

Center for Independent Experts (CIE) Independent Peer Review Report

Review Status Review Report:
Alewife (*Alosa pseudoharengus*)
and Blueback Herring (*Alosa
aestivalis*)

Kim De Mutsert
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Executive Summary

The coastwide meta-complex of river herring stocks (Alewife (*Alosa pseudoharengus*) and Blueback Herring (*Alosa aestivalis*)) on the U.S. Atlantic coast remains depleted to near historic lows. Commercial landings of river herring peaked in the late 1960s, declining rapidly through the 1970s and 1980s and have remained at levels less than 3 percent of the peak over the past decade. Based on various assessment methodologies, exploitation has decreased, mainly as a result of low stock levels, stricter regulations, and moratoria. To determine the risk of extinction of both Alewife and Blueback Herring, and whether a listing under the ESA of either ‘threatened’ or ‘endangered’ is warranted, a status review for Alewife and Blueback Herring was initiated.

The status review report of both Alewife and Blueback Herring is reviewed in this document. The status review and the assessment of extinction risk were based on the best available science. As part of the status review, potential distinct population segments (DPSs) within the petitioned species were evaluated. Four distinct population segments were recommended for Alewife, and three for Blueback Herring. Both species were deemed to be at low risk of extinction, assuming the dominant threats to their populations continue to be managed. The analysis of whether the species are in danger of extinction in a significant portion of their range, if not rangewide, concludes that there are no portions of the range of either Alewife or Blueback Herring that qualify as significant.

I conclude that the scientific conclusions appear sound and interpreted appropriately. I have some minor comments that are included in the body of this report. I mainly would like to see some revisions to the maps indicating the range of Alewife and Blueback Herring, plus maps that show the boundary overlap of The Nature Conservancy (TNC) ecoregions and the stock complexes to be added as visual tools to support the conclusions of the significant portion of its range analysis. Recommendations and comments included in this review are meant to address the clarity of the report, and do not change the conclusions regarding the status and extinction risk of either Alewife or Blueback Herring. I recommend accepting the conclusions of this report, that both Alewife and Blueback Herring are at low risk of extinction rangewide and in all DPSs, assuming the dominant threats to their population continue to be managed.

Background

On August 5, 2011, the Natural Resources Defense Council (NRDC) petitioned to list Alewife (*Alosa pseudoharengus*) and Blueback Herring (*Alosa aestivalis*) under the Endangered Species Act (ESA) as threatened throughout all or a significant portion of their ranges. In the alternative, the petitioner requested that Distinct Population Segments (DPSs) of Alewife and Blueback Herring be designated as specified in the petition (Central New England, Long Island Sound, Chesapeake Bay, and Carolina for alewives and Central New England, Long Island Sound, and Chesapeake Bay for blueback herring). In response to the petition, the National Marine Fisheries Service (NMFS) published a positive 90-day finding on November 2, 2011, concluding that listing these species under the ESA may be warranted and initiated a status review.

On August 12, 2013, NMFS determined that listing alewife and blueback herring as threatened or endangered under the ESA was not warranted (78 FR 48943). At that time, NMFS committed to revisiting the status of both species in three to five years. Three to five years

equates to approximately one generation time for each species and allowed for time to complete ongoing scientific studies.

The NRDC and Earthjustice filed suit against NMFS on February 10, 2015, challenging their decision not to list Blueback Herring as threatened or endangered. On March 25, 2017, the presiding judge issued a finding vacating the Blueback Herring listing determination and remanded the listing determination back to NMFS. As part of a negotiated agreement with NRDC et al., NMFS committed to publishing a revised listing determination for blueback herring by January 31, 2019. On August 15, 2017, NMFS published a notice initiating a status review for Alewife and Blueback Herring (82 FR 38672).

The status review synthesizes the best available scientific and commercial information regarding the species status, which includes their life history traits, demographic trends and susceptibility threats. Following the assessment of threats to the species, an extinction risk assessment is conducted to project the health of the populations into the future. The status review reports are meant to comprehensively review the best available scientific information on the status of Alewife and Blueback Herring, evaluate the factors contributing to the species' status, assess whether either species consists of DPSs, and include an assessment of the species' risk of extinction. This would then provide the information necessary for NMFS to make a determination on the potential listing of these species (or its DPSs) under the ESA is warranted.

