

# EcoSystem Indicator Partnership

Information on change  
in the Gulf of Maine

## What is the EcoSystem Indicator Partnership (ESIP)?

In 2006, the Gulf of Maine Council on the Marine Environment formed a partnership to assess the health of the Gulf of Maine ecosystem through the use of indicators. ESIP formed as a direct result of the recognized need to understand ecosystem status and trends in the Gulf of Maine region. The Council has many efforts that look at the health of the Gulf of Maine through monitoring and restoration. ESIP is an attempt to bring together the information from these and other efforts in the region.

## What are indicators?

Ecosystem indicators are measurements that reflect the condition of the environment. Indicators can be social, economic, environmental, or a combination of indices. The main purpose of an indicator is to make complex systems understandable in simple terms.

## Who are these indicators for?

ESIP has focused its efforts on developing indicators specifically for coastal managers and decision-makers in the

Gulf of Maine region. Looking at trends in ecosystem health over time allows these individuals to assess if management decisions or programs in the region are having the desired effect.

## How were the ESIP focus areas chosen?

ESIP has selected indicators for seven focus areas including aquaculture, aquatic habitats, coastal development, contaminants, climate change, eutrophication, and fisheries. These seven focus areas were determined after a series of reports, listening sessions, and workshops were conducted with public input. Subcommittees have formed for each of these focus areas. Over 150 volunteers representing interests and organizations from around the Gulf of Maine now participate in one or more of these subcommittees and assist ESIP in selecting and compiling information on specific indicators of ecosystem health.

## How were the indicators chosen?

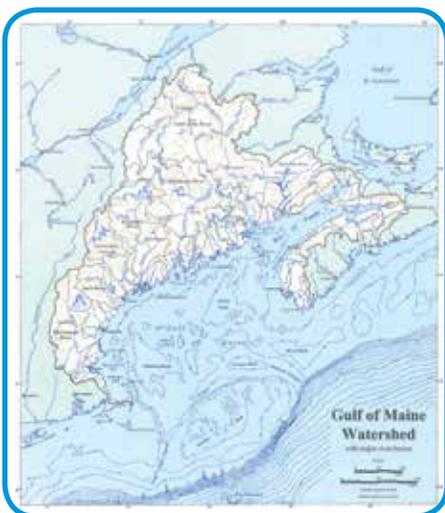
Each ESIP subcommittee began with a long list of potential indicators for each focus area. Indicators were assessed and selected based on the following questions:

- Is the indicator scientifically valid?
- Is it responsive to change?
- Does a cause and effect link exist?
- Are there accurate data available?
- Is the indicator relevant to users?
- Is it comparable regionally?
- Is it useful at different scales?
- Is it comparable to targets, thresholds, or standards in the states and provinces?
- Does it indicate a condition?

Since no one indicator satisfies all of these questions, several indicators were selected for each focus area.

## Some of the Organizations Represented in ESIP

Acadia University  
Bedford Institute of Oceanography  
Bigelow Laboratory for Ocean Sciences  
Boston University  
Bowdoin College  
CEF Consultants  
Clean Annapolis River Project  
Dalhousie University  
Darling Marine Center  
Environment Canada  
Fisheries and Oceans Canada  
Fishermen Scientist Research Society  
Friends of Casco Bay  
Georges River Tidewater Association  
Lobster Institute  
Maine Aquaculture Association  
Maine Department of Environmental Protection  
Maine Department of Marine Resources  
Maine Geological Survey  
Marine Environmental Research Institute  
Mass Audubon  
Massachusetts Office of Coastal Zone Management  
Massachusetts Department of Marine Fisheries  
Massachusetts Bays National Estuary Program  
Massachusetts Water Resources Authority  
National Oceanic and Atmospheric Administration  
New Brunswick Department of Agriculture, Aquaculture and Fisheries  
New Brunswick Department of the Environment and Local Government  
New Hampshire Department of Environmental Services  
Normandeau Associates  
Nova Scotia Fisheries & Aquaculture  
Saint Mary's University  
Salem Sound Coastwatch  
Town of Bar Harbor  
Planning Office Harpswell Maine  
University of Maine  
University of New England  
University of New Hampshire  
University of Rhode Island  
University of Southern Maine  
US Environmental Protection Agency  
US Fish and Wildlife Service  
US Geological Survey  
Wells National Estuarine Research Reserve



