG work in marine protected areas and beach restoration, as well as work to help assess the potential impacts of alternative energy on ecosystems indicates progress toward addressing this gap.

5. **Impacts addressing climate change**

The number of impacts reported in 2012 indicates a significant increase in the amount of SG contribution addressing climate change. Impacts covering the effects of climate change on habitat monitoring and restoration, sea level rise and shoreline erosion, and storm water management are just a few of the areas that SG is addressing the challenges of this gap.

6. **Development of innovative and safe eradication methods for invasive species**

SG produces a large amount of impacts in invasive species outreach and education, but comparatively few from the development of new technologies and eradication methods. This indicates SG's capacity to educate and be prepared for invasive species in our domestic waters, but also shows a need to focus more effort on safe and effective methods of removing or controlling invasives.

New Gaps

1. **Improve the detection and analysis of invasive species**

SG programming has devoted significant resources to education and outreach on invasive species. However, the Focus Team has acknowledged a need to increase SG's research capability to test for the presence of invasive species and to further assess the effects of invasive species on ecosystems.

2. **Increase capacity for ecosystem services valuation**

Related to existing gaps in restoration efforts, the Focus Team has identified a need to increase SG's capacity for ecosystem services valuation. Increasing the network-wide capability to assign and communicate value to and about ecosystems is a critical component across the HCE focus area. Development of guidelines, models, and network-wide toolkits could greatly increase SG's ability to accurately communicate the total value of ecosystems and the services they provide, as well as provide tools for managers to incorporate such information into their decision making.

3. **Increase research on harmful algal blooms (HABs)**

Tied to the existing gap in climate change, there is a need to research the causes and detection of HAB events; and as climate change progresses information will be crucial to the health of humans and ecosystems. Questions also remain about seafood consumption during HAB events, providing opportunity for collaboration with the Safe and Sustainable Seafood Supply focus area.

IV. Identification of emerging issues and new opportunities for Sea Grant

1. **Blue Carbon:**

There has been recent and significant attention paid to the role that coastal ecosystems play in sequestering and storing carbon. Sea Grant can play a critical part by working with partners to answer questions about the value of carbon storage and sequestration in coastal habitat, and to identify methods for mapping and targeting for protection and restoration.

2. **Water rights:**

Water supply is becoming a critical natural resource issue which could affect the health of our coastal ecosystems. Increasing population, climate change, new industrial uses, environmental needs and regional sharing of scarce water resources makes water planning and conservation essential. Each coastal state has its unique problems in allocating water because of additional needs for communities, coastal restoration, fisheries habitat, energy production and other needs. There is a need to help states develop comprehensive long-term policies and plans to manage water sources and to address not only their individual state uses but also in the context of regional demand.

3. **Multidisciplinary research and outreach:**

Sea Grant could increase its ability to address complex coastal and marine issues using multidisciplinary collaborations. Integrating physical and social sciences together in the research and outreach process would allow Sea Grant to capitalize on benefits from both disciplines to further its goals.

4. **Sustainability outreach and education**

Sustainability outreach and education is a critical area that Sea Grant could capitalize on through application in its focus areas. By incorporating sustainable concepts in economics, environment, and society into existing activities, Sea Grant could build on existing efforts to ensure that sustainable practices are encouraged throughout its efforts.