NMFS required three reviewers to conduct an impartial and independent peer review of the Alewife and Blueback herring Status Review Report. The reviewers were selected based on having working knowledge and recent experience in one or all of the following: 1) fisheries population dynamics, expertise in stock assessment and life history of anadromous species; 2) expertise in extinction risk analysis and population modeling; and/or 3) expertise in stock structure and genetics analysis. This report is one of the three reviews of the draft Status Review Report on Alewife (*Alosa pseudoharengus*) and Blueback Herring (*Alosa aestivalis*).

Description of Reviewer's Role in the Review Activities

Scientific peer review is defined as the organized review process where one or more qualified experts review scientific information to ensure quality and credibility. The reviewers of the draft Status Review Report must conduct their peer review impartially, objectively, and without conflicts of interest. Each reviewer must also be independent from the development of the science, without influence from any position that the agency or constituent groups may have.

Reviewers were approached by the Center for Independent Experts (CIE) to conduct the review of the Status Review Report on Alewife (*Alosa pseudoharengus*) and Blueback Herring (*Alosa aestivalis*). Each CIE reviewer was asked to review the list of background materials and reports listed in Appendix 1 prior to the review. Each CIE reviewer was asked to complete an independent peer review report in accordance with the Performance Work Statement (Appendix 2). Each CIE reviewer was asked to complete the independent peer review addressing each of the following terms of reference (TORs):

1. Is the information regarding the life history and population dynamics of the species the best scientific information available? If not, please indicate what information is missing

and if possible, provide sources.

2. Does the information on river herring genetics, physiological, behavioral, and/or morphological variation presented for the species' range represent the best scientific information available? If not, please indicate what information is missing and if possible, provide sources.
3. Based on the scientific information presented, are the conclusions regarding species, subspecies, or distinct population segment delineations supported by the information presented? If not, please indicate what scientific information is missing and if possible, provide sources.
4. Based on the scientific information presented in the extinction risk assessment report, does this analysis consider all of the best available data, and are the conclusions appropriate and scientifically sound? If not, please indicate what information is missing and if possible, provide sources.
5. In general, is the best scientific and commercial data available for the status review and extinction risk analysis of river herring presented in the report? If not, please indicate or provide sources of information on which to rely.
6. In general, are the scientific conclusions in the reports sound and interpreted appropriately from the information? If not, please indicate why not and if possible, provide sources of information on which to rely.
7. Where available, are opposing scientific studies or theories acknowledged and discussed? If not, please indicate why not and if possible, provide sources of information on which to rely.

These TORs are addressed in this review under the summary of findings below.

Summary of Findings

TOR 1. Life history and population dynamics

The information regarding the life history and population dynamics of the species is based on the best science available. I would advise against using the maps from Fishbase to indicate the range of river herring in the status review report (Figures 1 and 2, page 9). While the text correctly describes the range (page 8), Figures 1 and 2 do not reflect the range that is described in the text. The text states: "Blueback herring range from Nova Scotia south to the St. John's River, Florida (Figure 2), and alewife range from Labrador and Newfoundland south to North Carolina (Figure 3)". St. John's River is on the Atlantic side of north Florida, while Figure 1 indicates blueback herring occurrence in the Gulf of Mexico. Also, while the text indicates the northern end of the range of blueback herring is Nova Scotia, the figure shows the range end at Cape Cod, Massachusetts. I would also like to point out that the figures are incorrectly referred to as Figures 2 and 3, which should be Figures 1 and 2.

TOR 2. River herring genetics and physiological, behavioral and morphological variation

An up to date review on genetic diversity is provided. New research since the 2012 NMFS Stock Structure Workshop has updated which regional stocks can be distinguished. The

best available genetic information, using SNPs, indicates the following regional stock complexes for Alewife:

- Canada- Garnish River, Newfoundland to Saint John River, New Brunswick
- Northern New England- St. Croix River, ME to Merrimack River, NH
- Southern New England- Parker River, MA to Carll's River, NY
- Mid Atlantic- Hudson River, NY to Alligator River, NC

The best available genetic information, using SNPs, indicates the following regional groupings for Blueback Herring:

- Canada- Northern New England-Margaree River, Nova Scotia to Kennebec River, ME
- Mid New England- Oyster River, NH to Parker River, MA
- Southern New England- Mystic River, MA to Gilbert-Stuart Pond, RI
- Mid Atlantic- Connecticut River, CT to Neuse River, NC
- Southern Atlantic- Cape Fear River, NC to St. John's River, FL

These new boundaries of regional stocks are used in the significant portion of the range analyses, which are addressed later in this review. The information presented on river herring genetics, physiological behavioral, and morphological variation represents the best scientific information available.

