

River Herring Technical Expert Working Group (TEWG)

Climate Change Subgroup Webinar/Conference Call

June 9, 2014

12:00-1:30pm

Summary

I. Overview

The Climate Change Subgroup of the River Herring Technical Expert Working Group was established to “consider the impacts of climate change and climate variability on river herring rangewide (including freshwater)” in order to help contribute to the expected products of the TEWG. Janet Nye and Mike Alexander, co-chairs of the Climate Change Subgroup, convened a call on June 9, 2014, to obtain input on potentially productive approaches to move the subgroup forward. The draft agenda for the meeting included topics such as: 1) proposed timeline and structure of Climate Change subgroup meetings; 2) review of findings from workshop conducted on climate change impacts on river herring, and 3) identify key research needs that may be subject of future phone calls. This meeting summary includes the primary discussion topics and outcomes to contribute to future TEWG discussions. The information provided below reflects individual expert opinion and not consensus.

II. Key Topics

The following is a list of individual expert opinions provided by Climate Change Subgroup members or the public on various overarching topics. Some ideas have been combined where appropriate.

- Janet and Mike reviewed the overview of the subgroup which is to consider the impacts of climate change and climate variability on river herring rangewide, including freshwater.
- Janet presented the subgroup with a list of data gaps and analysis needs that were compiled from the 2012 NMFS River Herring Climate Change Workshop report. She highlighted the ones she felt were directly related to climate change. The subgroup members were asked for feedback on the list and whether any other data gaps identified at the workshop should be included in a climate change list. The subgroup discussed other bullets to be moved, as well as additional data gaps (see attachment for the lists that resulted from these discussions).
- Janet showed a graphic that Charlie Stock developed that could be used as a model to visualize the issues (see attachment). Structuring the information identified by the subgroup (e.g., data gaps) would be important as it could help inform needed

- speakers, etc. Important elements for quadrants that would be needed included marine, estuarine, and freshwater environments, and then historical and projected changes for each of these. One member emphasized that consideration of estuarine environments, in addition to marine and freshwater is important. Another member noted that it is also important to consider both ecological and physiological changes of river herring from climate change. Karen Wilson's compilation of information presented at the 2012 NMFS River Herring Climate Change Workshop was noted as a great starting point for a synopsis.
- The co-chairs suggested that the subgroup have a meeting with invited speakers to talk about their climate change research. Many members felt that this would be helpful, and it was noted that it would also be beneficial to the subgroup to hear updates on some of the research presented at the 2012 workshop. The group suggested a few potential speakers:
 - Mike Alexander- Review and progress of climate downscaling since workshop.
 - Desiree Tommasi- Effect of environmental conditions on river herring freshwater survival: a coastwide perspective.
 - Patrick Lynch- Projections of climate change effects on river herring in their marine habitat.
 - Kevin Friedland- Effects of climate on salmon in their marine habitat.
 - Karen Wilson- A review of river herring life history particularly their estuarine phase; stable isotope research update.
 - Gary Nelson- An exploratory analysis of biotic and abiotic factors affecting mortality and recruitment of Monument River alewife.
 - Eric Shultz and Stephen McCormick - Physiological aspects of river herring.
 - Jon Hare- Ongoing work on climate in the Northeast US.
 - Thibaud Riugier (France)- Simulations of Allis shad (*Alosa alosa*) distribution in response to climate
 - Steve Markstrom- Update on the status of creating climate projections for watersheds.
 - A member suggested that a spreadsheet currently being developed by the Habitat subgroup, which lists everyone's name and the research they are working on, could be helpful to this subgroup (e.g., help identify future speakers).
 - The co-chairs proposed that if the workload of subgroups member's allows, the subgroup could submit a peer review manuscript on the effects of climate change on river herring.
 - One member noted that there are limitations in the river herring data currently available for looking at climate change effects on river herring. A future discussion topic for this group could be to identify what data would be needed on river herring to fully assess impacts.
 - The goal of the larger TEWG effort is to develop a list of actions and consequently research projects that will contribute to river herring conservation, and monitor such a list. NOAA Fisheries and Atlantic States Marine Fisheries Commission will support

independent research projects to help fill in data gaps and implement conservation actions for river herring through an open and competitive process. Through the TEWG effort, NOAA Fisheries and ASMFC hope that other alternative sources of funding can be identified for other research needs. Additionally, the ideas generated for conservation actions will be useful for various management bodies.

III. Key Outcomes

Below is a list of individual expert opinions provided by participants related to specific threats, data gaps, research projects, information to be considered and/or monitoring (i.e., the identified research projects and/or conservation actions). Some ideas have been combined where appropriate. These outcomes are listed in no particular order, and those related to other subgroups are also included in the “Cross-Cutting Issues” section below).

a. Data Gaps

- Please see starter list of combined data gaps and analyses identified by the subgroup from a combination of discussions and review of 2012 NMFS Climate Change Workshop report.

b. Research Projects

- Please see starter list of combined data gaps and analyses identified by the subgroup from a combination of discussions and review of 2012 NMFS Climate Change Workshop report.
- Physiological tolerances or sensitivities of river herring to climate change in freshwater, estuarine and marine environments.

c. Information To Be Considered (e.g., published papers)

