

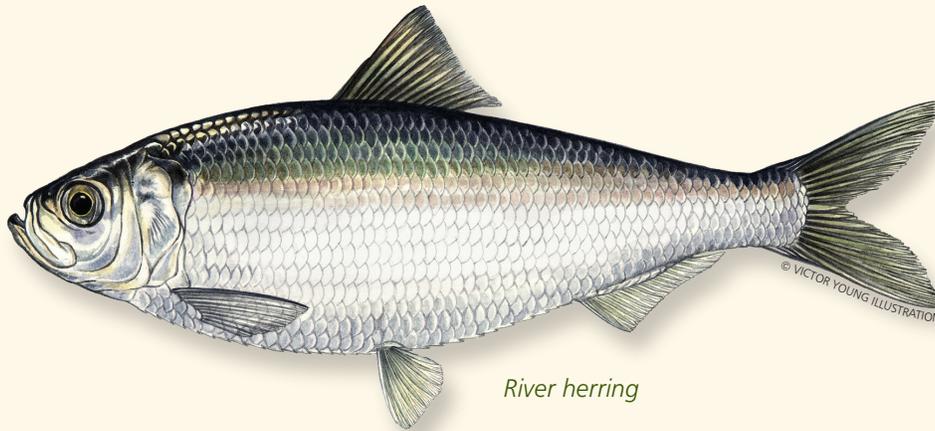
# River Herring and Climate Change

In July, I had the opportunity to participate in a National Marine Fisheries Service River Herring Climate Change Workshop. Attended by 29 River Herring experts from Florida to Maine, as well as climatologists and climate modelers. The workshop offered me a window into the complexity of managing an important living resource in times of great uncertainty. I left with a renewed sense of respect for the work of those who study living resources and the government agencies tasked with their management.

River Herring is a collective name for Alewife and Blueback Herring. The two species can be difficult to tell apart where both occur. Blueback Herring range from Florida to Maine and Alewife range from the Carolinas to Maine, and here in NH we have both species. Populations of both species have declined to the point there is a concern that the limited runs remaining throughout their ranges are in peril. Reasons for the decline include all the usual suspects: poor water quality in rivers and streams caused by stormwater and nutrient pollution, habitat loss and degradation, fish passage impairments that keep the fish from reaching traditional spawning habitat, past overfishing and now fishing by-catch issues in coastal and offshore fisheries. To top it all off, there is now climate change to consider.

The first day of the workshop was full of presentations on the current status of the fishery and a review of the biology and ecology of River Herring from a climate perspective. The second day of the workshop focused on discussions around key questions – What are

likely to be the main climate stressors to River Herring in the future? What additional science is needed? What are the likely impacts, and how can managers mitigate the additional stressors of climate change on River Herring? The discussions were mentally challenging. The participants engaged in serious and



River herring

thoughtful debate as you would expect from a group of professionals, who have dedicated their lives to understanding and researching fish and fish management.

I was struck that even with the extensive knowledge we have of these fish; sustainable management is a seemingly impossible task. I believe the knowledge to successfully manage is there, but the actual management can only realistically deal with some of the variables that control healthy populations. For example, the management of the river systems these fish depend on for spawning and nursery grounds are under the control of many diverse interests; power generating, pollution disposal, transport of commerce, recreation, and flood control to name a few. There is no one agency or organization with the authority and responsibility for dealing with water quality, habitat health and balancing the needs of competing interests, all the while maintaining healthy populations of these living resources. There is a compartmentalization of the

science and management that make effective management difficult at best. Society does not seem to have interest in wholistic strategies required to solve issues of this magnitude and the new stressors of climate change present additional challenges on top of this.

There is no doubt River Herring are in trouble. It is hard for me to imagine that the populations which sustained coastal communities for centuries are in jeopardy and could be lost. Yet there is hope. The fish are amazingly adaptable, as is evident in their tremendous ranges.

If managers can limit by-catch of River Herring by coastal and off shore fisheries and protect spatially distinct spawning habitats to adapt to annual climate and river flow variability, the fish will have spawning habitat options, meeting the environmental needs of eggs and fry. In addition, if continued efforts to improve water quality through better storm and waste water management are successful, we have a chance at building sustainable populations. Part of the discussion at the workshop talked about forming a new collaborative to take on these issues of management and search for ways to more effectively implement the many diverse actions that will be required to sustainably manage these fish. Not only did the workshop build the foundation for how to manage these fish under the new challenges of climate change, it also added to effort to build the collaborative foundation necessary to effectively tackle complex environmental issues.

Steve J. Miller  
CTP Coordinator, GBNERR

# Phenology as the Canary

Phenology is the study of the timing of natural events – events like migrations, egg laying, flowering and leaf out. This is not a new science or practice, nor is it particularly difficult to do. Local Native American tribes developed seasonal calendars to include “months” such as “moon of little nuts”, or “frost fish moon”, anticipating and defining seasonal periods of food availability. Shadbush, a local native shrub, is one of the first to bloom in spring, and was given its name by the early settlers who noticed the lovely white blossoms coinciding with shad’s spawning runs.

Keeping track of when things happen in nature is interesting and important to many people and cultures, but scientists from all over the world know that Phenology is telling us much more. Today, what we are learning by keeping track of when things happen in nature is that rapid change is occurring. There are local, regional and global examples all supporting a changing climate through observations of not only ocean temperatures, levels, precipitation and chemistry, but on the ground, real-life examples of things happening too fast, too differently, too extreme.

In any one year, a species arriving too early, or too late, or ice never forming on a lake or bay means little. Just as winning one baseball game by pitching a no-hitter or hitting a few home runs doesn’t mean that the player is neces-

sarily taking performance enhancing drugs, but winning an entire season, or several in a row, could point to problems. The cumulative effects of rapid and extreme change will inevitably have lasting negative impacts on ecosystems and economies that depend on predictable events such as ice in, or ice out.

For several years, staff of the Great Bay Reserve has been keeping track of many natural events that occur around the estuary. This year we were shocked to find horseshoe crab eggs on the shore on April 16th. In most years past, evidence of their arrival was not usually seen until mid-May. Last year, the crabs arrived in early May. Of course there are many variables that could account for this, and it may be insignificant. However, taken collectively, a shift in the spawning period of horseshoe crabs could impact food availability (eggs) for hundreds of species all along the east coast.

Keeping track of when natural events occur is what the USA National Phenology Network does. This Network brings together citizen scientists, government agencies, non-profit groups, educators and students of all ages to monitor the impacts of climate change on plants and animals in the United States. The network harnesses the power of people and the Internet to collect and share information, providing researchers with far more data than they could



*Canada geese migration*

collect alone.

You can assist in this effort by observing plants and animals in your own backyard and recording those observations in Nature’s Notebook, the national plant and animal Phenology observation program that is part of the USA National Phenology Network site: [usanpn.org/how-observe](http://usanpn.org/how-observe). In addition, visit <http://phenocam.unh.edu> to learn how scientists are recording real-time digital images of forest canopies to assist them in understanding what role Phenology plays in the global carbon cycle.

Every plant, bird, mammal, insect or fish follows some kind of a natural rhythm and pattern. Watching and recording that rhythm is not only vitally important to understanding how the earth may be changing, but it allows us a way to connect with seasonal variations in nature. What we observe can range from minute to spectacular, yet like a canary in a coal mine, never insignificant.

Kelle Loughlin  
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*Studying the timing of natural events, like the blooming of sea lavender and horseshoe crabs spawning, help us to better understand how the earth may be changing.*

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