

**River Herring Technical Expert Working Group (TEWG)**  
**Conference Call Summary**  
**December 16, 2014**  
**1:00 p.m. - 4:00 p.m.**

The River Herring Technical Expert Working Group (TEWG) held its fourth conference call on December 16, 2014 to discuss the following: 1) the status of the river herring conservation planning initiative; 2) updates on TEWG-related activities; and 3) updates on TEWG subgroups and committee efforts. Below is a summary of the discussions.

1). River Herring Conservation Planning

NOAA Fisheries and Atlantic States Marine Fisheries Commission (ASMFC) will be using products from the TEWG for the development of a conservation plan which is expected to be made available on the TEWG website by March 2015. NOAA Fisheries and ASMFC have received a number of proposals in response to the River Herring Request for Proposals, and are currently going through the review process. NOAA Fisheries and ASMFC noted that they plan to make the official grantee announcements before the ASMFC meeting in 2015.

There were reports provided on four initiatives related to the TEWG. An overview is provided below and additional information, including the full presentations, can be found on the TEWG website (<http://www.greateratlantic.fisheries.noaa.gov/protected/riverherring/tewg/index.html>):

1. Canadian River Herring Population: Canada's Department of Fisheries and Oceans reports that while there has been a 10 year lag in Canadian river herring research (latest information was in Rulifson 1994), but there has been more focus within the past year. Most of Canada's diadromous river herring populations are in the Maritime Provinces (Prince Edward Island, Nova Scotia and New Brunswick). According to the DFO 2001 report, the southern Gulf of St. Lawrence has the most important habitat for river herring. Differentiation of species in Canada does not always occur (e.g., bycatch of river herring).

The fisheries take place primarily in near-shore marine habitat, estuaries, rivers, and as by-catch. DFO is the lead agency for the management of river herring fisheries. The regulations vary with each region but include limited entry into the fishery, yearly and weekly closed times, gear restrictions and variation orders. The types of gear that are used are tip traps, trap nets, dip stands, and square nets.

There are six rivers where river herring data has been collected intermittently. They have data for Gaspereau River alewife up to 2006. Spawning escapement has increased as a result of weekly closures of two to three days and a new fishway. It is too early to

evaluate whether abundance is increasing. DFO is trying to evaluate the consistency of the newer commercial landings data with the older data. Landings are currently not divided by species. DFO is currently evaluating the options for monitoring in the future.

The majority of the hydroelectric development has been prevalent in Southwest Nova Scotia, Bay of Fundy, and Southwest New Brunswick. The Mactaquac Dam will be built on the St. John River. DFO has been looking to see how these developments may impact the fisheries. Jamie Gibson's PhD looked at turbine mortality. Juvenile turbine mortality occurs before fishing and reproduction, and adult turbine mortality occurs after reproduction. There is a lack of information on fish survival at these hydro facilities.

The frame work assessment for the Maritimes Region is planned for early 2016. Currently, DFO is looking at alewife and blueback river herring in the Tusket River where there is hydroelectric development. There is no timing set for the assessment of the Gulf Region. DFO is also looking for options for monitoring and assessment. In response to comments, Jamie Gibson will provide a list of the reports that were referenced in the talk, as well as other reports that may be useful (e.g., Jamie's PhD, fish diversion technology information). Also, Jamie Gibson will look into what river herring information is available in Newfoundland, including if alewife and blueback herring are distinguished. (Contact Jamie Gibson for more information.)

- Stock Structure Techniques and U.S. Stock Structure Using Microsatellites: Since river herring are anadromous fish that have mixed marine aggregations, it is difficult to distinguish the groups that can be managed independently. Historically, stock structure has been determined by using bony parts such as otoliths to look at the difference in morphology and growth patterns. The limitations of this method are the plasticity and the influence of environmental variation and chemical composition.

Molecular markers emphasize reproductive cohesion and factor prominently in defining populations and designating stock boundaries. By looking at the variation in allele frequencies you can determine several factors such as the amount of genetic diversity, the relationships among populations, stock boundaries, etc.

