



Blueprint for a Coastal Legacy: Connecticut Sea Grant Strategic Plan 2007-2013

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This strategic planning document has been prepared by the Connecticut Sea Grant College Program (CTSG) and formally endorsed by the University of Connecticut and the CTSG Senior Advisory Board.

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I. Introduction

For nearly 20 years, the Connecticut Sea Grant College Program (CTSG) has worked to foster the wise use and conservation of coastal and marine resources of the Long Island Sound (LIS) estuary, as well as working regionally, nationally and globally. The strategy for success of any individual Sea Grant College Program must be consistent with the overall vision and direction of the National Sea Grant Program. It must also be tuned into the environmental, social and economic priorities and problems presented within the Program's specific venue. For CTSG this includes the State of Connecticut as well as the adjoining water bodies and the larger New York/New England Region. Reflecting this regional identity, the mission of CTSG mirrors that of the National Sea Grant College Program: *to foster wise use and conservation of coastal and marine resources*, which for CTSG is focused on the waters, shorelines and watersheds of Long Island Sound. In developing this strategic plan, the Program seeks to understand the need for and impact of its various programs and activities in this venue. It also seeks to effectively network and collaborate with other Sea Grant Programs, as well as government, university, NGOs and industry stakeholders in implementing these programs and activities.

With the long-term goal of fostering the sustainable use, development, and management of Connecticut's coastal and marine resources throughout the 21st century, the current strategic plan will guide the program through 2013. A number of challenges and opportunities demand the attention of the program, either working alone or as a collaborative partner. This strategic plan is inspired by the recognition of the environmental and economic importance of coastal and marine resources and the need to foster the sustainable stewardship of these resources. Through CTSG's unique integration of research, education, outreach and communication programs, the program seeks to address coastal and marine resources challenges and opportunities at multiple scales.

This document outlines CTSG's strategic plan for work to be undertaken during 2007-2013. This plan consists of several logically interrelated and coordinated components, and provides detailed information on the environmental and institutional context in which we operate. The plan also presents the organizational orientation of the program, which serves as the foundation guiding all its work, as defined by CTSG's vision, mission, and operational philosophy. Given resource constraints and the large number of marine and coastal issues facing Connecticut and Long Island Sound, CTSG has chosen to target its coordinated efforts in those areas in which the program has a clear comparative advantage. Three thematic areas in which CTSG has particular expertise and can make significant impact are identified. An institutional plan for CTSG is then presented consisting of an overall strategy goal and specific strategic goals, objectives and activities for each of the three thematic areas and functional program areas of integrated research, education, outreach and communication. Plans for ongoing monitoring and evaluation of the overall strategic plan throughout the six-year period are also presented.

The current strategic planning process represents the most comprehensive self- and external-evaluation that CTSG has conducted to date. The strategic plan is the product of a two-year process, with ongoing and extensive input from CTSG stakeholders, collaborators and clientele. In the preparation of this strategic plan, CTSG solicited and received advice and information from a diverse and extensive group of government agencies, university officials, researchers, educators, non-governmental organizations, constituents and stakeholders. The resulting plan is designed to

address the specific needs of CTSG users and stakeholders, as communicated by these varied groups, as well as the priorities and directions for the National Sea Grant Program as described in the NOAA Sea Grant Strategic Plan FY 2003-2008 and the new National Sea Grant College Program Strategic Plan 2009-2013. While ambitious, this strategic plan represents that which CTSG feels is an achievable set of targets and goals. The plan will ensure maximum and effective allocation and use of the resources available to the program, and the greatest possible positive impact on Connecticut's marine, coastal, and human ecosystems.

The strategic priorities of CTSG over the coming years are influenced both by the policy and resource context in which the program exists, as well as by the institutional history of the program. Recognizing both the critical importance of these elements, but also the value of brevity in strategic planning documents, these elements are detailed in Appendices to this strategic plan. These include *Appendix A. Connecticut's Coastal and Marine Resources in Context: Opportunities and Challenges*, and *Appendix B. The History and Current Status of the Connecticut Sea Grant Program*. These Appendices follow the main text of this strategic plan.

II. Strategic Planning Process

Through the current strategic planning process, CTSG seeks to both further the overall Sea Grant mission and meet the expectations articulated in both NOAA's Strategic Plan for 2003-2008 and *Beyond: New Priorities for the 21st Century* and the National Sea Grant Office (NSGO) Strategic Plan, *Sea Grant in the New Century: NOAA Sea Grant Strategic Plan (Science for Sustainability in the New Century, FY 2003-2008 and Beyond)*. To accomplish this, this plan sets forth the vision, mission, goals, thematic areas and programs identified by CTSG through the strategic planning process. The resulting Strategic Plan is based on emerging NSGO initiatives, challenges and opportunities in the State and region.

The current planning process represents the most comprehensive self- and external-evaluation that CTSG has conducted to date. In developing its long-range strategic plan, CTSG has sought the advice, input, and guidance of the full range of program partners and stakeholders. This input was critical in identifying the key elements of the current plan. It included guidance regarding theme areas of primary focus, as well as those research, education and outreach programs and initiatives that are anticipated to provide maximal benefit to the State and the region's coast. In addition to input from users, stakeholders, and constituency groups, CTSG solicited input from each of its core staff, as well as a wide range of professionals with whom CTSG has interacted over the past years. This included input from those submitting proposals to CTSG, those funded by the program, and representatives of government and non-profit organizations with which CTSG has coordinated past efforts. While these efforts have led to the current five-year strategic plan, CTSG recognizes that strategic planning is a dynamic process involving continual monitoring, evaluation and adjustment.

Foundations for the Planning Process

Three primary documents provided a starting point for the strategic planning process.

1. *NOAA Strategic Plan for 2003-2008 and Beyond: New Priorities for the 21st Century*. This strategic plan is NOAA's response to challenges of the 21st Century, including assessing

and predicting environmental changes, protecting life and property, providing decision-makers with reliable scientific information, managing the Nation's living marine and coastal resources, and fostering global environmental stewardship. The plan identifies four mission goals, including one of direct relevance to the work of CTSG – protect, restore and manage the use of coastal and ocean resources through ecosystem-based management. The plan also identifies six cross cutting priorities, including three of direct relevance to CTSG – environmental literacy, outreach and education; sound, reliable state-of-the-art research; and international cooperation and collaboration.

2. *NOAA Sea Grant Strategic Plan for FY2003-2008 and Beyond: Science for Sustainability in the 21st Century.* This strategic plan provides a broad, national framework for priority-setting, decision-making, and action by Sea Grant. The 2003-2008 NOAA Sea Grant Strategic Plan identifies eleven thematic areas representing critical areas of focus for sustainable resource management. These include: (1) Aquaculture; (2) Biotechnology; (3) Coastal Communities and Economies; (4) Coastal Natural Hazards; (5) Digital Ocean; (6) Ecosystems and Habitats; (7) Fisheries; (8) Marine and Aquatic Science Literacy; (9) Seafood Science and Technology; (10) Urban Coasts; and (11) Invasive Species. While CTSG follows the overall direction provided by both NOAA and NSGO, it recognizes the critical heterogeneity among coastal and marine issues across states and regions, and hence tailors its Strategic Plan based on the emerging needs at local and regional levels.
3. *National Sea Grant College Program Strategic Plan 2009-2013: Meeting the Challenge.* This strategic plan provides renewed direction for the national program, and transitions the program from 11 thematic areas to 4 focus areas: (1) healthy coastal ecosystems; (2) sustainable coastal development; (3) a safe and sustainable seafood supply; and (4) hazard resilience in coastal communities.
4. *CTSG Strategic Plan 2002-2006: Charting Our Course.* As stated in this now-dated CTSG strategic planning document, the mission of the Connecticut Sea Grant College Program, *to foster wise use and conservation of coastal and marine resources*, is focused on the waters, shorelines and watersheds of Long Island Sound. This past plan called for research, education and outreach activities in three strategic focus areas: *Economic Leadership, Coastal Ecosystem Health and Public Safety, and Education and Human Resources*. The current strategic planning process views that past plan as a point of origin. As CTSG has completed the planning process for its new strategic plan, it is a critical element of evaluation to consider past progress towards meeting the goals of the now-expiring strategic plan. This progress is detailed in the most recent CTSG Implementation Plan, included as part of the 2006-2008 Omnibus submission package.

Steps in the Planning Process

The current strategic plan was prepared over an extensive, almost two year process that included wide array of CTSG partners and stakeholders in a series of focus groups, advisory meetings, formal surveys and reviews, and CTSG staff in strategic planning retreats and involvement in plan preparation. This process of review and guidance provided the inputs that manifest in the vision, mission, goals, thematic areas, benchmarks and programs identified by the current strategic planning document. These core elements of the CTSG Strategic Plan are detailed in subsequent sections. Appendix G details those involved in formal plan authorship.

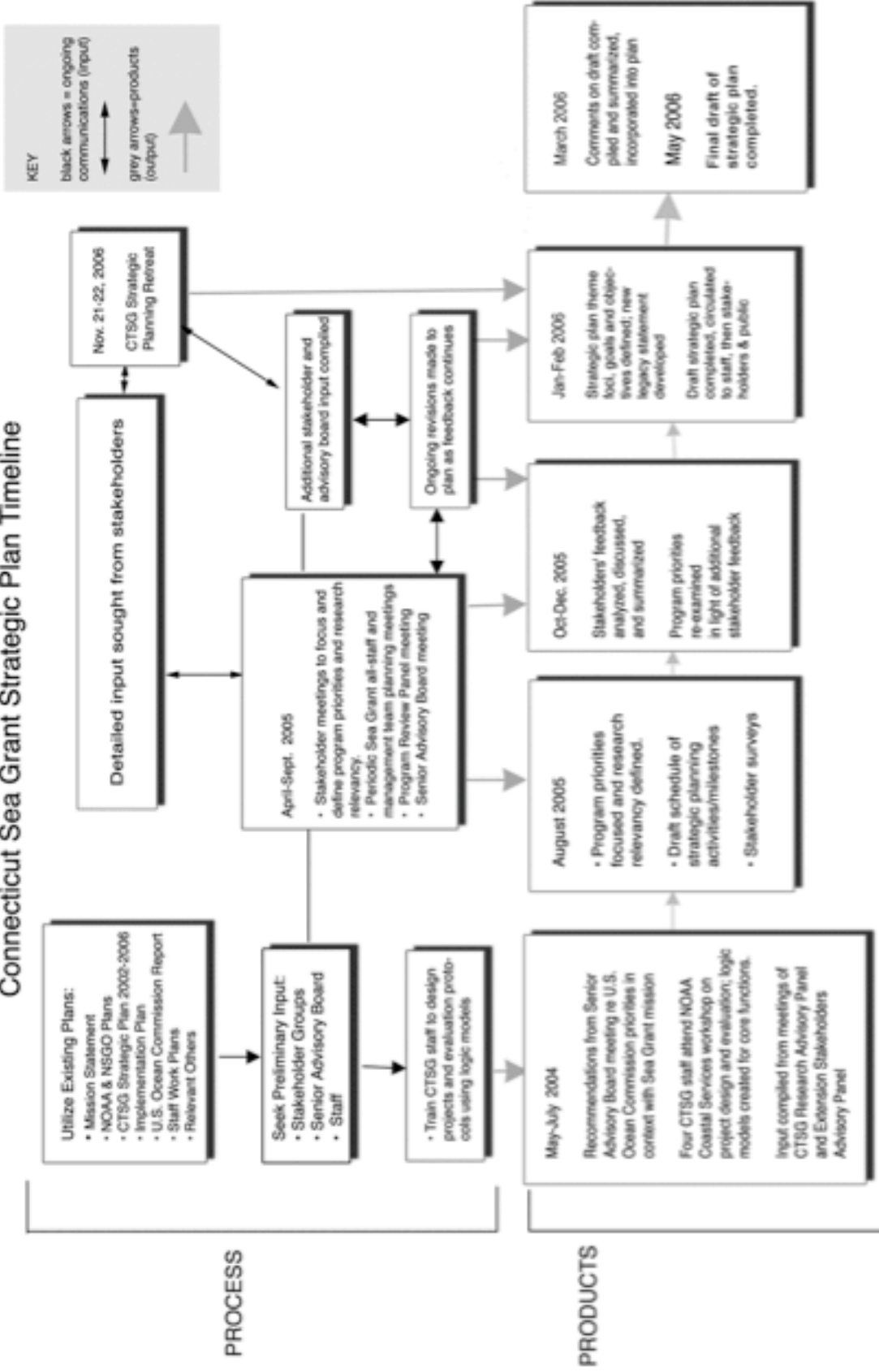
Steps in the CTSG strategic planning process included:

- Meeting with Senior Advisory Board members to assess the strategic priorities of the US Ocean Commission report. May 2004.
- Participation of CTSG staff in a project design and evaluation workshop with the NOAA Coastal Services Training Center. July 2004.
- Meetings with CTSG Research Advisory Panel and Extension/Stakeholders Advisory Panel. November 2004.
- Meeting with stakeholders on program priorities and research relevancy. April 2005.
- CTSG staff meeting to establish a schedule for the elicitation of user, stakeholder, and researcher input for strategic plan development. A schedule of activities and milestones was established, leading to final review and promulgation of the new strategic plan in Spring 2006. July 2005.
- Meeting of the Program Review Panel. August 2005.
- Elicitation of formal user, stakeholder, and researcher input for strategic plan development. All CTSG core programs (administration, research, extension/outreach, education and communication) developed formal mechanisms to obtain detailed feedback and information from appropriate constituencies. These mechanisms included extensive surveys of constituency groups, detailed one-on-one interviews, panel meetings, workshops, and other approaches best suited to each CTSG core program. Milestones for analysis of data were established, and mechanisms set in place for the use of data analysis within the strategic planning process. September-November 2005.
- Analysis of survey and feedback data for all CTSG core elements commenced as of October 2005 and completed by November 2005, providing quantitative metrics guiding strategic plan development.
- During summer and fall 2005, CTSG staff participated in regularly scheduled strategic planning meetings. The purpose of these meetings was to share results and progress of the ongoing strategic planning process as implemented by each CTSG core program, and to establish an ongoing schedule of goals and milestones, August – October 2005.
- A half-day meeting of the CTSG Senior Advisory Board to provide guidance for CTSG priorities and approaches over the next four years, and to provide an evaluation of progress over the past four years. 25 October 2005.
- A half-day workshop of CTSG Extension Program stakeholders and end-users to evaluate current program performance and provide guidance on priorities for the strategic plan. 8 November 2005.
- A half-day workshop of CTSG research constituency to provide a detailed evaluation of the current CTSG research program, and guidance for improving the research program during the duration of the strategic plan. 11 November 2005.
- A two-day strategic planning retreat for all CTSG staff. The retreat was used to process information and data obtained through prior elements of the strategic planning process, and to establish vision, mission, operational philosophy, geographic focus, thematic areas, strategy goal, strategy guiding principles, thematic area strategy, and monitoring and evaluation for the new strategic plan. The retreat also provided a final schedule and process for completion of the strategic planning document, to be completed by late spring 2006. 21-22 November 2005.
- Connecticut aquaculture industry summit to obtain priorities for research and extension/outreach. 8 February 2006.

- Draft strategic plan prepared and reviewed by CTSG staff. March 2006.
- Draft strategic plan sent to the CTSG Senior Advisory Board for review and comments. March 2006.
- Draft strategic plan put out for review and comment by CTSG constituencies. March – April 2006.
- Final internal drafts of strategic plan prepared. May 2006.
- Formal endorsement, pending PAT commentary, of the CTSG strategic plan by the CTSG Senior Advisory Board and the University of Connecticut. June 2006.
- Review of sub-final strategic plan by Program Assessment Team. October 2006.
- Final edits and publishing of strategic plan. November – December 2006.
- As required by the NOAA National Sea Grant Office, extended CTSG strategic plan to 2013, and aligned it to the NSGO's 2009-2013 strategic plan, with input from CTSG Senior Advisory Board. April – June 2009.

These steps in the CTSG strategic planning process are summarized in the *Connecticut Sea Grant Strategic Plan Timeline* illustrated below.

Connecticut Sea Grant Strategic Plan Timeline



Results of the Strategic Planning Process

Among the significant quantity information derived from the nearly two-year process of data gathering, stakeholder interaction, and internal deliberation that comprised the CTSG strategic planning process, a small number of focal points were often reinforced. These included five simple messages:

1. CTSG had contributed to significant positive impacts in the state and region, largely as a result of the optimum use of its relatively small staff and core resources.
2. Leveraging and partnerships had been, and would continue to be critical for the continued success of the program.
3. The program was clearly recognized for its successful integration of program areas (e.g., research, outreach, education), and was encouraged to continue such integrative activities.
4. The program would benefit from a tighter focus on a smaller number of critical theme areas, compared to broader areas of emphasis in past strategic plans (critical emerging theme areas are identified below).
5. The program would benefit not only from strategic priorities and planning in thematic areas of focus, but also in the functional operation of each program area.

The strategic planning process also identified key problems and challenges facing Connecticut and the region, within the general purview of CTSG. These are identified in subsequent sections of this plan addressing CTSG thematic priorities for 2007-2013. Based on this and other input, three key elements of the current strategic plan were developed. These included: 1] an updated vision and mission statement for the program; 2] a set of strategic priorities and goals for the functional aspects of the program, and 3] priority strategic areas of focus for the program, along with associated goals, objectives, strategies and benchmarks.

The distinction between functional strategies and strategic priorities is critical, and the strategic planning process provided valuable input in both areas. Simply put, functional strategies relates to *how* the program operates. Strategic priorities relate to *what* the program does. In particular, functional strategies relate to the internal operations of the CTSG program; these are approaches to improve the internal efficiency and maximize the operational capacity of CTSG in its day-to-day operations. It is the belief of CTSG, and its advisory boards, that strategic goals cannot be met without an efficient and productive operational structure.

Strategic priorities for the program, in contrast, are that which many readers associate with a “strategic plan”. These are the critical areas of focus which the strategic planning process—in its entirety—identified as the most appropriate targets of program efforts. This process clearly revealed that optimal impact of the program could only be realized through a targeted focus on a small number of theme areas for which the program had a clear and recognized expertise. Overlaying the areas of most critical importance to the sustainable use and conservation of Connecticut’s coastal and marine resources with those areas for which CTSG has a clearly recognized expertise resulted in the identification of three areas of strategic focus for the program. These include:

1. Marine aquaculture
2. Use and conservation of marine resources, ecosystems and habitats
3. Marine and aquatic science literacy

Each of these three thematic focus areas is discussed in following sections.

III. The Vision and Mission of Connecticut Sea Grant

The first three components of the 2007 – 2013 Strategic Plan are the vision, mission, and operational philosophy of CTSG, identified based on the strategic planning process outlined above. These three components outline the program’s aspirations and beliefs regarding its potential influence, forming the foundation of the organization’s orientation in all that it does. The goals and benchmarks identified later in this plan are grounded in the vision, mission, and operational philosophy identified below.

Vision

The broad vision guides both the mission and the operational philosophy of CTSG, as well as the subsequent goals and actions of the program. The vision of CTSG is summarized by the following statement: Foster sustainable use and conservation of coastal and marine resources for the benefit of the environment and current and future generations of residents of Connecticut and the Region.

Mission

As an organization, CTSG works toward the realization of its vision for the benefit of both the people and environment of Connecticut and the Region. The mission statement of CTSG supports this broader vision. The mission of CTSG is summarized by the following statement: Connecticut Sea Grant will work towards achieving healthy coastal and marine ecosystems and consequent public benefits by supporting integrated locally and nationally relevant research, outreach and education programs in partnership with stakeholders.

Operational Philosophy

The operational philosophy of CTSG describes how the organization is fundamentally oriented in all of its work. This philosophy is defined by: (1) the internal core values that CTSG holds for itself, and (2) the functional program areas CTSG espouses in the work that it undertakes. Details of the operational philosophy are provided in *Appendix C. Core Values and Strategic Guiding Principles*.

Geographic focus

Given the institutional mandate of CTSG, CTSG focuses its geographic area of responsibility on coastal and marine areas of Connecticut and Long Island Sound. CTSG will address regional, national and international issues as they are relevant to Connecticut and Long Island Sound.

IV. Functional Areas of the CTSG Program

The program has four main components or *functional areas*. These areas focus the day-to-day activities of the program. Although they are presented as individual components, in practice they are interdependent. These functional areas are:

1. Research
2. Outreach (extension and communication)
3. Education
4. Administration.

Appendix D outlines each of the functional areas and the key attributes and goals of each. The specific (topical) theme areas in which CTSG has chosen to target its research, outreach and education efforts—based on the input of numerous advisory bodies, users, and stakeholders—are presented in later sections of this plan. Appendix D, in contrast, highlights the *functional* goals, objectives, strategies and benchmarks that will guide the operation of the CTSG program.

V. Strategic Plan and Thematic Areas

The previous sections provide information on the contextual background, vision, mission, and functional areas of CTSG. This section presents CTSG's strategic plan and thematic focus areas for the period 2007-2013. It is comprised of two components: (1) a strategic goal, and (2) a set of thematic areas with associated goals, objectives, expected outcomes, strategic actions, and benchmarks. Many of the identified strategies and benchmarks represent detailed information that will also be presented as part of subsequent implementation plans. However, because these elements were part of the critical information flowing from the CTSG strategic planning process, it was decided that it was appropriate to also place them in the strategic planning document from which future implementation plans will be derived. Mechanisms for measuring the implementation of benchmarks are provided in the 2006-2008 Implementation Plan, which is the first Implementation Plan that covers materials from this Strategic Plan.

Strategic Goal

The goal CTSG seeks under its strategic plan is:

To create a legacy for CTSG by improving the capacity of stakeholders to make informed decisions regarding the sustainable use of Connecticut's marine and coastal resources.

Thematic Areas of Focus

Appendix E summarizes the thematic emphases of past CTSG and NOAA strategic plans as a background for the thematic focus areas identified by the current strategic plan. Drawing from these past and extant plans, both external and internal analysis and evaluation exercises undertaken for this strategic plan provided feedback that, with its relatively small size as a Sea Grant Program, and a need to develop a locally and nationally relevant identity and legacy,

CTSG should narrow and focus its thematic areas. That is, the thematic areas identified in past CTSG plans and proposal calls were judged to be too broad for current program resources. This process clearly revealed that optimal impact of the program could only be realized by greater focus on a smaller number of critical theme areas. The program thus identifies three thematic focus areas for the 2007-2013 Strategic Plan. These thematic focus areas are:

1. Marine aquaculture
2. Use and conservation of marine resources, ecosystems and habitats
3. Marine and aquatic science literacy

Each of these three thematic focus areas is discussed in more detail below. These sections outline *why* and *where* the institution has chosen its specific focus areas. These priorities also inform *what* exactly CTSG will strive to achieve, as defined within its six-year strategic plan.

Theme One: Marine Aquaculture

Connecticut has a thriving, historically-based shellfish industry. Currently, there are 67,000 acres of state and town bottom grounds leased to 50 shellfish companies, for the culture and production of Eastern oysters and hard clams, valued at more than \$25M in 2007. While the quantity of oysters farmed declined significantly in the late 1990s due to the outbreak of two natural diseases, there are promising signs of recovery. These oysters are still highly valued, commanding more than \$16/pound in 2007. Hard clam production has increased, and has become the more dominant shellfish grown in the Sound since 1997. In addition to shellfish culture, a small, but growing freshwater finfish industry, cultivating mainly trout and baitfish, contributes approximately 5% of the aquaculture revenues to the state. A large State program grows hundreds of thousands of Salmonid species for restoration. Other cultivated species include: Nori (seaweed), blue mussels, razor clams, bay scallops, tilapia, and black sea bass. Ornamental species including aquatic plants, aquarium fishes and invertebrates, and organic vegetables have also entered the aquaculture market.

The growth of this industry is not welcomed by all. Recent use conflicts arising over proposed uses of submerged aquaculture gear have resulted in local controversy, causing two major companies to abandon their expansion efforts. Within the past decade, several marine pathogens have caused high disease prevalence and mortality in cultured molluscan shellfish. Infections from these pathogens have led to widespread economic disaster when diseased shellfish were transferred to native growing areas. Shellfish aquaculture gear may have an impact on the marine environment, and there is a need to address the implications of this potential impact and examine possible remedies. New permitting and regulatory measures for aquaculture have been implemented in the State.

Theme One Problems and Challenges

- Use conflicts over proposed aquaculture gear and operations
- Marine pathogens causing disease and mortality in aquaculture species
- Impact of aquaculture gear on the marine environment
- Social, ethical and regulatory issues related to aquaculture
- Producer confusion and lack of knowledge of regulations and permitting requirements for aquaculture

- Complex regulatory and permitting structure often viewed as prohibitive by potential producers
- A need for students trained in aquaculture methods and economics
- A need for marketing information for aquaculture producers.

