**Long Island Sound Study**
**Science and Technical Advisory Committee and**
**Citizens Advisory Committee Joint Meeting**
**Bridgeport Regional Vocational Aquaculture School**
**Friday, June 16th, 2006**

**1. Welcome and Orientation to Facility**
The meeting was called to order at 9:40 am by Connecticut co-chair Dr. Charlie Yarish. There were 44 attendees.

**2. Self-introductions/Introductions of Facilitator:**
Attendees introduced themselves. Nancy Seligson, NY co-chair of the CAC, discussed the goals of meeting including addressing critical issues for the upcoming Policy Committee meeting and developing a coordinated message to go forward. Bill Logue, facilitator, was introduced.

**3. Review of Agenda:**
Bill Logue gave an overview of suggested ground rules and reviewed the agenda.

**4. Summary of October 2004 Meeting & STAC Activities, led by Dr. Larry Swanson:**
- Oct. 2004 was the first joint STAC/CAC meeting
  - The purpose of this meeting was to review, share perspectives, and discuss LIS research needs, priorities, funding and goals.
  - There were presentations and discussions on living marine resources, an overall synthesis activity of LIS, dredging, embayments as a research priority, STAC needing to obsess less over models, and scientific presentation needing to address the bottom line, and STAC needing to have greater respect for the CAC in their role of getting funding and public support.
- Last STAC meeting
  - 2004/05 STAC Fellow projects are near completion
    - Contaminants of concern paper will be used to update list
    - LIS residence time paper was submitted to a journal for publication
  - Current Fellows have been influential
    - Kari H. provided information on the sea squirt for a press conference with Senator Schumer.
    - Christine O. helped write Op-Ed on marine zoning that was published in the NY Times.
  - 2006/07 STAC Fellows include a student from Yale working on remote sensing and a student from MSRC, SUNY Stony Brook, working on invasive species in LIS, specifically the Asian shore crab.

**5. Update on CAC Activities and Areas of Interest, led by John Atkin:**
CAC priorities decided on at the December 2005 meeting were submitted to the Commissioners of CT DEP and NYS DEC and the EPA Regional Administrators for Regions 1 and 2. Priorities included: reduction of hypoxia and nutrient loading; LIS Stewardship initiative; global and local

issues impinging on the Sound including global warming, sea level rise and invasive species; devoting more attention to living marine resources including more baseline data and monitoring programs; and re-establishing funding levels for LIS.  There will be a LISS Policy Committee meeting in September and the CAC has not taken an official position on the Broadwater plan in LIS, but has a committee reviewing the issue.

**6.  Update on 2004 Meeting Recommendations, led by Mark Tedesco:**
Some recommendations from the 2004 meeting that we have made progress on include:
- Living resource indicators: project funded through enhancement grant program to evaluate LIS indicators
- Funded invasives work through the enhancement grant program (development of a LIS ANS Management Plan) and through the research grant program (investigation of live bait as a vector for ANS introductions)
- Land development preservation – the Cross Sound Cable Fund will provide 6 million dollars for projects like benthic mapping.
- Funding in 2007 budget for an Army Corps dredged material management plan
- Funding for near shore embayments – protect eelgrass beds
- Previous work funded Hans Dam, Jim O'Donnell to investigate SWEM model

7.  **Facilitated Discussion of High Priority Areas/Concerns, facilitated discussion with group led by Bill Logue:**
    A.  Climate change/global warming
        i.  What is the STAC doing, are there any ongoing studies for LIS?
        ii.  Sea level rise impacts and threats of disease
        iii.  Spread of invasives and disease
        iv.  Disappearance and erosion of marshes
        v.  Ell grass and fishery species
        vi.  Hypoxia and stratification
        vii.  Rising sea water temperatures – effects on aquatic ecology, organisms and disease
        viii.  Change in species –specifically avian and marine mammals
        ix.  Increased runoff and precipitation
        x.  Marketing and public awareness around LIS
        xi.  What can we do about it?
        xii.  Keystone species 5 years-25 years
        xiii.  Data from past as a starting point – put in book form
        xiv.  Change in temperature correlate with change in species composition
        xv.  Monitoring in place to respond in the future
    B.  Energy Infrastructure Project
        i.  Broadwater
        ii.  Quantitative information on ecosystem relative to past projects
        iii.  Regional energy policy and applications for LIS
        iv.  Management of underwater lands – marine zoning
        v.  Number crunching of energy uses given different scenarios including turbines and wind farms
        vi.  Environmental impact statements
        vii.  Community/education

      viii.   Continuous monitoring before/after projects
        ix.   Cumulative impacts of different projects
         x.   Characterization on every environment/natural community in proposed energy projects
       xi.   Define acceptable levels of disruption
      xii.   Cables an pipelines – comprehensive policy
     xiii.   Generic EIS for the sound
     xiv.   Formal relationship with energy organizations – informative vs. adversarial