In Palkovacs et al. (2014), 20 populations each of alewife and blue river herring were genotyped across the same 15 microsatellites. For both species, there were non-significant differences found primarily among neighboring and geographically proximal populations. Across the U. S. range, alewife had weak to moderate genetic differentiation, and blueback herring had weak genetic differentiation. This could be due to straying. Bayesian clustering identified three genetically distinguishable groups of alewives: 1. Northern New England; 2. Southern New England; and 3. Mid-Atlantic.

Blueback herring had four genetically distinguishable groups: 1. Northern New England; 2. Southern New England; 3. Mid-Atlantic; and 4. South Atlantic. The Principle Coordinates Analysis (PCoA) suggested that both species have a strong spatial component to genetic structure. In the Mantel test, there was increased genetic differentiation with geographic distance for both species, especially with alewives. Based on these results, it was suggested that river herring be managed by river. One commenter noted that how adaptable river herring are to climate change would be interesting to look at. (Contact Dan Hasselman for more information.)

- Canadian Stock Structure Using Microsatellites: The goal of this study by Meghan McBride was to see if Canadian alewife populations were demographically discrete. Hybrids were identified in this study. In pairwise comparisons, virtually all Canadian alewife populations show significant genetic differences. In the PCoA study, geographic clustering was evident. Sullivan's Pond outlet population is likely genetically distinct and isolated due to the construction of a canal in the 19<sup>th</sup> century. The Dendrogram analysis showed that alewife populations cluster by geographic region. Three alewife genetic clusters were revealed by Bayesian clustering: 1. Gulf of Maine; 2. Gulf of St. Lawrence/ Atlantic Coast Nova Scotia; and 3. Bay of Fundy. Subsequent rounds revealed there are eight alewife clusters, and blueback herring only have three clusters. Overall, alewife populations are structured at level of river (*i.e.*, nearly all river populations are genetically distinguishable from nearest neighbor and genetic structure stronger in Canadian portion of range river. Isolation by Distance (IBD) is highly significant across the northern portion of the alewife range. Prevalence of IBD suggests that most (genetically meaningful) dispersal occurs on small spatial scales. These patterns varied in the different geographic regions which may be due to landscape, hydrographic features, and human activities (dams, stocking). It was suggested again that each river population should be managed separately. Additionally, further studies include a parallel analysis on blueback herring and hybridization. In response to comments, Paul will provide information to the TEWG on the misidentification of river herring in the field. A Pairing otolith microchemistry with genetic analysis was noted as something to consider to provide additional information. (Contact Paul Bentzen for more information.)
- SNP Discovery in River Herring and Applications to Conservation/Management: NOAA Fisheries is engaged with others in a broad effort to provide single nucleotide polymorphisms (SNPs) for alosine fishes primarily for stock identification. There is a lack of reproducible size determination on different instruments which causes a standardization issue with microsatellites. Another issue found on the west coast for salmon is that there were 62 different microsatellite markers being used which cannot be compared to each other.

NOAA Fisheries and others then looked into using SNPs and found many advantages. They have initiated a SNP Ascertainment Panel to create large sequence databases throughout the species range. They have produced over 50 million DNA sequences for alewives. They received less sequence data for blueback herring, but they received enough to identify thousands of markers. (Contact John Carlos Garza for more information.)

