Atlantic States Marine Fisheries Commission

Shad and River Herring Management Board

October 19, 2021
9:00 – 10:30 a.m.
Webinar

Draft Agenda

The times listed are approximate; the order in which these items will be taken is subject to change; other items may be added as necessary.

1.	Welcome/Call to Order *(J. Davis)*	9:00 a.m.
2.	Board Consent • Approval of Agenda • Approval of Proceedings from May 2021	9:00 a.m.
3.	Public Comment	9:05 a.m.
4.	Consider American Shad Habitat Plans/Updates *(B. Neilan)* **Action**	9:15 a.m.
5.	Consider Technical Committee Report on Methods for Evaluating Mixed-stock Catch *(B. Neilan)* **Possible Action**	9:45 a.m.
6.	Progress Report on Prioritizing Systems for Shad Recovery and Developing Inventory of Available Data to Support Development of Fish Passage Criteria *(B. Neilan)*	10:10 a.m.
7.	Elect Vice Chair *(J. Davis)* **Action**	10:25 a.m.
8.	Other Business/Adjourn	10:30 a.m.

This meeting will be held via webinar, click here for details.

MEETING OVERVIEW

Shad and River Herring Management Board
October 19, 2021
9:00 a.m. – 10:30 a.m.
Webinar

Chair: Justin Davis (CT) Assumed Chairmanship: 2/21	Technical Committee Chair: Brian Neilan (NJ)	Law Enforcement Committee Representative: Warner (PA)
Vice Chair: VACANT	Advisory Panel Chair: Pam Lyons Gromen	Previous Board Meeting: May 5, 2021
Voting Members: ME, NH, MA, RI, CT, NY, NJ, PA, DE, MD, DC, PRFC, VA, NC, SC, GA, FL, NMFS, USFWS (19 votes)		

2. Board Consent

- Approval of Agenda
- Approval of Proceedings from May 5, 2021

3. Public Comment – At the beginning of the meeting public comment will be taken on items not on the agenda. Individuals that wish to speak at this time must sign-in at the beginning of the meeting. For agenda items that have already gone out for public hearing and/or have had a public comment period that has closed, the Board Chair may determine that additional public comment will not provide additional information. In this circumstance the Chair will not allow additional public comment on an issue. For agenda items that the public has not had a chance to provide input, the Board Chair may allow limited opportunity for comment. The Board Chair has the discretion to limit the number of speakers and/or the length of each comment.

4. Consider American Shad Habitat Plans/Updates (9:15-9:45 a.m.) Action

Background

- Amendment 3 to the Shad and River Herring FMP requires all states and jurisdictions to submit a habitat plan for American shad. A majority of the habitat plans were approved by the Board in February 2014, and it was anticipated that they would be updated every five years.
- The states began the process of reviewing their American shad habitat plans and making updates in 2020, however, many states encountered delays due to COVID-19. The Board has approved the following habitat plan updates: ME, NH, MA, RI, CT, Delaware River, MD, NC, SC, Savannah River, GA and FL.
- The following plans were submitted for TC review and Board consideration at the October 2021 meeting: VA, DC, NY (**Briefing Materials**).
- The Technical Committee reviewed these habitat plan updates via email and recommends Board approval (**Supplemental Materials**). The remaining states will provide their updated plans to the TC for review before the next Board meeting.

Presentations

- Shad Habitat Plan Updates for Board Consideration by B. Neilan

Board actions for consideration at this meeting

- Consider approval of updated shad habitat plans for VA and DC, and new habitat plan for NY

5. Consider Technical Committee Report on Methods for Evaluating Mixed-stock Catch (9:45-10:10 a.m.) Possible Action

Background

- The American Shad 2020 Benchmark Stock Assessment and Peer Review Report was accepted for management use in August 2020. The assessment found that American shad remain depleted on a coastwide basis, likely due to multiple factors, such as fishing mortality, inadequate fish passage at dams, predation, pollution, habitat degradation, and climate change. At the February 2020 meeting, based on the TC recommendation the Board tasked the TC with "developing methods to evaluate bycatch removals in directed mixed-stock fisheries in state waters in order to understand and reduce impacts to stocks outside the area where directed catch occurs."
- The TC formed a work group to address this task. Relevant data were collected from the states to identify possible methods for evaluating the impacts of mixed-stock removals in directed mixed-stock fisheries in state waters in order to understand and reduce impacts to stocks outside the area where directed catch occurs (**Supplemental Materials**).

Presentations

- Technical Committee Report and Recommendations on Methods for Evaluating Mixed-stock Catch by B. Neilan

Board actions for consideration at this meeting

- Consider recommending the TC recommendations be incorporated into the Delaware River Basin Coop Sustainable Fishery Management Plan.

6. Progress Report on Prioritizing Systems for Shad Recovery and Developing Inventory of Available Data to Support Development of Fish Passage Criteria (10:10-10:25 a.m.)

Background

- In light of the 2020 American shad stock assessment results, which showed that barriers to fish migration are significantly limiting access to habitat for American shad, in May 2021 the TC recommended actions to address fish passage impacts on population recovery, including that dam removal and the use of fish passage performance criteria be prioritized by state and federal agencies with fish passage prescription authority. The Board sent letters to the U.S. Fish and Wildlife Service and NOAA Fisheries to support their efforts to review dam passage. Additionally, the Board tasked the TC with prioritizing systems for shad recovery and developing an inventory of available data that would support development of fish passage criteria.
- The TC has made progress on this task by identifying Federal Energy Regulatory Commission (FERC) hydropower projects that are a priority for shad recovery efforts. Additionally the TC is gathering information on the types of data available for developing fish passage criteria for these priority projects. The TC expects to deliver a final report on this task at the next Board meeting.

Presentations

- Progress Report on Prioritizing Systems for Shad Recovery and Developing Inventory of Available Data to Support Development of Fish Passage Criteria by B. Neilan

7. Elect Vice-Chair

8. Other Business/Adjourn

Shad and River Herring 2021 TC Tasks

Activity level: Medium

Committee Overlap Score: Medium (Multi-species committees for this Board)

Committee Task List
• Board task to develop methods to evaluate bycatch removals in directed mixed-stock fisheries in state waters • Board task to prioritize systems for shad recovery and develop an inventory of available data that would support development of fish passage criteria. • Fall 2021: Updates to state Shad Habitat Plans • Annual state compliance reports due July 1
TC Members: Mike Brown (ME), Mike Dionne (NH), Brad Chase (MA), Patrick McGee (RI), Jacque Benway Roberts (CT), Wes Eakin (Vice Chair, NY), Brian Neilan (Chair, NJ), Josh Tryninewski (PA), Johnny Moore (DE), Harry Rickabaugh (MD), Ellen Cosby (PRFC), Joseph Swann (DC), Eric Hilton (VA), Holly White (NC), Jeremy McCargo (NC), Bill Post (SC), Jim Page (GA), Reid Hyle (FL), Ken Sprankle (USFWS), Ruth Hass-Castro (NOAA)

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

SHAD AND RIVER HERRING MANAGEMENT BOARD

Webinar
May 5, 2021

These minutes are draft and subject to approval by Shad and River Herring Management Board.
The Board will review the minutes during its next meeting.

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TABLE OF CONTENTS

INDEX OF MOTIONS

ATTENDANCE

Board Members

Megan Ware, ME, proxy for P. Keliher (AA)
Cheri Patterson, NH (AA)
Ritchie White, NH (GA)
Dennis Abbott, NH, proxy for Sen. Watters (LA)
Mike Armstrong, MA (Chair)
Raymond Kane, MA (GA)
Sarah Ferrara, MA, proxy for Rep. Peake (LA)
Phil Edwards, RI, proxy for J. McNamee (AA)
David Borden, RI (GA)
Eric Reid, RI, proxy for Rep. Sosnowski (LA)
Justin Davis, CT (AA)
Bill Hyatt, CT (GA)
Maureen Davidson, NY, proxy for J. Gilmore (AA)
Emerson Hasbrouck, NY (GA)
John McMurray, NY, proxy for Sen. Kaminsky (LA)
Joe Cimino, NJ (AA)
Tom Fote, NJ (GA)
Adam Nowalsky, NJ, Legislative proxy (Chair)
Kris Kuhn, PA, proxy for T. Schaeffer (AA)
Loren Lustig, PA (GA)
G. Warren Elliott, PA (LA)
John Clark, DE, proxy for D. Saveikis (AA)
Roy Miller, DE (GA)
Craig Pugh, DE, proxy for Rep. Carson (LA)
Lynn Fegley, MD, proxy for B. Anderson (AA)
Allison Colden, MD, proxy for Del. Stein (LA)
Russell Dize, MD (GA)
Pat Geer, VA, proxy for S. Bowman (AA)
Chris Batsavage, NC, proxy for J. Batherson (AA)
Jerry Mannen, NC (GA)
Bill Gorham, NC, proxy for Sen. Steinburg (LA)
Ross Self, SC, proxy for P. Maier
Malcolm Rhodes, SC (GA)
Doug Haymans, GA (AA)
Spud Woodward, GA (GA)
Hannah Hart, FL, proxy for J. McCawley (AA)
Marty Gary, PRFC
Max Appelman, NOAA
Mike Millard, US FWS

(AA = Administrative Appointee; GA = Governor Appointee; LA = Legislative Appointee)

Ex-Officio Members

Brian Neilan, Technical Committee Chair

Staff

Bob Beal
Toni Kerns
Maya Drzewicki
Kristen Anstead
Tina Berger
Pat Campfield
Lisa Carty
Emilie Franke
Lisa Havel
Chris Jacobs
Jeff Kipp
Laura Leach
Dustin Colson Leaning
Savannah Lewis
Kirby Rootes-Murdy
Sarah Murray
Mike Rinaldi
Caitlin Starks
Deke Tompkins
Geoff White

Guests

Fred Akers
Pat Augustine, Coram, NY
Joe Ballenger, SC DNR
Alan Bianchi, NC DNR
Dierdre Boelke, NEFMC
Jamie Botinovch
Jason Boucher, NOAA
Delayne Brown, NH F&G
Heather Corbett, NJ DEP
Caitlin Craig, NYS DEC
Jessica Daher, NJ DEP
Lorena de la Garza, NC DENR

Guests (continued)

Greg DiDomenico
John Duane
Wes Eakin, NYS DEC
Julie Evans
James Fletcher, Wanchese Fish Co
Toni Friedrich, SGA
Alexa Galvan, VMRC
Lewis Gillingham, VMRC
Zoe Goozner, Pew Trusts
Zach Greenberg, Pew Trusts
Melanie Griffin, MA DMF
Pam Lyons Gromen, Wild Oceans
Jon Hare, NOAA
Brendan Harrison, NJ DEP
Helen Takade-Heumacher
Carol Hoffman, NYS DEC
Kyle Hoffman, SC DNR
Jesse Hornstein, NYS DEC
Rachel Howland, NC DENR
Asm. Eric Houghtaling, NJ (LA)
Stephen Jackson, FL FWS
Jeff Kaelin, Lund's Fisheries
Desmond Kahn
Greg Kenney, NYS DEC
Wilson Laney
Chip Lynch, NOAA
Steve Meyers
Chris Moore, CBF
Clinton Morgeson, VA DWR
Allison Murphy, NOAA
Derek Orner, NOAA
Paul Piavis, MD DNR
Nicholas Popoff, US FWS
Bill Post, SC DNR
Jill Ramsey, VMRC
Harry Rickabaugh, MD DNR
McLean Seward, NC DENR
David Sikorski, CCA
Andrew Sinchuk, NYS DEC
Melissa Smith, ME DMR
Gregory Sorg, SC DNR
Renee St. Amand, CT DEEP
Michael Stangl, DE DFW
David Stormer, DE DFW
Jason Surma, Woods Hole Group
Chris Uraneck, ME DMR
Mike Waine, ASA
Craig Weedon, MD DNR
Ashley Weston, NOAA
Holly White, NC DENR
Kelly Whitmore, MA DMF
Margaret Whitmore, VA DWR
Chris Wright, NOAA
Renee Zobel, NH F&G

The Shad and River Herring Management Board of the Atlantic States Marine Fisheries Commission convened via webinar; Wednesday, May 5, 2021, and was called to order at 10:30 a.m. by Chair Justin Davis.

CALL TO ORDER

CHAIR JUSTIN DAVIS: Good morning everybody. I'm going to call to order this meeting of the Shad and River Herring Management Board. My name is Justin Davis; I'm the Administrative Commissioner from the state of Connecticut, and starting with today's meeting I will be taking over as Chair of this Board.

Quickly, I just want to acknowledge the great leadership of our outgoing Board Chair, Mike Armstrong, from the state of Massachusetts. Thanks, Mike, for all your work and leading this Board over the last couple years. I'm thankful for the opportunity to take over.

APPROVAL OF AGENDA

CHAIR DAVIS: The first item on our agenda today is approval of the agenda. I'll ask if there is any suggested modifications or additions to today's agenda.

MS. TONI KERNS: No hands, Justin.

CHAIR DAVIS: Okay, great, so we'll consider the agenda approved by consent.

APPROVAL OF PROCEEDINGS

CHAIR DAVIS: Moving on, the proceedings from the February, 2021 meeting of this Board were provided in the meeting materials. Are there any suggested corrections or additions to those proceedings from the February meeting?

MS. KERNS: No hands, Mr. Chair.

CHAIR DAVIS: Okay, great, we'll consider the proceedings from the February meeting approved by consent.

PUBLIC COMMENT

CHAIR DAVIS: The next item on our agenda is public comment. Caitlin or Toni, did we have anybody sign up to provide public comment?

MS. CAITLIN STARKS: Not to my knowledge.

MS. KERNS: Des Kahn has his hand up though, Mr. Chair.

CHAIR DAVIS: Okay, sure. Des, go ahead.

MR. DESMOND KAHN: Thank you, Mr. Chair. I made some comments at the last meeting of this Board in February, about evidence that striped bass predation has a negative impact on shad abundance in the Delaware River in particular. For this meeting I arranged with ASMFC staff to distribute a document that portrays this evidence. I trust Board members have received this. If you get a chance to look at it, I don't know if you have it available now. But what you'll see is that the first thing is the index of abundance of American shad in the Delaware River from about 1984 to 2014. That is at the Lewis Haul Seine, that is the Lewis family in New Jersey freshwater area both at the head of tide. It's a very long-term index. It goes way back before '84.