C. Ecosystem Based Management/Indicators of LMRs
         i.   Clear definition of ecosystem based management
        ii.   Basis for management; look at all components
      iii.   What are indicator species indicators of?  Stress, response, to what?
      iv.   Coordination of conservation planning in specific areas – integrate activities (e.g. birds, marine mammals)
        v.   Habitat and associated living resources
      vi.   Identify low-level product toxicity
     vii.   Major/minor watershed
    viii.   Integrate all systems
       ix.   Low trophic levels/benthic foraminifera
        x.   Cut through formalities
       xi.   Sediments/non-living components of the environment
      xii.   Ecosystem based goals
     xiii.   Collect data into database management system
     xiv.   Historical data – build up
      xv.   Include legislative/political arenas
     xvi.   Metrics of indicators
    xvii.   Long-term data
  xviii.   Establishment of sites for consist, long-term monitoring in LIS
     xix.   Species specific goals for ecosystem based management
      xx.   Coordinated research plan

D. LIS Ecosystem Data Synthesis
         i.   Don't reinvent the wheel
        ii.   Great living experiments
      iii.   Also look at economic terms
      iv.   Central repository for information
        v.   Better point:  availability of data
      vi.   Physical/chemical/biological/geological
     vii.   Propriety – know what to focus on
    viii.   CAC/STAC take a position on integrated observing system
       ix.   Develop strategy to incorporate graduate students to synthesize data
        x.   Focus on experience and models of other programs, i.e. the Joint Global Ocean Flux Study
       xi.   LIS monograph
      xii.   Translate synthesis into policy
     xiii.   Outside independent review

Bill Logue instructed everyone to put dots next to their priorities. Everyone received 16 dots to prioritize issues. A more detailed summary of these deliberations and a summary of recommendations prepared by Bill Logue is provided at the end of this document.

**8. Food Webs in LIS:**
Dr. Roman Zajac gave a presentation on his research project focused on food webs in Long Island Sound. The following topics were covered in his presentation:
- Level of complexities in trophic relations
- Complexity of geography of systems/habitats
- Differences in benthic habitats
- Food web compartment considering spatial/temporal scales
- Review, synthesis, potential applications of food webs in LIS
    - Collect/review pertinent data
    - Refine conceptual model
    - EWE modeling
    - Identify critical food web components
    - Run model
    - Assessment of gaps in knowledge

**9. LISS STAC Fellows Presentations:**
Christine O'Connell and Kari Heinonen gave updates on the progress of their independent projects. Kari is reviewing the CT DEP invasive species management act and assessing the probability of organism establishment, consequence of that establishment (economic, environmental, social and political), and estimating organism and pathway risk potential. She made a priority list of invasive species of concern for LIS and specifically reviewed the Chinese Mitten Crab. Kari also explored how her work would help develop management strategies. Christine O'Connell spoke on the feasibility of marine zoning in LIS. Christine defined marine zoning as a tool of ecosystem based management and discussed previous management strategies in the Sound and their shortcomings. She talked about the history of marine zoning and analyzed three different marine zoning case studies including California, Massachusetts, and Australia/New Zealand and explored their relevance to LIS.

**10. 2007 Priorities/Action Items Discussion, facilitated by Bill Logue:**
   a. Climate suggestions
       i. Establish key monitoring stations in each basin in LIS
       ii. Endorse the creation of a regional energy plan
       iii. Get and publicize visual documentation of diminishing marshes
       iv. Land use planning act – look into coastal zone management
   b. Energy
       i. Mapping of underwater lands
       ii. Use settlement $ - general EIS, broad policy on energy use/consumption
       iii. Inventory natural resources and benthic and coastal areas
       iv. General impacts – guidance for future projects
   c. Ecosystem/LMRs
       i. Environmental indicators
       ii. Clear definition

          iii.  Identify key components
          iv.  Genetic importance of food chain/ecosystem
           v.  Set goals
          vi.  Review current STAC indicators

d. Data synthesis
           i.  Build picture of system
          ii.  STAC should organize 1 or 2 day workshop
         iii.  Set priorities for 2007
         iv.  Look at available resources
           v.  Examine connections in data – political and public involvement
         vi.  Monograph – set deadline for synthesis report
        vii.  Workshop should include social scientists and natural scientists

The meeting adjourned at approximately 2:45 pm.

