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Evaluation of Current Community-Based Monitoring Efforts and Recommendations for Developing a Cohesive Network of Support for Monitoring Long Island Sound Embayments.

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Evaluation of Current Community-Based Monitoring Efforts and Recommendations for Developing a Cohesive Network of Support for Monitoring Long Island Sound Embayments.

Final Report

Funded by and Prepared for:

New England Interstate Water Pollution Control Commission
and
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List of Abbreviations used in this document.

CT	Connecticut
CT DEEP	Connecticut Department of Energy & Environmental Protection
EPA	Environmental Protection Agency
LIS	Long Island Sound
LISS	Long Island Sound Study
NYSDEC	New York State Department of Environmental Conservation
QAPP	Quality Assurance Project Plan
QA/QC	quality assurance / quality control
SOP	standard operating procedures

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1 Executive Summary

The current project focuses on Long Island Sound embayments and represents an exploration of the potential for coordination among community-based water quality monitoring groups, and coordination between community-based groups and data end users, including scientists and managers. Community-based monitoring groups represent a potential valuable source of water quality information. The development of standardized protocols, training methods and reporting procedures will serve to provide end users with the confidence necessary to utilize the data collected as part of community-based monitoring programs. Both groups of stakeholders stand to benefit from this type of coordination with the ultimate benefit being a healthier, better understood Long Island Sound.

Project Implementation

This project involved four specific tasks:

Task I: Near-Shore Data Needs Assessment

Involved identification of the necessary components of a community-based water quality monitoring program required to render the resulting data usable by data end-users (i.e. scientists and managers). This included the development of a survey that asked for feedback regarding the current and potential uses – by end users – of community-based water quality monitoring data. Survey results contributed to Task III recommendations.

Task II: Identify Established Long Island Sound Monitoring Groups

Involved creation of an inventory of recent and current water quality monitoring programs in Long Island Sound embayments and tributaries. To accomplish this task, the Sound was divided into three geographic regions: Eastern Connecticut, Western Connecticut and New York. The project team worked to identify community-based water quality monitoring groups within each region and, utilizing a survey tool developed by the project team, these groups were interviewed. The goal of these interviews centered around gaining a better understanding of *what* and *how* groups are monitoring. Survey results were later presented at a series of regional stakeholder meetings. These meetings had the additional goal of collecting preliminary feedback related to the establishment of a Long Island Sound water monitoring framework, and this feedback was later turned into a survey and distributed to stakeholders. This survey allowed us to quantify the feedback on the various framework components, and contributed to the Task III recommendations.

Task III: Framework Development

Comments collected from stakeholders (i.e. community-based water quality monitoring groups and end users, including scientists and managers) were used to develop a framework (this document) intended to guide implementation of a subsequent project to accomplish the program mission: Coordinate embayment water quality sampling efforts *among* community-based water quality monitoring groups, and *between* community-based groups and data end users, including scientists and managers.

Task IV: Quality Assurance Project Plan (QAPP) Development

A standardized and generic QAPP template for community-based monitoring groups characterized by modules containing text and information for each field parameter and a variety of methods was developed. The format and content of the QAPP is based on a 2006 QAPP developed under contract with the Massachusetts Office of Coastal Zone Management, with substantial modification to reflect a focus on coastal monitoring. The general QAPP and Adoption Form underwent a courtesy review by Environmental Protection Agency (EPA) Quality Assurance personnel from Region 1. A properly executed adoption form should meet Region 1 QAPP requirements.

Project Results

Task I: Near-Shore Data Needs Assessment

Among the end user respondents to the survey, there was a general feeling of support for the expansion of community-based monitoring. A few broad conclusions can be drawn from the results presented in Section 3 (page 11):

- The end-user community has needs that span a wide range of water quality parameters necessitating an expansion of community-based monitoring efforts currently underway.
- May through October represents the critical monitoring timeframe.
- The project would benefit from a network of experts willing to work with community-based monitoring groups who could, for example, help determine appropriate temporal and spatial guidelines for sampling.
- The proposed framework would benefit from a project coordinator to assist with project start-up, training, troubleshooting, data management, data quality assurance, and who could act as a liaison between the community-based groups and end users.
- The project would benefit from a centralized database that allows for community groups to input data in a standardized format, and access data in a variety of formats that included canned reports, visual representations and raw data.
- Though end users prefer data collected according to an EPA approved QAPP, they would utilize data collected under an appropriate quality assurance procedure. Additionally, they would like to see standard operating procedures and quality assurance / quality control (QA/QC) reports accompanying any data, regardless of the presence or absence of a QAPP.

It is worth noting that these results are potentially biased by the fact that the end-users most likely to respond to the survey are already interested in community-based data.

Task II: Identify Established Long Island Sound Monitoring Groups

A total of 10 community-based groups¹ were defined as currently conducting water quality programs in the Long Island Sound. While parameters monitored varied by group, almost all groups monitored temperature, salinity, and dissolved oxygen. Other popular indicators included pH and nitrate. Three of the groups monitored only bacteria, with all other parameters monitored by eight or fewer organizations. The methods used for monitoring various parameters also varied widely by group.

Responses to framework surveys distributed to community-based monitoring groups, in addition to feedback collected during regional stakeholder meetings, focused on a few primary points. In short, community-based monitoring groups would like:

- Access to stable sources of funding dedicated to monitoring that are exempt from the need to conduct research or innovate.
- Access to funding for equipment purchases or greater access to equipment loan programs.
- Technical assistance for QAPP development.
- Technical assistance for analysis of water quality data results.
- Greater access to analytical laboratory facilities. This refers to both the availability of funds to conduct analyses and more local certified laboratories that could conduct bacterial analysis (due to the short time requirement between collection and analysis for this parameter).
- A centralized database with flexible and accessible input and reporting features.

¹ Defined as staffed primarily by volunteers and whose origin can be linked to some community driven effort to address local problems.

Issues of secondary importance include:

- A need for assistance with data communication.
- Assistance with volunteer recruitment and retention.

Community-based groups responding to our survey are very willing to sample a range of additional water quality monitoring parameters identified by end-users as important. However, this is dependent upon the provision of necessary resources in the form of training, equipment and supporting funds.

Task III: Framework Development

In summary, there is tremendous enthusiasm for the proposed project from the community-based groups and end users. Though there was a small amount of skeptical feedback from the individual community-based organization interviews and regional meetings, this came primarily from people who reported to have been part of similar efforts in the past that had failed. Particularly in the regional meetings, it was clear that the community-based stakeholders want the project to move forward and are willing to help support its success.

Though the ultimate goal centers around a coordinated approach to connecting the work – and data – of community-based water quality monitoring groups to end users, it is conceivable that in order for this effort to be successful, a considerable amount of resources will need to be funneled to soliciting and maintaining the buy-in of community-based groups. The key features of a support network identified by community-based groups and end-users includes:

- Financial support dedicated to the sustainability and expansion of current monitoring programs.
- Financial support dedicated to the development of new monitoring programs.
- Facilitated collaboration between community-based monitoring programs and experts to ensure that the monitoring program design is adequate to achieve all stakeholder goals.
- Communication between community-based monitoring programs and data end users to ensure that parameters collected, location, and temporal frequency are sufficient to achieve all stakeholder goals.
- Support to ensure data quality and usability on the community group side, in the form of funding (e.g. for training, equipment, analyses), standard operating procedures (SOP) and QAPP development assistance, and a centralized database that includes a method for tracking quality assurance procedures.
- A centralized database with flexible and accessible input and reporting features.
- Training and guidance in the development of new monitoring programs.

To implement these key features into a support network for community-based monitoring, we suggest the following priorities:

- Provide financial support for monitoring programs.
- Establish the position of Long Island Sound Community-Based Monitoring Coordinator.
- Develop a centralized database.
- Increase communications among all Long Island Sound stakeholders.
- Provide technical support for monitoring programs.

Task IV: Quality Assurance Project Plan (QAPP) Development

The General QAPP for Long Island Sound Volunteer Coastal Monitoring is intended to serve all organizations participating in coastal water quality monitoring in the Long Island Sound region, and may also serve programs working in freshwater and other coastal zones. It contains baseline requirements to be met for data collection projects, as well as common objectives, parameters, methods and approaches for coastal and wetland, chemical and biological monitoring. Though it can be adopted as the project QAPP by any group performing these types of monitoring activities, it could also be useful as a template for a project-specific QAPP not adopting the full plan.

2 Project Methods and Approach

This section provides a brief overview of the background and approach taken when addressing the four tasks outlined by NEIWPC in the original Request for Proposals. This is essentially the “methods section” for the project. The output and conclusions relevant to each task are considered in later sections (Sections 3 through 6).

2.1 Project Context

The current project focuses on Long Island Sound embayments and represents an exploration of the potential for coordination among community-based water quality monitoring groups, and coordination between community-based groups and data end users, including scientists and managers. Community-based monitoring groups represent a potential valuable source of water quality information. The development of standardized protocols, training methods and reporting procedures will serve to provide end users with the confidence necessary to utilize the data collected as part of community-based monitoring programs.

Approximately 80 embayments and harbors line the margin of Long Island Sound, ranging in size from the tiny ($< 0.5 \text{ km}^2$) to the massive ($> 40 \text{ km}^2$). These embayments are the receiving waters for nutrients, sediments, and pollutants originating in the watershed of Long Island Sound. These areas are also utilized by residents of New York and Connecticut for recreational and commercial activities. While much monitoring effort is focused on the main stem of Long Island Sound, relatively little work is conducted in the embayments by the management and academic communities.

In obvious ways, coordination of data collection efforts could benefit the management and academic communities by providing a wealth of data in under-sampled embayments. Community-based monitoring groups also stand to benefit through direct contribution to management decisions and greater scientific understanding. As our understanding of the Long Island Sound deepens, the prospects for a healthier Sound are greatly enhanced.

2.2 Project Team

The project team consisted of research scientists (UConn), educators and outreach specialists (The Maritime Aquarium) and groups engaged in environmental advocacy and outreach (Save the Sound, Citizens Campaign for the Environment). Each brought differing backgrounds, perspectives, and relationships with community groups, allowing for an evaluation of monitoring support from many different angles.

People involved in the project were:

Agency	Role	Agency Representatives
The Maritime Aquarium at Norwalk	Lead Agency	Jamie Alonzo* Joe Schnierlein Cathy Hagadorn
Save the Sound, Connecticut Fund for the Environment	Subcontractor	Kierran Broatch Curt Johnson* Cassandra Devney Chris Cryder Leah Schmalz
Citizens Campaign for the Environment	Subcontractor	Maureen Dolan Murphy* Adrienne Esposito*
University of Connecticut	Subcontractor	Jamie Vaudrey* Charlie Yarish* Kimberly Gallagher

*Listed as a Principal Investigator in the project proposal.

2.3 Project Tasks

The project required the completion of four tasks:

Task I: Near-Shore Data Needs Assessment (Lead agency: University of Connecticut)

- Identification of the necessary components of a community-based water quality monitoring program required to render the resulting data usable by data end-users.

Task II: Identify Established Long Island Sound Monitoring Groups (Lead agency: All)

- Creation of an inventory of recent and current water quality monitoring programs in Long Island Sound embayments and tributaries.

Task III: Framework Development (Lead agency: University of Connecticut, The Maritime Aquarium)

- Use feedback collected from stakeholders to develop a framework intended to guide implementation of a subsequent project to accomplish the program mission: Coordinate embayment water quality sampling efforts among community-based water quality monitoring groups, and between community-based groups and data end users, including scientists and managers.

Task IV: Quality Assurance Project Plan Development (Lead agency: University of Connecticut)

- Develop a standardized and generic QAPP template for community-based monitoring groups characterized by modules containing standards for each field parameter and a variety of methods.

2.4 Project Implementation

2.4.1 Project Planning

On 1 May 2012, program partners convened at the Maritime Aquarium for a meeting focused on finalizing the program timeline and developing an initial communiqué and survey to be distributed to

citizen monitoring groups. After two rounds of revisions completed on 12 June 2012, final copies of the surveys were distributed to program partners.

2.4.2 Task I - Near-Shore Data Needs Assessment

An initial test survey delivered to end-users was conducted in January 2012 to determine the format of the survey and the questions to include. These surveys were conducted after the community stakeholder meetings (described in Task II, below), so that issues raised at the community stakeholder meetings could be incorporated into the development of the end user survey. The survey was uploaded to SurveyMonkey, participants had the option of speaking with Jamie Vaudrey in person or over the phone or completing the survey on-line. Interviews conducted by Vaudrey were entered into the online survey form. Fifty-seven people were invited to complete the survey; twenty-seven people completed the survey. Reminders of the request to participate were sent in May and again in June, with a last minute plea sent in July. The individuals contacted included members of the management community of Long Island Sound (Long Island Sound Study, New York State Department of Environmental Conservation, Connecticut Department of Energy & Environmental Protection), New York Sea Grant, Connecticut Sea Grant, Colleges and Universities, Town Shellfish Commissions, and Departments of Public Health.

A summary of the results is provided in Section 3 (page 11). The question-by-question results of the survey are provided in Appendix A.

2.4.3 Task II: Identify Established Long Island Sound Monitoring Groups

2.4.3.1 Community-Based Monitoring Group Surveys: Monitoring Activities

Project partners were assigned to one of three Long Island Sound coastal regions: Eastern Connecticut [from New Haven east; Save the Sound], Western Connecticut [New Haven to the metro New York area; The Maritime Aquarium], and Long Island [Citizen's Campaign for the Environment]. Each agency was responsible for researching community-based monitoring groups within their region, and making contact both to solicit buy-in for the project and distribute surveys. Groups were identified through prior knowledge of groups by project partners, web searches, and review of publications which included lists of local monitoring groups. Survey participants were also asked if they knew of anyone else conducting monitoring work. The contact area was confined to the coastal areas of concern to the Long Island Sound Study. Any groups with the potential to be sampling in saline waters (defined as having a salinity > 2 ppt) were contacted. Groups who clearly sampled only in freshwater areas were not contacted (as determined from group literature or website).

A total of 47 groups were contacted. Of the 47, 21 groups were monitoring in saline waters while two groups monitored only in freshwater. The remainder were not conducting any monitoring work and had no plans to begin monitoring. All 21 groups working in saline waters were interviewed in person when possible or by phone. Though this work was on-going, the bulk of interviews were completed by September 2012. Between September and December 2012, survey data were analyzed in preparation for a series of Regional Stakeholder Meetings scheduled during the month of December 2012.

A summary of the results is provided in Section 4.1 (page 19). The question-by-question results of the surveys and phone call results are provided in Appendix B.

2.4.3.2 Community-Based Monitoring Stakeholder Meetings

In November 2012, invitation letters for a series of regional meetings were distributed to all community-based groups who had participated in the initial survey, in addition to others who had not

yet been surveyed. Three regional meetings were held during the month of December according to the following schedule:

- Eastern Connecticut Regional Stakeholder Meeting, 17 December 2012, 4:00 – 6:00 p.m. at University of Connecticut's Avery Point Campus
- Western Connecticut Regional Stakeholder Meeting, 11 December 2012, 11:00 a.m. – 1:00 p.m. at The Maritime Aquarium at Norwalk
- Long Island/New York Regional Stakeholder Meeting, 19 December 2012, 11:00 a.m. – 1:00 p.m. at Citizens Campaign for the Environment's Farmingdale Office

At each meeting, a presentation summarized all project data collected to date and all attendees were asked to respond to the following questions:

- A. What does the LISS need to do to make this program successful? Examples: personnel to support QAPP development, database, management, training activities.
- B. What are the main challenges to establishing a Long Island Sound network?
- C. What incentives might facilitate your active participation? Examples: access to funding, QAPP assistance, technical assistance, training, access to equipment, displays for museums, lesson plans.
- D. What functionality would you like from a common data management system (i.e. data access/sharing, reporting)?

The minutes and slides for each meeting are provided in Appendix C. A summary of the three meetings is provided in section 4.2 (page 26).

2.4.3.3 Community-Based Monitoring Group Surveys: Framework Feedback

At each of the three regional stakeholder meetings, different issues and ideas were presented by the meeting participants. Feedback from the regional stakeholder meetings was compiled into an online questionnaire in an effort to inform all participants of the meeting results and further solicit opinions on priorities and recommendations to be included in the suggested framework.

The questions and responses are presented in Section 4.3 (page 27) and responses are incorporated into the suggested framework presented in Section 5 (page 35).

2.4.4 Task III: Framework Development

Comments from the community group surveys, end user surveys, and stakeholder meetings were used to outline the framework of a program designed to support community monitoring efforts in Long Island Sound.

2.4.5 Task IV: Quality Assurance Project Plan Development

The General QAPP was written by Dr. Jamie Vaudrey and Dr. Kimberly Gallagher (Department of Marine Sciences, University of Connecticut). Many QAPPs were reviewed when deciding on an approach for formatting the model QAPP, in addition to the guidance provided by the EPA to community monitoring groups on developing QAPPs. The content of the QAPP was developed based on EPA guidelines for the parameters commonly monitored by groups in the LIS area. The idea for the format of the QAPP was based on a 2006 QAPP developed by Jerry Schoen (Massachusetts Water Watch Partnership) and Barbara Warren (Salem Sound Coastwatch) under contract with the Massachusetts Office of Coastal Zone Management: *Massachusetts Volunteer Coastal Monitoring General Quality Assurance Project Plan (QAPP), Version 1.1, For Water Quality Monitoring, Wetland Biological Assessments, and Marine Introduced Species Monitoring*. The format and content

have been heavily modified to reflect a focus on coastal monitoring, versus Schoen and Warren's greater focus on freshwater assessments.

The General QAPP and Adoption Form underwent a courtesy review by EPA Quality Assurance personnel from Region 1. A properly executed adoption form should meet Region 1 QAPP requirements.

3 Task I - Near-Shore Data Needs Assessment

Potential end users were asked a series of questions regarding their opinions on the current and potential uses of community-based water quality monitoring data. The individuals contacted included members of the management community of Long Island Sound (LISS, NYSDEC, CT DEEP), NY Sea Grant, CT Sea Grant, Colleges and Universities, Town Shellfish Commissions, and Departments of Public Health.

The survey questions were divided by subcategories which addressed current and potential use of data, suggestions for temporal and spatial frequency, barriers to use of the data, quality control requirements, data format, and overall opinion of the importance of supporting community monitoring efforts.

Comments and results from this survey were incorporated into the framework detailed in Section 5 (page 35). The following is a summary of survey results. The full survey results, including all text comments, are provided in Appendix A.

3.1 Current interactions with community-based groups and overview of data needs.

Participants were first asked a series of questions about their current interactions with community-based monitoring programs and the data needs of the survey participant. Fifty-seven people were invited to complete the survey, 27 people completed the survey. Of the 27 participants, 64% (n=16) indicated they currently use data collected by community-based or volunteer monitoring groups. Current uses of data included: part of the 305b assessment process to prepare the Integrated Water Quality Report to Congress, educational and research purposes, the LISS indicators presentation, and as part of the sentinel monitoring program. One potential use mentioned by a number of respondents was to supplement our data sets in areas that we do not monitor, or monitor infrequently (mentioned by 7 respondents). Additional specific comments included:

- Stream and coastal monitoring to identify inputs of non-point source pollution that degrade coastal water quality and therefore impact swimming and shellfishing opportunities. (mentioned by 2 respondents).
- Rapid Bioassessment for Volunteers (RBV) protocol for fish passage data and temperature data are used to assess conditions in river reaches.
- Water quality monitoring data could be used to develop embayment water quality indicators.
- Community-based monitoring group data provides some insights into the various Stonington embayments, but cannot be used directly to open shellfish grounds, a process that is tightly controlled by the CT Bureau of Aquaculture.
- Most likely to compare our land cover data to finer-scale water quality data than is currently available.
- To assess status, trends, inter-relationships and comparisons with benchmarks (mentioned by 2 respondents).
- Scientific research (e.g. as model input).

- Climate change monitoring including water temperature, pH, salinity.
- As supporting data or to look for interesting trends prior to undertaking a study.
- Valuable outreach tool (mentioned by 2 respondents).
- Advocacy: Recognizing problems, focusing on those problems, supporting advocacy or restoration, try to fix the problem; advocacy for the data monitoring itself - recognizing the importance, publicity for the data, outreach to the governmental units; bringing to management committee (LISS) - to see how important it is to the local communities.

One participant noted, “The local use and application of the monitoring data varies with the individual program. The data from programs are not integrated or used regionally,” a comment which related directly to framework development. Another participant stated, “I think something really valuable is being lost in the fact that monitoring programs don't seem to combine results, though this is a large, expensive task.” Both of these comments touch on a subject also mentioned by the community groups: the need for a centralized database where data from multiple groups can be shared and compared. The need for this database is reflected in the suggested framework presented in Section 5 (page 35).

End users were asked to indicate which parameters they would like to see from community-based monitoring groups (Figure 1). The highest ranked parameters for end users were temperature and dissolved oxygen with more than 80% of end users affirming the importance of these parameters. These parameters are currently monitored by most of the active monitoring groups (Figure 1). Salinity, pH, fecal coliform and total nitrogen (total N) were also highly ranked by end users. While most groups monitor salinity and pH, only a few groups monitor total N and fecal coliform. Other nutrients, bacteria, indicators of water clarity (secchi, turbidity), and organism based indices (macrophytes, chlorophyll, diversity indices) were indicated as less important, with 40% to 60% of survey participants indicating these parameters are of value. All other parameters had some support from end users, but results indicate they are of lower priority (Figure 1). End users and monitoring groups were asked about anthropogenic compounds. While only one monitoring group sampled for PCBs and TPH Petroleum (not shown on Figure 1), 34% of end users indicated a desire to have groups collect data in this category. Specific compounds mentioned by end users included: PCBs, TPH Petroleum, PAHs, and pesticides. Additional parameters mentioned by end users included: silicates, biogenic silica, invasive invertebrates, juvenile finfish, extent and quality of riparian habitat, and particulates total & organic. As will be discussed later in Section 4.1 (page 19), community-based monitoring groups are generally willing to monitor additional parameters, but would require support in terms of funding and training.

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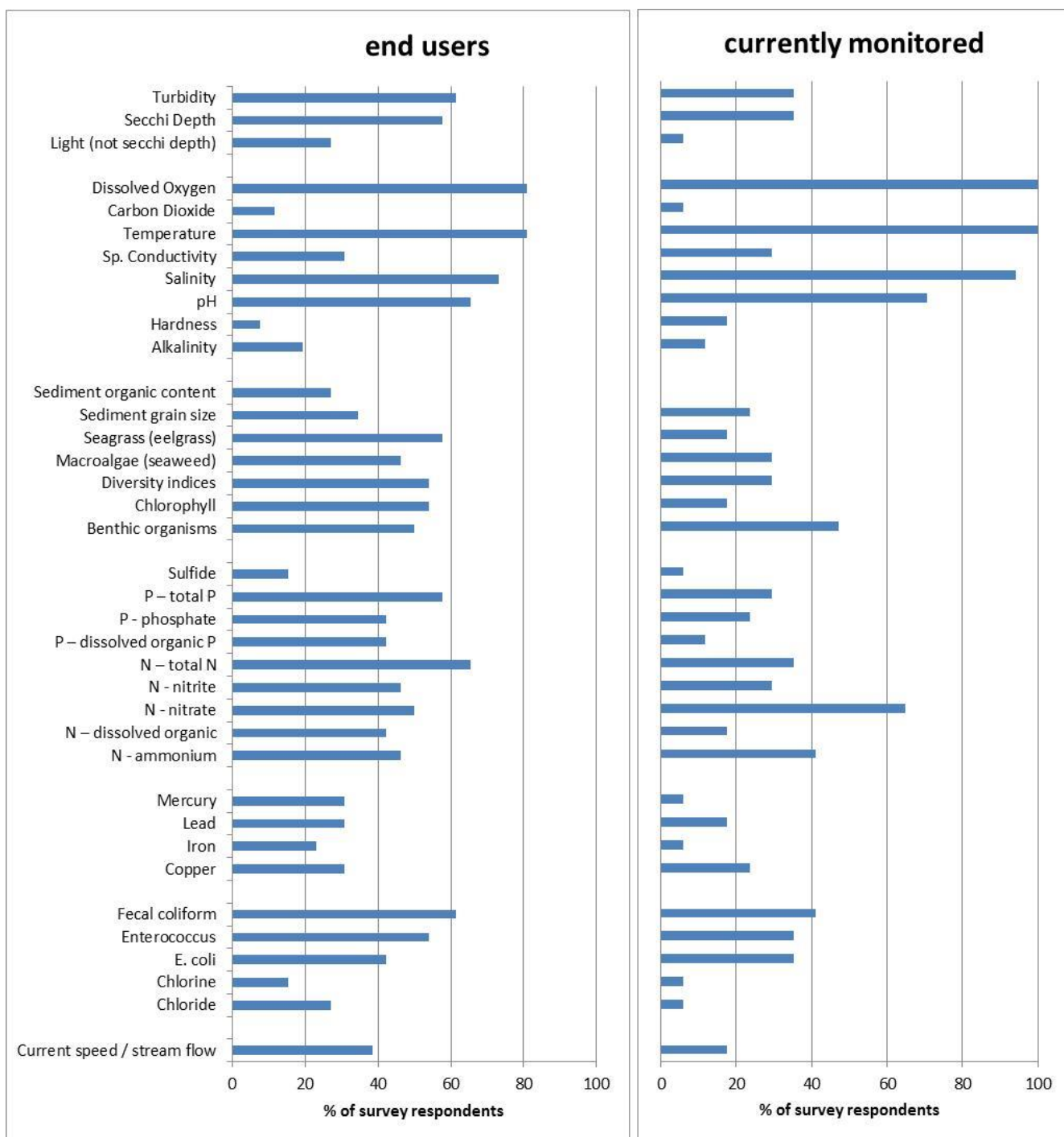


Figure 1: Parameters

List of parameters end users would like to see versus a list of what is currently monitored in Long Island Sound by community groups, labs, and educational organizations.

3.2 Desired temporal and spatial frequency of sampling.

Many community monitoring groups work primarily in the summer months. However, these groups are often willing to sample year round, if the need exists. End users were asked to rank the importance of obtaining data during each month (Figure 2). May through September were considered essential or

critical months for sampling. April was also highly ranked, followed by October. March and April had fewer “essential” listings, but were considered critical months for sampling. Half of the ends users responding considered November to be critical (with two end users ranking as essential). End users would like to see sampling during the winter months of December, January and February, but these months were designated as not critical and perhaps not necessary.

Most monitoring groups sample late May into early October, a pattern which coincides with the months identified as essential or critical by end users. With additional support, a smaller sampling effort may be encouraged in the months of March, April, and November; however, monitoring groups mentioned the difficulty of finding volunteers and actually conducting the field work during the colder months of the year. Safety of the volunteers also becomes more of a concern in colder weather.

End users were asked to identify the areas of interest they considered when ranking months from a list provided in the survey. The two largest considerations were hypoxia (50% of respondents) and eutrophication in general (46% of respondents). Phytoplankton, aquaculture in general, and shellfish bed closures were considered by 41% of respondents. Between 20% and 40% of the respondents indicated they also considered: harmful algae blooms, commercial aquaculture, seagrass, and recreation (boating, swimming, etc.).

End users were asked about the temporal and spatial frequency of sampling they would like to see. A few respondents noted that frequency really depends on the goal of the monitoring program. In general, spring, summer, and fall sampling should occur weekly to biweekly (once every two weeks). In some cases, monthly sampling supplemented with storm event sampling could also meet the program goals. For certain diversity indices, annual sampling may be appropriate. As for spatial frequency, a range of answers were provided reflecting the diverse interests of the end users (see Appendix A). A number of end users commented that temporal and spatial frequency should be determined with the assistance of an expert to appropriately reflect the goal of monitoring. The need for a network of experts willing to work with community-based monitoring groups is indicated by the end users comments and was also mentioned by the community-based monitoring groups.

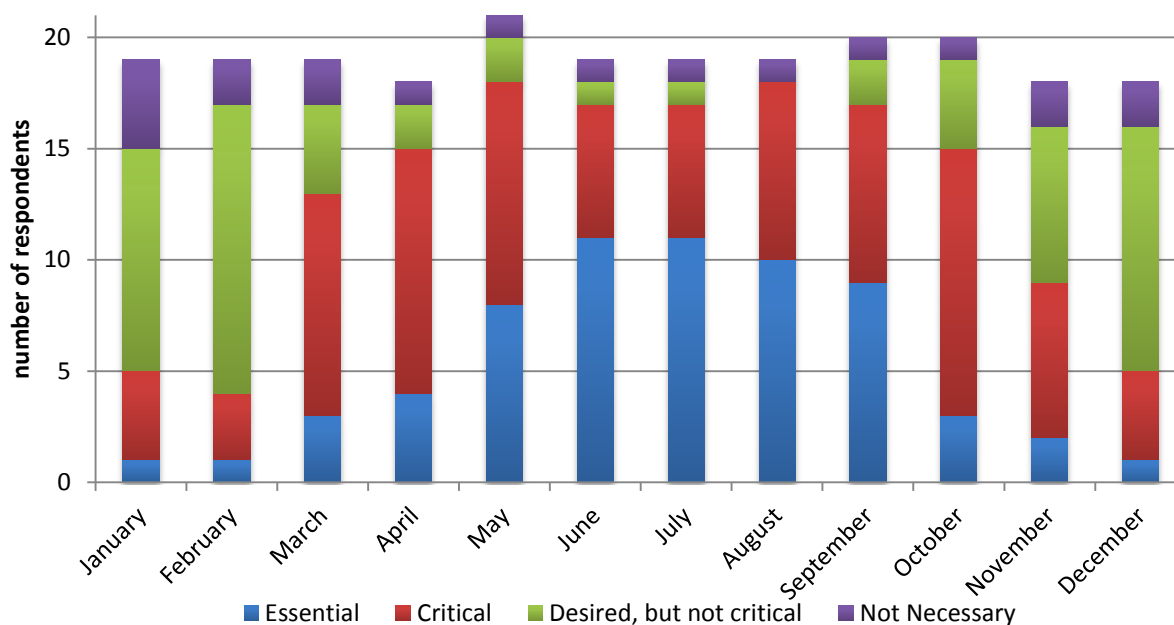


Figure 2: End User’s Temporal Preferences for Sampling

End users were asked to rank the importance of obtaining data during each month.






















































3.3 Barriers to the use of community-based monitoring data.

End user survey participants were asked a series of questions on barriers to the use of community-based monitoring data. The goal of these questions was to determine what data end users require from a monitoring program. An examination of the considerable and moderate categories reveals those issues of greatest concern to the end users (Table 1, yellow bars). The issue of data format is one of the greatest barriers facing end users. The data may be in an unwieldy format, requiring too much data analysis on the part of the end user. The need for a standard format was mentioned by respondents. A second major issue is concern over data quality. Some end users may only utilize data collected under an EPA approved Quality Assurance Project Plan (QAPP). While a QAPP is an indicator of the data quality, one end user noted during an in-person interview that almost any data can be useful for certain parameters. Knowledge of groups currently conducting monitoring proved to be little or no barrier. Some barrier was presented by the lack of groups monitoring in areas of interest and monitoring parameters of interest. A robust framework for supporting community-based monitoring should include some efforts at recruiting volunteers to new locations of interest and in providing suggestions on parameters of interest to end users.

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Table 1: End Users: barriers to using community-based data

End users were asked to rank potential barriers to the use of community-based monitoring data.

<i>potential barrier</i>	<i># of respondents</i>	<i>response</i>	<i># of respondents</i>	<i>pooled response</i>
I do not know of any groups collecting data, I lack the contacts.	4 	considerable barrier	5 	considerable + moderate
	1 	moderate barrier		
	9 	some barrier	12 	some + little
	3 	little barrier		
	8 	no barrier	8 	no
Data are not collected in physical locations of interest to me.	4 	considerable barrier	10 	considerable + moderate
	6 	moderate barrier		
	7 	some barrier	10 	some + little
	3 	little barrier		
	5 	no barrier	5 	no
The parameters I need are not collected (e.g. salinity).	2 	considerable barrier	6 	considerable + moderate
	4 	moderate barrier		
	12 	some barrier	15 	some + little
	3 	little barrier		
	4 	no barrier	4 	no
I am unwilling to analyze raw data belonging to another group.	4 	considerable barrier	9 	considerable + moderate
	5 	moderate barrier		
	3 	some barrier	7 	some + little
	4 	little barrier		
	9 	no barrier	9 	no
Available data are in an unwieldy format, takes too long to analyze.	5 	considerable barrier	11 	considerable + moderate
	6 	moderate barrier		
	5 	some barrier	9 	some + little
	4 	little barrier		
	5 	no barrier	5 	no
I have concerns over quality of the data.	8 	considerable barrier	11 	considerable + moderate
	3 	moderate barrier		
	9 	some barrier	10 	some + little
	1 	little barrier		
	4 	no barrier	4 	no
The data we use must be collected under an EPA approved QAPP.	7 	considerable barrier	9 	considerable + moderate
	2 	moderate barrier		
	4 	some barrier	7 	some + little
	3 	little barrier		
	9 	no barrier	9 	no

3.4 Quality control and training requirements.

End users were asked what type of quality control measures and what type of reporting and training requirements were necessary for the use of community-based monitoring data. The percentage of end users indicating agreement with or support for each statement is as follows:

60%	EPA Approved Quality Assurance Project Plan (QAPP)
52%	Field Blanks (control sample that accounts for contamination from collection procedure)
52%	Replicate field samples (replicate samples collected same place, same time)
32%	Duplicate field measures (replicate field measurements; same place, same time)
32%	Analytical replicates (replicate analyses of same sample)
28%	Spiked samples (adding known amount of substance to sample to account for degradation)
24%	Calibration blank (using a purified matrix to set zero point)
20%	Calibration sample (known sample that is run periodically to ensure equipment consistency)
20%	Negative or positive plates/tubes (presence/absence compared to expected)
8%	Samples split with another lab (field samples split and analyzed by different labs)
8%	Duplicate samples analyzed by another lab (duplicate field samples analyzed by different labs)
4%	Known QC standards analysis (running standards to establish a calibration curve)
4%	Unknown QC standards analysis (calibration standards included blindly in analysis)
0%	None required

Survey participants were then asked what information and level of oversight are required in order to use data collected by community-based groups. The percentage of end users indicating agreement with or support for each statement is as follows:

76%	standard operating procedures document
72%	QA/QC reports
52%	copies of field data sheets
32%	training documents
28%	I would like to attend some training events to verify procedures
24%	I would like a LISS representative to attend some training events to verify procedures
16%	training records (attendance, agenda)
8%	none

In summary, a QAPP makes the data much easier to justify use. In lieu of a QAPP, appropriate QA/QC procedures are acceptable. The end users would like to see standard operating procedures and QA/QC reports accompanying any data. Ideally, a LISS representative would be available to assist with training groups and checking in on the methods employed by community-based groups.

3.5 Data Format

One issue encountered when working with community-based monitoring data is the lack of a standard format among groups. As part of this project, one recommendation for the Long Island Sound Study will be the establishment of a centralized database where groups may enter their data and view data from around Long Island Sound. In anticipation of this recommendation, end users were asked to indicate all of the data products and data formats they are likely to use.

The percentage of end users indicating agreement with or support for each format listed is as follows:

56%	raw data (direct measurements, includes all replicates; checked for data entry errors)
20%	figures of raw data
76%	verified data (Raw data which have been checked for methodological errors)
44%	figures of verified data
60%	processed data (may include some averaging of spatial, temporal, or methodological replicates)
44%	figures of processed data
60%	summarized data (key information selected from the larger data set)
40%	figures of summarized data
80%	maps of data
40%	text file (.csv; .txt)
84%	Excel file (.xls; .xlsx)
80%	GIS or GIS-compatible files
48%	Access database (.mdb; .mdbx)

In summary, end users would like access to data in GIS-compatible format and Excel-compatible format. Verified data available for download and maps of data are also highly desirable. Access to processed data (may include some averaging) and summarized data (select information from a larger data set) would also be useful. Access to data ranked higher than the ability to look at figures of the data, though the figures are still desirable.

3.6 General Opinion of the Importance of Community-Based Monitoring

At the conclusion of the survey, end users were asked two questions to gauge their overall response to data quality and desire to use community-based monitoring data (Figures 3 and 4). In response to the question, “Where do you fall along the continuum of desiring more data vs. concerns over data quality?”, there was a slight trend to value the quality of the data over the quantity of the data, though respondents were relatively uniform across the continuum (Figure 3). This result is of no surprise and reflects the need for additional data tempered by the need to verify the data are collected in a manner which ensures it is trustworthy. The overall response from end users was that they are interested in using community-based monitoring data; however, this definitely reflects the fact that the people most likely to complete the survey are those most interested in using community-based data.

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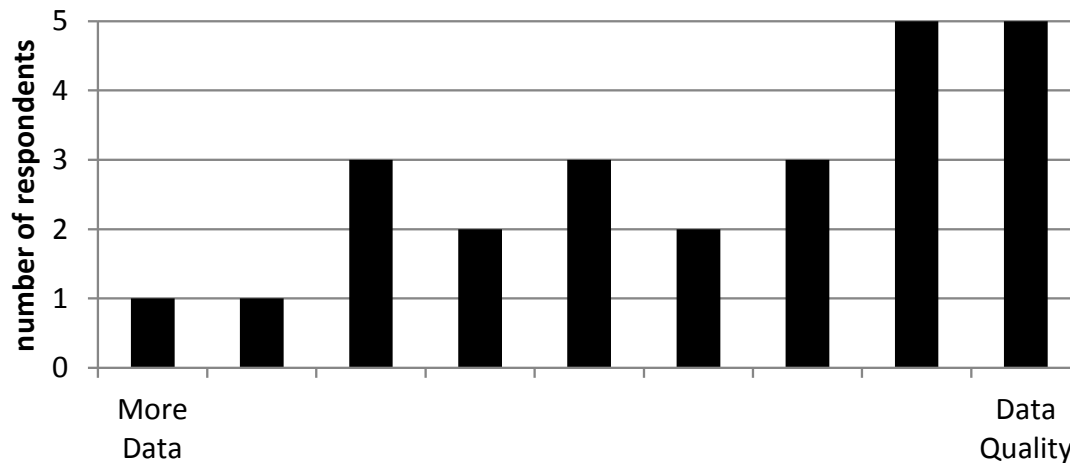


Figure 3: Data Quantity vs. Quality

End user's response to the question, "Where do you fall along the continuum of desiring more data vs. concerns over data quality?"

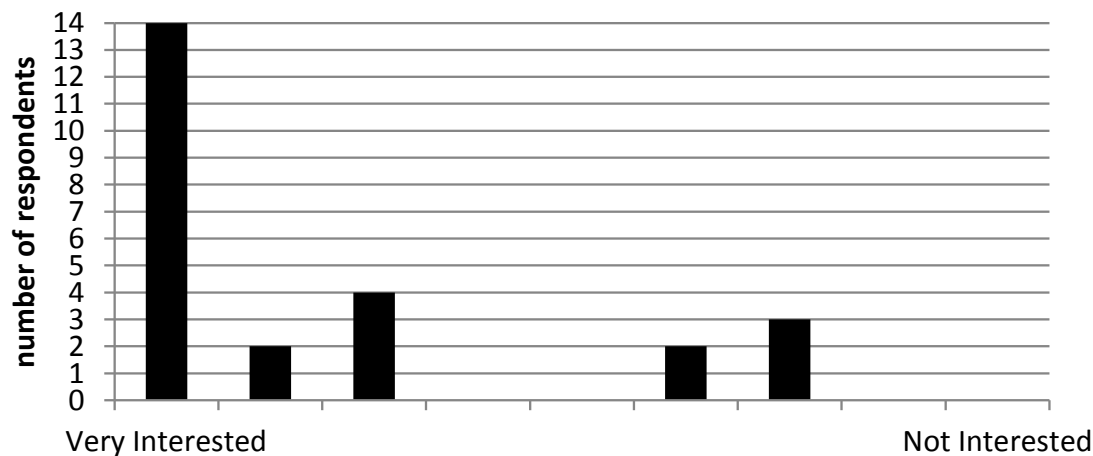


Figure 4: Use of Community-Based Monitoring Data

End user's response to the question, "How interested are you in obtaining access to community-based monitoring data?" Results from this figure are biased because the people most likely to complete the survey are those most interested in using community-based data

4 Task II: Identify Established Long Island Sound Monitoring Groups

4.1 Community-Based Monitoring Group Surveys: Current Monitoring Activities

Fifteen community-based groups in the Long Island Sound area were identified as potentially conducting water quality monitoring activities (see Section 2.4.3, page 9 for method). Of these, only ten were currently conducting water quality programs (Table 2). Community-based groups were defined as those groups which are staffed primarily by volunteers and whose origin can be linked to some community driven effort to address local problems.

In order to expand the number of organizations included in the development of a framework to support monitoring in Long Island Sound, additional types of organizations were included in the survey: labs, educational facilities, middle and high schools, colleges, and universities. To be included in this project, these organizations had to engage in water quality monitoring, in other words, monitoring the same parameter at an appropriate temporal frequency and spatial scale for a number of years in a row. By this definition, research conducted by these organizations is not categorized as monitoring, as most research projects are only conducted for a limited number of years. The State run monitoring programs were also not included in this process, as these programs are funded by New York or Connecticut and supported by the Long Island Sound Study. The surveys of these additional groups was not intended to be comprehensive, we did not attempt to contact all such organizations within the LIS area. Instead, the inclusion of these additional groups is representative of the other types of water quality monitoring occurring in LIS. With the expanded definition of who to include in the development of the framework, forty-seven organizations were contacted (Table 2, Figure 5). Of these, twenty-one were conducting water quality monitoring in saline waters (Table 2, Figure 6).

Generally speaking, monitoring agencies were spread along the Connecticut shoreline with community-based groups concentrated in Eastern Connecticut (Figure 6). All New York groups were concentrated in the Western end of Long Island Sound (Figure 6). Roughly half of the monitoring groups interviewed had been monitoring for 5 years or more with half again as many monitoring for 10 years or more (Figure 7).

While parameters monitored varied by group, almost all groups monitored temperature, salinity, and dissolved oxygen (n=17, Figure 8). Other popular indicators included pH (n=12, Figure 8) and nitrate (n=11, Figure 8). Three of the groups monitored only bacteria (Save the River, Save the Hills; Manhasset Bay Protection Committee; NYC Water Trail Association). All other parameters were monitored by eight or fewer organizations (Figure 8).

The methods used for monitoring various parameters also varied by group. Out of the nine groups monitoring nutrient concentrations in the water column, four of the groups collected water and sent samples to an analytical lab for analysis, the remaining five groups used test kits (e.g. LaMotte, Hatch). Twelve of the seventeen groups monitoring dissolved oxygen utilized a probe (e.g. YSI, HACH, Hanna) while five used a test kit (e.g. LaMotte); two of the groups use both methods and two did not identify their method. Within a group, there was typically a mix of methods involving test kits, hand held *in situ* sampling devices, and samples sent to analytical labs. Use of the test kits for nutrients and dissolved oxygen were generally necessitated by budget constraints. This was especially true for organizations such as CUSH (following the URI Watershed Watch model), where each volunteer has a “sample kit” and an assigned location for monitoring; as many as ten stations may be sampled simultaneously.

The need for funding to support equipment purchases and sample analysis was reflected in response to the survey question asking, “What support could you use moving forward?” This question required a free-form answer, the participants were not provided with a list of possible answers. Of the fifteen respondents to the question, thirteen listed funding and/or equipment as a program need. Two of the groups which currently monitor only bacteria mentioned they would like to expand their programs, if additional funds were available. One group mentioned that consistent funding for monitoring programs is not consistent with the current model of grant competition, a statement that was echoed by many people at the stakeholder meetings. The complaint is that most grant competitions require a research component and typically require the groups to do something new and innovative. This type of requirement does not reflect the importance of consistent long term monitoring of coastal waters. The other comment regarding funding through an RFP model is that deadlines for proposals, start and end

dates of funded projects, and delivery of funds do not align with the typical sampling season. The need for technical support interpreting data was also ranked highly, with four of the fifteen respondents mentioning technical support. Training (n=3), assistance finding analytical labs (n=3) and assistance with communication of results (n=2) were all mentioned by more than one group. Additional comments on program needs included assistance with QAPP development, assistance with developing methods, and assistance with data management. The responses to these questions provided the skeleton on which the framework was built.

Survey participants were provided with a list of potential concerns and asked to rate each as “no concern”, “minor concern”, or “major concern.” The stability and quantity of funding was a major or minor concern for most groups (Figure 9). Availability of equipment was also of concern to many groups. Comments to this series of questions reiterated the need for funding to support equipment purchases and maintenance. Staffing numbers was listed as a major or minor concern by many survey respondents, though some respondents commented that it was not an issue as long as the Town continues to fund staff in support of the monitoring program. Loss of volunteer motivation over time was also noted as an issue for some groups; attrition due to volunteer burn-out was mentioned by two respondents. Perceived credibility of the data was not a concern for just over half of the respondents. One respondent indicated that members of the organization recognize the need for a QAPP by governmental organizations, but indicate they feel “QAPP requirements are onerous.” Other potential problems were generally of no concern or minor concern for almost all respondents (Figure 9).

Original responses to all survey questions are provided in Appendix B.

Table 2: Organizations Contacted

All organizations listed here were contacted to determine if they were sampling in saline waters. A “✓” in the monitoring column indicates the organization is actively involved in water quality monitoring of at least one water body.