## 2). General River Herring Updates and/or Initiatives

There was a report provided on an update and/or initiative related to the TEWG:

- **Electronic Monitoring and Observer Coverage:** This is a continuation of the update on the monitoring program in the New England and Mid-Atlantic fisheries. A reminder was provided that NOAA Fisheries does not fund monitoring. NOAA Fisheries is working with the New England Fishery Management Council (NEFMC) and the Mid-Atlantic Fishery Management Council (MAFMC) to administer programs that are above and beyond monitoring programs. These programs would standardize monitoring requirements and administer funding to the monitoring programs. The action would specify observer coverage targets. The goal of the targets is to monitor bycatch including river herring. The action is currently under development. The councils will consider a range of alternatives and recommend them to NOAA Fisheries by February and April 2015. The Councils are considering the option to include dockside monitoring. (go to <http://www.mafmc.org/council-events/201412observer-funding-omnibus-pdftmat-meeting> or contact Carrie Nordeen for more information)

## 3). TEWG Updates (More detailed summaries of the subgroup calls and progress are available on the TEWG website<sup>1</sup>)

### *General TEWG Updates (Coordinators: Diane Borggaard and Marin Hawk)*

A few members have retired and will no longer be participating in the group. These full meetings are an important opportunity to provide thoughts on larger issues, as well as provide feedback to subgroups and the Ecosystem Integration Committee for individuals not already involved. NOAA Fisheries and the ASMFC are requesting white papers from all of the TEWG subgroups. They will be distributing Doodle Polls for meetings in 2015 around already established river herring meetings, and they are interested in knowing of any other potential meeting conflicts. The TEWG calendar is an important resource for information on TEWG and subgroup meetings (<http://www.greateratlantic.fisheries.noaa.gov/protected/riverherring/tewg/calendar/index.html>).

### *Fisheries Subgroup (Co-chairs: Jason Didden and Mary Beth Tooley)*

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<sup>1</sup> <http://www.greateratlantic.fisheries.noaa.gov/protected/riverherring/tewg/index.html>

The subgroup has finished their individual opinion-based document on needs, and are considering using the Stock Status subgroup's prioritization exercise as a model for the next step. They are now seeking input from the other groups to determine what the next step is and how the Fisheries subgroup should now function. The subgroup welcomes any feedback from the rest of the TEWG.

*Climate Change Subgroup (Co-chairs: Janet Nye and Mike Alexander)*

The subgroup heard from several of its members as well as the community on the current climate change studies that are related to river herring. This included a discussion of the data gaps and climate models that could apply to river herring. The subgroup hopes to combine the various talks and more general discussion in a white paper that might be published. They plan on ranking their research priorities by January, and they will have a final draft report by March. The presentations and summaries are available on the subgroup's website (<http://www.greateratlantic.fisheries.noaa.gov/protected/riverherring/tewg/climate/index.html>).

*Stock Status Subgroup (Co-chairs: Kevin Sullivan and Michael Bailey)*

The subgroup has been receiving individual expert opinions on stock status research needs. They have shared the document with their subgroup members and with the full TEWG, but have not received much feedback. Some of the Stock Status subgroup members have ranked each of the research needs, and they are waiting to hear from the others. This ranking will be a major component of their white paper which they plan to have finished in March.

*Genetics/Hybrids/Landlocked Subgroup (Chair: Dan Hasselman)*

The subgroup has looked at their table of recommendations and has discussed the potential of microsatellite chemistry and the implications of dams and runs on landlocked alewife populations. A list of research needs is available on the subgroup's website (<http://www.greateratlantic.fisheries.noaa.gov/protected/riverherring/tewg/genetics/index.html>). While not looking for consensus, their ranking exercise revealed there were broad agreements concerning which of the research needs ranked lowest and highest.

*Habitat Subgroup (Co-chairs: Alison Bowden and Jeff Pierce)*

The subgroup had its members fill in a spreadsheet of their current or recent work on habitat research. With this spreadsheet, the research priorities have been identified. Very few researchers have been looking at acoustic tagging, and there is a lack of comparative studies so there is some difficulty in talking about the whole range of river herring. There is a white paper currently in the works. The geographies on the habitat restoration plan will be drafted by January and will be useful for the NFWF report and the white paper.