Theme One Goal

To contribute to the expansion of environmentally- and economically-sustainable marine aquaculture industries in Connecticut and the Northeast.

Theme One Objective

To address the needs of a growing aquaculture industry through an integrated program of research, education, and outreach, that reduces impediments to a sound business; improves profitability; manages aquatic health; addresses issues of conflict and policy; and assesses impacts of aquaculture on the environment.

Theme One Expected Outcomes

A more diverse and competitive aquaculture industry in Connecticut and the Northeast US including the culture of new species, use of new culture technologies, new markets and increased profitability.

A growing environmentally- and economically-sustainable marine aquaculture industry in Connecticut and the Northeast.

Theme One Strategies

- Conduct research and outreach:
 - to determine factors leading to disease transmission of marine pathogens and other factors which impact molluscan and crustacean health and sustainability.
 - on marketing, business management, production economics, product quality, and regulation/policy to improve profitability.
- Conduct research, education and outreach:
 - to address use conflicts arising from the introduction of new aquaculture technologies, including the proposed uses and benefits of submerged aquaculture gear.
 - for environmentally sensitive and science-based policy and regulation, including the careful siting, operation and monitoring of coastal facilities.
- Determine the impacts of shellfish aquaculture practices on the environment, including the impacts of shellfish bottom cages on eelgrass; the impacts of shellfish cultivation on water and sediment quality; and the carrying capacities for aquaculture areas.
- Enhance cooperative international research and educational activities with universities, international agencies and governments on ocean and coastal resources.
- Investigate the potential impact of existing leases on other organisms (e.g., winter flounder)

Theme One Benchmarks (Short and Long Term)

- By 2013, the annual value of aquaculture production in Connecticut will have increased by 25% compared to the 2007 level with the help of CTSG programs and activities.
- Improved knowledge of disease transfer in molluscs and crustaceans.
- Improved facilitation for the safe transfer of shellfish across state and regional borders.
- A more streamlined state aquaculture permitting system; by 2013, the CTSG programs and activities will have reduced the permitting process time by 50% compared to 2007.
- Improved communication between industry members and regulatory agencies.
- Increased understanding awareness among growers (aquaculture producers) of the impacts of shellfish aquaculture on the marine environment; by 2013, CTSG programs and activities will inform shellfish aquaculture activities in Connecticut, enabling the shellfish industry to reduce its environmental impacts on eelgrass by nearly 100% compared to 2007; by 2013, CTSG and NOAA Aquaculture Program will contribute to the development of a web portal on shellfish aquaculture and the environment; by 2015, the site will be utilized for decision-making by at least 50% of state aquaculture coordinators; by 2013, CTSG will contribute to the development of a textbook on shellfish aquaculture and the environment which will be published by a reputable publisher.
- Regulatory agency staff more knowledgeable about the aquaculture industry.
- Acquisition of new skills and information by growers that will enhance production and/or marketing.
- Acquisition by students of new knowledge and skills that will prepare them for a career in the field of aquaculture.
- By 2011, CTSG/CT Farm Service Agency/USDA FSA will convene four informational workshops to discuss eligibility requirements for the Non-insured Assistance Program; by 2015, CTSG, Connecticut Department of Agriculture and USDA Farm Service Agency will modify FSA policy to reflect new eligibility requirements for the Non-insured Assistance Program.

Theme Two: Use and Conservation of Marine Resources, Ecosystems and Habitats

Theme Two Goal

To support management efforts to conserve and protect ecosystems and habitats for the sustainable use of living resources in Long Island Sound's watershed, Connecticut and the Northeast United States.

Theme Two Objectives

- Conduct research, education and outreach to provide greater understanding of Long Island Sound among Connecticut residents and those making policy decisions regarding the role and function of habitat in the marine and coastal ecosystems.
- Develop collaborative partnerships with national, regional and state management agencies; non-governmental organizations; industry; and citizen organizations to improve living resource and habitat management efforts, including fisheries and ecosystem-based management.

The strategy for this theme contains four sub-themes: (1) coastal land use and community planning; (2) habitat restoration and enhancement, (3) aquatic invasive species; and (4) use and conservation of marine resources.

Sub-theme 2A: Coastal Land Use and Community Planning

Land use is at the heart of many conservation issues. The land use/water quality connection, in particular, has been touted in recent high-profile federal reports, including the U.S. Commission on Ocean Policy. Land use is determined at the most local level of government, yet it is the victim of a federal and state “mission gap” that precludes the considerable expertise, effort and funding that are necessary for a coordinated strategy to address the many land use issues we face as a nation.

When addressing the challenges of coastal land use and community planning the experience of the NEMO program has found that education – not regulation – is the most effective, and most cost-effective, means of influencing land use decisions. The educational goals are to demystify land use planning, and provide technical tools and support to enable town officials to be more proactive in protecting the character and natural resources of their community. Communities can, and do, accomplish many great things, given a little catalytic education and assistance.

Sub-Theme (2A) Problems and Challenges

- Lack of understanding among State and regional residents regarding the role and function of habitat in marine and coastal ecosystems
- Loss and degradation of critical marine and coastal habitats
- Lack of appropriate plans and partnerships to preserve marine and coastal ecosystems and prevent further loss and degradation
- Increasing development in the Connecticut coastal zone
- Point and non-point source pollution of Long Island Sound
- Lack of public understanding of water quality issues and sources of pollution in Long Island Sound
- Federal and state “mission gap” that precludes the considerable expertise, effort and funding that are necessary for a coordinated strategy to address the land use issues
- Dated community land use plans unable to account for contemporary patterns of land use and development
- Need for land use and other information at the community level to facilitate appropriate decision making and planning
- Lack of understanding of coastal watershed impacts on coastal embayments

Sub-Theme (2A) Expected Outcomes

Coastal communities, decision makers and development professionals will gain a greater understanding of the type, location and threats to their coastal resources and communities; initiate planning efforts to implement policy changes; inform their decisions with geospatial information; adopt and implement more effective and environmentally-friendly stormwater management practices; and gain increased awareness of the importance of, and techniques to protect, vegetated riparian buffers. Further, coastal communities have greater awareness of, and access to, information, resources, and tools in order to facilitate planning for climate change and

coastal hazards. Coastal communities start to include climate change and coastal hazards in local planning efforts.

Sub-Theme (2A) Strategies

- Conduct research, outreach and education:
 - to characterize land cover and land cover change for all coastal riparian corridors and to assist Long Island Sound managers in prioritizing coastal riparian corridors for both restoration and preservation initiatives.
 - to provide science-based information on the value and status of coastal riparian buffers and their importance to water quality, as well as strategies for maintaining or restoring them in coastal communities.
 - to provide science-based information about land use impacts on water quality and coastal resources, and potential impacts of climate change, sea level rise and coastal hazards for coastal communities land use decision makers.
 - on geospatial and resource information to coastal resource managers, decision makers, and communities.
 - to prioritize coastal properties for public access and open space preservation.
- Conduct research to locate and track the success of development using low impact development (LID) techniques and provide this information through an on-line database for development professionals and local land use decision makers.
- Conduct outreach:
 - on alternative storm water management and land use strategies for coastal communities and professional organizations representing the development and conservation communities.
 - to assist selected coastal communities in their efforts to incorporate planning and policy tools into their regulations for coastal resource protection.
 - to assist coastal communities developing strategies to mitigate and adapt to potential climate change and sea level rise scenarios.

Sub-Theme (2A) Benchmarks (Short and Long-Term):

- At least eight coastal communities will develop coastal resource inventories and incorporate them into community master plans.
- A new web-based resource for coastal communities will be developed, enabling citizen planners, commissioners and other stakeholders to produce and assemble town and watershed-level maps of their natural resources and other key data layers.
- A new web-based resource for coastal communities will be developed, enabling them to obtain information, photos, and local contacts on Low Impact Development practices, resulting in higher adoption rate of Low Impact Development practices in coastal municipalities.
- A new web site disseminating new research information on coastal riparian area land cover and land cover change will be created for natural resource managers and for coastal land use decision makers; at least 12 coastal communities will be exposed to the information through SGE workshops.
- New web-based resources on riparian buffers (including planting guides) will be developed to complement existing resources for coastal communities. At least 4 coastal communities or coastal land managers will improve riparian buffer practices.

- At least five coastal communities will make changes in local land use regulations that reduce the impact of development on coastal resources and reference the state Stormwater Quality Manual.
- CTSG develops an inventory of available resources, information, and tools available on climate change and coastal hazards, and work with partners to make this information more widely known and available to coastal communities, and at least two Connecticut coastal communities use available information, resources, and tools to begin incorporating climate change into their planning.
- State Coastal Zone Management plans and grant proposals for preserving coastal open space will be improved with research information created by the SGE, in collaboration with the Center for Land Use Education and Research.

Sub-theme 2B: Habitat Management, Restoration and Enhancement

Long Island Sound is a nationally significant estuary located in the densely populated metropolitan New York City region. The Long Island Sound estuary provides both economic and ecological benefits. Pressures from the region's large population have resulted in estuarine habitat loss and degradation. In the past century, more than one-third of the Sound's tidal wetlands have been lost. Eelgrass beds that once grew throughout the Sound are in a state of decline. Today's coastal forests and coastal grasslands comprise only a fraction of their original acreage around the Sound. The rapid loss of wetlands and other important habitats has slowed due to state and federal wetland protection legislation and coastal management plans, but pollution and invasion by non-native species continue to degrade Long Island Sound habitats. Unless this trend is altered by the preservation and appropriate management of significant habitats and restoration and enhancement of degraded habitats, the Long Island Sound ecosystem, even as it currently exists, will not be sustained for the future. In addition, climate change impacts are likely to significantly alter the coastal habitats of Long Island Sound.

Restoration and enhancement should strive to restore a diversity of plant and animal species. Habitats in Long Island Sound in need of management, restoration and enhancement include tidal wetlands; riverine migratory or riparian corridors; beaches, dunes, cliffs and bluffs; estuarine embayments; submerged aquatic vegetation; coastal, island or maritime forests; shellfish reefs; coastal and maritime grasslands; rocky intertidal zones; and intertidal flats. Management, restoration and enhancement projects should be community-based and should take into account the watershed as a whole.

Sub-Theme (2B) Problems and Challenges

- Lack of understanding among State and regional residents regarding the role and function of habitat in marine and coastal ecosystems
- Loss and degradation of critical marine and coastal habitats
- Lack of appropriate plans and partnerships to preserve marine and coastal ecosystems and prevent further loss and degradation
- Increasing development in the Connecticut coastal zone
- Degrading effects of pollution
- Invasion by non-native species in Long Island Sound
- Need for partnerships to facilitate community-based management/restoration efforts

- Need for additional information regarding vulnerable coastal ecosystems in need of protection or restoration.
- Gaps/lack of data in understanding climate change impacts to LIS habitats.

Sub-Theme (2B) Expected Outcomes

Progress towards the management, restoration and enhancement of habitats in and along Long Island Sound as a healthy, functioning system.

Coastal residents, businesses and industries, educators and students, and resource users/stakeholders are more knowledgeable on the factors leading to habitat alteration and destruction, and have a greater awareness of and appreciation for Long Island Sound.

Coastal landowners (municipalities, land trusts, individuals and the State of Connecticut) have access to and apply information on new approaches and techniques with regard to restoration of coastal ecosystems.

Land stewards partner and use scientific information and public input (to the degree applicable) to determine and prioritize potential restoration sites, set realistic goals and engage in community-based restoration projects.

Sub-Theme (2B) Strategies

- Conduct research and outreach:
 - on specific techniques for the management, restoration and enhancement of all types of habitats.
- Conduct outreach and education:
 - to facilitate long-term interactions between researchers, federal agencies, state regulatory agencies, local organizations, industries, and coastal property owners in Long Island Sound in planning, financing and completing habitat management, restoration and enhancement efforts, as well as ensuring that these efforts take into account probable climate change impacts to these coastal habitats.
 - to prevent habitat alteration and destruction.
 - for community-based restoration and enhancement projects to promote local stewardship.
 - to promote habitat based management planning.
 - to promote local, state, and federal partnerships in habitat management and restoration.

Sub-Theme (2B) Benchmarks

- Restored and enhanced coastal habitats for ecosystem benefit as a result of the activities of CTSG and partners.
- More knowledgeable students and citizens on the factors leading to habitat alteration and destruction and on means to prevent habitat alteration and destruction: by 2013, CTSG will educate students and the general public on coastal restoration projects using websites, magazines, classroom activities and signage at public access locations.