The next chart you'll see is a plot of the catch per trip of striped bass in the waters of the state of Delaware, between 1984 and 2014. This is pretty much very similar to the time series of abundance portrayed by the statistical catch at age model in the striped bass stock assessment, showing a low period in the '80s, and an increase and a peak in about the 2000s, and then some decline.

Then you'll see a plot of the two indices together. As I mentioned last time, you'll have a chance to look at this. When striped bass were low, shad were blooming in the '80s, in particular. As striped bass increased in the '90s, shad declined. When you had the sort of peak of striped bass in the 2000s, shad were at their lowest level.

I don't know if you were involved back then, but in 2005, due to a coastwide decline of shad, the Shad Management Board shut down an intercept gillnet fishery along the coast, with the idea that that might

be the cause of this shad decline. That had no impact whatsoever. If you look at the plot of the Delaware Index of Abundance. There was no response.

What that implies is that the fishery was having, it implied it had little to no impact on stock abundance. In other words, it was a very minimal impact. These two indices are highly significantly statistically negatively correlated. What that is taking in fisheries ecology to mean is that the predator is controlling the prey.

That is known as top-down control, when you have a negative correlation between abundance of these two species like this. What the implication of this is, and I'm going to wrap this up, is that as long as we have this very high abundance of striped bass, with very large individuals that can consume adult shad, we're not going to get a return of shad or blueback herring to the high abundance that they enjoyed in a period like the '80s.

This has also been borne out on the Connecticut River, including by work that you, yourself, Mr. Chairman did as a graduate student there, showing consumption of adult shad by large striped bass in the river. Victor Crecco and Tom Savoy of Connecticut, Bureau of Marine Fisheries documented this in several publications.

Lastly, Victor Crecco told me he had visual evidence when he could see schools of large striped bass herding American shad up against the Holyoke Dam, all the way up in Massachusetts, and preying on them. We've got the mechanism predation for this negative correlation, and I wanted to make the Board aware of this evidence. Thank you very much.

CHAIR DAVIS: Thank you, Des. Appreciate that comment, and also appreciate you making those materials available to the Board ahead of this meeting. Are there any other members of the public who would like to make comment today? Do we have any hands, Toni?

MS. KERNS: Jeff Kaelin has his hand up.

CHAIR DAVIS: Okay, Jeff, go ahead.

MR. JEFF KAELIN: I didn't know we were going to open up comments, but I just wanted to say that I really did appreciate Des' work, I thought it was really interesting, because you know the shorthand version of blueback and shad declines recently has been the offshore fishing fleet. You know obviously it's really a little more complex than that.

I do know, I just was talking to Jason Didden at the Council the other day. A few years ago, when this came up, we did go back and look at the shore-side monitoring data, which several years of 50 percent of the trips in the midwater trawl fishery. Really, that fleet doesn't catch very much shad. There are some data out there, Mr. Chairman.

I think I brought it up as an AP member, so I just wanted to make that point. Certainly, we want to see these stocks rebuild. It is complex, so I wanted to thank Des for his work, and for the Committee to consider this in a very broad way, so thanks for allowing me to make those comments.

CHAIR DAVIS: Okay, thank you, Jeff. Any other members of the public who would like to make comment?

MS. KERNS: I don't see any other hands, Justin.

REVIEW OF TECHNICAL COMMITTEE PROGRESS ON BOARD TASKS

CHAIR DAVIS: Okay great, thanks, Toni. We'll move on to the next item on our agenda, which is to get a review of Technical Committee Progress on Board Tasks. We've got the Chair of our Technical Committee, Brian Neilan here this morning, he is going to be giving us a presentation on three different items, two of which will require some Board action.

I think the way I would like to proceed here is to give the presentation on each item, and then stop and have a period of time for questions and comments, and then potentially taking action on that item. That being said, you know we've got about 35 minutes on

the clock here, to get through these three items, so I will be looking to move things along, to try to keep us on schedule. With that, Brian, I'll go ahead and turn it over to you.

MR. BRIAN NEILAN: All right, thank you, Mr. Chair, and good morning to the Board. My name is Brian Neilan, I'm the TC Chair and Rep from New Jersey. Today we have a couple presentations our staff put together for you. First, we will have this presentation on the TCs progress on a few Board tasks, and then I'll review some shad habitat plan updates as well. Here is a quick overview of what this presentation will cover.

First, at the last Board meeting the Board tasked the TC with developing a guidance document for implementing requirements under Amendment 2 and 3. We'll review the highlights of this document, and then the Board will consider it for approval. Second, I'll go over the progress made so far in regards to the task of evaluating and addressing bycatch in mixed-stock fisheries in state waters, and finally we'll go over a letter with recommendations from the TC on addressing fish passage performance, which we know has been a significant impediment to stock recovery.

CONSIDER TECHNICAL GUIDANCE DOCUMENT FOR IMPLEMENTATION OF AMENDMENTS 2 AND 3 TO THE SHAD AND RIVER HERRING FMP

MR. NEILAN: Okay, so first up is a review of the Technical Guidance Document developed by the TC to help states and jurisdictions better implement Amendments 2 and 3 to the FMP. For some background, back in late 2017, the Board tasked the TC to develop proposed improvements to Amendments 2 and 3, in regards to these five issues here.

Management and monitoring of rivers with low abundance in harvest, standardization of SFMP requirements, incorporation of stock assessment information into SFMPs, and discussion on the timeline for renewing plans, clarification of de minimis requirements, as they pertain to SFMPs, and a review of years of data required for developing an SFMP.

At the previous Board meeting in February, the Board approved the TCs recommendations and subsequently tasked the TC with developing a guidance document. This document is to help states and jurisdictions best implement the measures required by Amendments 2 and 3, and the draft document was included with your meeting materials for this meeting.

Just for the record, the TC does not recommend any changes to the FMP to address commercial fisheries. These will still have an SFMP requirement. An FMP should clarify the management of recreational fisheries specifically, and the recreational fishery should be dependent on the availability of harvest and monitoring information.

The fish chart rubric that staff put together, and the Board approved for allowing recreational harvest, should be used when a state is deciding which type of FMP to develop, either a standard SFMP, or an alternative management plan, as allowed under the amendments. Which type of plan a state can implement is dependent upon the known or suspected presence of shad or river herring in the system, as well as the quantity and quality of the data available to support a given type of plan.

The Board approved this chart back in February, and its use for recreational fisheries. Unless there are any specific questions, to keep it moving I won't go over the entire chart. Not hearing any, we can go to the next slide. In regards to technical guidance on the standardization of FMP requirements, a plan should provide details on management responses to trip triggers, including the type of restrictions that will be considered. That can be a suite of options.

States must notify the Board if the threshold is exceeded, and implement a management response in the following fishing year. Any restriction that is implemented in response to an exceeded threshold, must be in place until the associated target that was tripped is met for five consecutive years. Finally, in the case of interjurisdictional waterbodies. States should cooperatively develop FMPs and implement

identical sustainability targets and management measures on that interjurisdictional waterbody.

For Issue 3, incorporation of stock assessment information into SFMPs. The TC will continue to review information on required and ongoing monitoring efforts, and develop recommendations for improvements. The data used in these plans and assessments, essentially the TC will continue to review data on a case-by-case basis, and make appropriate recommendations on what should be included in a given SFMP, based on the data that we have available. Also, plans will continue to be required to be updated and reviewed every five years. The document makes no changes to the de minimis requirements. To qualify for de minimis status, states must land less than 1 percent of the coastwide commercial total, to be exempted from subsampling commercial and recreational catch for biological data.

This does not exempt states from the requirement to prohibit recreational harvest and possession, with exceptions for systems that have an approved sustainable fishery plan. The TC guidance on minimum number of years of data required to develop and establish a primary sustainability metric, is 10 years of data for American shad, consecutive years of data, and 10 years of data for river herring.

In the case of river herring, the TC may accept a time series of 7 to 9 years, with consideration of additional information to justify this shorter time series, such as exploitation rate, stock size, passage efficiency, really just case by case. The TC also developed some further guidance beyond the initial Board task, as it was reviewing the amendments in regards to the use of alternative management plans.

Going forward, the document requires that states proposing an AMP should now also include a rationale and justification for why a standard fishery management plan cannot be used. Justification that the proposed management program will be conservationally equivalent to catch and release.

Explanation of how the state will determine if or when an AMP is no longer appropriate, including a data source and trigger, such as three years of harvest that is observed through a creel survey, or something similar. A description of management response if the trigger is met. We have an example here, if harvest is documented through a creel survey for three consecutive years, catch and release only regulations will be implemented statewide, or for specified systems.

If a management trigger in an AMP is met the state must notify the Board in the next compliance report, and pursue implementation of a management response for the following calendar year. That is all I have, in regards to the TCs guidance document. I could take any questions anyone might have, before the Board considers the document for approval.

CHAIR DAVIS: All right, thanks, Brian. I'll turn it back to the Board and ask if anybody has questions for Brian on the presentation.

MS. KERNS: Right now, I just see Cheri Patterson with her hand up.

CHAIR DAVIS: Okay, go ahead, Cheri.

MS. CHERI PATTERSON: Would you please go back to Slide 7, I believe, if that is possible? I have a question in regards to B, where you have management restrictions implemented in response to a stock falling below the sustainability target, must stay in place until the target or targets have been met for at least five consecutive years of sufficient data collection. What was the purpose of going up to five consecutive years, as opposed to what is in there currently, where it indicates proposals to reopen closed fisheries may be submitted as part of the annual compliance report, and will be subject to review by the Plan Development Team, TC, and management board? I'm thinking this five consecutive years is a little extreme for some instances, and I would like to know why it went to five consecutive years.

MR. NEILAN: Sure, so the TC felt that they wanted some hard number. Just basically, sometimes we have a lot of gray, and we're looking for a little more "black and white" in the Amendments 2 and 3. Five

consecutive years is considered basically one shad generation. Given the results from the assessment and the general coastwide depleted status, the TC felt that five years was conservative, at a level of conservation that they felt they were comfortable with.

MS. PATTERSON: Okay, follow up, Mr. Chair?

CHAIR DAVIS: Absolutely, go ahead.

MS. PATTERSON: Thank you. This regards both shad and river herring, correct?

MR. NEILAN: Yes, that is correct.

MS. PATTERSON: I don't have a problem with everything else stated within this technical guidance. However, I do with 2B. I think that five consecutive years may be fine for shad, it doesn't have to be that high for river herring, as well as, there are many reasons behind instituting a management restriction, that may not have to do with the stock itself having an issue. An example could be what we've run into in New Hampshire.

We had a dam removal occur, and it's taken us two to three years to figure out how to now account for the fish passing through that former dam sight. We have reduced numbers counted for those reasons, as well as when anybody does a fish passage modification, that could affect passage until the modification is realized or not realized, and more modification needs to occur. It's not saying that the fish, the stock itself is failing. It's the accountability for how various states are counting these targets and thresholds.

I'm a little leery of this one, and I would prefer to have the previous language be put into this particular standardization, where it says that the proposals to reopen closed fisheries, may be submitted as part of the annual compliance report, and still be subject to that review by all three members or portions of the management, being the Plan Development Team, the TC, and the management board, because there are exceptions to this. I would hate to see some standardization interrupt those exceptions.

MS. STARKS: Mr. Chair, if I could follow up. This is Caitlin.

CHAIR DAVIS: Sure, go ahead, Caitlin.

MS. STARKS: I definitely hear Cheri's concerns, and I just wanted to kind of offer how this document would be utilized. Just to clarify. There wouldn't be necessarily a hard requirement, since this wouldn't be written into the FMP for there to be at least five years, where that sustainability target is being met. It would still be subject to TC review, but this is to give the Technical Committee some more structure with how they're looking at these requests. I do believe that indicates that Cheri has described, where there is another reason besides the population itself that is causing a sustainability target to not be met.

The Technical Committee would still have some ability to take that information into account, when they're making a decision or a recommendation to the Board about whether to reopen or remove a management restriction. Then ultimately, it would still be the Board's purview to approve or not approve such a request.

MS. PATTERSON: Follow up, Mr. Chair.

CHAIR DAVIS: Sure, go ahead, Cheri.

MS. PATTERSON: Thank you. I appreciate that, Caitlin, that it allows the TC some guidelines. That being said, you have guidelines here specific to shad, whereas you can have a lower consecutive year data collection for river herring. Why aren't you putting three to five years or three years for river herring and five for consecutive years for shad?

MS. STARKS: I can allow Brian to answer that, but I don't believe, I guess I was under the impression that the five years was applied to both species, not just shad, so Brian if you have any follow up to add.

MR. NEILAN: Sure, yes in this case it was both species, not just shad. Given the state of the river herring and shad stocks, I think the TC wanted to err on the side of

caution, and applies a longer time series to both species. I think Caitlin made a great point there that if a jurisdiction submits some sort of a reason as to why their numbers might be off, and it's not just the fishery. We have these consecutive years of sufficient data collection here, and I think if you could make the case, the TC is going to review it and understand that.

CHAIR DAVIS: Thanks, Brian, and I'll ask at this point, if we maybe hit pause on this particular discussion. I'm just going to ask if any other Board members have questions related to the presentation we were just given, on the Technical Guidance Document.

MS. KERNS: We have one hand, Bill Hyatt.

CHAIR DAVIS: Okay, Bill.

MR. WILLIAM HYATT: Yes, I just wanted to say that I thought this guidance document provides a nice balance between giving states flexibility and requiring consistent, clear standards. That said, I do have one question, and that pertains to the use of alternative management plans for recreational fisheries.

You said that alternative recreational management plans could be used in instances where they have the same conservation value as catch and release for recreational fisheries. I was just wondering if you could expand upon that with an example, to make that a little easier to understand. Thank you.

CHAIR DAVIS: Thanks Bill, Brian, do you want to field that one?

MR. NEILAN: Sure, I guess we could go to the previous slide, is that what we're looking at? Just to get an idea what I'm answering here to better understand how to apply the AMPs to the recreational fisheries?

MR. HYATT: My question had to do specifically with equivalency to catch and release, just sort of an example that would make that a little bit clearer.

MR. NEILAN: Okay, sure. I think in some of the southern states, I think particularly this might have come up specifically for Georgia, where they have exceptionally low presence of these species. The idea here was that the species are so low to begin with, and encountered so infrequently in the fishery, that if somebody does take one home it's so infrequent that it's going to have almost no effect, almost to the point of having a closed fishery or no harvest.

MR. HYATT: It would require some documentation that there was either extremely low abundance or an extremely minimal fishery.