TOR 3. Species, subspecies, or distinct population segment delineation

While both species are referred to as river herring, Alewife and Blueback Herring are correctly handled as two different species in the report. A description of land-locked populations is included, which are life history variants of Alewife and Blueback Herring. Because the life history of landlocked river herring excludes them from the list of species over which NMFS has jurisdiction (because they don't spend a portion of their lifetimes in marine waters), I agree with the assessment to exclude the landlocked populations from the review of the status of the species.

A distinct population segment (DPS) analysis was performed. The updated boundaries of regional stocks based on genetic studies changes the delineations of potential DPSs from what was requested for designation as DPSs. Based on the recent genetic information, and because the stock complexes were found to meet the criteria for both discreteness and significance, the following distinct population segments were recommended for Alewife:

- Canada DPS- Garnish River, Newfoundland to Saint John River, New Brunswick
- Northern New England DPS- St. Croix River, ME to Merrimack River, NH
- Southern New England DPS- Parker River, MA to Carll's River, NY
- Mid Atlantic DPS- Hudson River, NY to Alligator River, NC

Using the same criteria, the following stock complexes were identified as DPSs for blueback herring:

- Canada-Northern New England DPS – Margaree River, Nova Scotia to Kennebec River, ME
- Mid Atlantic DPS- Connecticut River, CT to Neuse River, NC
- Southern Atlantic DPS- Cape fear River, NC to St. John’s River, FL

The evaluation of significance on page 89 would be helped by the inclusion of maps that shows the boundaries of TNC ecoregions and the stock complexes to illustrate the overlap or lack thereof. The same counts for Blueback Herring. The scientific information presented provides a basis and support for the conclusions regarding species and distinct population segment delineations.

TOR 4. Extinction risk assessment

Extinction analyses were performed on both Alewife and Blueback Herring, on rangewide and per DPS basis. A qualitative analyses were performed with a panel of knowledgeable scientists. A risk matrix approach was used, in which first the condition of both species was summarized according to four demographic risk criteria: abundance, growth rate/productivity, spatial structure/connectivity, and diversity. The scientists subsequently estimated the extinction risks of the Alewife and Blueback Herring after conducting demographic risks analyses, and performed a threats assessment for the species by scoring the severity of current threats to the species, as well as predicting whether the threat will increase, decrease, or stay the same in the foreseeable future. The summary of the demographic risks and threats obtained by this approach was then considered by the status review team in determining the species’ overall level of extinction risk.

The analyses make use of the best available data, as presented in the status review portion of the report. Based on these data, experts made rankings, and the conclusions based on these rankings, e.g. the average score of the rankings, and what that average indicates, are appropriate and scientifically sound. I recommend accepting the conclusions of the extinction risk assessments as presented in the status review report. I do have some comments on the presentation of the results in the text, that I have indicated with specific examples below:

I have some confusion over seeming contradictions in the text. For example, the following statement on page 121:

“Artificial propagation ranked as a *Very Low to Low* threat to alewives coastwide. However, team members noted that artificial propagation/stocking has detrimental effects on alewife populations.” Isn’t it the team members that do the ranking? This ranking is a qualitative ranking of threat to Alewife. Why is stocking ranked as a very low to low threat to Alewife by the same team that notes stocking has detrimental effects on Alewife populations? In a few other cases the text paints a direr picture than the rankings do as well, what is the cause of this discrepancy? The same counts for Blueback Herring on page 143.

Two other items in the text can use some clarification:

1) Figure 17 and 18: I don’t understand the reasoning behind (one of) the experts’ choice to see a rangewide high extinction risk at 3% but a 0% high extinction risk for each DPS. If there is no high risk of extinction in any of the DPSs, why vote for a 3% rangewide high extinction risk? This was a

very small percentage of the total (team members indicated a 75% low risk), but I wonder what the justification for the rangewide high risk vote was when the same team member(s) did not see any of the DPSs to be at high risk.