## Priority Indicators

### Aquaculture

- The economic value of aquaculture
- Acres of permitted aquaculture

### Aquatic Habitats

- Extent of eelgrass
- Extent of salt marsh
- Locations of tidal restrictions

### Climate Change

- Sea level
- Precipitation trends and anomalies
- Air temperature trends and anomalies

### Coastal Development

- Point sources
- Population density
- Employment density
- Impervious surface coverage

### Contaminants

- Chemical contaminants in mussels
- Sediment contaminants and toxicity
- Shellfish beds approved for harvesting

### Eutrophication

- Nitrogen and phosphorus loading
- Water clarity
- Dissolved oxygen
- Chlorophyll *a*

### Fisheries

- Ocean jobs
- Dominant species metric

### What indicators were chosen?

In 2008, twenty-one priority indicators were selected by the ESIP subcommittees. Each of these priority indicators provide an important first step toward assessing overall ecosystem health in the Gulf of Maine.

### What interactions exist between the indicators?

In an ecosystem, living and non-living systems interact. The selected indicators attempt to reflect these interactions. For example, climate change indicators – such as precipitation – directly influence aquatic habitats indicators (such as extent of eelgrass and dissolved oxygen), which in turn affect fisheries indicators – specifically production density. It is vitally important to consider these interactions when evaluating the Gulf of Maine at an ecosystem scale.

### Where does ESIP go from here?

ESIP is collecting and analyzing data for each of the priority indicators. Fact sheets with initial analysis of the indicators were released between 2009 and 2014. ESIP has also developed webtools to present spatial and temporal trends.

### Workshops

Workshops are being scheduled throughout the Gulf of Maine region to introduce the indicators and associated data. If you or your group is interested in a workshop or training session, please contact ESIP's program manager via email at [ESIPmail@gulfofme.org](mailto:ESIPmail@gulfofme.org).

### ESIP Indicator Reporting Tool

#### How do I access data on the ESIP indicators?

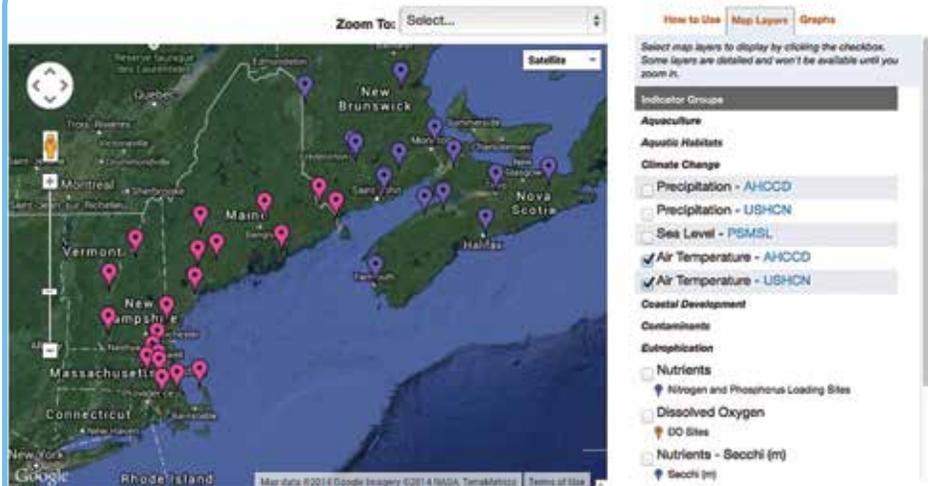
ESIP released the Indicator Reporting Tool in the spring of 2008 on its website [www.gulfofmaine.org/esip/reporting](http://www.gulfofmaine.org/esip/reporting). This tool contains datasets and layers that are updated regularly. Currently the tool houses data from many organizations including Gulfwatch, Mussel Watch, and NERACOOS buoys, along with selected data layers on point sources of contamination and eelgrass extent. Users can upload data for specific time periods or produce graphs of multiple datasets within the tool.

