CLIMATE CHANGE – COASTAL SENTINTEL SITE NETWORK
Long and Fishers Island Sounds

BACKGROUND:
The discussion about climate change at the October 2008 Long Island Sound Study (LISS) Management Committee meeting led to the recommendation that 'Sentinel (monitoring) Sites' in Long Island Sound be established as a means of quantifying environmental changes from climate change (e.g., warming, sea level rise, changes in precipitation, changes in wind patterns, shifts in species composition). The LISS began drafting a new Governors Agreement, which included the following suggestion with regard to sentinel sites:

> "Identify two or more sentinel sties as key monitoring areas to measure the effects of global climate change on Long Island Sound flora, fauna, and ecosystems. The Management Conference partners will assist in the monitoring of these sites according to their legal authorities and responsibilities, and will report any significant early-warning findings and recommendations for action by 21011."

This is not the first time that managers and scientists have determined that there is the need for baseline monitoring data against which to assess environmental change. Johnson and York established baseline vegetation (terrestrial and estuarine) in Cold Spring Harbor in 1915. The Connecticut Board of Fisheries and Game provided funds to the University of Connecticut in support of graduate studies to establish baseline data at sites such as the Barn Island Wildlife Management Area in the late 1940's. As part of a coastwide survey of tidal wetlands for the CT Department of Environmental Protection, Niering and Warren established 10 permanent vegetation-microrelief plots from Fishers Island Sound to western LIS in the early 1970's. Detailed baseline data for *Laminaria longicruris* (e.g., biomass, growth, productivity) were collected at Black Ledge in Eastern LIS in the late 1980's.

Many programs produce annual reports about the environment and the LISS specifically reports on the health of the Sound. There reports rely upon data from various monitoring programs. So why do we need sentinel sites in the Sound? A careful examination of the indicators report in various reports will reveal that most of the indicators are not actually a measure of environmental health. Many of these indicators were not established to measure environmental health but to have metrics relative to the needs of an individual program. For an example, from a wildlife perspective, there has been interest in tracking populations of Osprey, a species that declined due the indiscriminate use of DDT. While the number of nesting pair of Osprey is increasing as DDT products decrease, human activities have contributed to increases in raccoons. Ground nests were once common at the mouth of the Connecticut River but today successful fledging of young from ground nests is rare today due to predation by raccoon. The majority of indicators reported in these annual reports have little bearing on measuring the role of climate change upon the environment.

The longest continuous temperature dataset in the Sounds is at Dominion (formerly Millstone) in Waterford, CT. Temperature monitoring is just one of the requisite monitoring requirements of the state permit for a thermal discharge. The location for temperature monitoring was not based upon the establishment of site that would reflect the Sounds' response to climate change, yet

these data continue to be cited as the source of temperature trends in LIS. The Dominion site is influenced by Sound and Thames River.

If the LISS is to support Sentinel Sites in LISS, then it would be prudent to first understand the existing or defacto long-term monitoring and its value to assessing the impacts from climate change. What specific climate change questions are we trying to answer in the Sounds. Are there specific species that are at their range limits that should be targeted for in this network? Dr. Charles Yarish at UConn Stamford and Ron Rozsa of DEP Coastal Management discussed these questions in light of the LISS opportunity and decide to organize an informal workshop at UConn, Avery Point, Groton on January 28, 2008.

WORKSHOP RESULTS AND RECOMMENDATIONS:

The attendees to the workshop are listed in Appendix A. The workshop targeted managers and scientists from Connecticut. The workshop was scheduled on short notice given the schedule of the LISS schedule for drafting the Governors agreement.

From the workshop emerged the following consensus:

- the development of Sentinel Sites to gauge the impacts of climate change in the Sounds is a priority;
- there should be a cluster of sites (e.g., rocky intertidal, tidal wetlands, submerged habitats) for each major sub-region (i.e., eastern, central and western) - these subregions need not share the same suite of habitats given the similarities and dissimilarities amongst regions;
- it is important to compile basic information about long-term monitoring sites for an initial screening of potential sites for the Sentinel Site network;
- early in the evaluation process it is important to solicit suggestions about new sampling sites.

Regardless of which sites are incorporated into the final Climate Change Sentinel Site Network, DEP acknowledged the value of compiling any and all information about all long-term monitoring sites into a GIS. That GIS could become part of the data that are reviewed by regulatory programs to assure that critical monitoring sites and not destroyed indiscriminantly.

It was noted that while there may be a short-term funding opportunity through the LISS, with the growing interest in climate change there are a growing number of funding sources. Congress has recently provided USGS over 7 million for the purposes of an internal competition for climate change research. CT USGS submitted a proposal for the Connecticut River that would help to gauge the impacts upon the river's "Wetlands of International Importance". The CT legislation for the Regional Greenhouse Gas Initiative sets aside 7 percent of the revenues generated for the following purposes: So it was recommended that the development of a Climate Change Sentinel Monitoring Network consider funding opportunities beyond the LISS.

Specific Recommendations and Next Steps:

It was recommended that basic information be compiled regarding key attributes (appendix B) for existing monitoring sites. It was suggested that a web-based form be created and that the data be compiled into a database. This form would be created by the Long Island Sound Integrated

Coastal Observing System. Requisite lat/long data can be used to generate a point coverage in GIS. A separate form would be created to invite suggestions for new monitoring sites or new types of monitoring data.

This survey would produce a series of map and site summaries that would be the basis for the next workshop to further the discussions on Sentinel Sites.

APPENDIX A - Workshop Attendees

Peter Auster
Ivar Babb
Juliana Barrett
Chris Elphick
Todd Fake
Mark Johnson
Kevin O'Brien
James O'Donnell
Ron Rozsa
Robert Whitlach
Charles Yarish
Roman Zajac

APPENDIX B – Key Site Attributes for Initial Survey

Collector	Individual(s) or party(ies) responsible for collecting data
Collector Organization	Affiliation of collector(s)
Longitude	
Latitude	
State	
Data Collected	Description of data collected
Data Format	e.g., Hard/softcopy, spreadsheet, database, field notes, etc.
Study/Research Project	For what reason was the data collected
Study Category	field to classify the study for organizational purposes
Data Collection Locations	to record the spatial components of sampling/monitoring sites
Data Collection Begin	time collection began
Data Collection End	time collection ended
Data Collection Frequency	how often was/is data collected
Data Collection Equipment	what was used to collect the data
Comments	any/all comments reelvant to the monitoring/sampling
Documents	To allow the uploading of relevant charts, figures, etc.