MR. NEILAN: Yes, so the justification, if you're applying for an AMP that justification would be required, and you would also have to have some sort of system to look for a signal that the fishery was increasing, or abundance was increasing. Then go from there once you are starting to see fish, if you see them more frequently.

MS. STARKS: If I could follow up, Mr. Chair.

CHAIR DAVIS: Go ahead, Caitlin.

MS. STARKS: I just wanted to let everyone know that there are three alternative management plans that were approved by the Board already for recreational fisheries. The Technical Committee was kind of following their process with approving those, in developing these recommendations for this Technical Guidance Document. If you're interested in looking at those, they are on our website for South Carolina, Georgia, and Florida already AMPs in place for recreational harvest.

CHAIR DAVIS: Okay, thanks, Caitlin. I think at this point, we do need to take some Board action on this item, and Caitlin, am I correct in assuming that what we were looking for here is a motion from the Board to approve this Technical Guidance Document?

MS. STARKS: Yes, I think we would need a motion to approve it.

MS. KERNS: You have John Clark with his hand up.

CHAIR DAVIS: Okay, go ahead, John.

MR. JOHN CLARK: Thank you, Mr. Chair, if you're ready I have a motion.

CHAIR DAVIS: Go ahead.

MR. CLARK: Move to approve the Technical Guidance Document for implementation of Amendments 2 and 3 to the Shad and River Herring Fishery Management Plan.

CHAIR DAVIS: Okay, thank you, John, do we have a second to the motion?

MS. KERNS: Dr. Malcolm Rhodes.

CHAIR DAVIS: Thank you, Dr. Rhodes. Any discussion on the motion?

MS. KERNS: I don't know if John is, he still has his hand up, I don't know if he wants to speak to it. He put his hand down.

CHAIR DAVIS: John, did you want to speak to the motion?

MR. CLARK: Sorry about that, I just put my hand down. I think the motion is self-explanatory, thanks.

CHAIR DAVIS: I'll ask again if there is any discussion on the motion.

MS. KERNS: I don't have any hands raised, Justin.

CHAIR DAVIS: Okay, given that, I'll ask if there are any objections to the motion.

MS. KERNS: I see no hands raised.

CHAIR DAVIS: Okay, so given that we'll consider the motion approved by unanimous consent.

UPDATE ON METHODS TO EVALUATE BYCATCH IN MIXED-STOCK FISHERIES

CHAIR DAVIS: Moving on, we'll move on to our second item under Review of Technical Committee Progress**,** which would be an update on Methods to Evaluate Bycatch in Mixed-stock Fisheries**.** Brian, go ahead.

MR. NEILAN: As Mr. Chair said, we'll be going over the TCs progress on evaluating bycatch in mixed-stock fisheries in state waters. A bit of background. Back in August of 2020, after receiving the results of the stock assessment, the Board tasked the TC with identifying potential paths forward to improve shad stock along the coast. Some system-specific recommendations were made at the last Board meeting in February, and the TC identified the need to better understand and possibly reduce impacts to external stocks of directed mixed-stock fisheries.

An example that is often used is Hudson and Connecticut River shad being caught in the lower Delaware Bay. At that February meeting, the TC was tasked with developing methods to evaluate bycatch removals in directed mixed-stocked fisheries in state waters in order to understand and reduce impacts to these stocks.

So far, we've developed a roadmap for going forward to accomplish this task, as you see here. Fist we are going to define our goals and expectations, identify where these mixed-stock fisheries are being executed, and collect any and all data available from these areas. This includes past and present DNA studies, tagging data, and commercial and recreational harvest data, to determine where these mixed-stock fisheries occur, and to what degree. Once we know what data we have available, we can determine the feasibility of developing modeling methods to estimate composition of mixed-stock fisheries.

After that we can evaluate any new or existing methods of reducing or eliminating mixed-stock harvest, and finally, the goal here is to develop recommendations from the Board on reducing or eliminating mixed-stock harvest or recommend research priorities going forward to address this task.

Here is where we are as of right now. The TC Task Group has been populated, which sent out a data request and data template to all state representatives, looking for information on mixed-stock fisheries and/or bycatch. States with mixed-stock fisheries

have filled out the template with their available data, and submitted them to the Task Group.

The Task Group will be meeting later this month for the first time, to start evaluating the available data, and plan how to move forward on this task. That is generally where we are currently, in regards to this task. Like I said before, your TC Task Group will be meeting for the first time later this month, and I can take any questions that the Board may have.

CHAIR DAVIS: I'll ask if anyone from the Board has questions for Brian on this item.

MS. KERNS: I don't see any hands raised at this time.

CONSIDER TECHNICAL COMMITTEE RECOMMENDATIONS ON ADDRESSING FISH PASSAGE PERFORMANCE

CHAIR DAVIS: Okay, thanks, Toni. Brian, I guess that means you can go ahead and move on to our last item under Review of Technical Committee Progress, Considering the Technical Committee Recommendations on addressing Fish Passage Performance.

CHAIR DAVIS: All right, recommendations on addressing fish passage. We can go right to the next slide. Starting with a little background. This ties into the original Board task of identifying potential paths forward to improve shad stocks. The TC indicated that further action is needed to improve fish passage, due to passage mortality posing a significant threat to stock recovery.

Analysis done in the recent stock assessment suggests passage barriers reduced coastwide spawner production potential by up to 41 percent. As a result, the TC prepared a memo with recommendations for Board action related to passage. Here we have some key information highlighted in the memo.

The cumulative effect of barriers should be recognized as one of the most impactful obstacles to the recovery of American shad, in part due to a bunch of issues, including migratory delays, injuries and stress, and mortality to upstream and downstream migrants at adult and juvenile life stages.

Assessment modeling of current passage efficiencies showed a less than 10 percent increase in spawner potential, versus no passage at all at a first encountered barrier. Quantitative fish passage performance criteria are needed to test the effectiveness of fish passage facilities, to achieve management goals. Fish passage prescription authority lies with the Fish and Wildlife Service and NMFS under the Federal Power Act, as well as states often having the ability to address fish passage when issuing water quality certificates for operation. In regards to TC recommendations, the TC feels that the following actions are needed to reduce impacts of barriers, and provide for population recovery.

First and foremost, barrier removal is the preferred approach to restored habitat access. Obviously, this is not an option all the time, or in every instance. When dam removal is not an option, the development and use of fish passage performance standards in river systems, based on available data, fish passage modeling tools, and fish passage expertise is recommended. If the required information to develop performance standards is not available, it should be developed.

The TC recommends that the Commission forward letters to agencies with relative authorities to request prioritizations of these here mentioned issues, when considering licensing and permitting of projects that might impede access to spawning grounds and out-migration. Next steps for today, we already addressed the draft Technical Guidance Document, so I can take any questions on the fish passage letter, otherwise hand it over to the Board to consider.

CHAIR DAVIS: Great, thanks, Brian. Before I potentially entertain questions related to this last part of the presentation. I wanted to invite the Board members representing the federal agencies in question here, to potentially provide comment on their sort of perceived value of sending letters to their respective agencies requesting prioritization, according to the TC recommendation. I'll just sort of

put that out there, Max or Mike, if either of you would like to comment on this idea of sending letters.

MS. KERNS: You have Mike Millard and then Max.

CHAIR DAVIS: Okay, go ahead, Mike.

MR. MIKE MILLARD: First of all, I guess I would like to say that the intent of that recommendation is certainly good. The Service agrees that fish passage is a huge issue, and probably the single largest action we can take to restore a system is removal of a dam, and then followed by passage mechanics after that.

I guess I would say, speaking internally for the Service in my region, and probably the southeast region. But a letter such as this may not move the needle too much. We feel like we already prioritize fish passage, at least in the northeast we have full time fish passage engineers that are really busy. We have a fish passage discretionary pot of money every year that we move out, move out to our partners, including states and NGOs.

In the northeast it is about just under 1.5 million dollars a year, and I assume it's similar in the southeast region. Could we do more? Sure. But that would come at the cost of other issues that are priorities, and I know everyone on the Board understands how that works. Having said that, such a letter could be useful when we get into FERC negotiations, right? Everything you prescribe in a FERC settlement needs to be justified pretty tightly. A letter like this and the results that it might produce, could be useful in those FERC negotiations for justifying prescriptive actions to utilities. Thank you.

CHAIR DAVIS: Thanks, Mike. Max.

MR. MAX APPELMAN: Yes, so following on what Mike just said. I think for the Agency we would echo a lot of those sentiments that very important work, and I don't think we would disagree with a lot of those bullet points on the previous slide. We do prioritize this work, and I think there is a lot of great examples in the northeast, and then successes in the past, and ongoing work here with other systems.

We also require, you know testing and minor modifications to fishways during the life of FERC licenses, but of course major changes are really only feasible during relicensing, or when the license is first issued. We do prioritize that work. We exercise our authorities under the Federal Power Act. In regard to FERC relicensing, we reserve those authorities. But that's not to say that a letter of support, like Mike was saying, wouldn't be valuable.

I think having the management authority's perspective, in this case the Commission's voice on why this work is needed to achieve certain management goals or objectives, could help ground truth, as Mike was getting at, some of our requests and proposals for fishways could definitely help tie that in with the Commission's perspective. That could be helpful. I think as part of that, it might be useful to have the Technical Committee help identify those systems that are high priority for shad recovery.

Maybe inventory available data at those sites, or other sites that could support the development of this fish passage criteria. I think that might help provide some guidance or direction to, not just the federal agencies, but also the states, you know where to focus conservation efforts in the future. I'll end there, and see what other Board members had to say on this.

CHAIR DAVIS: Thank you, Max and Mike for those comments. I think those are very helpful to the Boards on how to move forward with this item. I'll ask if there are any other questions and comments from the Board on this topic.

MS. KERNS: The only name I Have is Allison Colden.

CHAIR DAVIS: Okay, go ahead, Allison.

MS. ALLISON COLDEN: This kind of follows along with the question or comment that Max just made. I was curious if there is already available, or could be developed, basically a list or a timeline of existing facilities that will be up for relicensing. It seems like,

you know relicensing or the point of licensing is one of the very few opportunities that states have to enforce or implement these performance standards.

I think it would be helpful if we knew when those facilities were up for relicensing, to plan ahead to prioritize the development of those performance metrics. I was wondering if that was currently available, or could be developed relatively easily.

CHAIR DAVIS: Thanks, Allison. Brian, I'm going to defer to you on that one, although we can also ask for input from Max or Mike if needed.

MR. NEILAN: Sure, Ken Sprankle with the Fish and Wildlife Service has over the past couple years been spearheading an effort to put together a database of different impoundments on a system-by-system or state-by-state basis, just to kind of get full coverage of the Atlantic coast, and where we have impoundments, and possibly using that to prioritize where efforts at removing them will have the most effect. I don't think we have a list, in terms of FERC renewals coming up. But I'm sure that is something that could be put together.

MS. KERNS: Mr. Chair, you have Mike Millard.

CHAIR DAVIS: Okay, go ahead, Mike.

MR. MILLARD: I can speak for the Service, and I'll let Max, I guess weigh in for NOAA, but we have full time FERC coordinators on staff, that I assume have a list like that or could easily get this type data, FERC relicensing schedules coming up. I guess I would add while I have the floor. To Max's recommendation, and I hate to dump more back on the TC. But it is one thing, it's a good thing to have a schedule of FERC relicensing's coming up.

It would be value added to have that schedule with some sort of priority of the bang for the buck, with a cross benefit of those FERC events coming up, in terms of fish passage and benefit to the fishery resources. Every negotiation I think, that the Service has to sort of weigh the cost benefit of how much to invest in that particular negotiation. Knowing that for a fishery resource would help us inform those decisions.

CHAIR DAVIS: Toni, was there another hand up after Mike?

MS. KERNS: Those were all the hands that I have so far.

CHAIR DAVIS: Okay, great, thanks. My takeaway from the discussion here is what we've heard from our federal partners is that there would be some value to sending the letters that the Technical Committee is recommending, particularly when it comes to the FERC relicensing process.

Max Appelman also suggested that there might be some value as part of that correspondence in providing information to the Agencies on prioritization of different projects, that also might be helpful during the FERC relicensing process for these agencies to make, sort of cost benefit decisions. At this point we can take action on this item, and Caitlin, I think we would be looking for a motion from the Board, relative to potentially sending these letters, correct?

MS. STARKS: Yes, it's up to the Board how they would like to proceed. I guess if the Board would like to send a letter, we would need a motion to recommend that to the ISFMP Policy Board. But I guess I wanted to clarify process wise for the Technical Committee. Is it preferable to have the Technical Committee try to gather this information? Look at the list of FERC relicenses, and prioritize those and then include that information in a letter that would go to the agencies, or is it preferable to, I guess send a letter today with less information, and then follow up with that prioritization? I guess that is what I would like to clarify.

CHAIR DAVIS: Brian, do you want to provide some input on that?

MR. NEILAN: Sure. I think anytime you have more data you can put into the letter; it would be more convincing. I think Caitlin brings up a pretty good point here. That might be worth going down that

avenue. I guess just I would be remiss to not get some guidance on the Board. We also have the other task of the mixed-stock fisheries. I guess we would look to the Board for some guidance on prioritization on the tasks as well.

MS. KERNS: Mr. Chair, you have two Board members and a member of the public. Your Board members are Allison Colden and Megan Ware, and just let me know if you want to go to the public.

CHAIR DAVIS: Okay, Megan, go ahead, and then I'll go to you, Allison.

MS. MEGAN WARE: Kind of just listening, because that's a question I had for the TC. I feel like we're starting to talk maybe about like river-specific data or recommendations, so I'm wondering, was the original intent of the letter to be, I don't want to say generic, but kind of like a single letter that everyone gets, or was the thought process that this would be a letter formulated for kind of each agency or state with specific information in it?

MR. NEILAN: Both. I think the original intent here was to kind of send this out to the appropriate agencies, as one letter. If we go the avenue of looking at prioritizations and system-specific evaluations, it's certainly going to delay the sending of this letter, I'm sure by quite a bit. I think that's something to consider as well.

CHAIR DAVIS: Okay thanks, Allison.

MS. COLDEN: I had my hand raised previously, just being willing to offer a motion to this regard. But happy to hold that until we figure out this issue of general versus specific letters.

CHAIR DAVIS: Okay thanks, and Toni, you mentioned there was someone from the public who had their hand up?

MS. KERNS: Wilson Laney.

CHAIR DAVIS: Okay, Wilson, go ahead. I will ask you to try to keep it brief, because we are running up against the end of our allotted time on the agenda.