Summary of Discussions and Recommendations
Prepared by Bill Logue, meeting facilitator

The agenda for the day was structured with several goals, including continuing the dialogue between CAC and STAC members to improve understanding, coordination and partnership and to identify issues of public concern and scientific interest affecting the Sound's ecology and implementation of the CCMP. Toward this end, discussion was focused on four areas previously identified by both the STAC and CAC:

- Climate Change/Global Warming
- Energy Infrastructure Projects
- Ecosystem Based Management Practices/Indicators of LMRs
- LIS Ecosystem Data Synthesis

In order to maximize the time for dialogue there were no formal presentations. The facilitator solicited comments and questions concerning each topic. These were recorded on flip charts. Each person received 16 dots, with CAC and STAC members using different colors. Committee members were encouraged to allocate 4 dots per topic but were free to allocate dots as the wished and could assign multiple dots to a single comment.

Using this method, members assigned dots to various issues to gain a sense of relative weighting of issues needing further discussion. The preferences are tabulated below with the number of dots by CAC or STAC members noted and the total. The chart below has been ordered to reflect relative weighting. This provided the group with a sense of what each Committee felt might be a high priority and where the committees were either in agreement or had different relative priorities.

## Chart of relative weighting of issues for discussion

| Item and Comment: Climate Change and Global Warning | CAC | STAC | Total |
|---|---|---|---|
| 1. What can be done about climate change/global warning? | 12 | 12 | 24 |
| 2. Sea level rise: what does it mean for habitat restoration and what are the planning implications? | 13 | 7 | 20 |
| 3. Is there more information concerning impact of temperature rise on ecosystems, organisms and diseases? | 7 | 13 | 20 |
| 4. What will the impact be on spread of invasive species and diseases? | 5 | 11 | 16 |
| 5. How will climate change/global warming impact hypoxia and stratification? | 3 | 13 | 16 |
| 6. Will temperature change create a change in the type or prevalence of various species? | 5 | 8 | 13 |
| 7. What will be the impact on disappearance/erosion of marshes? What living marine resources are indicators (e.g., eel grass, fisheries) and are they indicators of cause or effect? | 4 | 8 | 12 |
| 8. What will be the impact on avians and marine mammals? | 5 | 5 | 10 |
| 9. What data exists (as it relates to LIS?)? | 5 | 5 | 10 |

| | CAC | STAC | Total |
|---|---|---|---|
| 10. Can education/marketing on LIS and priorities be tied in with events such as Al Gore's film? | 3 | 5 | 8 |
| 11. What are current STAC priorities/what studies are being conducted (on this issue)? | 2 | 2 | 4 |
| 12. Impact on keystone species in 5 years, 25 years? | 0 | 3 | 3 |
| 13. How can the increase in runoff be addressed? | 0 | 0 | 0 |

| Item and Comment: Energy Projects | CAC | STAC | Total |
|---|---|---|---|
| 1. What quantitative information exists on ecosystem communities near past projects and what are the implications for the future? | 6 | 25 | 31 |
| 2. Can the settlement funds be used to create a generic EIS for LIS? | 17 | 4 | 21 |
| 3. Can mapping be conducted and management plans for underwater lands/marine zoning be developed? | 8 | 11 | 19 |
| 4. Can an energy policy for Long Island Sound and the region be developed?  Can it include a conclusion about what acceptable disruption? | 6 | 9 | 15 |
| 5. What continuous monitoring can be performed during and after a project? | 9 | 3 | 12 |
| 6. All types of projects (cables, LNG, wind, hydro-turbines) need to be studied and their cumulative affect estimated. | 4 | 5 | 9 |
| 7. A sufficient characterization of natural communities should be performed | 3 | 2 | 5 |
| 8. Can a cross-Sound construction policy be created by New York and Connecticut? | 1 | 3 | 4 |
| 9. How can LISS-CAC communicate better/educate more effectively with politicians? | 2 | 2 | 4 |
| 10. Can New York and Connecticut develop a joint relationship with the energy organization to create an informed/collaborative dialogue? | 1 | 1 | 2 |
| 11. Broadwater | 1 | 0 | 1 |
| 12. Can quantities of need and possible scenarios be developed for future energy use? | 0 | 1 | 1 |
| 13. EIS on projects | 0 | 0 | 0 |

| Item and Comment: Ecosystem Management / Indicators of Living Marine Resources | CAC | STAC | Total |
|---|---|---|---|
| 1. What ecosystem based goals can be established for Long Island Sound? | 11 | 11 | 22 |
| 2. For indicator species: what are they indicators of?  Do they | 13 | 9 | 22 |

