Environmental indicators in New England:
Sharing Best Practices to Strengthen Watershed Counts and Explore Regional Collaboration
September 25, 2012
Hazards Rooms A&B, URI Coastal Institute, GSO, Narragansett, RI

Goals:
- To explore shared regional indicators and communication strategies
- To further strengthen Narragansett Bay Watershed Counts by learning from and sharing strategies with established indicator programs in adjacent waterbodies

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Watershed Counts history and draft year 3 workplan (Q Kellogg and Meg Kerr)
Presentation at http://watershedcounts.org/documents/WC_Summary.pdf

Watershed Counts has completed 2 years of science-based indicator development with on-going stakeholder involvement. The following time line summarizes the work to date:

Activity	Months	Year
One-on-one Stakeholder Meetings	Jan - March	2010
Selection by RI Env. Mon. Collab.	June	
Beach Closures, IC, Flow, Invasives, Climate Change		
Metric development vetted through workshops	Sept - Dec	
Presentation at RI Statehouse	April	2011
Evaluation workshop	May	
Selection of additional metrics	June - Aug	2011
Freshwater quality, marine water quality, open space, resource economics		
Metric development vetted through workshops	Sept - Jan	2011/12
Presentation at RI Statehouse	April	2012
Evaluation workshop	June	
Regional Workshop	Sept 25	

During Year 3, Watershed Counts plans to report on the established metrics and will continue developing metrics that are currently qualitative or incomplete. The following chart summarized plans for the year, which will culminate in a presentation at the RI Statehouse and a presentation to MA decision-makers.

Draft Work Plan for 2013

Indicator	Metric	Plan 2013	2012	2011	Potential link to management
Saltwater Beach Closures	# closure events, total and by town ppt during beach season	Assess Report	Assessed Reported	Metrics developed Assessed Reported	Stormwater mgt
Climate Change	Sea level Sea surface temp # high intensity storms	Assess Report		Metrics developed Assessed Reported	Adaptation plans and implementation
Impervious Cover	% of NB watershed % by town			Metrics developed Assessed Reported	LID implementation Stormwater mgt
Freshwater Quality - Rivers & Streams	Based on state (MA, RI, CT) assessments	Assess and Report for entire watershed using 2010 assessments Include 2012 assessments if available	Metrics developed Assessed and Reported for four watersheds using 2010 assessments		Land use decisions LID implementation Stormwater mgt
Freshwater Quality - Lakes & Ponds		Develop Assess & Report if possible*			
Protected Open Space	Area and % of watershed	Continue development (e.g., focus on floodplains and riparian areas) Assess & Report if possible*	Metrics developed Assessed Reported		Land use decisions
Marine Water Quality	Area and % impaired for dissolved oxygen, based on state (RI) assessment	Continue metric development Assess & Report if possible*	Metrics developed Assessed Reported		Watershed management
Freshwater Quantity		Continue development Assess & Report if possible*	Continued development	Metric development initiated Assessed & Reported in qualitative terms	Land use decisions Water resource management
Invasive Species		Continue development Assess & Report if possible*	Continued development Assessed & Reported on # of lakes in RI found to have aquatic invasives	Metric development initiated Assessed & Reported in qualitative terms	Invasive species detection & response
Natural Resource Economics	Value of a day at the beach	Continue development Assess & Report if possible*	Metrics developed Assessed Reported		Public and political support for env. protection

* Watershed Counts only reports on metrics that have been developed, assessed and vetted by the assigned group as well as any partners who wish to weigh in.

Discussion:

Q. Will the 2013 beach closure metric include freshwater beaches?
A. Watershed Counts is interested in including freshwater beaches in the beach closure metric. The RI Department of Health does not monitor freshwater beaches as frequently as salt water beaches so the data are not as complete.

Q. What indicator(s) resonated most with the public and with decision-makers?
A. In 2012, the economic metric on the value of a beach day resonated with the press and with the audience at the RI State House. This metric linked well with the beach closure metric.