COMMUNITY BASED		monitoring	ID
Ash Creek Conservation Association	Bridgeport, CT		
Avalonia Land Conservancy	Old Mystic, CT		
Bronx River Alliance	Bronx, NY		
Citizen's Volunteer Monitoring Program	Westchester County, NY		
Clean Up Sound and Harbors (CUSH)	Stonington, CT	✓	A
Coalition to Save Hempstead Harbor	Sea Cliff, NY	✓	B
Coastal Steward	Port Jefferson, NY		
Eastern Connecticut Conservation District	Norwich, CT	✓	C
Friends of the Bay	Oyster Bay, NY	✓	D
Hempstead Harbor Protection Committee	Sea Cliff, NY	✓	B
Manhasset Bay Protection Committee	Manhasset, NY	✓	F
Niantic River Watershed Committee	Waterford, CT	✓	G
NYC Water Trail Association	Brooklyn, NY	✓	H
Operation SPLASH (Stop Polluting Littering And Save Harbors)	Freeport, NY		
Save the River, Save the Hills	Waterford, CT	✓	I
SE*CRES	Mystic, CT	✓	J

LAB or EDUCATIONAL FACILITY		monitoring	
Bruce Museum	Greenwich, CT	✓	K
Cedar Island Marina Research Lab	Clinton, CT	✓	L
Cornell Cooperative Extension of Suffolk County	Suffolk County, NY		
Group for the East End	Southold & Bridgehampton, NY		
The Harbor Watch Water Quality Monitoring Program of Earthplace	Westport, CT	✓	M
The Maritime Aquarium	Norwalk, CT	✓	N
Marshlands Conservancy	Rye, NY		
Millstone Environmental Lab	Waterford, CT	✓	O
North Shore Land Alliance	Old Westbury, New York		
PROBE, Alley Pond Environmental Center	Little Neck Bay, Douglaston, NY		
Project Oceanology	Groton, CT		
Riverhead Foundation	Riverhead, NY		
Rocking the Boat	Bronx, NY	✓	P
Save the Bay	Westerly, RI	✓	Q
Sheffield Island of Seaport Association	Norwalk, CT		
Sheldrake Environmental Center	Larchmont, NY		
Sierra Club	West Sayville, NY		
South Shore Estuary Reserve	Hauppauge, NY		
Trout Unlimited & Fund for the Environment	Wilton, CT		
HIGH SCHOOL or MIDDLE SCHOOL		monitoring	
Bridgeport Regional Aquaculture Science and Technology Center	Bridgeport, CT	✓	R
Brien McMahon High School	Norwalk, CT		
Fox Lane High School	Bedford, NY		
Marine Science Magnet School	Groton, CT		
Norwalk High School	Norwalk, CT		
Pine Point School	Stonington, CT	✓	S
Rye Country Day School	Rye, NY		
Staples HS	Westport, CT	✓	T
The Sound School	New Haven, CT	✓	U
The Ursuline School	New Rochelle, NY	✓	V
COLLEGE or UNIVERSITY		monitoring	
Connecticut College (Dr. Loomis)	New London, CT		
Southern Connecticut State University (Dr. Breslin)	New Haven, CT	✓	W
U.S. Coast Guard Academy (Dr. Bergondo)	New London, CT		
Yale (Dr. Benoit)	New Haven, CT	✓	X

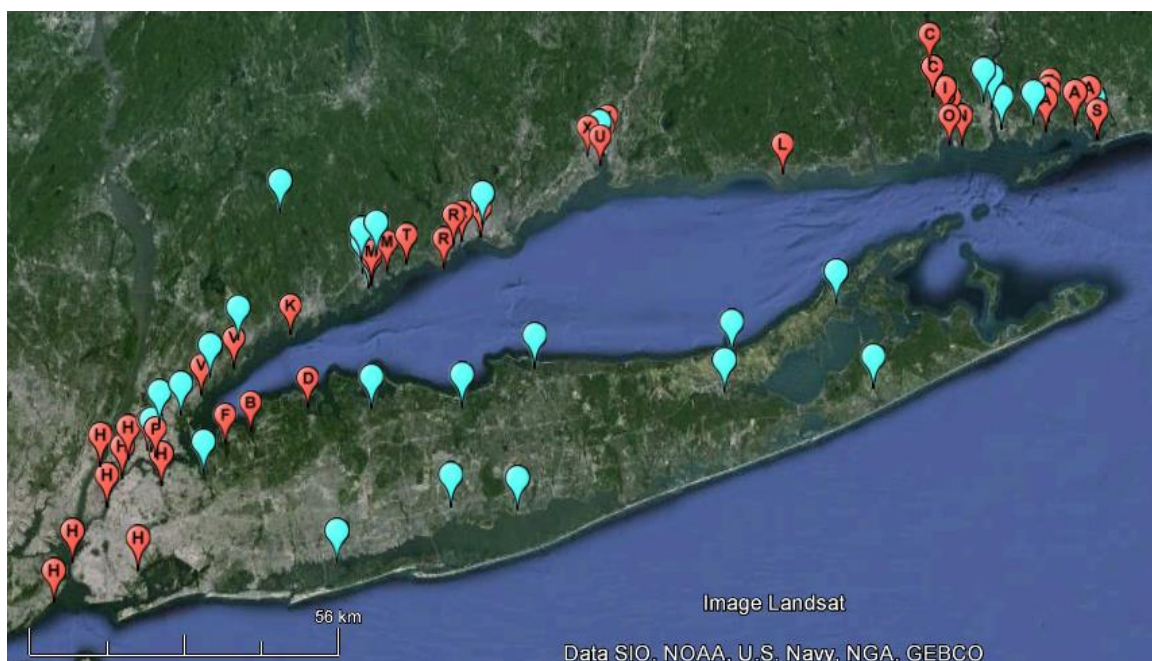


Figure 5: All Monitoring Groups Queried

Red pins indicate the group is currently active. Blue pins indicate the group does not currently engage in monitoring activities. An individual organization may have more than one pin, if they monitor multiple bodies of water. The letters shown in the red pins are assigned one per organization (Table 2).



Figure 6: Groups Currently Conducting Water Quality Monitoring

An individual organization may have more than one pin, if they monitor multiple bodies of water. The letters shown in the red pins are assigned one per organization (Table 2). Red pins included in the yellow polygons are community-based organizations (with the exception of Save the Bay and Millstone Environmental Lab in the CT polygon and Rocking the Boat in the NY polygon). Other flags are labs, educational organizations, or schools (middle, high, college, university).

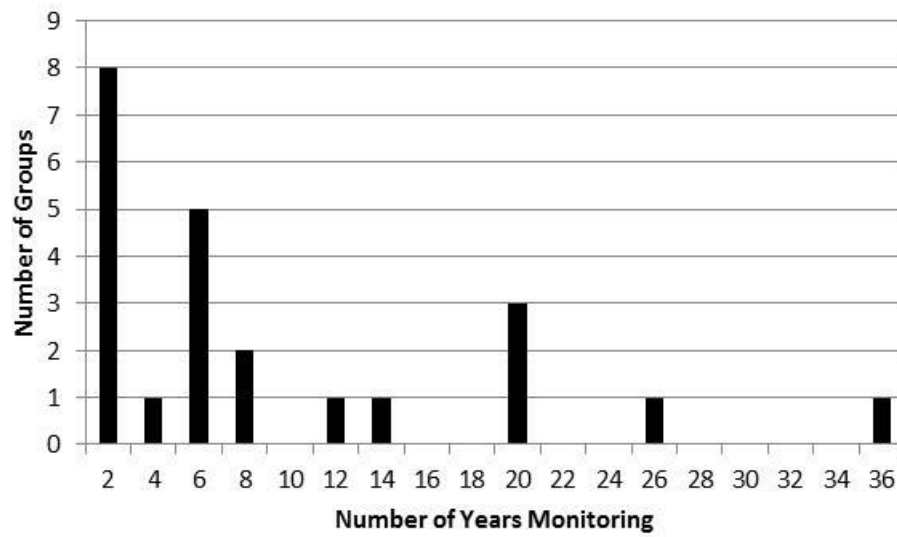


Figure 7: Age of Monitoring Programs

The twenty-one groups with active monitoring programs span in age from 1 year to 35 years. Data are binned in two-year increments.

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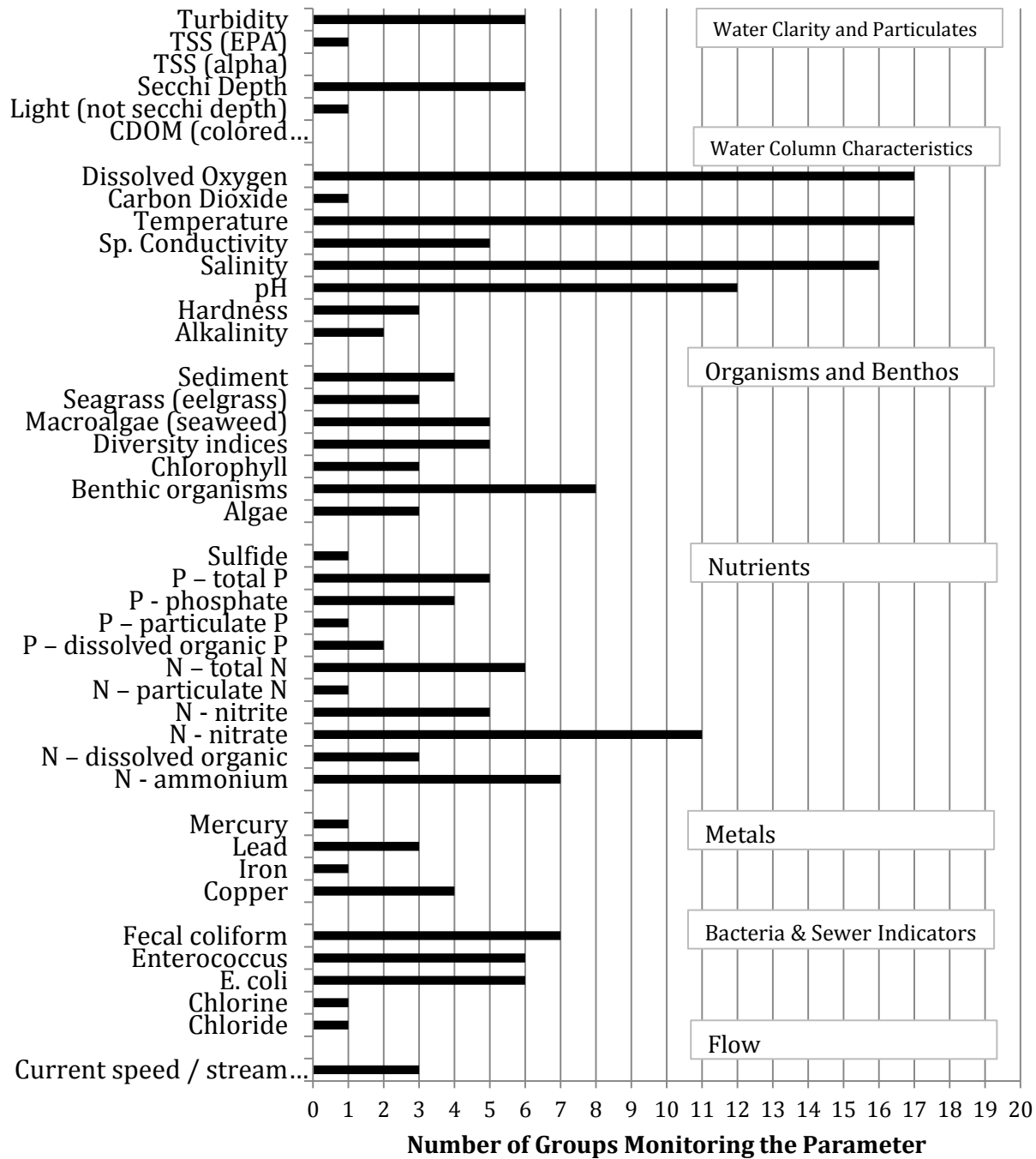


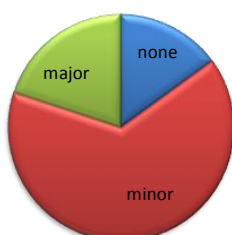
Figure 8: Parameters Monitored by Groups

Only parameters monitored by at least one group are included. Parameters are roughly grouped into categories by type.

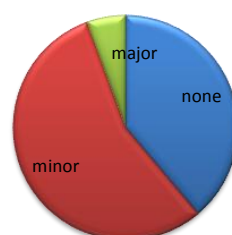
Funding support (e.g. stability, quantity)



Equipment (e.g. type, amount)



Staffing numbers (e.g. too many, few)



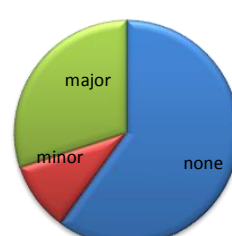
Perceived credibility of data



Community support for monitoring effort



Loss of volunteer motivation over time



Liability



Legal access to monitoring sites



Monitoring expertise

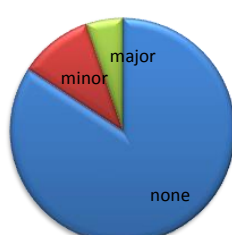


Figure 9: Survey Participant Rankings of Potential Concerns.

Survey participants were asked to rank the potential concerns indicated in the subheadings as a major concern, minor concern, or no concern. Each subheading had between 18 and 20 respondents.

4.2 Community-Based Monitoring Stakeholder Meetings

Three regional stakeholder meetings were held to bring community-monitoring groups together to discuss thoughts and current practices. The meetings were held after a majority of the interviews of these groups had been conducted. The three meetings each included a different population of community-based monitoring organizations. The Western Connecticut meeting was the smallest and included three educational organizations. The New York meeting had representatives from three long-established community-based organizations, a Town representative who supports one of these organizations, and a representative of the Interstate Environmental Commission's Monitoring Program.

The largest meeting was held in Eastern Connecticut and included truly volunteer-based organizations, education organizations, schools and colleges/universities, and private labs. Involving different types of organizations in each meeting was fortuitous, as we received comments from multiple perspectives. The smaller meetings allowed for more input from each individual, while the larger meeting allowed us to break into smaller groups by organization type for focused discussions.

The minutes from these meetings are provided in Appendix C. Comments at these meetings reiterated the sentiments expressed in the interviews and surveys, with greater elaboration and cross-fertilization of ideas. The comments from all three meetings have been summarized by theme. Note that the need for a dedicated staff person or people to support community-based monitoring is mentioned in almost all categories.

SUPPORT

- Resources, especially staffing, are a main challenge. Need a dedicated staff person / people for the LISS program.
- A coordinator should facilitate the communication among groups, training, assistance with QAPP.
- Would like to see a central hub for training – organizations or groups which are willing to provide support in training.
- Some of the educational groups from the Avery Point and Norwalk meetings mentioned that displays interpreting water quality data and highlighting various environmental issues would be a useful tool. Farmingdale community groups said that such displays would also be useful to them – for post offices, libraries, and festivals.
- We would like to have local labs for bacteria sample processing. The holding time for these samples is short and getting samples to the Hartford, CT area is a detriment to sampling.
- While groups mentioned that an umbrella organization which can provide support would be beneficial to their programs, groups want to maintain their autonomy.
- Would be good to have a list of people willing to provide support (QAPP, training, advice, etc.).

QAPP

- Groups would like someone to facilitate going through a revision or writing of a QAPP.
- One of the most useful items in a sample QAPP is clear standard operating procedures (SOPs).
- Be sure to define the roles. For example, who can and cannot be the QA Officer.
- What happens if the QAPP is violated, are the data disqualified? For example, a Person X is QA Officer for an organization. If Person X covers someone and goes out on a data collection trip, are the data disqualified because the QA Officer cannot be directly involved with collecting data?
- D. Harris (Harbor Watch) has paid staff at the lab who run checks on collection techniques; this is very helpful in ensuring the QAPP is followed. This comment started a conversation about how the framework could suggest a similar type of site visit approach for organizations.

DATABASE

- Data display, graphics, data repository, consistency, user-friendly data entry are all important.
- STORET is “unusable.”
- Would like an Excel interface.
- There must be a support person to assist with questions and check data.
- Would be useful to have a workshop on data entry – how to use the common database.

- Creating annual reports is expensive and labor intensive. It would help if groups could compare among systems and through time.
- Using a simple tidal prism approach and the concentration determined from monitoring, calculate the flux of constituents to / from LIS automatically.
- Calculate the tidal stage automatically.
- Kid/teacher friendly
- Easily compare locations
- Standard format
- Place to check if QAPP or non-QAPP collected data

GAPS - FUNDING

- MAJOR gap = funding! Funders are not willing to provide funding over time. When applying for funding, groups have to put a new spin on their efforts every funding cycle – the funders want to see that something new is being conducted. This is artificial for a monitoring program; the goal of a monitoring program is to monitor the same suite of parameters in the same locations over time.
- Also need more funding for equipment and to support staff. This could encourage the sampling of additional locations.
- The timing of funding is also an issue. Due to delays in contracting, money is often delivered after the field season has passed. The funding cycle does not match up with the budget cycle for most towns. Eric Swenson (Hempstead Harbor Protection Committee) provided an example – in January, he develops a budget. The budget is adopted by the municipal members and these municipalities pay their dues in March. In March, he is still not sure of the status of LISFF funds. Ideally, the funding awarded by the LISFF is known before budget development to avoid budget shortfalls.
- Some groups must conduct fund raising efforts to meet their budget shortfalls.
- Community groups really need a pot of money dedicated to monitoring, not having to try something new every 2 years.
- Make programs sustainable: staff to support the program, committed funds for monitoring groups.
- End users indicate they would like to see more quality control (e.g. analytical replicates, field blanks). These cost additional money and funding should be made available to support these analyses.

GAPS – DATA AND TECHNICAL SUPPORT

- The biggest gap is in delivering the data to the community.
- The fact that Sound Health publishes oxygen maps with the embayments shown as blue (= supportive of aquatic life) is misleading at best and detrimental to the efforts of local embayment monitoring groups. These maps imply that the embayments are doing fine, by the color choice. *(Note from Vaudrey – on the CT DEEP hypoxia maps, there is a line that surrounds the study area, but the distinction is not obvious to the casual observer. In addition, the legend shows that anything > 4.8 mg/L will be shown as white, but there is no white on the map, only the background blue.)*
- “Sound Health” comes out every 2 years. Include embayments in this publication.
- Sourcing of pathogens – where are they coming from? This is the next step, so you can investigate the problem.

- Sourcing of N input – helps with educational and outreach programs - helps groups identify where the main focus should be: geese or septic...
- We could use more guidance on data interpretation. Would be nice to have someone at a University look at the group's data to validate or tell them what they are seeing.
- There is a need for technical help and training. We need “top-down” guidance – for example, where and when to sample.

OTHER CHALLENGES

- On Eastern Long Island, there are few defined harbors and bays, so it is hard to develop a proprietary sense of interest within the community. One participant suggests that the State should be out monitoring those areas.
- On a state level, funding for the shellfish program has dwindled – so fewer analyses are conducted.
- For the academic world, the biggest issue is that sampling is often integrated into course work. It is not a part of a formal monitoring program, where samples are taken on a regular and consistent basis.
- From the research perspective, we need to know what data are available; it would be helpful to have a contact who knows which groups are monitoring, where and when. Also that contact could help us connect with end users who could utilize the data.

WHY HAVE GROUPS DISAPPEARED?

- Economic downturn has resulted in people less willing to volunteer their time.
- Now have more double income families – people are not available for volunteer work.
- After 9/11, people became more insular.
- Lack of money to fund activities, including outreach.
- There are smaller groups of people willing to donate.
- We have become a crisis-based society, when water quality is bad, people respond; if good, no need to monitor.
- For some groups, the motivating person has died or moved on, the organization then loses momentum.
- Schools have also changed, as have the students. It is harder to get young people involved with volunteer monitoring. The students have become detached from the skills they need – like using a shovel. However, partnerships can be developed – Locust Valley works with Friends of the Bay, very motivated kids – this is because they have a teacher facilitating the interaction.
- One high school monitored for 25 years, stopped because of liability and funding issues.
- Friends of the Bay have been successful at maintaining their program for a few reasons: most of the volunteers are retirees, this leads to continuity in the volunteer staff within a season and from season to season. Friends of the Bay also has a paid employee supervising the program.

OTHER SUGGESTIONS

- Fifteen years ago, there was a two-day conference for monitoring groups. It included training on techniques and vendors were present to provide workshops on assorted equipment. Would be nice for EPA/LISS to have an open house and exchange information among groups. This should include workshops, discussions, and presentations on interpreting data and what it all means.

- Send CT DEEP interns out to work with monitoring organizations, especially those that are low on volunteers. Along this same line, NJ DEEP uses Americorp Watershed Ambassadors – an intern gets assigned to a specific group.
- Create a network for standardization of equipment and use of calibration standards. Also provides a network of contact for sharing equipment when something goes wrong.

4.3 Community-Based Monitoring Group Surveys: Framework Feedback

Once the surveys of community-groups and end users were complete, data were used to develop recommendations for the framework necessary to support community-based monitoring in Long Island Sound. A second survey was created to better quantify the opinions of participants. Questions focused on support for the process and support required by monitoring groups. Specifics on database development were addressed and monitoring groups were queried about their willingness to sample additional parameters of interest to end users.

Survey respondents were overwhelmingly supportive of the proposed framework, with 74% giving the highest rating of “Very Supportive” (Table 3). A similar trend was seen in response to the question of the importance of staff dedicated to the implementation of the proposed framework (Table 3).

When asked about the types of support that would be of most potential value to community-based monitoring groups, assistance with data interpretation was most highly rated with the lowest response being “supportive” and the majority of people saying “fairly supportive” or “very supportive” (Table 4). Also ranked highly were having access to a liaison who could address monitoring questions and a series of supports revolving around the facilitation of communication among community-based monitoring groups, and between community-based groups and end users. Assistance with fundraising, support with data management, access to equipment, and assistance with finding analytical labs fell in the mid-range of importance. Assistance with developing a QAPP and with volunteer recruitments, while still considered important, were less important than the other types of support.

When asked about the importance of various features important in a database, nearly every characteristic listed received a highly positive score (Table 5). Interestingly, having access to “Ready to Go” reports and charts received the lowest score in this section though there was some indication in the comments section of the survey that there may have been confusion around what was meant by “Ready to Go”.

When asked how willing community-based monitoring groups would be to including specific parameters in their monitoring program, 50% of the groups responded that they would be at least “Willing” to include 12 of the 14 parameters (Table 6). pH, secchi depth, and total suspended solids ranked highest in this group with 75% of respondents indicating they were “Willing” or better. Macrophyte collection using underwater cameras, snorkeling or diving gear were ranked lowest while macrophyte collection using a rake or grab scored near the high end of the range.

Results of this survey clarified the priorities for development of the framework.

Table 3: Framework Survey Results – Support of Framework Development

	N	No Opinion	Do Not Support	Somewhat Supportive	Supportive	Fairly Supportive	Very Supportive	data sparklines: bars show patterns of data for this question
How would you characterize your support for this project intended to coordinate and support Long Island Sound water quality monitoring efforts among all stakeholder groups?	20	0%	0%	0%	15%	10%	75%	
If the decision is made to proceed with the implementation of this project intended to coordinate and support Long Island Sound water quality monitoring efforts among all stakeholder groups, how important do you think it will be for there to be dedicated staff?	20	0%	0%	0%	25%	20%	55%	

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Table 4: Framework Survey Results – Support for Community Monitoring

Responses are sorted with most popular at the top of the list, least popular on the bottom. Sort order was determined from the sum of scores for “Very Supportive” and “Fairly Supportive.”

	N	No Opinion	Do Not Support	Somewhat Supportive	Supportive	Fairly Supportive	Very Supportive	data sparklines: bars show patterns of data for this question
As envisioned, various kinds of support could be made available to your organization as a result of this project. How important do you consider each of the following types of potential supports for your water quality monitoring efforts:								
Assistance with data interpretation	12	0%	0%	0%	17%	50%	33%	
A liaison you could contact with questions related to LIS water quality monitoring	17	0%	0%	18%	12%	41%	29%	
Facilitation of communication between community-based water quality monitoring groups & scientists/managers involved in water quality efforts	17	0%	0%	6%	18%	24%	53%	
Opportunities to network with other community-based monitoring groups	17	0%	0%	6%	24%	41%	29%	
Support with fundraising for your water quality monitoring efforts	16	0%	0%	13%	25%	25%	38%	
Assistance with data management	13	0%	0%	15%	15%	38%	31%	
Opportunities to network with scientists and/or managers focused on LIS water quality issues	17	0%	0%	12%	24%	18%	47%	
Facilitation of communication among community-based water quality monitoring groups	17	0%	0%	12%	24%	35%	29%	
Assistance with finding an analytical lab for sample analyses	12	0%	0%	25%	17%	33%	25%	
Access to water monitoring equipment	13	0%	0%	23%	31%	23%	23%	
Support with marketing your water quality monitoring efforts	14	7%	0%	29%	21%	29%	14%	
Assistance with developing Quality Assurance Project Plans (QAPP)	15	0%	0%	40%	20%	13%	27%	
Assistance with volunteer recruitment	7	0%	0%	57%	14%	14%	14%	

Table 5: Framework Survey Results – Database

Responses are sorted with most popular at the top of the list, least popular on the bottom. Sort order was determined from the sum of scores for “Very Supportive” and “Fairly Supportive.”

	N	No Opinion	Do Not Support	Somewhat Supportive	Supportive	Fairly Supportive	Very Supportive	data sparklines: bars show patterns of data for this question
The final report for this project will include recommendations for a database tool that will be used to coordinate data sharing among all stakeholders interested in Long Island Sound water quality. Please indicate how important you think it is that each of the following be included as part of the proposed database effort:								
Ability to make data comparisons across different timeframes	17	0%	0%	6%	6%	29%	59%	
Ability to upload & access your organization's water quality data	17	0%	6%	0%	12%	24%	59%	
Ability to search and download data in a variety of formats	17	0%	0%	6%	12%	24%	59%	
Ability to make data comparisons among different geographic regions	17	0%	6%	0%	12%	18%	65%	
Requirements for data standardization (i.e. units) across all database users	17	0%	0%	12%	12%	29%	47%	
A directory of references for relevant literature (e.g. newsletters, scientific papers) focused on LIS water quality & monitoring	17	0%	0%	6%	24%	53%	18%	
A directory of LIS water quality monitoring groups	17	0%	0%	6%	29%	35%	29%	
Access to real-time & archived information on tides and weather	17	0%	0%	12%	29%	35%	24%	
“Ready to Go” reports and charts for high interest water quality measures [please specify below]	16	13%	0%	19%	13%	25%	31%	
Ability to access data according to whether data was collected using a quality assurance project plan (QAPP)?	17	0%	6%	12%	41%	29%	12%	

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Table 6: Framework Survey Results – Parameters

Responses are sorted with most popular at the top of the list, least popular on the bottom. Sort order was determined from the sum of scores for “Willing,” “Fairly Willing,” and “Very Willing.”

	N	No Opinion	Not Willing	Slightly Willing	Willing	Fairly Willing	Very Willing	data sparklines: bars show patterns of data for this question
Scientists and managers working on the Long Island Sound have identified a number of parameters of interest to them which are not routinely monitored by community-based groups. A short description of these parameters and associated sampling efforts is below. Please indicate your willingness to include the following parameters in your program's monitoring efforts [assume access to equipment and training]:								
pH (collect water sample, read immediately with a wand type pH meter)	17	6%	0%	0%	0%	12%	82%	
Secchi Depth (dipping a secchi disc into the water, noting depth of disappearance)	17	12%	0%	12%	6%	0%	71%	
Total Suspended Solids (collect a water sample, deliver to analytical lab)	17	12%	0%	12%	29%	12%	35%	
Bacteria (collect a water sample, deliver to analytical lab)	17	6%	12%	12%	12%	6%	53%	
Phytoplankton (collect water sample, filter within 3 hours, freeze filter pad until delivery to analytical lab)	17	12%	12%	6%	18%	18%	35%	
Diversity indices using fish seine net pulls	17	24%	12%	12%	6%	12%	35%	
Macrophyte collection (e.g. macroalgae, eelgrass) with a rake or grab	17	18%	12%	12%	24%	6%	29%	
Diversity indices using grabs of bottom sediment with in-house organism identification or by sending to analytical lab	17	18%	24%	12%	6%	0%	41%	
Diversity indices using plankton net tows with in-house organism identification via microscope or by sending to analytical lab	17	18%	24%	12%	18%	6%	24%	
Diversity indices using underwater cameras	17	18%	18%	18%	18%	12%	18%	
Diversity indices using stream invertebrate surveys	17	18%	29%	6%	18%	18%	12%	
Diversity indices using bird watch counts	17	29%	6%	18%	18%	6%	24%	
Macrophyte collection using underwater cameras	17	18%	18%	18%	24%	12%	12%	
Macrophyte collection via snorkeling or diving for transect counts / collection	17	29%	35%	12%	6%	12%	6%	

5 Task III: Framework Development

5.1 Review of Other Programs

In preparation for the regional stakeholder meetings held in December 2012, we researched several other frameworks currently being implemented in estuarine and marine systems in attempt to find effective models with substantial potential to guide development of a Long Island Sound framework. Model frameworks were chosen based on their structure and data collection (i.e. in the context of the goals of the current project), demonstrated financial sustainability, and perceived program quality (derived from annual reports and other publications). Framework case studies were presented at stakeholder meetings as a way to start building buy-in, and to provide examples of best practices. These case studies are briefly presented below.

Buzzards Bay Coalition

(<http://www.savebuzzardsbay.org/Homepage>)

Mission

“The Buzzards Bay Coalition is a membership-supported non-profit organization dedicated to the restoration, protection and sustainable use and enjoyment of our irreplaceable Bay and its watershed. The Bay Coalition works to improve the health of the Bay ecosystem for all through education, conservation, research and advocacy.”

Funding

Revenues for the Buzzards Bay Coalition’s 2012 fiscal year² totaled \$4,907,416 broken down as follows:

- 47% Donations
- 38% Government Grants
- 6% Memberships
- 5% Investments & Other Income
- 4% Events

Leadership

President/Buzzards Baykeeper; Vice-President, Watershed Protection; Director of Membership and Events; Administrative Assistant/Volunteer Coordinator; Vice-President, Operations; Senior Educator; Director of Land Protection; Development Assistant; Land Protection & Stewardship; Director of Finance; Vice-President, Education and Public Engagement; Bookkeeper; Science Director; Senior Attorney; Communications and Outreach Manager; Restoration Ecologist; Director of Monitoring Programs

Details

The Buzzards Bay Coalition maintains a rigorous volunteer program, the Baywatchers, that conducts the majority of their monitoring efforts in all major embayments. Volunteers are trained prior to monitoring, and the program has the *“dual benefit of accomplishing comprehensive water quality monitoring while empowering citizens to become educated and passionate Bay guardians.”* Baywatchers volunteers measure the following parameters once a week from May to September: dissolved oxygen,

² Derived from the Buzzards Bay Coalition’s 2012 Annual Report at <https://www.savebuzzardsbay.org/document.doc?id=772>

temperature, salinity, water clarity. Approximately four times between July and August, additional water samples are collected and sent to a laboratory to be analyzed for nitrogen, phosphorus, carbon / nitrogen ratios, chlorophyll *a* and phaeophytin. All data collection and analysis is conducted in accordance with U.S. EPA and state-approved QAPPs. Roughly 4% of the Coalition's budget, or \$185,000, is devoted to running the Baywatchers program³ (~57% labor (1 full-time staff, 1 part-time summer assistant), 32% lab fees, 11% supplies/travel). The Buzzards Bay Coalition also runs two learning centers that host a variety of school, group and family programs.

Morro Bay National Estuary Program Volunteer Monitoring Program

(<http://www.mbnep.org/>)

Mission

The Morro Bay National Estuary Program brings citizens, local government, non-profit organizations, agencies, and landowners together through collaboration and partnership to protect and restore the Morro Bay Estuary. The Estuary Program is a local, non-profit organization, not a government agency, and thus has no regulatory authority. Instead, the program makes progress by fostering collaboration at a watershed-level. This approach has proved to be both efficient and effective.

Funding

As one of 28 national estuary programs, The Morro Bay National Estuary Program receives an annual grant from the U.S. Environmental Protection Agency (EPA; \$600K) which they are expected to match 1:1. A substantial amount of their work is accomplished through donated services, including access to bacteria and sediment analysis labs (city sewage treatment lab, and local community college lab, respectively; see http://www.mbnep.org/Library/Files/2012_AnnualReport.pdf for complete breakdown of FY 2012 donated services). Though they currently have a 3-year grant supporting three-quarters of their monitoring efforts, they are looking into implementation of a membership model (similar to that of the Buzzard Bay Coalition) as a source of sustainable funding. A breakdown of expense distribution and income sources for the Morro Bay National Estuary Program 2012 fiscal year can be found here: http://www.mbnep.org/Library/Files/2012_AnnualReport.pdf (pg 10).

Leadership

Executive Director; Assistant Director; Watershed Restoration Coordinator; Monitoring Program Manager; Office Manager; Monitoring Coordinator; Communications & Development Coordinator.

Details

The Morro Bay National Estuary Program hosts an innovative collection of ongoing and seasonal volunteer opportunities, including Creek Samplers (monthly creek monitoring; dissolved oxygen, pH, temperature, turbidity, conductivity, nitrates, phosphates, flow), Bacteria Monitors (samples collected by volunteers and sent to a lab for analysis), Dawn Patrol (early morning kayak trips to collect dissolved oxygen, salinity and

³ Pers. comm. (September 2013) Rachel Jakuba, Science Director, who spends 25% of her time providing program oversight. The labor budget reflects her time.

temperature data), Plankton Pullers (sampling from shore-based sites; counts conducted with microscopes; data mailed to Department of Public Health for toxic algae bloom monitoring), Bioassessment (stream assessments looking at habitat quality and macroinvertebrates), and Marine Vegetation Surveys (e.g. eel grass, algae; fall and winter surveys done from shore, boat or kayak). Training is provided by estuary program staff, and volunteers are asked to commit to 3-6 month stints. Though volunteers conduct a vast majority of the monitoring, related activities are also supported by 1.75 FTE who manage monitoring efforts and volunteers, ensure data quality, and conduct technical and/or hazardous monitoring not appropriate for volunteers. Publicly available comprehensive data reports are generated on an annual basis summarizing all monitoring efforts.

5.2 Synopsis of Community Group Comments

The responses to the survey and verbal comments during the stakeholder meetings focused on a few primary points:

- Stability of funding and funding dedicated to monitoring (i.e. RFPs that do not include a research component).
- Access to funding for equipment purchases and greater access to equipment loan programs.
- Need for technical assistance for QAPP development and data analysis.
- Greater access to analytical laboratory facilities. This refers to both the availability of funds to support analysis and an increase in local labs certified by the State for bacterial analysis (the time constraints between collection and delivery to the analytical lab make this parameter difficult when labs are not local).
- Assistance in the form of a centralized database with flexible reporting features.

Secondary issues included:

- A need for assistance with communication of data.
- Suggestions or assistance with volunteer recruitment and sustainability.

Based on comments made during the surveys and stakeholder meetings, respondents were willing to sample additional parameters at the suggestion of end users. However, it was mentioned that volunteer participation is greatly reduced and there are safety concerns during colder months.

5.3 Synopsis of End User Comments

Among the end user respondents to the survey, there was a general feeling of support for the expansion of community-based monitoring; however, this result is biased by the fact that the people most likely to respond to the survey are already interested in community-based data. The remaining results should thus be taken as representative of the opinions of people who already recognize the utility of community-based data, and not the opinions of the larger community of data end users.

A few broad conclusions can be drawn from the results presented in Section 3 (page 11):

- There exist a number of additional parameters that the end user community would like to see.
- Expansion of community-based monitoring to additional areas of interest should be encouraged.
- Sampling should occur May through October, while colder months are desired but not critical.
- When developing a monitoring program, community-based groups should confer with an expert to determine the temporal and spatial frequency of sampling.

- A need exists for a network of experts willing to work with community-based monitoring groups.
- A LISS representative (or a person funded by another entity) could assist with training, general questions, data management, data quality assurance, and as a link between the community-based groups and end users. This person or people could also facilitate the establishment of monitoring programs in new areas.
- A centralized database in a standardized format is essential to a cohesive network of community-based monitoring in Long Island Sound. The database should include some built-in reporting features as well as the ability for end users to download the data.
- An EPA approved QAPP would be ideal, but appropriate quality assurance procedures are acceptable.
- The end users would like to see standard operating procedures and QA/QC reports accompanying any data, regardless of the presence or absence of a QAPP.

5.4 Suggested Priorities

Taken in summary, there is tremendous enthusiasm for the proposed project from the community-based groups and end users. Though there was a small amount of skeptical feedback from the individual community-based organization interviews and regional meetings, this came primarily from people who reported to have been part of similar efforts in the past that had failed. Particularly in the regional meetings, it was clear that the community-based stakeholders want the development of a coordinated, community-based LIS embayment water quality monitoring program to move forward and are willing to help support its success.

The ultimate goal centers on a coordinated approach to connecting the work – and data – of community-based water quality monitoring groups to end users. In order for this effort to be successful, resources will need to be funneled to soliciting and maintaining the buy-in of community-based groups. Though the incentive for end user participation is intrinsic, participation by community-based groups will be in no small part extrinsic to the primary goal and require a substantial degree of facilitation and incentivization. As one stakeholder put it, significant effort needs to go toward maintaining participation and buy-in among community-based groups and may be a reason why prior similar efforts failed.

The key features of a support network identified by community-based groups and end users were:

- Financial support dedicated to the continuation and expansion of current monitoring programs.
- Financial support dedicated to the development of new monitoring programs.
- Communication between community-based monitoring programs and experts to ensure the monitoring program methods are adequate to achieve the program goal.
- Communication between community-based monitoring programs and data end users to ensure the parameters collected, location, and temporal frequency are sufficient to meet the need of the monitoring program goals and provide other data end users with useful information.
- Adequate quality assurance procedures. This feature requires funding to assist with analyses and equipment purchases, assistance with standard operating procedures and QAPP development, and a centralized database that includes a method for tracking quality assurance procedures.
- A centralized database that is easy to use when entering data (something compatible with the way groups format data in Excel), and provides reporting features and the capability to download the data.

- While existing groups generally indicated they are content with their current training procedures, new groups will require initial training and guidance in the development of the monitoring program.

To implement these key features into a support network for community-based monitoring, we suggest the following priorities:

- Provide dedicated financial support for monitoring programs.
- Establish the position(s) of *LIS Community-Based Monitoring Coordinator(s)*.
- Develop a centralized database.
- Increase communications among all Long Island Sound stakeholders.
- Provide technical support for monitoring programs.

Each of these priorities is discussed in detail in the following sections.

5.4.1 *Provide financial support for monitoring programs.*

Program funding consistently arose as a priority issue in interviews, meetings and surveys; with substantial feedback focused around the need for funds devoted to community-based water quality monitoring efforts. Stakeholders desire funds, specifically, for lab analyses, equipment and staffing. Additionally, funding streams were requested that coincided with the field season, and that were tied to the long-term sustainability of monitoring efforts, as opposed to short term grants requiring program growth or innovation. Access to funds could be incentivized through requirements tied to data quality, data sharing, and network participation.

One suggestion is to establish a Long Island Sound-specific equipment loan program, similar in content to EPA's Equipment Loan Program for Volunteer Water Monitoring. Alternatively, a separate funding program could be established to help with the purchase and maintenance of equipment.

5.4.2 *Establish the position of LIS Community-Based Monitoring Coordinator.*

First and foremost, dedicated staff in the form of one or more *LIS Community-Based Monitoring Coordinators* will be critically necessary to the success of implementing the proposed framework. Note that the suggested position title does not include the word "volunteer." Monitoring activities in Long Island Sound are conducted by a variety of groups including volunteer based groups, local governments, educational organizations, private labs, and schools. Establishing an office in support of only volunteer based monitoring will exclude more than half of the organizations currently active in Long Island Sound.

Specifically, the Monitoring Coordinator will be needed to help with coordination of the other framework components identified as high priority by community-based stakeholders. It is important that these framework components be considered as incentives to solicit participation by community-based monitoring groups, which will be absolutely critical to the goal of connecting community-derived water quality data to the end user community. Stated differently, this project will live or die by the degree to which community-monitoring groups are engaged. Specifically, the top ranked desired types of support identified by community-based groups include:

- Assistance with data interpretation;
- Opportunities to network with other community-based monitoring groups;
- Facilitation of communication between community-based water quality monitoring groups & scientists/managers involved in water quality efforts;
- Opportunities to network with scientists and/or managers focused on LIS water quality issues;

- Facilitation of communication among community-based water quality monitoring groups. One suggestion is an online chat group like the Phase II list server run by Eileen Keenan (NYS DEC).
- A liaison that could be contacted with questions related to LIS water quality monitoring;
- Support with fundraising for water quality monitoring efforts.

The Monitoring Coordinator could help accomplish the above by coordinating regularly scheduled meetings (e.g. quarterly, regional), events (e.g. lectures, summit) and/or trainings (e.g. equipment use, QAPP, database use) that bring community-based monitoring groups together with each other and with the end user community. This could facilitate the sharing of resources, including equipment and best practices. The Monitoring Coordinator could also assist with data management (e.g. database support), collection (e.g. help connect community groups to labs) and interpretation (e.g. via the database, or by connecting community groups with end users).

Other suggestions from interviews, meetings and surveys for roles a Monitoring Coordinator could play, include public relations (e.g. newsletters, reports), coordinating with inland monitoring agencies to assist with related monitoring efforts (e.g. point and non-point source pollution), liaising with other local/state/regional/federal entities engaged in similar work, coordinate volunteer sharing between community-based sites, assist with the revival of prior monitoring efforts, and conduct quality control site visits to community-based groups.

The Monitoring Coordinator should also take the lead in developing a Monitoring Guide. Examples of such guides are available from the Buzzards Bay Coalition (<http://www.savebuzzardsbay.org/>) and the URI Watershed Watch (<http://www.uri.edu/ce/wq/ww/Manuals.htm>).

The success of the suggested framework hinges on a person or small group of people taking on the role of coordinating activities and acting as a resource for community groups and data end users. One of the community group members reviewing this framework indicated, “I find it impossible to believe that a single person could do a good job on all these fronts. Perhaps one for each sub-region? Or a head plus support staff? Establishing this position without sufficient manpower to do the job could adversely affect morale and staying power by the monitoring groups.” The need for staff with at least a portion of their effort dedicated to supporting community-based monitoring is reflected by the number of staff involved with the Buzzards Bay and Morro Bay programs (see Section 5.2, page 37).

5.4.3 *Develop a centralized database.*

The database constitutes a critical piece of the proposed framework. Though the database priorities that emerged from the interviews, meetings, and framework survey are both basic and intuitive, we heard feedback from a small but vocal minority that had bad experiences using the STORET system. More than one participant received training on using STORET, tried using the database, and determined that, “the value was in no way commensurate with the effort and frustration involved.” Not only will it be important that the database input and output interfaces be developed with a focus on ease of use, it is suggested that specific attention is paid – at least on the reporting side – to public accessibility and, specifically, K-12 students and teachers, given the tremendous academic potential this resource will hold.

Survey respondents specifically identified the following as important components of any framework database:

- Ability to upload & access each organization's water quality data.
- Ability to search and download data in a variety of formats.
- Ability to make data comparisons among different geographic regions.

- Ability to make data comparisons across different timeframes.
- Inclusion of quality assurance information associated with all data.
- A directory of LIS water quality monitoring groups.
- A directory of references for relevant literature focused on LIS water quality & monitoring;
- Automatic calculation of percent saturation for dissolved oxygen from temperature, salinity, and oxygen concentration (mg/L).
- Automatic inclusion of time of high and low tides as well as time of sampling expressed as time after low or high tide (the database would query an online program to get this information, without any effort from the user).
- Automatic inclusion of average wind direction, average wind speed, and total rainfall for the previous 2 days and the previous 7 days (the database would query an online program to get this information, without any effort from the user).

Feedback from community-based monitoring groups made it clear that motivation to participate in the proposed framework was in part derived from the potential that data generated at the local level would contribute to the larger body of knowledge and inform management actions. A database not only provides an easy way to build these bridges, but also represents a way to greatly extend the reach beyond the scope of this project into schools and the public domain (e.g. museums, libraries). That said, database accessibility in the form of easy data upload and reporting will be key to accomplishing all related goals.

5.4.4 Increase communications among all LIS stakeholders.

During the community group stakeholder meetings, a recurring theme was the need for improved communication among monitoring groups, management, academia, the general public, and other potential data end users. As indicated in the discussion above (Section 5.4.1, page 39), a Monitoring Coordinator could facilitate communications among all parties.

The Monitoring Coordinator could organize biennial or annual meetings to bring together community-based monitoring groups and data end users. The goal would be to share results and identify additional areas of concern. This meeting should be a combination of community-based results presentations, presentations by scientists, presentations by managers, and workshops on topics of interest. A few members of established monitoring programs reminisced about a conference held ~15 years ago for community monitoring groups in the LIS area.

As with most programs, a website would facilitate communication among people interested in monitoring activities and provide a venue for exchange of information and a central location for resource material. The website could also include updates from organizations and highlights of ongoing efforts.

One comment that came out of the group meetings was the possibility of a communication which includes information from multiple groups. One possibility is to include nearshore work in the LISS's *Sound Health* publication.

5.4.5 Provide technical support for monitoring programs.

One issue identified by the community-based monitoring groups was the need for technical support. This support was requested in all aspects of establishing a monitoring program, from development of a sampling plan to interpretation of the data. While most active groups indicated they did not need assistance with training, they did recognize that programs would need assistance when they were new or when they added a new parameter. The history of the active monitoring programs indicate they had

assistance in establishing their protocols, but assistance came from a variety of sources as each group was required to go out and find their own expert.