DR. WILSON LANEY: I will keep it brief, Mr. Chairman, and thank you for recognizing me. To the question about whether or not there is a list of upcoming FERC licenses, the answer is yes. It's on the FERC website, all you have to do is download it. Then with regard to prioritization of passage of barriers within individual states. Some while back, and Caitlin should be able to find this information. Jeff Kipp was the staff person who was coordinating the ASMFC Fish Passage Working Group. That was one thing the Work Group did, was we worked with the Technical Committee and the state representatives on the Fish Passage Working Group, to put together a list of barrier priorities within each jurisdiction. It probably is somewhat dated now, since I think we did that quite a few years ago.

But the Technical Committee would not have to start from scratch, is the point, if you all wanted to charge them with taking a look at both the FERC list and that previous list put together by the Fish Passage Work Group in considering whether or not to include that information in any letter that you might send to the Fish and Wildlife Service, NMFS, and FERC. Thank you.

CHAIR DAVIS: Great, thanks very much for that comment, Wilson. Any other hands up at this point, Toni?

MS. KERNS: I don't have any other hands.

CHAIR DAVIS: Okay, well at this point, I think it's probably time for us to potentially make a motion to take action, and Allison, I'll turn back to you, since you mentioned that you were potentially ready to make a motion. Would you like to do so?

MS. COLDEN: Sure. I don't know if staff has one ready, but I can try and do this on the fly as well, if not.

MS. STARKS: Allison, were you making a motion to send a letter, or to task the TC?

MS. COLDEN: I was going to go ahead and make the motion to send the letter to the agencies.

MS. STARKS: Okay, Maya, can you pull that motion up please that I drafted? The third one.

MS. COLDEN: Okay, move to recommend to the ISFMP Policy Board that the Commission write a letter to NOAA Fisheries and U.S. Fish and Wildlife Service, to prioritize the following actions to provide increased opportunities for population recovery of American shad. First, dam and barrier removals are the preferred approach to restore fish species habitat access for population restoration, and for habitat restoration benefits.

When dam removal is not an option, the development and use of fish passage performance standards in river systems, based on available data, fish passage modeling tools, and fish passage expertise is recommended. If the required information developed performance standards are not available, support their development for such purposes and application.

CHAIR DAVIS: Thank you, Allison, do we have a second to the motion?

MS. KERNS: Cheri Patterson.

CHAIR DAVIS: Thank you, Cheri, any discussion on the motion?

MS. KERNS: Max Appelman.

CHAIR DAVIS: Okay, go ahead, Max.

MR. APPELMAN: Of course, given the intent of this motion, I would be abstaining. But I just wanted to comment on sort of the tone of what this looks like right now. I think what Mike and I were saying earlier is that we already do prioritize this work, so if the intent here is to request prioritization, I don't think that is going to do much. But again, if the tone were more in a supportive nature, I think that is something that we could take to the table at these FERC negotiations. Just making that sort of comment on what the tone of this letter, how this letter could help the agency.

CHAIR DAVIS: Any other discussion on the motion?

MS. KERNS: I don't see any other hands raised, Justin.

CHAIR DAVIS: Okay, process question, Toni. I can ask if there are any objections, and if there aren't any, should I also ask if there are any abstentions, given that we've had one Board member indicating they are going to abstain from the vote.

MS. KERNS: Yes, we can do it that way, ask if there are objections, and then we'll indicate one abstention, unless Mike also abstains, and he has his hand up as an abstention, so we could do those two. Allison Colden does have her hand up now.

CHAIR DAVIS: Allison, go ahead.

MS. COLDEN: In response to Max, I was wondering if slightly modifying this language would help, and I would suggest move to recommend to the ISFMP Policy Board that the Commission write a letter to NOAA Fisheries and U.S. Fish and Wildlife Service, supporting their activities in dam passage review, to provide increased opportunities, et cetera. I would love some feedback, and would be willing, if the seconder was comfortable with that, to make that adjustment.

CHAIR DAVIS: Okay, thanks, Allison. I guess I'll first ask Max to respond if he would view this as an improvement to the motion.

MR. APPELMAN: Sure, yes. I do. I think Allison is on the right track here, you know maybe just finding a way to cut out prioritize and substitute with support actions. Maybe that is a clean way to do it.

CHAIR DAVIS: Okay, thanks, Max. Allison, would you be good with that wording?

MS. COLDEN: Yes, that's fine with me, thank you.

CHAIR DAVIS: Cheri, I'll also ask you as the seconder of the motion if you're good with that.

MS. PATTERSON: Yes, thank you.
CHAIR DAVIS: Okay, any other discussion on the motion?

MS. KERNS: You have no hands raised.

CHAIR DAVIS: Okay, given that I'll ask if there are any objections to this motion.

MS. TINA L. BERGER: I'm sorry, but I'm not sure the motion is in a final language.

MS. STARKS: Yes, I was just going to pick and come back, I wanted to remove prioritize, so maybe it should say supporting their activities in dam passage review, to provide increased opportunities. Is that what you said, Allison?

MS. COLDEN: Yes, I think that is correct.

MR. APPELMAN: If I could just jump in again, Mr. Chair, and just say, as long as we're clear on the record of when staff actually goes and writes this letter, and that it takes a tone, a supporting tone, as opposed to a directive. I think I'm fine with this. Of course, I am abstaining.

CHAIR DAVIS: Okay, thanks, Max, and thank everybody for keeping me honest there, and noting that the motion wasn't in final form yet. Now that I believe we've got it in final form, I'll ask again if there are any objections, noting that there are already two abstentions on the record from U.S. Fish and Wildlife Service and NOAA National Marine Fisheries Service.

MS. KERNS: I see no hands raised in objection.

CHAIR DAVIS: Great, thanks, we'll consider this approved by consent. I think the other matter we have to deal with here is there was some discussion about potential value in taking the Technical Committee with coming up with prioritizations of different barriers for restoration action, potentially using the list of upcoming FERC actions as a guiding tool for that. Also keeping in mind though, that the Technical Committee already currently has one task on their docket ongoing, the evaluation of bycatch in mixed-stock fisheries.

I guess I'll put this back to the Board. Would anyone care to make a motion to task the Technical Committee with an additional task related to prioritization of fish passage projects, keeping in mind that we should then also give some guidance on prioritization of the Technical Committee's tasking.

MS. KERNS: Max Appelman.

CHAIR DAVIS: Go ahead, Max.

MR. APPELMAN: Yes, I'm happy to make that motion. I think this is a valuable exercise, and hearing from Wilson, they don't really need to start from scratch, there might be some documents there to get it started. I do have a motion. I don't know if staff wants to, yes, great.

I would move to task the Technical Committee with prioritizing systems for shad recovery, and developing an inventory of available data that would support development of fish passage criteria. The intent here, given the workload already on the TC, would be to prioritize this below those ongoing TC tasks.

CHAIR DAVIS: Okay, great, thanks, Max. Do we have a second to the motion?

MS. KERNS: Mike Millard.

CHAIR DAVIS: Thanks, Mike, any discussion on the motion?

MS. KERNS: Mike Millard.

CHAIR DAVIS: Go ahead, Mike.

MR. MILLARD: I obviously support the motion, since I seconded it. But I guess I would add that there are, in addition to what Wilson identified, I know there is more than a couple map-based prioritization tools for some sort of Hec-8 level, I think or maybe even finer

than that. We're prioritizing where you get the biggest bang for the buck for fish passage, given the fishery resources in the basin. There are tools available for the TC to go off on.

CHAIR DAVIS: Any other discussion on the motion?

MS. KERNS: No additional hands, Mr. Chair.

CHAIR DAVIS: Given that, I'll ask if there are any objections to the motion.

MS. KERNS: I see no hands.

CHAIR DAVIS: Okay, we'll consider the motion approved by unanimous consent. Thanks everybody.

CONSIDER APPROVAL OF THE SHAD HABITAT PLAN UPDATES

CHAIR DAVIS: All right, and we'll now move on to the last item on our agenda. I apologize, we have run a bit over our allotted time here, so we'll attempt to move through this last item quickly, which is to Consider Approval of the Shad Habitat Plan Updates. Brian, I'll turn it back over to you.

MR. NEILAN: Thank you, Mr. Chair, I'll try to move quickly. I don't want to cut into people's lunches too much. We have some Shad Habitat Plan updates for you. Just a bit of background. Under Amendment 3 all states and jurisdictions are required to submit habitat plans for American shad, which are meant to contain a summary of information current and historical spawning and nursery habitats, threats to those habitats, and any restoration programs that the states are undertaking.

In February, the Board agreed that these plans should be updated every five years or so, similar to SFMPs, and asked that states update existing plans originally approved in 2014, and for the states with missing plans to submit new habitat plans. This is the Merrimack and the Hudson. Six habitat plans were approved by the Board back in February. Today we have another six habitat plans for Board consideration. The TC has reviewed all these plans, and recommends them all for Board approval. Here is our habitat plan updates. For the Massachusetts coastal rivers, new sections were incorporated in regards to shad runs in the Jones, North, South, and Neponset rivers.

They did a whole bunch of updates, new summaries on their Table 1, looking at the different shad runs in the state. Generally, just a general update, nothing too crazy. Rhode Island updated its Habitat Plan with recent dam removals and fishway installations and improvements on the Pawcatuck and Pawtuxet rivers.

Connecticut updated many of its tables and figures, as well as maps in the Habitat Plan, updated threats to the threat's assessment section, updated the habitat assessment, as well as the habitat restoration sections, with any new info that has come up since the previous plan. The Delaware River Basin states updated their plan, so New York, New Jersey, Pennsylvania and Delaware.

More information on salt front location and primary historical spawning grounds in the background section. They also updated main stem and tributary habitat assessment, updated the nursery habitat section, as well as the threat assessment section. For South Carolina there was the acknowledgement of the approved joint Shad Habitat Plan for the Savannah River, between South Carolina and Georgia.

They updated information regarding the Yadkin and Pee Dee River for relicensing issued to Duke Energy some river specific online tools available to the public that include information for a whole bunch of different issues, in regards to licensing in specific rivers, and information regarding the Santee-Cooper FERC license, which has not yet been issued.

They also added some additional fish passage consideration. Finally, Florida updated sections on the St. Johns, the Econlockhatchee River and the Ocklawaha. I think I might have added an extra A in there somewhere. Specifically updated the Basin Management Action Plan for Lake Jesup, which discharges into the historical spawning grounds for

shad, as well as the Basin Management Plans for the first three springs that discharge into the St. Johns River.

Updated, like I said the Econlockhatchee Plan and the Ocklawaha. The St. John's River Management District updated its review of impacts, removing the dam on nutrient dynamics downstream. Today the Board needs to consider approval of the six plans presented. The TC recommends that all six plans that I just went through there should be approved by the Board.

Also, a possible recommendation that the remaining states update habitat plans, and submit new plans in the case of the Hudson and the Merrimack, in time for the TC to review for the next Board meeting. I can take any questions if anybody has any, otherwise I'll turn it over to Mr. Chair.

CHAIR DAVIS: Thank you, Brian, I admire your courage in attempting some of those river names, there were some doozies in there. I'll ask if anyone on the Board has questions for Brian.

MS. KERNS: I do not see any hands, Mr. Chair.

CHAIR DAVIS: Okay, thanks, Toni. Given that, I'll ask if anyone on the Board would care to make a motion.

MS. KERNS: I'm sorry, Mike Armstrong just put his hand up, I apologize.

CHAIR DAVIS: Okay, go ahead, Mike.

DR. MICHAEL ARMSTRONG: I'm sorry, I was anticipating your next words. I assume they were asking for a motion, is that correct, Mr. Chairman?

CHAIR DAVIS: That is correct, Mike.

DR. ARMSTRONG: All right, I have one for you. Move to approve the Shad Habitat Plan Updates for Mass, Rhode Island, Connecticut, Delaware River, South Carolina, and Florida, as presented today.

CHAIR DAVIS: Okay, thank you, Dr. Armstrong, do we have a second to the motion?

MS. STARKS: I saw Lynn Fegley's hand first.

CHAIR DAVIS: Okay Lynn, thank you. Any discussion from the Board? I will make one note. There was a recommendation in there from the Technical Committee which states we have plans still outstanding, submit those in time for review before the next Board meeting. I guess I would ask the maker of the motion if he would be amendable to adding something in there to the motion to address that recommendation.

MS. STARKS: I don't think it's necessary, but if you would like to include it in the motion that is fine.

CHAIR DAVIS: Okay, thanks, Caitlin. Given that, maybe it's not necessary.

MS. KERNS: I don't see any hands wanting to comment on the motion, Mr. Chair.

CHAIR DAVIS: Okay, given that I'll ask if there are any objections to the motion.

MS. KERNS: I see no hands raised.

CHAIR DAVIS: Okay, we'll consider the motion approved by unanimous consent. Thanks everyone.

ADJOURNMENT

CHAIR DAVIS: Moving on to our last item on the agenda, is there any other business to come before this Board today?

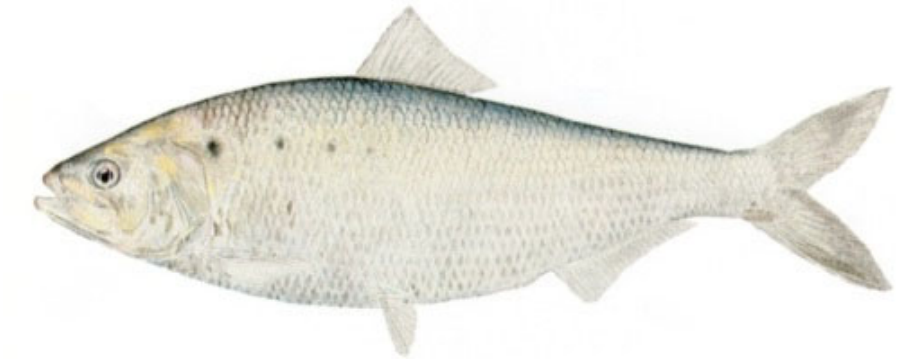
MS. KERNS: I don't see any hands raised.

CHAIR DAVIS: All right, then I'll entertain a motion to adjourn.

(Whereupon the meeting convened at 11:45 a.m. on May 5, 2021.)

