

**Appendix A: Priority Topic**

<b>TOPIC</b>	<b>Creation of a GIS-based Eelgrass Habitat Suitability Index Model</b>
<b>SUGGESTED COST ESTIMATE RANGE:</b>	Up to \$110,000
<b>PROJECT PERIOD:</b>	15 months, July 2010 – September 2011
<b>LISS COMMITMENTS SUPPORTED:</b>	<ul style="list-style-type: none"> <li>• Evaluate the causes of declines in eelgrass populations</li> <li>• Monitor the status and trends of eelgrass in the Sound</li> <li>• Identify and expand spatial data for living resources and habitat in the Sound</li> </ul>
<b>BACKGROUND</b>	<p>Eelgrass, <i>Zostera marina</i>, is a rooted, submerged vascular plant which grows in shallow coastal waters. Its presence is typically used as an indicator of good water quality as it requires sunlight to penetrate through clear waters to grow. Eelgrass is an extremely valuable habitat and nursery ground for numerous commercially important fish and shellfish species, serves as an important food source for many species, aides in coastal nutrient and carbon cycling, and dampens and absorbs wave energy. The plant itself and the ecosystem services it supports are critical to productive coastal environments.</p> <p>Seagrass populations, including eelgrass, are experiencing alarming declines around the world. Poor water quality, especially excess nitrogen and persistent algal blooms, physical disturbances (fishing and shellfishing gear, boating practices, marine construction), and natural occurrences such as ice scour and bioturbation are all thought to negatively, and many times collectively, impact and stress this species. The majority of Long Island Sound (LIS) eelgrass was decimated in the 1930s by <i>Labyrinthula zostorae</i>, a slime mold, which destroyed populations throughout LIS. While populations were able to rebound and revegetate in eastern LIS, poor water quality (excess nitrogen) in western LIS limited and still continues to limit re-vegetation and restoration.</p> <p>The Long Island Sound Study (LISS) funds the United States Fish and Wildlife Service to inventory, map, and groundtruth LIS eelgrass acreage on a triennial basis. The 2006 survey documented 1905 acres in LIS; 1669 acres in Connecticut waters (mostly east of the Connecticut River) and 236 acres in New York waters (mostly around Fishers Island). Results of the 2009 survey are expected to be made available shortly.</p> <p>Both New York and Connecticut have initiated efforts and invested significant resources into researching eelgrass. In 2006 the New York State Legislature established a New York State Seagrass Task Force charged with examining the current state of seagrass abundance and distribution in New York marine waters and making recommendations on restoring, researching, preserving, and properly managing this valuable marine resource. The Task Force presented its final report to the New York State Governor and Legislature on December 30, 2009. Additionally, a New York State Seagrass Experts Meeting was held in 2007 whereby a scientific panel of national and local seagrass experts identified and prioritized research, monitoring, management and outreach recommendations. The Connecticut Eelgrass Workgroup includes representatives from state, federal, academic and private interests. The workgroup oversees all research efforts related to eelgrass in Connecticut waters and provides scientific guidance for resource management. The most recent eelgrass project evaluated by the workgroup and funded by the LISS, resulted in recommended habitat and water quality requirements for the growth and survival of eelgrass.</p> <p>A GIS-based, spatial index model is needed to identify coastal areas meeting basic eelgrass habitat and water quality requirements. The index model should provide marine and coastal resource managers, scientists, and researchers in both NY and CT with the ability to refine eelgrass habitat and water quality requirements, model potential changes in eelgrass presence</p>