The proposed program will need to include a Monitoring Coordinator who can act as a liaison between community-based groups, experts, and end users. The coordinator should develop a network of people willing to act as advisors to community-based monitoring groups and facilitate the introduction of community-based groups to experts in their local area.

The Monitoring Coordinator can also prioritize monitoring efforts based on end-user needs and community group capacity, including providing the necessary support and training for community-based groups interested in expanding their efforts. Perhaps some of the most compelling survey results came from the section asking for community-based monitoring groups' willingness to collect parameters on behalf of end users. Most monitoring groups surveyed are willing to collect data for the vast majority of the parameters listed (12 of 14). The key is to facilitate the communication of end users needs to the monitoring groups.

Ready access to regional laboratories for certain types of analyses (e.g. bacteria) was also identified as desired by community-based groups. Other model frameworks have handled similar issues in a variety of ways, including developing protocols and training for volunteers who transport samples to labs, sometimes even assisting with analyses and the management / dissemination of data. All of this information, including information on sources for equipment and analytical services, could be communicated through the website.

The Monitoring Coordinator is critical to providing technical support to the community-monitoring groups. The coordinator can provide support personally, but more importantly, can also link monitoring groups with experts in the appropriate fields who are willing to assist.

5.5 Suggested Framework

The suggested framework is a compilation of community group interests and end user requests. Established large-scale monitoring programs were also referenced.

5.5.1 Parameter Recommendations

The types of monitoring currently occurring in Long Island Sound can roughly be divided into bacterial monitoring and water quality monitoring. Some groups do both and some do only one. In addition, some groups have expanded their monitoring program to include various diversity indices. The suggested parameters for diversity indices will not be listed here, as they vary greatly with the index, though the "required parameters" from the water quality list will also be required for diversity indices and flora / fauna sampling. For bacterial sampling and water quality sampling, a list of required parameters is included, followed by a list of suggested parameters. The required parameters reflect the parameters included in established monitoring programs (e.g. Buzzard's Bay Coalition's Baywatchers Program, URI Watershed Watch) as well as the priorities of data end users and community groups.

BACTERIAL MONITORING PROGRAMS

Required Parameters (**bold** = sample collected by group)

appropriate **bacteria sample**, sent to lab for analysis (see EPA guidance for type to sample, based on desired goal: <http://water.epa.gov/type/rs1/monitoring/vms511.cfm>)

GPS coordinates (may obtain from a mapping program at a later time)

depth of sample

total water depth

precipitation in the last 24 hours

tidal stage (ebb / flood) or degree of stream flow for channelized flows (stagnant, running, etc.)

time of nearest low tide

Suggested Parameters (**bold** = sample collected by group)

water clarity (secchi disk depth or secchi disk tube depth)

temperature

salinity

daily precipitation for the past week (may obtain from local weather station)

stream flow (for channelized waters, e.g. streams)

wind speed (Beaufort Scale or anemometer)

wind direction

visual observations of the station (birds, animals, pipes, etc.)

WATER QUALITY MONITORING PROGRAMS

Required Parameters (**bold** = sample collected by group)

temperature

salinity

dissolved oxygen

water clarity (secchi disk depth or secchi disk tube depth)

GPS coordinates (may obtain from a mapping program at a later time)

depth of sample

total water depth

precipitation in the last 24 hours

tidal stage (ebb / flood) or degree of stream flow for channelized flows (stagnant, running, etc.)

time of nearest low tide

Suggested Parameters (**bold** = sample collected by group)

Highly ranked as important to monitor:

pH – this parameter is highly desired by end users, it should be measured on site

bacteria

nutrients – end users would like samples sent to analytical labs

Total Nitrogen & Total Phosphorus are of highest priority.

Inorganic N species (NH_4^+ , NO_3^- , NO_2^-) ranked second in priority.

Organic N, Organic P, & Inorganic P ranked third for priority.

Total Suspended Solids (gravimetric: filter water, weigh particles retained)

Turbidity (instrument based, nephelometric turbidity units)

Chlorophyll (filtered from water sample, analyzed by lab)

Lower ranked as important to monitor (higher ranked listed first):

Seagrass

Diversity Indices

Benthic Invertebrates

Macroalgae

Sediment Grain Size

Sediment Organic Content

Metals (mercury, lead, iron, copper)

Chloride

Chlorine

Alkalinity

Additional parameters important to monitor:

daily precipitation for the past week (may obtain from local weather station)

stream flow (for channelized waters, e.g. streams)

wind speed (Beaufort Scale or anemometer)

wind direction

visual observations of the station (birds, animals, pipes, etc.)

5.5.2 Field Recommendations

NUMBER OF SAMPLES

Responses from the community monitoring groups and end users indicated that the number of samples taken will vary with parameter. This issue is more fully addressed in the sample QAPP, which provides specific information on the number of samples required by parameter. In general, replicate field samples at 5% of the stations are required, as are field blanks for some methods. One profile is typically considered sufficient for the basic water quality parameters (temperature, salinity, dissolved oxygen, pH, water clarity). These field methods should be detailed as part of the next phase of this project, through the writing of a Monitoring Guide. Examples of such guides are available from the Buzzards Bay Coalition (<http://www.savebuzzardsbay.org/document.doc>) and the URI Watershed Watch (<http://www.uri.edu/ce/wq/ww/Manuals.htm>).

FREQUENCY OF SAMPLING

At a minimum, water quality sampling should occur May through October. This time frame is consistent with other monitoring program guidance. Additional sampling trips in March and April are also of interest to data end users. Cold weather sampling may also be needed to address certain questions, this should be determined through consultation with an expert.

The frequency of sampling should be determined through consultation with an expert to ensure the frequency will be sufficient to meet the goals of the monitoring program. A typical sampling frequency is once every two weeks for temperature, salinity, dissolved oxygen, pH, water clarity (secchi disk depth), and chlorophyll. Monthly water sample collection where samples are sent out for analysis (nutrients, total suspended solids, turbidity, chlorophyll, alkalinity) is common, though many end users see the benefit of sampling every two weeks. Metals and flora/fauna sampling schedules should be determined from consultation with an expert.

SELECTION OF SAMPLING LOCATIONS

The selection of sampling locations will ultimately be determined by the goals of the monitoring program. A general guideline is that locations should span the gradient of interest. This typically means moving from a freshwater influenced location on the inland edge of an embayment or harbor out to a station which is representative of the main stem of Long Island Sound. If the system has multiple freshwater inputs, sampling locations should capture the potential effect of each inflow. Consideration should also be given to areas of high flow versus low flow or stagnant areas. Ideally, some stations will be located in deeper areas of the system, as well as the shallower nearshore areas, though access to deeper sites may not be possible for some groups who operate without boat support. Canoes or other paddle boats may be one option for reaching deeper locations.

If the goal is to sample a potential point source, sampling should occur upstream and downstream of the source. When sampling such potential sources, close attention must be paid to tidal stage, as an incoming tide is likely to exhibit different spatial patterns relative to an outgoing tide. A quick way to check the direction of flow is to release a passive drifter, such as an apple or orange (we suggest fruit because they are buoyant enough to float but dense enough to be almost fully submerged, and fruit is biodegradable in the event it cannot be retrieved).

The EPA provides guidance on determining the location and number of stations in a system. The suggested EPA methods provide a distribution which is statistically sound; in other words, by following the EPA suggested methods for determining station location, the distribution of stations will not be biased. An issue for many monitoring programs is access to the water. Consultation with an expert can help determine the appropriate scheme for choosing station locations. Guidance on establishing monitoring goals and methods can be found in *Volunteer Estuary Monitoring. A Methods Manual. 2nd Edition. US EPA and Ocean Conservancy* (<http://water.epa.gov/type/rsl/monitoring/index.cfm>), or use the internet search terms “EPA volunteer monitoring”). More advanced EPA support documents can be found by searching for “EPA Systematic Planning” or at <http://www.epa.gov/QUALITY/dqos.html>.

5.5.3 Equipment Recommendations

BEST TECHNOLOGIES

The equipment employed depends in large part on the structure of the organization and the funds available. A monitoring group with one or two field teams may be able to purchase more advanced and expensive sampling equipment. However, groups who have many small teams of volunteers independently monitoring one or two sites (e.g. CUSH has around 11 teams) cannot afford to equip each team with a multiparameter meter. Table 7 lists suggestions for each parameter, with the most desirable appearing first. The order of desirability of equipment is based solely on data end user preferences. All options listed are acceptable. If a parameter from section 5.5.1 is not listed, then that parameter is determined from a water sample sent out to an analytical lab.

Table 7: Suggested Equipment

Suggested equipment are listed in order of preference. All options listed are acceptable. Cost of samples sent to analytical labs are not included as these prices vary by lab.

PARAMETER	EQUIPMENT	APPROXIMATE COST
temperature	multiparameter handheld instrument*	\$1,500 to \$6,000 (includes probes for multiple parameters)
	thermometer	\$15 (no certification) to \$40 (certification for calibration)
	Onset HOBO deployable temperature sensors (not for single readings, these are deployed and sample at a set interval such as once every 15 minutes)	\$42 to \$123 per sensor (multiple types available) + \$167 to \$218 for communication
salinity	multiparameter handheld instrument*	\$1,500 to \$6,000 (includes probes for multiple parameters); \$45 / L for salinity standard
	digital handheld refractometer unit (e.g. Sper Scientific Pocket Digital Refractometers, Mettler Toledo Refracto 30PX Portable Refractometer)	\$500 to \$2,800; \$45 / L for salinity standard
	refractometer	\$160 to \$200; \$45 / L for salinity standard
	hydrometer	\$55 (no certification), \$300-\$350 (3-point calibration certification); \$45 / L for salinity standard
dissolved oxygen	multiparameter handheld instrument*	\$1,500 to \$6,000 (includes probes for multiple parameters) + \$50 per membrane replacement kit (6 – 10 membranes)
	single parameter handheld instrument	\$600 to \$2,000
	LaMotte SMART 3 Colorimeter Water Quality Analyzer (reagent available for nitrate, ammonia, phosphate, silica, chlorine, dissolved oxygen, pH, sulfate, iron, copper)	\$1,044 for colorimeter, reagents are \$0.50 to \$1 per sample
	titration kit**	\$55 to \$114 for initial kit, \$15 to \$20 for potassium iodate standard (required for EPA approved method), \$0.18 per sample for reagents

PARAMETER	EQUIPMENT	APPROXIMATE COST
pH	multiparameter handheld instrument*	\$1,500 to \$6,000 (includes multiple probes) + \$2 to \$6 per sample day for calibration solution
	LaMotte SMART 3 Colorimeter Water Quality Analyzer (reagent available for nitrate, ammonia, phosphate, silica, chlorine, dissolved oxygen, pH, sulfate, iron, copper)	\$1,044 for colorimeter, reagents are \$0.50 to \$1 per sample
	handheld meter (e.g. Oakton Waterproof Big Display pHTestr 20, Mettler Toledo SevenGo pH Portable Meter)	\$140 to \$790 (units also come as pH, temperature, oxygen meters) + \$2 to \$6 per sample day for calibration solution
	water sample, sent to analytical lab; not recommended unless delivered immediately to lab	
secchi disk depth	secchi disk or secchi tube (for very shallow waters, < 0.5 m)	\$60 to \$75
GPS coordinates	GPS unit	\$200 to \$800, depending on features
depth	marked line	\$10 to \$50
	depth sounder	\$70 to \$1000
turbidity	water sample, send to analytical lab	
	turbidity meter (e.g. LaMotte 2020we and 2020wi Turbidity Meters, OAKTON Turbidimeter)	\$1000 to \$2000 + \$100 for standard (good for multiple sampling trips)
total suspended solids	water sample, send to analytical lab	
nutrients	water sample, send to analytical lab	
	LaMotte SMART 3 Colorimeter Water Quality Analyzer (reagent available for nitrate, ammonia, phosphate, silica, chlorine, dissolved oxygen, pH, sulfate, iron, copper)	\$1,044 for colorimeter, reagents sold separately - \$0.50 to \$1 per sample
	LaMotte Series 1200 Single-Parameter Colorimeters (for ammonia, phosphate, or chlorine)	\$400 to \$515 (includes reagents for 100 tests); additional reagents \$0.50 to \$1 per sample

PARAMETER	EQUIPMENT	APPROXIMATE COST
chlorine	water sample, send to analytical lab	
	LaMotte SMART 3 Colorimeter Water Quality Analyzer (reagent available for nitrate, ammonia, phosphate, silica, chlorine, dissolved oxygen, pH, sulfate, iron, copper)	\$1,044 for colorimeter, reagents are \$0.50 to \$1 per sample
	LaMotte Series 1200 Single-Parameter Colorimeters (for ammonia, phosphate, or chlorine)	\$400 to \$515 (includes reagents for 100 tests); additional reagents \$0.50 to \$1 per sample
chlorophyll	filtered water sample, freeze, deliver filter pad to analytical lab (must remain cold)	\$50 to \$100 for 6 filter holders, \$100 per 100 GF/F filters (may be provided by lab)
	send raw water sample to analytical lab; not recommended unless delivered immediately to lab	
	fluorescence probes are available, but usually require attachment to a sonde; also require analytical lab analysis of samples for calibration	\$2,000 for a fluorescence probe, attached to a sonde (\$8,000 to \$10,000) + cost of lab analysis of calibration samples
seagrass, macroalgae (equipment depends on type of analysis)	underwater video camera system (GoPro, SeaViewer)	\$400 to \$2,000
	benthic grab, dry algae, weigh	grab \$400 to \$700 (could snorkel or wade to collect), oven \$500 to \$1,000 (can use a dehydrator instead), scale \$150 to \$600
	mapping by snorkeling	GPS unit (\$200 to \$600), waterproof case for GPS (\$40), waterproof notebook (\$20)

* Multiparameter handheld instruments utilize electronic based probes linked by a waterproof cable to a handheld unit for reading parameter values. Examples include: YSI Pro Plus, Horiba U-50, Hanna HI 9828, In-Situ SmarTROLL, etc.

** Titration kits are available from LaMotte and Hach.

MAINTENANCE

All equipment should be maintained as directed in the instructions provided by the manufacturer. In all cases, equipment should be tested before the field season begins to ensure proper functioning. Equipment should be calibrated before sampling trips. All equipment should be inspected for damage which would necessitate replacement or repair prior to each sampling trip.

In section 5.4.1, it was suggested that the Monitoring Coordinator take the lead in developing a Monitoring Guide. This Guide should include specifics on maintenance required for equipment.

Specific guidance is provided in *The General QAPP for Long Island Sound Volunteer Coastal Monitoring*, section B.6. (Instrument / Equipment Testing, Inspection and Maintenance), which accompanies this report.

FIELD CALIBRATION TECHNIQUES

The Monitoring Guide developed to support community-based monitoring in Long Island Sound should also detail the field calibration techniques for the instrument employed.

Specific guidance is provided in *The General QAPP for Long Island Sound Volunteer Coastal Monitoring*, section B.7. (Instrument / Equipment Calibration and Frequency), which accompanies this report.

5.5.4 Laboratory Recommendations

Details on the suggested analytical methods, and maintenance and calibration of equipment are included in *The General QAPP for Long Island Sound Volunteer Coastal Monitoring*, sections B.4. (Analytical Methods) and B.5. (Quality Control). A list of New York or Connecticut approved analytical labs is provided in section B.4. (Analytical Methods) of *The General QAPP for Long Island Sound Volunteer Coastal Monitoring*.

For parameters requiring analyses (nutrients), it is recommended that a state certified lab be contracted and that the lab provide details on its Quality Management Plan including SOPs and QAPPs. Additional details on lab analyses and a list of state certified labs is provided in *The General QAPP for Long Island Sound Volunteer Coastal Monitoring*.

For bacterial analyses, a contracted lab might be easiest for volunteers. It is important to remember that bacterial analyses require a strict hold time. Another option that could be explored is for the group(s) to purchase equipment (e.g., Idexx laboratories) to process samples on their own and submit to training/certification by the State. The determination as to which is the preferred method is beyond the scope of this document.

5.5.5 Training Recommendations

The community monitoring groups indicated a number of topics to include in a training program. The groups noted they do not require training in the techniques they currently use, as they have previously sought training in those areas. However, a centralized and standardized training program was recognized as beneficial for groups just starting a monitoring program or for groups adding new parameters.

Workshops on various topics were discussed as a useful approach to refreshing the memories of program coordinators and introducing groups to greater complexity of understanding (e.g. for data analysis). These could be conducted in-person or offered as a webinar.

A conference dedicated to community-based monitoring was suggested by multiple groups. The conference would include presentations by groups in order to share results, lectures on topics relevant to data analysis by invited scientists, presentations on current management approaches by members of the management community, and presentations on technology associated with addressing environmental issues (i.e. low impact development, bioextraction). Workshops offered at the conference could include an introduction to equipment and sampling techniques by vendors and specialists, grant writing, QAPP writing, and data analysis.

The following details some of the suggestions for inclusion in a training program.

DEVELOPMENT OF THE SAMPLING PROGRAM

The training program should include a workshop providing guidance on developing a sampling program. Topics to cover include many of the topics discussed in this framework:

- parameters to include
- choice of sampling equipment
- number of stations within a site
- how to choose station locations
- temporal frequency of sampling
- developing a training program for volunteers
- equipment acquisition and maintenance
- proper record keeping
- data analysis

As noted in Section 5.5.2 (page 44), guidance on establishing monitoring goals and methods can be found in *Volunteer Estuary Monitoring. A Methods Manual. 2nd Edition. US EPA and Ocean Conservancy* (<http://water.epa.gov/type/rsl/monitoring/index.cfm>), or use the internet search terms “EPA volunteer monitoring”). More advanced EPA support documents can be found by searching for “EPA Systematic Planning” or at <http://www.epa.gov/QUALITY/dqos.html>.

GRANT WRITING AND FUNDRAISING

Many community groups are new to the process of finding funding opportunities and grant writing. This information could be conveyed in a number of different ways:

- A website with guidance on identifying funding with an accompanying list server to notify people of funding opportunities would provide up-to-date information to community-based monitoring groups.
- A grant writing workshop could help participants understand the level of detail and qualities of a program sought by funding organizations.
- Representatives from funding organizations could be invited to a community-group monitoring workshop to deliver a brief overview of their grant programs.
- The *LIS Community-Based Monitoring Coordinators* could review proposals before submission and offer suggestions.

DEVELOPMENT OF A QAPP

This is one area mentioned by many groups as the development of a QAPP is considered a daunting task. The model QAPP developed as part of this project (Section 6, page 62) provides a good start for groups developing their first QAPP. A workshop on completing the project specific aspects of the QAPP could further ease this process.

SAMPLING TECHNIQUES

Instruction in sampling techniques is especially recommended for new groups, though established groups could also benefit from inclusion in a workshop to ensure their methods are consistent with those used throughout Long Island Sound. This session must be run as a hands-on workshop, with time allowed for groups to practice sampling under the observation of the trainer. Training should include written documentation of all methods introduced, to allow participants to take notes during the workshop. Documents should also be available on-line for later use.

When possible, groups should bring their own sampling equipment to the workshop, so they can review the proper techniques specific to their equipment. The workshop coordinator should also provide a variety of equipment, so that groups may be exposed to other options for sampling.

When reviewing sampling techniques for samples which will be sent to an analytical lab, a person familiar with the requirements of the labs to be used should be invited to present these techniques. While the *LIS Community-Based Monitoring Coordinators* may stand in as a resource, a person from the analytical lab is the best option as she or he will review specific requirements. The Coordinators may then provide input on how those techniques required by the analytical lab fit into the requirements of an EPA approved QAPP.

EQUIPMENT CALIBRATION, USE, AND MAINTENANCE

Information on equipment may be included in the workshop on sampling techniques. Training may also be provided on a group-by-group basis. The trainer may be the *LIS Community-Based Monitoring Coordinator* or may be one of the experts identified by the Coordinators as willing to provide assistance to local groups. Familiarity with the equipment is a key feature required in a trainer. If necessary, the Coordinator may assist the groups in arranging a meeting with a vendor to go over use of a specific piece of equipment.

Also included in this workshop should be data keeping requirements and techniques for tracking the calibration of instruments.

DATA ANALYSIS AND PRESENTATION TECHNIQUES

Workshops on data analysis and the presentation of data are key to assisting groups with reaching target audiences. In addition to covering what to include, information may also be provided on how to structure and deliver an effective communication. While the *LIS Community-Based Monitoring Coordinator* may lead some of these discussions, other experts should also be invited. Certain scientists or members of the Long Island Sound Study could provide insight on data analysis techniques which move beyond the simple side-by-side comparison of data. Communication experts from the Long Island Sound Study, CT Sea Grant, and NY Sea Grant could provide workshops on effective techniques for oral presentation of data, written outreach material, and social media techniques.

These workshops could be offered multiple times a year with topics rotating to reflect the interests of the attendees. Offering the session as a webinar may also attract people who do not want to travel great distances.

COMMUNICATIONS AND COMMUNITY OUTREACH

As with the Data Analysis and Presentation Techniques just discussed, a workshop on structuring effective communications for community outreach would be beneficial. Topics could include how to write a compelling article, speaking to the press, developing newsletters, organizing events, publicizing events, etc.

Representatives from established programs could provide workshops reviewing their current practices and what has not worked so well in the past. Groups should also be provided with time to discuss their past efforts and discuss how they might move forward with the task of communicating to the general public.

The *LIS Community-Based Monitoring Coordinator* could provide on-line summaries and supporting information from workshops, for those unable to attend or to be available for later use.

5.5.6 Data Management Recommendations

DEVELOPMENT OF STANDARDIZED DATA REPORTING FORMAT

The need for the development of a standardized data reporting format was recognized prior to the start of this project. Through the interviews of community groups and data end users, qualities required of the format were determined.

The highest priority items were the need to use common units across all groups, include information on quality control measures employed in the data collection, and ease of use for both the person entering the data and the person utilizing the data. The community groups indicated that Excel was their platform of choice. End users indicated that just about any platform will work for obtaining data.

We suggest using both an Excel template for the entry of data and a web-based interface for uploading to the database. The template should include all possible water quality parameters. Community groups would enter only those data which were collected by their group. By including spaces for all possible parameters, a standard format is achieved. The centralized database could be designed to accept the data directly from the Excel format. The benefit of an Excel interface is that groups may enter their data once and maintain a local copy of the data without the need to download their own data from the centralized database. The Excel template should be designed to automatically graph data and include any necessary calculations. An example of how this Excel data entry template may appear is provided in Figure 10. The data in Figure 10 are automatically graphed (Figure 11).

A key feature of the Excel template is the ability to pull out summary statistics from the data and have the data presented in a common graphing format for data reporting. The use of an Excel platform will also allow community groups to develop additional graphs as needed.

The development of the Excel template should occur in consultation with community groups and the centralized database designer.

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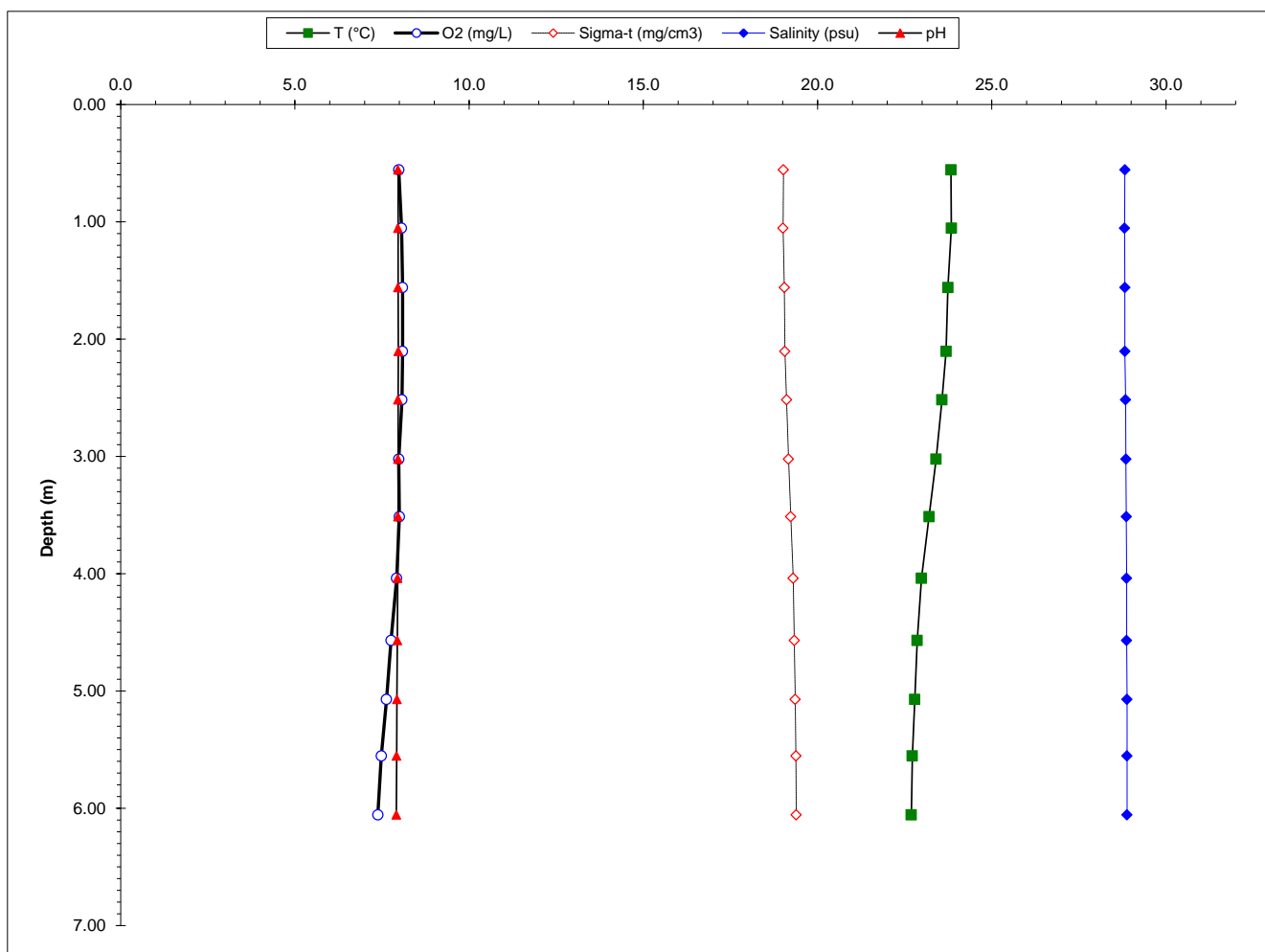


Figure 11: Example of Excel Template Automated Graphing

Data entered into the Excel template (Figure 10) are automatically graphed.

DEVELOPMENT OF LIS-WIDE EMBAYMENT MONITORING WATER QUALITY DATABASE

Development of a centralized database was viewed as an essential component of a LIS-wide water quality monitoring network. The database should include the following features:

- easy to use when entering or uploading data
- support on use provided by the *LIS Community-Based Monitoring Coordinator*
- availability of data in multiple formats
- ability to view quality assurance / quality control data
- ability to compare multiple systems in space and time
- ability to map data
- ability to graph data
- ability to query the database (e.g. display all instances where dissolved oxygen was < 3 mg/L)
- ability to apply filters to the data (e.g. display data between 2009 and 2012)
- automatic calculation of percent saturation for dissolved oxygen from temperature, salinity, and oxygen concentration (mg/L)

- automatic inclusion of time of high and low tides as well as time of sampling expressed as time after low or high tide (the database would query an online program to get this information, without any effort from the user)
- automatic inclusion of average wind direction, average wind speed, and total rainfall for the previous 2 days and the previous 7 days (the database would query an online program to get this information, without any effort from the user)
- a directory of LIS water quality monitoring groups
- a directory of references for relevant literature focused on LIS water quality & monitoring

A number of centralized databases are currently in use in the Long Island Sound region. One of these databases may be a candidate for hosting the community-based water quality data. Alternatively, a separate database could be developed incorporating features of these databases. Four of these databases are reviewed briefly below.

- LISICOS, The Long Island Sound Integrated Coastal Observing System (<http://lisicos.uconn.edu/>) – This site includes a clickable map leading to data files which can be plotted and downloaded. Data included are the LIS buoy data, waves and currents, and the data collected on the CT DEEP cruises.
- The Connecticut Data Collaborative (<http://ctdata.org/>) – This group utilizes the “Weave” platform, which allows for the visualization of multiple types of data. The figures generated by the user can be explored in depth by clicking on features of interest. This database allows users the most freedom of all presented here for evaluating data in multiple ways.
- The Maritime Aquarium (<http://www.maritimeaquarium.org/long-island-sound/research-biodiversity>) – The Maritime Aquarium’s Long Island Sound Biodiversity Database is a searchable web resource to monitor species trends in Long Island Sound. Partners collecting data include The Maritime Aquarium, SoundWaters, SoundKeeper and the Bridgeport Aquaculture School. Data are collected on 125 species of marine organisms and water quality variables including temperature, salinity, dissolved oxygen, pH, and turbidity. The Maritime Aquarium is currently fundraising to enhance its database interface and is interested in exploring opportunities for further enhancement toward serving the needs outlined above.
- The Wood-Pawcatuck Watershed Association’s Southern Rhode Island Water Quality Sampling Data (<http://www.wpwa.org/waterQuality.htm>) – This interactive map incorporates data from the URI Watershed Watch database. Clicking on a map flag leads to a pdf of the data, including a “score card” on the water body. The pdf includes links to additional data. The URI Watershed Watch publishes static maps (non-interactive) on their website generated from a central database (<http://www.uri.edu/ce/wq/ww/data/12Locations.htm>).

In order to determine the choice of database format, a committee of community group members and data end users should be created to evaluate the options available. The hosts of the databases listed above can be approached to determine their willingness and ability to host the database. Commercially available databases should also be reviewed. In all cases, financial support will be required to develop and maintain the database. Incentives should be offered to community groups to enter past data into the database.

DATA DISSEMINATION PLAN

The *LIS Community-Based Monitoring Coordinator* should oversee an annual synthesis of data from all groups entering data into the database. The Coordinator will also facilitate the use of the database by others interested in the data (e.g. for integration of embayment data into the LISS indicators presentation and reporting). Ideally, the database will allow for the development of customized reports

which will facilitate the synthesis of these data. The database should also include a routine to collate data into a format appropriate for uploading to the EPA's STORET/WQX database. A common complaint from community groups was the unwieldy interface of the EPA STORET system. Using the centralized database to ease this transference to the STORET system would assist community groups with complying with providing data to STORET.

5.5.7 Funding Recommendations

In July 2013, a survey was distributed to all community-based water quality monitoring groups inquiring about program funding (n = 9). These groups were asked to provide information on the degree to which they rely on grant funding and fundraising, in addition to current versus desired needs relating to a host of program components.

All groups responding to the survey (n = 4) depend on grants to support their current water quality monitoring efforts (Table 8). The majority of current operating expenses fund laboratory analyses, transportation and staffing (in rank order) with significantly less spent on community outreach and equipment. At least one group found it difficult to extract a budget for community outreach stating that it permeated their programming. It is worth noting that at least two respondents reported expending zero dollars on administration, equipment, transportation, and/or community outreach. This zero expenditure reflects the in-kind services provided by the local government.

Interestingly, when asked for the *desired* amount of funding within each category (as compared with *current* levels of funding), only a single organization reported to desiring a relatively small increase (\$500) for equipment only. Based on these results, the budget required by these groups should accurately reflect the amount required to run a monitoring program within a single area.

Comments from community-based water quality monitoring groups indicate current operating efforts seem to have reached a balance between required funds and available funds, though many funding sources are tenuous and any loss of funding would require corresponding increases from alternative sources. One organization mentioned that while they do not currently have equipment needs, funding to support replacement equipment when their equipment breaks or needs to be maintained would be helpful. At least one monitoring group echoed a sentiment heard often during stakeholder meetings regarding the need for alternative sources for monitoring funding not tied to a competitive grants program.

Considered in summary, the small number of Long Island Sound water quality monitoring groups who have been able to achieve financial sustainability have done so primarily through grants and the leveraging of in-kind resources. Respondent comments in concert with the small number of groups reporting an ability to conduct sustained monitoring, are the primary indicators that a coordinated, community-based monitoring effort of Long Island Sound is limited by overall availability of funding. As these community based monitoring groups are asked to add parameters and additional quality control samples by end users, additional funding will be required to cover expenditures related to equipment, staffing, administration and/or analyses. Additional funding streams will be critical to supporting this level of coordination. Recommendations include funding sources to support operating costs of productive community-based monitoring groups (productivity could be assessed annually according to pre-determined criteria) with financial incentives for those groups requiring additional resources to enhance the coordination and expansion of their monitoring efforts relative to end-user needs.

Table 8: Current annual funding levels.

Current annual funding levels for community monitoring groups identifying themselves as “community-based.” The groups identifying themselves as educational organizations, independent labs, and schools were not included in this assessment.

	group 1	group 2	group 3	group 4	AVERAGE
Staff (e.g. full-time, part-time)	\$4,125	\$7,500	\$38,000	\$18,500	\$17,031
Volunteer support (non-staff; e.g. administration, gear, training, recruitment)	\$6,500	\$1,500	\$3,000 (in-kind)	\$500	\$2,875
Program administration (e.g. operating expenditures, office supplies)			\$2,400 (cash match provided) + \$2,086 (in-kind)	\$2,500	\$3,493
Materials, supplies, equipment maintenance that directly support water quality monitoring	\$1,500	\$1,000	\$5000	\$1,000	\$2,125
Equipment				\$500	\$500
Laboratory-based water quality analyses conducted externally	\$12,000	\$0	\$25,366 (in-kind)	\$68,000	\$35,122
Transportation directly supporting water quality monitoring (e.g. boat, vehicles)	\$0 (volunteers provide)	\$0 (land-based sampling)	\$39,261 (in-kind)	\$5,500	\$22,381
Community outreach (e.g. public events)	\$500			\$500	\$500
External communication (e.g. newsletters, publications)	\$1,000		\$12,000	\$7,500	\$6,833
Total from Grants	\$25,625	\$10,000	\$60,400	\$104,500	\$90,860
Total from In-Kind Services	not listed	not listed	\$66,713	not listed	
Total	\$25,625+	\$10,000+	\$127,113	\$104,500+	
number of stations	10	10	16	19	
frequency	biweekly & monthly*	monthly	weekly & triweekly*	weekly	
number of parameters	14	5	11	16	

* data for some parameters are collected less often; biweekly = a sampling trip every two weeks; triweekly = a sampling trip every three weeks

CURRENT FUNDING LEVELS

Of the programs responding to our survey regarding funding levels (distributed only to active community-based water quality monitoring programs), two incurred operating expenses less than \$30,000 and two had total operating budgets of between \$100,000 and \$130,000 (Table 8). This difference in budget was tied both to the number of parameters measured and the frequency with which

monitoring occurred. One of the largest expenses incurred by a monitoring group is for analytical services. One community group member indicated that increases in parameters to monitor or a need for field replicates will result in an increase in funds required for analytical services. The range in cost associated with analytical fees reflects the difference in number of parameters tested, frequency of sampling, number of stations, and number of field replicates (Table 8).

The current funding levels indicate a group sampling water quality biweekly will require approximately \$40,000 per year in direct funds to operate. This estimate was based on group 1 from Table 8, with additional funds provided for equipment and additional field replicates. A group sampling a larger area and more frequently will need direct funds on the order of \$90,000 per year. The funds required to run these programs are assumed to be supplemented with in-kind services provided by analytical laboratories, as in the case of group 3 (Table 8). If in-kind services are not available, the cost of an extensive monitoring program (e.g. groups 3 & 4, Table 8) is estimated to be around \$130,000 per year. For the Hempstead Harbor program, local municipalities pay dues to the Hempstead Harbor Protection Committee, which works with the Coalition to Save Hempstead Harbor to fund the monitoring program. These municipal dues are the source of in-kind funds which allow this group to monitor many stations on a weekly basis.

Extrapolating the dollar amounts reported by groups responding to queries on the cost of their monitoring programs to the remaining community-based monitoring programs, and taking into account the parameters monitored and frequency of monitoring, the current estimate of grant funding received by all community-based groups in the LIS area is \$322,000 per year. If the LISS decides to move forward with the development of a network of support for community-based monitoring programs, it is highly likely that existing groups would apply for assistance and new groups may also arise in response to the availability of funds. Two of the groups who currently monitor only bacteria indicated they would be interested in expanding their programs to water quality monitoring if funds were available. At the group meetings, community groups indicated a willingness to follow certain protocols and monitor specific parameters of interest to the LISS, with appropriate financial support.

SCOPE OF TOTAL NEED OF UNFUNDED EMBAYMENT MONITORING GROUPS ACROSS THE SOUND

Fifteen community-based groups in the Long Island Sound area were identified as potentially conducting water monitoring activities. Of these, only ten were currently conducting water quality monitoring programs (Table 2). The Hempstead Harbor Protection Committee and Coalition to Save Hempstead Harbor form a partnership who work together on the same system: Hempstead Harbor. The Niantic River Watershed Committee and Save the River, Save the Hills also work on the same system: Niantic River, but without the formalized partnership of the Hempstead Harbor groups. CUSH and SE*CRES monitor in overlapping areas, though on differing schedules. Thus there are only seven areas currently being monitored by community-based groups and these seven are located in Eastern Connecticut or on Western Long Island.

For the purposes of developing a funding recommendation, we would encourage the development of a monitoring program in twelve locations. These locations should be located between New York City, NY and the Connecticut River, CT; and between Huntington Bay, NY and eastern Long Island. Programs in these locations would fill in the spatial gaps between current monitoring programs (Figure 6, page 23; community groups are enclosed in the yellow polygons).

A new program requires start-up funds to purchase equipment and supplies. This cost may range from \$10,000 to \$50,000 depending on the equipment purchased and the extent of the program (Table 7). Some of these initial equipment needs may be met by the EPA equipment loan program, though availability of equipment is not guaranteed and in fact has been limited or nonexistent in recent years.

Annual operation costs range from \$40,000 to \$90,000 per year for a full water quality monitoring program (programs focused solely on bacteria will require less funding).

Development of monitoring groups in new locations should proceed in a progressive fashion, with only a few groups encouraged each year under the guidance of the *LIS Community-Based Monitoring Coordinator*. The rationale is that some groups will require more assistance with startup and the resources of the Coordinator should not be stretched too thin. In some cases, existing groups may be encouraged to expand their current monitoring programs to new areas or to include additional parameters. An estimate by year is presented in Table 9.

Table 9: Suggested levels of funding delivered directly to monitoring groups.

The levels of funding shown are for dollars received by groups and does not include any overhead required by the funding organization. These estimates do not include support for the *LIS Community-Based Monitoring Coordinator(s)* or other staff supporting the LIS monitoring program. Costs for support for active groups and for the equipment maintenance fund include a 2% inflationary increase per year.

	support for active groups	equipment fund - maintenance for existing groups	number of new groups or expansion of current programs	start-up funds for new groups	annual expenses for new groups or expansion of existing groups	total
year 1	\$322,000	\$30,000*	2	\$50,000	\$180,000	\$582,000
year 2	\$512,040	\$15,000	2	\$50,000	\$180,000	\$757,040
year 3	\$705,881	\$15,300	2	\$50,000	\$180,000	\$951,181
year 4	\$903,598	\$15,606	2	\$50,000	\$180,000	\$1,149,204
year 5	\$1,105,270	\$15,918	2	\$50,000	\$180,000	\$1,351,189
year 6	\$1,310,976	\$16,236	2	\$50,000	\$180,000	\$1,557,212
year 7	\$1,520,795	\$16,561	2	\$50,000	\$180,000	\$1,767,357
year 8	\$1,734,811	\$16,892	0	\$0	\$0	\$1,751,704
year 9	\$1,769,507	\$17,230	0	\$0	\$0	\$1,786,738
year 10	\$1,804,898	\$17,575	0	\$0	\$0	\$1,822,472
year 11	\$1,840,996	\$17,926	0	\$0	\$0	\$1,858,922
year 12	\$1,877,815	\$18,285	0	\$0	\$0	\$1,896,100
year 13	\$1,915,372	\$18,651	0	\$0	\$0	\$1,934,022
year 14	\$1,953,679	\$19,024	0	\$0	\$0	\$1,972,703
year 15	\$1,992,753	\$19,404	0	\$0	\$0	\$2,012,157

* During year 1, existing groups are expected to request funds to replace outdated equipment. This initial influx of requests should taper off with time. The values shown for later years are to cover maintenance and replacements costs for all existing groups.

CURRENT AND POTENTIAL FUNDING SOURCES

All groups conducting monitoring activities were asked about their sources of funding during the interview process. Eleven groups identified their sources of funding. The majority of groups obtained funding from grant programs. These programs included:

- Long Island Sound Futures Fund, National Fish and Wildlife Foundation
- Clean Water Act Section 319, EPA
- Sea Grant, NOAA

Alternative sources of funding supplemented the support of monitoring programs. Two labs are funded independently by businesses and received little to no grant funding (Millstone Environmental Lab –

Dominion; Cedar Island Marine Lab – Cedar Island Marina). The Manhasset Bay Protection Committee, The Coalition to Save Hempstead Harbor, and The Hempstead Harbor Protection Committee are funded in part by the local governments and in-kind services are provided by the local Health Departments. Foundation grants are utilized by Save the Bay. The Maritime Aquarium funds monitoring in part through their operating budget.

Group representatives also mentioned fund raising in the local community when they have experienced a budget shortfall.

Additional potential funding sources to explore include small foundations and groups who might be interested in these types of data (e.g. The Nature Conservancy, Save the Sound, etc.). Advocacy groups may be approached to support monitoring relative to an issue of concern. Searching for additional sources for grant funds and fund raising opportunities should be included in the job description for the *LIS Community-Based Monitoring Coordinator*.

RECOMMENDATIONS ON CORE FINANCIAL NEEDS

The core needs for a Long Island Sound monitoring program are:

- dedicated funding to support active monitoring groups (Table 9, page 59)
- dedicated funding to encourage development of new monitoring groups (Table 9, page 59)
- dedicated funding to support the development and ongoing operations of a centralized database
- dedicated funding to support staff to act as *LIS Community-Based Monitoring Coordinators*

In the next phase of the development of a LIS community-based monitoring network, the possibility for reducing costs associated with monitoring should be explored. While groups indicated a desire to maintain autonomy, some centralization of services may facilitate cost reductions. An area to explore is the possibility of a centralized analytical lab or labs underwritten by the LISS.

5.5.8 Recommendations for Encouraging Formation of Additional Monitoring Groups

Community-based monitoring groups are currently restricted to the Long Island shore from Oyster Bay to New York City. No groups monitor east of the Oyster Bay / Cold Spring Harbor area (Figure 6). Along the northern edge of the Sound, community-based monitoring groups are found from Niantic River to the Rhode Island border (Figure 6). The remainder of the north shore of LIS, from Niantic River west to New York City, is monitored in places by educational facilities, private labs, and schools (high schools, middle schools, colleges, universities).

Monitoring groups should be encouraged along the central portions of both coasts of Long Island Sound. The *LIS Community-Based Monitoring Coordinator* will be essential in encouraging the establishment of new groups. This person can reach out to local citizens to determine who might be willing to assist with a monitoring program. In the early phases of developing a new group, the Coordinator could take the lead on establishing a program and training participants. The goal would be to eventually make the group autonomous. The URI Watershed Watch provides a good model for how to encourage and support citizens interested in learning more about their local waterbody.

Specific suggestions for establishing more monitoring groups and activities:

- Contact Conservation Commissions and Shellfish Commissions to determine what is needed in an area and to find people potentially interested in participating in a comprehensive monitoring program.
- Host an “introduction to monitoring” event in conjunction with other groups currently working in the area (local clubs, Save the Sound, beach clean-ups, etc.). The goal would be to get people interested in monitoring their local water bodies.

- Develop a monitoring program and associated curriculum for schools. These groups may not be able to consistently participate, but could provide critical information on indices that can be monitored once or twice annually.
- Coordinate Sound-wide participation in national or world-wide monitoring events, such as the Secchi Dip-In (<http://www.secchidipin.org/>).
- Coordinate with existing biological monitoring programs. Examples include: Tim Visel's (The Sound School) Connecticut Blue Crab Population Habitat Study which uses data from citizen monitors; Project Limulus, a horseshoe crab program run by Dr. Mattei, Dr. Beekey, and A. Rudman of Sacred Heart University; establish a SeagrassNet monitoring location in Long Island Sound (<http://www.seagrassnet.org/>); utilize citizen scientists in the LIS Sentinel Site network.

Establishment and support of new monitoring groups requires the presence of a person dedicated to this task. The establishment of the position of *LIS Community-Based Monitoring Coordinator* is required.