Commonwealth of Virginia American Shad Habitat Plan

2021 Update



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Introduction

The Virginia American Shad Habitat Plan for the ASMFC is a joint effort between staff of the Virginia Institute of Marine Science, Virginia Department of Wildlife Resources, and the Virginia Marine Resources Commission. This 2021 report includes additional information or progress on existing threats recorded within the 2014 report, but also includes documentation of three additional threats considered to impact American Shad habitat: 1) In-river construction and blockage to migration; 2) Agricultural water intakes; and 3) Industrial water intakes and discharge. The scope of this report is limited to the three primary tributaries of the Chesapeake Bay within Virginia (James, York, and Rappahannock rivers); populations of American Shad exist in the Virginia portions of the Nottaway River and the Potomac River, but these are managed by other jurisdictions (North Carolina and Potomac River Fish Commission, respectively). We thank Emily Hein (VIMS) and Randy Owen and Tiffany Birge (VMRC) for information.

Agencies within the Commonwealth of Virginia with Regulatory Ability Related to American Shad or American Shad Habitat Management

Virginia Marine Resources Commission (VMRC). The VMRC is divided into three divisions: 1) Fisheries Management, which is charged with regulation of fisheries resources in tidal and marine environments, including collection of fisheries statistics, development of management plans, and promotion and development of recreational fishing activities; 2) Habitat Management, which manages and regulates the submerged bottom lands, tidal wetlands, sand dunes, and beaches; and 3) Law Enforcement, which enforces state and federal fisheries laws and regulations.

Virginia Department of Wildlife Resources (VDWR). The Department of Game and Inland Fisheries became the Department of Wildlife Resources on July 1, 2020. The VDWR manages and regulates inland fisheries, wildlife, and recreational boating for the Commonwealth of Virginia, and is responsible for enforcement of laws pertaining to wildlife and inland fisheries management.

Virginia Department of Environmental Quality (VDEQ). The VDEQ is charged with monitoring and regulating the quality of air and water resources in Virginia. VDEQ is organized into many programs, including Air, Water, Land Protection and Revitalization, Renewable Energy, Coastal Zone Management, Enforcement, Environmental Impact Review, Environmental Information, and Pollution Prevention.

In addition to state agencies, the Army Corps also regulates all of these areas from the federal perspective (with input and/or official consultation with other federal agencies such as NOAA-Fisheries and Fish and Wildlife Service).

Habitat Assessment

In Virginia, American Shad is found in the Chesapeake Bay and its major tributaries, including the Potomac, Rappahannock, York, and James rivers, as well as smaller tributaries and other coastal habitats (e.g., along the Delmarva peninsula) (Fig. 1). Additionally, American Shad are found in certain rivers in Virginia that drain to North Carolina (Desfosse et al., 1994). Here we focus on the major western tributaries of the Chesapeake Bay as these are the primary stocks in Virginia waters. Although certain spawning/rearing reaches are known for American Shad for individual rivers (Bilkovic et al. 2002), the amount of habitat used by American Shad for these life history stages at a river-wide scale is unknown for Virginia tributaries of the Chesapeake Bay. Several tidal portions of the three major Virginia tributaries of the Chesapeake Bay have been designated as high priority areas for living resources, and migratory fishes in particular (Figs. 2, 3).

James River

The James River forms at the junction of the Cowpasture and Jackson rivers (rkm 580), and its drainage is the largest watershed in Virginia, totaling 26,164 km^2 (Jenkins and Burkhead, 1994). Average annual spring discharge on the James River is 294.2 m^3/s (Tuckey 2009). Prior to damming, which began in the colonial period, shad and river herring were reported to reach these headwaters and far into the major tributaries of the James River (Loesch and Atran, 1994). The two primary tributaries of the James River below the fall line at Richmond are the Appomattox River, which joins at the city of Hopewell (rkm 112), and the Chickahominy River, which joins at rkm 65. The extent of salt water is variable, but brackish conditions are observed as far up as the mouth of the Chickahominy River on a seasonal basis. Tidal water reaches the City of Richmond at approximately rkm 167 at the lower end of the fall zone. Boshers Dam is at the upper end of the fall zone at rkm 182.

York River System

The York River system includes the Mattaponi and Pamunkey rivers, which merge at West Point, VA, to form the York River (53 rkm). This is the smallest of the three western tributary systems, with a watershed of 6,892 km^2 (Jenkins and Burkhead, 1994); the Pamunkey drainage is larger and has greater average spring discharge than that of the Mattaponi (3,768 km^2 and 47.5 m^3/s vs. 2,274 km^2; 27.2 m^3/s, Bilkovic 2000). Tidal propagation extends to approximately 67 rkm in the Mattaponi and 97 rkm in the Pamunkey (i.e., approximately 120 km and 150 km, respectively, from the mouth of the York River; Lin and Kuo, 2001). The extent of the salt intrusion varies by season, but moderate salinity values (>2 ppt) are often observed in lower portions of these rivers.

Rappahannock River

The Rappahannock River, which is approximately 314 km in length (172 km is tidal; 118 km is salt water), has its headwaters in the Piedmont and is fed by the Rapidan River. The Rappahannock watershed encompasses a total of 7,032 km^2 (Jenkins and Burkhead, 1994), and the average annual discharge at the fall line is 45 m^3/s (O'Connell and Angermeier 1997). An estimated 125 tributaries of the Rappahannock River are potentially used by alosines (O'Connell and Angermeier 1997).

Threats Assessment and Habitat Restoration Programs

Rulifson (1994) identified the following river specific factors potentially involved in the decline of migratory alosines in Virginia, including American Shad:

Rappahannock River: dams, overfishing, turbidity, low oxygen

York River System:

York River: industrial water intakes, industrial discharge locations, overfishing, chemical pollution, thermal effluents, low oxygen, sewage outfalls
Mattaponi River: industrial discharge locations, overfishing, thermal effluents
Pamunkey River: industrial discharge locations, overfishing, thermal effluents

James River System:

James River: channelization, dredge and fill, dams, industrial water intakes, industrial discharge locations, overfishing, chemical pollution, thermal effluents, turbidity, sewage outfalls
Nansemond River: dams
Chickahominy River: dams, industrial discharge locations, overfishing.
Appomattox River: dams
Pagan River: turbidity, sewage outfalls

Further Rulifson (1994) identified the potential habitat management practices, or rather their effects, involved in the decline of migratory alosines in Virginia, including American Shad:

Rappahannock River: inadequate fishways, reduced spawning habitat

York River System:

York River: poor water quality
Mattaponi River: poor water quality
Pamunkey River: poor water quality

James River System:

James River: inadequate fishways, reduced freshwater input to estuaries, reduced spawning habitat, poor water quality, water withdrawal
Nansemond River: inadequate fishways, reduced freshwater input to estuaries, reduced spawning habitat, water withdrawal
Chickahominy River: reduced freshwater input to estuaries, reduced spawning habitat, fishing on spawning area, water withdrawal
Appomattox River: inadequate fishways, water releases from dams, reduced spawning habitat, water withdrawal
Pagan River: turbidity, poor water quality

From the above threats assessment, several primary classes of threats and their associated repercussions are identified here in relation to American Shad habitat needs and restoration in Virginia. These are discussed below.

Threat: Barrier to Migration (Dams). As an anadromous fish, American Shad are negatively impacted by obstructions to migration from marine and estuarine habitats to the upstream

freshwater spawning and rearing habitats. Here we provide a review of the primary obstructions found on the three Virginia tributaries of the Chesapeake Bay.

Rappahannock River: The main stem of the Rappahannock River was dammed until 2004-2005 when the submerged Crib Dam (built in 1854) and the Embrey Dam (built in 1910) at Fredericksburg (rkm 179) were removed. Removal of the dam reopened 170 km of potential habitat on the Rappahannock and Rapidan rivers for migratory fishes, such as American Shad and river herring (American Shad and Blueback Herring have been collected 45 km upstream of dam). Over 2,200 miles of Upstream Functional Network miles were reopened by the removal of Embrey Dam, which was the last remaining dam on the Rappahannock main stem. Upstream Functional Network miles are all miles accessible on the barrier stream plus all accessible tributary miles above the passage project (Martin, 2019). There are dams in place on tributaries of the Rappahannock (e.g., the Rapidan River) that may impede migration of American Shad (although it is unknown if American Shad used these reaches prior to dam installation). A fish passage was installed on the Orange Dam on the Rapidan River, a tributary of the Rappahannock (http://www.dwr.virginia.gov/fishing/fish-passage/) 16 km upstream of Rapidan Mill Dam, which remains as a migration barrier.

York River System: The Mattaponi, Pamunkey, and York rivers are all completely undammed. There are few dams in place on some tributaries of these rivers (e.g., the Ashland Mill Dam on the South Anna River, a tributary of the Pamunkey, which is known to block American Shad migration).

James River: Numerous dams on the James River and its tributaries have historically blocked migration of fishes. Between 1989 and 1993 three dams in the fall zone in Richmond were breached or notched, extending available habitat to the base of Boshers Dam. A fish passage was installed in Boshers Dam (built in 1823) in 1999, reopening 221 km of the upper James River and 322 km of its tributaries to American Shad and other anadromous fishes; the next dam of the mainstem is at Lynchburg, VA (Weaver et al., 2003). A total of 4,700 upstream functional network miles were reopened by the Boshers fishway (Martin, 2019). Approximately 204 km of the main stem of the Appomattox River is accessible to American Shad. Harvell Dam (rkm 17) in Petersburg, VA had a Denil fishway (1998) and then the dam was removed in 2014. Brasfield Dam (rkm 28) that forms Lake Chesdin near Matoaca, VA has a fish lift that completes passage through the Appomattox fall zone resulting in access to 2,957 upstream functional network miles. The first dam on the Chickahominy is Walkers Dam at rkm 35 that has a functioning double Denil fishway built in 2015 that reopens 48 mainstem river kilometers (508 upstream functional network miles). American Shad are known to use the Walkers fishway (2021 DWR trapping data) and have been found over 40 km upstream (Michael Odom, USFWS personal communication 2020). A number of additional dam removal and fishway construction projects have occurred in the past on several smaller creeks and streams in the James River drainage as well (http://www.dwr.virginia.gov/fishing/fish-passage/).

Recommended Actions: Installation of fish passage systems, breaching and removal of dams as appropriate (see Fig. 4 for recent activities in Virginia and the Chesapeake Bay watershed generally). Continued monitoring of fish passage systems currently in place for effectiveness for American Shad passage.

The remaining significant American Shad habitat that is yet to be reopened in Virginia includes the South Anna River, a tributary of the Pamunkey River, upstream of the Ashland Mill Dam

(this would open 59.5 km of shad habitat on the mainstem plus any suitable tributary miles). American Shad were routinely collected during sampling for several years below Ashland Mill Dam at Rt. 1 and continue to be caught by anglers below the dam. Discussion of removal of this dam was proposed as mitigation for the King William Reservoir and there have been recent discussions of removal being done for mitigation credits, but the dam is still in place. Ashland Mill Dam is a Tier 1 (top 5% priority) barrier in the Chesapeake Bay Fish Passage Prioritization Tool (https://maps.freshwaternetwork.org/chesapeake/#) . In the James River, there remain seven dams spaced over 34 km beginning with Scott's Mill Dam in Lynchburg, VA (removal of these barriers or passageway installation would open a significant amount of habitat). Within the Rappahannock River system, removal or fish passage at the Rapidan Mill Dam (on the Rapidan River, a tributary of the Rappahannock; also a Tier 1 priority) would open 53.1 km of habitat because there is a Denil fishway on a water supply dam (Orange, VA) 16 km upstream of Rapidan Mill Dam. Passage options are currently being explored including removal for mitigation credits.

Agency or Agencies with Regulatory Authority: Licensing and relicensing of dams is regulated by FERC. Within Virginia, VDWR oversees the Fish Passage Program. VMRC, VDWR, and VDEQ all may be involved with the permitting process, regulations and monitoring of aspects of fish passage systems, dam removals, and other environmental factors associated with these activities depending on position of the dam. VDWR consults with fish passage engineers from the USFWS throughout fish passage projects.

Goal: "The importance of migratory fish species was recognized in the 1987 Chesapeake Bay Agreement and re-affirmed in Chesapeake 2000. A commitment was endorsed to 'provide for fish passage at dams and remove stream blockages whenever necessary to restore natural passage for migratory and resident fish.' The Fish Passage Work Group of the Bay Program's Living Resource Subcommittee developed strategies (1988) and implemented plans (1989) to fulfill this commitment. In 2004, the original Fish Passage Goal of 1,357 miles (established in 1987) was exceeded. Chesapeake 2000 led to the establishment of a new Fish Passage Goal, set in 2004, committing signatory jurisdictions to the completion of 100 fish passage/dam removal projects," to re-open an additional 1,000 miles of high-quality habitat to migratory and resident fishes. This increased the overall goal to 2,807 total miles for which Virginia is responsible for roughly one-third of the miles to be reopened. [from VDWR (https://dwr.virginia.gov/fishing/fish-passage/#background; accessed June 28, 2021)].

Progress: Through 2013 partners reopened a total of 2,690.75 miles based on the original method of counting miles (mainstem miles only on barrier stream). Starting with 2014, the method for counting miles reopened was modified to begin counting all accessible miles above a barrier on the barrier stream and its tributaries. This method calculates what is known as "upstream functional network miles" in order to provide a more realistic picture of habitat restoration and accessibility (Martin, 2019). Using this GIS based method over 12,000 miles have been reopened by dam removal and over 19,000 miles have been reopened by fish passage installation for a grand total of 31,313.4 upstream functional network miles. Because American Shad tend to spawn in larger streams not all of the upstream functional network miles are necessarily available to shad spawning. The current Long-term Target in the Chesapeake Bay Fish Passage Logic and Action Plan is as follows: Continually increase access to habitat to support sustainable migratory fish populations in the Chesapeake Bay watershed's freshwater rivers and streams. By 2025, restore historical fish migration routes by opening an additional 132

miles every two years to fish passage. Restoration success will be indicated by the consistent presence of Alewife, Blueback Herring, **American Shad**, Hickory Shad, American Eel and Brook Trout, to be monitored in accordance with available agency resources and collaboratively developed methods.

Cost: N/A

Timeline: N/A. Other than continuing to contribute to the overall Bay passage goal target dates there is no Virginia specific timeline set for dam removal and fish passage installation in Virginia. While not set for individual species (i.e., specific to American Shad), the next phase in prioritizing will use the prioritization tools and other existing information to create a Virginia plan that could include breaking down habitat total goals and accomplishments per anadromous species, including American Shad.