*The benefit to New Hampshire from the ESIP process is collaboration with other scientists on nutrient-loading models and eutrophication responses in the Gulf of Maine. This issue is important but many of the available models were developed in other regions. It is helpful to have such a knowledgeable group to work with on this issue.*

– Phil Trowbridge

New Hampshire Estuaries Project, 2009

## Indicator Reporting Tool



The screenshot displays the ESIP Indicator Reporting Tool interface. It features a map of the Gulf of Maine region with various data layers selected in the legend. The legend includes categories such as Aquaculture, Aquatic Habitats, Climate Change, Coastal Development, Contaminants, Eutrophication, and Fisheries. The selected layers are: Precipitation - AHCCD, Precipitation - USHCN, Sea Level - PSMSL, Air Temperature - AHCCD, and Air Temperature - USHCN. The map shows the Gulf of Maine coastline and surrounding states and provinces, with various data points plotted.

[About ESIP](#) [About Site Data](#) [Download Tutorial Data](#) [Tell Us What You Think](#)

The EcoSystem Indicator Partnership (ESIP) was formed by the Gulf of Maine Council to develop indicators for the Gulf of Maine. Activities of ESIP initially center on convening regional practitioners in six indicator areas: coastal development, contaminants and pathogens, eutrophication, aquatic habitat, fisheries and aquaculture, and climate change. The current Indicator Reporting Tool is the initial step towards delivering indicators for the Gulf of Maine.

[Read more on the ESIP page on www.gulfofmaine.org](#)

[Click here for the ESIP Reporting Tool User Guide in PowerPoint \(23 MB\)](#)  
[Click here for the Acrobat PDF version of the Guide \(6 MB\)](#)

Please let us know how this tool is working for you. [Click here to send us feedback](#)

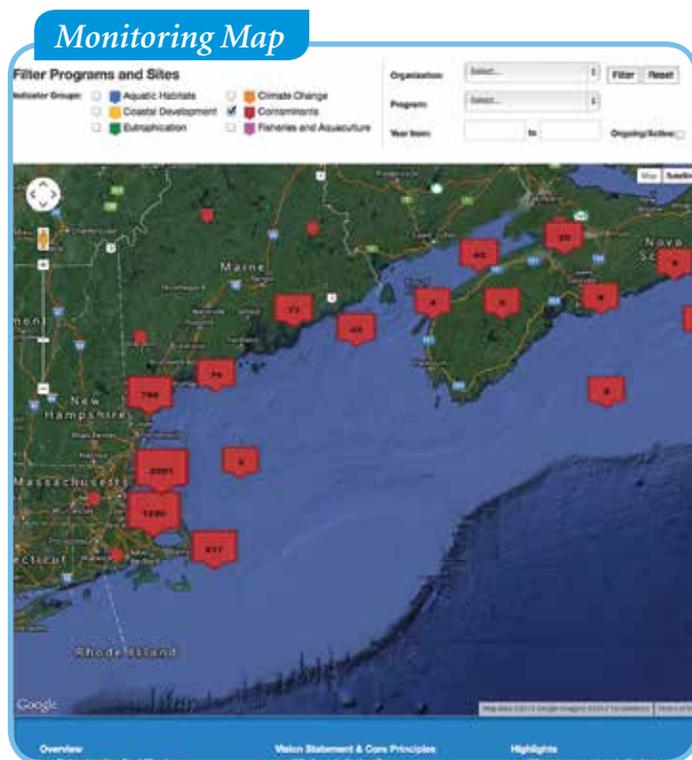
## ESIP Monitoring Map

### Who is monitoring the health of the Gulf of Maine?

ESIP has developed an online tool, available at [www.gulfofmaine.org/esip/map](http://www.gulfofmaine.org/esip/map), which shows the location of different monitoring programs around the Gulf of Maine. Users can search for relevant monitoring programs based on any of the seven indicator focus areas. Specific information about sites and parent organizations can also be obtained. Another unique feature of this tool allows the user to locate nearby sites to ones of their own interest.