- Velotta, J.P., McCormick, S.D., O’Neill, R.J., and E.T. Schultz. 2014. Relaxed selection causes microevolution of seawater osmoregulation and gene expression in landlocked Alewives. *Oecologia*. DOI 10.1007/s00442-014-2961-3.
- Karen Wilson’s summary of river herring temperature tolerances:
 - Table and additional information found in the NMFS River Herring Climate Change Workshop report;
http://www.nero.noaa.gov/prot_res/CandidateSpeciesProgram/sswpdocs/RIVER%20HERRING%20CLIMATE%20CHANGE%20WORKSHOP%20REPORT_122712.pdf
 - Full presentation found at:
http://www.nero.noaa.gov/prot_res/CandidateSpeciesProgram/ClimateChangeWorkshop/Day%201/RH%20CC%20Workshop%20KWilson.pdf

IV. Next Steps

The Climate Change Subgroup discussed the following next steps:

June 23, 2014

- The 2012 NMFS River Herring Climate Change Workshop report will be emailed to all the members of the subgroup. The members will look through the report to see if there are any additional data gaps or analysis to add to the current list.
- Roger Rulifson will distribute a spreadsheet developed for the Habitat Subgroup (which includes members' name and research expertise) to Janet and Diane for possible use by the Climate Change Subgroup.
- Janet and Mike will send the list of potential speakers to the subgroup for review. Speakers will be invited to present at future meetings.
- Janet and Mike will schedule the next meetings in July and August. These two meetings will help ensure input from all members is included in case some members cannot make every meeting, as well as to help inform the September TEWG meeting.
- There may be a face-to-face subgroup gathering at the American Fisheries Society conference.
- A draft meeting summary will be distributed to the subgroup.

V. Cross-Cutting Subgroup Issues

The following cross-cutting subgroups issues were discussed and will be further considered by the TEWG and its Ecosystem Integration Committee.

- A good collaboration between the Habitat and Climate Change Subgroups would include looking at the impacts of various flows on passage (i.e., ability of river herring to get over a barrier).

VI. Participants

a. Subgroup Members

The affiliation of each member can be found on the subgroup roster available at the TEWG Climate Change Subgroup website:

<http://www.nero.noaa.gov/protected/riverherring/tewg/climate/index.html>

Peter Moore

Desiree Tommasi

Eric Nelson

Charles Stock

Stephen McCormick

Janet Nye

Michael Alexander

Roger Rulifson

Karen Wilson

Jon Hare

Diane Borggaard

- b. Public
Edith Carson
Joel Llopiz
Andrew Jones

VII. Meeting Materials

The following materials were provided to support the meeting. Additional information can be found at the TEWG Climate Change Subgroup website:

<http://www.nero.noaa.gov/protected/riverherring/tewg/climate/index.html>

- a. Draft Agenda
- b. 2012 NMFS River Herring Climate Change Workshop Report

Data and Analysis Needs (identified in Climate Change workshop 2014):

Not climate specific

- Historical level of the population
- Life history (ocean, habitat, etc.) for all stages and habitat areas (e.g., lake, river, estuary and ocean) using consistent coastwide protocols
- Habitat use
- Assess fish just above the tide zone and below a structure
- Quantitative larval assessment for habitats (e.g., for spawning areas in North Carolina other than the Albemarle Sound)
- Ocean distribution
- Fishing impact in the ocean environment
- Migratory patterns coast wide for all stocks
- Overcome barriers to pull datasets together and coordination across states to fill-in data gaps
- Increased river monitoring, not just at the first dam
- Well-coordinated fishery independent survey network in juvenile habitats
- Reproduction
- Stock recruitment
- Quantify juvenile emigration
- Data disparity for blueback herring versus alewives
- Improve long term indices on population status
- Additional genetic information
- Better methods to count river herring (e.g., Hewitt, 2003) and/or for other areas standardizing technologies where good counts can be obtained
- Estimates of spawning habitat by watershed (with and without dams)
- Improve long term indices on population status
- Improved monitoring of restocking in the rivers
- Juvenile indices

Directly related to climate

- **Linking river runs to water temperatures and flow-(Possible speakers: Desiree Tommasi, Gary Nelson)**
- **Environmental tolerances and thresholds (e.g., temperature) for all life stages-(interactions with salinity, pollutants)**
- **River herring sensitivity to climate change variables and projecting these into the future (Possible speakers: Karen Wilson)**
- **Water chemistry and habitat criteria for river herring**
- **Water quality (including temperature, pH, salinity, contaminants, etc.) and match it up to spawning habitat and early life stage development**
- **Environmental cues that lead to spawning and migration**
- **Amount of available river herring spawning habitat**
- **Historical relationships with environmental variables**
- **Continuous climatologies for marine estuaries and freshwater, as well as migratory habitats**
- **River flow and temperature**
- **Homing rates to determine how quickly fish may be able to adapt to change**
- **Ocean acidification impacts**
- **Flood magnitudes and frequencies in watersheds impacted by human development**
- **Flood types and timing looking at recruitment (as egg sets and densities are not always available)**
- **More information on river herring at the extremes of the range to see the most acute climate change effect (e.g., on blueback herring in the St. Johns River, alewife in North Carolina)**
- **Use GIS to develop high resolution elevation models to project inundation due to sea level rise**
- **Behavior and physiological studies**
- **Appropriate habitat baselines are important for comparisons**
- **Downscaled temperature, stream flow climate projections, seasonal in both marine and freshwater systems-Mike Alexander**
- **Impacts of stream flow on passage and interaction with barriers**

Climate effects on river herring