- More knowledgeable land stewards on coastal habitats and management needs: by 2010, CTSG will develop a training module and plan outline for Habitat Based Management Planning; by 2011, CTSG will train coastal land stewards using a Habitat Based Management Plan that will guide active management and restoration of coastal properties.
- Enhanced partnerships among stakeholders (land owners, government, public) to engage in community-based management, restoration and enhancement projects: by 2012, with the help of CTSG tools and training, and in collaboration with partners, management plans will be developed for at least 4 high priority coastal sites in Connecticut; by 2013, the training and planning efforts will be presented for application to other northeastern states.

Sub-theme 2C: Aquatic Invasive Species

The introduction and spread of aquatic invasive species (AIS) in marine and freshwater environments pose a serious threat to the ecology and native biodiversity of ecosystems and to the economic and/or health interests of the people of the State of Connecticut. Aquatic invasions pose difficult challenges to natural resource managers. Once established, populations of AIS are often self-sustaining, and expensive to eradicate, if eradication is even feasible. Effective AIS management requires ongoing efforts devoted to the prevention of new introductions, detection of, and spread prevention for, newly-established species with invasive tendencies, and to the eradication and/or control of existing invasive populations. Invasive species have the potential to establish and spread rapidly due to a lack of physical or biological constraints. The range of AIS impacts is extensive and includes degradation of habitat or ecosystem structure, localized extinction of rare species, spread of pathogens, choking of waterways, clogging of industrial water intakes and wetland systems, fouling of water supplies, and interference with recreational activities such as fishing, boating and swimming.

Sub-Theme (2C) Problems and Challenges

- Introduction and spread of aquatic invasive species (AIS) in the marine and freshwater environments
- Need for effective AIS management plans, coordinated effort, and adequate funding for plan implementation
- Loss and degradation of critical marine and coastal habitats
- Lack of resources to effectively address AIS so as to preserve marine and coastal ecosystems and prevent further loss and degradation
- Need for dedicated partnerships to facilitate AIS management efforts
- Need for additional information regarding vulnerable coastal ecosystems in need of protection or restoration.

Sub-Theme (2C) Expected Outcomes

Progress towards greater awareness of aquatic invasive species issues and implementation of policy and strategies to minimize new introductions and mitigate the effects of established invaders.

Resource managers address aquatic invasive species (AIS) through a comprehensive and coordinated science-based approach, using available resources efficiently with respect to early detection, rapid response, control, eradication, spread prevention, and policy.

Coastal residents, resource managers, businesses and industries, educators and students, and resource users/stakeholders are aware of the environmental and economic impacts caused by aquatic species invasions, implement measures to prevent new introductions and slow the spread of those already introduced, and/or participate in eradication and restoration efforts.

Managers, land trusts, NGOs, and coastal residents have tools to make science-based decisions relative to the management and prevention of aquatic nuisance species.

Sub-Theme (2C) Strategies

- Contribute to the implementation of the State of Connecticut Aquatic Nuisance Species Management Plan, which coordinates a statewide approach to minimizing the ecological, socioeconomic and public health impacts of aquatic invasive species in Connecticut.
- Facilitate the development of an interstate Long Island Sound Aquatic Invasive Species Management Plan that guides Connecticut and New York in protecting Long Island Sound's native biodiversity, key commercial species, and marine and coastal habitats from the environmental, economic, and/or human health impacts of aquatic invasive species.
- Conduct education and outreach programs:
 - to highlight significant vectors or pathways by which non-native marine organisms can be introduced to the Northeast region (Maine to New York)
 - to raise awareness leading to behavior changes that prevent, reduce, or minimize the spread of non-native marine species region-wide.
 - to make science-based information and resources on aquatic invasive species available to students and teachers.
- Conduct research and outreach to quantify the threat and impact of invasive species on marine resources and the marine ecosystem.
- Conduct outreach to maintain public awareness of aquatic invasive species issues.

Sub-Theme (2C) Benchmarks (Short and Long Term)

- Adoption of a Connecticut aquatic invasive species management plan; implementation of 50% of the key short-term objectives and priorities for 2007-2011; development of a new set of five-year priorities, strategies and actions.
- Development and adoption, of an interstate Long Island Sound aquatic invasive species management plan; implementation of 40% of the key short-term objectives and priorities outlined in the plan.
- CTSG-supported research will develop and use methods and tools to identify the distribution, spread and ecological as well as economic impacts of aquatic nuisance species on Long Island Sound marine and coastal ecosystems and their living marine resources.

- Educational programs for a range of audiences to raise awareness of the issue: at least 2000 students and 200 K-12 educators in Connecticut increase their awareness of AIS as a result of CTSG activities..
- Continued partnerships with EPA-Long Island Sound program, Connecticut Department of Environmental Protection, CLEAR to increase overall awareness and understanding of the problems caused by AIS.
- Greater awareness among recreational boaters of the risk of marine aquatic introductions from fouled hulls and of best management hull maintenance options ; 25% of Connecticut marine bait retailers regularly share "Don't Dump Bait" advisory messages with anglers at point-of-sale; 50% of marine anglers surveyed indicate they dispose of unused live marine bait and seaweed packing material in the trash.
- Greater awareness among marine anglers of the best management practices for the proper disposal of live marine bait to avoid new introductions; 100% of public marine boat launches in Connecticut posted with "Don't Dump Bait" signs; 50% of boaters surveyed indicate they employ best management practices for hull cleaning.

Sub-theme 2D: Use and Conservation of Marine Resources

The Long Island Sound watershed is home to more than 8 million people, with millions more flocking yearly to its shores for recreation. Over 20 million people live within 50 miles of the Sound. The Sound is characterized by multiple uses by multiple user groups. Ferries, ships and barges transport people and goods into deep water harbors. Commercial fishing and shell fishing provide income and employment. Recreational fishermen target a range of species. Boaters, beach swimmers and sunbathers by the thousands enjoy the Sound's beaches, waters and marinas. Birdwatchers can delight in a variety of shore birds, song birds, and birds of prey, among other avian species.

The ability of the Sound to support these diverse uses is dependent on the quality of its waters, living resources, and habitats. These activities in the Sound generate more than \$5 billion annually in the regional economy. With the uses it serves and the recreational opportunities it provides, Long Island Sound is among the most important and valuable estuaries in the nation.

While commercial fishing remains an important traditional Connecticut maritime industry, landings for all species combined totaling 28M pounds (with an ex-vessel value of \$49M) in 1993 dropped to about 10M pounds in 2007 (ex-vessel value of \$42M). This decline is in part a result of state and regional fisheries management actions which have limited access and imposed quotas for various species in an effort to re-build sustainable stocks. It is also the result of a major blow when the Long Island Sound bi-state fishery for American lobsters, worth \$40 million in the mid-1990s, was devastated by a mortality event in 1999. Annual landings by Connecticut lobstermen alone declined from 3.7 million pounds in 1998 to 570,000 pounds in 2007, and recovery of the lobster population remains uncertain. Unfortunately, the southern New England lobster population also suffers from epizootic shell disease, causing extensive pitting and lesions of the lobster's carapace, further exacerbating the decline of the fishery.

Considering recent changes and pressures, there is concern that current approaches to fisheries management do not adequately respond to the problems of the New England commercial fisheries. A number of possible alternative fisheries management measures are available,

including collaborative management, harvest cooperatives, marine protected areas, ecosystem-based management, and rights-based fisheries management. CTSG will work in the region to improve understanding of these measures. Saltwater recreational fishing is also a major economic activity in Long Island Sound. CTSG will work to promote sustainable fishing opportunities, heighten awareness of marine recreational fishing issues, and advance marine conservation principles.

Seafood consumers, as well as health care providers, dietitians, and nutritionists are bombarded with information about the health benefits and risks associated with the consumption of seafood. This information can be confusing and contradictory, leaving consumers at a loss when making decisions about seafood purchases.

Sub-Theme (2D) Problems and Challenges

- Decline of commercial fishing in Connecticut and regionally
- Collapse of Long Island Sound lobster fishery
- Shell disease in Long Island Sound lobster populations
- Need for widespread consideration of different approaches to fisheries management in New England
- Need for science to inform an ecosystem-based approach to management of marine resources
- Lack of appropriate plans and partnerships to preserve coastal and marine resources
- Need for science-based information to support resource and fishery management efforts
- Need among fishers for information on livelihood diversification strategies
- Lack of information among local residents regarding resource stewardship
- Ongoing need for HACCP training among seafood processors to address turnover in the industry and provide new or updated information on seafood-related food safety hazards and control measures.
- Need for improved communications between resource users and regulators.
- Confusion among health care providers, dietitians, nutritionists, and seafood consumers regarding benefits and risks associated with consumption of seafood.

Sub-Theme (2D) Expected Outcomes

Coastal residents, businesses and industries, educators and students, and resource users/stakeholders are more knowledgeable on the factors leading to habitat alteration and destruction, and have a greater awareness of and appreciation for Long Island Sound, and of the agencies and programs in place to help protect and preserve the Sound and its resources.

Managers have tools to identify the impacts of management activities on living marine resources of importance to Long Island Sound.

Improved understanding by fisheries stakeholders and implementation of alternative fisheries management approaches for commercial and recreational fisheries in New England, the United States and internationally, leading to more sustainable fish stocks.

The safety of seafood available through wholesale channels is continually and comprehensively protected as more individuals in the seafood industry have up-to-date training in the application

of HACCP principles to seafood processing, enabling local seafood businesses to remain in operation.

Members of the Connecticut seafood industry implement their HACCP programs competently.

Dietitians, health care providers, EFNEP staff, nutritionists and the Connecticut seafood consumers have an improved understanding of the health benefits derived from fish and seafood products and the risks associated with consumption and are better equipped to provide science-based information to their clients and make informed choices for their families about which seafood is safe to consume, how much and how often.

Connecticut seafood consumers have access to information on the health benefits and risks associated with the consumption of fish and seafood products.

Properly managed capture fisheries will provide an economic development dividend to numerous countries around the world, addressing poverty and food security issues.

Sustainable aquaculture practices in developing countries, improved food security and livelihoods for poor households, and increased availability of safe and healthy seafood for US consumers.

Coastal communities, resource managers, NGOs, industry, and other interested parties will apply a greater understanding of the benefits and constraints associated with renewable energy alternatives to local and regional decision-making.

Improved water quality and conservation and protection of habitats and living resources in Connecticut and the Northeastern United States.

Sub-Theme (2D) Strategies

- Support/conduct research:
 - that improves scientific understanding of acute and cumulative effects of physical, chemical, and biological contaminants on marine and coastal ecosystems;
 - that identifies methods to minimize negative effects of human-caused impacts on marine and coastal ecosystems;
 - to better understand the impacts of water quality problems (hypoxia, toxic contamination, pathogen contamination, debris) on the health of marine and coastal ecosystems.
- Conduct outreach and education:
 - for resource developers, regulatory officials, resource management agencies, and the public to provide objective, science-based information on best management practices for use and conservation of marine and coastal resources;
 - that encourages direct communication between fisheries management personnel and fishing constituents and partnerships for collaborative research and management;
 - to increase environmental stewardship practices;
 - to inform marine recreational anglers of management and policy issues;

- on the health benefits and risks associated with seafood consumption and to provide current, science-based information on seafood-related “hot” issues;
- for Connecticut seafood processors who must comply with the 1997 FDA safe seafood processing regulation so that they can develop and maintain adequate HACCP and sanitation control plans, and understand how to implement and follow them successfully.
- Support/conduct research and outreach:
 - on critical issues relevant to Connecticut’s three major commercial fishing sectors: shellfish, lobster and finfish;
 - on experiences with alternative fisheries management strategies in New England and the United States; reviewing the Connecticut fisheries management experience and performance; assessing problems and opportunities in Connecticut fisheries and management; and recommending alternative management strategies;
 - on livelihood diversification for commercial fishermen as a result of changes occurring in the fisheries;
 - on the status and value of recreational fishing in Connecticut.
- Conduct outreach:
 - with industry, user groups, and government on fisheries management, including collaborative management, harvest cooperatives, marine protected areas, ecosystem based management, adaptive management and rights-based fisheries management.
 - on renewable energy alternatives for the coastal zone (land and water)

Sub-Theme (2D) Benchmarks (Short and Long-Term)

- 200 additional seafood processors from southern New England trained in application of HACCP principles to seafood processing.
- 80% of previously trained seafood processors that are still active receive updated training/information.
- 25% reduction in the food safety or HACCP-related problems documented during seafood HACCP inspections in Connecticut.
- 50 vocational high school students trained in the application of HACCP principles to seafood processing in Connecticut.
- 175 dietitians, nutritionists, and health care providers trained by CTSG in the use of the “Seafood at its Best” curriculum.
- Up to 75% of those trained in using the “Seafood at its Best” curriculum sharing some or all of the information with their clients.
- Number of consumers with an increased awareness and ability to make more informed choices concerning seafood consumption and its associated health benefits and risks.
- Improved understanding and/or adoption by regional, national and international fisheries managers of alternative management approaches, in part due to CTSG activities
- Improved information on livelihood diversification strategies for commercial fishermen
- 8500 Connecticut residents learn something new about Long Island Sound or the Long Island Sound Study through CTSG activities; at least one individual behavior change

undertaken to reduce impact on LIS and its watershed identified in 35% of Connecticut residents surveyed.