### How can I get my program on the Monitoring Map?

The ESIP Monitoring Map is constantly being updated. To have your monitoring program added to the webtool, contact the ESIP program manager. This tool is presented at various international meetings and utilized by the partnership's members, coastal decision-makers, and managers. The more information presented within the tool, the more useful it is to everyone.



## Focus on Massachusetts

One of the important objectives of the organization I work for, the Massachusetts Bays Program (MBP), is to compile relevant and current information that allows for a science-based assessment of the environmental conditions or "health" of the Massachusetts Bays, and to communicate this assessment to many different audiences. Fundamental to that effort is the development and use of meaningful indicators, especially those that focus on the seven areas identified by ESIP:

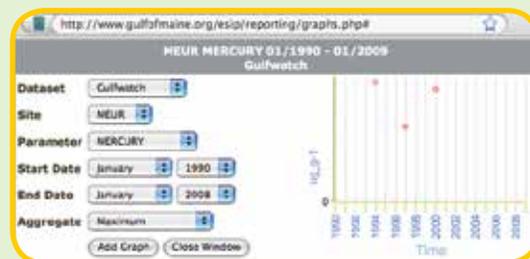
- aquaculture
- aquatic habitats
- coastal development
- contaminants
- climate change
- eutrophication
- fisheries

The MBP has been involved with the ESIP effort since its inception with the Gulf of Maine Council, when the coastal states of the Gulf of Maine began exploring collaborative efforts to aid in our understanding of the Gulf of Maine ecosystem. We take to heart the thoughts of Dr. Scott Nixon of the University of Rhode Island – that in order to understand the state or condition of an ecosystem, you must have a strong understanding of the next larger ecosystem. For Massachusetts and Cape Cod Bays, that next larger system is the Gulf of Maine. ESIP provides us with that capability.

– Christian Krahforst, Massachusetts Bay Program

## Focus on Maine

The ESIP Indicator Reporting Tool provides access to multiple types of information that will enable managers in Maine to look at status and trends of resources and various stressors. It provides the opportunity to look at what is occurring along the Maine coast and the Gulf of Maine region as a whole. Data on habitats and other indicators provided by the tool can be used by management groups such as the Taunton Bay Advisory Group. The tool enables such groups to focus on a geographic area, and allows specific indicator data from that area to be selected and graphed. Combining data from different indicators also provides a more comprehensive picture of the area. The figure below shows a graph of mercury median concentrations at the site closest to Taunton Bay, as well as a map depicting the eelgrass layer. Mercury is a particular chemical of concern for both fisheries and aquaculture due to exposure risk in human health, and eelgrass provides important habitat for fish.



## Focus on Bay of Fundy

Nova Scotia completed and released a State of the Coast report in 2009 which used several indicators common to the ESIP process. In fact, several of the Nova Scotia priority areas were developed as a result of interactions with the Gulf of Maine Council and ESIP. In this way, regional efforts can contribute to ongoing activities at the state and provincial level.

*We have benefited through our involvement in the ESIP process, becoming more aware of the nutrient work being done in the northeastern US. It is increasingly being recognized that the Annapolis River watershed has a nutrient enrichment problem, originating from a combination of point and non-point sources. The webtools and priority indicators will provide us with more tools to better understand this problem and work towards its remediation.*

– Andy Sharpe, Clean Annapolis River Project, 2009



### EcoSystem Indicator Partnership

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The EcoSystem Indicator Partnership (ESIP) is part of the **Gulf of Maine Council on the Marine Environment (GOMC)**. In 2006, the GOMC created ESIP to assess the ecological integrity of the Gulf of Maine through the use of indicators. This fact sheet is one outcome supporting this goal. Funding, in part, was provided by the Department of the Interior, the US Environmental Protection Agency, and Environment Canada.

For more information on any of the ESIP products, please visit our website at [www.gulfofmaine.org/esip](http://www.gulfofmaine.org/esip).