*Species Interactions Subgroup (Chair: Eric Schultz)*

The subgroup has been receiving several reports that look at species interactions out in the field (i.e. Connecticut River striped bass paper). Presenters have talked to the group about topics such

as the effects of invasive catfishes on river herring in the Chesapeake area. The subgroup has researched some topics such as predators that feed on river herring, anecdotal species, and predator-prey interactions in lieu of river herring parasites and prey. The subgroup is compiling a database that outlines the referenced studies (and others) in order to identify data gaps along the coast, as well as conservation projects. They are planning to rank their research priorities by importance. The subgroup is close to creating a white paper.

*Ecosystem Integration Committee (Co-chairs: Diane Borggaard and Jon Hare)*

NOAA Fisheries and ASMFC talked about subgroup white papers, as well as the overlapping issues document with the EIC. The EIC realizes that the subgroups have issues that overlap one another and have talked about. It is important to make sure that the overlapping issues are being shared and talked about across the subgroups. We'll be continuing to talk about this to avoid duplication.

Individual expert opinion and comments made during the discussions include:

- The research needs of the Stock Status subgroup needs to be shared with the Fisheries subgroup since some of them are fisheries related.

4). Other Items

- Individual expert opinion and comments made during the discussions on other items or those with broad applicability included: A comment was made that although longer time series are important, shorter time series should also be considered to show places/time/areas where river herring can be found but are not typically sampled (e.g, NEAMAP Survey). Wilson Laney noted that he the Cooperative Winter Tagging Cruise will be continuing in and information could be shared with the TEWG.

5). Public Comment

- There was a question about the lawsuit for not listing blueback herring under the Endangered Species Act (ESA). NOAA Fisheries did receive a notice of intent to sue from several groups including the Natural Resources Defense Council,.

6). Next Steps

1. The TEWG members are encouraged to provide feedback to the chairs, co-chairs, Diane, and Marin on how to improve this process and suggest any future speakers that we should have.
2. Doodle polls for 2015 meetings have been sent, and TEWG members should fill them out and identify any meeting conflicts.
3. Speakers will provide follow-up to the TEWG (e.g., Jamie Gibson will provide a list of references as noted above; Paul Bentzen will provide information on misidentification of

river herring in the field. Jamie Gibson and Kiersten Curti will further discuss Canadian data).

4. Jeffrey Pierce will distribute some information on river herring received from Jamie Courmane (distributed to EIC).
5. John Carlos Garza can provide a future presentation to the TEWG when results from the SNP analysis are available.
6. A suggestion was made that the Fisheries Subgroup may want to consider Stock Status Subgroup research suggestions based on the mention of fisheries needs. Further discussion between these subgroups could be helpful.

Note: Draft Agenda and background materials can be found at:

<http://www.greateratlantic.fisheries.noaa.gov/protected/riverherring/tewg/index.html>

**TEWG Members**

Michael Alexander  
Lee Anderson  
Trevor Avery  
Mike Bailey  
Diane Borggaard  
Alison Bowden  
Tony Chatwin  
Kiersten Curti  
Kim de Mutsert  
Gregory DiDomenico  
Katie Drew  
Phil Edwards  
Claire Enterline  
Ben Gahagan  
Stephen Gephard  
Joseph Gordon  
Ruth Haas-Castro  
Carolyn Hall  
Jon Hare  
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Eric Hilton  
Lisa Kerr  
Wilson Laney  
Ben Lenz

Genine Lipkey  
Johnny Moore  
Peter Moore  
Carrie Nordeen  
Janet Nye  
Matt Ogburn  
Eric Palkovacs  
Fritz Rohde  
Roger Rulifson  
Eric Schultz  
Lindsey Staszak  
Lori Steele  
Charles Stock  
Chad Holbrook  
Andy Jones  
Alan Weaver  
Theodore Willis  
Bennett Wynne  
Theodore Castro-Santos  
Rob Vincent

**Other Participants**

Purcie Bennett-Nickerson  
Paul Bentzen  
Kristen Byler

Edith Carson  
John Garza  
Jamie Gibson  
Jim Hawkes  
Deirdre Kimball  
Dan Kircheis  
Joel Llopiz  
Sean McDermott  
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