- CTSG-supported research develops indices applicable to Long Island Sound to monitor changes indicative of ecosystem changes (degradation or improvement) in response to physical, chemical or biological stressors of natural or anthropogenic origin.
- CTSG-supported research develops methods to identify the origin and consequences of physical, chemical or biological stressors of importance to marine and coastal ecosystems of Long Island Sound ecosystems.
- CTSG-supported research contributes to improving the understanding of the causes and consequences of hypoxia in Long Island Sound, including the relative contributions of physical, chemical and biological factors.
- CTSG-supported research develops methods and tools to identify the impacts of management activities on living marine resources of importance to Long Island Sound.
- CTSG-related activities contribute to the coordination of research, monitoring, education, and information exchange on ecosystem-based management in the Northeast US, specifically the Gulf of Maine and New York Bight regions.
- CTSG coordinates development of a research and information plan to define the priorities to progress towards ecosystem-based management at the regional scale (NY Bight)
- CTSG supports at least 2 research projects in support of ecosystem-based management at the regional scale that address identified regional priorities.
- CTSG contributes to a regional workshop on identifying research priorities and informational needs regarding planning for renewable energy infrastructure in the coastal zone (land and water).

Theme Three: Marine and Aquatic Science Literacy

The education of future environmental professionals and leaders is critical to the responsible use and management of our nation's marine and aquatic resources. Science and engineering majors, future marine scientists and education professionals need opportunities to learn science in real-world settings and to apply their skills at work under the mentorship of actual scientists. Producing an environmentally and scientifically literate citizenry and a group of technical, policy and managerial professionals who can ensure a sustainable future is essential.

CTSG has worked to ensure that its education program addresses issues relevant to a variety of educational constituents and is dedicated to reaching out to traditionally underrepresented and underserved groups. Formal (K-12) and informal science educators in Connecticut are in the midst of a challenging transition. In 2004, the Connecticut State Department of Education issued new Science Frameworks for grades K-10. The new Science Frameworks lack a focus on environmental quality, biodiversity, and Long Island Sound and its watershed, leaving teachers to creatively weave water and Long Island Sound related materials into their curricula. The previous version of the Connecticut Science Frameworks contained an entire strand, through all K-12 grade levels, dedicated to water.

The lack of focus on water issues in the Connecticut Science Frameworks will have an impact on K-12 students. Many students in Connecticut's most diverse cities and towns have never been to the shore, and are not aware of how their actions can impact coastal environments. Several Long

Island Sound coastal communities, including New Haven, New London, and Bridgeport, and river towns, including Hartford and Norwich, are among Connecticut's poorest and most diverse. Connecticut also has several small rural towns, particularly in the northern part of the state, as well as two federally recognized Native American tribal nations.

Theme Three Problems and Challenges

- Need to educate future environmental professionals and leaders
- Need for opportunities to learn science in real-world settings and to apply associated skills
- Lack of science education and opportunities (particularly addressing marine and coastal issues) among traditionally underrepresented and underserved groups
- New Connecticut science frameworks for grades K-10, and challenge of transition
- New science frameworks lack a focus on environmental quality, biodiversity, and Long Island Sound and its watershed
- Lack of experience and education among K-12 students related to coastal and marine issues and human impacts on coastal and marine environments—particularly within less-wealthy urban and rural districts.
- Need for curricular materials for K-12 classrooms addressing marine and coastal issues and science.

Theme Three Goal

To foster a better world through ecological and environmental knowledge and stewardship.

Theme Three Objective

Conduct formal and non-formal educational activities that will equip people with the knowledge and skills required to make sound decisions in the management, use and conservation of ocean and coastal resources.

Theme Three Expected Outcomes

A significant increase in public knowledge and understanding of marine and aquatic science issues accomplished through a variety of educational strategies at all levels.

Theme Three Strategies

- Conduct professional development programs in the form of workshops, conferences, institutes, and presentations for educators at local, regional, and national venues
- Continue to secure funding to provide opportunities for educators to have research experiences
- Continue to work with formal and informal education entities to develop long-lasting professional relationships
- Continue the Sea Grant involvement with graduate programs
- Continue the Long Island Sound fellows program
- Continue to solicit and mentor applicants for NOAA Sea Grant Knauss Fellows program
- Continue to develop and revise curricular and resource materials relating to the Long Island Sound ecosystems and its inhabitants
- As applicable, continue to align resource materials to state and /or national standards
- Reprint and distribute CTSG curricular materials in Spanish.

- Seek partnerships and provide teacher professional development workshops to educators of traditionally underrepresented / underserved groups
- Continue to work with partners to bring cutting edge technology (e.g., live web casts from research vessels at sea) to educators and the general public
- Continue to produce educational CD-ROMs, DVDs and other media rich classroom resources
- Continue to develop and implement innovative and informative front end, formative and summative assessments and share the methodology with other education professionals

Theme Three Benchmarks (Short and Long-Term)

- Educators will receive resources and learn strategies to implement marine and aquatic science into their standards-based classrooms: by 2013, CTSG-supported professional development opportunities for educators will have reached at least 500 educators, and through them at least 12,000 students, and 30% of school districts in Connecticut; by 2013, at least four resources will be developed or revised by CTSG for use in classrooms.
- Formal and informal educators, K-12 students and the general public will become more aware of marine and aquatic issues and resources: by 2011, at least 3500 Connecticut residents, and by 2013 an additional 5000 residents, will have received information on the LIS, key issues facing LIS and the efforts currently in place to protect and restore this estuary, as a result of CTSG programs and activities; at least one individual behavior change undertaken to reduce impact on LIS and its watershed will be identified in at least 25% of Connecticut residents surveyed by 2011, and in at least 35% of those surveyed by 2013, as a consequence of activities and programs of CTSG and its partners.
- Students exposed to work with science professionals will consider marine and aquatic related careers. By 2013, CTSG will have contributed to the education of at least 30 new graduate and 20 new undergraduate students via its research projects, fellowships, internships, and education and outreach programs; by 2015, at least five students who worked with CTSG staff or CTSG-funded researchers since 2007 will have undertaken a career in marine and aquatic sciences.
- Formal and informal educators and students will utilize CTSG developed curricular resources: by 2013, at least 2000 students and 200 K-12 educators in Connecticut will have increased their awareness of AIS as a result of CTSG activities.
- Traditionally underrepresented and underserved populations will become more aware of marine and aquatic issues and educational resources: by 2011, CTSG will facilitate learning about Long Island Sound among Hispanic and Latino populations by translating at least two CTSG educational resources in Spanish, and distributing them to educators in underserved communities for use in classrooms; by 2013, CTSG educational activities will have reached at least 5 underrepresented and underserved school districts/communities in Connecticut; by 2013, at least 2 CTSG-funded research projects will engage in the STRONG-CT (Science and Technology: Reaching Out to New Generations in CT) program, a collaboration between the University of Connecticut and three community colleges that targets first generation college students (many of whom are African-American or Latino).
- Educators, students and the general public will access new technologies to bring real-time science into their classrooms and homes: by 2013, at least two products and / or technology based programs will be developed.

- The CTSG Education Coordinator, working with a variety of partners, will continue to develop and share assessment methodologies and best practices for marine and aquatic science programming: by 2013, CTSG will share four new assessment methodologies or best practices for marine and aquatic science programming with education and science professionals through publications and /or presentations or at local, regional or national venues.

VI. Strategic Plan Monitoring, Evaluation and Updating

Ultimately, CTSG must be able to determine whether or not the sum of CTSG's parts (strategies) leads to the achievement of the whole (the strategic goal and the four thematic goals and objectives). To do this, CTSG's Strategic Plan requires both ongoing and periodic performance monitoring and evaluation. CTSG gauges its institutional and programmatic progress using an adaptive management approach in which the underlying strategic assumptions of the goals and four thematic areas are systematically tested, evaluated, and adapted through time. Monitoring CTSG's progress toward its thematic goals and objectives, and ultimately the strategy goal, will therefore require CTSG to evaluate aggregate strategy progress toward achieving the objectives through time. Hence, both CTSG performance, and this strategic planning document, will be subject to frequent review, both internal and external.

The CTSG Strategic Plan, and progress towards Plan goals and objectives, is reviewed annually during the Senior Advisory Board (SAB) meeting. During this meeting, CTSG staff summarize program progress and achievements with regard to the Strategic Plan goals and objectives. The SAB then provides guidance as to future program activities, as well as whether certain elements of the Strategic Plan should be revised or revised. Formal evaluation and revision of the Strategic Plan also occurs in 5-year cycles, with the expiration of each strategic planning cycle and the commencement of the new cycle.

Program management is responsible for monitoring and evaluating all activities of CTSG, in coordination with all CTSG staff and user groups. Detailed progress towards fulfillment of the goals of the strategic plan will be provided by CTSG Annual Reports and Implementation Plans, which are filed annually and biennially, respectively, in fulfillment of National Sea Grant Office requirements. Implementation plans will incorporate reports of performance towards goals and interim benchmarks. Evaluation of specific CTSG results and dissemination will be conducted throughout the biennial cycle using both formal (progress reports, periodic panel meetings, Senior Advisory Board meetings, surveys of end-users, etc.), as well as informal (ad hoc discussions with stakeholders and end-users, review of media coverage of CTSG activities) mechanisms. Evaluation is viewed as a continual activity through which mechanisms for achieving results and dissemination are constantly improved, to achieve the maximum impact of CTSG funds and activities. It is also a mechanism by which progress towards biennial milestones is assessed. Where possible, evaluation is conducted in terms of quantifiable milestones set in implementation and strategic plans, and metrics of performance towards those milestones. In other instances, evaluation is qualitative.

A primary element of evaluation is the periodic elicitation and review of progress and termination reports from each program element. Although the procedures for progress reporting mandated by the National Sea Grant office are in a current state of flux, we anticipate that the primary information gathered from PIs will be similar to that gathered in past years. Progress reports draw from the original goals and objectives specified by each program element, and elicit concrete elements of progress towards those goals.

Formal evaluation mechanisms differ across program elements. Results of research projects are evaluated in the short-term using standardized metrics including:

1. Primary accomplishments—scientific findings of research to date or significant achievements.
2. Benefits—specific benefits, applications, and uses stemming from this project. Includes benefits expected in the future. These are quantified in concrete terms (metrics), where possible, and include information regarding *who* is applying research or other results and the uses or benefits that can be anticipated outside the research community.
3. Publications and Reports—published materials with complete references, as well as those which have been submitted but not yet published and those in press.
4. Patents/Copyrights/Inventions—including those already gained and expected.
5. Students Involved—includes both undergraduate and graduate students involved in Sea Grant projects, and thesis results from these students.
6. Miscellaneous Results—interesting spin-offs or unexpected insights that evolved during the course of the project.

Formal progress reports are requested annually from investigators, and consolidated by CTSG staff into an annual report of progress that is disseminated to end-users, policymakers, and government officials both state- and nationwide. Results from these reports are entered into a flexible and expandable research database, to enable research productivity and results to be constantly tracked. In addition to formal progress reporting, non-core research, extension, and education elements are in continual contact with CTSG core elements—particularly the communication and extension programs—to ensure that research results are being capitalized for the greatest possible benefit.

Broader social impacts will of course differ by project, and hence cannot be easily assessed using a standardized template or reporting form. Hence, to quantify the longer-term results and benefits of the research project in measures such as businesses and jobs created, acres of marsh restored, number of accidents prevented, CTSG engages in individualized tracking of research results, through ongoing communication with investigators. CTSG staff also monitors the results of follow-on research to the original project to detect downstream advances that lead to easily-described or quantified benefits.