2) Table 23: How can hybrids and landlocks in category E have an SD of 0 when the range is 1-2?

TOR 5. Scientific and commercial data

To my knowledge, the report presents the best scientific and commercial data available for the status review and extinction risk analysis of river herring.

TOR 6. Scientific conclusions and interpretation

The scientific conclusions in the report are sound and interpreted appropriately from the information.

TOR 7. Presentation of opposing views

All available information on river herring seems included in the status review and the analysis. The panel of experts seems to have been represented by a diversity of views, as illustrated by the wide range and high standard deviation of some of the rankings of specific threats and risks.

General comments

Page 15: remove the question mark after Schmidt and Limburg 1989, include a period after “al” in Gainas et al.

Page 23: Provide more clarity regarding the following statement:

“Of the available CPUE datasets considered in the ASMFC stock assessment, none reflected declining trends over the last ten years of the update (2006-2015). One of the eight datasets showed an increasing trend, four showed a decreasing trend and three showed no trend (**Figure 7**). Six datasets were not updated due to discontinuation or changes in methodology.”

Were the declines seen in the trend of 4 of the 8 datasets just not in the last 10 years? Include over what time frame the declines were seen, since you first provide the statement that none reflect a declining trend in the last 10 years. Does the first statement just pertain to the 8 datasets mentioned in the second sentence? It reads a bit confusing to first have “of the available datasets...” then ‘...of the 8 datasets...’ and then ‘6 datasets...’ which are not part of the 8.

Page 45: Add ‘to’ to “There has been considerable degradation of spawning habitat and nursery habitat for alewife and blueback herring due to decreased water quality over the last two centuries.”

Page 48: SAS is defined here as the river herring stock assessment subcommittee, while SAS has already been mentioned in the report on page 32. Define the abbreviation at first mention.

Tables: I advise that all tables either follow the imperial or the metric (preferred) system. In Table 5 the landings are reported in pounds, while the incidental catch in Table 6 is reported in metric tonnes. To get a better sense of relative contribution, the same units should be used.

Page 75: “In some areas, successful fish passage has been created; thus, restoring access to large amounts of habitat once blocked.” I find this assertion a bit strong. Access is restored when the dam is removed. Perhaps rephrasing it as ‘improving access’ rather than ‘restoring access’ would be enough to make this an accurate assertion. Fish passages on dams generally work as bottlenecks, which some percentage of the migrating population successfully makes use of.

Page 86: “Though evidence has come forward that indicates that some hybridization may be occurring between alewife and blueback herring, there is not enough evidence to conclude whether or not hybridization poses a threat to one or both species of river herring. Hasselman et al. (2014) documented F2 generation hybrids breeding with parent species. Overall, hybrid populations are not a significant threat to alewife or blueback herring coastwide.”

Revise either the first or the last sentence. It is first stated there is not enough evidence to conclude whether or not hybridization poses a threat to Alewife or Blueback Herring, then subsequently that hybrid populations are not a threat to Alewife or Blueback Herring.

Page 87: Change “...fisheries biologists, managers...”, into “...fisheries biologists and managers...”

Page 91: Add a parenthesis) after Reid et al. 2018.

Page 92: Add ‘is’ to “...and it not unique...”

Page 123: Be consistent in either capitalizing Low Risk, Moderate Risk, High Risk, or not capitalizing them.

Page 142: Add ‘s’ to ‘specie’ in the last sentence of the first paragraph.

Conclusions and Recommendations

The coastwide meta-complex of river herring stocks on the U.S. Atlantic coast remains depleted to near historic lows. Commercial landings of river herring peaked in the late 1960s, declining rapidly through the 1970s and 1980s and have remained at levels less than 3 percent of the peak over the past decade. Based on various assessment methodologies, exploitation has decreased, mainly as a result of low levels, stricter regulations, and moratoria. To determine the risk of extinction of both Alewife and Blueback Herring, and whether a listing under the ESA of either ‘threatened’ or ‘endangered’ is warranted, a status review for Alewife and Blueback Herring was initiated. The resulting status review report of Alewife and Blueback herring is reviewed in this document.