| | | | |
|---|---|---|---|
| indicate a stress or a response?  Which species will be indicators of low level toxicity? | | | |
| 3. Can a clear definition of ecosystem based management be developed? | 6 | 12 | 18 |
| 4. Can a database be established that links existing information, ties in with GIS elements, and where data is accessible to others conducting studies?  Can it incorporate historical data and keep data for comparison purposes (e.g., when an indicator species is dropped)? | 9 | 8 | 17 |
| 5. Can a coordinated research plan with a timeline be established? | 9 | 5 | 14 |
| 6. Can the ecosystem model include bottom, benthic temperature and habitat? | 7 | 7 | 14 |
| 7. Can conservation plans for specific areas and specific species (including avians) be coordinated? | 10 | 3 | 13 |
| 8. Can a plan for an indicator species of the month be created to connect with public information campaigns? | 2 | 10 | 12 |
| 9. What are the metrics and variables of indicator species? | 4 | 4 | 8 |
| 10. Can the low trophic levels be included in an ecosystem management approach for LIS? | 4 | 4 | 8 |
| 11. Can species specific conservation goals be established? | 7 | 0 | 7 |
| 12. How do sediments, temperature, physical oceanography and species interact with each other? | 2 | 3 | 5 |
| 13. What are the legislative and political aspects of ecosystem based management? | 2 | 3 | 5 |
| 14. Can a major/minor watershed approach be used? | 3 | 1 | 4 |
| 15. What specific applications of ecosystem management can identified for Long Island Sound? | 0 | 3 | 3 |
| 16. Can the components (such as indicators species) and not just nutrients be looked at? | 1 | 2 | 3 |
| 17. What are the long term data sets and how are they put together?  Are they consistent across the sound? | 0 | 2 | 2 |
| 18. Habitat and LRs | 0 | 1 | 1 |

| Item and Comment: Data Synthesis | CAC | STAC | Total |
|---|---|---|---|
| 1. Can a monograph of existing knowledge be created? | 6 | 22 | 28 |
| 2. Can a central repository be created for data (chemical, biological, physical, geological)? And/or can data be made available/accessible on a wider basis? | 7 | 12 | 19 |
| 3. What can be learned from others such as the Chesapeake and Great South Bay? | 16 | 2 | 18 |
| 4. Can priorities for focus of data collection and synthesis be set | 7 | 7 | 14 |
| 5. Can a strategy be developed to get the data synthesized, e.g., using graduate students? | 8 | 4 | 12 |

| | | | |
|---|---|---|---|
| 6. Why are patterns emerging and can the data be used to challenge models? | 4 | 7 | 11 |
| 7. How can the synthesis be used to shape a message, policy and funding? | 6 | 4 | 10 |
| 8. Can population growth and human impact be included? | 3 | 7 | 10 |
| 9. Can data be compiled on the economics aspects of ecosystems be compiled and used for advocacy? | 7 | 2 | 9 |
| 10. Can a joint CAC/STAC position be taken on the integrated oceanic observation system? | 1 | 6 | 7 |
| 11. Are people available to analyze the data? | 1 | 3 | 4 |
| 12. What other examples can be found that have synthesized data effectively? For example the joint ocean flux program. | 2 | 2 | 4 |
| 13. How can community awareness of the need for the synthesis be increased? | 0 | 0 | 0 |

## **Themes Noted and Recommendations for Action Items:**

Using this information concerning relative weighting, the facilitator identified themes from the earlier discussion. These themes were discussed and recommendations for action by the STAC, CAC, Management Committee or Policy Committee were identified and discussed. Themes and recommendations are grouped by topic below.

1)      Climate Change/Global Warming

Themes:

On climate change/global warming, the group distinguished between national and global initiatives outside of their purview and focused on items at the regional and local level as they relate to the mission of the LISS.
- There is a need to understand how temperature change and sea level rise relate to LISS work and the implications for habitat restoration, species abundance, disease, marsh loss and invasive species.
- What to do about climate change/global warming at the Long Island Sound level and how this large issue relates to the actions LISS can take with respect to management goals.
- How to link this issue to data synthesis priorities for Long Island Sound was an undercurrent of the discussion.

Facilitator's note: The weightings indicate that both committees feel that climate change/global warming are a serious threat. Further, the CAC places a higher priority with the implications for current recovery efforts and how to plan for future changes concerning sea level rise. The STAC seems to place higher priority on what lessons can be drawn from existing national/international information on climate change for ecosystems, organisms and diseases and how it applies to the

Sound.  The STAC indicated higher concern about impacts on existing problem issues (hypoxia, stratification, invasives and diseases).