For education and outreach projects, the short-term quantification of results and benefits is more straightforward. Measures include number of students and teachers trained, attendance at workshops, entries to the web site, number of articles published in local and regional newspapers and newsletters, etc. Some measure of the benefits accrued can be made through use of follow-

up questionnaires to educational seminars and workshops, and surveys presented to users of the web site. Overall value of the educational and outreach initiatives can be gauged by recognition awards to the CTSG staff and the CTSG program as a whole. As with the research program described above, detailed data on research projects and outreach activities will be assembled and entered into a database to track and evaluate projects and provide program data and insight for external accountability reviews.

Finally, global feedback and recommendations for all program elements will be obtained during the periodic program assessments and evaluations conducted by the National Sea Grant Office.

APPENDICES TO THE CONNECTICUT SEA GRANT STRATEGIC PLAN

Appendix A. Connecticut's Coastal and Marine Resources in Context: Opportunities and Challenges

Much of the attention of CTSG is focused on the Long Island Sound Estuary (LIS), the “urban sea”, which forms the southern boundary of the State and the northern boundary of Long Island, New York. LIS is a significant environmental, economic, cultural and recreational resource for both Connecticut and New York, and the Southern New England region as a whole. Recognized for its beauty and value, LIS was one of the first “estuaries of national significance” to be designated by the US Environmental Protection Agency. More 8 million people live in the Long Island Sound watershed and more than 20 million people live within 50 miles of the coast. Connecticut currently has one of nation's most densely populated shorelines, at 719 people per square mile, expected to increase to 727 by 2008. Diverse usage of the Sound includes recreation, commercial fishing, coastal aquaculture, marine trades and transportation, and recreational boating, as well as habitat for fish, shellfish, birds, wildlife and plants. Long Island Sound's estimated value to the regional economy is \$5.5 billion per year.

Long Island Sound, its connecting harbors, rivers, and estuaries, and the adjacent 618 miles of shoreline area, are also a key component of the socio-economic setting for Connecticut. Connecticut is a heavily populated state, with over two million residents concentrated in the I-95 corridor. Large coastal cities in Connecticut include Stamford, Bridgeport, New Haven and New London. Development pressures continue to grow along LIS. Housing in Connecticut's less urbanized coastal communities continues to transition from part-time summer cottages to larger, year-round homes accompanied by the concomitant increasing demands on septic and sewer systems, local roads and infrastructure, and wells or public water supplies. Coastal cities wrestle with waterfront re-development, port security, and coastal access, cut off from the shoreline by highways and railways. Over the past century, the Sound has been heavily stressed by pollution from coastal cities and municipalities, including both point and non-point sources. In addition, the continuing development of coastal areas for residential and commercial use removes or degrades wildlife habitat. Although the “official” destruction of coastal marshes has been largely halted, the continuing development of upland areas continues to remove habitat and contribute to runoff and non-point source pollution, and sea level rise threatens the remaining marsh ecosystems. Moreover, variances to wetlands regulations still allow the loss of wetland habitat in some areas.

In addition to these contemporary impacts, the impacts of old abuses from development still remain. This impact is felt throughout the Connecticut River Watershed, which extends throughout New England, as well as the Housatonic and Thames River Watersheds. The coastal communities around Long Island Sound can be considered urban shorelines. As a result, the challenges of protecting coastal ecosystems and preserving the shoreline as a recreational and cultural resource for the community, is far more complex than in other coastal regions. Controlling pollution and restoring damaged habitat is an ongoing challenge for the agencies and organizations seeking to preserve the Sound's water quality and ecosystem diversity.

For a relatively small water body, the Sound is highly utilized. There are more than 30 harbors of various sizes along the 130-mile stretch of Connecticut coast with connecting waterways to the interior. These ports and waterways support a wide range of commercial enterprises including marine transportation, fishing, aquaculture, and shipbuilding. In addition, the waterways and shorelines provide a venue for recreation and tourism, and an ever increasing number of recreational boats and personal watercraft. The Sound provides a highly-controversial means for transporting energy from New England to Long Island via submerged cables and pipelines, and is currently proposed as a location for an equally-controversial floating LNG (liquid natural gas) terminal. The use and modification of offshore habitat for navigation channels, marinas and mooring areas, and aquaculture sites also modifies living resource habitat along the shore. Living resources are also at risk from over-fishing and the impacts of pollution. The addition to the loss of living resources, the introduction of invasive species represents a critical and ongoing threat to LIS ecosystems and may have serious economic consequences.

Maritime industry also represents a primary influence on the Sound and its surrounding coastal lands, and must be considered as a key partner and stakeholder in the Sea Grant strategy. This industry has always been a vital component of Connecticut's economic base and heritage. The industry currently employs 12,000 people and generates \$2.6 billion in revenues annually. Business areas within this industry include shipbuilding, commercial fishing, aquaculture, marine manufacturing, marine engineering, port services, marine terminal operation, marine construction, marina operation, marine environmental services, and marine transportation. Commercial fishing still exists in clusters up and down the coast and is still an important component of Connecticut's coastal economy. However, commercial fisheries and fishermen are in a period of transition, as new government fisheries regulations are being put into place and as commercially important stocks (such as winter flounder and lobster) decline in abundance. Many fishermen are working part-time in other occupations to supplement their income, and the influence of "gentrification" has begun to restrict access to shoreline facilities. Maintaining the welfare of those associated with Connecticut's commercial fisheries is a critical challenge as these transitions continue.

In addition to commercial fin-fisheries, Connecticut has a thriving shellfish industry with deep historical roots. Currently, there are 67,000 acres of state and town bottom grounds leased to 40 shellfish companies for the culture and production of Eastern oysters and hard clams, valued at more than \$12 million in 2004. Even this is a very small fraction of the historical size of the Connecticut shellfish aquaculture industry, which was historically dominated by oyster production. The growth of this industry, however, is not welcomed by all. Use conflicts over proposed uses of submerged aquaculture gear have resulted in local controversy, causing two major companies to recently abandon their expansion efforts. Other cultivated species include: trout, baitfish, Nori (seaweed), blue mussels, razor clams, bay scallops, tilapia, and black sea bass. Ornamental species including aquatic plants, aquarium fishes and organic vegetables have also entered the aquaculture market. However, identifying the appropriate and optimal role of aquaculture as a beneficial use of LIS resources remains an ongoing challenge.

Compounding the challenges associated with appropriate management of LIS is joint jurisdiction over the Sound's resources and management responsibilities, shared with New York State. Intra- and interstate user-conflicts are unavoidable and abundant, and range from pro and con energy

groups, to commercial fishermen vying for space with shellfishermen, to community concerns about the impacts of aquaculture gear on recreational boating and sensitive habitat, to recreational angling versus commercial fishing interests.

Although many of these issues in Long Island Sound manifest locally, they are, for the most part, global in nature. For example, as fish are an international commodity in a globalized economic marketplace, linkages with and understanding of commercial fisheries and aquaculture around the world must be established in order to ensure food security and resource conservation both in Connecticut and the United States. Coastal and marine stewardship issues exist at multiple geographic levels, and must be addressed across local, regional, national and international arenas.

Appendix B. History and Current Status of the Connecticut Sea Grant Program

The genesis of CTSG was the passage of the Sea Grant College and Program Act of 1966, which established a national network to support marine research, education and outreach with the goal of fostering the wise use and development of the nation's coastal and marine resources. The CTSG program started somewhat sporadically in the late 1970s and early 1980s with a modest extension effort. The program expanded steadily as a research component was added under leadership of the first Sea Grant Director, Dr. Victor Scottron. Dr. Edward C. Monahan took over as Director in 1986. Under his leadership, the research component of the program and its participating institutions expanded further. In 1988, the University of Connecticut received its formal designation as a Sea Grant College, marking the maturation of CTSG as a full-fledged, comprehensive Sea Grant program. In 2005, Dr. Monahan retired as Director. An Interim Director, Dr. Sylvain DeGuise, was assigned by the University while a search for a replacement was undertaken. In 2007, De Guise was selected to be the director of the program.

The Connecticut Sea Grant Program is located at the Avery Point Campus of the University of Connecticut, which provides infrastructure support through office space and certain administrative support services. The University of Connecticut (UConn) is the formally designated Sea Grant College for the State of Connecticut and thus serves as the "flagship" university for the Connecticut Sea Grant College Program. The location also provides an ideal venue for supportive collaboration since the UConn Marine Sciences Department, Project Oceanology, and the NOAA-sponsored National Undersea Research Center are also located on the Avery Point Campus.

CTSG is a small Sea Grant program, with a current staff of 10 people, with a total of 7.0 FTEs (as of 2007). The staff includes a Director and Associate Director, administrative support, extension educators, education coordinator, and communications director. Sea Grant staff have affiliations not only with Sea Grant but with academic departments of the University of Connecticut, including the Department of Extension, the Department of Agricultural and Resource Economics, and the Department of Natural Resource Management and Engineering.

Given the relatively small size of CTSG's core staff and federal funding levels, the program is characterized by its extensive and successful use of leveraging and partnerships to address ongoing challenges. More so than larger Sea Grant programs, the long-term impact and legacy of CTSG depends critically on the program's ability to develop and foster long-term partnerships.

CTSG has undertaken a number of innovative activities to address the challenges and opportunities for fostering stewardship of coastal and marine resources – all involving the novel use of partners and leveraging to address critical needs and issues. For example, the NEMO (Nonpoint Education for Municipal Officials) began in 1991 as a collaboration between CTSG and the Cooperative Extension Service. Initial programming emphasized "linking town halls to land use and water quality" using build-out projections, remote sensing, impervious surface cover, and water quality ratings to demonstrate various future scenarios to municipal policymakers and residents. Through collaborations with NASA and NOAA Coastal Services Center, the program has acquired high-end satellite imagery, making possible even greater

geospatial resolution to show how land use and coasts are changing. The popular Focus on the Coast program was instituted in recent years to work directly with municipalities and offer online resource tools as a supplement to on-the-ground training and workshops. NEMO to date has worked with almost two-thirds of the 169 municipalities in Connecticut. NEMO staff conduct about 150 educational workshops per year. Connecticut Sea Grant's staff includes a full-time Connecticut NEMO Coordinator. As good ideas tend to spread quickly, NEMO soon became a national network. The national hub is based in Connecticut and coordinates 34 projects in 32 states, many of them organized and staffed by Sea Grant programs.

Key educational partnerships include the K-12 marine education training and the Yale Sea Grant Internship program, initiated in 1994. Located at the Yale University Center for Coastal and Watershed Studies, this collaboration has resulted in more than 54 Yale Sea Grant interns having completed projects linking watershed use and coastal policy. Many of these interns, in turn, have worked directly with—and provided assistance to—the many stakeholders, users, and policy makers that both depend on and influence Connecticut's marine and coastal resources. Such activities exemplify CTSG's efforts to maximize our impacts through partnerships and leveraging.

Given the critical role of partnerships in the program's efforts and impact, the capabilities and plans of potential partners are a critical component of both formulating and implementing an effective strategy for the future. For CTSG this includes a number of sister Sea Grant Programs, as well as a wide array of government agencies, educational institutions, and non-governmental organizations concerned with understanding the marine environment, protecting marine resources, and promoting sustainable economic growth in the maritime sector. Other Sea Grant programs include those in the six New England states, including the Rhode Island, MIT, Woods Hole, Vermont, New Hampshire and Maine Sea Grant Programs, as well as the New York Sea Grant Program. Key government agencies include NOAA, EPA, USGS, Connecticut Department of Environmental Protection, Connecticut Department of Agriculture, and New York Department of Environmental Conservation. Key educational institutions at the college level include the University of Connecticut (CTSG's flagship university), Yale University, Wesleyan University, Connecticut College, Fairfield University and the Williams College/Mystic Seaport undergraduate program. Other important educational institutions include the Maritime Aquarium at Norwalk, the Mystic Aquarium and Institute for Exploration, Project Oceanology, the Bridgeport Regional Vocational Aquaculture School, Mystic Seaport, and the Sound School in New Haven. Important maritime industry organizations include the Connecticut Marine Trades Association (CMTA), the Connecticut Maritime Coalition (CMC), and the Connecticut Seafood Council.