5.6 Summary of Framework Priorities and Objectives

- Provide a separate funding mechanism for monitoring activities, or encourage current funding avenues to allow monitoring activities without the need for basic research.
- Establish the position of *LIS Community-Based Monitoring Coordinator*. This person's role would be to facilitate communications among the citizens, scientists, management community, and other end users of data. This person would provide support for establishment of new programs and sustenance of existing programs, monitoring program development, training, quality assurance oversight, data base management, and information on funding opportunities. Please note that the position title does not include the word "volunteer." Monitoring activities in Long Island Sound are conducted by a diverse array of groups including volunteer based groups, local governments, educational organizations, private labs, and schools. Establishing an office in support of only volunteer based monitoring will exclude more than half of the organizations currently active in Long Island Sound.
- Development of a LIS Monitoring Guide which details standard operating procedures.
- Development of a centralized database for storing and reporting information.
- Organize biennial or annual meetings to bring together community-based monitoring groups and data end users. The goal would be to share results and identify additional areas of concern. This meeting should be a combination of community-based results presentations, presentations by scientists, presentation by managers, and workshops on topics of interest.
- Develop a website with monitoring resources for the Long Island Sound community. This website should include links to all active groups as well as information useful to community groups and data end users.
- Include nearshore work in the LISS's *Sound Health* publication. A suggestion was made to instead publish a *LIS Embayment and Harbor Health* in alternate years, as *Sound Health* is published once every two years.
- The EPA currently runs an equipment loan program. The *LIS Community-Based Monitoring Coordinator* could organize a similar program. Alternatively, a separate funding program could be established to help with the purchase of equipment.
- Develop a network of people willing to act as advisors to community-based monitoring groups. The *LIS Community-Based Monitoring Coordinator* should facilitate the introduction of community-based groups to experts in their local area.

- Provide information on sources for equipment and analytical services.
- Evaluate options for reducing the costs of supporting monitoring programs (e.g. analytical lab services at reduced costs).

6 Task IV: Quality Assurance Project Plan Development

The General QAPP for Long Island Sound Volunteer Coastal Monitoring is intended to serve all organizations participating in coastal water quality monitoring in the Long Island Sound area, and may also serve programs working in freshwater and other coastal zones. It contains baseline requirements to be met for data collection projects, as well as common objectives, parameters, methods and approaches for coastal and wetland chemical and biological monitoring. Some references are included for freshwater stream and river monitoring, in recognition of the fact that many coastal monitoring programs also work in the freshwater areas which drain to the coastal zone. For freshwater monitoring, additional reference resources should be obtained.

The General QAPP for Long Island Sound Volunteer Coastal Monitoring can be adopted as the project QAPP by any group performing these types of monitoring activities. If not adopted, an individual project QAPP is typically required and *The General QAPP for Long Island Sound Volunteer Coastal Monitoring* may be useful as a template for a project-specific QAPP. *The General QAPP for Long Island Sound Volunteer Coastal Monitoring* is designed to streamline the process of writing a QAPP for Monitoring Programs in the Long Island Sound area. This document does not replace guidance on developing a program and is not sufficient as a stand-alone document to guide the initial development and sample design process for a monitoring program. The document includes directions, general language, and resources for tailoring the QAP to the user's program design.

The General QAPP for Long Island Sound Volunteer Coastal Monitoring includes an *Adoption Form* which is a document completed by the monitoring organization's Project Manager to detail the specifics of the monitoring program and to accept the general guidelines provided in *The General QAPP for Long Island Sound Volunteer Coastal Monitoring*. The adoption form was designed with instructions at the beginning of each section and includes check boxes, text boxes, and pre-formatted tables. Users may take advantage of the formatting features of Microsoft Word or may choose not to utilize those features.

The QAPP deliverables which accompany this report includes the main document, the adoption form, and a series of supporting documents. All of these documents should have been provided with this report, in a separate folder.

It is recommended that community groups attend a training session on QAPP development, though it is possible to work through the QAPP without training.

7 List of Appendices

Appendix A: End User Surveys

Provides all responses to questions, including text comments. Figures were automatically generated by the SurveyMonkey website as part of survey output.

“Appendix A - End User Survey Results.pdf”

30 pages

Appendix B: Community Group Survey Results

Responses from all groups who are currently monitoring are summarized into a standard format. This allows for attribution of individual responses to organizations.

“Appendix B - Community Group Survey Results”

115 pages

Appendix C: Minutes for Stakeholder Meetings

Minutes from the three stakeholder meetings have been combined into a single .pdf.

Norwalk,CT Meeting	pages 1-9
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Groton,CT Meeting	pages 10-16
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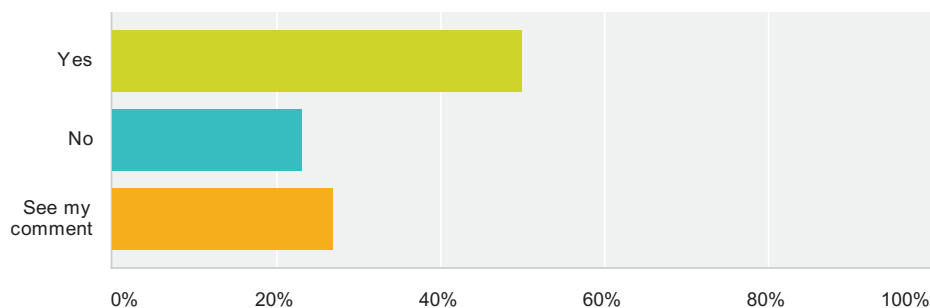
Farmingdale, NY Meeting	pages 17-23
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“Appendix C - Minutes for Stakeholder Meetings.pdf”

23 pages

Q2 Do you use data collected by community monitoring groups or other "citizen scientists?"

Answered: 26 Skipped: 1



Answer Choices	Responses	
Yes	50%	13
No	23.08%	6
See my comment	26.92%	7
Total		26

#	Comment	Date
1	Beach Water Quality Samples collected	7/18/2013 2:54 PM
2	Currently we do not have monitoring groups. Steven Johnson Milford Open Space Coordinator is working on setting up River Monitoring.	7/18/2013 8:16 AM
3	I review the data collected by CUSH, a local community based organization in Stonington. I've met with with CUSH leaders a few times and have provided input on my interests. Their data provides some insights into the various Stonington embayments, but I can't use it directly to open shellfish grounds, a process that is tightly controlled by the CT Bureau of Aquaculture.	7/17/2013 3:52 PM
4	As part of the 305b assessment process to prepare the Integrated Water Quality Report to Congress	5/30/2013 3:47 PM
5	For educational and research purposes, yes.	3/21/2013 4:11 PM
6	As Town Supervisor - no. none is available; but yes, in the LISS CAC	3/7/2013 9:41 AM
7	Use EPA water quality data, some may be from community groups, but don't think so	2/25/2013 4:05 PM
8	I do not routinely use community monitoring data, but others in my office do (sentinel monitoring)	2/25/2013 11:50 AM
9	I don't currently use data collected by monitoring groups, but much of the data types are identified in the LISS Sentinel Monitoring for Climate Change strategic plan.	2/22/2013 3:15 PM
10	Working with CUSH, Harbor Watch / River Watch; and we collect at Milford Lab	2/22/2013 9:47 AM
11	I use both citizens data and government, academia data	2/21/2013 12:33 PM
12	I use beach cleanup monitoring data for the LISS indicators presentation.	2/21/2013 9:58 AM
13	The local use and application of the monitoring data varies with the individual program. The data from programs are not integrated or used regionally.	2/20/2013 10:13 AM

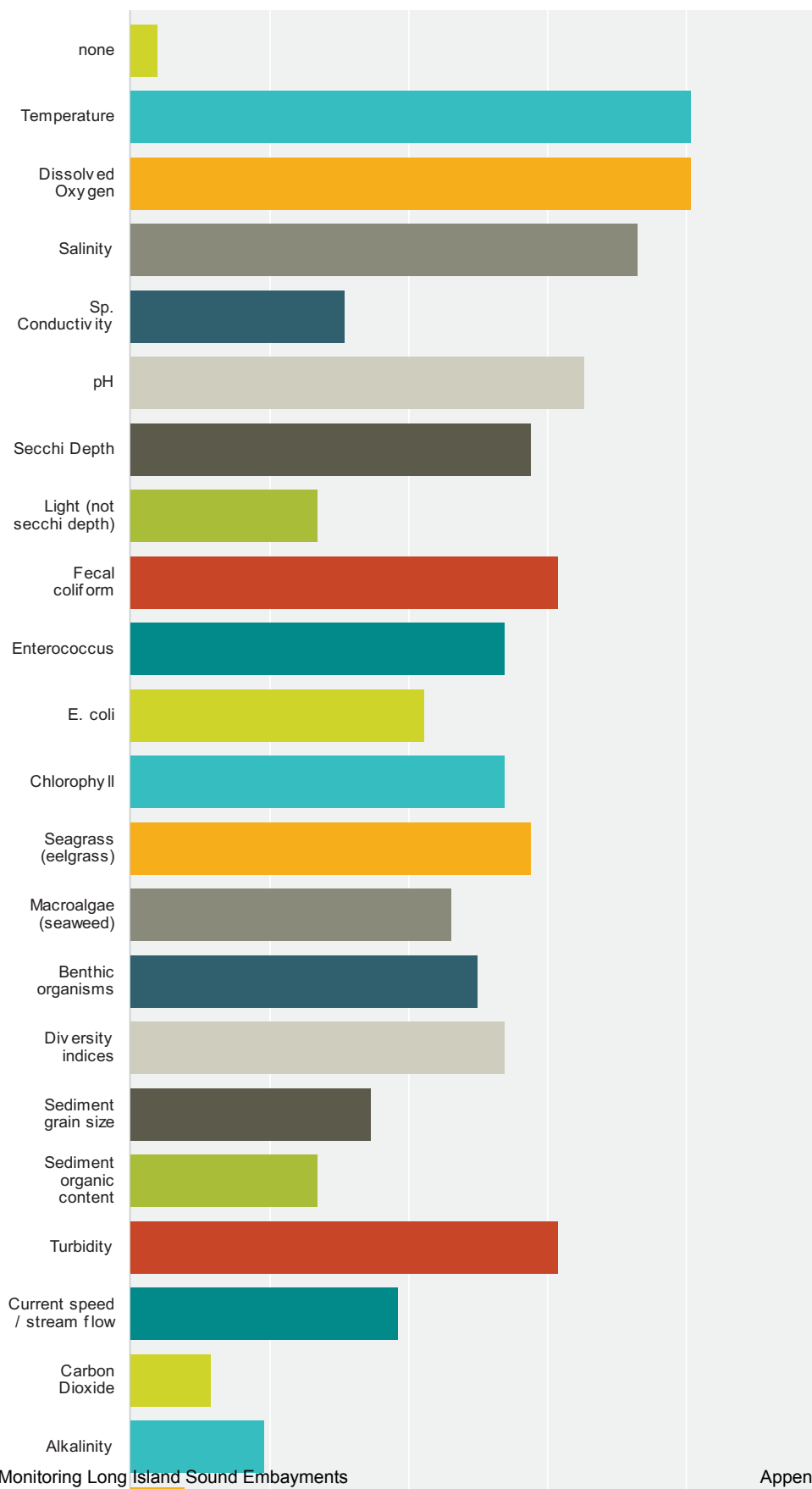
Q3 How might you use community monitoring data, or how do you currently use the data?

Answered: 26 Skipped: 1

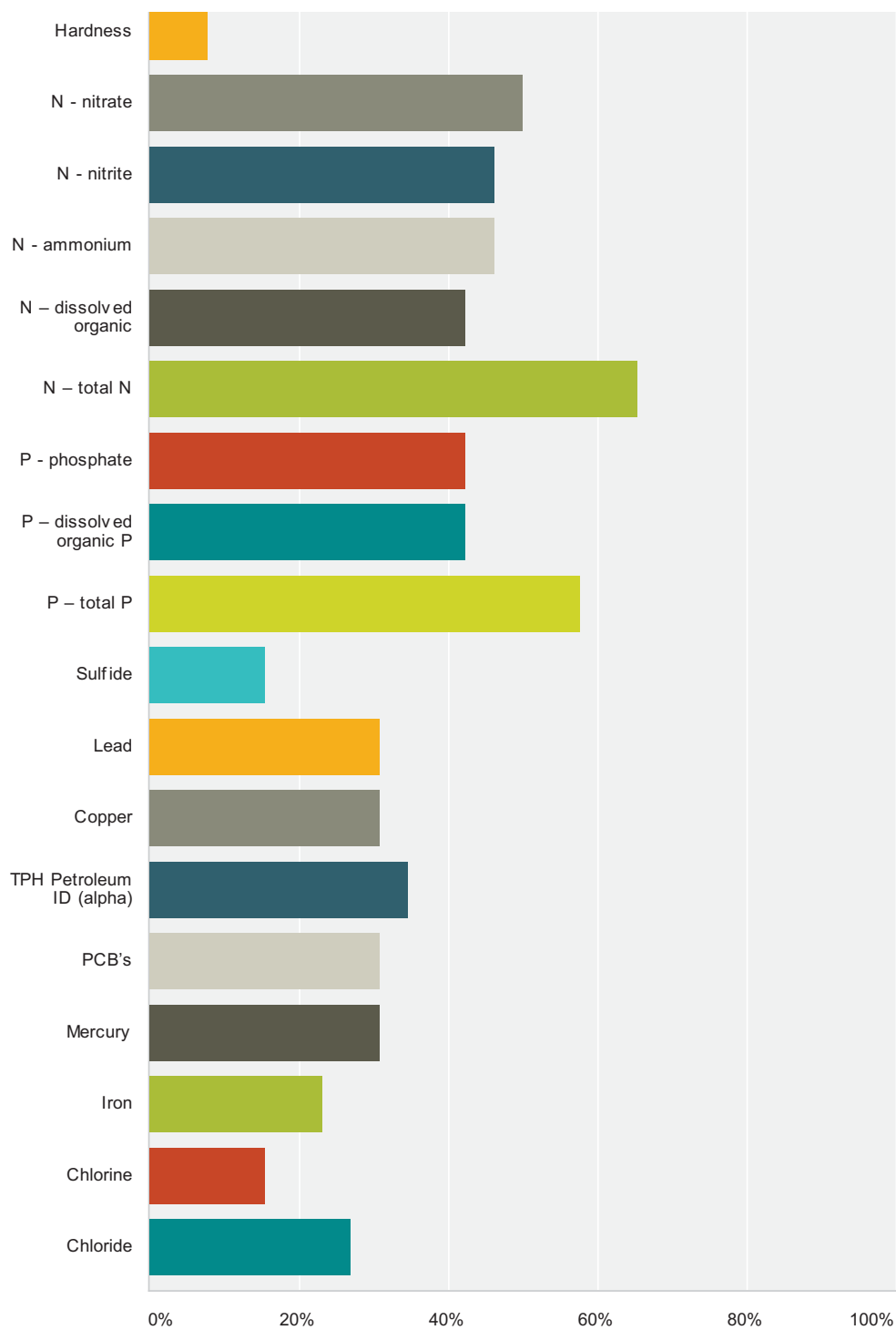
#	Responses	Date
1	To open and close swimming and recreational shellfishing	7/18/2013 2:54 PM
2	We would use the data to evaluate the health of the watercourses in Town and as a guide for loations for potential projects (Eagle Scout/Gold Award/SPE/Mitigation/SWCD) to enhance the water quality in areas that need it most.	7/18/2013 8:16 AM
3	As part of our sanitary survey reports written for shellfish classification of growing areas.	7/17/2013 4:33 PM
4	I'd like to add their fecal coliform data into the Bureau of Aquaculture database. I'll continue to use their data to identify potential water-quality problem areas or areas that may be might be opened to shellfishing.	7/17/2013 3:52 PM
5	to assist with non-point pollutant loading trends/patterns with regards to shellfishing and bathing waters	7/15/2013 4:17 PM
6	As part of the 305b assessment process to prepare the Integrated Water Quality Report to Congress	5/30/2013 3:47 PM
7	Other organizations are invited to input data into our database.	5/30/2013 2:50 PM
8	RBV fish passage data, temperature data compiled in Saugatuck River Watershed - used to assess conditions in river reaches	5/29/2013 4:10 PM
9	helps with embayment work, supplementary to major monitoring efforts, valuable outreach tool	5/28/2013 1:12 PM
10	Community monitoring data could be used to supplement our data set in areas that we do not monitor, or monitor infrequently.	5/28/2013 8:57 AM
11	As supporting data or to look for interesting trends prior to undertaking a study.	5/24/2013 4:43 PM
12	To look at areas and times when I am not able to sample, to supplement the data I have.	5/24/2013 12:30 PM
13	For educational and research purposes....comparison with ambient data; work with MS students at CUNY Environmental Science Masters Program	3/21/2013 4:11 PM
14	Use varies depending on agency project needs.	3/12/2013 11:30 AM
15	Most likely to compare our land cover data to finer-scale water quality data than is currently available.	3/11/2013 8:37 AM
16	translates into teh form of advocacy of some kind. Recognizing problems, focusing on those problems, supporting advocay or restoration, try to fix the problem; advocacy for the data monitoring itself - recognizing the importance, publicity for the data, outreach to the governmental units; bringing to management committee (LISS) - to see how imporant it is to the local communities	3/7/2013 9:41 AM
17	To supplement an ongoing study, or provide further evidence for a problem I am working on.	2/26/2013 3:36 PM
18	Generally, publications for LISS, support LISS reporting initiatives, use to buodl new types of communication, support own investigations within habitat restoration adn stewardship work	2/25/2013 4:05 PM
19	stream and coastal monitoring is useful to identify inputs of non-point source pollution that degrade coastal water qalty and therefore impact swimming and shellfishing opportunities. I am involved in monitoring horseshoe crab spawning abundance each spring.	2/25/2013 11:50 AM
20	Community monitoring data should be worked into boty other embayment sampling programs and larger state or interstate agency monitoring plans to get a better sense of what is happening in the Sound, both in general (to establish a baseline) and with the impacts of climate change. I think something really valuable is being lost in the fact that monitoring programs don't seem to combine results, though this is a large, expensive task.	2/25/2013 9:10 AM
21	To assess the relative condition of the 3 major watersheds in East Lyme so we can prioritize open space acquisition to protect/improve drinking water aquifers	2/23/2013 6:43 PM
22	Climate change monitoring including water temp, pH, salinity	2/22/2013 3:15 PM
23	Working on a project with Getchis, Bricker, Rose, and CLEAR to develop a marine spatial planning for aquaculture sites. Based on the Shellfish Mapper (which is conflict based) and the FARM model - looking to add water quality data into the conflict approach. For FARM model, we need the water quality data.	2/22/2013 9:47 AM
24	to assess status, trends, inter-relationships and comparisons with benchmarks	2/21/2013 12:33 PM
25	wq monitoring data could possible be used to development embayment water quality indicators.	2/21/2013 9:58 AM
26	Community monitoring data could be combined with agency and university monitoring data to expand the geographic area where status and trends in water quality are assessed.	2/20/2013 10:13 AM

Q4 What data would you be interested in seeing from a community monitoring group?

Answered: 26 Skipped: 1



End Users Opinions of Data Collected by Community-based Monitoring GroupsFunded by the



Answer Choices	Responses
none	3.85% 1
Temperature	80.77% 21
Dissolved Oxygen	80.77% 21
Salinity	73.08% 19
Sp. Conductivity	30.77% 8
pH	65.38% 17
Secchi Depth	57.69% 15
Light (not secchi depth)	26.92% 7

End Users Opinions of Data Collected by Community-based Monitoring Groups Funded by the

Fecal coliform	61.54%	16
Enterococcus	53.85%	14
E. coli	42.31%	11
Chlorophyll	53.85%	14
Seagrass (eelgrass)	57.69%	15
Macroalgae (seaweed)	46.15%	12
Benthic organisms	50%	13
Diversity indices	53.85%	14
Sediment grain size	34.62%	9
Sediment organic content	26.92%	7
Turbidity	61.54%	16
Current speed / stream flow	38.46%	10
Carbon Dioxide	11.54%	3
Alkalinity	19.23%	5
Hardness	7.69%	2
N - nitrate	50%	13
N - nitrite	46.15%	12
N - ammonium	46.15%	12
N – dissolved organic	42.31%	11
N – total N	65.38%	17
P - phosphate	42.31%	11
P – dissolved organic P	42.31%	11
P – total P	57.69%	15
Sulfide	15.38%	4
Lead	30.77%	8
Copper	30.77%	8
TPH Petroleum ID (alpha)	34.62%	9
PCB's	30.77%	8
Mercury	30.77%	8
Iron	23.08%	6
Chlorine	15.38%	4
Chloride	26.92%	7

Total Respondents: 26

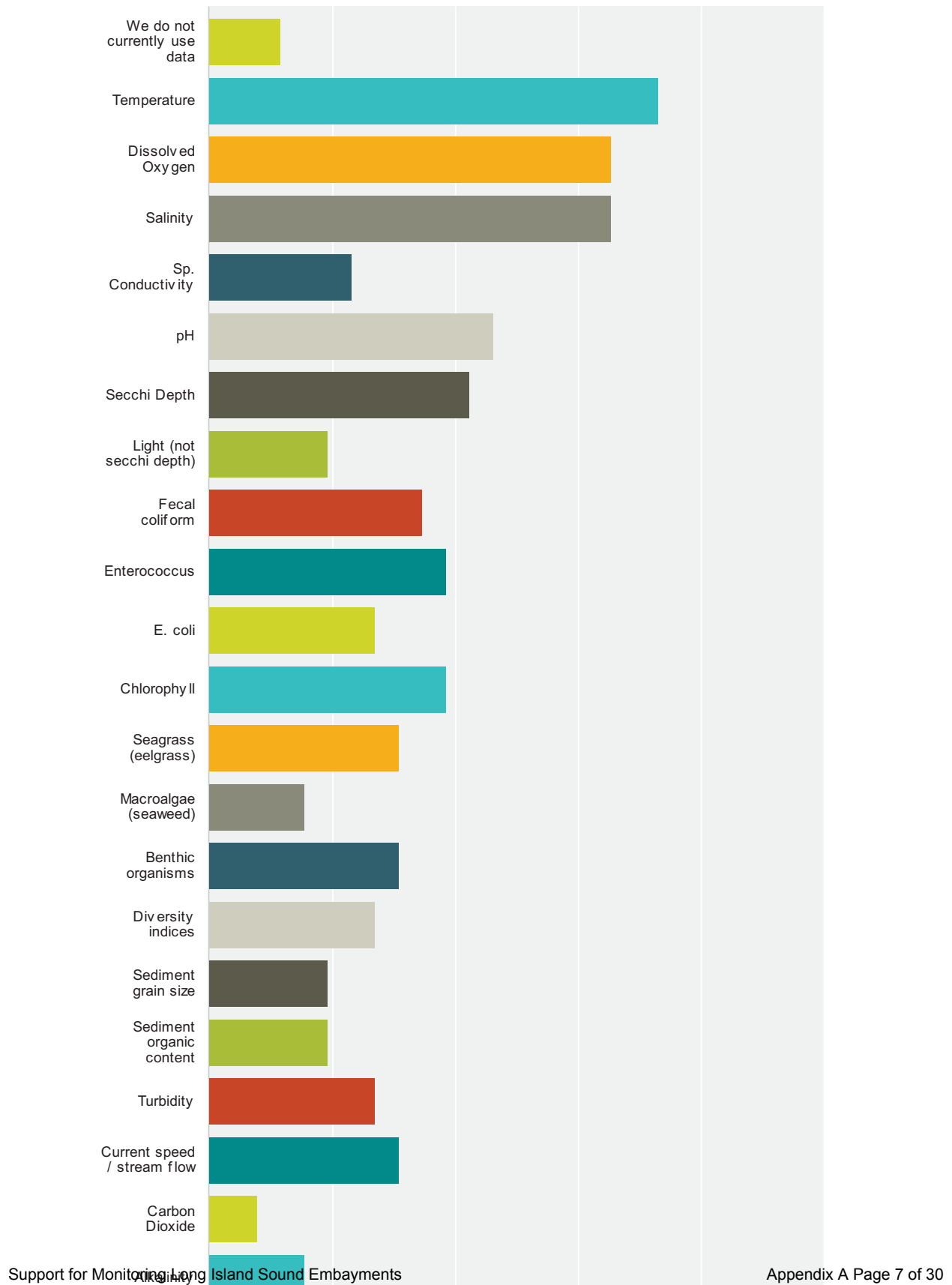
#	Other (please specify)	Date
1	HABs and Phytoplankton!	7/17/2013 4:33 PM
2	sediment pH	7/17/2013 3:52 PM
3	We are more of a data portal to the public and, presumably, we could add fields for any of it. I will email a data sheet separately so you can see what kinds of data our database is currently set up to receive.	5/30/2013 2:50 PM
4	some discussion of silicate/BSi etc.. may be warranted?	5/28/2013 1:12 PM

End Users Opinions of Data Collected by Community-based Monitoring GroupsFunded by the

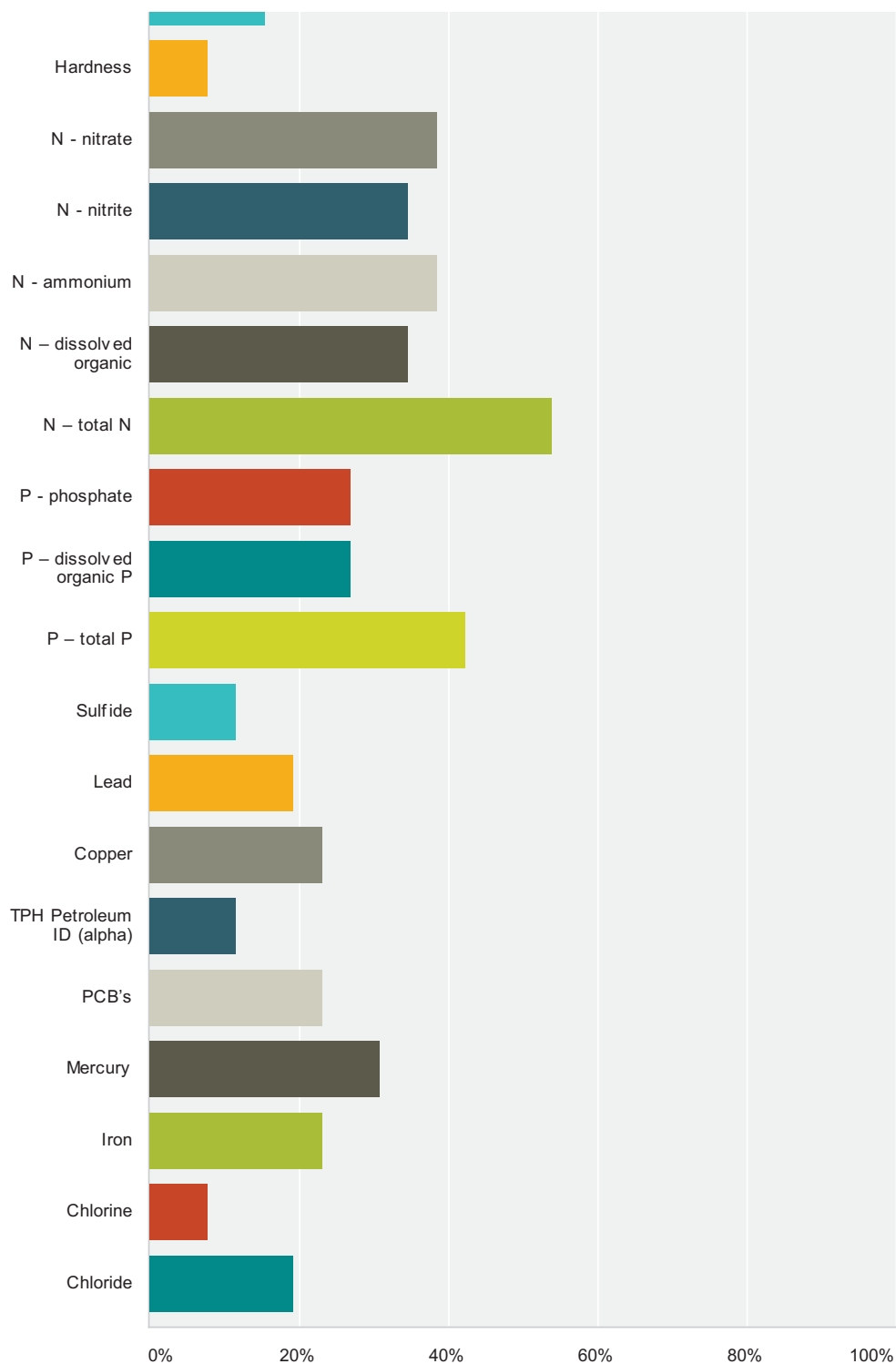
5	specific invertebrates e.g. invasives	5/24/2013 4:43 PM
6	with QAPPS preferred	3/21/2013 4:11 PM
7	juvenile finfish surveys of inshore areas	3/12/2013 11:30 AM
8	all would be good! nutrients would be helpful now; change in flora or fauna; toxins need to be carefully explained - the idea of legacy in the sediments	3/7/2013 9:41 AM
9	Really depends on the problem of interest.	2/26/2013 3:36 PM
10	esp. sensitivities indicator species, toxicology, water quality indicators; riparian habitat - extent and quality; WQ indicators for river health - any gaps where they can support existing efforts; indicators linked to increased development pressures; tracking of LID; anything linked to human health that can be linked to communications (e.g. NY has a project linking tree canopy to asthma - something the public cares about)	2/25/2013 4:05 PM
11	particulates, total & organic	2/22/2013 9:47 AM
12	PAHs, pesticides	2/21/2013 12:33 PM

Q5 What data do you currently use? This question refers to any data you may use: from your organization, other organizations, or community based monitoring groups.

Answered: 26 Skipped: 1



End Users Opinions of Data Collected by Community-based Monitoring GroupsFunded by the



Answer Choices	Responses	
We do not currently use data	11.54%	3
Temperature	73.08%	19
Dissolved Oxygen	65.38%	17
Salinity	65.38%	17
Sp. Conductivity	23.08%	6
pH	46.15%	12
Secchi Depth	42.31%	11

End Users Opinions of Data Collected by Community-based Monitoring GroupsFunded by the

Light (not secchi depth)	19.23%	5
Fecal coliform	34.62%	9
Enterococcus	38.46%	10
E. coli	26.92%	7
Chlorophyll	38.46%	10
Seagrass (eelgrass)	30.77%	8
Macroalgae (seaweed)	15.38%	4
Benthic organisms	30.77%	8
Diversity indices	26.92%	7
Sediment grain size	19.23%	5
Sediment organic content	19.23%	5
Turbidity	26.92%	7
Current speed / stream flow	30.77%	8
Carbon Dioxide	7.69%	2
Alkalinity	15.38%	4
Hardness	7.69%	2
N - nitrate	38.46%	10
N - nitrite	34.62%	9
N - ammonium	38.46%	10
N – dissolved organic	34.62%	9
N – total N	53.85%	14
P - phosphate	26.92%	7
P – dissolved organic P	26.92%	7
P – total P	42.31%	11
Sulfide	11.54%	3
Lead	19.23%	5
Copper	23.08%	6
TPH Petroleum ID (alpha)	11.54%	3
PCB's	23.08%	6
Mercury	30.77%	8
Iron	23.08%	6
Chlorine	7.69%	2
Chloride	19.23%	5
Total Respondents: 26		

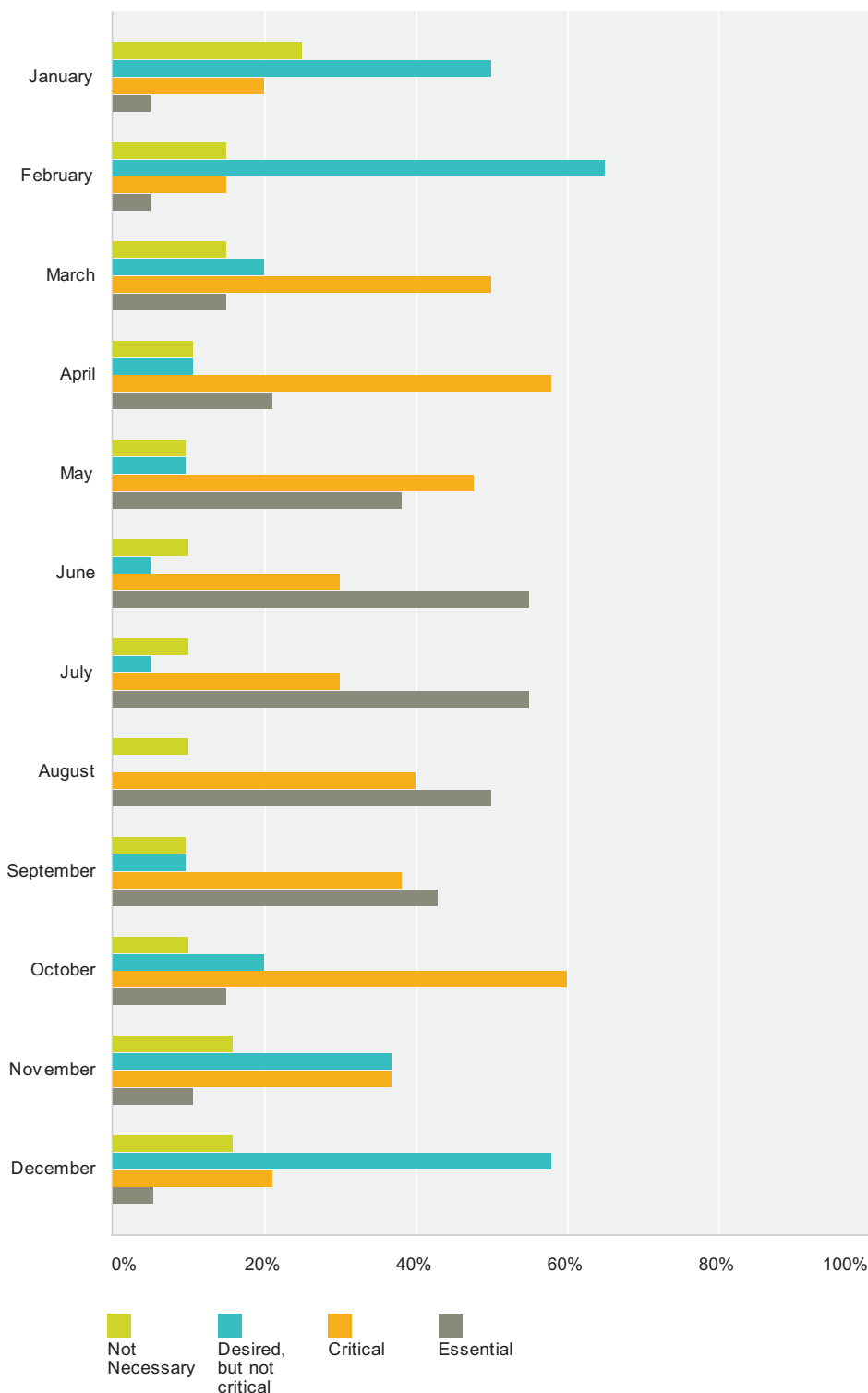
#	Other (please specify)	Date
1	HABs and phytoplankton	7/17/2013 4:33 PM
2	We are not a data user per se unless we get special requests/projects.	5/30/2013 2:50 PM
3	BOD; rainfall data/metero/climate data	3/21/2013 4:11 PM

End Users Opinions of Data Collected by Community-based Monitoring GroupsFunded by the

4	toxicology , fauna surveys	2/25/2013 4:05 PM
5	sentinel monitoring program has assembled long term data trends	2/25/2013 11:50 AM
6	Salt marsh and coastal forest vegetation	2/22/2013 3:15 PM
7	particulates, total & organic	2/22/2013 9:47 AM
8	I have highlighted the broadest list that is used in comprehensive environmental indicator efforts	2/20/2013 10:13 AM

Q6 Many community monitoring groups work primarily in the summer months. However, these groups are often willing to sample year round, if the need exists. Please rank the importance of obtaining data during each month.

Answered: 22 Skipped: 5

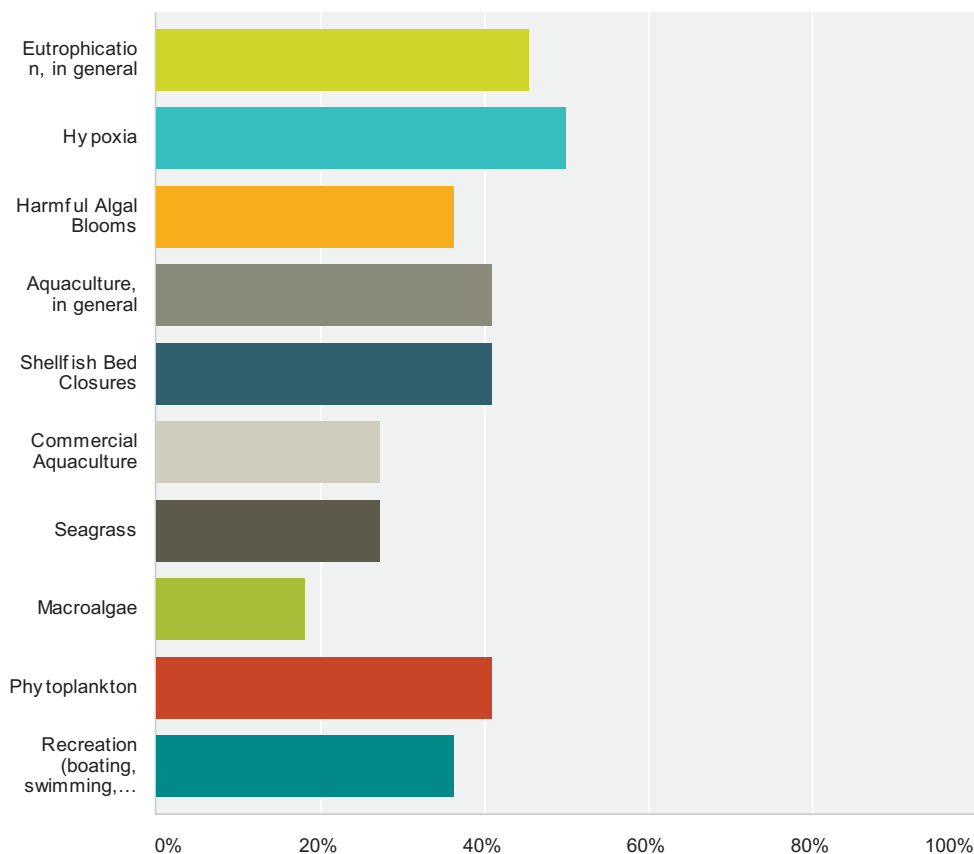


End Users Opinions of Data Collected by Community-based Monitoring GroupsFunded by the

January	43% 5	50% 10	40% 4	5% 1	20
February	15% 3	65% 13	15% 3	5% 1	20
March	15% 3	20% 4	50% 10	15% 3	20
April	10.53% 2	10.53% 2	57.89% 11	21.05% 4	19
May	9.52% 2	9.52% 2	47.62% 10	38.10% 8	21
June	10% 2	5% 1	30% 6	55.00% 11	20
July	10% 2	5% 1	30% 6	55.00% 11	20
August	10% 2	0% 0	40% 8	50% 10	20
September	9.52% 2	9.52% 2	38.10% 8	42.86% 9	21
October	10% 2	20% 4	60% 12	15% 3	20
November	15.79% 3	36.84% 7	36.84% 7	10.53% 2	19
December	15.79% 3	57.89% 11	21.05% 4	5.26% 1	19

Q7 When answering the previous question, which of the following areas of interest were you considering?

Answered: 22 Skipped: 5



Answer Choices	Responses
Eutrophication, in general	45.45% 10
Hypoxia	50% 11
Harmful Algal Blooms	36.36% 8
Aquaculture, in general	40.91% 9
Shellfish Bed Closures	40.91% 9
Commercial Aquaculture	27.27% 6
Seagrass	27.27% 6
Macroalgae	18.18% 4
Phytoplankton	40.91% 9
Recreation (boating, swimming, fishing, Shellfishing)	36.36% 8
Total Respondents: 22	

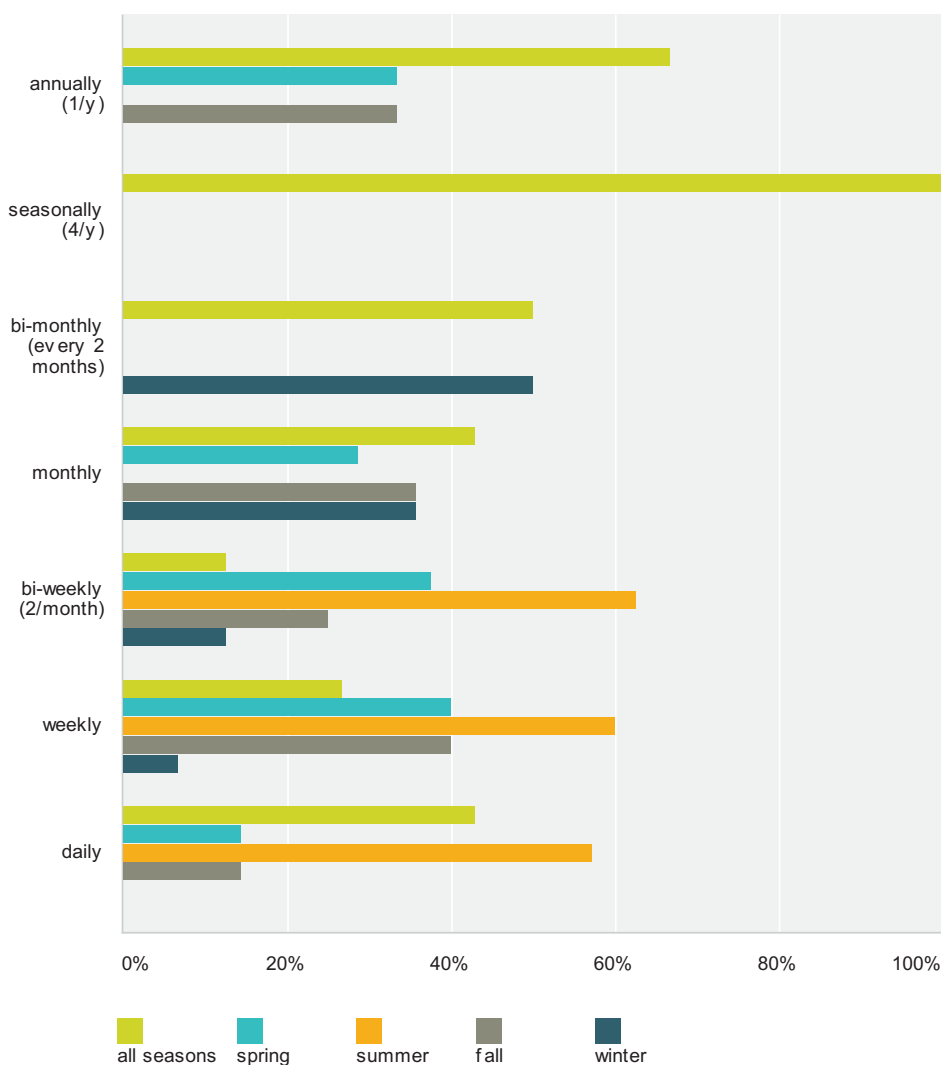
#	Other (please specify)	Date
1	Hmmmm...not sure about how to interpret Critical and Essential. I collect water for fecal coliform analysis several times per month, every month of the year	7/17/2013 4:07 PM
2	Please disregard answer above - was forced to check a box.	5/30/2013 2:53 PM

End Users Opinions of Data Collected by Community-based Monitoring GroupsFunded by the

3	Fish passage	5/29/2013 4:51 PM
4	invasives	5/24/2013 4:47 PM
5	more data is nice for temporal trends, but monitoring could be alternated to allow for better analysis of available data among sources	3/21/2013 4:19 PM
6	As noted, we're interested in relating our land cover to WQ parameters; as far as coastal waters go this would be mostly N, which of course relates to hypoxia and algal blooms.	3/11/2013 8:43 AM
7	Beach closures is number 1	3/7/2013 10:04 AM
8	Really thinking about freshwater inputs to estuaries, from the perspective of my work.	2/26/2013 3:44 PM
9	fauna, toxicology	2/25/2013 4:05 PM
10	general pollution, especially sewage and run-off which degrades water quality	2/23/2013 6:49 PM

Q8 What temporal frequency of sampling would you like to see? Please note that you have the option of indicating different frequencies for different seasons.