Threat: Pressures from Land Use Associated with Population Growth

Many of the non-barrier threats identified by Rulifson (1994) can be collectively viewed as the results of changes in land use associated with population growth. The human population surrounding the three primary Virginia rivers is centered in Richmond (James River), with a significant population center in Fredericksburg (Rappahannock River); the remaining areas are rural (Fig. 5). According to the Chesapeake Bay Program, within Virginia land use pressure is highest along the James River at Richmond, with other significantly high vulnerability levels at the James River near the confluence of the Chickahominy River, and the peninsula separating the James River from the York River (Fig. 6). Land use surrounding rivers within the Chesapeake Bay watershed in Virginia likely is associated with contamination (significant levels throughout, principally PCBs, but also metals within the York River system; Fig. 7), sediment load (High in the Rappahannock, Low in the York River system, Chickahominy and Appomattox rivers, and Medium in the Upper James River; Fig. 8), and phosphorus yields (High in the Rappahannock, Medium in the Upper James River, and Low in the other rivers; Fig. 9); nitrogen yields are low in all three river systems (Fig. 10). Low summertime dissolved oxygen levels remains a threat in all portions of three rivers, except the upper Mattaponi and upper Pamunkey rivers (York River System), and the upper James River (Fig. 11).

Recommended Action: No specific actions can be identified related to mitigation against land use in Virginia as it relates to American Shad habitat use. Indeed, it is difficult to identify specific actions to be taken in land use management that will affect American Shad population status (Waldman and Gephard, 2011). However, further study of freshwater habitat use by American Shad in Virginia is needed. Specifically, quantification and analysis of specific reaches of riverine habitats used by American Shad during residency (adults during the spawning run, larvae, and juveniles) is needed to better manage and address habitat concerns of the species. As a first step toward addressing decline of American Shad in Virginia, in part due to habitat alteration, a hatchery stocking program ran from 1994 to 2017 in the James River and 2003 to 2014 in the Rappahannock River.

Agency or Agencies with Regulatory Authority: Land use regulations associated with water quality primarily are under the authority of VDEQ, although both VMRC and VDWR may be involved in the permitting process and other aspects of regulation for certain activities that will affect water quality.

Goal: No specific goals are identified for protecting American Shad from pressures associated with habitat alteration and other land use changes. Enforcement of a moratorium on fisheries of American Shad (VMRC; VDWR) is aimed at curbing further declines.

Progress: The moratorium for American Shad has been in place in Virginia since 1994. Stocking of hatchery fishes (VDWR) ceased on the Rappahannock after the 2014 season and on the James after the 2017 season.

Cost: N/A

Timeline: N/A

Threat: In-River Construction Blocking Migration

In-river construction projects such as bridge and tunnel construction and maintenance, dredging, and others, have the potential for disruption of American Shad migration (as well as that of other anadromous fishes) from both direct (e.g., acoustic interference) and indirect (e.g., habitat alteration) factors.

Recommended Action: Enforcement of time-of-year restrictions (TOYR). Current TOYR for American Shad are between February 15 and June 30 of any year (https://dwr.virginia.gov/wp-content/uploads/media/Time-of-Year-Restrictions.pdf). There may be case-by-case relaxation of this TOYR exceptions based on where the work is proposed. For example, upstream of Boshers Dam on the James River, VDWR recommend the TOYR to be March 15 to June 30 because American Shad do not reach this point in the river until mid-March. Case-by-case consideration of appropriate mitigation measures for individual projects (e.g., bubble curtains, coffer dams, etc.).

Agency or Agencies with Regulatory Authority: VMRC regulates any structures on, over, or under subaqueous bottom, the local wetlands board (or VMRC if a locality has not adopted the Wetlands Ordinance) regulates anything on, under, or over tidal wetlands (between mean low water and mean high water for non-vegetated areas and between mean low water and 1.5 x the tide range above mean high water for vegetated wetlands). VMRC distributes permit applications to other regulating agencies and other agencies (e.g., DWR, VIMS) that do not issue permits themselves to provide input to the permit process during the public interest review.

Goal: No specific goal is set for this threat, as the projects are sporadic and change year to year. However, with each application, measures of how the project will affect habitat are assessed and considered during the application process. Any request for TOY suspension for a specific project is vetted by inter-agency discussions.

Progress: Using the most recent five-year average (2016-2020), approximately 1,789 permit applications are estimated to be submitted per year for projects in Tidewater Virginia that have the potential to impact American Shad habitat. Within the same five-year time window, an estimated average of 346 permit applications per year for the non-tidal reaches of Virginia are received. An unknown number of these projects have the potential to adversely affect this species' habitat. Project scope ranges from small developments with minor impacts, if at all (e.g.,

dock construction and repair) to major infrastructure improvements (e.g., construction of a new tunnel across the mainstem of the James River).

Cost: N/A

Timeline: N/A

Threat: Surface Water Withdrawal and Discharge

Surface water is removed for power generation (nuclear and fossil fuel), manufacturing, and agriculture, and may be categorized as either consumptive (irrigation) or non-consumptive (e.g., power generation). Surface water withdrawals in Virginia include significant removal of water from reservoirs, ponds and other impoundments, springs, rivers, and streams, and in 2019 accounted for 89% of total (=surface + ground) water withdrawals within the Commonwealth (1.1 billion gallons per day); this was 1% lower than the five-year average due to decrease in manufacturing (VDEQ 2020). The surface waters used by American Shad are subject to significant withdrawals, with the largest volumes removed occurring in the waters surrounding Richmond, Hampton Roads, and Washington D.C. (as well as Giles County, which lies outside of the range of American Shad).

In Virginia, the withdrawal of volumes greater than the average of 10,000 gallons per day during a month, or 1 million gallons per month for non-tidal waters (60,000 gpm for tidal waters) for irrigation are required to be reported through the Water Withdrawal Reporting Regulation (VDEQ 2020). The VDWR recently updated its recommendations for design and operation of stream intakes (https://dwr.virginia.gov/wp-content/uploads/media/Surface-Water-Intake-Design-Operation-Standards.pdf), with the following requirements: intake is fitted with a screen with openings no larger than 1 mm, the intake velocity does not exceed 0.25 feet per second, and the intake does not withdraw more than 10% of the instantaneous flow. However, because of the permitting thresholds, the withdrawal of surface water for most agricultural purposes is exempt from permitting requirements, but have the potential to directly impact American Shad through impingement and entrainment.

Recommended Action: Develop a better understanding of the amount of water intakes for agriculture, particularly in tidal streams and rivers that support American Shad spawning and nursery grounds. Further, the effects (e.g., temperature and chemical differences) of discharge in non-consumptive water withdrawals on American Shad (particularly on early life history stages) is unknown.

Agency or Agencies with Regulatory Authority: VDEQ regulates water withdrawals and discharges. The VDEQ reports annually (October) to the VA Governor and General Assembly on the status of Water Resources in the Commonwealth. In-stream work is permitted by VMRC. VDEQ regulates water withdrawals, although water intakes for agricultural use (i.e., irrigation) are exempt (see 9VAC25-210-310; https://www.deq.virginia.gov/permits-regulations/permits/water/water-withdrawal).

Surface water withdrawal permits are applied for through the VDEQ, with input from VMRC and the U.S. Army Corps of Engineers (USACE) with VDEQ determining the potential impact on aquatic life, water quality, recreation, and downstream impacts.

Goal: Although by law the withdrawal of surface water for agricultural purposes is unregulated, (i.e., exempt from permit requirements), these withdrawals, given their position within the watersheds, are undoubtedly a potential source of loss of early life history stages through impingement and entrainment. Data on the prevalence of agricultural intakes within specific river systems would allow for estimation of potential losses of larval American Shad. This is a recognized concern by the VDEQ (2020). VDEQ has "tentatively been approved for federal funding from the USGS Water Use Data Research Program to support a project to improve estimates of agricultural water use." This and other VDEQ studies, including habitat and water quality and ecological modeling, are steps to fill these information gaps.

Progress: Nothing yet to report.

Cost: N/A

Timeline: N/A

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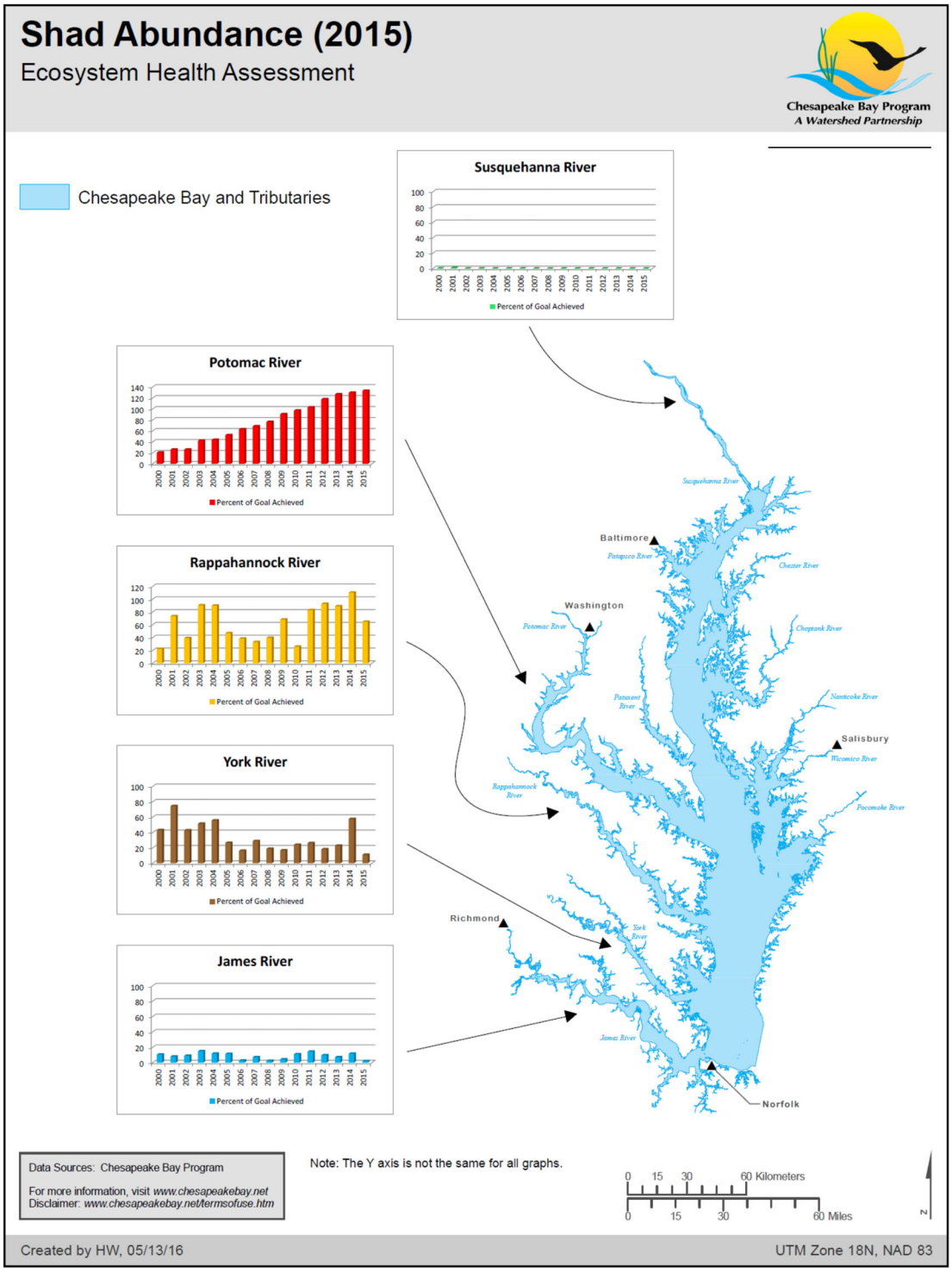


Figure 1. Shad distribution and abundance in the Chesapeake Bay. (Source: Chesapeake Bay Program)

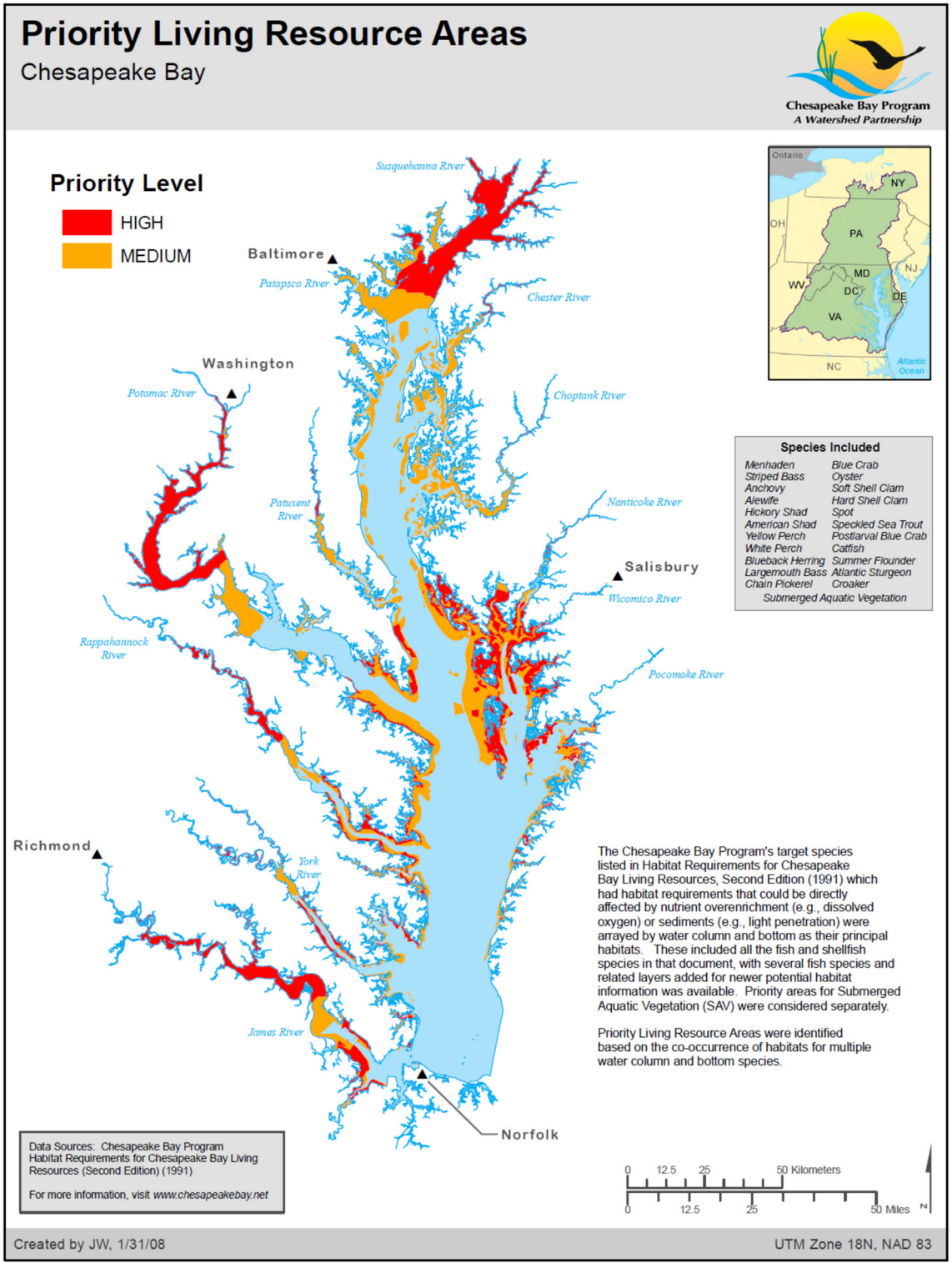


Figure 2. Priority living resource areas of the Chesapeake Bay watershed. (Source: Chesapeake Bay Program)