Q. Can you incorporate public comments on the web site?
A. This is a great suggestion. We will look into incorporating a moderated discussion on the web site, while recognizing that this can be a time consuming activity.

Q. Can Watershed Counts help develop goals that will put the metrics into a larger context (e.g., Watershed Counts reports on acres of protected open space, but what is our goal for protecting open space)?
A. Goal setting is a high level undertaking and larger than the scope of Watershed Counts indicators.

Q. Explain why Watershed Counts has both qualitative and quantitative metrics.
A. The goal is to have quantitative metrics for all the Watershed Counts indicators. But Watershed Counts is also committed to reporting annually and developing metrics that are broadly accepted and based on solid data. For some of the metrics (for example freshwater flow and invasives) we have developed useful qualitative statements but we are committed to continuing to work towards an acceptable quantitative metric.

Overview of Long Island Sound Study Indicator Program (Jason Krumholz)
Presentation at: http://watershedcounts.org/documents/Krumholz_presentation_final.pdf

The motto of the LISS indicators working group is: "we all have the right to assess progress by seeing the data ourselves."

The LISS indicators program began in 1998, structured around their 1994 Comprehensive Conservation and Management Plan (CCMP). It initially included 85 indicators in 6 categories. Over time it has been distilled into 51 indicators in 4 categories, or "concerns"—water quality, marine & coastal animals, habitats, and land use/population. Of these, 20-25 key measures are highlighted in their biennial publication, "Sound Health". Multi-metric indices, i.e., those that combine several metrics for an overall index for an area of concern, are now a priority.

The underlying data come from a wide variety of sources – and ensuring that data are compatible is an ongoing challenge. Other challenges include gaps in spatial resolution,

consistency of data, incorporating higher temporal resolution, gaps in CCMP topic areas, and dealing with bi-state data.

Some of the next steps for the program include assessing condition indicators, recommending appropriate methods for trend analysis, looking at further spatial disaggregation and developing a Report Card style presentation.

Discussion:

Q. How much does it cost annually to maintain the LISS indicators program?

A. The costs are mostly staff time so it is difficult to measure. Not all the staff working on the project work for LISS. The monitoring program costs close to $900,000 annually. Developing the report and web site costs about $40,000 annually.

Q. On an ongoing basis, how many FTEs contribute to this effort?

A. The program uses the expertise of multiple people and agencies. LISS dedicates about 2 FTEs for whom the indicator work is on the front burner.

Q. How are key components of the public responding to and using the indicator program?

A. Outreach is accomplished through "Sound Health," which has been distributed as a newspaper insert. The 2012 report will not be an insert; rather, it will be sent to schools with the anticipation that schoolchildren will bring the publication to their families.

Q. Do you have examples of how the indicators have been used?

A. There are no good examples of "because of this indicator, management has changed …". However, management considerations drive the choice of indicators. When there is an indicator reported on, management focuses on the issue. Hypoxia is a prime example of this.

Overview of Buzzards Bay Indicator Program (Joe Costa)
Presentation at: http://watershedcounts.org/documents/costa-talk1-watershed-counts.pdf

In 1988 the Buzzards Bay National Estuary Program Citizens Advisory Council became a separate nonprofit but has remained closely affiliated with Buzzards Bay program. The first CCMP was developed in 1992.

Water quality monitoring was largely done by volunteers and was used to develop a eutrophication index (now called "health index") which is still used. Eelgrass was added as an indicator in 1995 and in 2003 the program published a state of the bay report looking at pollution, watershed health and living resources. The report was published on the website and generated a lot of interest. A new management plan (CCMP) is under development. The original CCMP included a detailed monitoring plan, but the new CCMP will be more generalized and will focus on using data to support management decisions. The Buzzards Bay audience understands and supports water quality monitoring.

Discussion:
Q. You have an overall bay health index, but embayments have different goals so how do you compare?
A. Each embayment has its own analysis. We try to focus on the local level when we can.