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	<p>should water and/or habitat quality change in the future, and identify potential restoration sites. The index model should enable easy scenario changes and viewing, and facilitate individual use as well as demonstrations in group settings. It should generate pertinent maps, reports, and data tables.</p> <p>The award recipient will need to use the above inventories, and other relevant natural resource information or data as the primary components to populate a GIS database and then use other available, ancillary data sets to develop a model to produce the deliverables described below. Similar work already accomplished by the Peconic Estuary Program, called the “Peconic Eelgrass Restoration Site Suitability Index Model” as well as the recommended eelgrass habitat and water quality requirements (Vaudrey, 2008) should be referenced in developing the required GIS model. The grant recipient should expect to interact with LISS, CT, and NY staff and identify important data gaps.</p> <p>Previous work to date that can be used in development of the GIS-based Eelgrass Habitat and Water Quality Site Suitability Index Model (not a comprehensive list):</p> <ul style="list-style-type: none"> <li>- Peconic Eelgrass Restoration Site Suitability Index Model (prioritizes and ranks areas with suitable environmental characteristic which would support eelgrass and eelgrass restoration) <a href="http://counties.cce.cornell.edu/suffolk/gis/sampleProject1.html">http://counties.cce.cornell.edu/suffolk/gis/sampleProject1.html</a></li> <li>- Tiner, R., H. Bergquist, T. Halavik, and A. MacLachlan. 2007. 2006 Eelgrass Survey for Eastern Long Island Sound, Connecticut and New York. U.S. Fish and Wildlife Service, National Wetlands Inventory Program, Northeast Region, Hadley, MA. National Wetlands Inventory report. 24 pp. plus Appendix.</li> <li>- Vaudrey, Jamie. 2008. Establishing Restoration Objectives for Eelgrass in Long Island Sound, Part I: Review of the Seagrass Literature Relevant to Long Island Sound (<a href="http://www.lisrc.uconn.edu/eelgrass/documents/LIS%20Eelgrass%20Literature%20Survey.pdf">http://www.lisrc.uconn.edu/eelgrass/documents/LIS%20Eelgrass%20Literature%20Survey.pdf</a>) and Part II: Case Studies (<a href="http://www.lisrc.uconn.edu/eelgrass/documents/LIS%20Eelgrass%20Case%20Studies.pdf">http://www.lisrc.uconn.edu/eelgrass/documents/LIS%20Eelgrass%20Case%20Studies.pdf</a>)</li> <li>- Yarish, C., R.E. Linden, G. Capriulo, E.W. Koch, S. Beer, J. Rehnberg, R. Troy, E.A. Morales, F.R. Trainor, M. DiGiacomo-Cohen and R. Lewis. 2006. Environmental Monitoring, seagrass mapping and biotechnology as means of fisheries habitat enhancement along the Connecticut coast. Stamford, Connecticut: University of Connecticut. Final report submitted to the Connecticut Department of Environmental Protection, Hartford, CT. Report number CWF 314-R.</li> <li>- Current NY and CT eelgrass restoration sites and associated physical and chemical monitoring data.</li> <li>- Current and historical NY and CT eelgrass survey, water quality, microalgae, hardened shoreline, and sediment monitoring data.</li> </ul>
<b>EXPECTED OUTCOMES:</b>	<ul style="list-style-type: none"> <li>- Improved understanding of the habitat and water quality characteristics that determine eelgrass establishment and growth in Long Island Sound.</li> <li>- Improved ability of eelgrass managers at New York and Connecticut’s environmental agencies to access and analyze spatial data related to eelgrass habitat and water quality.</li> <li>- Improved ability of habitat restoration managers to identify and strategically target the areas most suitable for restoration</li> </ul>

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	<p>as eelgrass habitat.</p> <ul style="list-style-type: none"> <li>- Improved understanding of gaps in existing spatial data for the habitat and water quality characteristics that determine eelgrass establishment.</li> </ul>
<b>EXPECTED METHODOLOGY:</b>	<p>The project team will meet regularly with the LISS on the direction and conduct of the project. The award recipient should expect to work closely with the LISS and other partners and potential sources of information in an iterative process to:</p> <ul style="list-style-type: none"> <li>- Research the availability of and obtain relevant GIS data layers and other important information that will build the base for the model.</li> <li>- Use the habitat and water quality requirements for eelgrass growth identified in Vaudrey 2008 to produce a GIS map showing the areas that meet those requirements.</li> <li>- Develop a GIS-based model that environmental managers can use to assess areas of Long Island Sound for their current ability to serve as eelgrass habitat and their potential to become habitat in the future.</li> <li>- Final work plan and project implementation must account for and include input from the LISS and its Connecticut and New York state representatives.</li> </ul>
<b>DELIVERABLES:</b>	<ul style="list-style-type: none"> <li>- An approved Quality Assurance Project Plan (QAPP)</li> <li>- An easy-to-use, GIS-based model for managers which includes metadata, MXD and shapefiles.</li> <li>- GIS maps of areas meeting preliminary developed habitat and water quality requirements for eelgrass growth (Vaudrey 2008).</li> <li>- A final report that includes documentation of the process used and a user's manual for the GIS model.</li> <li>- To the extent possible with the data available, provide the following in a final report:             <ul style="list-style-type: none"> <li>- GIS map of identified areas where eelgrass should (according to Vaudrey's requirements) be present and comparison of these areas to survey data layers showing current and historic eelgrass distribution.</li> <li>- GIS map of identified areas where eelgrass restoration and/or revegetation may be most successful given current water quality conditions.</li> <li>- GIS map of identified areas of potential habitat where restoration may be possible if habitat or water quality parameters change/improve.</li> <li>- List of primary and secondary limiting factors in eelgrass presence and restoration.</li> <li>- List of recommendations for water quality and/or habitat improvements to support eelgrass in areas where restoration is not currently recommended.</li> <li>- GIS map of areas where eelgrass may migrate to or thrive with sea level rise and climate change symptoms</li> <li>- List of recommendations for improving the data upon which the analysis is based.</li> </ul> </li> <li>- Several project start-up meetings with the LISS.</li> <li>- Frequent communication via conference calls, email, and other venues not requiring travel</li> <li>- Quarterly progress reports (format will be provided)</li> <li>- Training sessions for the US EPA Long Island Sound Office, and selected representatives of NYSDEC and CTDEP</li> <li>- License agreement(s) may be required for use and protection of sensitive data sets</li> </ul>
<b>RFP TOPIC CONTACT:</b>	<p>Julie Rose          NOAA Research Ecologist          USEPA/Long Island Sound Office          888 Washington Blvd, Suite 9-11          Stamford, CT 06904-2152</p> <p>p: (203) 977-1541          e: <a href="mailto:rose.julie@epa.gov">rose.julie@epa.gov</a></p>