Appendix C. Connecticut Sea Grant Core Values and Strategic Guiding Principles

Core values are the central, institutional principles that guide CTSG in its provision of services each day. Taken together, they form an operating philosophy that describes how CTSG as an organization is oriented toward its work and interactions with the world. Each value reflects a belief that CTSG has about itself that it strives to manifest through its professional practice. CTSG staff are committed to be perceived as living manifestations of these institutional beliefs.

Through the strategic planning process, CTSG identified seven key institutional core values that underlie all that CTSG does as an organization. These seven core values are as follows:

1. **Partnerships** – CTSG will undertake our work in partnership with local, regional, national and international organizations and institutions, both public and private sector, and with the users of our outputs. CTSG will utilize and coordinate with networks of interested individuals and organizations, whenever possible. As necessary, the program will work to strengthen the capacity of our partners to engage in research and outreach. Partnerships will be collaborative and mutually beneficial.
2. **Integrity** – Honesty, respect and transparency guide the work of the program, and CTSG’s confident and professional application of science. The program believes that learning is essential to improvement. Honesty regarding challenges and failures promotes learning and improvement of the organization’s capacity to promote positive change.
3. **Objectivity** – The program focuses on scientific expertise and serves as a neutral, “objective broker” of information to a wide range of constituencies.
4. **Teamwork** – The program undertakes its work, whenever possible, utilizing a multidisciplinary team approach involving institutions and organizations beyond CTSG. Progress and impacts are dependent on an ability to share and integrate knowledge among ourselves our partners, and the outside world. Effective communication is the foundation upon which CTSG’s internal and external networks function. In our teamwork, the program strives to be both innovative and dynamic.
5. **Facilitation** – Using the best scientific information available, the program works to engage and inform all stakeholders in dialogue on coastal and marine resource challenges and opportunities.
6. **Knowledge generation and sharing** - The program recognizes that science can and should benefit all people, and knows that new knowledge, practically applied, can change the world. The program’s commitment to innovation is fueled by a desire to generate and share skills, knowledge and information in the most effective manner possible regardless of the conditions.

7. Responsiveness - The program will maintain the professional, interdisciplinary skills necessary to provide services effectively to partners and stakeholders. The program has and will foster an increased ability to react quickly and adaptively to change.

In addition to these seven institutional core values, CTSG has identified three strategic principles that will guide its program of action in its aim to achieve strategic goals and objectives. These are:

1. To focus and integrate thematic priority programs in research, outreach and education in order to develop a locally and nationally relevant identity and legacy.
2. To make the Connecticut public, stakeholders, University of Connecticut, elected officials and state agencies more aware of CTSG and the services it offers and to increase support for CTSG programs.
3. To leverage and diversify funding and funding sources for CTSG.

Appendix D. Goals, Objectives, and Benchmarks for CTSG Functional Areas

The following appendix highlights each of the four functional areas of CTSG (research, administration, outreach and education). For each area, the appendix provides goals, strategies, objectives, and benchmarks identified by the CTSG strategic planning process.

Functional Area 1. Research

Knowledge gained from scientific research is critical to meeting the challenges of current marine issues; the CTSG program is positioned to optimize the application of the state's intellectual resources to relevant issues facing the state, the region, the nation, and the world. CTSG will develop an aggressive and focused research agenda useful for decision-making, public policy, education, and capacity building. As noted above, the specific (topical) theme areas in which CTSG has chosen to target its research efforts are presented in later sections of this plan. This section highlights the *functional* goals, objectives, strategies and benchmarks that will guide the operation of the CTSG research program over the coming years.

Research Program Functional Goal

To support and foster research that addresses important issues facing the coastal resources of Connecticut and Long Island Sound, as well as the challenges and opportunities of resource users and policymakers. Within these categories, Connecticut Sea Grant seeks to support and foster research that produces tangible benefits to stakeholders.

Research Program Functional Objectives

The topical objectives sought by the CTSG research program are detailed in later sections of this strategic plan that address specific *theme areas* for research, outreach, and education. These specific topical, theme-oriented objectives are not repeated here. Rather, the following objectives represent the functional objectives of the research program, contributing towards the overall goal stated above.

- Support and foster research of the highest quality and relevance to Connecticut's resources, resource users, and policymakers.
- Encourage participation of the most highly-qualified and respected researchers in CTSG research efforts and programs, as well as in advisory boards and peer-review bodies.
- Increase support for multidisciplinary research, and research that bridges or combines the natural and social sciences.
- Support and foster research that informs a broad range of users and supports State- and nationwide management, conservation and development efforts.
- Increase and diversify funding and funding sources for research activities.
- Increase the visibility and stature of the research program within the State and nation.
- Increase the integration between research, outreach, and communications to ensure optimal use of research results.
- Expand participation of colleges and universities, and other educational institutions throughout the state, in CTSG research efforts and competitions.
- Maintain a research program perceived as balanced, fair, flexible and responsive in its funding priorities.

Research Program (Functional) Expected Outcomes

A widely-recognized research program supporting varied, high quality research that is clearly responsive to the issues facing the coastal resources of Connecticut and Long Island Sound and the needs of users, stakeholders and policymakers.

Research Program Functional Strategies

- Identify and tap new funding sources and develop partnerships with other agencies to fund relevant research activities.
- Increase interactions with advisory boards, users, and policymakers to derive the most relevant and responsive requests for proposals.
- Expand communication efforts to notify researchers of funding opportunities sponsored by CTSG and related agencies.
- Increase interactions between research coordinators in the various agencies that support research relevant to Connecticut and Long Island Sound coastal resources and resource users. These include the Long Island Sound Study, Connecticut DEP, and other public and non-profit organizations.
- Work with partner agencies to leverage funds and provide the greatest possible support for high-quality, responsive research.
- Capitalize on national and international research initiatives and partnerships, both through participation of internal CTSG staff and through the development of research teams with other organizations and researchers.
- Continue to seek the most highly-qualified peer reviewers and panelists to assess research proposals.
- Continue existing interactions with established and respected researchers in fields addressed by CTSG research efforts, and develop new relationships with both promising and established researchers.
- Work with Connecticut researchers to encourage the highest-quality submissions to national research competitions (e.g., NSIs) and to increase the exposure of researchers to such funding opportunities.

Research Program Functional Benchmarks (short- and long-term)

- An increased level of research funding directed towards Connecticut coastal issues, both through CTSG channels and through partner agencies.
- Broader support for CTSG research activities—monetary and non-monetary—with support derived from an increased array of partner agencies.
- An increased number and quality of interactions with research coordinators from partner agencies, as evidenced by scheduled meetings, joint calls for research activities, recognition of alternative funding sources for researchers, etc.
- More extensive notifications, to a broader number of researchers, of research opportunities sponsored by or related to CTSG.
- A sustained (short-term) and increased (long-term) number of applications to CTSG research competitions, from a wide variety of institutions and disciplines.
- A sustained (short-term) and increased (long-term) number of individuals and agencies consulted to determine research priorities, to peer-review research proposals, and to serve on CTSG research panels.
- Increased numbers of publications derived from CTSG-sponsored research efforts.

- Funding of new researchers who have previously not drawn research funding from CTSG.
- Continued interactions with existing researchers with whom CTSG has had long-term and effective relationships.
- Increased notification of investigators of national research competitions, and increased submission of proposals from Connecticut researchers.
- Increased number of formal interactions between CTSG-supported researchers and CTSG outreach and education staff.
- Continued support of multi-investigator, multidisciplinary research efforts that are clearly responsive to local needs.
- Increased ability to demonstrate impacts from CTSG-sponsored research activity.
- Continued and increased involvement of CTSG staff on funded research activities.
- Development of a user-friendly database to track CTSG research products and impacts.

Functional Area 2. Outreach (Extension and Communication)

The functional area of outreach is composed of both extension and communication. The efforts of extension are focused on the thematic areas defined later.

2.A. Extension

Balancing the needs of economic development with sustainable use of existing resources, resource enhancement, or habitat restoration is challenging for communities, state agencies, businesses, and legislative bodies. CTSG extension educators are ideally placed to help address these educational and informational needs objectively. CTSG extension educators strive to identify, in collaboration with users and partners, critical issues facing coastal communities and businesses for which we have the expertise and resources available to develop effective outreach and technology transfer programs. Partnerships with members of the research community, other Sea Grant programs, state and federal agencies, non-governmental organizations, and community groups foster the integration of broad expertise and amplify the effectiveness of these programs.

Extension Functional Goals

1) To advance the optimal use, preservation, and restoration of coastal and marine resources in Connecticut and Northeastern U.S. waters, focusing on the thematic areas (defined later); and 2) to facilitate the implementation and exchange of marine expertise among universities, federal/state/municipal agencies, industry, stakeholders and the public.

Extension Functional Objectives

To plan and implement appropriate extension education programs based on formal and informal needs assessments, and in partnership with coastal stakeholders, resource managers, researchers, non-governmental organizations, and community groups, that address the identified thematic areas through teaching, scholarship and grantsmanship.

Extension Expected Outcomes

Identifiable progress and significant contributions that address critical informational needs in the thematic areas defined later in this plan.

Extension Functional Strategies

- Engaging, advising, and informing individuals, partners, communities, and industries to facilitate information flow, assure coordination and cooperation, and provide assistance in the use, evaluation, and application of information;
- Providing outreach, technology transfer, and extension services using research-based information to fishermen, aquaculturists, recreational boaters, seafood processors and distributors, maritime industries, municipalities, community lake associations, and the general public within Connecticut and the Northeast region, utilizing a variety of tools including workshops, publications, web-based venues, and individual contact;
- Establishing effective linkages and partnerships among Sea Grant, universities, agency professionals, community groups and citizens.

Extension Functional Benchmarks

Short-term

- A topical advisory or steering committee will be established for each major program effort, to provide input and feedback as the program/project progresses.
- A formal needs assessment will be undertaken on a biennial basis among key stakeholder groups.
- The CTSG extension and education stakeholder advisory group will meet annually to discuss key concerns and priority marine issues in Connecticut.
- The CTSG extension and education stakeholder advisory group will meet biennially to review and prioritize research pre-proposals based on the relevancy of the proposed work to Connecticut, the Northeast region, and/or the nation.
- CTSG extension will establish partnerships with other Sea Grant programs, state and federal agencies, non-governmental organizations, and community groups to facilitate the development and implementation of critical projects and programs.
- CTSG extension educators will work with members of the research community to disseminate research results to interested stakeholders; and adapt and apply research results to extension programs.

Long-term

- CTSG extension faculty will consistently seek input and feedback from stakeholders on priority issues facing coastal communities and businesses locally and regionally and utilize this input to develop and implement extension programs.
- CTSG extension will establish and maintain long-term partnerships with other Sea Grant programs, state and federal agencies, non-governmental organizations, and community groups to strengthen extension programs and outcomes in the identified thematic areas.
- CTSG extension educators will actively participate in pertinent research with members of the research community and make the resulting information accessible to appropriate stakeholders.

2.B. Communication

The CTSG communications office supports and links all aspects of the program – research, extension, education, and administration– and the external world by keeping information moving among components. Communications oversees preparation and dissemination of publications and other products, defines the program's image, and serves as media relations liaison with the University's public relations office. CTSG publications and other products provide key information to a variety of audiences and user groups. Informing the public, both directly and via media outlets, about CTSG activities provides an outlet through which taxpayers and others may realize the benefits of funding directed to the CTSG office, and may take advantage of the services offered by CTSG. Communication is also a key element in identifying the program and its services to those who might wish to partner or leverage efforts with CTSG. CTSG's Communications program strategy is planned and implemented in context with “Communicating For Success”, a review of National Sea Grant Communications Activities, and the Strategic Plans of the University of Connecticut and NOAA, and in balanced context with other program components.