Q. You are using a black box model. How do you know the model is correct? And assuming it is (with current conditions) how will that change over time, e.g., adjust for climate change?
A. The reality is that the model is trying to estimate change in bay conditions resulting from a change in loading. Although simplified, the overall picture is fairly accurate. We use adaptive management to adjust the specific numbers.

Q. What is the investment in the indicator system?
A. For the most part, the coalition sustains its own program. The water quality monitoring program costs at least $100K per year, but then there are other (public outreach) costs that are up to $50K. Additional costs are the other indicators (herring for example), the website, etc. Staff has been growing (Coalition has about 18 people) and they have over 150 volunteers and are looking to expand.

Q. How does a nonprofit maintain scientific integrity?
A. The Coalition has outside experts who come in and provide an evaluation for each indicator.

Q. How do you set the baselines for your indicators? How far back in time do you go (if you do)?
A. The 2011 bay health index looks at historical conditions (pre-colonial times).

Buzzards Bay Living Resources Indicators (Joe Costa)
Presentation at: **http://watershedcounts.org/documents/costa-talk2-watershed-counts.pdf**

The State of the Bay indicators compare conditions to pre-colonial times.
Eelgrass baseline assumes eelgrass was growing in all suitable areas.
Various shellfish were examined and scallops were selected because the data are the best — the data come from shellfish wardens throughout the state. Lobster statistics are complicated because data are not available at the Buzzards Bay level, but at a regional scale.
Herring are reported but the fishery is affected by offshore fishery so it may not be an effective indicator of conditions within the bay.
Nitrogen—eutrophication score takes average of all embayments and factors weather variations by using a 5 year average (to try reduce noise in data).
Bacteria pollution—identified by shellfish closures as acres (particularly summer closures that might reflect stormwater management).
Toxic pollution – most objective; strongly influenced by oil spill in early 2000s; state is no longer monitoring shellfish and other seafood for toxins.
Watershed Health (forest, stream buffers (200 ft.), wetlands). Cape Cod was deforested in 1800s. It is now gaining more forests as agricultural fields are being converted/recovering.

Residential land use is increasing faster than population is growing. Wetlands data is at 1:5000, delineated by DEP from aerials every 5 years. Forest data come from the Woods Hole Research Station.

Benthic habitat affected by boat moorings which have increased over time. Mooring chain scars can be seen in many embayments. Used "best professional judgment" to establish thresholds for poor/fair/good.

Discussion:
Q. How often are your flights?
A. Coalition goes out every 5 years but they supplement the analysis with other data from sources such as Bing and Google.

Q. Do you have a clear understanding of the relationship between changes in nutrient inputs and the health of eelgrass?
A. In the early 90s, we related eelgrass abundance to nitrogen inputs. The analysis is available on the website. Consider eelgrass as a water quality "integrator."

Q. How do you determine a reasonable baseline?
A. Need to consider management targets and whether goals are attainable.

Sentinel Monitoring for Climate Change in Long Island Sound (Juliana Barrett):
Presentation at:
http://watershedcounts.org/documents/Sentinal_Monitoring_RI_meetingJB.pdf

What is Sentinel Monitoring? A multidisciplinary scientific investigation into local impacts of climate change through long-term monitoring of select indicators/sentinels via targeted monitoring efforts. Sentinels are measurable variables that are susceptible to some key aspect of climate change and which are being monitored for the appearance of climate change. Ideal sentinel attributes - can distinguish the signal of climate change from natural variations.

Stakeholders (bi-state workgroup) worked together to create a sentinel list and prioritize it. The group focused on physical and ecological components of climate change rather than looking at human impacts. The workgroup together narrowed a list of 37 potential sentinels to 17. Then narrowed it again to 6 priority groups (birds, finfish, lobster, phytoplankton, coastal and upland forest, salt marsh). A large technical workgroup was important for acceptance by scientists and researchers. On-line tools were used to communicate with the larger workgroup. Finally, they sent out an rfp for monitoring. The program only received a few proposals and awarded a grant to a project looking at marsh birds/habitat. A data citation clearinghouse was just completed and will be expanded over time.