Answered: 22 Skipped: 5



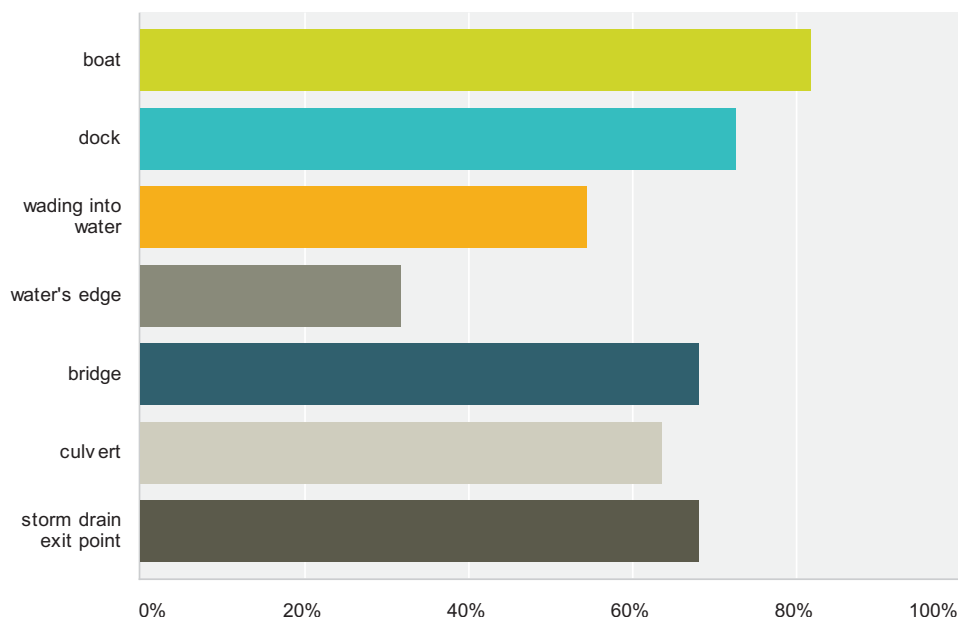
	all seasons	spring	summer	fall	winter	Total Respondents
annually (1/y)	66.67% 2	33.33% 1	0% 0	33.33% 1	0% 0	3
seasonally (4/y)	100% 5	0% 0	0% 0	0% 0	0% 0	5
bi-monthly (every 2 months)	50% 2	0% 0	0% 0	0% 0	50% 2	4
monthly	42.86% 6	28.57% 4	0% 0	35.71% 5	35.71% 5	14
bi-weekly (2/month)	12.50% 1	37.50% 3	62.50% 5	25% 2	12.50% 1	8
weekly	26.67% 4	40% 6	60% 9	40% 6	6.67% 1	15
daily	42.86% 3	14.29% 1	57.14% 4	14.29% 1	0% 0	7

End Users Opinions of Data Collected by Community-based Monitoring GroupsFunded by the

#	Other (please specify)	Date
1	really , the frequency depends on the particular data being collected. I could use coliform data monthly all year, but don't need macroalgae that frequently .	7/17/2013 4:07 PM
2	Please disregard answer above - was forced to check a box.	5/30/2013 2:53 PM
3	For our purposes, temporally denser sampling in smaller areas would be preferable to infrequent sampling in larger areas.	3/11/2013 8:43 AM
4	Monthly sampling supplemented with storm event sampling	2/26/2013 3:44 PM
5	really depends on the research question - e.g. piping plover - who shows up, # fledged, etc. - ask the mentor	2/25/2013 4:05 PM
6	it depends on the output desired (public health outputs may require higher sampling frequencies than sentinel monitoring for climate cahnge indicators	2/25/2013 11:57 AM

Q9 Are you willing to use data collected from the following locations? If there are restrictions on the type of sampling, please note in the text box provided. For example, you may be interested in temperature data from a dock, but not nutrient data.

Answered: 22 Skipped: 5



Answer Choices	Responses
boat	81.82% 18
dock	72.73% 16
wading into water	54.55% 12
water's edge	31.82% 7
bridge	68.18% 15
culvert	63.64% 14
storm drain exit point	68.18% 15
Total Respondents: 22	

#	Other (please specify)	Date
1	depends on what type of data they are collecting	7/17/2013 4:35 PM
2	catch basin, WPCF outfall	7/15/2013 4:27 PM
3	All of the data are useful for different objectives. The volunteer group should specify the intended use of the data as well as include other associated metadata such as the depth of the sampling location, presence of waterfowl, tide stage, which bank if a river station, etc.	5/30/2013 3:56 PM
4	Please disregard answer above - was forced to check a box.	5/30/2013 2:53 PM
5	exception may be sediment/tss data; if appropriate context provide for sampling location--ok	3/21/2013 4:19 PM
6	boat is good - middle of harbors; but influenced by my training at Save the Sound - wading into water or hanging off bridge seems suspect; but if a scientist showed OK, I'm open to it	3/7/2013 10:04 AM
7	Depends on the problem. Typically water chemistry would not be good from a dock.	2/26/2013 3:44 PM

End Users Opinions of Data Collected by Community-based Monitoring GroupsFunded by the

8	would take any data collected according to protocol	2/25/2013 4:05 PM
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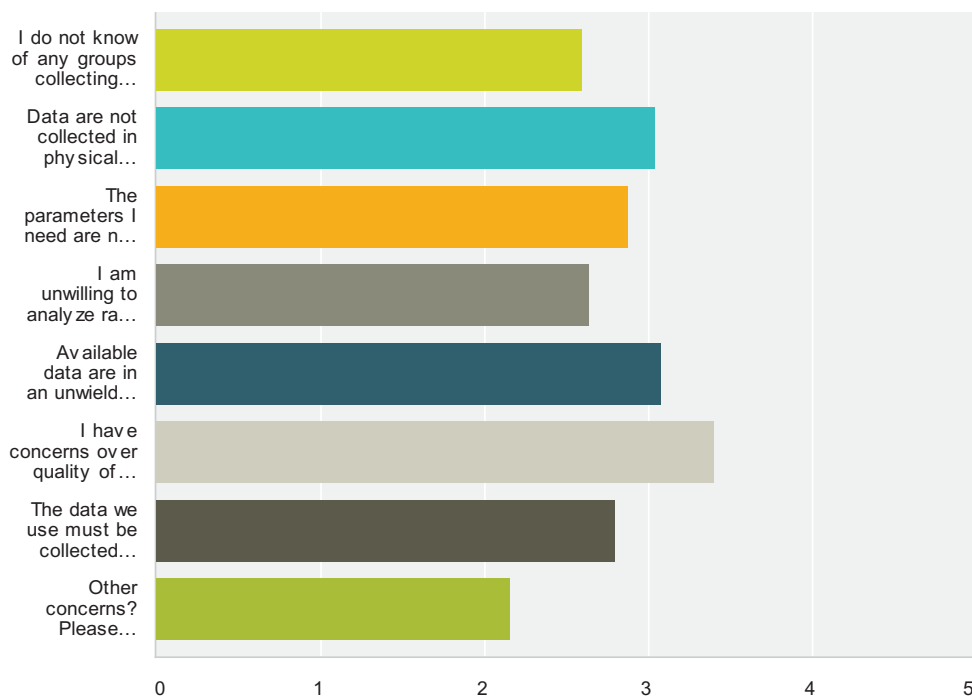
Q10 Do you have any suggestions or requirements for the spatial extent of sampling? For example, the number of stations per given area.

Answered: 22 Skipped: 5

#	Responses	Date
1	Have enough samples to measure significant changes or trends	7/18/2013 2:57 PM
2	I would prefer to see a minimum of 2 samplings per area.	7/18/2013 8:33 AM
3	We use many different types of data and the spatial extent would depend on the specific type of sample that was being collected.	7/17/2013 4:35 PM
4	Sure, I always need data at more locations than is reasonable to collect. Stonington has a long coastline, with two significant rivers and many embayments. I try to target areas of particular interest and stay within the capabilities of the Monitoring Group.	7/17/2013 4:07 PM
5	mouths of rivers and every half mile up, at any point source (outfall/discharge pipe), at potential pollution source sites (shoreline sewage pumping stations), at tributaries entering, outside marinas/mooring fields, across depth contours every 10-20 feet out, or out as dye dilution studies show outgoing tidal impacts	7/15/2013 4:27 PM
6	You can't require a minimum number of stations per given area. It is better to request that the spatial extent of the sampling stations be representative of the area. In river systems for example, try to bracket potential pollution sources or known changes like a physical structure (dam). In estuarine areas, the coverage needs to include open deep water/channel areas as well as the easy areas off docks. Of course you may have to combine sampling types (docks in conjunction with boats and it may not be necessary to do both types of surveys every time). Unfortunately I think you really have to look at each waterbody on a case by case basis.	5/30/2013 3:56 PM
7	n/a	5/30/2013 2:53 PM
8	We base our decision making on size of watershed, existing data collection stations and other opportunities (e.g. suspected impacts from outfalls)	5/29/2013 4:51 PM
9	consistency...	5/28/2013 1:14 PM
10	I don't have requirements but would like to see at least 2 sites one near the head waters and one closer to the mouth of the harbor	5/28/2013 9:04 AM
11	Depends on the sediment type present and the depth	5/24/2013 4:47 PM
12	Just that spatial extent should be sufficient to resolve and gradients.	5/24/2013 12:34 PM
13	desirably 3- ...and use of transects/depending on width and depth.	3/21/2013 4:19 PM
14	Number of stations may vary by location in order to assure representative sampling.	3/12/2013 11:34 AM
15	culverts and drains are pretty specific locations. It would be nice to cover one or more "drainage sheds"	3/11/2013 8:43 AM
16	At Save the Sound, they used the navigational buoys as stations - in the harbor, 5-6 spots.	3/7/2013 10:04 AM
17	I don't think there are general recommendations for this. Depends on the problem being researched, and whether the goal is a snapshot in time, or a fixed site for doing trend analysis. Also depends a lot on the physical properties of the estuary.	2/26/2013 3:44 PM
18	No - just that groups follow established protocol and meet with a mentor in a specific area. How good does the data need to be - peer reviewed journals, other uses - needs to be considered.	2/25/2013 4:05 PM
19	no	2/25/2013 11:57 AM
20	This would have to be based on a lot of different factors that I will leave to the experts.	2/25/2013 9:14 AM
21	2-4 stations per waterbody	2/23/2013 6:49 PM
22	Depends on area and what is being sampled.	2/22/2013 3:18 PM

Q11 What are the main barriers to your use of community monitoring data? Please rate the following. If other concerns prevent you from using community based data, please enter these in the comment box provided.

Answered: 25 Skipped: 2



	considerable barrier	moderate barrier	some barrier	little barrier	no barrier	Total	Average Rating
I do not know of any groups collecting data, I lack the contacts to reach these people.	16% 4	4% 1	36% 9	12% 3	32% 8	25	2.60
Data are not collected in physical locations of interest to me.	16% 4	24% 6	28.00% 7	12% 3	20% 5	25	3.04
The parameters I need are not collected (e.g. salinity).	8% 2	16% 4	48% 12	12% 3	16% 4	25	2.88
I am unwilling to analyze raw data belonging to another group.	16% 4	20% 5	12% 3	16% 4	36% 9	25	2.64
Available data are in an unwieldy format, takes too long to analyze.	20% 5	24% 6	20% 5	16% 4	20% 5	25	3.08
I have concerns over quality of the data.	32% 8	12% 3	36% 9	4% 1	16% 4	25	3.40
The data we use must be collected under an EPA approved QAPP.	28.00% 7	8% 2	16% 4	12% 3	36% 9	25	2.80
Other concerns? Please describe in the comment box.	20% 5	4% 1	12% 3	0% 0	64% 16	25	2.16

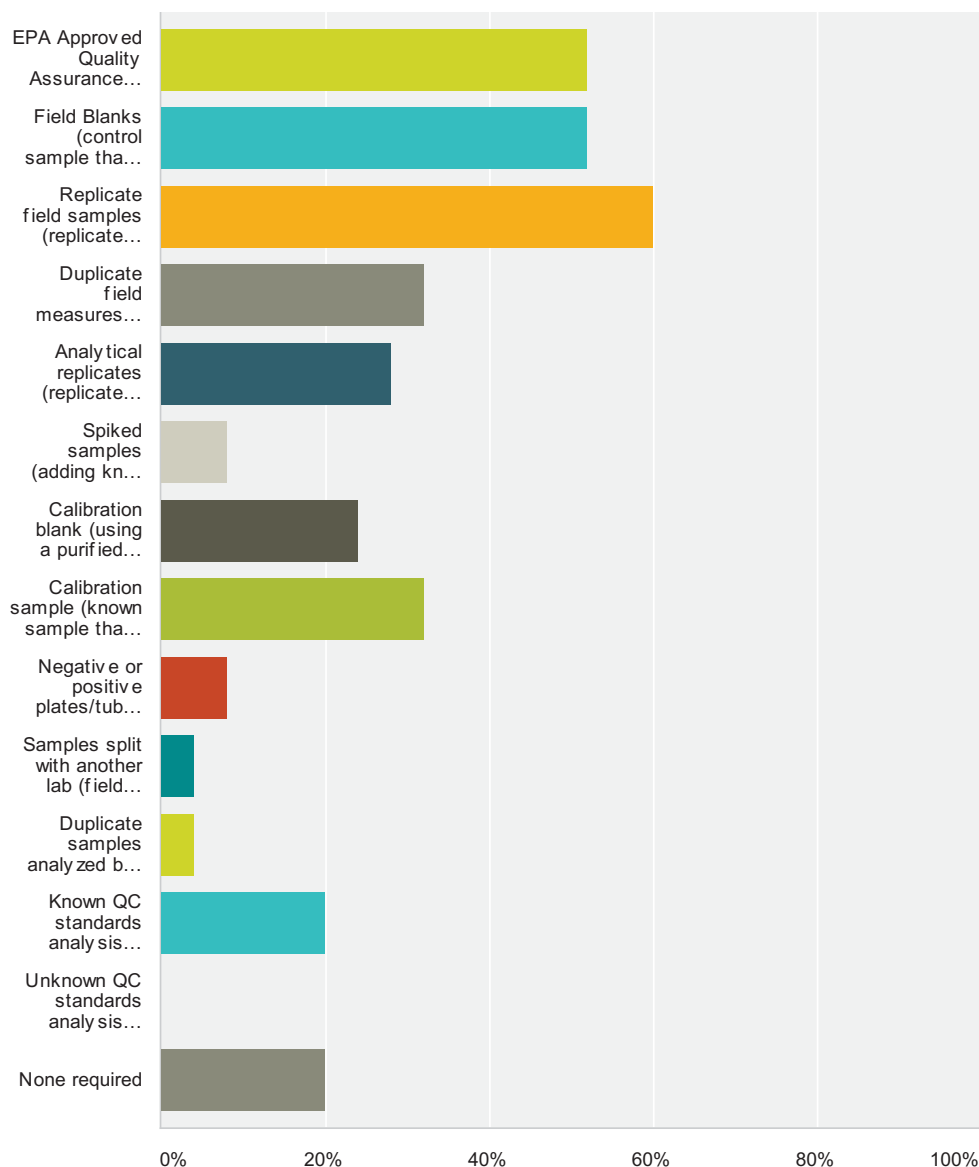
#	Comments for "I do not know of any groups collecting data, I lack the contacts to reach these people."	Date
1	Not aware of all data collected but generally accessible	5/29/2013 4:52 PM
2	qapp	3/21/2013 4:22 PM
3	No one working in Mamaroneck, or Westchester in general. As an elected official, she would be happy to publicize the data.	3/7/2013 10:04 AM

End Users Opinions of Data Collected by Community-based Monitoring Groups Funded by the

#	Centralized list of data, source of data	2/22/2013 9:41 AM
5	There are a handful of groups that are active and sustaining.	2/20/2013 10:19 AM
#	Comments for "Data are not collected in physical locations of interest to me."	Date
1	I would need data collected throughout the Sound in order for it to be useful to me	2/21/2013 10:03 AM
2	Locations are usually near-shore waters that agency/univeristy monitoring programs do not address.	2/20/2013 10:19 AM
#	Comments for "The parameters I need are not collected (e.g. salinity)."	Date
1	We supplement when needed. E.g. we collect particulates where CUSH samples; chl & partic for where HarborWatch works	2/22/2013 9:47 AM
2	Additional parameters would be helpful.	2/20/2013 10:19 AM
#	Comments for "I am unwilling to analyze raw data belonging to another group."	Date
1	very time consuming to determine the data collection parameters/conditions	7/15/2013 4:30 PM
2	monster barrier - need to have analyzed data for a municipality to use; need some interpretation - Does not need to be perfect science for government to use it.	3/7/2013 10:04 AM
3	I would be willing, but I don't have the expertise and it's not in my "work plan."	2/25/2013 9:17 AM
4	Need is to have a standard format and analysis for all groups.	2/20/2013 10:19 AM
#	Comments for "Available data are in an unwieldy format, takes too long to analyze."	Date
	There are no responses.	
#	Comments for "I have concerns over quality of the data."	Date
1	To be able to use the fecal coliform data I'd have to convince the CT Bureau of Aquaculture to use it. For the other data there is no barrier. CUSH's data are good.	7/17/2013 4:13 PM
2	if/when appropriate meta data and QAPP not provided	3/21/2013 4:22 PM
3	Governments - does not need to be perfect! We can take the citizen scientist data and inform the public - incredibly powerful information.	3/7/2013 10:04 AM
4	if they can quantify the error, I would be more inclined to use it	2/25/2013 4:05 PM
5	the stuff i use is straightforward, people i work with are responsible	2/22/2013 9:47 AM
#	Comments for "The data we use must be collected under an EPA approved QAPP."	Date
1	I don't know their QAPP well enough to comment	7/17/2013 4:13 PM
2	depends on objective of data use	3/21/2013 4:22 PM
3	local groups have shown the ability to develop a QAPP.	2/20/2013 10:19 AM
#	Comments for "Other concerns? Please describe in the comment box."	Date
1	Quality samples are important	7/18/2013 3:00 PM
2	Quality Control and QC for bacterial monitoring are critical to be used in shellfish program database. We have not used phytoplankton monitoring data from community monitoring groups in the past, however because we have a public health related mission, the training needs to be comprehensive and we still need to follow-up on any species of concern.	7/17/2013 4:38 PM
3	not knowing what is collected and where	5/28/2013 9:07 AM
4	have not seen the training	5/24/2013 4:48 PM
5	single sample datasets	3/21/2013 4:22 PM
6	Any data is better than none!	3/7/2013 10:04 AM
7	I do not use this data personally so these are not barriers to my utilization	2/25/2013 12:00 PM
8	More funding should be given to the analysis of data, not just the collection. Synthesis is so important.	2/25/2013 9:17 AM
9	data transfer issues (large files)	2/21/2013 12:36 PM
10	data needs to be collected temporally as well as spatially	2/21/2013 10:03 AM
11	Need for centralized, quality controlled analysis and presentation of data.	2/20/2013 10:19 AM

Q12 What type of quality assurance and quality control would you require in order to use community monitoring data?

Answered: 25 Skipped: 2



Answer Choices	Responses	
EPA Approved Quality Assurance Project Plan (QAPP)	52%	13
Field Blanks (control sample that accounts for contamination from collection procedure)	52%	13
Replicate field samples (replicate samples collected same place, same time)	60%	15
Duplicate field measures (replicate field measurements; same place, same time)	32%	8
Analytical replicates (replicate analyses of same sample)	28.00%	7
Spiked samples (adding known amount of substance to sample to account for degradation)	8%	2
Calibration blank (using a purified matrix to set zero point)	24%	6
Calibration sample (known sample that is run periodically to ensure equipment consistency)	32%	8
Negative or positive plates/tubes (presence/absence compared to expected)	8%	2

End Users Opinions of Data Collected by Community-based Monitoring Groups Funded by the

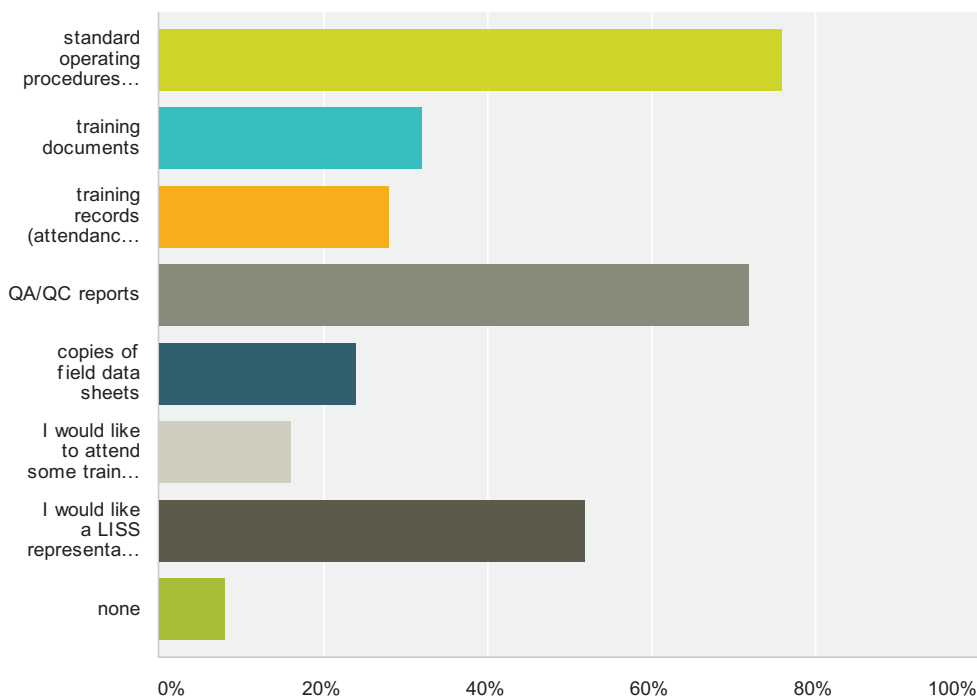
Samples split with another lab (field samples split and analyzed by different labs)	4%	1
Duplicate samples analyzed by another lab (duplicate field samples analyzed by different labs)	4%	1
Known QC standards analysis (running standards to establish a calibration curve)	20%	5
Unknown QC standards analysis (calibration standards included blindly in analysis)	0%	0
None required	20%	5

Total Respondents: 25

#	Other (please specify)	Date
1	Except for fecal coliform data	7/17/2013 4:14 PM
2	I wouldn't say I would require all of these, but if an organization had all of these it would elevate the quality of their data and my confidence in it, as well as change the way I use the data.	5/30/2013 3:59 PM
3	Data entered into our database can be designated as QAPP or non-QAPP.	5/30/2013 2:54 PM
4	Depends on application	5/29/2013 4:53 PM
5	very little - I would be looking for is the QA/QC - if they can explain it, that would bolster the data for me	3/7/2013 10:04 AM
6	want some sort of reputable quality check - a research scientist saying they would use the data	2/25/2013 4:05 PM
7	more a matter of seeing that they are doing that type of stuff, than checking on the data specifically - it shows they are careful and conscientious	2/22/2013 9:47 AM
8	we would prefer data with a QAPP; but can utilize data of lesser quality if need be	2/21/2013 12:41 PM
9	I don't have the expertise to know about qc controls other than the EPA QAPP	2/21/2013 10:04 AM

Q13 What information and level of oversight would you require in order to use data collected by community-based groups?

Answered: 25 Skipped: 2

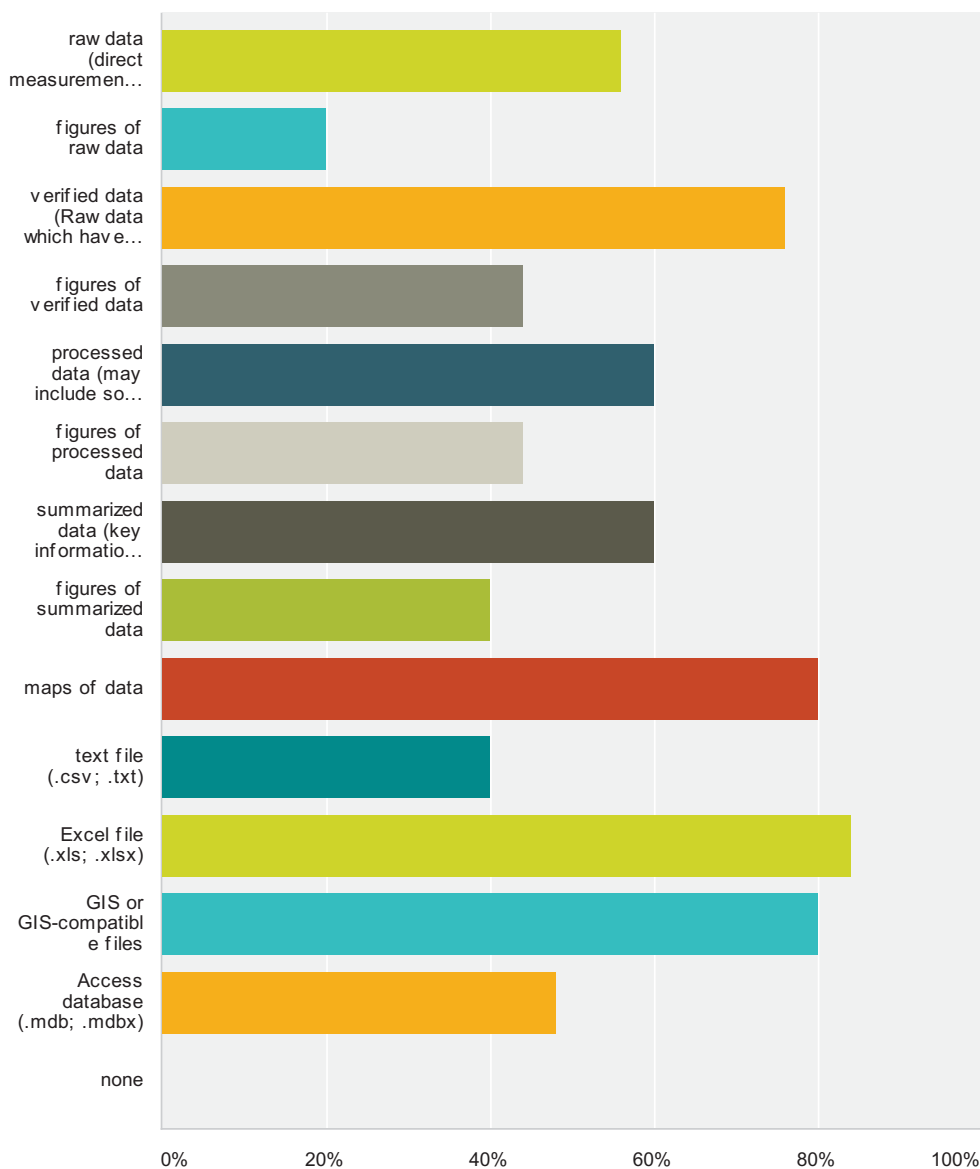


Answer Choices	Responses	
standard operating procedures document	76%	19
training documents	32%	8
training records (attendance, agenda)	28.00%	7
QA/QC reports	72%	18
copies of field data sheets	24%	6
I would like to attend some training events to verify procedures	16%	4
I would like a LISS representative to attend some training events to verify procedures	52%	13
none	8%	2
Total Respondents: 25		

#	Other (please specify)	Date
1	Again I would like to see these but not require all of them.	5/30/2013 3:59 PM
2	id be interested in attending training events for consistency of procedures purpose	3/21/2013 4:24 PM
3	Back-up data, in the beginning - once I know the group, would not need to see SOPs and training info. Want someone from LISS telling me they are a bonafide trained group	3/7/2013 10:04 AM
4	would like a standardized program for protocols	2/25/2013 4:05 PM
5	I would have to default to whatever the EPA requires, since they're the funding agency .	2/25/2013 9:19 AM
6	we would prefer these types of data	2/21/2013 12:41 PM
7	The control procedures would be established in the QAPP. Occasional quality audits to assure QAPP is being implemented is valuable.	2/20/2013 10:22 AM

Q14 One issue encountered when working with community-based monitoring data is the lack of a standard format among groups. As part of this project, one recommendation for the Long Island Sound Study will be the establishment of a centralized database where groups may enter their data and view data from around Long Island Sound. Please check all of the data products and data formats you are likely to use.

Answered: 25 Skipped: 2



Answer Choices	Responses	
raw data (direct measurements, includes all replicates; checked for data entry errors)	56.00%	14
figures of raw data	20%	5
verified data (Raw data which have been checked for methodological errors)	76%	19

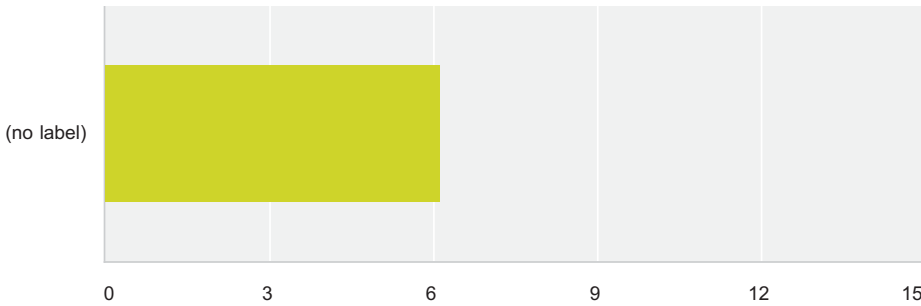
End Users Opinions of Data Collected by Community-based Monitoring Groups Funded by the

figures of verified data	44%	11
processed data (may include some averaging of spatial, temporal, or methodological replicates)	60%	15
figures of processed data	44%	11
summarized data (key information selected from the larger data set)	60%	15
figures of summarized data	40%	10
maps of data	80%	20
text file (.csv; .txt)	40%	10
Excel file (.xls; .xlsx)	84%	21
GIS or GIS-compatible files	80%	20
Access database (.mdb; .mdbx)	48%	12
none	0%	0
Total Respondents: 25		

#	Other (please specify)	Date
1	Prefer QA/QD data in raw format. Figures and graphs are subject to teh organizations interpretations and may not be appropriate for my use. That's not to say they shouldn't continue to produce these and I wouldn't ever look at them. I will, but would also request follow up data files.	5/30/2013 4:01 PM
2	data dictionaries	3/21/2013 4:25 PM
3	"old people want text"	3/7/2013 10:04 AM
4	great if publicly available & protected data, so you can't change; don't want to have to contact webmaster for a password or broken links. Needs to be standardized and user-friendly - this requires a huge effort, right up front.	2/25/2013 4:08 PM
5	I'd take a text file at this point, other data types would be nice.	2/22/2013 9:47 AM
6	For purposes of reporting environmental conditions, our most likely used products are maps and figures of synthesized data.	2/20/2013 10:26 AM

Q15 Where do you fall along the continuum of desiring more data vs. concerns over data quality?

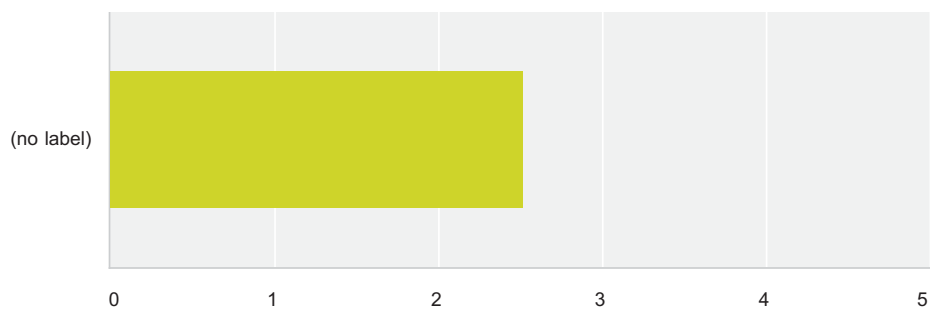
Answered: 25 Skipped: 2



	More Data is most important	(no label)	(no label)	(no label)	(no label)	(no label)	(no label)	(no label)	Data Quality is most important	Total	Average Rating
(no label)	4% 1	4% 1	12% 3	8% 2	12% 3	8% 2	12% 3	20% 5	20% 5	25	6.12

Q16 How interested are you in obtaining access to community-based monitoring data?

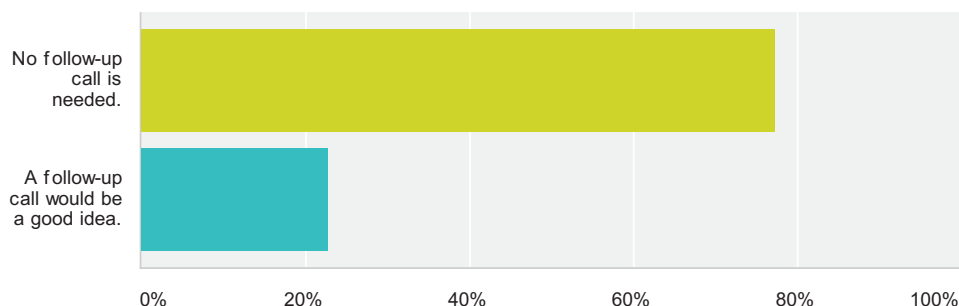
Answered: 25 Skipped: 2



	Very Interested	(no label)	(no label)	(no label)	(no label)	(no label)	(no label)	(no label)	Not Interested	Total	Average Rating
(no label)	56.00% 14	8% 2	16% 4	0% 0	0% 0	8% 2	12% 3	0% 0	0% 0	25	2.52

Q17 Recognizing that you may not have had the time or inclination to type all of your comments in the survey, please let us know if we should follow-up with you to get additional comments.

Answered: 22 Skipped: 5



Answer Choices	Responses
No follow-up call is needed.	77.27% 17
A follow-up call would be a good idea.	22.73% 5
Total Respondents: 22	

#	Other (please specify)	Date
1	I'd be happy to talk to you, however.	7/17/2013 4:16 PM
2	A follow up call would be OK.	5/30/2013 4:02 PM
3	Call if I can clarify anything	3/12/2013 11:44 AM
4	Totally up to you, would be glad to talk if you want.	3/11/2013 8:47 AM
5	But feel free to call or e-mail if clarification is needed.	2/25/2013 9:22 AM
6	If you have any questions about my answers, please give me a call 860 405-9106	2/22/2013 3:23 PM
7	For the LISS sentinel monitoring groups, developing a long-term database in embayments is critical. We have very little data for these places. 2. As for timing, monthly on an annual basis is ideal, with more frequent in summer. But even a few times in the winter can be useful.	2/22/2013 9:49 AM
8	if you wish additional information please call	2/21/2013 12:42 PM
9	I'd be happy to discuss.	2/20/2013 10:27 AM

Q18 Thank you for completing the survey. If you would like to discuss any of these questions, your responses, or if you have additional comments, please contact: Jamie Vaudrey Department of Marine Sciences University of Connecticut jamie.vaudrey@uconn.edu 860-405-9149 Jamie Vaudrey may contact you with follow-up questions. Please add any additional comments below, on any topic.

Answered: 10 Skipped: 17

#	Responses	Date
1	Thank you for letting our department participate in the survey.	7/18/2013 3:03 PM
2	Nice survey!	5/30/2013 2:55 PM
3	Survey doesn't ask where the very large honorarium promised should be sent....	5/28/2013 1:18 PM
4	Great survey, i think covered alot of concerns from both end-users and will help balance those challenges faced by those collecting the data.	3/21/2013 4:27 PM
5	Not to side step water quality but there is a need to collect juvenile finfish data for inshore areas. CTDEP collected such data in the 1990's at five (?) locations. HW/RW continues to collect this data at two locations. They have found a concerning decline in the abundance and diversity of juvenile finfish. A return to the sites sampled by CTDEP may yield some very useful information.	3/12/2013 11:44 AM
6	Good survey - helped me think about it in a way that is more rationale. Just hope there are other end-users that are having the same response as I am - the need to get the data collected and make it available.	3/7/2013 10:05 AM
7	Need to identify key parameters for monitoring groups - then every group uses these, so you get longevity and consistency. Would like to see a few people setting the rules for what is considered good data, so that the rest of us can feel comfortable using the data. This is a great project - getting people involved, improving communication among various sectors. The resulting data have the potential to inform current projects and stimulate ideas for new projects.	2/25/2013 4:08 PM
8	I deal with collecting information from NYS (mostly) for the environmental indicators program, so I have some dabbling in data, but, unfortunately, I am not completely emmersed in data needs for neither LISS nor NYS. I may be able to comment a little bit on the needs of NYSDEC's Bureau of Marine Resources, but not much. From a climate change perspective (I've been heavily involved in the sentinel monitoring program), I think we really need to start bringing the data together and making sense of it across the entirety of LIS.	2/25/2013 9:22 AM
9	Suggestion - develop a bank of samples that are stored, but not necessarily analyzed. This allows for going back and testing, if you see something interesting. Example: filter water on poly carbonate filter, store in a lysis buffer at -80C.	2/22/2013 9:49 AM
10	I am interested in embayment data, regardless of who does the sampling. It could be citizen volunteers, universities, environmental organizations or local and state governments.	2/21/2013 10:09 AM

Clean Up Sound and Harbors (CUSH)

type: community based
organization location: Stonington, CT
currently monitoring: Yes
monitoring sites: Stonington Harbor & Mystic Harbor
number of years monitoring: 4.5
monitoring frequency: biweekly, monthly, and after significant rainfall

PROGRAM GOALS: Long Term water quality; pollution

PERCEIVED GAPS IN MONITORING EFFORTS: would like to monitor more coves, embayments and freshwater feeders

PERSONNEL

paid staff: 2
volunteers: 25
students: 10
other: 250 members, board members

number involved in a single monitoring event: 30

Clean Up Sound and Harbors (CUSH) - continued

PROGRAM DEVELOPMENT

initial program development assistance: URIWW (URI Watershed Watch...~25 years old and assist with volunteer monitoring)

current program assistance or technical support: URIWW

desired support for the future: Help with source ID methods, data management and communication

TRAINING

description of current training for monitors: Modeled on URIWW

All groups felt that current training was adequate.

desired support for the future: Would like to know what is available.

Clean Up Sound and Harbors (CUSH) - continued

QUALITY CONTROL PROTOCOLS

utilize a QAPP: yes
interested in obtaining a QAPP:

location where samples analyzed: URIWW, Phoenix Lab, Uconn

quality control measures employed:

- Field Blanks
- X Replicate field samples
- X Duplicate field measures
- X Analytical replicates
- Spiked samples
- X Calibration blank
- X Calibration sample
- Negative or positive plates/tubes
- Samples split with another lab
- Duplicate samples analyzed by another lab
- X Known QC standards analysis
- Unknown QC standards analysis

CONCERNS

Community support for monitoring effort	minor	Need more dedicated volunteers
Legal access to monitoring sites	minor	Occasionally a problem
Loss of volunteer motivation over time	major	Lots of attrition
Perceived credibility of data	none	
Staffing numbers (<i>e.g. too many, too few</i>)	none	
Equipment (<i>e.g. type, amount</i>)	minor	Supplies as we expand

Clean Up Sound and Harbors (CUSH) - continued

CONCERNS (continued)

Funding support (<i>e.g. stability, quantity</i>)	major	Funding Sources: LISSFF, Sea Grant, Local businesses
Monitoring expertise	none	
Liability	major	Nobody signs waivers!
Other issues / concerns:	minor	Have found absolute need for oversight of collections, records, weather/tide information
Other issues / concerns:	major	Volunteers easily lose expertise over time without realizing it. How to do refreshers? A fun way to do it? A nice way to suggest it?

DATA MANAGEMENT

data are publicly available:	Yes
if not, the group is willing to make data available:	Yes
manner in which data are shared:	

data are shared with:

EDUCATION and OUTREACH

website	Yes	
social media / email	Yes	
community events	Yes	
workshops	Yes	
school programs	Yes	
publications / other distributed material		
other	Yes	regional database (raw data; not user friendly), give data to DEEP, press coverage

LIS EMBAYMENT MONITORING PROJECT

willing to participate in the project:	Yes
if no, describe why:	

Stream of Sound and Harbor (2007)

Test	YES / NO	Frequency (e.g. daily, weekly, monthly, annually)	Equipment Used (e.g. YSI, Hach, Vernier, LaMotte, Millipore)	QAPP? YES / NO	Location (e.g. lat/long)
Algae					
Alkalinity					
Azithromycin					
Carbon dioxide					
Chloride					
Chlorine					
Chlorophyll	yes	biweekly	filters	yes	saltwater sites
Copper	previously				
Dissolved oxygen	yes	Biweekly	LaMotte Kit	Yes	All sites
<i>E. Coli</i>	yes	Monthly, post rain	Lab Samples	Yes	Freshwater sites
Enterococcus	yes	Monthly, post rain	Lab Samples	Yes	saltwater
Fecal coliform	yes	Monthly, post rain	Lab Samples	Yes	saltwater
Hardness					
Iron					
Lead	previously				
Light (not secchi depth)					
Mercury					
N - ammonium	yes	Monthly, post rain	Lab Samples	Yes	All sites
N - nitrate	yes	Monthly, post rain	Lab Samples	Yes	All sites
N - nitrite	yes	Monthly, post rain	Lab Samples	Yes	All sites
N – total N	yes	Monthly, post rain	Lab Samples	Yes	All sites
N – dissolved organic					
PCB's	sediment, 2011				
pH	Yes	Monthly	Lab samples	Yes	Mystic Harbor Site (URI)
P - phosphate					
P – total P	Yes	Monthly and post-rain	Lab samples	Yes	All sites
P – particulate P					
P – dissolved organic P					
Salinity	Yes	Biweekly	Refractometer	Yes	All sites
Secchi Depth					
Sulfide					
Sp. Conductivity					
Temperature	Yes	Biweekly	Hand-held	Yes	All sites
Petroleum	previously	Occasionally	Lab samples	No	Selected Sites
TSS (EPA)					
Turbidity					
Sediment					
Macroalgae (seaweed)					
Seagrass (eelgrass)					
Benthic organisms					
Diversity indices					
Current speed / stream flow	Yes	Monthly	GWI flow meter	No	Feeder streams

No group monitors: 1,7-DMX, Acetaminophen, Atenolol, Caffeine, Carbamazepine, CDOM (colored dissolved organic matter), Cotinine, Ethylene glycol, N – particulate N, Primidone, Propylene, Surfactants, TSS (alpha), Urobilin

Eastern Connecticut Conservation District

type: community based
organization location: Norwich, CT
currently monitoring: Yes
monitoring sites:
number of years monitoring: 5
monitoring frequency: weekly, monthly, bi-monthly, annual; Project specific (usually short-term)

PROGRAM GOALS: Project-specific

PERCEIVED GAPS IN MONITORING EFFORTS:

PERSONNEL

paid staff: x
volunteers: x
students: x
other:

number involved in a single monitoring event: 10

Eastern Connecticut Conservation District - continued

PROGRAM DEVELOPMENT

initial program development assistance: CTDEEP

current program assistance or technical support: CTDEEP

desired support for the future:

TRAINING

description of current training for monitors: 1 day training on methodology according to approved QAPP

All groups felt that current training was adequate.

desired support for the future: sure

Eastern Connecticut Conservation District - continued

QUALITY CONTROL PROTOCOLS

utilize a QAPP: yes
interested in obtaining a QAPP:

location where samples analyzed: By volunteers at their homes, by an outside lab

quality control measures employed:

- X Field Blanks
- Replicate field samples
- X Duplicate field measures
- Analytical replicates
- Spiked samples
- X Calibration blank
- X Calibration sample
- Negative or positive plates/tubes
- Samples split with another lab
- Duplicate samples analyzed by another lab
- Known QC standards analysis
- Unknown QC standards analysis

CONCERNS

Community support for monitoring effort	major	Our projects rely on volunteer participation to conduct field work
Legal access to monitoring sites	none	
Loss of volunteer motivation over time	major	
Perceived credibility of data	minor	
Staffing numbers (<i>e.g. too many, too few</i>)	none	
Equipment (<i>e.g. type, amount</i>)	minor	

CONCERNS (continued)

Funding Sources:EAA CWA 319 programs, NFWF/LISFF

none

minor

Other issues / concerns:

data are publicly available:	Yes
if not, the group is willing to make data available:	Yes
manner in which data are shared:	

EDUCATION and OUTREACH

website	Yes
social media / email	Yes
community events	Yes
workshops	Yes
school programs	
publications / other distributed material	Yes
other	

willing to participate in the project: Yes
if no, describe why:

Test	YES / NO	Frequency (e.g. daily, weekly, monthly, annually)	Equipment Used (e.g. YSI, Hach, Vernier, LaMotte, Millipore)	QAPP? YES / NO	Location (e.g. lat/long)
Algae					
Alkalinity					
Azithromycin					
Carbon dioxide					
Chloride					
Chlorine					
Chlorophyll					
Copper					
Dissolved oxygen	Yes	monthly	In site	Yes	Project dependent (Amos lake in Preston)
E. Coli	Yes	Weekly-8 weeks	Sent to state	Labs-yes	
Enterococcus					
Fecal coliform					
Hardness					
Iron					
Lead					
Light (not secchi depth)					
Mercury					
N - ammonium					
N - nitrate	Yes	Weekly 8 weeks	Lamotte	Yes	Amos lake Preston
N - nitrite					
N – total N					
N – dissolved organic					
PCB's					
pH	Yes	Weekly, 8 weeks	In site	Yes	Amos Lake
P - phosphate					
P – total P					
P – particulate P					
P – dissolved organic P					
Salinity	Yes	Monthly	In site	Yes	Amos Lake
Secchi Depth	Yes	Weekly, 8 weeks	Secchi disk	Yes	Amos Lake
Sulfide					
Sp. Conductivity	Yes	Monthly	In site	Yes	Amos Lake
Temperature	Yes	Monthly	In site	Yes	Amos Lake
Petroleum					
TSS (EPA)					
Turbidity	Yes	Monthly	In site	Yes	Amos Lake
Sediment					
Macroalgae (seaweed)					
Seagrass (eelgrass)					
Benthic organisms	Yes	Annually	X	Yes	Niantic River watershed, East Lyme Waterford Montville Salem
Diversity indices					
Current speed / stream flow					

No group monitors: 1,7-DMX, Acetaminophen, Atenolol, Caffeine, Carbamazepine, CDOM (colored dissolved organic matter), Cotinine, Ethylene glycol, N – particulate N, Primidone, Propylene, Surfactants, TSS (alpha), Urobilin

Friends of the Bay

type: community based
organization location: Oyster Bay, NY
currently monitoring: Yes
monitoring sites: Cold Spring Harbor, Oyster Bay
number of years monitoring: 13
monitoring frequency: weekly, April - October. Would like to conduct winter monitoring, but it is difficult since they do not have access to a boat in winter.

PROGRAM GOALS: Research Projects, Marina Impacts

PERCEIVED GAPS IN MONITORING EFFORTS: Many gaps: equipment failure/change director (may change what project they want to focus on)

PERSONNEL

paid staff: 1
volunteers: 20
students: 15
other: 2 summer interns

number involved in a single monitoring event: 5

Friends of the Bay - continued

PROGRAM DEVELOPMENT

initial program development assistance: The NYS DEC, Town of Oyster Bay, and Coalition to Save Hempstead Harbor

current program assistance or technical support: The EPA, Coalition to Save Hempstead Harbor

desired support for the future:

TRAINING

description of current training for monitors: On the Job training, same volunteers come back so they don't need that much training.