Recommendations for Potential Action Items:

- Determine what adaptation methods are available.
- Review and understand what DEC/DEP are undertaking with respect to greenhouse gases, which initiatives and agreements are moving forward, and where additional support and input may be necessary. The Management Committee should be encouraged to endorse plans that are moving forward and consider which plans the states should renew efforts to reach agreement.
- Establish key monitoring areas in the Sound basins.
- Through compilation and creation, establish a database of visible documentation (photographs, aerial and satellite images) of changes in Sound marshlands.
- Look to land use planning processes and organizations to assess impacts of land use and address coastal zone management issues.

2)      Energy Projects

Themes:

On energy projects, the group chose not to address specific projects. Rather the group discussed what could be learned from past experiences about how to gather and assess data on impacts of past and future projects.  It was noted that projects and policy should not be viewed in the isolation of a specific energy type or geographic location but as a whole system.

- There is value in understanding past projects and determining the degree to which anticipated impacts occurred and what was not anticipated.
- As more projects of different types are proposed, the state of mapping of underwater lands becomes important to create a base line of knowledge and inform management plans for those underwater lands.
- The diversity of potential proposals and projects and the multiple jurisdictions were seen as incentives to create a regional or Long Island Sound energy policy addressing potential future demand and the associated infrastructure.

Facilitator' Note: The weightings indicate a mutual concern that future energy projects avoid negative impacts on the Sound and that decisions concerning the projects be made with good information in hand.  This plays out with each committee a little differently.  For the STAC it means understanding past projects and how they have actually affected surrounding ecosystem communities so that information can influence future discussions. For the CAC it means integrating knowledge about the entire sound through a broad EIS.  For both it means better understanding a baseline through mapping (which is an ongoing priority) and underwater lands management plans.

Recommendations for Potential Action Items:

- Support projects to evaluate the effects of past energy projects on ecological communities in Long Island Sound.
- Encourage use of settlement funds to create a general environmental impact statement and natural resource inventory for the Sound. This should include analysis of impacts/what has occurred since construction of existing energy projects such as the Iroquois Pipeline.
- Continue bottom inventory and mapping.
- Support the creation of a Long Island Sound/regional energy policy.

3)      Ecosystem Based Management Practices/Indicators of LMRs

Themes:

On ecosystem based management (EBM)/indicators of LMRs, the discussion noted that further clarity and specifics are needed to direct actions in a meaningful manner.
- EBM practices and goals can only be drawn from a clear definition of what is meant by EBM.
- Indicators are an essential element of evaluating EBM and they need to be chosen with clarity about what they are indicators of.
- EBM modeling data needs to be accessible and managed and account for historical data.

Facilitator's Note: The weightings indicate high agreement between the two committees about the value of ecosystem based management as a goal and the need for clarity about the importance about indicator species, top to bottom tracking and the linking / accessibility of collected data. The weighting also seems to reflect a CAC desire that a clear definition of EBM be stated in a way that they can articulate it to their constituencies and garner support for LISS initiatives.

Recommendations for Potential Action Items:

- Create a clear definition of ecosystem based management.
- Determine which indicators to evaluate and what they are evaluating.
- Set goals.
- STAC identify key components.
- For modeling, create a database of available information compiled with access to the underlying data by various researchers. An attempt should be made to include historical data.

4) Data Synthesis

Themes:

On data synthesis the discussion focused on the need for integration of data, the need for broad based data, and the role of data in decision making, setting priorities and measuring results.

- Broad base of chemical, physical, biological and geological data is needed to inform priority setting.
- Lessons can be learned from other efforts about how to synthesize and manage data.
- A specific product that summarizes the state of knowledge is important in setting priorities and future assessment.
- Securing resources, especially people and time, are an important aspect of accomplishing data synthesis and management.

Facilitator's Note: The weightings indicate that the STAC feels that data synthesis is a very high priority in order to move the science forward and establish priorities. Later discussion seemed to bring CAC members on board with this conclusion.

Recommendations for Potential Action Items:

LISS should seek to synthesize a broad base of data on chemical, biological, physical and geological aspects of the sound. This will help articulate what is known, where gaps exist and guide priority setting.

- A first step should be the STAC co-chairs drafting a plan for a workshop or conference of 2-5 days, where papers and presentations will be delivered and discussed. The goal is to understand what is known, how it is known, and why it is important. It was suggested that this information include social science aspects and how that data can ultimately connect to the public and political education process.
- The primary outcome of the session will be a monograph, largely drafted or outlined at the meeting, and perhaps published proceedings.
- The secondary outcome as a follow-up will be a smaller work group of joint STAC/CAC members to develop additional materials to support educational activities and public dissemination information. This could include a multi-media presentation.