A data citation library has been established and is online, with search capability using a map. Researchers can enter their data, along with links to websites.

Discussion:

Q. Can you explain sentinel vs parameter?

A. A sentinel must be a measurable variable that is susceptible to some key aspect of climate change and which is being monitored for the appearance of climate change.

Q. Of the sentinels, how much can you say from the data already in the database and how much really needs more work?

A. This is the focus of our current work. We don't know.

Q. For something like marsh birds, how can you look at trends when you just have 2 years for data collection?

A. That is why this is pilot monitoring - trying to get researchers to commit to further research. It is critical to get this to fit into broader regional monitoring. Synthesis is also forthcoming and there is an effort to get monitoring to link better to management needs.

Q. Do you have plans for incorporating human health?

A. Not yet, but there is a big opportunity for collaboration and a recognition that reframing climate change as a human health/public health issue is likely a way to engage a broader spectrum of the public.

Q. Are there comparable projects in the climate ready estuaries (CRE) grant program?

A. Charlotte Harbor is doing something similar. But part of the purpose of CRE is to fund different types of projects.

Development of Estuarine Biological Indicators (BCG) (Peg Pelletier)
Presentation at: http://watershedcounts.org/documents/WatershedCounts_BCG.pdf

BCG – biological condition gradient – tracks ecosystem stressors against biological conditions. Greenwich Bay has been a case study for testing the methodology. Estuarine BCG uses the Freshwater BCG framework, which has been in use for some time. This study looked at eelgrass extent, benthic habitat, primary productivity and shellfish (response indicators) and plotted them against the level of exposure to stressors.
(Pre-colonial→agricultural → maritime → industry → suburbanization)

Availability of data has been an issue, but can be somewhat addressed by EMAP (Environmental Monitoring and Assessment Program).

Estuarine BCG can provide common language and a link to management for goals. It can provide consistent data but there are challenges and complexity when applying to site-specific issues. For now it is more useful for larger regional analyses.

Discussion:

Q. Will this work be expanded to cover all of Narragansett Bay?

A. The Greenwich Bay BCG was a pilot study. A bay-wide assessment is in our workplan and we are compiling all the benthic data we can find -- some goes back to 1950s. We are concentrating on benthic information for now because that is where our expertise lies but eventually we would like to have a wider series of indicators.

Open Discussion of Communicating about Indicators (Judith Swift, facilitator)

We need to recognize that change, i.e. improvement, is slow. Even after management strategies are put in place, the ecosystem response takes time. We should have interim measures of success. For example, we could showcase management decisions that are expected to contribute to protection or restoration of resources.

People relate to specific examples and we should distill research to answer "So What?." For example, this past summer Narragansett Bay did not develop a DO problem even though conditions suggested that it would. Why?

There is a trajectory of change from understanding to action. Effective communication recognizes where people are and helps them move to the next step.
Can social media help reach a broader range of stakeholders? Or are we saturated with information?

We can use web stats to understand how people visit and use our web sites.

Regional Recommendations

Use social science expertise and social marketing to strengthen communications.

EPA is tracking climate related events – could groups take advantage of this information?
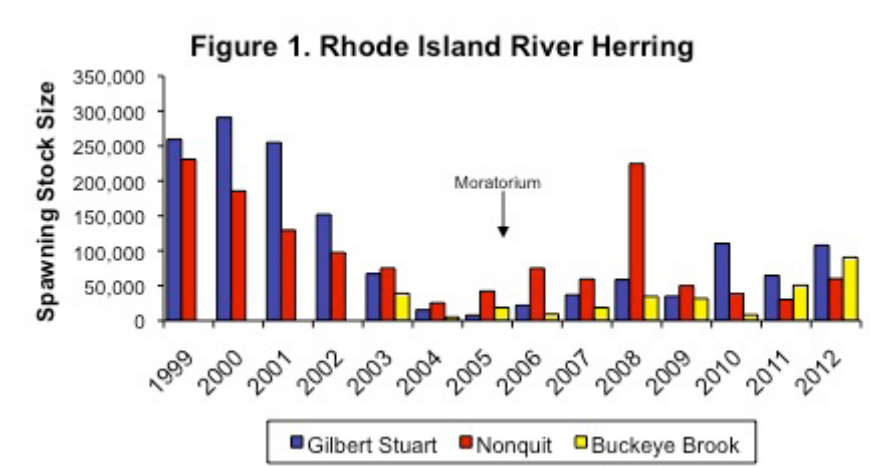
Recommendations to Watershed Counts