All groups felt that current training was adequate.

desired support for the future: No

Friends of the Bay - continued

QUALITY CONTROL PROTOCOLS

utilize a QAPP: yes
interested in obtaining a QAPP:

location where samples analyzed: a. Ambient reading: Nassau County Department of Health.
b. Nitrogen taken to analytical chemist

quality control measures employed: X Field Blanks
X Replicate field samples
Duplicate field measures
Analytical replicates
Spiked samples
Calibration blank
X Calibration sample
Negative or positive plates/tubes
Samples split with another lab
Duplicate samples analyzed by another lab
Known QC standards analysis
Unknown QC standards analysis

CONCERNS

Community support for monitoring effort none

Legal access to monitoring sites none

Loss of volunteer motivation over time none

Perceived credibility of data none

Staffing numbers (*e.g. too many, too few*) minor The Executive Director currently does everything. They could use additional staffing.

Equipment (*e.g. type, amount*) minor Comes back to funding. It would be good to have similar equipment to other water quality monitoring programs. This way they would have consistent data and would be able to share resources.

Friends of the Bay - continued

CONCERNS (continued)

Funding support (*e.g. stability, quantity*) major

Monitoring expertise none

Liability none

Other issues / concerns: Money and support. They are frustrated with the grant process for funding the program. The grant process pushes for bigger, better, projects. If monitoring is needed, then money needs to be expanded to do so.

Other issues / concerns: Could use technical support. For example, consultants recommended that FOB stop monitoring site 17. So they have the ability to add new location, but unsure where the new location would be best suited.

DATA MANAGEMENT

data are publicly available: yes
if not, the group is willing to make data available: yes

manner in which data are shared: They have an Intern working on google fusion map. They also publish data in annual report in the website. Data is also available for anyone on request by contacting their office.

data are shared with:

EDUCATION and OUTREACH

website	Yes
social media / email	Yes
community events	Yes
workshops	Yes
school programs	
publications / other distributed material	Yes
other	

LIS EMBAYMENT MONITORING PROJECT

willing to participate in the project: Yes
if no, describe why:

Friends of the Bay

Test	YES	Frequency (e.g. daily, weekly, monthly, annually)	Equipment Used (e.g. YSI, Hach, Vernier, LaMotte, Millipore)	QAPP? YES / NO	Location (e.g. lat/long)
Algae					
Alkalinity	YES				streams and outfall pipes
Azithromycin					
Carbon dioxide					
Chloride					
Chlorine					
Chlorophyll					
Copper	YES				streams and outfall pipes
Dissolved oxygen	YES	Once a week		Yes	open water, streams, and outfall pipes
E. Coli	YES				streams and outfall pipes
Enterococcus	YES				open water
Fecal coliform	YES				open water, streams, and outfall pipes
Hardness	YES				streams and outfall pipes
Iron					
Lead	YES				streams and outfall pipes
Light (not secchi depth)					
Mercury					
N - ammonium	YES				open water, streams, and outfall pipes
N - nitrate	YES				open water, streams, and outfall pipes
N - nitrite					
N – total N	YES	Once a week		Yes	
N – dissolved organic	YES				open water
PCB's					
pH	YES	Once a week		Yes	open water, streams, and outfall pipes
P - phosphate					
P – total P					
P – particulate P					
P – dissolved organic P					
Salinity	YES				open water
Secchi Depth	YES				open water
Sulfide					
Sp. Conductivity	YES				streams and outfall pipes
Temperature	YES	Once a week		Yes	open water, streams, and outfall pipes
Petroleum					
TSS (EPA)	YES				streams and outfall pipes
Turbidity	YES				streams and outfall pipes
Sediment					
Macroalgae (seaweed)					
Seagrass (eelgrass)					
Benthic organisms					
Diversity indices					
Current speed / stream flow					

No group monitors: 1,7-DMX, Acetaminophen, Atenolol, Caffeine, Carbamazepine, CDOM (colored dissolved organic matter), Cotinine, Ethylene glycol, N – particulate N, Primidone, Propylene, Surfactants, TSS (alpha), Urobilin

Coalition to Save Hempstead Harbor and Hempstead Harbor Protection Committee

type: community based
organization location: Sea Cliff, NY
currently monitoring: Yes
monitoring sites: Hempstead Harbor
number of years monitoring: 20
monitoring frequency: most areas weekly, May through October. Every 3 weeks at a minimum.

PROGRAM GOALS: a. Public education & engagement

b. To be able to assist other government agencies with monitoring efforts. For example the HHPC does bacteria testing for the health department and conducts all mid harbor testing. If they did not conduct mid harbor monitoring, it would have stopped. In essence they have filled in a gap with county health department

c. Restoration in Scutters pond. HHPC was able to do pre-sampling , during, and post sampling for stormwater run-off to scutters pond, as far as major contributors

d. helped monitor for opening shellfish beds opening—speed up process for reopening harbor—needed to involve bay mean for testing, IEC, TNH, DEC. DEC initiated testing after Coalition

e. to be able to react quickly for sewage spill—collect samples

PERCEIVED GAPS IN MONITORING EFFORTS: a. Gaps have to do with monetary and technical support. Plankton samples are hard to get analyzed. Right now, Nassau County Health does the testing, but because of staff and brain drain there, it takes a long time, and there are more cuts pending. Just took sample that will stay there for months.

b. Before 1991 the County had a marine biologist and lab

PERSONNEL

paid staff:	1	
volunteers:	15	
students:	0	
other:	4	town staff, The town purchased a boat for the progr

number involved in a single monitoring event: 3

Coalition to Save Hempstead Harbor and Hempstead Harbor Protection Committee - continued

PROGRAM DEVELOPMENT

initial program development assistance: Harbor Watch/River Watch organization (CT), Boces Marine Education, Nassau County Department of Health

current program assistance or technical support: NCDOH, DEC, CT DEP (local or broader), Town of Oyster Bay

desired support for the future:

i. New Equipment

ii. Technical support—need estuary expertise, (ex, higher ammonia, higher pH levels being picked up around the harbor)

iii. Funding—consistent funding that is not part of competitive grant program. The Coalition could not possibly continue the program with some designated funds. Grant periods are not conducive to the times when the monitoring occurs; they don't hear about the next round of funding until they have already started for the season. There were times when they wanted to do DNA testing, but they couldn't lay out money. Need consistent and regular financing.

iv. There is a lack of labs that are certified to do this type of analysis. For fecal coliform (beaches). For shellfish they use different indicators. There are sometimes wide variations in fecal and enterococci coliform. Both lack of certified labs and existing labs. Nassau County is a verified lab—but time period is limited for sampling, they need to have a lab close by. Right now though the County lab is doing it for free, the lab is aging and their future is unknown. DEC is stuck with their lab and how many samples they can handle at a given time. Even when Carol was collecting samples, transporting—if DEC is given more cuts it is uncertain what will happen. Nassau County cannot do shellfish testing, only DEC can. Nassau has historically done this in-kind because they (Hempstead Harbor Coalition) is providing them a service. Plankton sampling is very important for shellfish and shellfisheries being open.

TRAINING

description of current training for monitors:

i.

Annual training—very detailed SOP's, which they go over with them every season.

ii. Ammonia testing, not worth doing

iii. Go out at the beginning of the season, make sure everything looks ok, equipment is calibrated—every year equipment gets sent out. Also doing titrations.

iv. Also working with Friends of the Bay to standardize equipment. Are able to borrow each other's equipment if something is not working.

All groups felt that current training was adequate.

desired support for the future:

i. Yes-

would like to see conference with vendors, equipment, and people who are doing the work elsewhere.

ii. Would be helpful to have a turbidity meter: No background turbidity number is established for the LIS or embayments. Some other places are coming up with a background number. The Coalition is now establishing a background number for Hempstead harbor, with the last three years of data, which is included in research in annual report. They are testing at ½ meter below the surface using a secchi disk. A coordinated approach would help establish a background level—if others were using same equipment.

Coalition to Save Hempstead Harbor and Hempstead Harbor Protection Committee - continued

QUALITY CONTROL PROTOCOLS

utilize a QAPP:	yes
interested in obtaining a QAPP:	
location where samples analyzed:	a. bacteria-NCDOH (mid-harbor samples) b. Bacteria shellfish-DEC LAB (will be on-call or as needed or after structural changes) c. Nitrate/Nitrite samples – Town of Oyster Bay d. Ammonia - on board e. Physical - on board f. bio-observation - on board
quality control measures employed:	X Field Blanks X Replicate field samples Duplicate field measures Analytical replicates Spiked samples X Calibration blank X Calibration sample Negative or positive plates/tubes X Samples split with another lab X Duplicate samples analyzed by another lab Known QC standards analysis Unknown QC standards analysis

CONCERNS

Community support for monitoring effort		Volunteers won't usually commit to a whole program, but pieces of it.
Legal access to monitoring sites		
Loss of volunteer motivation over time	major	People feel comfortable; where you reach a point where things are getting better there is less interest. People are not committed to a whole program.
Perceived credibility of data		
Staffing numbers (<i>e.g. too many, too few</i>)	major	Program involves all entites/partners
Equipment (<i>e.g. type, amount</i>)	major	In terms of money—multi parameter sonde is \$5,000 new—right now equipment is good but when you have to replace, is expensive. Dissolved oxygen probably costs \$400, keeping up on costs.

CONCERNS (continued)

Other issues / concerns:

data are shared with:

willing to participate in the project: Yes
if no, describe why:

Test	YES / NO	Frequency (e.g. daily, weekly, monthly, annually)	Equipment Used (e.g. YSI, Hach, Vernier, LaMotte, Millipore)	QAPP? YES / NO	Location (e.g. lat/long)
Algae					
Alkalinity					
Azithromycin					
Carbon dioxide					
Chloride					
Chlorine					
Chlorophyll					
Copper					
Dissolved oxygen	Yes	Weekly	YSI, LaMotte	X	
<i>E. Coli</i>					
Enterococcus	Yes	Weekly	Nassau County Department Health Lab	X	
Fecal coliform	Yes	Weekly	NCDH lab	X	
Hardness					
Iron					
Lead					
Light (not secchi depth)					
Mercury					
N – ammonium	Yes	Weekly	LaMotte	X	
N – nitrate (NO3)	Yes	Weekly	Hatch	X	
N – nitrite (NO2)	Yes	Weekly	Hatch	X	
N – total N					
N – dissolved organic					
PCB's					
pH	Yes	Weekly	YSI, LaMotte	X	
P - phosphate					
P – total P					
P – particulate P					
P – dissolved organic P					
Salinity	Yes	Weekly	YSI	X	
Secchi Depth	Yes	Weekly	disk	X	
Sulfide					
Sp. Conductivity					
Temperature	Yes	Weekly	YSI	X	
Petroleum					
TSS (EPA)					
Turbidity	Yes	Weekly	LaMotte	X	
Sediment					
Macroalgae (seaweed)					
Seagrass (eelgrass)					
Benthic organisms					
Diversity indices					
Current speed / stream flow					

No group monitors: 1,7-DMX, Acetaminophen, Atenolol, Caffeine, Carbamazepine, CDOM (colored dissolved organic matter), Cotinine, Ethylene glycol, N – particulate N, Primidone, Propylene, Surfactants, TSS (alpha), Urobilin

Manhasset Bay Protection Committee

type:	community based
organization location:	Manhasset, NY
currently monitoring:	Yes
monitoring sites:	Manhasset, NY, 6 points, - shoreline, middle of bay, 2 by STP
number of years monitoring:	6
monitoring frequency:	From May to September, we test weekly. The county processes samples at their lab, so they have to coincide with their program. During bathing and beach season.

PROGRAM GOALS: a. Monitoring is mostly for public recreation, since it is closed to shellfishing. In 1980's someone dredged out all of the clams and sold them out east-stripping the entire resource. b. They aim to establish a baseline for the harbor, which is now 3-5 feet shallower than it was 30 years ago.

PERCEIVED GAPS IN MONITORING EFFORTS: Right now, we are just monitoring for the most basic things, but would like to do more. Since we are not in a TMDL embayment, we don't need to monitor for nitrogen. Also, we do not have the equipment or the ability to train staff to expand our parameters.

PERSONNEL

paid staff:		
volunteers:		
students:		
other:	1	Town Bay Constable staff do the sampling, not paid by Committee/ Nassau County Dept of Health tests, under their QAPP. It is helpful to also have the data from the STP and the sanitation departments

number involved in a single monitoring event:

Manhasset Bay Protection Committee - continued

PROGRAM DEVELOPMENT

initial program development assistance: Nassau County Dept of Health. When they stopped doing their boat samples, the Committee picked it up.

current program assistance or technical support: same as above

desired support for the future: We could do a larger range of parameters, but then would need equipment and training. Then we would need bay constables to commit to additional time.

TRAINING

description of current training for monitors: The Department of Health gives the seasonal staff a refresher course in the Sampling protocol

All groups felt that current training was adequate.

desired support for the future: Yes-if we were going to expand the program, we would need additional assistance and resources.

Manhasset Bay Protection Committee - continued

QUALITY CONTROL PROTOCOLS

utilize a QAPP: No
interested in obtaining a QAPP: Maybe. right now the process is too much to justify getting one

location where samples analyzed: Nassau County Dept. of Health

quality control measures employed: X Field Blanks
Replicate field samples
Duplicate field measures
Analytical replicates
Spiked samples
Calibration blank
Calibration sample
Negative or positive plates/tubes
Samples split with another lab
Duplicate samples analyzed by another lab
Known QC standards analysis
Unknown QC standards analysis

CONCERNS

Community support for monitoring effort	minor	Community is interested in getting the results, but it is delayed in getting back to them - not until the swimming season is over. Town has not had bathing beach open for years, but it is not because of water quality, it's because town doesn't want to hire lifeguard
Legal access to monitoring sites	none	
Loss of volunteer motivation over time	none	
Perceived credibility of data	minor	occasionally we get an "off" reading
Staffing numbers (<i>e.g. too many, too few</i>)	minor	As long as town is providing help it is not an issue.
Equipment (<i>e.g. type, amount</i>)	minor	If we were to expand the parameters it would be a concern.

Manhasset Bay Protection Committee - continued

CONCERNS (continued)

	occasionally we get an "off" reading
Funding support (<i>e.g. stability, quantity</i>)	major Funding sources are currently from Nassau County Dept. of Health Budget and the Town of North Hempstead. Concerned because since we are dependent on County and town, if cuts happen or staff leaves, could jeopardize the program. Right now, our contact is thinking of retiring. There is no other contact and we are not sure if County will still be able to process samples.
Monitoring expertise	major Concerned because seasonal staff is temporary and different every year.
Liability	none

Other issues / concerns:

Other issues / concerns:

DATA MANAGEMENT

data are publicly available:	pay a fee to use it every year, but it lives on the Town's server and acces
if not, the group is willing to make data available:	pay a fee to use it every year, but it lives on the Town's server and acces
manner in which data are shared:	Department of Health provides weekly spreadsheets to Committee. Th

data are shared with:

EDUCATION and OUTREACH

website	Yes	
social media / email	Yes	
community events	Yes	
workshops	Yes	
school programs	Yes	
publications / other distributed material	Yes	
other	Yes	displays at festivals and public events

LIS EMBAYMENT MONITORING PROJECT

willing to participate in the project:	Yes
if no, describe why:	

Test	YES / NO	Frequency (e.g. daily, weekly, monthly, annually)	Equipment Used (e.g. YSI, Hach, Vernier, LaMotte, Millipore)	QAPP? YES / NO	Location (e.g. lat/long)
Algae					
Alkalinity					
Azithromycin					
Carbon dioxide					
Chloride					
Chlorine					
Chlorophyll					
Copper					
Dissolved oxygen					
E. Coli	Yes	weekly	8 bottle rack		Manhasset Bay
Enterococcus					
Fecal coliform	Yes	weekly	8 bottle rack		Manhasset Bay
Hardness					
Iron					
Lead					
Light (not secchi depth)					
Mercury					
N - ammonium					
N - nitrate					
N - nitrite					
N – total N					
N – dissolved organic					
PCB's					
pH					
P - phosphate					
P – total P					
P – particulate P					
P – dissolved organic P					
Salinity					
Secchi Depth					
Sulfide					
Sp. Conductivity					
Temperature					
Petroleum					
TSS (EPA)					
Turbidity					
Sediment					
Macroalgae (seaweed)					
Seagrass (eelgrass)					
Benthic organisms					
Diversity indices					
Current speed / stream flow					

No group monitors: 1,7-DMX, Acetaminophen, Atenolol, Caffeine, Carbamazepine, CDOM (colored dissolved organic matter), Cotinine, Ethylene glycol, N – particulate N, Primidone, Propylene, Surfactants, TSS (alpha), Urobilin

NYC Water Trail Association

type: community based
organization location: Brooklyn, NY
currently monitoring: Yes
monitoring sites: 25 sites around the harbor including one in Flushing Bay and at
number of years monitoring: 1
monitoring frequency: weekly for 20 week testing season, May-Sept.

PROGRAM GOALS: Bacteria monitoring to provide predictive database for boaters; pressure on government officials to address CSO problems; citizen engagement

PERCEIVED GAPS IN MONITORING EFFORTS: Do not test Oct.- April. And only test 1 day per week - more would be better. There are also more sites they would like to test - but need more volunteers.

PERSONNEL

paid staff: 0
volunteers: 30
students: 0
other:

number involved in a single monitoring event:

NYC Water Trail Association - continued

PROGRAM DEVELOPMENT

initial program development assistance: We pretty much did it on our own; a few phone calls to IDEXX and to the EPA's citizen science office

current program assistance or technical support: Self-supported

desired support for the future: We think the EPA and YSC DEP should provide subsidies to local univ. and non profit labs to support citizen monitoring programs. Biggest hassle is long travel times to our lab on Pier 40, and this would be eased by a network of local labs.

TRAINING

description of current training for monitors: We ran two training sessions for samplers, made a training video, and distributed a 'sampling dos and don'ts' document

All groups felt that current training was adequate.

desired support for the future: No

NYC Water Trail Association - continued

QUALITY CONTROL PROTOCOLS

utilize a QAPP: No
interested in obtaining a QAPP: No

location where samples analyzed: At the River Project lab on Pier 40 in NYC

quality control measures employed:

- Field Blanks
- Replicate field samples
- X Duplicate field measures
- X Analytical replicates
- Spiked samples
- Calibration blank
- Calibration sample
- Negative or positive plates/tubes
- Samples split with another lab
- Duplicate samples analyzed by another lab
- Known QC standards analysis
- Unknown QC standards analysis

CONCERNS

Community support for monitoring effort	none	
Legal access to monitoring sites	none	All sites are current or potential boat launches so access isn't an issue
Loss of volunteer motivation over time	major	Burnout factor is serious; that's why we don't try to do this year-round
Perceived credibility of data	minor	We understand concerns of govt agencies but feel Qapp requirements are onerous
Staffing numbers (<i>e.g. too many, too few</i>)		
Equipment (<i>e.g. type, amount</i>)		

NYC Water Trail Association - continued

CONCERNS (continued)

Funding support (*e.g. stability, quantity*)

We understand concerns of govt agencies but feel Qapp requires

minor

Funding Sources: we rely on grant money to do a job we feel the government should be doing

Monitoring expertise

Liability

Other issues / concerns:

Other issues / concerns:

DATA MANAGEMENT

data are publicly available: yes

if not, the group is willing to make data available: yes

manner in which data are shared: Online and through email list

data are shared with: Sampling volunteers, boathouses, and interested parties

EDUCATION and OUTREACH

website yes

social media / email yes

community events

workshops yes

school programs

publications / other distributed material

other yes poster display at conferences

LIS EMBAYMENT MONITORING PROJECT

willing to participate in the project: Yes

if no, describe why:

Test	YES / NO	Frequency (e.g. daily, weekly, monthly, annually)	Equipment Used (e.g. YSI, Hach, Vernier, LaMotte, Millipore)	QAPP? YES / NO	Location (e.g. lat/long)
Algae					
Alkalinity					
Azithromycin					
Carbon dioxide					
Chloride					
Chlorine					
Chlorophyll					
Copper					
Dissolved oxygen					
E. Coli					
Enterococcus	Yes	Weekly, May-September	IDEXX Enteroalert, sealer, incubator	no	See our map interface at : http://www.nycwatertrail.org/water_quality_test.html
Fecal coliform					
Hardness					
Iron					
Lead					
Light (not secchi depth)					
Mercury					
N - ammonium					
N - nitrate					
N - nitrite					
N – total N					
N – dissolved organic					
PCB's					
pH					
P - phosphate					
P – total P					
P – particulate P					
P – dissolved organic P					
Salinity					
Secchi Depth					
Sulfide					
Sp. Conductivity					
Temperature					
Petroleum					
TSS (EPA)					
Turbidity					
Sediment					
Macroalgae (seaweed)					
Seagrass (eelgrass)					
Benthic organisms					
Diversity indices					
Current speed / stream flow					

No group monitors: 1,7-DMX, Acetaminophen, Atenolol, Caffeine, Carbamazepine, CDOM (colored dissolved organic matter), Cotinine, Ethylene glycol, N – particulate N, Primidone, Propylene, Surfactants, TSS (alpha), Urobilin

Niantic River Watershed Committee

type: community based
organization location: Latimer brook, Waterford, CT
currently monitoring: Yes
monitoring sites: Latimer Brook - 8 stations
number of years monitoring: 0.5
monitoring frequency: monthly

PROGRAM GOALS: Obtain information on water quality particularly nitrate, in Latimer Brook, largest tributary to the Niantic River

PERCEIVED GAPS IN MONITORING EFFORTS: Will do some rapid biassement monitoring, TBD

PERSONNEL

paid staff: 1
volunteers: 12
students: 0
other: 1st selectman of the (appointed by 4 towns in Wat

number involved in a single monitoring event: 1 to 3

Niantic River Watershed Committee - continued

PROGRAM DEVELOPMENT

initial program development assistance:

current program assistance or technical support: ECCD

desired support for the future:

TRAINING

description of current training for monitors:

All groups felt that current training was adequate.

desired support for the future: No

Niantic River Watershed Committee - continued

QUALITY CONTROL PROTOCOLS

utilize a QAPP: No
interested in obtaining a QAPP: Maybe

location where samples analyzed:

quality control measures employed:

- X Field Blanks
- X Replicate field samples
 - Duplicate field measures
 - Analytical replicates
 - Spiked samples
 - Calibration blank
 - Calibration sample
 - Negative or positive plates/tubes
 - Samples split with another lab
 - Duplicate samples analyzed by another lab
 - Known QC standards analysis
 - Unknown QC standards analysis

CONCERNS

Community support for monitoring effort	minor
Legal access to monitoring sites	minor
Loss of volunteer motivation over time	minor
Perceived credibility of data	none
Staffing numbers (<i>e.g. too many, too few</i>)	none
Equipment (<i>e.g. type, amount</i>)	minor

Niantic River Watershed Committee - continued

CONCERNS (continued)

Funding support (*e.g. stability, quantity*) major

Monitoring expertise none

Liability none

Other issues / concerns:

Other issues / concerns:

DATA MANAGEMENT

data are publicly available: Yes
if not, the group is willing to make data available: Yes
manner in which data are shared:

data are shared with:

EDUCATION and OUTREACH

website Yes
social media / email Yes
community events Yes
workshops Yes
school programs hope to start
publications / other distributed material Yes
other

LIS EMBAYMENT MONITORING PROJECT

willing to participate in the project: yes
if no, describe why:

Test	YES / NO	Frequency (e.g. daily, weekly, monthly, annually)	Equipment Used (e.g. YSI, Hach, Vernier, LaMotte, Millipore)	QAPP? YES / NO	Location (e.g. lat/long)
Algae					
Alkalinity					
Azithromycin					
Carbon dioxide					
Chloride					
Chlorine					
Chlorophyll					
Copper					
Dissolved oxygen	yes	Monthly	YSI	In prep	All stations
E. Coli					
Enterococcus					
Fecal coliform					
Hardness					
Iron					
Lead					
Light (not secchi depth)					
Mercury					
N - ammonium					
N - nitrate	Yes	Monthly	LaMotte	In prep	All stations
N - nitrite					
N – total N					
N – dissolved organic					
PCB's					
pH	yes	Monthly	YSI	In prep	All stations
P - phosphate					
P – total P					
P – particulate P					
P – dissolved organic P					
Salinity					
Secchi Depth					
Sulfide					
Sp. Conductivity	yes	Monthly	YSI	In prep	All stations
Temperature	yes	Monthly	YSI	In prep	All stations
Petroleum					
TSS (EPA)					
Turbidity					
Sediment					
Macroalgae (seaweed)					
Seagrass (eelgrass)					
Benthic organisms					
Diversity indices					
Current speed / stream flow	yes	use USGS gauge in Latimer Brooke			

No group monitors: 1,7-DMX, Acetaminophen, Atenolol, Caffeine, Carbamazepine, CDOM (colored dissolved organic matter), Cotinine, Ethylene glycol, N – particulate N, Primidone, Propylene, Surfactants, TSS (alpha), Urobilin

Save the River, Save the Hills

type:	community based
organization location:	Waterford, CT
currently monitoring:	Yes
monitoring sites:	4 spots on upper Niantic River
number of years monitoring:	6
monitoring frequency:	Every Monday. If get bad numbers, test again on Wednesday. Also after rainfall.

PROGRAM GOALS: Towns to take over and enforce swimming and sports restrictions based on monitoring

PERCEIVED GAPS IN MONITORING EFFORTS: Expand number of sampling sites (want about 15-20 to find where pollution is);

DNA testing of samples to determine source of contaminators (\$)

PERSONNEL

paid staff:	1	
volunteers:	12	
students:	1	
other:	200	6 Board Members, 200 members

number involved in a single monitoring event: volunteers, 1 student

Save the River, Save the Hills - continued

PROGRAM DEVELOPMENT

initial program development assistance: DEP and Ledge Light Health District

current program assistance or technical support: DEP and Ledge Light Health District

desired support for the future: Money to expand testing program. More volunteers

TRAINING

description of current training for monitors: On the boat training (about an hour) Get professional people where needed (when they did more testing)

All groups felt that current training was adequate.

desired support for the future: Yes; especially when the program is expanded. Want more grants, would want to hire someone to bring the samples up to Hartford for them.

Save the River, Save the Hills - continued

QUALITY CONTROL PROTOCOLS

utilize a QAPP:	No
interested in obtaining a QAPP:	Yes

location where samples analyzed:	Dep. Public Health Lab in Hartford (Picked up by Ledge Light Health District)
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quality control measures employed:	Field Blanks Replicate field samples Duplicate field measures Analytical replicates Spiked samples Calibration blank Calibration sample Negative or positive plates/tubes Samples split with another lab Duplicate samples analyzed by another lab Known QC standards analysis Unknown QC standards analysis
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CONCERNS

Community support for monitoring effort	major
Legal access to monitoring sites	none
Loss of volunteer motivation over time	minor
Perceived credibility of data	none
Staffing numbers (<i>e.g. too many, too few</i>)	minor
Equipment (<i>e.g. type, amount</i>)	major

Save the River, Save the Hills - continued

CONCERNS (continued)

Funding support (<i>e.g. stability, quantity</i>)	major	
Monitoring expertise	minor	
Liability	major	
Other issues / concerns:	major	No one doing anything about it. No improvement in River, getting worst
Other issues / concerns:	major	Where do the data go?

DATA MANAGEMENT

data are publicly available:	Yes
if not, the group is willing to make data available:	Yes
manner in which data are shared:	On web for public, towns, Niantic River Watershed Advisory Group
data are shared with:	

EDUCATION and OUTREACH

website		
social media / email		
community events		
workshops		
school programs		
publications / other distributed material		
other	yes	newsletter

LIS EMBAYMENT MONITORING PROJECT

willing to participate in the project:	Yes
if no, describe why:	

Test	YES / NO	Frequency (e.g. daily, weekly, monthly, annually)	Equipment Used (e.g. YSI, Hach, Vernier, LaMotte, Millipore)	QAPP? YES / NO	Location (e.g. lat/long)
Algae					
Alkalinity					
Azithromycin					
Carbon dioxide					
Chloride					
Chlorine					
Chlorophyll					
Copper					
Dissolved oxygen					
E. Coli					
Enterococcus	Yes	Weekly	Sample bottles and ice box	No	The 4 sites
Fecal coliform					
Hardness					
Iron					
Lead					
Light (not secchi depth)					
Mercury					
N - ammonium					
N - nitrate					
N - nitrite					
N – total N					
N – dissolved organic					
PCB's					
pH					
P - phosphate					
P – total P					
P – particulate P					
P – dissolved organic P					
Salinity					
Secchi Depth					
Sulfide					
Sp. Conductivity					
Temperature					
Petroleum					
TSS (EPA)					
Turbidity					
Sediment					
Macroalgae (seaweed)					
Seagrass (eelgrass)					
Benthic organisms					
Diversity indices					
Current speed / stream flow					

No group monitors: 1,7-DMX, Acetaminophen, Atenolol, Caffeine, Carbamazepine, CDOM (colored dissolved organic matter), Cotinine, Ethylene glycol, N – particulate N, Primidone, Propylene, Surfactants, TSS (alpha), Urobilin

SE*CRES

type:	community based
organization location:	Mystic, CT
currently monitoring:	Yes
monitoring sites:	The coves of Stonington
number of years monitoring:	8
monitoring frequency:	Summer, when volunteers are free

PROGRAM GOALS: "Protect, Monitor and Serve"

PERCEIVED GAPS IN MONITORING EFFORTS: Money, fecal coliform, total Nitrogen (would like to test these but can not at this time period)

PERSONNEL

paid staff:	0
volunteers:	12
students:	0
other:	0

number involved in a single monitoring event:	3
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SE*CRES - continued

PROGRAM DEVELOPMENT

initial program development assistance: Classes at Project O

current program assistance or technical support: Project O and UConn, Marine Science

desired support for the future: QAPP development, 501C help, raiding money

TRAINING

description of current training for monitors: One on one training with instruments and how to use them

All groups felt that current training was adequate.

desired support for the future: no

SE*CRES - continued

QUALITY CONTROL PROTOCOLS

utilize a QAPP:	no
interested in obtaining a QAPP:	yes

location where samples analyzed:	in the field
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quality control measures employed:	Field Blanks Replicate field samples Duplicate field measures Analytical replicates Spiked samples Calibration blank Calibration sample Negative or positive plates/tubes Samples split with another lab Duplicate samples analyzed by another lab Known QC standards analysis Unknown QC standards analysis
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CONCERNS

Community support for monitoring effort	minor	
Legal access to monitoring sites	none	So far so good. One cove: the insurance won't let them use an entry point
Loss of volunteer motivation over time	major	
Perceived credibility of data	none	
Staffing numbers (<i>e.g. too many, too few</i>)	minor	
Equipment (<i>e.g. type, amount</i>)	none	Allowed access to them but can't afford more

SE*CRES - continued

CONCERNS (continued)

Funding support (<i>e.g. stability, quantity</i>)	major	
Monitoring expertise	none	
Liability	none	
Other issues / concerns:	major	Wanting to test more parameters! E.coli, fecal coliform*, N ammonium, N nitrate, N nitrite, N total N, N particulate N, N dissolved Organic, pH, sediment. *=a current goal and something that they are very interested in achieving
Other issues / concerns:	major	need 501C

DATA MANAGEMENT

data are publicly available:	no
if not, the group is willing to make data available:	no
manner in which data are shared:	email
data are shared with:	local media

EDUCATION and OUTREACH

website	
social media / email	
community events	
workshops	
school programs	
publications / other distributed material	x
other	

LIS EMBAYMENT MONITORING PROJECT

willing to participate in the project:	yes
if no, describe why:	

Test	YES / NO	Frequency (e.g. daily, weekly, monthly, annually)	Equipment Used (e.g. YSI, Hach, Vernier, LaMotte, Millipore)	QAPP? YES / NO	Location (e.g. lat/long)
Algae	Yes	very rarely	need bioscope	No	all
Alkalinity					
Azithromycin					
Carbon dioxide					
Chloride					
Chlorine					
Chlorophyll					
Copper					
Dissolved oxygen	Yes	occasioanally	YSI 556	No	all
E. Coli					
Enterococcus					
Fecal coliform					
Hardness					
Iron					
Lead					
Light (not secchi depth)					
Mercury					
N - ammonium					
N - nitrate					
N - nitrite					
N – total N					
N – dissolved organic					
PCB's					
pH					
P - phosphate					
P – total P					
P – particulate P					
P – dissolved organic P					
Salinity	Yes	occasioanally	YSI556	No	all stations
Secchi Depth					
Sulfide					
Sp. Conductivity					
Temperature	Yes	occasioanally	YSI556	No	all stations
Petroleum					
TSS (EPA)					
Turbidity	Yes	occasioanally	YSI556	No	all stations
Sediment					
Macroalgae (seaweed)					
Seagrass (eelgrass)					
Benthic organisms					
Diversity indices	Yes	rarely		No	all stations
Current speed / stream flow					

No group monitors: 1,7-DMX, Acetaminophen, Atenolol, Caffeine, Carbamazepine, CDOM (colored dissolved organic matter), Cotinine, Ethylene glycol, N – particulate N, Primidone, Propylene, Surfactants, TSS (alpha), Urobilin

Bruce Museum

type: lab or educational facility
organization location: Greenwich, CT
currently monitoring: Yes
monitoring sites: Greenwich Point
number of years monitoring: 2
monitoring frequency: 20-30 trips/y (fall & spring)

PROGRAM GOALS: Education outreach and promoting awareness of scientific monitoring and the LIS.

PERCEIVED GAPS IN MONITORING EFFORTS: Seasonal winter activities not conducted. Project in the future possibly double due to new Seaside center programming.

PERSONNEL

paid staff: yes
volunteers: yes
students: yes
other: yes interns

number involved in a single monitoring event: 14

Bruce Museum - continued

PROGRAM DEVELOPMENT

initial program development assistance: College course work and working at the Maritime Aquarium.
And as Bruce Museum Naturalist 2009

current program assistance or technical support: Self and occasional 4th grade teachers, Greenwich Shellfish
Commission and Town of Greenwich.

desired support for the future: Staff, funding and collaborations ie training.

TRAINING

description of current training for monitors: Review YSI procedures, plankton net use near shore.
Interpretation and recording.

All groups felt that current training was adequate.

desired support for the future: Yes

Bruce Museum - continued

QUALITY CONTROL PROTOCOLS

utilize a QAPP:	No
interested in obtaining a QAPP:	Maybe - interested in finding out more, but not sure needed for current programming
location where samples analyzed:	in the field and at Seaside center, occasionally at St. John's University for Biology Department, by Dr. Frank Cantelmo
quality control measures employed:	Field Blanks Replicate field samples Duplicate field measures Analytical replicates Spiked samples Calibration blank Calibration sample Negative or positive plates/tubes Samples split with another lab Duplicate samples analyzed by another lab Known QC standards analysis Unknown QC standards analysis

CONCERNS

Community support for monitoring effort	none
Legal access to monitoring sites	none
Loss of volunteer motivation over time	none
Perceived credibility of data	none
Staffing numbers (<i>e.g. too many, too few</i>)	none
Equipment (<i>e.g. type, amount</i>)	none

Bruce Museum - continued

CONCERNS (continued)

Funding support (<i>e.g. stability, quantity</i>)	minor	maybe other initiatives that would receive funding over monitoring efforts.
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Monitoring expertise	none
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Liability	none
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Other issues / concerns:

Other issues / concerns:

DATA MANAGEMENT

data are publicly available:	No
if not, the group is willing to make data available:	No
manner in which data are shared:	Time constraints limited training time to participate with the LIS databases

data are shared with:	Previously with TMA and LIS Database
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EDUCATION and OUTREACH

website	Yes
social media / email	Yes
community events	training @ Bruce Museum Seaside Center)
workshops	teacher advisory councils.)
school programs	Yes
publications / other distributed material	Brooklyn Museum and Greenwich libraries, Greenwich Audubon, Greenwich Environmental Center
other	Yes Museum newsletter hardcopy and email

LIS EMBAYMENT MONITORING PROJECT

willing to participate in the project:	Yes
if no, describe why:	

The Bruce Museum

Test	YES / NO	Frequency (e.g. daily, weekly, monthly, annually)	Equipment Used (e.g. YSI, Hach, Vernier, LaMotte, Millipore)	QAPP? YES / NO	Location (e.g. lat/long)
Algae					
Alkalinity					
Azithromycin					
Carbon dioxide					
Chloride					
Chlorine					
Chlorophyll					
Copper					
Dissolved oxygen	Yes	20 -30 annually	YSI meter	No	Greenwich Point, CT
E. Coli					
Enterococcus					
Fecal coliform					
Hardness					
Iron					
Lead					
Light (not secchi depth)					
Mercury					
N - ammonium					
N - nitrate					
N - nitrite					
N – total N					
N – dissolved organic					
PCB's					
pH					
P - phosphate					
P – total P					
P – particulate P					
P – dissolved organic P					
Salinity	Yes	Same as DO			
Secchi Depth					
Sulfide					
Sp. Conductivity					
Temperature	Yes	Same as DO			
Petroleum					
TSS (EPA)					
Turbidity					
Sediment					
Macroalgae (seaweed)	Yes		*Quadrats		
Seagrass (eelgrass)	Yes				
Benthic organisms	Yes		Seine and plankton nets		
Diversity indices	Yes				
Current speed / stream flow					

No group monitors: 1,7-DMX, Acetaminophen, Atenolol, Caffeine, Carbamazepine, CDOM (colored dissolved organic matter), Cotinine, Ethylene glycol, N – particulate N, Primidone, Propylene, Surfactants, TSS (alpha), Urobilin

Cedar Island Marina Research Lab

type: lab or educational facility
organization location: Clinton, CT
currently monitoring: Yes
monitoring sites: Hammonasett River, Cedar Island Marina, Clinton Harbor
number of years monitoring: 20
monitoring frequency: weekly

PROGRAM GOALS: Research Projects, Marina Impacts

PERCEIVED GAPS IN MONITORING EFFORTS: Many gaps: equipment failure/change director (may change what project they want to focus on)

PERSONNEL

paid staff: 1 winter, 3 summ.
volunteers: 1
students: 1
other:

number involved in a single monitoring event: 1 to 5

Cedar Island Marina Research Lab - continued

PROGRAM DEVELOPMENT

initial program development assistance: Mike Gliman (Dr. Sean Grace-SCSU)

current program assistance or technical support: Mike Gliman (Dr. Sean Grace-SCSU)

desired support for the future: More equipment and hire a PhD

TRAINING

description of current training for monitors: Water testing, report writing, scientific writing, poster set up

All groups felt that current training was adequate.

desired support for the future: Yes

Cedar Island Marina Research Lab - continued

QUALITY CONTROL PROTOCOLS

utilize a QAPP: yes
interested in obtaining a QAPP:

location where samples analyzed:

quality control measures employed:

- Field Blanks
- X Replicate field samples
- X Duplicate field measures
- Analytical replicates
- Spiked samples
- Calibration blank
- Calibration sample
- Negative or positive plates/tubes
- Samples split with another lab
- Duplicate samples analyzed by another lab
- X Known QC standards analysis
- X Unknown QC standards analysis

CONCERNS

Community support for monitoring effort	minor	
Legal access to monitoring sites	major	
Loss of volunteer motivation over time	major	Volunteers don't like to get dirty
Perceived credibility of data	minor	
Staffing numbers (<i>e.g. too many, too few</i>)	minor	
Equipment (<i>e.g. type, amount</i>)	major	

CONCERNS (continued)

Cedar Island Marina

none

none

Other issues / concerns:

data are publicly available:	Yes
if not, the group is willing to make data available:	Yes
manner in which data are shared:	

EDUCATION and OUTREACH

LIS EMBAYMENT MONITORING PROJECT

Cedar Island Marine Lab

Test	YES / NO	Frequency (e.g. daily, weekly, monthly, annually)	Equipment Used (e.g. YSI, Hach, Vernier, LaMotte, Millipore)	QAPP? YES / NO	Location (e.g. lat/long)
Algae					
Alkalinity					
Azithromycin					
Carbon dioxide					
Chloride					
Chlorine					
Chlorophyll					
Copper					
Dissolved oxygen	Yes	Monthly/in past	HACH	no	
E. Coli					
Enterococcus					
Fecal coliform					
Hardness					
Iron					
Lead					
Light (not secchi depth)					
Mercury					
N - ammonium					
N - nitrate					
N - nitrite					
N – total N					
N – dissolved organic					
PCB's					
pH					
P - phosphate					
P – total P					
P – particulate P					
P – dissolved organic P					
Salinity	Yes	Monthly (current)	HACH	no	
Secchi Depth					
Sulfide					
Sp. Conductivity					
Temperature	Yes	Monthly (current)	HACH	no	
Petroleum					
TSS (EPA)					
Turbidity					
Sediment	yes	Every ~7 years	Grain size		
Macroalgae (seaweed)					
Seagrass (eelgrass)					
Benthic organisms	Yes	Weekly- winder flounder and beam trawl	no		
Diversity indices	yes				
Current speed / stream flow					

No group monitors: 1,7-DMX, Acetaminophen, Atenolol, Caffeine, Carbamazepine, CDOM (colored dissolved organic matter), Cotinine, Ethylene glycol, N – particulate N, Primidone, Propylene, Surfactants, TSS (alpha), Urobilin

The Harbor Watch Water Quality Monitoring Program of Earthplace

type: lab or educational facility
organization location: Westport, CT
currently monitoring: Yes
monitoring sites: Norwalk & Saugatuck Harbors; The HW WQMP monitors many
number of years monitoring: 25
monitoring frequency: weekly, May-Oct.

PROGRAM GOALS: To improve the biological integrity of Long Island Sound and its watershed by gathering valuable and credible water quality data

PERCEIVED GAPS IN MONITORING EFFORTS: finan. Sup.

PERSONNEL

paid staff: 4
volunteers: 20
students: 50
other: 6 college interns

number involved in a single monitoring event: All of the above work in teams of 2 to 3 individuals

The Harbor Watch Water Quality Monitoring Program of Earthplace - continued

PROGRAM DEVELOPMENT

initial program development assistance: The University of Connecticut Marine Science Dept. (Dr. Barbara Welsh) 1986

current program assistance or technical support: The EPA Region 1 lab in Chelsford, MA, the CT DEEP water Mana

desired support for the future: The same level

TRAINING

description of current training for monitors: We conduct two training session each year, one in October and one in March. Each session is four days.

All groups felt that current training was adequate.

desired support for the future: Not presently required

The Harbor Watch Water Quality Monitoring Program of Earthplace - continued

QUALITY CONTROL PROTOCOLS

utilize a QAPP: yes
interested in obtaining a QAPP:

location where samples analyzed:

quality control measures employed:

- X Field Blanks
- X Replicate field samples
- X Duplicate field measures
- X Analytical replicates
- Spiked samples
- X Calibration blank
- X Calibration sample
- X Negative or positive plates/tubes
- X Samples split with another lab
- X Duplicate samples analyzed by another lab
- Known QC standards analysis
- X Unknown QC standards analysis

CONCERNS

Community support for monitoring effort none

Legal access to monitoring sites none

Loss of volunteer motivation over time none

Perceived credibility of data none

Staffing numbers (*e.g. too many, too few*) none

Equipment (*e.g. type, amount*) none

The Harbor Watch Water Quality Monitoring Program of Earthplace - continued

CONCERNS (continued)

Funding support (*e.g. stability, quantity*)

Monitoring expertise none

Liability none

Other issues / concerns:

Other issues / concerns:

DATA MANAGEMENT

data are publicly available: Yes
if not, the group is willing to make data available: Yes
manner in which data are shared: For most of our monitoring projects the water quality data is compiled in

data are shared with:

EDUCATION and OUTREACH

website	Yes	
social media / email	Yes	
community events	Yes	
workshops	Yes	
school programs	Yes	
publications / other distributed material	Yes	
other	Yes	scientific reports

LIS EMBAYMENT MONITORING PROJECT

willing to participate in the project: Maybe
if no, describe why:

Test	YES / NO	Frequency (e.g. daily, weekly, monthly, annually)	Equipment Used (e.g. YSI, Hach, Vernier, LaMotte, Millipore)	QAPP? YES / NO	Location (e.g. lat/long)
Algae					
Alkalinity					
Azithromycin					
Carbon dioxide					
Chloride					
Chlorine					
Chlorophyll					
Copper					
Dissolved oxygen	Yes	weekly, May- October	YSI 52, 58, 59, 2030	No	Norwalk H., Saugatuck H.
<i>E. coli</i>	Yes	weekly, May- October	Membrane Filtration	Yes	Norwalk Harbor
Enterococcus	Yes	If needed	Membrane Filtration	No	Local Bathing Beaches
Fecal coliform	Yes	weekly, May- October	Membrane Filtration	Yes	Norwalk Harbor
Hardness					
Iron					
Lead					
Light (not secchi depth)					
Mercury					
N - ammonium	Yes	As needed	Out sourced to York Laboratories-Stratford, CT	Yes	Norwalk Harbor
N - nitrate	Yes	As needed	Out sourced to York Laboratories-Stratford, CT	Yes	Norwalk Harbor
N - nitrite					
N – total N	Yes	As needed	Out sourced to York Laboratories-Stratford, CT	Yes	Norwalk Harbor
N – dissolved organic					
PCB's					
pH					
P - phosphate					
P – total P	Yes	As needed	Out sourced to York Laboratories-Stratford, CT	Yes	Norwalk Harbor
P – particulate P					
P – dissolved organic P					
Salinity	Yes	Weekly May- October	YSI SCT 30 meter	No	Norwalk H., Saugatuck H.
Secchi Depth	Yes	Weekly May- October	Secchi Disk	No	Norwalk H., Saugatuck H.
Sulfide					
Sp. Conductivity					
Temperature	Yes	weekly, May- October	YSI DO & SCT meters	No	Norwalk H., Saugatuck H.
Petroleum					
TSS (EPA)					
Turbidity					
Sediment					
Macroalgae (seaweed)					
Seagrass (eelgrass)					
Benthic organisms	Yes	Weekly May- November	One-meter beam trawl with ¼ inch mesh net	No	Norwalk H., Saugatuck H.
Diversity indices					
Current speed / stream flow					

No group monitors: 1,7-DMX, Acetaminophen, Atenolol, Caffeine, Carbamazepine, CDOM (colored dissolved organic matter), Cotinine, Ethylene glycol, N – particulate N, Primidone, Propylene, Surfactants, TSS (alpha), Urobilin

The Maritime Aquarium

type:	lab or educational facility
organization location:	Norwalk, CT
currently monitoring:	Yes
monitoring sites:	Norwalk Harbor, Pelham Park, Stamford Cove Park, Sherwood
number of years monitoring:	12
monitoring frequency:	coastal programs - daily depending on season (100 trips), and every time research vessel goes out (200 trips).