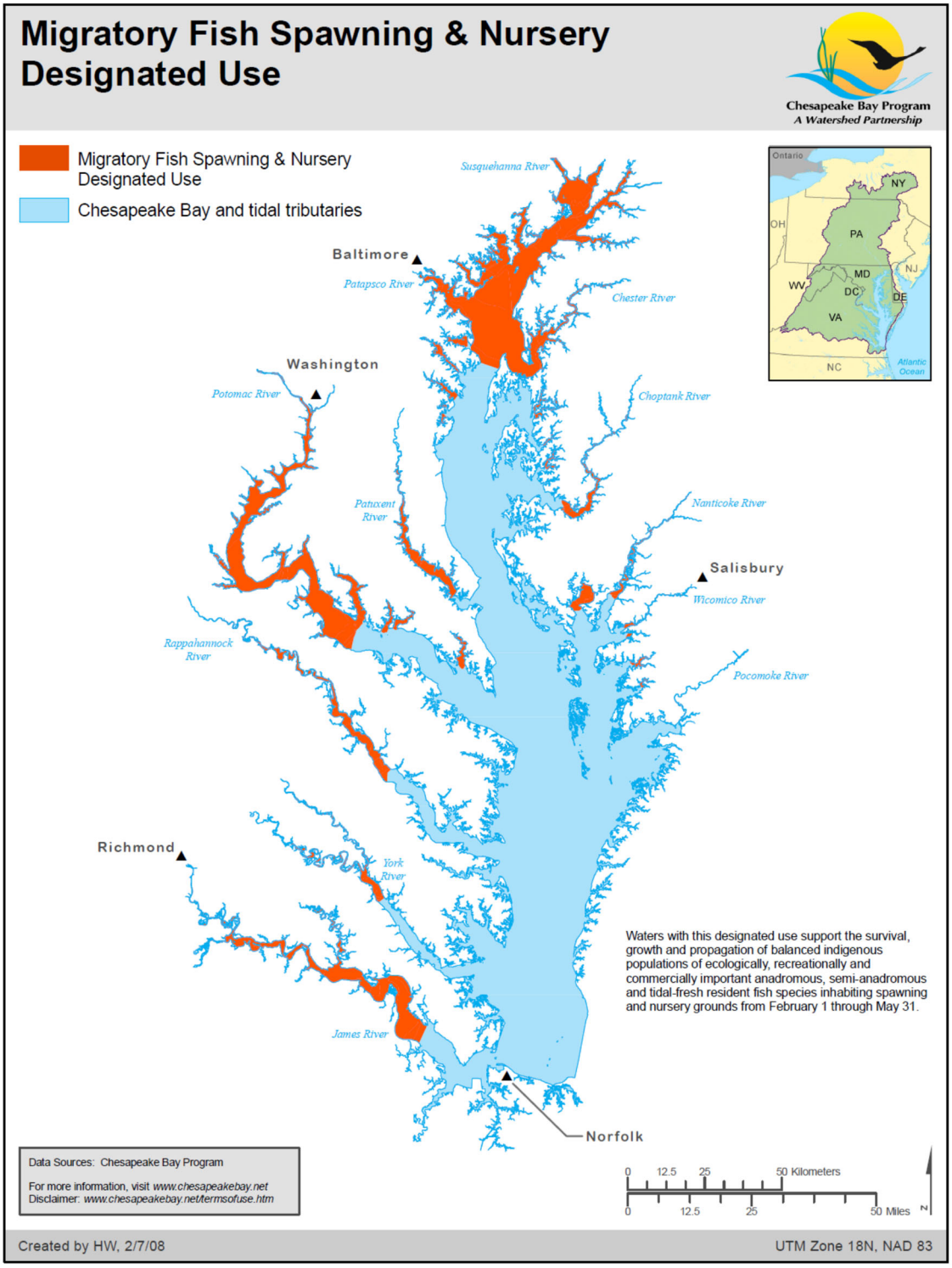


Figure 3. Migratory fish use of the Chesapeake Bay watershed (Source: Chesapeake Bay Program)

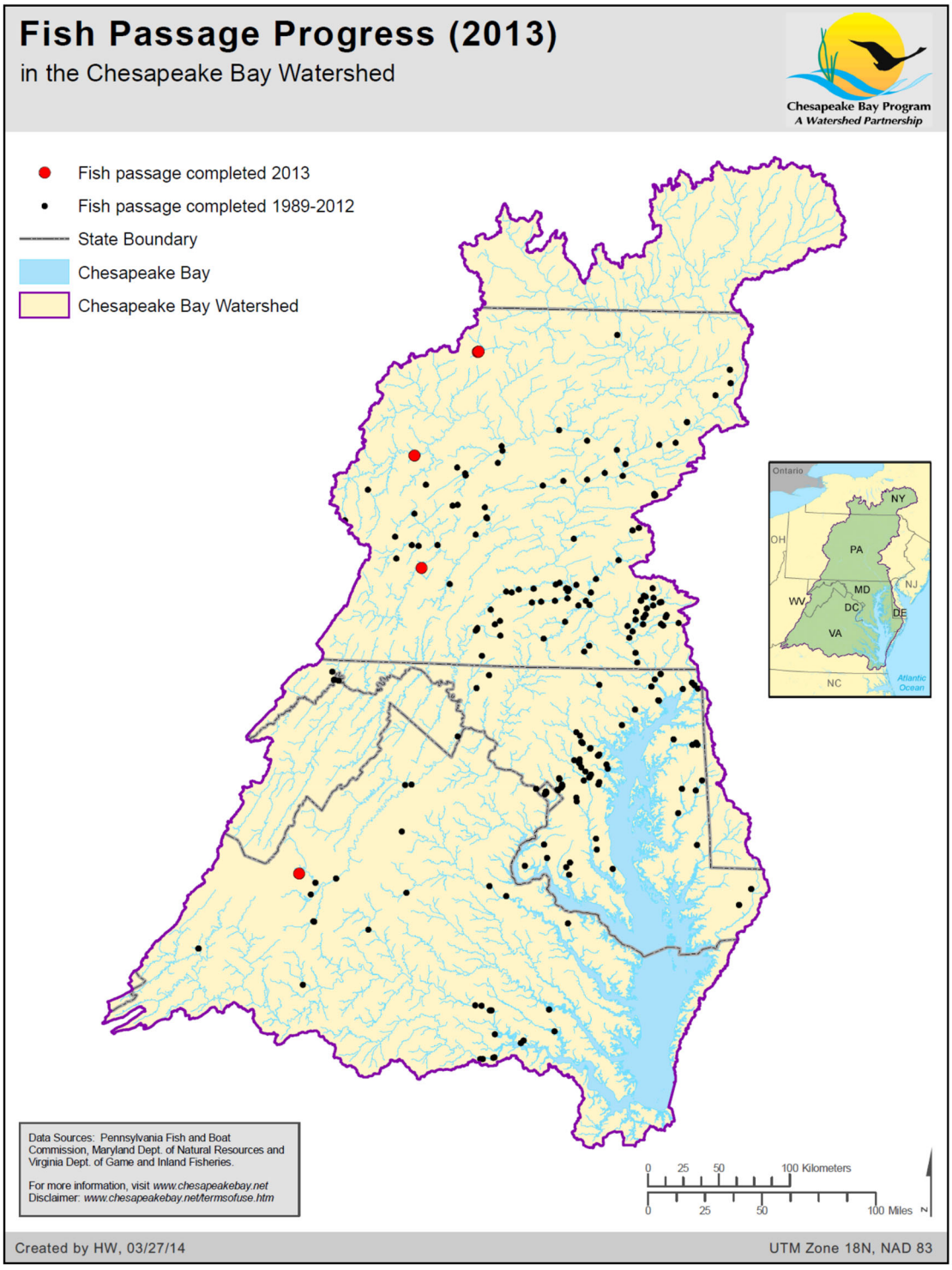


Figure 4. Fish passage projects in the Chesapeake Bay watershed. (Source: Chesapeake Bay Program)

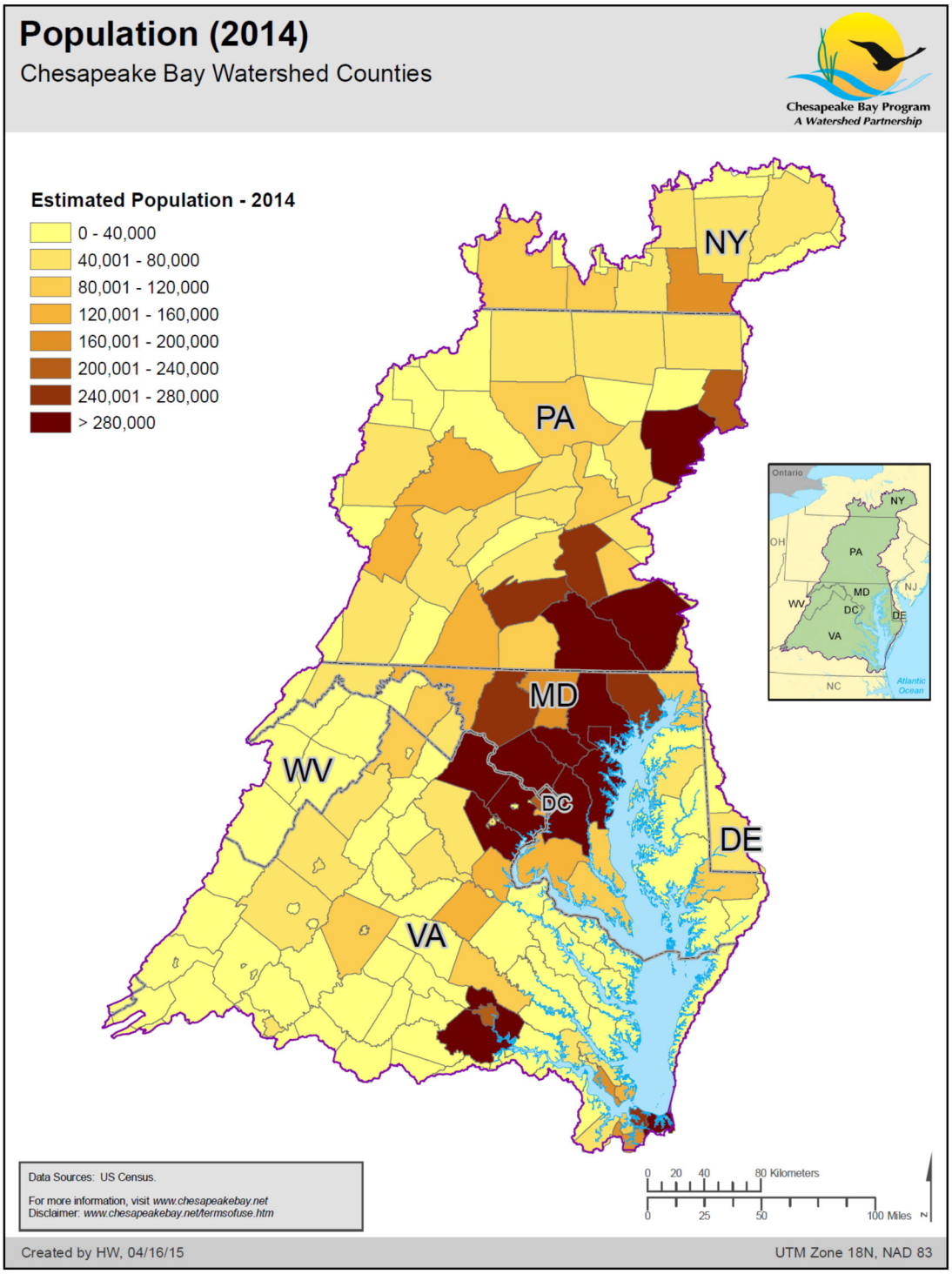


Figure 5. Population levels of the Chesapeake Bay region. (Source: Chesapeake Bay Program)