Communication Functional Goals

- Initiate information campaigns to disseminate science-based knowledge to stakeholder audiences in useful form.
- Implement the flow of and access to scientific and technical findings
- Support the program’s administration, marine extension, and education efforts
- Learn new communications technologies to enhance appeal and effectiveness of products
- Enhance program image and visibility
- Develop and implement Communications policy guidelines

Communication Functional Objectives

- Produce high quality, relevant print and electronic products to deliver CTSG messages
- Produce and maintain web pages that present the program’s identity and activities
- Transmit Sea Grant results to university researchers, extension programs, educators, resource managers, coastal industry, decision-makers, and the public.
- Improve integration and holistic nature of outreach efforts

Communications Expected Outcomes (short- and long-term)

- High quality, readily-available, user-friendly information accessible to user groups
- Sea Grant information products that work for users
- Better educated citizenry
- Better educated decision-makers
- Better equipped teachers and better educated students
- Greater general awareness of Sea Grant and its mission

Communication Functional Strategies

- Work with Sea Grant researchers, extension and education staff, and program administration to plan integrated approaches for communication, taking into account audience needs, available resources, and capabilities of team members and partners.
- Evaluate rationale (demonstrated audience need) and most effective packaging for proposed outreach products

- Evaluate effectiveness of completed communication products, by means such as direct feedback, web trends monitoring and surveys of print products
- Explore new technologies such as variable data imaging, RSS, and “pod-casting”
- Craft web pages that are interesting, innovative, and interactive. Improve ease of use of the publications section
- Publicize Sea Grant events and accomplishments, working with University communications for media relations efforts

Communications Functional Benchmarks

- Each Sea Grant research project is linked to an information product that is part of an integrated outreach program.
- Evaluation processes developed and refined to determine effectiveness of Communications products and dissemination methods
- Sea Grant research results are tracked and transmitted to the Sea Grant network and beyond (i.e., transmittal of publications to Sea Grant Library)
- Increased usage of CTSG’s world wide web sites, as tracked by Web Trends and electronic surveys
- New technologies learned and implemented to enhance presentation and delivery of information resulting from program activity.
- Media “hits” and placement of newsworthy items tracked.

Functional Area 3. Education

Education has been part of CTSG’s mission from its inception, a mission consistent with and complimentary to the educational missions of the University of Connecticut, the National Sea Grant College Program and its parent agency, NOAA. According to the most recent National Sea Grant strategic plan, “educating the 21st century workforce in marine and aquatic sciences is integral to both educational and scientific missions.” Sea Grant’s educational efforts “contribute to improving marine and aquatic science literacy by facilitating the delivery of science-based information, programming, and resources to formal and informal education communities.”

CTSG considers its educational programming to be multifaceted in serving a number of distinct client groups that span an age range from the very young to senior citizens, and includes educators who serve the learning needs of client groups. Further, our education efforts are distinct from, but complementary to, the outreach programming provided by our Extension and Communications programs. For CTSG, education is defined not so much by the type of program or the subject matter, but rather by the target audience. The CTSG Education program has one or more of the following target audiences:

- Educators, both formal (K-12) and informal (aquaria, museums, etc.)
- Students from early childhood through adults, including
 - o K-12 students in formal or informal settings
 - o College and university students

Stakeholder input on programmatic issues is routinely sought by way of active participation on advisory boards and committees, as well as a CTSG Extension and Education stakeholder

advisory board. The Education community is linked to the scientific and education research communities through several innovative methods. The CTSG Education Coordinator has served as the Education and Outreach coordinator on four separate research cruises (*Deep East* 2001; *Mountains in the Sea* 2003 and 2004; *Deep Atlantic Stepping Stones* 2005) funded by NOAA's Office of Ocean Exploration (OE).

Education Functional Goal

To foster a better world through ecological and environmental knowledge and stewardship.

Education Functional Objective

Conduct formal and non-formal educational activities that will equip people with the knowledge and skills required to make sound decisions in the management, use and conservation of ocean and coastal resources.

Education Expected Outcomes

A significant increase in public knowledge and understanding of marine and aquatic science issues accomplished through a variety of educational strategies at all levels.

Education Functional Strategies

- Providing professional development and resource materials in the marine and aquatic sciences for pre-service, in-service, and informal educators; and assistance in meeting state and national level education standards.
- Empowering formal and informal educators to effectively use science-based educational materials, data resources, and digital media.
- Stimulate interest in careers in fields related to the marine and aquatic science and to support the training and development of a future cadre of scientists in those disciplines.
- Modifying existing and develop new interdisciplinary curricular materials that address emerging issues; incorporate the latest scientific knowledge and technology; and are aligned with state and / or national education standards.
- Developing and disseminate curricular materials and programs to traditionally underrepresented and underserved groups.
- Providing educators throughout the nation with tools and strategies for involving students of all ages in technology-based science discoveries.
- Initiating projects that develop and refine appropriate assessment and evaluation strategies and practices for the marine and aquatic science education community.
- Increasing opportunities for interaction and collaboration with a variety of partners.

Education Functional Benchmarks

Short-term

- Educators will receive resources and learn strategies to implement marine and aquatic science into their standards-based classrooms.
- Formal and informal educators, K-12 students and the general public will become more aware of marine and aquatic issues and resources.
- Formal and informal educators and students will utilize CTSG curricular resources.

Long-Term

- Students exposed to work with science professionals will consider marine and aquatic related careers.
- Traditionally underrepresented and underserved populations will become more aware of marine and aquatic issues and educational resources.
- Development of assessment methodologies for marine and aquatic science products and programming.
- Educators, students and the general public will access new technologies to bring real-time science into their classrooms and homes.

Functional Area 4. Administration

CTSG administration performs a variety of functions including planning, grant administration, communications, competitive proposal review and selection, fund-raising, program evaluation, human resource management, mentoring, and advising. The other three functional areas of CTSG rely on an effective administrative and management structure. Financial and administrative changes at both national and state levels require an administrative program that is adaptive and flexible. CTSG must seek to make optimal use of available funding, seek to leverage new sources of funding, and optimize networking opportunities. At the same time, the program strives to minimize the proportion of resources allocated to administrative activities.

Administration Functional Goal

To provide sound, cost-effective, innovative, flexible and supportive leadership and support for both CTSG staff and constituencies, and to increase the level and quality of interaction among all CTSG staff to increase organizational unity and attainment of the broader vision and mission.

Administration Functional Objectives

- Strengthen the management capabilities of our program managers and staff to better manage the fiscal, human and information resources of our program.
- Increase and diversify funding and funding sources, as well as logistical support.
- Increase program visibility and stature within the State.
- Maintain good external relationships with other Sea Grant programs, the National Sea Grant Office and NOAA in general, to take advantage of all available opportunities.
- Provide leadership in all activities.

Administration Expected Outcomes

Streamlined, efficient, flexible and user-friendly administration with clear guidelines to support and facilitate the research, outreach and education activities of the program.

Administration Functional Strategies

- Improve guidelines for office procedures
- Improve guidelines for the scope of staff responsibilities and procedures to provide back-up support for staff.
- Improve communications and workflow within CTSG.
- Recruitment of a fiscal officer.

- Improve reporting procedures for principal investigators of research projects, in coordination with the University Office of Sponsored Programs.
- Improve capital budgeting procedures.
- Aggressively seek new sources of funding from federal and state programs.
- Develop a working relationship with the UConn Foundation to seek private sources of funding for CTSG.
- Seek out additional or new potential partners to achieve the CTSG mission.
- Improve communication with University officials and State agencies to promote a better understanding of CTSG.
- Continue to attend Sea Grant Association semi-annual meetings and maintain strong and active exchanges and collaborations with other Sea Grant programs, the National Sea Grant Office and NOAA in general.

Administration Functional Benchmarks (short- and long-term)

- Improved CTSG staff support across the range of activities through improved management within CTSG and better program support.
- Improved partnerships and leveraging to accomplish the mission of CTSG.
- Improved access to financial and logistical support from federal, state and private sources.
- Better awareness of CTSG, its activities and accomplishments within the state of Connecticut in particular, as well as at the national level in general.

Appendix E. Themes of Past CTSG and Current NOAA Research and Strategic Plans

CTSG's 2002-2006 Strategic Plan identified three primary theme areas of economic leadership, coastal ecosystem health and public safety, and education and human resources. The 2003-2008 NOAA Sea Grant Strategic Plan identifies eleven thematic areas representing critical areas of focus for sustainable resource management. These include: (1) Aquaculture; (2) Biotechnology; (3) Coastal Communities and Economies; (4) Coastal Natural Hazards; (5) Digital Ocean; (6) Ecosystems and Habitats; (7) Fisheries; (8) Marine and Aquatic Science Literacy; (9) Seafood Science and Technology; (10) Urban Coasts; and (11) Invasive Species. In fulfilling our current strategic plan requirements, CTSG builds upon our past strategic and implementation plans, as well as the extant NOAA strategic planning document. Accordingly, CTSG seeks to foster coastal/marine research, extension/outreach, and education of the highest quality and relevance within these eleven thematic areas, as targeted to the specific needs and goals of our partners and constituency groups. Based on these theme areas, additional strategic guidelines and priorities of NOAA and the National Sea Grant College Program, and external advisory committees, the most recent CTSG request for proposals targeted research, education, and extension in the following topic areas:

1. Sustainable Seafood Culture, Safety, Production and Harvest;
2. Marine Biotechnology;
3. Sea Level Rise and Global Climate Change;
4. Long Island Sound Environmental and Natural Resource Issues;
5. Conservation, Management, and Restoration of Connecticut's Coastal Ecosystems.
6. Connecticut's Urban Coasts and Coastal Communities

Appendix F. Groups Asked to Review and Comment on Strategic Plan Draft Document

In addition to CTSG staff, numerous user, stakeholder, and researcher groups were asked to provide commentary and critiques on draft versions of this strategic planning document. These are in addition to the numerous individuals and groups who provided input during the strategic planning process.

1. Connecticut Sea Grant Senior Advisory Board
2. Connecticut Sea Grant Researchers
 - a. CTSG Research Advisory Board
 - b. Researchers funded by CTSG during prior years
 - c. Researchers applying for CTSG or related NOAA programs during prior years
 - d. Other researchers in CTSG focus areas and other areas of marine and coastal science.
3. Connecticut Sea Grant User and Stakeholder Groups (Education)
 - a. Mystic Aquarium & Institute for Exploration
 - b. National Undersea Research Center (North Atlantic and Great Lakes)
 - c. Neag School of Education, University of Connecticut
 - d. Project Oceanology
 - e. Elementary and middle school teachers
4. Staff and Representatives of CTSG Partner Organizations, including
 - a. The Long Island Sound Study
 - b. Connecticut Department of Environmental Management
 - c. The Long Island Sound Resource Center
 - d. Connecticut Non-Profits/ NGOs:
 - e. Connecticut Audubon, and the Connecticut Audubon Coastal Center
 - f. The Maritime Aquarium at Norwalk
 - g. Mystic Aquarium & Institute for Exploration
 - h. Mystic Seaport Museum
 - i. Project Oceanology
 - j. The Nature Conservancy
 - k. Connecticut Outdoor and Environmental Educators Association
 - l. Connecticut Science Teachers Association
 - m. Southeastern New England Marine Educators
 - n. Connecticut shellfish industry
 - o. Municipal shellfish commissions
 - p. Connecticut Cooperative Extension System, NEMO
 - q. Connecticut Food Marketing Policy Center, UCONN
 - r. Regional Vocational-Agriculture High Schools (19)—including those at Bridgeport and New Haven (see below)
 - s. Connecticut Department of Education
 - t. Connecticut Department of Agriculture
 - u. Connecticut Agricultural Experiment Station
 - v. New England Fishery Management Council
 - w. National Undersea Research Center (North Atlantic and Great Lakes)
 - x. EPA Long Island Sound National Estuary Program

- y. Yale School of Forestry and Environmental Studies
 - z. Wesleyan University
 - aa. Sacred Heart University
 - bb. Connecticut College
 - cc. University of Hartford
 - dd. University of New Haven
 - ee. Western Connecticut State University
 - ff. Southern Connecticut State University
 - gg. Fairfield University
 - hh. The Connecticut State University System
5. Official Administration Representatives of the University of Connecticut
 6. Official Administration Representatives of the UConn Avery Point Campus
 7. All University of Connecticut Faculty, All Campuses

Appendix G. Strategic Plan Authorship

This strategic plan was prepared and authored through a collaborative partnership of all CTSG staff, with input and review from numerous stakeholder groups as detailed above. Primary authorship and organizational responsibilities were taken by Dr. Robert S. Pomeroy of the CTSG Extension Program and the Department of Agricultural and Resource Economics, University of Connecticut—based on his extensive and recognized experience in implementing strategic planning efforts for organizations worldwide. However, all CTSG staff contributed substantively to the writing of individual plan sections. These include CTSG Interim Director (now Director) Dr. Sylvain De Guise, Associate Director Dr. Robert J. Johnston, Sea Grant Extension Program Leader Nancy C. Balcom, Extension Program Educator Tessa Getchis, Communications Director Margaret A. Van Patten, Sea Grant Educator Diana L. Payne, and Coastal Community Development Program Coordinators John Rozum and Chester Arnold. Also contributing were Administrative Assistant Karen L. Massaro and Secretary Irene K. Schalla.