New indicators to consider:

Eelgrass. There are data for RI
http://www.edc.uri.edu/Eelgrass/ and it includes historical data (1884)
http://www.edc.uri.edu/restoration/html/intro/sea.htm

Shellfish: Consider looking at acre-days of closure. DEM has data. This would link to economic indicators very well. It is important to recognize that shellfish bed closures link closely to rainfall so they mimics more than the abundance of shellfish. But the CSO project has opened sections. We would need to compare similar precipitation years. Also, closures are not based on sampling, but rather on rainfall. DEM may need to change the rainfall depth at which closures

are triggered, but this requires sampling to reevaluate the relationship between rainfall and water quality.

Herring: Demonstrates the result of investments in fish ladders, dam removal, water quality improvements, and the impacts of eutrophication. Impacted by commercial fishing. Analysis must look at long-term trends. It would also be interesting to focus on river herring within one or two rivers. (See following graphic from Narragansett Bay Journal article on river herring http://www.nbep.org/journals/fall_2012/River-Fish-Status.pdf)

Figure 1. Rhode Island River Herring

General recommendations
- Develop goals for metrics
- Restructure indicator framework using LISS, Buzzards Bay and NBEP Currents of Change as possible models. Buzzards Bay uses
  WATER POLLUTION (nitrogen/toxins/pathogens),
  WATERSHED HEALTH (forests, stream buffers, wetlands),
  LIVING RESOURCES (eelgrass, bay scallops, river herring).
  Consider the use of multi-metric indices – combining sensitive indicators (eelgrass) and more robust indicators (benthos).
- Consider revisiting stakeholders who helped frame the program at the beginning.
- Remember communication with funders. Success stories important to "sell" these programs.

Communication:

On the web site and in communication with decision-makers, make it clear what people can do to address issues. Identify actions. WHAT CAN I DO?? Make the web site more interactive.

Choose the subset of indicators for the public awareness insert that: 1)tells a story; 2) is not

difficult to interpret; and 3) does not have data consistency issues.

Understand that STATE HOUSE is different than MY house... may need different stories. Avoid jargon -- recognize that average person does not know what 'infiltration' is... use terms like "SOAK IT INTO THE GROUND".

Continue to explore a Report Card format- helps to communicate to connect to issue & goal

Use success stories to document progress on given indicators; be careful of "ultimate" success - be sure to use interim successes as well. The National Coastal Assessment used success stories effectively. Remember that un-impacted areas are success stories as well as areas where we have restored function. Link success stories to people – talk about beaches, shellfishing, etc.

Use CHILDREN for public outreach -- use PR firm, social sciences -- Keep it simple -- social marketing. What is the message, who is the audience, who should deliver the message? Use tiered strategy of information dissemination

Remember tools that have been developed – Water Words that Work (http://waterwordsthatwork.com/)

Attendees:

Name	Last Name	Email	Organization
Ross	Adrian	paddle-faster@yahoo.com	Pawtuxet River Authority
Glenn	Archetto	glenn.archetto@gmail.com	URI
Jane	Austin	jaustin@savebay.org	Save the Bay
Suzanne	Ayvazian	Ayvazian.Suzanne@epamail.epa.gov	EPA AED
Juliana	Barrett	juliana.barrett@uconn.edu	LISS
Georgia	Basso	basso.georgea@epa.gov	EPA
Veronica	Berounsky	VBerounsky@gso.uri.edu	URI
Walter	Berry	Berry.Walter@epamail.epa.gov	U.S. EPA
Eric	Boettger	Eric.Boettger@ri.usda.gov	NRCS
Jon	Boothroyd	Jon_Boothroyd@uri.edu	URI
Caitlin	Chaffee	cchaffee@crmc.ri.gov	CRMC
Ames	Colt	ames.colt@DEM.RI.GOV	BRWCT
Joe	Costa	jcosta@buzzardsbay.org	Buzzards Bay National Estuary Program
Mel	Cote	cote.mel@epa.gov	EPA Region 1
Kevin	Cute	kcute@crmc.ri.gov	CRMC
Jeff	Davis	Jeff.Davis@doa.ri.gov	DOA
Chris	Deacutis	deacutis@gso.uri.edu	NBEP
Gina	DeMarco	gdemarco.nricd@verizon.net	Northern RI Conservation District
Linda	Green	LGreen@uri.edu	Watershed Watch
Alison	Hamel	ahamel@dot.ri.gov	RI DOT
Elizabeth	Herron	emh@uri.edu	Watershed Watch
Q	Kellogg	q@edc.uri.edu	URI
Meg	Kerr	megkerr@cox.net	NBEP
Jason	Krumholz	Krumholz.Jason@epamail.epa.gov	LISS
Tom	Kutcher	tkutcher@savebay.org	Save the Bay
Lesley	Lambert	lesley@gso.uri.edu	NBEP
Jim	Latimer	Latimer.Jim@epamail.epa.gov	U.S. EPA
Andrew	Maclachan	andrew_macLachlan@fws.gov	US F&W
Eugenia	Marks	emarks@asri.org	Audubon
Amanda	Martin	Amanda.Martin@doa.ri.gov	R.I. Statewide Planning
Marissa	Mazzotta	Mazzotta.Marisa@epamail.epa.gov	U.S. EPA
Bryan	Milstead	Milstead.Bryan@epamail.epa.gov	EPA ORD NHEERL Atlantic Ecology Division
David	Newton	newton.dave@epa.gov	EPA Region 1
Jennifer	Pagach	Jennifer.Pagach@ct.gov	LISS
Melissa	Palmisciano	melipalm@gmail.com	NBEP
Peg	Pelletier	Pelletier.Peg@epamail.epa.gov	U.S. EPA
Jenny	Pereira	JPereira@rifoundation.org	The Rhode Island Foundation

Denise	Poyer	denisep@wpwa.org	Wood-Pawcatuck Watershed Assn
Margherita	Pryor	pryor.margherita@epamail.epa.gov	EPA
Donald	Pryor	Donald_Pryor@Brown.edu	Brown University
Pamela	Reitsma	Pamela.Reitsma@narrabay.com	NBNERR
Richard	Ribb	rribb@nbep.org	NBEP
Julie	Rose	julie.rose@noaa.gov	LISS
Pam	Rubinoff	rubi@crc.uri.edu	URI
Scott	Ruhren	sruhren@asri.org	Audubon
Malia	Schwartz	Malias@ds.uri.edu	URI
Elizabeth	Scott	Elizabeth.Scott@dem.ri.gov	RIDEM
Heather	Stoffel	stoffelh@hotmail.com	URI MERL
Judith	Swift	jswift@uri.edu	Coastal Institute
Mark	Tedesco	Tedesco.Mark@epamail.epa.gov	Long Island Sound Study
Terri	Teller		Blackstone River National Heritage Corridor Commission
Elise	Torello	elise.torello@gmail.com	Salt Ponds Coalition
Bob	Vanderslice	Robert.Vanderslice@health.ri.gov	RI HEALTH
Hal	Walker	walker.henry@epa.gov	EPA ORD
Chris	Whitt	chris.witt@doa.ri.gov	R.I. Statewide Planning
Chip	Young	cyoung@gso.uri.edu	URI Coastal Institute