PROGRAM GOALS: TMA hopes to capture current data on the local H2O quality in the greater Norwalk Harbor and other LIS coastal areas. Salinity, DO, temperature

PERCEIVED GAPS IN MONITORING EFFORTS: TMA would like to monitor turbidity and pH. Bacteria counts as well. To give more information about physical parameters relating to ecosystem health. Especially pH, following Ocean trends of pH changes. Bacteria monitoring could help indicate upstream and coastal areas.

PERSONNEL

paid staff:	34	
volunteers:		
students:	200	
other:	60	interns

number involved in a single monitoring event:	34
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The Maritime Aquarium - continued

PROGRAM DEVELOPMENT

initial program development assistance:

current program assistance or technical support: Self, EPA, YSI rep

desired support for the future: Have more staff and time to conduct pH, bacteria and turbidity.
Need incubater and autoclave, nutrient auger, Millipore kit.

TRAINING

description of current training for monitors: Staff training 4 x yearly. In addition to 2-5 x with senior staff.
Using the YSI meters, staff shown how to calibrate, use,
technique, using product instructions and organization QAPP.

All groups felt that current training was adequate.

desired support for the future: Would like more time to insure proper calibration techniques;
factory calibration costs

The Maritime Aquarium - continued

QUALITY CONTROL PROTOCOLS

utilize a QAPP: yes
 interested in obtaining a QAPP:

location where samples analyzed: on site & in situ

quality control measures employed:

- Field Blanks
- Replicate field samples
- X Duplicate field measures
- Analytical replicates
- Spiked samples
- Calibration blank
- Calibration sample
- Negative or positive plates/tubes
- Samples split with another lab
- Duplicate samples analyzed by another lab
- X Known QC standards analysis
- Unknown QC standards analysis

CONCERNS

Community support for monitoring effort minor Depending on findings. Until something is a problem.

Legal access to monitoring sites none

Loss of volunteer motivation over time none

Perceived credibility of data major Any time data collected, credibility should be a concern. TMA is 1st line notifier, otherwise not known to public and scientific community.

Staffing numbers (*e.g. too many, too few*) minor Staff turnover. And desire to conduct more extensive testing.

Equipment (*e.g. type, amount*) minor Need more \$. Continue funding and LT maint.

The Maritime Aquarium - continued

CONCERNS (continued)

Any time data collected, credibility should be a concern. TMA is :

Funding support (*e.g. stability, quantity*)

Grants, and operating budget

Monitoring expertise

minor

Easy to teach the monitoring, but concern about protocol compliance

Liability

minor

Not for TMA, maybe if using winkler titration. ~ Public or Community perception of data – finger pointing – collection, OSHA.

Other issues / concerns:

Other issues / concerns:

DATA MANAGEMENT

data are publicly available:

yes

if not, the group is willing to make data available:

yes

manner in which data are shared:

data are shared with:

EDUCATION and OUTREACH

website

yes

social media / email

yes

community events

yes

workshops

yes

school programs

yes

publications / other distributed material

yes

other

yes

TMA database

LIS EMBAYMENT MONITORING PROJECT

willing to participate in the project:

Maybe

if no, describe why:

The Maritime Aquarium

Test	YES / NO	Frequency (e.g. daily, weekly, monthly, annually)	Equipment Used (e.g. YSI, Hach, Vernier, LaMotte, Millipore)	QAPP? YES / NO	Location (e.g. lat/long)
Algae					
Alkalinity					
Azithromycin					
Carbon dioxide					
Chloride					
Chlorine					
Chlorophyll					
Copper					
Dissolved oxygen	Yes	300	YSI mod. 85	yes	Norwalk Harbor
E. Coli					
Enterococcus					
Fecal coliform					
Hardness					
Iron					
Lead					
Light (not secchi depth)					
Mercury					
N - ammonium					
N - nitrate					
N - nitrite					
N – total N					
N – dissolved organic					
PCB's					
pH					
P - phosphate					
P – total P					
P – particulate P					
P – dissolved organic P					
Salinity	Yes	300	YSI mod. 85	Y	W. CT LIS
Secchi Depth					
Sulfide					
Sp. Conductivity					
Temperature	Yes	300	YSI mod. 85	Y	W. CT LIS
Petroleum					
TSS (EPA)					
Turbidity					
Sediment					
Macroalgae (seaweed)	Yes	300		Y	W. CT. LIS
Seagrass (eelgrass)					
Benthic organisms	Yes	250		Y	W. CT. LIS
Diversity indices	Yes	300		Y	W. CT. LIS
Current speed / stream flow	Yes	10		Y	W. CT. LIS

No group monitors: 1,7-DMX, Acetaminophen, Atenolol, Caffeine, Carbamazepine, CDOM (colored dissolved organic matter), Cotinine, Ethylene glycol, N – particulate N, Primidone, Propylene, Surfactants, TSS (alpha), Urobilin

Millstone Environmental Lab

type:	lab or educational facility
organization location:	Waterford, CT
currently monitoring:	Yes
monitoring sites:	Eastern LIS in vicinity of Millstone Point, Niantic River and
number of years monitoring:	35
monitoring frequency:	Depends on study (weekly, biweekly, monthly, and quarterly)

PROGRAM GOALS: To study effects that Millstone Power Station has on marine environment

PERCEIVED GAPS IN MONITORING EFFORTS: They pretty much cover everything that needs to be monitored; not many groups doing what they are doing

PERSONNEL

paid staff:	9	
volunteers:	6	
students:	0	
other:	3	summer interns

number involved in a single monitoring event:	9
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Millstone Environmental Lab - continued

PROGRAM DEVELOPMENT

initial program development assistance: Started in the late 60's. A fellow named Nelson Marshall was very instrumental. He formed the Millstone Ecological Advisory Committee.

current program assistance or technical support: The Advisory Committee still helps today

desired support for the future: None - they provide more support than they ask for.

TRAINING

description of current training for monitors: All staff are professional marine scientists

All groups felt that current training was adequate.

desired support for the future: no

Millstone Environmental Lab - continued

QUALITY CONTROL PROTOCOLS

utilize a QAPP: yes
interested in obtaining a QAPP:

location where samples analyzed: in the field, at our facility, by an outside lab

quality control measures employed:

- X Field Blanks
- X Replicate field samples
Duplicate field measures
- X Analytical replicates
Spiked samples
- X Calibration blank
- X Calibration sample
Negative or positive plates/tubes
Samples split with another lab
Duplicate samples analyzed by another lab
- X Known QC standards analysis
- Unknown QC standards analysis

CONCERNS

Community support for monitoring effort	none
Legal access to monitoring sites	minor
Loss of volunteer motivation over time	none
Perceived credibility of data	major
Staffing numbers (<i>e.g. too many, too few</i>)	minor
Equipment (<i>e.g. type, amount</i>)	minor

Millstone Environmental Lab - continued

CONCERNS (continued)

Funding support (<i>e.g. stability, quantity</i>)	none	
Monitoring expertise	none	
Liability	none	
Other issues / concerns:	major	A major concern is for people to recognize what the lab does; community recognition and support.
Other issues / concerns:		

DATA MANAGEMENT

data are publicly available:	yes
if not, the group is willing to make data available:	yes
manner in which data are shared:	annual report
data are shared with:	CT DEEP, academic researchers & public

EDUCATION and OUTREACH

website		
social media / email		
community events		
workshops	x	
school programs		
publications / other distributed material	x	
other	x	raw data provided to CT DEEP, as well as academic researchers who make peer reviewed journals

LIS EMBAYMENT MONITORING PROJECT

willing to participate in the project:	yes
if no, describe why:	

Millstone Environmental Lab

Test	YES / NO	Frequency (e.g. daily, weekly, monthly, annually)	Equipment Used (e.g. YSI, Hach, Vernier, LaMotte, Millipore)	QAPP? YES / NO	Location (e.g. lat/long)
Algae	No				
Alkalinity	No				
Azithromycin	No				
Carbon dioxide	No				
Chloride	No				
Chlorine	No				
Chlorophyll	No				
Copper	No				
Dissolved oxygen	Yes	Bi-weekly	Hanna instrument	Yes	Niantic River & Bay
E. Coli	No				
Enterococcus	No				
Fecal coliform	No				
Hardness	No				
Iron	No				
Lead	No				
Light (not secchi depth)	No				
Mercury	No				
N - ammonium	Yes	Bi-weekly	Samples are frozen	N/A	Niantic River & Bay
N - nitrate	Yes	"	and will be sent to	"	"
N - nitrite	Yes	"	UConn for analysis	"	"
N – total N	Yes	"	"	"	"
N – dissolved organic	Yes	"	"	"	"
PCB's	No				
pH	Yes	Taken every 15 minutes	pH meter at plant	Yes	at intake & discharge
P - phosphate	Yes	Bi-weekly	Analysis to be done	Yes	Niantic River & Bay
P – total P	Yes	"	by UConn	"	"
P – particulate P	Yes	"	"	"	"
P – dissolved organic P	Yes	"	"	"	"
Salinity	Yes	At least bi-weekly	Hanna	Yes	Niantic River & Bay
Secchi Depth	No				
Sulfide	No				
Sp. Conductivity	No				
Temperature	Yes	Bi-weekly	Hanna	Yes	Niantic River & Bay
Petroleum	No				
TSS (EPA)	No				
Turbidity	No				
Sediment	No				
Macroalgae (seaweed)	Yes	Every other month	Transect study	Yes	3 sites around Millstone Point
Seagrass (eelgrass)	Yes	Monthly in summer	Transect study	Yes	3 sites around Millstone Point
Benthic organisms	Yes	Twice a year	Core samples and microscopes	Yes	4 sites around Millstone Point
Diversity indices	No				
Current speed / stream flow	No				

No group monitors: 1,7-DMX, Acetaminophen, Atenolol, Caffeine, Carbamazepine, CDOM (colored dissolved organic matter), Cotinine, Ethylene glycol, N – particulate N, Primidone, Propylene, Surfactants, TSS (alpha), Urobilin

Rocking the Boat

type:	lab or educational facility
organization location:	Bronx, NY
currently monitoring:	Yes
monitoring sites:	At the shore of Hunts Point Riverside Park and at the mouth of
number of years monitoring:	8
monitoring frequency:	Weekly at the two sites during student program time (March-May (13 weeks), July- mid Aug (7 weeks), mid Sept-Nov (10 weeks))

PROGRAM GOALS: Youth development and education, scientific monitoring and research

PERCEIVED GAPS IN MONITORING EFFORTS: I think spatially we are in a good location as we collect data from the mouth of the Bronx River although given that there is monitoring going on throughout the upper reaches of the river, it would be great to have a comprehensive analysis of all the data collected and then ideally shared with the partners.

PERSONNEL

paid staff:	15
volunteers:	
students:	25
other:	

number involved in a single monitoring event:	25
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Rocking the Boat - continued

PROGRAM DEVELOPMENT

initial program development assistance: Initially Bronx River Alliance trained Rocking the Boat senior staff and at our request, they'll continue to provide trainings for the junior staff although many are trained in-house.

current program assistance or technical support: Bronx River Alliance

desired support for the future:

TRAINING

description of current training for monitors:

All groups felt that current training was adequate.

desired support for the future:

Rocking the Boat - continued

QUALITY CONTROL PROTOCOLS

utilize a QAPP: yes
interested in obtaining a QAPP:

location where samples analyzed: At our facility—on boats or in a lab

quality control measures employed:

- Field Blanks
- X Replicate field samples
- Duplicate field measures
- Analytical replicates
- Spiked samples
- X Calibration blank
- Calibration sample
- Negative or positive plates/tubes
- Samples split with another lab
- Duplicate samples analyzed by another lab
- Known QC standards analysis
- Unknown QC standards analysis

CONCERNS

Community support for monitoring effort

Legal access to monitoring sites none

Loss of volunteer motivation over time none

Perceived credibility of data minor More respected in a scientific community. Would like to see the data for the Bronx River in particular compiled and analyzed in a comprehensive way

Staffing numbers (*e.g. too many, too few*)

Equipment (*e.g. type, amount*) minor

Rocking the Boat - continued

CONCERNS (continued)

Funding support (*e.g. stability, quantity*)

More respected in a scientific community. Would like to see the

major

Funding Sources:NOAA, EPA fund the program of which Water Monitoring is a part, there is no dedicated funding currently.

Monitoring expertise

none

Liability

Other issues / concerns:

Other issues / concerns:

DATA MANAGEMENT

data are publicly available: yes

if not, the group is willing to make data available: yes

manner in which data are shared: It has been uploaded to the Globe database, a national database of water quality data and we'd be willing to share with more organizations/people.

data are shared with: In addition to the Globe database, our data goes to the Bronx River Alliance and we keep it within Excel spreadsheets and analyze some in-

EDUCATION and OUTREACH

website x

social media / email x

community events x

workshops

school programs x

publications / other distributed material x

other

LIS EMBAYMENT MONITORING PROJECT

willing to participate in the project: yes

if no, describe why:

Test	YES / NO	Frequency (e.g. daily, weekly, monthly, annually)	Equipment Used (e.g. YSI, Hach, Vernier, LaMotte, Millipore)	QAPP? YES / NO	Location (e.g. lat/long)
Algae					
Alkalinity					
Azithromycin					
Carbon dioxide					
Chloride					
Chlorine					
Chlorophyll					
Copper					
Dissolved oxygen	Yes	weekly	LaMotte	Yes	2 locations
E. Coli					
Enterococcus					
Fecal coliform					
Hardness					
Iron					
Lead					
Light (not secchi depth)					
Mercury					
N - ammonium					
N - nitrate	Yes	weekly	LaMotte	Yes	2 locations
N - nitrite					
N – total N					
N – dissolved organic					
PCB's					
pH	Yes	weekly	pH strips	Yes	2 locations
P - phosphate					
P – total P					
P – particulate P					
P – dissolved organic P					
Salinity	Yes	weekly	refractometer	Yes	2 locations
Secchi Depth					
Sulfide					
Sp. Conductivity					
Temperature	Yes	Weekly	Thermometer	Yes	2 locations
Petroleum					
TSS (EPA)					
Turbidity	Yes	weekly	Turbidity tube	Yes	2 locations
Sediment					
Macroalgae (seaweed)					
Seagrass (eelgrass)					
Benthic organisms					
Diversity indices					
Current speed / stream flow					

No group monitors: 1,7-DMX, Acetaminophen, Atenolol, Caffeine, Carbamazepine, CDOM (colored dissolved organic matter), Cotinine, Ethylene glycol, N – particulate N, Primidone, Propylene, Surfactants, TSS (alpha), Urobilin

Save the Bay

type:	lab or educational facility
organization location:	Westerly, RI
currently monitoring:	Yea
monitoring sites:	In PR – 1 location North of WWTF, 2 South (1 at mouth of PR)
number of years monitoring:	6
monitoring frequency:	May – Oct, 1x or 2x per month (dives, 1 / summer for a transect)

PROGRAM GOALS: primary – education of stakeholders, town, public
secondary – better understanding of the ecosystem

PERCEIVED GAPS IN MONITORING EFFORTS: circulation information – especially in Stonington and LNB area... seems to be stalling out in this area

PERSONNEL

paid staff:	2	
volunteers:	3	
students:	2	
other:	1	Americorp Intern

number involved in a single monitoring event:	6
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Save the Bay - continued

PROGRAM DEVELOPMENT

initial program development assistance: URI Watershed Watch

current program assistance or technical support: self-sufficient, URI WW does lab analysis

desired support for the future: getting public to understand the info

TRAINING

description of current training for monitors: on the day of sampling, Dave is present – often new volunteers each time, have a few veterans; just completed a training manual

All groups felt that current training was adequate.

desired support for the future: no

Save the Bay - continued

QUALITY CONTROL PROTOCOLS

utilize a QAPP: no
interested in obtaining a QAPP: yes

location where samples analyzed: URI Watershed Watch Labs

quality control measures employed:

- Field Blanks
- Replicate field samples
- X Duplicate field measures
- Analytical replicates
- Spiked samples
- Calibration blank
- Calibration sample
- Negative or positive plates/tubes
- Samples split with another lab
- Duplicate samples analyzed by another lab
- Known QC standards analysis
- Unknown QC standards analysis

CONCERNS

Community support for monitoring effort	minor	understanding why monitoring is done – getting the message out to people
Legal access to monitoring sites	none	
Loss of volunteer motivation over time	none	
Perceived credibility of data	major	always a concern – but haven't used for legal purposes yet
Staffing numbers (<i>e.g. too many, too few</i>)	minor	early in season and late in season, too few
Equipment (<i>e.g. type, amount</i>)	minor	provided by URI, concerned about upgrading YSI

Save the Bay - continued

CONCERNS (continued)

always a concern – but haven't used for legal purposes yet

Funding support (*e.g. stability, quantity*)

major foundation grants

Monitoring expertise

none

Liability

minor boat safety

Other issues / concerns:

Other issues / concerns:

DATA MANAGEMENT

data are publicly available: yes

if not, the group is willing to make data available: yes

manner in which data are shared: wpwa.org/waterQuality.htm

data are shared with: public, town government, etc.

EDUCATION and OUTREACH

website yes

social media / email yes

community events yes

workshops yes

school programs yes

publications / other distributed material yes

other

LIS EMBAYMENT MONITORING PROJECT

willing to participate in the project: yes

if no, describe why:

Test	YES / NO	Frequency (e.g. daily, weekly, monthly, annually)	Equipment Used (e.g. YSI, Hach, Vernier, LaMotte, Millipore)	QAPP? YES / NO	Location (e.g. lat/long)
Algae	Yes	monthly	quadrat on shore, % cover	N	Sandy Point, 2 stations on N shore, 2 on S shore
Alkalinity					
Azithromycin					
Carbon dioxide					
Chloride					
Chlorine					
Chlorophyll	Yes	2x per month	filter, sent to URI	StB-no; URI-yes	
Copper					
Dissolved oxygen	Yes	biweekly	YSI probe, LaMotte	no	
E. Coli					
Enterococcus	Yes	monthly	sent to URI	StB-no; URI-yes	
Fecal coliform	Yes	monthly	sent to URI	StB-no; URI-yes	
Hardness					
Iron					
Lead					
Light (not secchi depth)					
Mercury					
N - ammonium	Yes	monthly	sent to URI	StB-no; URI-yes	
N - nitrate	Yes	monthly	sent to URI	StB-no; URI-yes	
N - nitrite	Yes	monthly	sent to URI	StB-no; URI-yes	
N – total N	Yes	monthly	sent to URI	StB-no; URI-yes	
N – dissolved organic					
PCB's					
pH	Yes	monthly	sent to URI		
P - phosphate	Yes	monthly	sent to URI		
P – total P	Yes	monthly	sent to URI		
P – particulate P			sent to URI		
P – dissolved organic P					
Salinity	Yes	biweekly	refractometer, YSI meter		
Secchi Depth	Yes	biweekly	secchi disc		
Sulfide					
Sp. Conductivity					
Temperature	Yes	bimonthly	thermometer, YSI meter		
Petroleum					
TSS (EPA)					
Turbidity					
Sediment	Yes	annual	diver survey, 20 transects		20 transects out of 30 established transects
Macroalgae (seaweed)	Yes	annual / monthly	diver survey, 20 transects / quadrats at tide line		20 transects out of 30 established transects / 4 stations on Sandy Point
Seagrass (eelgrass)	Yes	annual	diver survey, 20 transects		20 transects out of 30 established transects
Benthic organisms	Yes	annual	diver survey, 20 transects		20 transects out of 30 established transects
Diversity indices					
Current speed / stream flow					

No group monitors: 1,7-DMX, Acetaminophen, Atenolol, Caffeine, Carbamazepine, CDOM (colored dissolved organic matter), Cotinine, Ethylene glycol, N – particulate N, Primidone, Propylene, Surfactants, TSS (alpha), Urobilin

Bridgeport Regional Aquaculture Science and Technology Center

type: middle school, high school, college or university
organization location: Bridgeport, CT
currently monitoring: Yes
monitoring sites: Bridgeport Harbor, Blackrock, Ash Creek, Westport Aquaculture
number of years monitoring: 19
monitoring frequency: 150-200 trips per year.

PROGRAM GOALS: education, stewardship

PERCEIVED GAPS IN MONITORING EFFORTS: Sampling conducted year round, less frequent in August.

PERSONNEL

paid staff: 7
volunteers: 0
students: 250
other: Collaborations with local Universities and Departme

number involved in a single monitoring event: 250

Bridgeport Regional Aquaculture Science and Technology Center - continued

PROGRAM DEVELOPMENT

initial program development assistance: staff - self

current program assistance or technical support: staff - self

desired support for the future: PD, new equipment, settling plates, user friendly database

TRAINING

description of current training for monitors:

All groups felt that current training was adequate.

desired support for the future: Having students work with University and other scientists make the lessons real and shows the power of collaborative research.

Bridgeport Regional Aquaculture Science and Technology Center - continued

QUALITY CONTROL PROTOCOLS

utilize a QAPP: yes
interested in obtaining a QAPP:

location where samples analyzed: in field, outside labs

quality control measures employed:

- X Field Blanks
- X Replicate field samples
- X Duplicate field measures
- X Analytical replicates
- X Spiked samples
- X Calibration blank
- X Calibration sample
- X Negative or positive plates/tubes
- X Samples split with another lab
- X Duplicate samples analyzed by another lab
- Known QC standards analysis
- Unknown QC standards analysis

CONCERNS

Community support for monitoring effort	none
Legal access to monitoring sites	none
Loss of volunteer motivation over time	none
Perceived credibility of data	none
Staffing numbers (<i>e.g. too many, too few</i>)	none
Equipment (<i>e.g. type, amount</i>)	minor Need more and updated equipment

Bridgeport Regional Aquaculture Science and Technology Center - continued

CONCERNS (continued)

Funding support (*e.g. stability, quantity*) minor public school, private grants, etc.

Monitoring expertise none

Liability none

Other issues / concerns:

Other issues / concerns:

DATA MANAGEMENT

data are publicly available: yes
if not, the group is willing to make data available: yes
manner in which data are shared:

data are shared with: Mainly students and specific collaborative partnerships

EDUCATION and OUTREACH

website
social media / email
community events
workshops yes
school programs yes
publications / other distributed material
other yes SENEME, NMEA, Science fairs

LIS EMBAYMENT MONITORING PROJECT

willing to participate in the project: yes
if no, describe why:

BRASDEC

Test	YES / NO	Frequency (e.g. daily, weekly, monthly, annually)	Equipment Used (e.g. YSI, Hach, Vernier, LaMotte, Millipore)	QAPP? YES / NO	Location (e.g. lat/long)
Algae	Yes				
Alkalinity	Yes				
Azithromycin					
Carbon dioxide					
Chloride	Yes				
Chlorine	Yes				
Chlorophyll					
Copper	Yes				
Dissolved oxygen	Yes				
E. Coli	Yes				
Enterococcus					
Fecal coliform					
Hardness	Yes				
Iron	Yes				
Lead	Yes				
Light (not secchi depth)					
Mercury	Yes				
N - ammonium	Yes				
N - nitrate	Yes				
N - nitrite	Yes				
N – total N	Yes				
N – dissolved organic	Yes				
PCB's					
pH	Yes				
P - phosphate	Yes				
P – total P	Yes				
P – particulate P					
P – dissolved organic P	Yes				
Salinity	Yes				
Secchi Depth	Yes				
Sulfide	Yes				
Sp. Conductivity	Yes				
Temperature	Yes				
Petroleum					
TSS (EPA)					
Turbidity					
Sediment	Yes				
Macroalgae (seaweed)	Yes				
Seagrass (eelgrass)					
Benthic organisms	Yes				
Diversity indices	Yes				
Current speed / stream flow					

No group monitors: 1,7-DMX, Acetaminophen, Atenolol, Caffeine, Carbamazepine, CDOM (colored dissolved organic matter), Cotinine, Ethylene glycol, N – particulate N, Primidone, Propylene, Surfactants, TSS (alpha), Urobilin

Pine Point School

type: middle school, high school, college or university
organization location: Stonington, CT
currently monitoring: Yes
monitoring sites: Little Narragansett Bay area, Stonington, CT
number of years monitoring:
monitoring frequency:

PROGRAM GOALS: Sample in Little Narragansett Bay and surrounding areas during the school year..

PERCEIVED GAPS IN MONITORING EFFORTS:

PERSONNEL

paid staff:
volunteers:
students:
other:

number involved in a single monitoring event:

Pine Point School - continued

PROGRAM DEVELOPMENT

initial program development assistance:

current program assistance or technical support:

desired support for the future:

TRAINING

description of current training for monitors:

All groups felt that current training was adequate.

desired support for the future:

Pine Point School - continued

QUALITY CONTROL PROTOCOLS

utilize a QAPP:

interested in obtaining a QAPP:

location where samples analyzed:

quality control measures employed:

Field Blanks

Replicate field samples

Duplicate field measures

Analytical replicates

Spiked samples

Calibration blank

Calibration sample

Negative or positive plates/tubes

Samples split with another lab

Duplicate samples analyzed by another lab

Known QC standards analysis

Unknown QC standards analysis

CONCERNS

Community support for monitoring effort

Legal access to monitoring sites

Loss of volunteer motivation over time

Perceived credibility of data

Staffing numbers (*e.g. too many, too few*)

Equipment (*e.g. type, amount*)

Pine Point School - continued

CONCERNS (continued)

Funding support (*e.g. stability, quantity*)

Monitoring expertise

Liability

Other issues / concerns:

Other issues / concerns:

DATA MANAGEMENT

data are publicly available:

if not, the group is willing to make data available:

manner in which data are shared:

data are shared with:

EDUCATION and OUTREACH

website

social media / email

community events

workshops

school programs

publications / other distributed material

other

LIS EMBAYMENT MONITORING PROJECT

willing to participate in the project:

if no, describe why:

not available

Staples High School

type: middle school, high school, college or university
organization location: Westport, CT
currently monitoring: Yes
monitoring sites: Sherwood Island State Park
number of years monitoring: 4
monitoring frequency: 2 trips/y

PROGRAM GOALS: to introduce biological monitoring to high school students

PERCEIVED GAPS IN MONITORING EFFORTS:

PERSONNEL

paid staff:
volunteers:
students: 25
other:

number involved in a single monitoring event: 25

Staples High School - continued

PROGRAM DEVELOPMENT

initial program development assistance:

current program assistance or technical support:

desired support for the future:

TRAINING

description of current training for monitors:

All groups felt that current training was adequate.

desired support for the future:

Staples High School - continued

QUALITY CONTROL PROTOCOLS

utilize a QAPP: No
interested in obtaining a QAPP: No

location where samples analyzed: in the field

quality control measures employed:

- Field Blanks
- Replicate field samples
- Duplicate field measures
- Analytical replicates
- Spiked samples
- Calibration blank
- Calibration sample
- Negative or positive plates/tubes
- Samples split with another lab
- Duplicate samples analyzed by another lab
- Known QC standards analysis
- Unknown QC standards analysis

CONCERNS

Community support for monitoring effort

Legal access to monitoring sites minor

Loss of volunteer motivation over time

Perceived credibility of data minor

Staffing numbers (*e.g. too many, too few*)

Equipment (*e.g. type, amount*) minor

Staples High School - continued

CONCERNS (continued)

Funding support (<i>e.g. stability, quantity</i>)	minor	usually students pay field trip costs
-----------------------------------------------------	-------	---------------------------------------

Monitoring expertise

Liability

Other issues / concerns:	minor	It's hard to find time during school for students to participate in sampling
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Other issues / concerns:

DATA MANAGEMENT

data are publicly available:	no
if not, the group is willing to make data available:	no
manner in which data are shared:	

data are shared with:

EDUCATION and OUTREACH

website
social media / email
community events
workshops
school programs
publications / other distributed material
other

LIS EMBAYMENT MONITORING PROJECT

willing to participate in the project:	Yes
if no, describe why:	

Staples High School

Test	YES / NO	Frequency (e.g. daily, weekly, monthly, annually)	Equipment Used (e.g. YSI, Hach, Vernier, LaMotte, Millipore)	QAPP? YES / NO	Location (e.g. lat/long)
Algae					
Alkalinity					
Azithromycin					
Carbon dioxide					
Chloride					
Chlorine					
Chlorophyll					
Copper					
Dissolved oxygen					
E. Coli					
Enterococcus					
Fecal coliform					
Hardness					
Iron					
Lead					
Light (not secchi depth)					
Mercury					
N - ammonium					
N - nitrate					
N - nitrite					
N – total N					
N – dissolved organic					
PCB's					
pH					
P - phosphate					
P – total P					
P – particulate P					
P – dissolved organic P					
Salinity	Yes	biannually	refractometer	NO	Sherwood I.
Secchi Depth					
Sulfide					
Sp. Conductivity					
Temperature					
Petroleum					
TSS (EPA)					
Turbidity					
Sediment					
Macroalgae (seaweed)					
Seagrass (eelgrass)					
Benthic organisms					
Diversity indices					
Current speed / stream flow					

No group monitors: 1,7-DMX, Acetaminophen, Atenolol, Caffeine, Carbamazepine, CDOM (colored dissolved organic matter), Cotinine, Ethylene glycol, N – particulate N, Primidone, Propylene, Surfactants, TSS (alpha), Urobilin

The Ursuline School

type: middle school, high school, college or university
organization location: New Rochelle, NY
currently monitoring: Yes
monitoring sites: Rye (marsh lands) and New Rochelle (Hudson Park)
number of years monitoring: 2
monitoring frequency: 2-3 trips/y

PROGRAM GOALS: Part of AP Env. Sci. course

PERCEIVED GAPS IN MONITORING EFFORTS: No

PERSONNEL

paid staff: 0
volunteers: 0
students: 12 to 15
other:

number involved in a single monitoring event: 12 to 15

The Ursuline School - continued

PROGRAM DEVELOPMENT

initial program development assistance: self

current program assistance or technical support: self

desired support for the future: Would be nice to have another adult in field with me

TRAINING

description of current training for monitors: Train students on equipment

All groups felt that current training was adequate.

desired support for the future: another adult

The Ursuline School - continued

QUALITY CONTROL PROTOCOLS

utilize a QAPP: no
interested in obtaining a QAPP: no

location where samples analyzed: in field and at my school

quality control measures employed:

- Field Blanks
- X Replicate field samples
- X Duplicate field measures
- Analytical replicates
- Spiked samples
- Calibration blank
- Calibration sample
- Negative or positive plates/tubes
- Samples split with another lab
- Duplicate samples analyzed by another lab
- Known QC standards analysis
- Unknown QC standards analysis

CONCERNS

Community support for monitoring effort	none
Legal access to monitoring sites	minor
Loss of volunteer motivation over time	none
Perceived credibility of data	none
Staffing numbers (<i>e.g. too many, too few</i>)	minor
Equipment (<i>e.g. type, amount</i>)	minor

The Ursuline School - continued

CONCERNS (continued)

Funding support (*e.g. stability, quantity*) none science budget at school

Monitoring expertise none

Liability minor

Other issues / concerns:

Other issues / concerns:

DATA MANAGEMENT

data are publicly available: no

if not, the group is willing to make data available: no

manner in which data are shared:

data are shared with: do not share

EDUCATION and OUTREACH

website
social media / email
community events
workshops
school programs
publications / other distributed material
other

LIS EMBAYMENT MONITORING PROJECT

willing to participate in the project: Yes

if no, describe why:

Test	YES / NO	Frequency (e.g. daily, weekly, monthly, annually)	Equipment Used (e.g. YSI, Hach, Vernier, LaMotte, Millipore)	QAPP? YES / NO	Location (e.g. lat/long)
Algae					
Alkalinity					
Azithromycin					
Carbon dioxide	Yes	Seasonally	LaMotte	no	Rye marshlands/New Rochelle beach
Chloride					
Chlorine					
Chlorophyll					
Copper					
Dissolved oxygen	Yes	Seasonally	LaMotte		
E. Coli					
Enterococcus					
Fecal coliform	Yes	Seasonally	LaMotte		
Hardness	Yes	Seasonally	LaMotte		
Iron					
Lead					
Light (not secchi depth)					
Mercury					
N - ammonium					
N - nitrate	Yes	Seasonally	LaMotte		
N - nitrite					
N – total N					
N – dissolved organic	Yes	Seasonally	LaMotte		
PCB's					
pH	Yes	Seasonally	LaMotte		
P - phosphate	Yes	Seasonally	LaMotte		
P – total P					
P – particulate P					
P – dissolved organic P					
Salinity	Yes	Seasonally	LaMotte		
Secchi Depth					
Sulfide					
Sp. Conductivity					
Temperature	Yes	Seasonally	LaMotte		
Petroleum					
TSS (EPA)					
Turbidity					
Sediment					
Macroalgae (seaweed)					
Seagrass (eelgrass)					
Benthic organisms					
Diversity indices					
Current speed / stream flow					

No group monitors: 1,7-DMX, Acetaminophen, Atenolol, Caffeine, Carbamazepine, CDOM (colored dissolved organic matter), Cotinine, Ethylene glycol, N – particulate N, Primidone, Propylene, Surfactants, TSS (alpha), Urobilin

Southern Connecticut State University (Dr. Breslin)

type: middle school, high school, college or university
organization location: New Haven, CT
currently monitoring: Yes
monitoring sites: Long Wharf Pier, New Haven.
number of years monitoring: 1
monitoring frequency: Once a week, within an hour of slack high tide.

PROGRAM GOALS: Collect long-term data set, help with oyster research, teach students hands-on

PERCEIVED GAPS IN MONITORING EFFORTS: other locations

PERSONNEL

paid staff:
volunteers:
students: 12
other: Note: This group started from a class in the Spring 20

number involved in a single monitoring event: 12

Southern Connecticut State University (Dr. Breslin) - continued

PROGRAM DEVELOPMENT

initial program development assistance: SCSU

current program assistance or technical support: SCSU

desired support for the future: UV spectrophotometer

TRAINING

description of current training for monitors: Use of meters in class, typical data that they should be seeing

All groups felt that current training was adequate.

desired support for the future: Has associates they can call if they need extra help.

Southern Connecticut State University (Dr. Breslin) - continued

QUALITY CONTROL PROTOCOLS

utilize a QAPP: No
interested in obtaining a QAPP: Yes

location where samples analyzed: in the field

quality control measures employed:

- Field Blanks
- Replicate field samples
- X Duplicate field measures
- X Analytical replicates
- Spiked samples
- X Calibration blank
- X Calibration sample
- Negative or positive plates/tubes
- Samples split with another lab
- Duplicate samples analyzed by another lab
- X Known QC standards analysis
- Unknown QC standards analysis

CONCERNS

Community support for monitoring effort	none	
Legal access to monitoring sites	none	Don't ask, don't tell. (Using a dock and no one has told them no yet...)
Loss of volunteer motivation over time	none	
Perceived credibility of data	none	
Staffing numbers (<i>e.g. too many, too few</i>)	none	
Equipment (<i>e.g. type, amount</i>)	minor	Want an extra spectrophotometer. In process of applying for one now. .

Southern Connecticut State University (Dr. Breslin) - continued

CONCERNS (continued)

Funding support (*e.g. stability, quantity*) none external grants

Monitoring expertise none

Liability none

Other issues / concerns:

Other issues / concerns:

DATA MANAGEMENT

data are publicly available: no
if not, the group is willing to make data available: no
manner in which data are shared: Class, school

data are shared with: N/A: Collecting at the moment but want to share eventually once they get enough data

EDUCATION and OUTREACH

website yes
social media / email yes
community events
workshops yes
school programs yes
publications / other distributed material
other yes seminars, used in other classes at SCSU

LIS EMBAYMENT MONITORING PROJECT

willing to participate in the project: yes
if no, describe why:

scsu

Test	YES / NO	Frequency (e.g. daily, weekly, monthly, annually)	Equipment Used (e.g. YSI, Hach, Vernier, LaMotte, Millipore)	QAPP? YES / NO	Location (e.g. lat/long)
Algae					
Alkalinity					
Azithromycin					
Carbon dioxide					
Chloride					
Chlorine					
Chlorophyll	Yes	Once a week	spectrophotometer	no	dock
Copper					
Dissolved oxygen	Yes	Once a week	YSI	No	Dock
E. Coli					
Enterococcus					
Fecal coliform					
Hardness					
Iron					
Lead					
Light (not secchi depth)	Yes	Once a week	Light meters	No	dock
Mercury					
N - ammonium					
N - nitrate					
N - nitrite					
N – total N					
N – dissolved organic					
PCB's					
pH	Yes	Once a week	pH probe	No	dock
P - phosphate					
P – total P					
P – particulate P					
P – dissolved organic P					
Salinity					
Secchi Depth	Yes	Once a week	Secchi disk	No	dock
Sulfide					
Sp. Conductivity	Yes	Once a week	YSI	No	dock
Temperature	Yes	Once a week	YSI	No	dock
Petroleum					
TSS (EPA)					
Turbidity					
Sediment	Yes	Once a week	Grabs, spectrophotometer	No	dock
Macroalgae (seaweed)					
Seagrass (eelgrass)					
Benthic organisms					
Diversity indices					
Current speed / stream flow					

No group monitors: 1,7-DMX, Acetaminophen, Atenolol, Caffeine, Carbamazepine, CDOM (colored dissolved organic matter), Cotinine, Ethylene glycol, N – particulate N, Primidone, Propylene, Surfactants, TSS (alpha), Urobilin

U.S. Coast Guard Academy (Dr. Bergondo)

type: middle school, high school, college or university
organization location: New London, CT
currently monitoring: Yes
monitoring sites:
number of years monitoring:
monitoring frequency:

PROGRAM GOALS: Sample along the Thames River, as part of course work.

PERCEIVED GAPS IN MONITORING EFFORTS:

PERSONNEL

paid staff:
volunteers:
students:
other:

number involved in a single monitoring event:

U.S. Coast Guard Academy (Dr. Bergondo) - continued

PROGRAM DEVELOPMENT

initial program development assistance:

current program assistance or technical support:

desired support for the future:

TRAINING

description of current training for monitors:

All groups felt that current training was adequate.

desired support for the future:

U.S. Coast Guard Academy (Dr. Bergondo) - continued

QUALITY CONTROL PROTOCOLS

utilize a QAPP:

interested in obtaining a QAPP:

location where samples analyzed:

quality control measures employed:

Field Blanks
Replicate field samples
Duplicate field measures
Analytical replicates
Spiked samples
Calibration blank
Calibration sample
Negative or positive plates/tubes
Samples split with another lab
Duplicate samples analyzed by another lab
Known QC standards analysis
Unknown QC standards analysis

CONCERNS

Community support for monitoring effort

Legal access to monitoring sites

Loss of volunteer motivation over time

Perceived credibility of data

Staffing numbers (*e.g. too many, too few*)

Equipment (*e.g. type, amount*)

U.S. Coast Guard Academy (Dr. Bergondo) - continued

CONCERNS (continued)

Funding support (*e.g. stability, quantity*)

Monitoring expertise

Liability

Other issues / concerns:

Other issues / concerns:

DATA MANAGEMENT

data are publicly available:

if not, the group is willing to make data available:

manner in which data are shared:

data are shared with:

EDUCATION and OUTREACH

website

social media / email

community events

workshops

school programs

publications / other distributed material

other

LIS EMBAYMENT MONITORING PROJECT

willing to participate in the project:

if no, describe why:

not available

Yale (Dr. Benoit)

type:	middle school, high school, college or university
organization location:	New Haven, CT
currently monitoring:	Yes
monitoring sites:	Mill River (41.32061N; 72.98328W), West River (41.29951N;
number of years monitoring:	3
monitoring frequency:	YSI every 15 min., equipment checked each month and verified with field measurements

PROGRAM GOALS: Monitoring tidal restoration and research change of tide gates (what happens). Doing it for research and testing hypothesis.

PERCEIVED GAPS IN MONITORING EFFORTS: ice in winter - take device out January to March

PERSONNEL

paid staff:	
volunteers:	
students:	x
other:	x Profs of Yale and other colleges

number involved in a single monitoring event:	10
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Yale (Dr. Benoit) - continued

PROGRAM DEVELOPMENT

initial program development assistance: self

current program assistance or technical support:

desired support for the future: money

TRAINING

description of current training for monitors: on the job

All groups felt that current training was adequate.

desired support for the future: No

Yale (Dr. Benoit) - continued

QUALITY CONTROL PROTOCOLS

utilize a QAPP: no
interested in obtaining a QAPP: maybe

location where samples analyzed:

quality control measures employed:

- Field Blanks
- Replicate field samples
- Duplicate field measures
- Analytical replicates
- Spiked samples
- Calibration blank
- X Calibration sample
- Negative or positive plates/tubes
- Samples split with another lab
- Duplicate samples analyzed by another lab
- Known QC standards analysis
- Unknown QC standards analysis

CONCERNS

Community support for monitoring effort	none	Wants to engage larger community but not a “concern”
Legal access to monitoring sites	minor	permission from CTDEEP
Loss of volunteer motivation over time	none	
Perceived credibility of data	none	
Staffing numbers (<i>e.g. too many, too few</i>)	minor	
Equipment (<i>e.g. type, amount</i>)	major	Risk of being destroyed. Not well protected; could be vandalized

Yale (Dr. Benoit) - continued

CONCERNS (continued)

Funding support (<i>e.g. stability, quantity</i>)	major	YSI foundation, Sea Grant
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Monitoring expertise	none
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Liability	none
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Other issues / concerns:	major	biofouling - have to clean!
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Other issues / concerns:

DATA MANAGEMENT

data are publicly available:	yes
if not, the group is willing to make data available:	yes
manner in which data are shared:	Private and Public Site (Real time) Data files and computer spread sheets

data are shared with:	Anyone who wants to see it and public
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EDUCATION and OUTREACH

website	yes
social media / email	
community events	
workshops	
school programs	Yes
publications / other distributed material	
other	

LIS EMBAYMENT MONITORING PROJECT

willing to participate in the project:	Yes
if no, describe why:	

... .

Yale

Test	YES / NO	Frequency (e.g. daily, weekly, monthly, annually)	Equipment Used (e.g. YSI, Hach, Vernier, LaMotte, Millipore)	QAPP? YES / NO	Location (e.g. lat/long)
Algae					
Alkalinity					
Azithromycin					
Carbon dioxide					
Chloride					
Chlorine					
Chlorophyll					
Copper					
Dissolved oxygen	Yes	Daily	YSI	No	Both Sites
E. Coli					
Enterococcus					
Fecal coliform					
Hardness					
Iron					
Lead					
Light (not secchi depth)					
Mercury					
N - ammonium					
N - nitrate					
N - nitrite					
N – total N					
N – dissolved organic					
PCB's					
pH	Yes	Daily	YSI	No	Both Sites
P - phosphate					
P – total P					
P – particulate P					
P – dissolved organic P					
Salinity	Yes	Daily	YSI	No	Both Sites
Secchi Depth					
Sulfide					
Sp. Conductivity					
Temperature	Yes	Daily	YSI	No	Both Sites
Petroleum					
TSS (EPA)					
Turbidity	Yes	Daily	YSI	No	Both Sites
Sediment					
Macroalgae (seaweed)					
Seagrass (eelgrass)					
Benthic organisms					
Diversity indices					
Current speed / stream flow					

No group monitors: 1,7-DMX, Acetaminophen, Atenolol, Caffeine, Carbamazepine, CDOM (colored dissolved organic matter), Cotinine, Ethylene glycol, N – particulate N, Primidone, Propylene, Surfactants, TSS (alpha), Urobilin

Community Group Meeting

December 11, 2012; 11 a.m. – 1 p.m.

Hosted by The Maritime Aquarium, Norwalk, CT

Attendees (*italics = project partners*):

1. *Jamie Alonzo (presenter, project PI), The Maritime Aquarium*
2. *Jamie Vaudrey (presenter, project PI), University of Connecticut*
3. *Charlie Yarish (project PI), University of Connecticut*
4. *Cathy Hagadorn (project PI), The Maritime Aquarium*
5. *Joe Schnierlein (project PI), The Maritime Aquarium*
6. Peter Linderhoff, Bruce Museum
7. Dick Harris, Harbor Watch

The meeting started at 1:30 p.m.; waiting for late arrivals.

The agenda is included in this document.

The Power Point presentation utilized at this meeting is included at the end of this document.

(In the following summary, italics are points for PIs to consider, not mentioned explicitly during the meeting.)

1. Introductions

2. Power point presentation by Jamie Alonzo and Jamie Vaudrey.

2.1. Jamie Alonzo: overview of project

No comments.

