



Long Island Sound and Climate Change – *What is Going to Happen?*

Jennifer Pagach and Juliana Barrett

Have you noticed any changes in Long Island Sound? Perhaps you notice warmer temperatures, fewer lobsters and more blue crabs? Were you one of the people who saw a manatee, seahorse, or tropical fish in the Sound this summer? The climate of Long Island Sound is already changing with both scientists and local homeowners taking note. Through Sentinel Monitoring of Climate Change, we hope to best track and manage these shifts including changes in physical features, habitat, species abundance and diversity. Sentinels are those species, systems and parameters specific to Long Island Sound that will or are already experiencing change due to climate related changes. For example, sentinels include finfish, lobster, salt marshes and associated species, eelgrass and harmful algal blooms. EPA's Long Island Sound Study allocated funds for the development of a dynamic Sentinel Monitoring Strategy for Climate Change in Long Island Sound to answer questions we all have, like what will Long Island Sound (LIS) be like 50 or even 100 years from now? Will blue crabs completely replace lobsters? Will palm trees grow along our shores?

A core team of scientists and resource specialists from EPA's Long Island Sound Study (LISS), Connecticut Department of Environmental Protection (DEP), the Connecticut



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Habitat for many common wading birds such as these snowy egrets may change with sea level rise and other climate change-related impacts.

Sea Grant Program, New York Department of Conservation, and New York Sea Grant are leading the strategic planning effort with funding provided by EPA. The team has established working groups of academics, managers and experts on the local, state, regional and federal levels to address relevant issues in both Connecticut and New York. The strategic plan will form the basis for a specially designed, long-term monitoring program to identify LIS resources that are most vulnerable to climate change and most critically in need of management. These efforts will ultimately enable us to develop appropriate adaptation strategies to protect the Sound's biodiversity and significant natural resources.

"It might be a while before we see palm trees surviving New England winters outdoors, but we are already seeing shifts in species range and distribution" said Harry Yamalis, habitat restoration coordinator for Connecticut DEP's Office of Long Island Sound Programs. "We need to quickly assess what is changing to date." he added.

In 2008, a sentinel monitoring database of historic and current monitoring data was developed through a partnership between the Connecticut DEP and the University of Connecticut. Input from scientists involved in Long Island Sound research was sought to populate the database with the



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Long Island Sound is the southernmost inshore limit of the American Lobster's range. Most scientists agree that warmer water temperatures are a leading cause of the decline in the lobster populations in Long Island Sound that has been noted since 1998.



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Ilya, a manatee who came north up the Atlantic Coast as far as Long Island Sound. These events could increase with warming.

type of data collected and dates. This database now has information from researchers in Connecticut and New York and includes information on water quality monitoring, fish trawls and shellfish harvests. The long-term goal is to develop a comprehensive web page that will document ongoing research (as well as capture historic data) and serve as a resource for investigators, resource managers and the public. Data from past and present research is necessary to help identify trends related to climate change on the regional, Sound-wide and local levels. For example, fisheries biologists from the Connecticut DEP are seeing more fish species more commonly found in mid-Atlantic waters here in Long Island Sound as water temperatures within the Sound increase.

“In Long Island Sound this year we have seen multiple tropical fish species such as parrot fish, lookdown and on November 7 we got a video of a small mola mola,” Matt Lyman reports. A mola mola or ocean sunfish is the largest bony fish in the world, and primarily feeds on jellyfish.

In addition to identifying a process for data collection and synthesis, the strategic plan will help identify data and monitoring gaps that may be important in the context of climate change.

As the first step in the development of the strategic plan, a list of sentinels for Long Island Sound was developed. For each sentinel (34 have been identified to date), the workgroups have identified what factors are causing or could cause change, what monitoring questions need to be addressed for that sentinel, what is the “sentinel indice” or what exactly needs to be measured and what data have already been collected.

For example, if the sentinel is acidification of Long Island Sound waters (the process of becoming more acidic), the cause of this acidification is that with more carbon dioxide in the atmosphere the world’s oceans are absorbing more of this compound. This changes the water chemistry causing



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Changes are happening in wetland ecosystems surrounding Long Island Sound.

it to become more acidic. The monitoring question we can ask is, “Is there an increase in the hydrogen ion concentration in the waters of Long Island Sound?” and, we can measure the pH of the waters to determine this. We can also look at the thickness of crustacean shells. Some species such as oysters, clams and mussels develop thinner shells as the pH decreases while other species, such as crabs and lobsters develop thicker shells.

Sentinel monitoring, like climate change, is very much a dynamic process. Our list of 34 sentinels is likely to change as scientists collect and analyze data and we may need to change the questions that are asked. We do not know what species will show up next. By looking at the physical, chemical and biological factors that may change as our climate changes, and then relating those changes to habitats and ecosystems, we will have a better idea what those species may be. By involving folks like you who know about and care for the Sound, this program will promote education, awareness and participation in climate change adaptation issues, and will inform management decisions on adaptation planning. As the Long Island Sound estuary changes, so too, will the management needs and our methods for protecting and preserving this vital estuary, palm trees or not.

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