The status review and the assessment of extinction risk were based on the best available science. As part of the status review, potential distinct population segments within the petitioned species were evaluated. Four distinct population segments were recommended for Alewife, and three for Blueback Herring. Both species were deemed to be at low risk of extinction, assuming the dominant threats to their populations continue to be managed. The analysis of whether the species are in danger of extinction in a significant portion of their range, if not rangewide, concludes that there are no portions of the range of either Alewife or Blueback Herring that qualify as significant.

I conclude that the scientific conclusions appear sound and interpreted appropriately. I do have some recommendations to improve the report. I recommend including other maps to indicate the range of Alewife and Blueback Herring than Figures 1 and 2. While the range description is correct, having the Fishbase estimates of range as the first two figures may hurt the credibility of the report. Some additional general comments on the report are included in this review; addressing these comments will improve the clarity of the document. I recommend that the conclusions of this report, that both Alewife and Blueback Herring are at low risk of extinction rangewide and in all DPSs, assuming the dominant threats to their population continue to be managed, are accepted.

Appendix 1: Bibliography of materials provided for review

Status review report:

NMFS. 2018. Status review of the Alewife (*Alosa pseudoharengus*) and Blueback Herring (*Alosa aestivalis*). Greater Atlantic Regional Fisheries Office, National marine Fisheries Service, National Oceanic and Atmospheric Administration, Gloucester, MA. September 28, 2018, 150pp.

Required Pre-review Documents

ASMFC, 2017. River Herring Stock Assessment Update. Volume I. Coastwide Summary. Arlington, VA. 193 pp.

ASMFC, 2017. River Herring Stock Assessment Update. Volume II. State Specific Reports. Arlington, VA. 682 pp.

NMFS. 2011. 90-Day Finding on a Petition To List Alewife and Blueback Herring as Threatened Under the Endangered Species Act. Federal Register, Volume 76, No. 212. Wednesday, November 2, 2011.

NMFS. 2012. River Herring Stock Structure Working Group Report. Report to the National Marine Fisheries Service, Northeast Regional Office. August 13, 2012, 60pp. Appendices A and B

NMFS, 2013. Endangered and Threatened Wildlife and Plants; Endangered Species Act Listing Determination for Alewife and Blueback Herring. Federal Register, Volume 78, No. 155. Monday, August 12, 2013.

NRDC, 2011. Petition to List Alewife (*Alosa pseudoharengus*) and Blueback Herring (*Alosa aestivalis*) as Threatened Species and to Designate Critical Habitat.

Recommended Pre-review Documents

Baetscher, D.S., D.J. Hasselman, K. Reid, E.P. Palkovacs, and J.C. Garza. 2017. Discovery and characterization of single nucleotide polymorphisms in two anadromous alosine fishes of conservation concern. *Ecology and Evolution* 7(17): 6638-6648.
<https://doi.org/10.1002/ece3.3215>

Bethoney, N.D., B.P. Schondelmeier, K.D.E. Stokesbury, and W.S. Hoffman. 2013. Developing a fine scale system to address river herring (*Alosa pseudoharengus*, *A. aestivalis*) and American shad (*A. sapidissima*) bycatch in the U.S. Northwest Atlantic mid-water trawl fishery. *Fisheries Research* 141:79-87, doi: 10.1016/j.fishres.2012.09.003

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Appendix 2: Statement of Work

**Performance Work Statement (PWS)
National Oceanic and Atmospheric Administration (NOAA)
National Marine Fisheries Service (NMFS)
Center for Independent Experts (CIE) Program
External Independent Peer Review**

*Endangered Species Act (ESA) Status Review and Extinction Risk Assessment
of River Herring (Alewife and Blueback Herring)*

Background

The National Marine Fisheries Service (NMFS) is mandated by the Magnuson-Stevens Fishery Conservation and Management Act, Endangered Species Act, and Marine Mammal Protection Act to conserve, protect, and manage our nation's marine living resources based upon the best scientific information available (BSIA). NMFS science products, including scientific advice, are often controversial and may require timely scientific peer reviews that are strictly independent of all outside influences. A formal external process for independent expert reviews of the agency's scientific products and programs ensures their credibility. Therefore, external scientific peer reviews have been and continue to be essential to strengthening scientific quality assurance for fishery conservation and management actions.