2.2. Jamie Vaudrey: overview of community group survey results

Schnierlein: Mentioned that the EPA and CTDEEP do not always agree on what criteria are important. For example, the EPA does not think DNS of bacterial samples is not currently a good method of identification, while CT DEEP does feel it can provide usable information. Response was that groups could discuss this with EPA and CTDEEP, but it would not be covered in the QAPP or framework, as it is a specialized and expensive measurement. *It should be noted that such discrepancies in the way EPA and CTDEEP prioritize parameters may apply to other parameters as well.*

Schnierlein: Brien McMahon High School monitored for 25 years, stopped because of liability and funding issues (comment from Schnierlein, not a McMahon representative).

A point for PIs to consider: do we want to follow up with groups who have stopped monitoring? Seems that there are relatively few where this apply.

Harris & Hagadorn: Discussion of how organizations were categorized. Decided that Harbor Watch should be move to the “Labs and Educational Organizations” category. This was a mis-reading of the survey results by Vaudrey. Presentation data will be fixed before the next presentation.

Hagadorn: looks like many groups from Long Island are missing. *Vaudrey will check.*

2.3. Jamie Vaudrey: overview of QAPP approach

Schnierlein: Be sure to define the roles. For example, who can and cannot be the QA Officer.

Schnierlein: What happens if the QAPP is violated, are the data disqualified? For example, Schnierlein is the QA Officer for the Maritime Aquarium. If he covers someone and goes out on a data collection trip, are the data disqualified because the QA Officer cannot be directly involved with collecting data?

Group: Suggestion that datasheets for educational organizations have a checkbox to indicate if data were collected following all QAPP procedures.

Group: Would be good to have a list of people willing to provide support (QAPP, training, advice, etc.)

Schnierlein: For the QAPP, provide a start for the process that is manageable for the groups. Don't drop the whole thing in their lap.

Harris: Harbor Watch has paid staff at the lab who run checks on collection techniques, very helpful in insuring the QAPP is followed.

Group: This started a conversation about how the framework could suggest a similar type of site visit approach for organizations. CT DEEP could oversee, possibly Sea Grant.

Group: A LISS sponsored workshop on preparing a QAPP is a good idea.

Yarish: How about a "QAPP-lite"... A QAPP that is already completed for temperature, salinity, dissolved oxygen, and secchi depth.

2.4. Jamie Alonzo provided an overview of other frameworks of support and began asking for input on the framework.

Group: A coordinator should facilitate the communication among groups, training, assistance with QAPP

Harris: Effort tapers off over time. Need to keep people interested and focused.

This is a topic we should address directly at the remaining two meetings – how is this accomplished? Is the comparison to other areas throughout LIS sufficient incentive?

Harris: What can this process provide for Harbor Watch?

As Pls, we need to figure out how to answer this question for educational groups and for community based groups. We may need to follow up – this is another question to focus on at the remaining two meetings.

Linderhoff: Would like to see a central hub for training – organizations or groups which are willing to provide support in training.

Harris – NO STORET!! the EPA on-line database is unwieldy and poorly documented. No training on use is provided and the output is not worth the effort.

Linderhoff: For educational organization, what is the tangible gain of using a QAPP for the Bruce Museum? The group suggested: funding, equipment, STEM educational benefits.

Pls need to articulate the educational benefits. Also need to look into what programs are now requiring QAPPs (Sea Grant, LISFF) and are they requiring QAPPs of monitoring and educational groups, or just basic research?

Yarish: One tangible gain for educational organizations may be for the LISS to provide displays suitable for use in nature centers, aquaria, etc. Group added that educational programming based on the data collected into a centralized database may also encourage educational organizations to participate.

3. Summary of Action Items

Move Harbor Watch to Labs and Educational Facilities category.

Check CCE contact record (done, Vaudrey had not added in the people contacted, but not monitoring to maps).

Generate new data plots, based on revised data.

PIs need to articulate the educational benefits of using a QAPP. Also need to look into what programs are now requiring QAPPs (Sea Grant, LISFF) and are they requiring QAPPs of monitoring and educational groups, or just basic research?

For E CT meeting, the following questions should be addressed:

Effort tapers off over time. Need to keep people interested and focused. *This is a topic we should address directly at the remaining two meetings – how is this accomplished? Is the comparison to other areas throughout LIS sufficient incentive?*

What can this process provide for Harbor Watch?

As PIs, we need to figure out how to answer this question for educational groups and for community based groups. We may need to follow up – this is another question to focus on at the remaining two meetings.

Put together a questionnaire specific to each group for the Framework discussion – break out by community based, middle and high school, college, labs and educational organizations. Get at what each of these different groups would like form a framework and what they would need as far as incentives to participate. (media attention, visual displays for facilities, access to other data, etc.)

Evaluation of Current Citizen Monitoring Efforts & Recommendations for Developing a Cohesive Network of Support for Monitoring Long Island Sound Embayments

Stakeholder Regional Meeting

The Maritime Aquarium at Norwalk . 11 December 2012

Agenda

- 1. Welcome & Introductions**
- 2. Introduction to LISS-NEIWPCC Grant Goals, Tasks & Timeline**
- 3. Task Data Presentation & Updates**
 - a. Task I: Near-Shore Data Needs Assessment
 - b. Task II: Identify Established Monitoring Groups
 - c. Task IV: Quality Assurance Project Plan Development
 - d. Task III: Framework Development
 - i. Model Framework Presentation*
 - ii. Stakeholder Feedback Discussion*

Evaluation of Current Citizen Monitoring Efforts & Recommendations for Developing a Cohesive Network of Support for Monitoring Long Island Sound Embayments



LISS-NEIWPCC Embayment Monitoring Project

Introduction to the Project: Project Goal

Improve access by Long Island Sound Study partners to quality-assured embayment water quality monitoring data, and ultimately improve scientific understanding for more holistic management of the Long Island Sound.

Action Agenda 2011-2013

Action 3, Science & Management Section

"Evaluate options for enhancing and coordinating citizen and other monitoring in embayments and harbors and analyzing this data to improve conditions, assess impacts of conditions. Subsequently make recommendations on the feasibility, efficiency and sustainability of findings."

LISS-NEIWPCC Embayment Monitoring Project

Embayments

Broad bays formed by indentations in the shoreline.

- Among the most easily accessed parts of the Sound, also where water quality problems & related consequences (beach closures, shell fisheries closures, algae blooms) are most likely to affect local communities.
- Also gaining more attention as playing important roles in nutrient cycling & circulation patterns.
- Community monitoring groups often seek money from the LISS who wants to ensure that resulting data sets are of suitable consistency, quality & accessibility so as to be useful to the LISS & other end users.

LISS-NEIWPCC Embayment Monitoring Project

Project Phases

Phase I Goal (current effort)

- Evaluation of near-shore water quality monitoring efforts
- Subsequent development of a framework for coordinated near-shore water quality monitoring

Phase II Goal

- Implementation of framework suggested in Phase I
- Provide technical support to community monitoring groups

LISS-NEIWPCC Embayment Monitoring Project

Phase I: Project Tasks

Task I

- Near-Shore Data Needs Assessment

Task II

- Identify Established Monitoring Groups

Task III

- Framework Development

Task IV

- Quality Assurance Project Plan Development

LISS-NEIWPCC Embayment Monitoring Project

Task I: Near-Shore Data Needs Assessment

- Meet with data end users to discuss data needs
- Identify requirements for data collected from community groups to be usable by end users



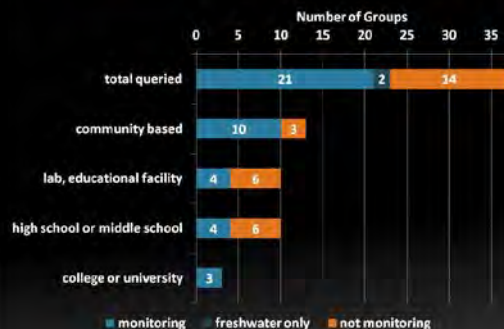
LISS-NEIWPCC Embayment Monitoring Project

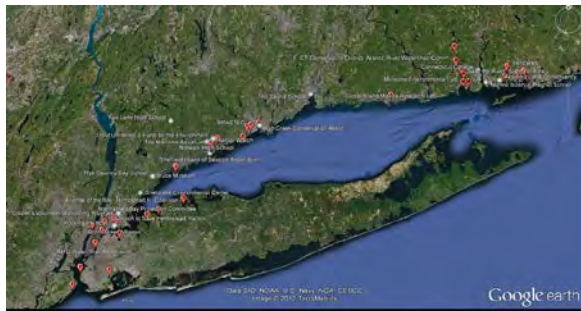
Task II: Identify Established Monitoring Groups

- Create an inventory of recent & current water quality monitoring groups.
- Conduct interviews to clearly understand how community monitoring groups operate.



LISS-NEIWPCC Embayment Monitoring Project





all groups queried

LISS-NEIWPCC Embayment Monitoring Project



all groups queried who are monitoring

LISS-NEIWPCC Embayment Monitoring Project



community based organizations

LISS-NEIWPCC Embayment Monitoring Project



community based – water quality

LISS-NEIWPCC Embayment Monitoring Project



community based - bacteria

LISS-NEIWPCC Embayment Monitoring Project



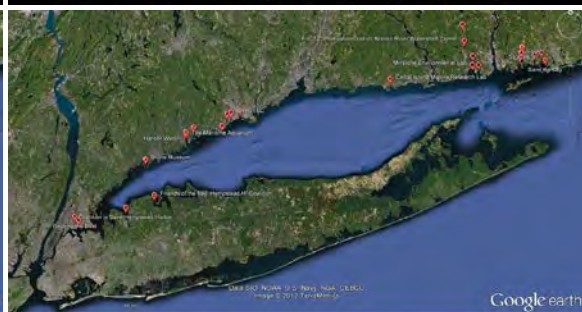
labs & organizations + BASTEC

LISS-NEIWPCC Embayment Monitoring Project



schools (middle, high, college/univ.)

LISS-NEIWPCC Embayment Monitoring Project



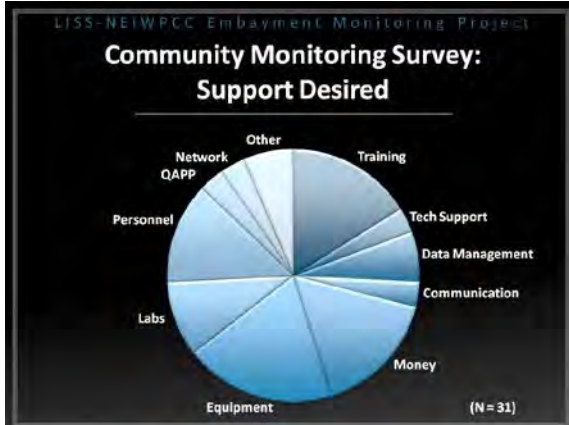
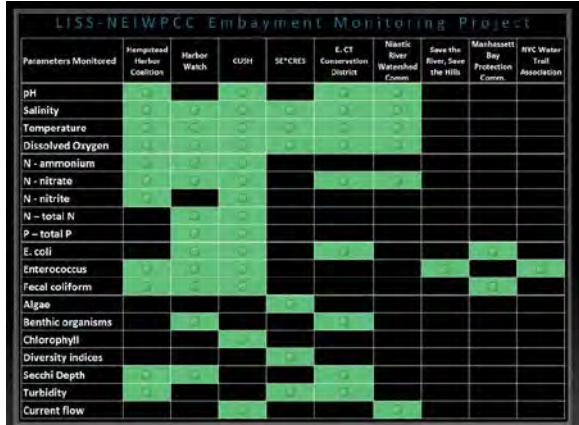
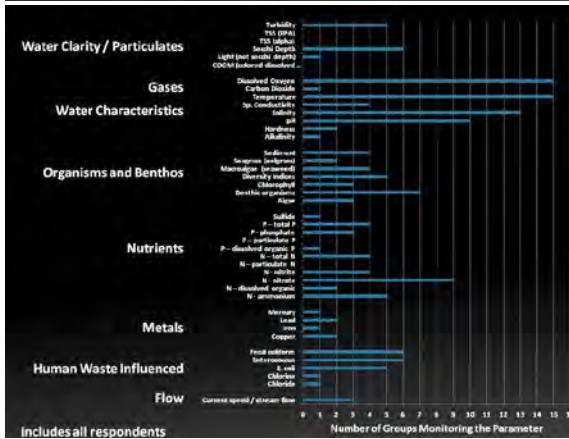
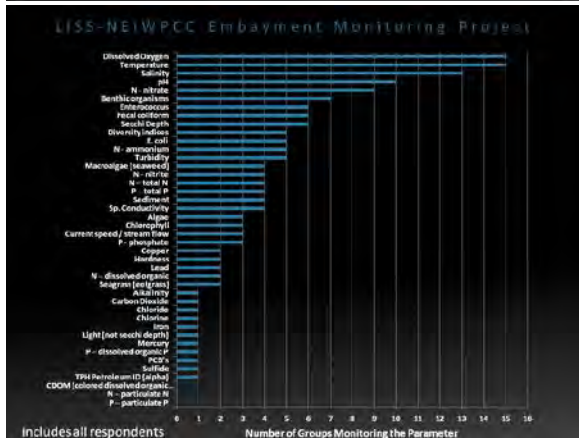
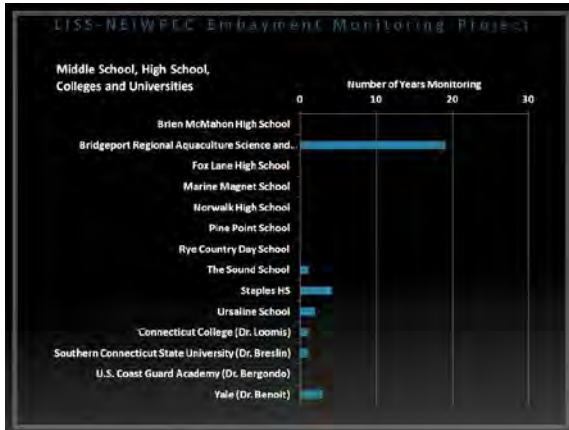
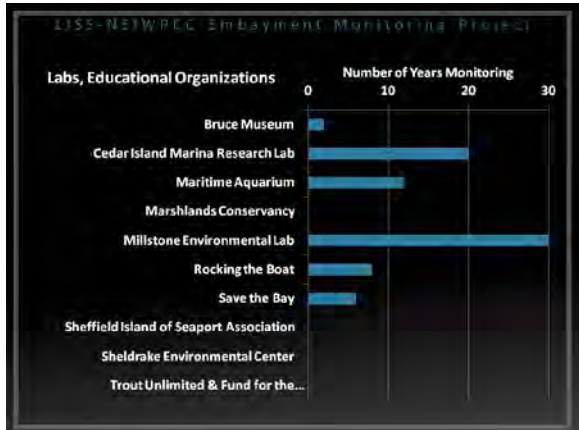
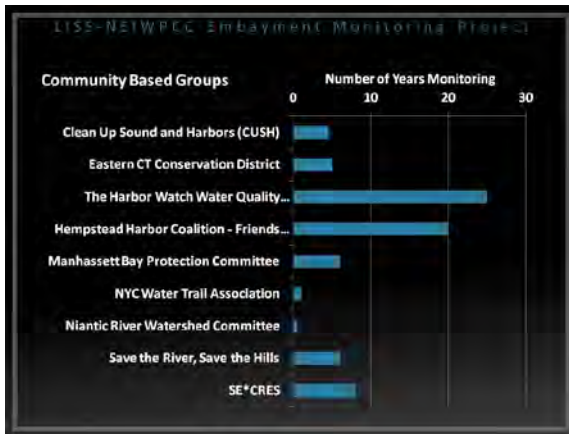
water quality on a regular basis

LISS-NEIWPCC Embayment Monitoring Project



water quality and/or bacteria on a regular basis

LISS-NEIWPEC Embayment Monitoring Project



LISS-NEIWPCC Embayment Monitoring Project

Task IV: Quality Assurance Project Plan Development

- Provide module templates with standardized text for each field parameter along with a variety of methods to ease the process of QAPP development.

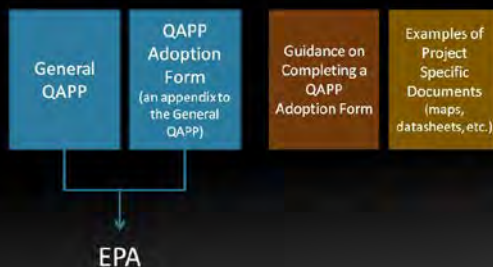
QAPP

EPA approved Quality Assurance Project Plan

- provides end users with an assurance that data were collected and processed in a manner suitable to their needs
- most groups are already following these requirements
 - most need to add in a field blank and possibly, additional replication of profiles

QAPP

EPA approved Quality Assurance Project Plan



Task III: Framework Development

- Recommendations to improve coordination of community groups' monitoring efforts.
- Provide recommendations for how to make resulting data useful to end-user's groups.
- Provide recommendations related to:
 - ✓ Measured parameters
 - ✓ Field sampling
 - ✓ Equipment
 - ✓ Laboratory methods
 - ✓ Training
 - ✓ Data management
 - Database use / characteristics
 - ✓ Funding priorities
 - Creating a monitoring network

Model Frameworks for Water Quality Monitoring Networks

Framework Case Studies

- Buzzards Bay Coalition
- Morro Bay National Estuary Program Volunteer Monitoring Program

Framework Database Examples

- [Water Atlas](#) (Charlotte Harbor, FL)
- [Wood-Pawcatuck Watershed Association](#)
- [Programa del Estuario de la Bahía de San Juan](#)
- [St. Johns River Water Management District](#)

Buzzards Bay Coalition

Baywatchers Volunteer Water Quality Monitoring Program

Description

- Volunteers to help assess and evaluate water quality and long-term ecological trends in all of Buzzards Bay's harbors and coves. Each year ~100 volunteers measure water quality at ~130 locations.

Goal

- Monitor all of Buzzards Bay's major embayments
- Dual benefit of accomplishing comprehensive water quality monitoring while empowering citizens to become educated and passionate guardians of Buzzards Bay.

Buzzards Bay Coalition Baywatchers Volunteer Water Quality Monitoring Program

Water Quality Monitoring

- Year-round DO, salinity, pH & water clarity measurements
- Summer sampling effort
 - ✓ 4 dates
 - ✓ Water collected & sent to lab (nitrogen, phosphorus, carbon/nitrogen ratios, phaeophytin, chlorophyll-a)
- Utilize EPA QAPP
- Volunteer training provided

Additional Volunteer Opportunities

- Volunteer Educational Docent
- Buzzards Bay Coalition Property Maintenance Teams
- Buzzards Bay Baykeeper Support (boat pump-out service)
- Community Outreach

Morro Bay National Estuary Program Volunteer Monitoring Program

Description

- 10-year partnership with local residents to monitor the health of the Morro Bay estuary. Citizens monitor water quality in the bay and creeks, track indicator species, survey shorebird populations & more.

Goal

- Serves the dual mission of collecting critical data about the health of the watershed and bay, while educating and empowering hundreds of watershed citizens to play a part in understanding and protecting the estuary and watershed.

Morro Bay National Estuary Program Volunteer Monitoring Program

Ongoing & Seasonal Opportunities for Volunteers

- Creek Samplers (DO, pH, temp, turbidity, conductivity, nitrates, phosphates, flow; sample 1x / month)
- Bacteria Monitors (1-4 sites / month; samples sent to lab)
- Dawn Patrol (kayakers measure DO, salinity & temp)
- Plankton Pullers (1 site / month; conduct counts send samples to lab)
- Bioassessment (seasonal; habitat quality, macroinvertebrate census)
- Marine Vegetation Survey (fall & winter; eelgrass, algae; via kayak, boat or land-based)

Miscellaneous

- Provides annual data summaries
- QAPP / sampling training provided by estuary program staff
- Minimum volunteer commitment requested

Model Frameworks for Water Quality Monitoring Networks

Framework Case Studies

- Buzzards Bay Coalition
- Morro Bay National Estuary Program Volunteer Monitoring Program

Framework Database Examples

- [Water Atlas \(Charlotte Harbor, FL\)](#)
- [Wood-Pawcreek Watershed Association](#)
- [Program del Estuario de la Bahía de San Juan](#)
- [St. Johns River Water Management District](#)

Phase II Indicators of Success

- Community monitoring groups collecting data according to approved QAPPs, which is uploaded to centralized database.
- Data collection satisfies needs of all primary stakeholders.
- Community monitoring groups coordinating among each other & with data end users to standardize data collected according to needs of data end users.
- End users & community monitoring groups communicating on regular basis, making revisions to the data collected & methods used as needs change, in real time.
- A valued collaboration among primary stakeholders built on the goals of environmental stewardship that is self-sustaining in terms of incentives, ongoing support & outcomes.

Community Group Meeting

December 17, 2012; 4 p.m. – 6 p.m.

Hosted by The University of Connecticut, Department of Marine Sciences, Groton, CT

Attendees (*italics = project partners*):

1. *Jamie Alonzo (presenter, project PI), The Maritime Aquarium*
2. *Jamie Vaudrey (presenter, project PI), University of Connecticut*
3. *Kierran Broatch (project PI), Save the Sound*
4. *Cassie Devney (project intern), Save the Sound*
5. *Kim Gallagher (project postdoc), University of Connecticut*
6. *Erin Jacobs (NEIWPCC project manager), NEIWPCC*
7. *Jim Latimer (EPA project science advisor), EPA NHEERL*
8. Nancy Balcom (speaker), Connecticut Sea Grant College Program
9. Mark Tedesco, EPA
10. Jason Krumholz, NOAA
11. Joellen Anderson, Avalonia Land Conservancy
12. Rick Newton, Avalonia Land Conservancy
13. Claire Gavin, CUSH
14. Don Danila, Niantic River Watershed Commission - East Lyme
15. John Jasper, Niantic River Watershed Commission & Nature's Fingerprint
16. Judy Rondeau, Niantic River Watershed Commission & Eastern CT Conservation District
17. Lauren Rader, Project Oceanology
18. Don Landers, Millstone Environmental Lab
19. John Swenarton, Millstone Environmental Lab
20. Jon Mitchell, Pine Point School
21. Dave Prescott, Save the Bay (via conference call)
22. Fred Grimsey, Save the River, Save the Hills
23. Mark Sperry, Save the River, Save the Hills
24. Bruce MacMahon, SE*CRES
25. Bill Skindzier, SE*CRES
26. Tim Visel, Sound School of New Haven
27. Vince Breslin, Southeastern Connecticut State University
28. Deanna Bergondo, U.S. Coast Guard Academy
29. Gaboury Benoit, Yale

The meeting started at 4:00 p.m.

The agenda is included in this document.

The Power Point presentation utilized at this meeting is included at the end of this document.

(In the following summary, *italics* are points for PIs to consider, not mentioned explicitly during the meeting.)

The meeting followed a different format from the Norwalk and Farmingdale meetings, due to the large number of participants:

- Vaudrey and Alonzo presented the power point. A few clarification points were handled during the presentation, but no substantial discussion occurred during the viewing of the power point presentation.
- Participants were divided into groups for small group discussion. People were told to identify the group they thought was most relevant for them. Each group was provided with a questionnaire and paper to focus the discussion.
- A representative from each group summarized the main points discussed within their group. These points are summarized below.

The questionnaire given to each group:

Long Island Sound Embayment Community Monitoring Meeting, E. CT, 12/17/2012

GROUP (circle 1): community based middle & high school college & university
 lab & educational supporting organization other: _____

Project Goal: Improve access by Long Island Sound Study partners (end users and generators of data) to quality-assured embayment water quality monitoring data, and ultimately improve scientific understanding for more holistic management of the Long Island Sound.

Project Strategies:

- Survey scientists & managers for better understanding of end user data needs;
- Survey community-based monitoring groups to better understand efforts;
- Develop standardized QAPP templates to ease the process of QAPP adoption;
- Explore the establishment of a Sound-wide network to support project goal;
- Explore adopting common data management solution to support project goal.

Discussion Questions:

- A. What does the LISS need to do to make this program successful?
 - B. What are the main challenges to establishing a LIS network?
 - C. What incentives might facilitate your active participation?
 - D. What functionality would you like from a common data management system?
-

The questionnaire included an additional blank page to allow for note taking beyond the first page.

RESULTS OF GROUP DISCUSSIONS

Left the Meeting Early: Prescott (phone), Benoit

Community Based Organizations: Rondeau (group spokesperson), Broatch, Devney, Gallagher, Anderson, Newton, Gavin, Danila, Jasper, Landers, Grimsey, Sperry, MacMahon, Skindzier

Question A: What does LISS need to do?

We would like to have local labs for bacteria sample processing. The holding time for these samples is short and getting samples to the Hartford area is a detriment to sampling.

We need more funding opportunities – there is very little support for monitoring, most RFPs require hypothesis driven science.

Also need more funding for equipment and to support staff. This could encourage the sampling of additional locations.

QAPP – is important to have, but support in development would help.

We could use more guidance on data interpretation. Would be nice to have someone at a University look at the group's data to validate or tell them what they are seeing (D. Danila)

There is a need for technical help and training. We need “top-down” guidance – for example, where and when to sample. (F. Grimsey)

Question B: main challenges?

Resource, especially staffing, are a main challenge. Need a dedicated staff person / people for the LISS program.

Data consistency.

Creating buy-in, so everyone wants to participate.

Question C: Incentives

Funding opportunities, help with QAPP, guidance on data interpretation, training on how to sample and how to set up a program

Question D: functionality of database

Data display, graphics, data repository, consistency, user-friendly data entry

One example – Wood-Pawcatuck website is not very “user-friendly”

Calculate the flux of constituents to / from LIS automatically

Lab & Educational Organizations: Alonzo (group spokesperson), Rader, Swenarton

Question A: What does LISS need to do?

Make programs sustainable: staff to support the program, committed funds for monitoring groups

Question B: main challenges?

Question C: Incentives

good public relations, access to data, assistance with data management, links to related literature

Question D: functionality of database

kid/teacher friendly, central repository for data, easily compare locations, standard format, place to check if QAPP or non-QAPP collected data

Middle & High School; College & University: Vaudrey (group spokesperson), Mitchell, Visel, Breslin, Bergondo

(Comments below are “free-form,” this group did not systematically answer the questionnaire.)

For the academic world, the biggest issue is that sampling is often integrated into course work. It is not a part of a formal monitoring program, where samples are taken on a regular and consistent basis.

Some suggestions for establishing a monitoring program included:

Directed study or independent study based on monitoring

Get clubs involved with monitoring.

From the research perspective, we need to know what data are available, it would be helpful to have a contact who knows which groups are monitoring, where and when. Also that contact could help us connect with end users who could utilize the data.

Standardizing data collection and format is a good idea.

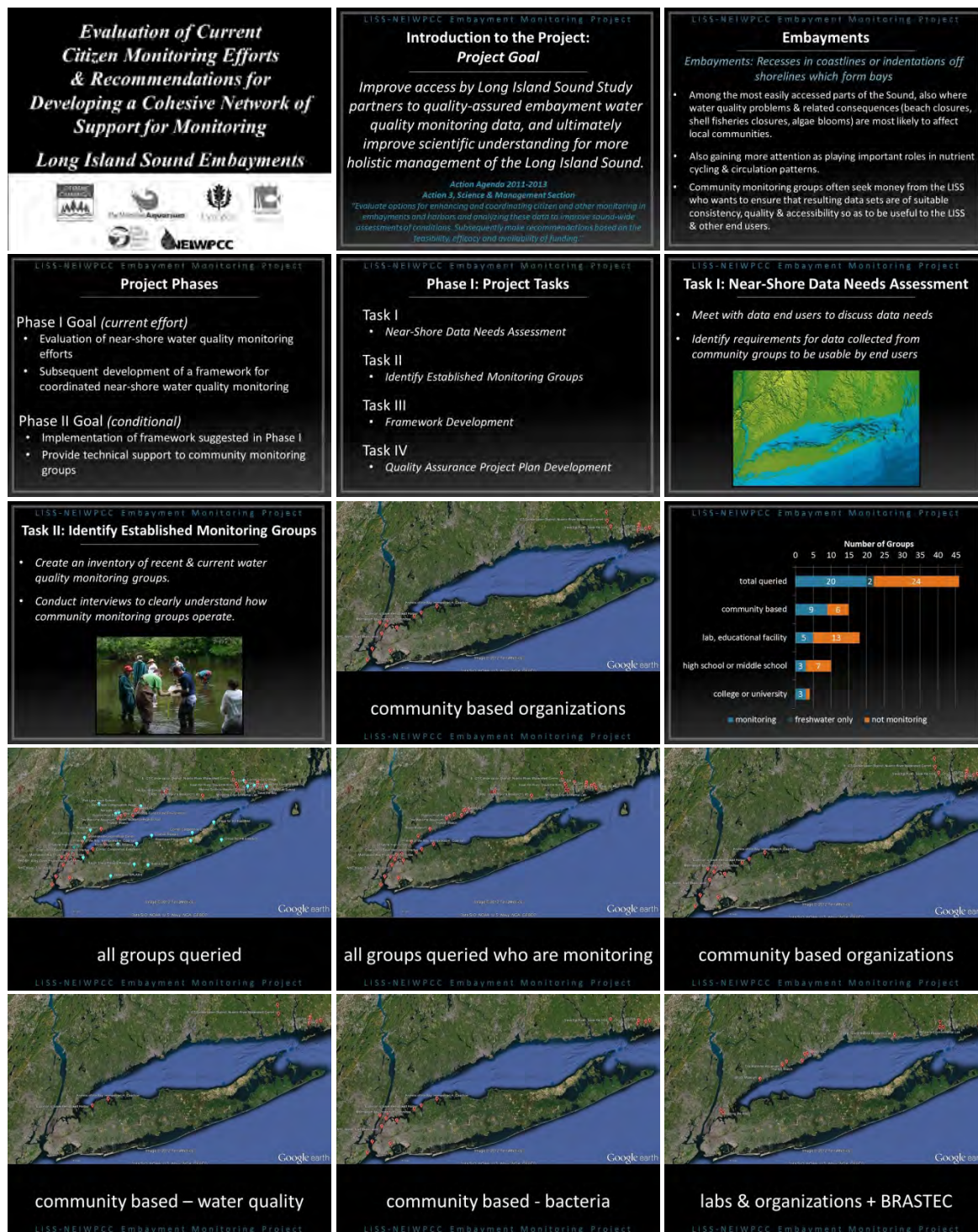
An umbrella organization which can provide supports is good, but allow groups their autonomy.

In the database:

Include a feature which looks up tides and weather automatically and includes that info in database.

Provide raw data, not just reports. Make it in a format which is easy to download.

“Sound Health” comes out every 2 years. In the alternating years, put out “Embayment Health.”





<p>LISS-NEIWPCC Embayment Monitoring Project</p> <h3>Task III: Framework Development</h3> <ul style="list-style-type: none"> Recommendations to improve coordination of community groups' monitoring efforts. Provide recommendations for how to make resulting data useful to end-user's groups. Provide recommendations related to: <ul style="list-style-type: none"> Measured parameters Field sampling Equipment Laboratory methods Training Data management Database use / characteristics Funding priorities Creating a monitoring network 	<p>LISS-NEIWPCC Embayment Monitoring Project</p> <h3>Model Frameworks for Water Quality Monitoring Networks</h3> <p>Framework Case Studies</p> <ul style="list-style-type: none"> Buzzards Bay Coalition Morro Bay National Estuary Program Volunteer Monitoring Program <p>Framework Database Examples</p> <ul style="list-style-type: none"> Water Atlas (Charlotte Harbor, FL) Wood-Pawcatuck Watershed Association Program del Estuario de la Bahía de San Juan St. Johns River Water Management District The Maritime Aquarium at Norwalk 	<p>LISS-NEIWPCC Embayment Monitoring Project</p> <h3>Buzzards Bay Coalition</h3> <p>Baywatchers Volunteer Water Quality Monitoring Program</p> <p>Description</p> <ul style="list-style-type: none"> Volunteers to help assess and evaluate water quality and long-term ecological trends in all of Buzzards Bay's harbors and coves. Each year ~100 volunteers measure water quality at ~130 locations. <p>Goal</p> <ul style="list-style-type: none"> Monitor all of Buzzards Bay's major embayments. Dual benefit of accomplishing comprehensive water quality monitoring while empowering citizens to become educated and passionate guardians of Buzzards Bay.
<p>LISS-NEIWPCC Embayment Monitoring Project</p> <h3>Buzzards Bay Coalition</h3> <p>Baywatchers Volunteer Water Quality Monitoring Program</p> <p>Water Quality Monitoring</p> <ul style="list-style-type: none"> Year-round DO, salinity, pH & water clarity measurements Summer sampling effort <ul style="list-style-type: none"> 4 dates Water collected & sent to lab (nitrogen, phosphorus, carbon/nitrogen ratios, phaeophytin, chlorophyll-a) Utilize EPA QAPP Volunteer training provided <p>Additional Volunteer Opportunities</p> <ul style="list-style-type: none"> Volunteer Educational Docent Buzzards Bay Coalition Property Maintenance Teams Buzzards Bay Baykeeper Support (boat pump-out service) Community Outreach 	<p>LISS-NEIWPCC Embayment Monitoring Project</p> <h3>Morro Bay National Estuary Program</h3> <p>Volunteer Monitoring Program</p> <p>Description</p> <ul style="list-style-type: none"> 10-year partnership with local residents to monitor the health of the Morro Bay estuary. Citizens monitor water quality in the bay and creeks, track indicator species, survey shorebird populations & more. <p>Goal</p> <ul style="list-style-type: none"> Serves the dual mission of collecting critical data about the health of the watershed and bay, while educating and empowering hundreds of watershed citizens to play a part in understanding and protecting the estuary and watershed. 	<p>LISS-NEIWPCC Embayment Monitoring Project</p> <h3>Morro Bay National Estuary Program</h3> <p>Volunteer Monitoring Program</p> <p>Ongoing & Seasonal Opportunities for Volunteers</p> <ul style="list-style-type: none"> Creek Samplers (DO, pH, temp, turbidity, conductivity, nitrates, phosphates, flow; sample 1x / month) Bacteria Monitors (1-4 sites / month; samples sent to lab) Dawn Patrol (kayakers measure DO, salinity & temp) Plankton Pullers (1 site / month; conduct counts send samples to lab) Bioassessment (seasonal; habitat quality, macroinvertebrate census) Marine Vegetation Survey (fall & winter; eelgrass, algae; via kayak, boat or land-based) <p>Miscellaneous</p> <ul style="list-style-type: none"> Provides annual data summaries QAPP / sampling training provided by estuary program staff Minimum volunteer commitment requested
<p>LISS-NEIWPCC Embayment Monitoring Project</p> <h3>Questions for Discussion</h3> <p>A. What does the LISS <u>need to do</u> to make this program successful?</p> <p>Examples: personnel to support QAPP development, data base management, training activities.</p> <p>B. What are the <u>main challenges</u> to establishing a LIS network?</p> <p>C. What <u>incentives</u> might facilitate your active participation?</p> <p>Examples: access to funding, QAPP assistance, technical assistance, training, access to equipment, displays for museums, lesson plans.</p> <p>D. What <u>functionality</u> would you like from a common data management system (i.e. data access/sharing, reporting)?</p>		

Community Group Meeting

December 19, 2012; 11 a.m. – 1 p.m.

Hosted by The Citizen's Campaign Fund for the Environment, Farmingdale, NY

Attendees (*italics = project partners*):

1. *Jamie Vaudrey (presenter, project PI), University of Connecticut*
2. *Kim Gallagher (presenter), University of Connecticut*
3. *Maureen Dolan Murphy, Citizen's Campaign Fund for the Environment*
4. *Tara Bono, Citizen's Campaign Fund for the Environment*
5. Carol DiPaolo, Coalition to Save Hempstead Harbor
6. Eric Swenson, Hempstead Harbor Protection Commission
7. Pat Aiken, Friends of the Bay
8. Jenifer Wilson-Pines, Manhasset Bay Protection Committee
9. Caitlyn Nichols, Interstate Environmental Commission District of NEIWPCC

The meeting started at 11 am.

The Power Point presentation utilized at this meeting is included at the end of this document.

(In the following summary, *italics* are points for PIs to consider, not mentioned explicitly during the meeting.)

1. Introductions
2. Power point presentation by Jamie Vaudrey and Kim Gallagher.
 - 2.1. *Jamie Vaudrey: overview of project*
 - 2.2. *Jamie Vaudrey: overview of community group survey results*
 - 2.3. *Kim Gallagher: overview of QAPP approach*
 - 2.4. Jamie Vaudrey provided an overview of other frameworks of support and began asking for input on the framework.

Comments from meeting attendees:

SAMPLE ANALYSIS

- The public health department is conducting bacteria lab analysis (paying for this). Some lab facilities identify the plankton.
- EPA has been developing a quick test for bacteria → groups would like this test to be available.

QAPP

- Groups would like someone to facilitate going through a revision of a QAPP.
- One group wanted to revise QAPP to do additional monitoring of bacteria, but were told by EPA that EPA did not want to look at revising the QAPP unless it was covered under a project.
- Caitlyn Nichols (IEC) mentioned that NJ DEP sponsored a two day "water summit". One afternoon was a QAPP workshop, which included an example of an actual QAPP.
- Caitlyn Nichols (IEC) mentioned that EPA has an identified person to help with community groups writing a QAPP.

- One of the most useful items in a sample QAPP is clear standard operating procedures (SOPs).

DATABASE

- Storet is “unusable.”
- Would like an excel interface.
- There must be a support person to assist with questions and check data.
- In the “two day conference,” would be useful to have a section on data entry – how to use the common database.
- Creating annual reports is expensive and labor intensive. It would help if groups could compare among systems and through time.

OTHER SUPPORT

- It was mentioned that some of the educational groups from the Avery Point and Norwalk meetings mentioned that displays would be a useful tool. Farmingdale community groups said that such displays would also be useful to them – for post offices, libraries, and festivals.
- *This concept of displays as one way to support groups is important to include in the recommendations.*

MAIN CHALLENGES

- On Eastern Long Island, there are few defined harbors and bays, so it is hard to develop a proprietary sense of interest within the community. Eric Swenson suggests that the State should be out monitoring those areas.
- On a state level, funding for the shellfish program has dwindled – so fewer analyses conducted.
- Groups need help interpreting the data.

GAPS

- The biggest gap is in delivering the data to the community.
- The fact that Sound Health publishes oxygen maps with the embayments shown as blue (=supportive of aquatic life) is misleading at best and detrimental to the efforts of local embayment monitoring groups. These maps imply that the embayments are doing fine, by the color choice. (*Note from Vaudrey – on the CT DEEP hypoxia maps, there is a line that surrounds the study area, but the distinction is not obvious to the casual observer. In addition, the legend shows that anything > 4.8 mg/L will be shown as white, but there is no white on the map, only the background blue.*)
- MAJOR gap = funding! Funders are not willing to provide funding over time. When applying for funding, groups have to put a new spin on their efforts every funding cycle – the funders want to see that something new is being conducted. This is artificial for a monitoring program; the goal of a monitoring program is to monitor the same suite of parameters in the same locations over time.
- The timing of funding is also an issue. Due to delays in contracting, money often is delivered after the field season has passed. The funding cycle does not match up with the budget cycle for

most towns. Erik Swenson provided an example – in January, he develops a budget. The budget is adopted and towns pay their dues on March. In March, he is not sure of the status of LISFF funds.

- Friends of the Bay had to conduct fund raising efforts to meet their budget shortfalls.
- Community groups really need a pot of money dedicated to monitoring, not having to try something new every 2 years.
- Sourcing of pathogens – where are they coming from? This is the next step, so you can investigate the problem.
- Sourcing of N input – helps with educational and outreach programs - helps groups identify where the main focus should be: geese or septic...

WHY HAVE GROUPS DISAPPEARED?

- Economy
- Now have more 2 earning families – not available for volunteer work.
- After 9/11, people became more insular.
- Lack of money to fund activities, including outreach.
- There are smaller groups of people willing to donate.
- We have become a crisis-based society, when water quality is bad, people respond; if good, no need to monitor.
- For some groups, the motivating person has died or moved on, the organization then loses momentum.
- Schools have also changed, as has the students. It is harder to get young people involved with volunteer monitoring. The students have become detached from the skills they need – like using a shovel. However, partnerships can be developed – Locust Valley works with Friends of the Bay, very motivated kids – this is because they have a teacher facilitating the interaction.
- Friends of the Bay have been successful at maintaining their program for a few reasons: most of the volunteers are retirees, this leads to continuity in the volunteer staff within a season and from season to season. Friends of the Bay also has a paid employee supervising the program.

OTHER SUGGESTIONS

- Fifteen years ago, there was a two day conference for monitoring groups. It included training on techniques and vendors were present to provide workshops on assorted equipment. Would be nice for EPA/LISS to have an open house and exchange information among groups. This should include workshops, discussions, and presentations on interpreting data and what it all means.
- Send CT DEEP interns out to work with monitoring organizations, especially those that are low on volunteers. Along this same line, NJ DEEP uses Americorp Watershed Ambassadors – an intern gets assigned to a specific group.
- Create a network for standardization of equipment and use of calibration standards. Also provides a network of contact for sharing equipment when something goes wrong.
- Would also like all groups to come up with a list of core parameters for monitoring.

Evaluation of Current Citizen Monitoring Efforts & Recommendations for Developing a Cohesive Network of Support for Monitoring Long Island Sound Embayments

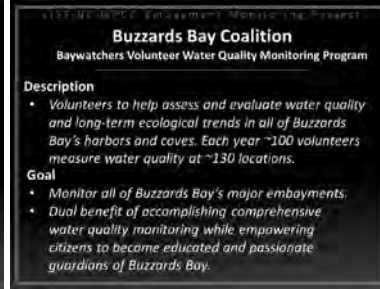
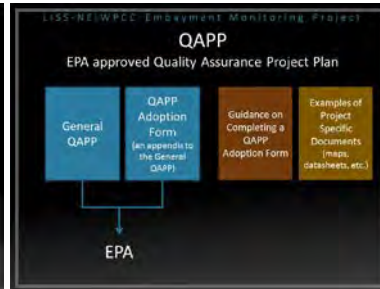
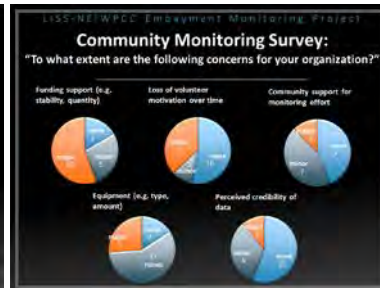
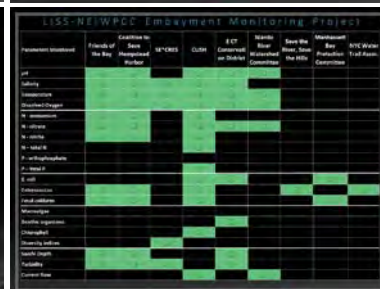
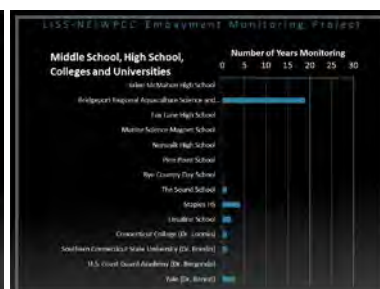
Stakeholder Regional Meeting

Citizen's Campaign Fund for the Environment at Farmingdale. 19 December 2012

Agenda

- 1. Welcome & Introductions**
- 2. Introduction to LISS-NEIWPCC Grant Goals, Tasks & Timeline**
- 3. Task Data Presentation & Updates**
 - a. Task I: Near-Shore Data Needs Assessment
 - b. Task II: Identify Established Monitoring Groups
 - c. Task IV: Quality Assurance Project Plan Development
 - d. Task III: Framework Development
 - i. Model Framework Presentation*
 - ii. Stakeholder Feedback Discussion*





LISS-MCdePCP, Ecosystem Monitoring, Forest

Buzzards Bay Coalition

Baywatchers Volunteer Water Quality Monitoring Program

Water Quality Monitoring

- Year-round DO, salinity, pH & water clarity measurements
- Summer sampling effort
 - ✓ 4 dates
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- Utilize EPA QAAPP
- Volunteer training provided

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- Volunteer Educational Docent
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- Community Outreach

LISS-MCdePCP, Ecosystem Monitoring, Forest

Morro Bay National Estuary Program

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Description

- 10-year partnership with local residents to monitor the health of the Morro Bay estuary. Citizens monitor water quality in the bay and creeks, track indicator species, survey shorebird populations & more.

Goal

- Serves the dual mission of collecting critical data about the health of the watershed and bay, while educating and empowering hundreds of watershed citizens to play a part in understanding and protecting the estuary and watershed.

LISS-MCdePCP, Ecosystem Monitoring, Forest

Morro Bay National Estuary Program

Volunteer Monitoring Program

Ongoing & Seasonal Opportunities for Volunteers

- Creek Samplers (DO, pH, temp, turbidity, conductivity, nitrates, phosphates, flow; sample 1x / month)
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- Bioassessment (seasonal; habitat quality, macroinvertebrate census)
- Marine Vegetation Survey (fall & winter; eelgrass, algae; via kayak, boat or land-based)

Miscellaneous

- Provides annual data summaries
- QAAPP / sampling training provided by estuary program staff
- Minimum volunteer commitment requested

Questions for Discussion

A. What does the LISS need to do to make this program successful?

Examples: personnel to support QAAPP development, data base management, training activities.

B. What are the main challenges to establishing a LIS network?

C. What incentives might facilitate your active participation?

Examples: access to funding, QAAPP assistance, technical assistance, training, access to equipment, displays for museums, lesson plans.

D. What functionality would you like from a common data management system (i.e. data access/sharing, reporting)?