Scientific peer review is defined as the organized review process where one or more qualified experts review scientific information to ensure quality and credibility. These expert(s) must conduct their peer review impartially, objectively, and without conflicts of interest. Each reviewer must also be independent from the development of the science, without influence from any position that the agency or constituent groups may have. Furthermore, the Office of Management and Budget (OMB), authorized by the Information Quality Act, requires all federal agencies to conduct peer reviews of highly influential and controversial science before dissemination, and that peer reviewers must be deemed qualified based on the OMB Peer Review Bulletin standards¹. Further information on the Center for Independent Experts (CIE) program may be obtained from www.ciereviews.org.

Scope

NMFS is required to use the best available scientific and commercial data in making determinations and decisions under the ESA. We conduct a review of the species through a process known as the status review. The status review is used to prepare a determination on whether listing under the ESA is warranted. The status review synthesizes the best available scientific and commercial information regarding the species status, which includes its life history, demographic trends and susceptibility threats. Following the assessment of threats to

¹ http://www.cio.noaa.gov/services_programs/pdfs/OMB_Peer_Review_Bulletin_m05-03.pdf

the species, an extinction risk assessment is conducted to project the health of the populations into the future.

We are currently conducting a status review of alewife and blueback herring to determine whether listing either species as endangered or threatened under the ESA is warranted. On August 12, 2013, based on a previous status review, we determined that listing alewife and blueback herring as threatened or endangered under the ESA was not warranted. The Natural Resources Defense Council and Earthjustice filed suit on February 10, 2015 challenging this decision. On March 25, 2017, the court vacated the blueback herring listing determination and remanded the listing determination back to us. As part of a negotiated agreement in this case, we are required to publish a revised listing determination for blueback herring no later than January 31, 2019. Alewife and blueback herring are included in our current review.

The information and analysis contained in these reports will include essential factual elements upon which the agency may base its ESA-listing determination. Accordingly, it is critical that these reports contain the best available information on the status of alewife and blueback herring, species delineation and extinction risk of the species, and that all scientific findings be both reasonable and supported by valid information contained in the documents. Therefore, the CIE reviewers will conduct a peer review of the scientific information in the two reports on river herring based on the Terms of Reference (ToRs) to be developed. The CIE reviewers will ensure an independent, scientific review of information for a management process that is likely to be highly controversial regardless of our listing decision. Given the public interest in river herring, it will be important for NMFS to have a transparent and independent review process for the status report and extinction risk assessment.

Requirements

NMFS requires three reviewers to conduct an impartial and independent peer review in accordance with the PWS, OMB Guidelines, and the TORs below. The reviewers shall have working knowledge and recent experience in one or all of the following: 1) fisheries population dynamics, expertise in stock assessment and life history of anadromous species; 2) expertise in extinction risk analysis and population modeling; and/or 3) expertise in stock structure and genetics analysis. It is desirable that as part of the extinction risk analysis expertise, reviewers should be familiar with applications in fisheries, particularly anadromous species.

Tasks for reviewers

Each CIE reviewers shall complete the following tasks in accordance with the PWS and Schedule of Milestones and Deliverables.

- Pre-review Background Documents: Review the following background materials and reports prior to the review:

Required Pre-review Documents

ASMFC, 2017. River Herring Stock Assessment Update. Volume I. Coastwide Summary. Arlington, VA. 193 pp.

ASMFC, 2017. River Herring Stock Assessment Update. Volume II. State Specific Reports. Arlington, VA. 682 pp.

[NMFS. 2011. 90-Day Finding on a Petition To List Alewife and Blueback Herring as Threatened Under the Endangered Species Act. Federal Register, Volume 76, No. 212. Wednesday, November 2, 2011.](#)

[NMFS. 2012. River Herring Stock Structure Working Group Report. Report to the National Marine Fisheries Service, Northeast Regional Office. August 13, 2012, 60pp. Appendices A and B](#)

[NMFS, 2013. Endangered and Threatened Wildlife and Plants; Endangered Species Act Listing Determination for Alewife and Blueback Herring. Federal Register, Volume 78, No. 155. Monday, August 12, 2013.](#)

[NRDC, 2011. Petition to List Alewife \(*Alosa pseudoharengus*\) and Blueback Herring \(*Alosa aestivalis*\) as Threatened Species and to Designate Critical Habitat.](#)

Recommended Pre-review Documents

Baetscher, D.S., D.J. Hasselman, K. Reid, E.P. Palkovacs, and J.C. Garza. 2017. Discovery and characterization of single nucleotide polymorphisms in two anadromous alosine fishes of conservation concern. Ecology and Evolution 1:1-11, doi:[10.5061/dryad.v4q83](https://doi.org/10.5061/dryad.v4q83)

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- Desk Review: Each CIE reviewer shall conduct the independent peer review in accordance with the PWS and TORs, and shall not serve in any other role unless

specified herein. Modifications to the PWS and TORs can not be made during the peer review, and any PWS or TORs modifications prior to the peer review shall be approved by the NMFS Project Contact.

- **Contract Deliverables - Independent CIE Peer Review Reports:** Each CIE reviewer shall complete an independent peer review report in accordance with the PWS. Each CIE reviewer shall complete the independent peer review according to required format and content as described in **Annex 1**. Each CIE reviewer shall complete the independent peer review addressing each TOR as described in **Annex 2**.

Place of Performance

Each CIE reviewer shall conduct an independent peer review as a desk review, therefore no travel is required.

Period of Performance

The period of performance shall be from the time of award through August 2018. Each reviewer’s duties shall not exceed 10 days to complete all required tasks.

Schedule of Milestones and Deliverables: The contractor shall complete the tasks and deliverables in accordance with the following schedule.

Within two weeks of award	Contractor selects and confirms reviewers
No later than two weeks prior to the review	Contractor provides the pre-review documents to the reviewers
June 2018	Each reviewer conducts an independent peer review as a desk review
Within two weeks after review	Contractor receives draft reports
Within two weeks of receiving draft reports	Contractor submits final reports to the Government

Applicable Performance Standards

The acceptance of the contract deliverables shall be based on three performance standards: (1) The reports shall be completed in accordance with the required formatting and content; (2) The reports shall address each TOR as specified; and (3) The reports shall be delivered as specified in the schedule of milestones and deliverables.

Travel

Since this is a desk review travel is neither required nor authorized for this contract.

Restricted or Limited Use of Data

The contractors may be required to sign and adhere to a non-disclosure agreement.

NMFS Project Contact:

Tara Trinko Lake

tara.trinko@noaa.gov

NMFS, Greater Atlantic Region

55 Great Republic Drive, Gloucester, MA 01930

Annex 1: Peer Review Report Requirements

1. The report must be prefaced with an Executive Summary providing a concise summary of the findings and recommendations, and specify whether or not the science reviewed is the best scientific information available.
2. The main body of the reviewer report shall consist of a Background, Description of the Individual Reviewer's Role in the Review Activities, Summary of Findings for each ToR in which the weaknesses and strengths are described, and Conclusions and Recommendations in accordance with the TORs.
3. The reviewer report shall include the following appendices:
 - a. Appendix 1: Bibliography of materials provided for review
 - b. Appendix 2: A copy of the CIE Statement of Work

Annex 2: Terms of Reference for the Peer Review

Endangered Species Act (ESA) Status Review and Extinction Risk Assessment of River Herring (Alewife and Blueback Herring)

1. Is the information regarding the life history and population dynamics of the species the best scientific information available? If not, please indicate what information is missing and if possible, provide sources.
2. Does the information on river herring genetics, physiological, behavioral, and/or morphological variation presented for the species' range represent the best scientific information available? If not, please indicate what information is missing and if possible, provide sources.
3. Based on the scientific information presented, are the conclusions regarding species, subspecies, or distinct population segment delineations supported by the information presented? If not, please indicate what scientific information is missing and if possible, provide sources.
4. Based on the scientific information presented in the extinction risk assessment report, does this analysis consider all of the best available data and are the conclusions appropriate and scientifically sound? If not, please indicate what information is missing and if possible, provide sources.
5. In general, is the best scientific and commercial data available for the status review and extinction risk analysis of river herring presented in the report? If not, please indicate or provide sources of information on which to rely.
6. In general, are the scientific conclusions in the reports sound and interpreted appropriately from the information? If not, please indicate why not and if possible, provide sources of information on which to rely.
7. Where available, are opposing scientific studies or theories acknowledged and discussed? If not, please indicate why not and if possible, provide sources of information on which to rely.