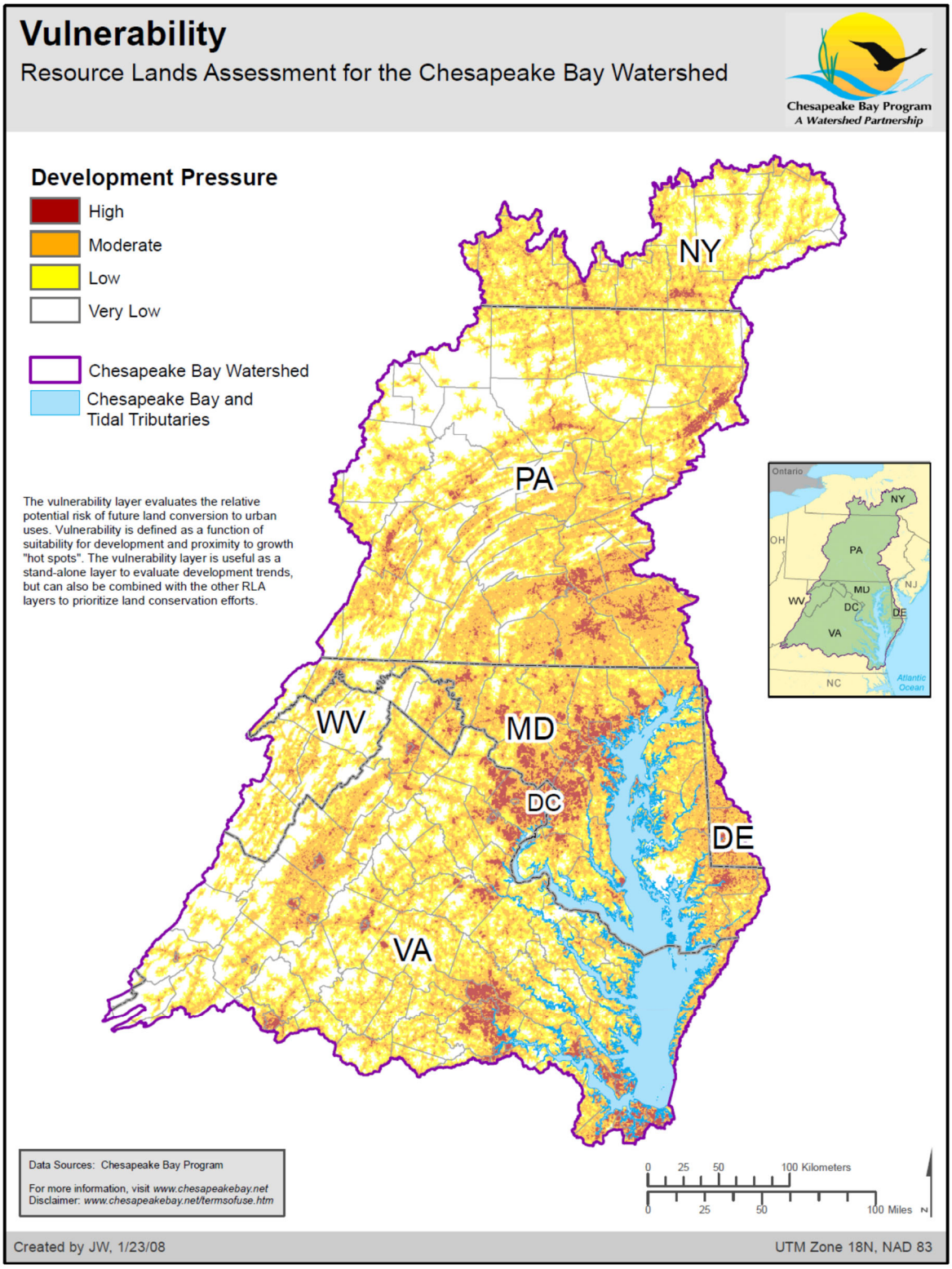


Figure 6. Potential for lands to become urban, representing significant land use changes and impacts. (Source: Chesapeake Bay Program)

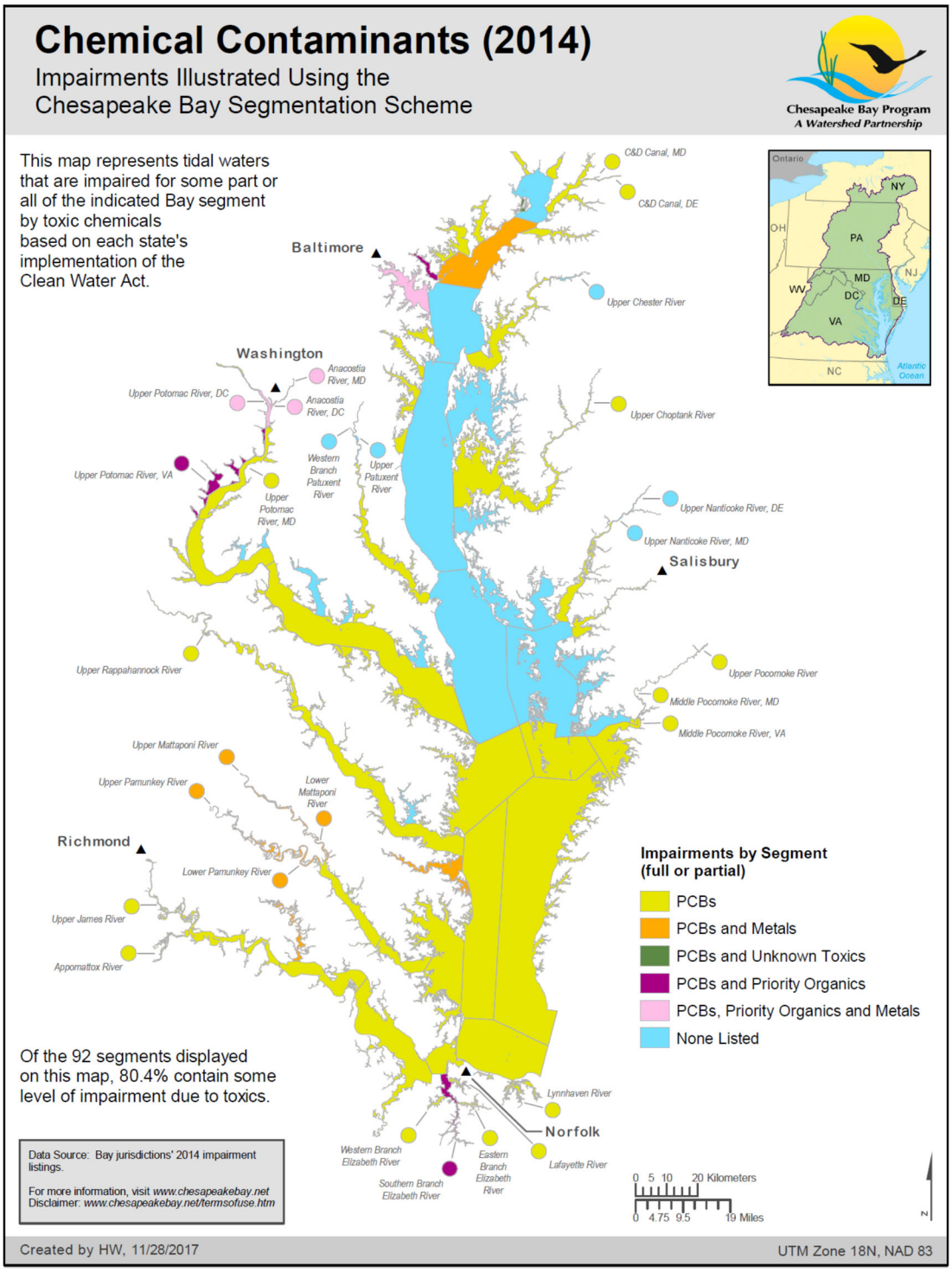


Figure 7. Chemical contaminants in the Chesapeake Bay watershed. (Source: Chesapeake Bay Program)

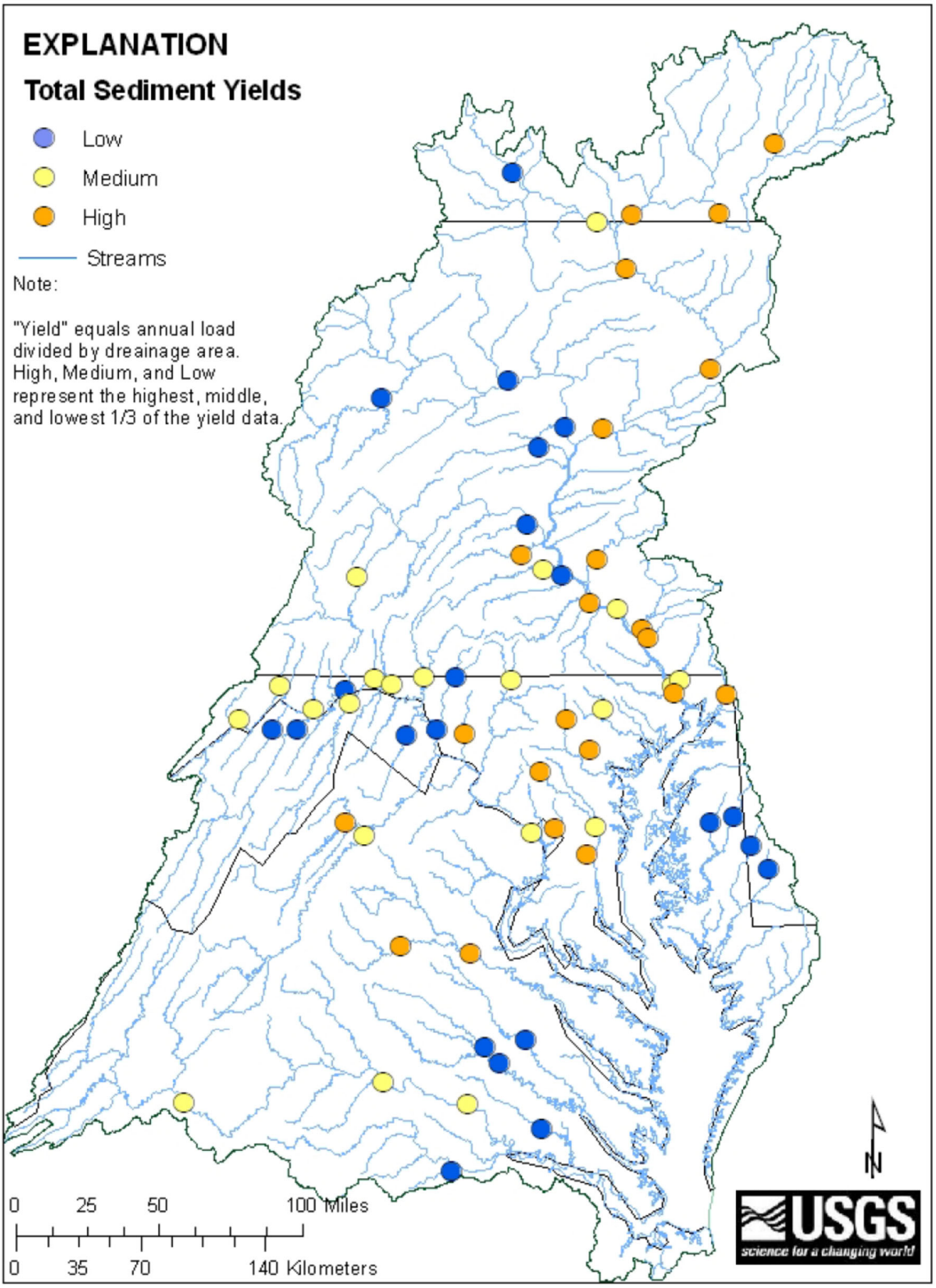


Figure 8. Sedimentation yields in the Chesapeake Bay watershed. (Source: Chesapeake Bay Program)

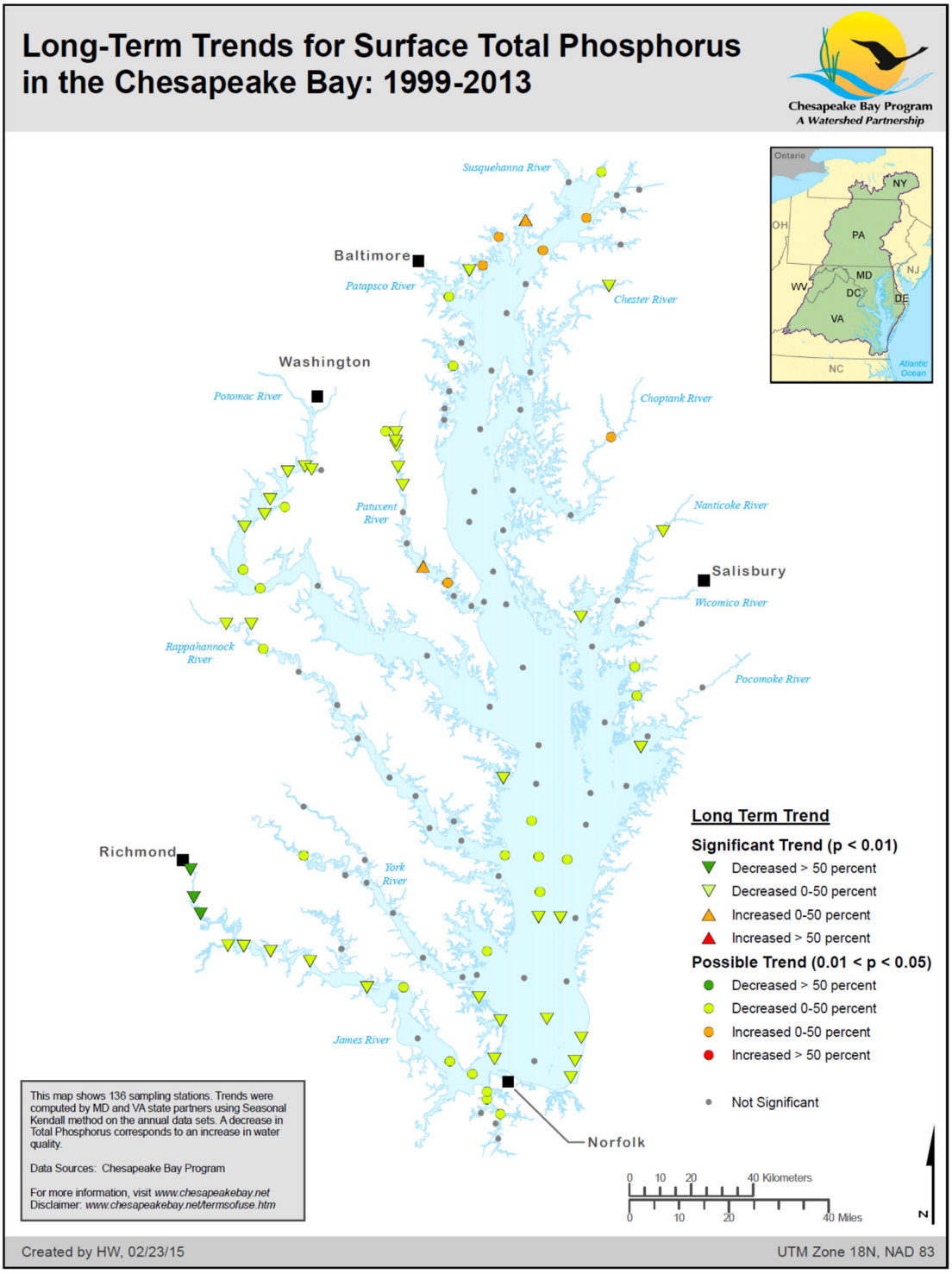


Figure 9. Total phosphorus yields in the Chesapeake Bay watershed. (Source: Chesapeake Bay Program)

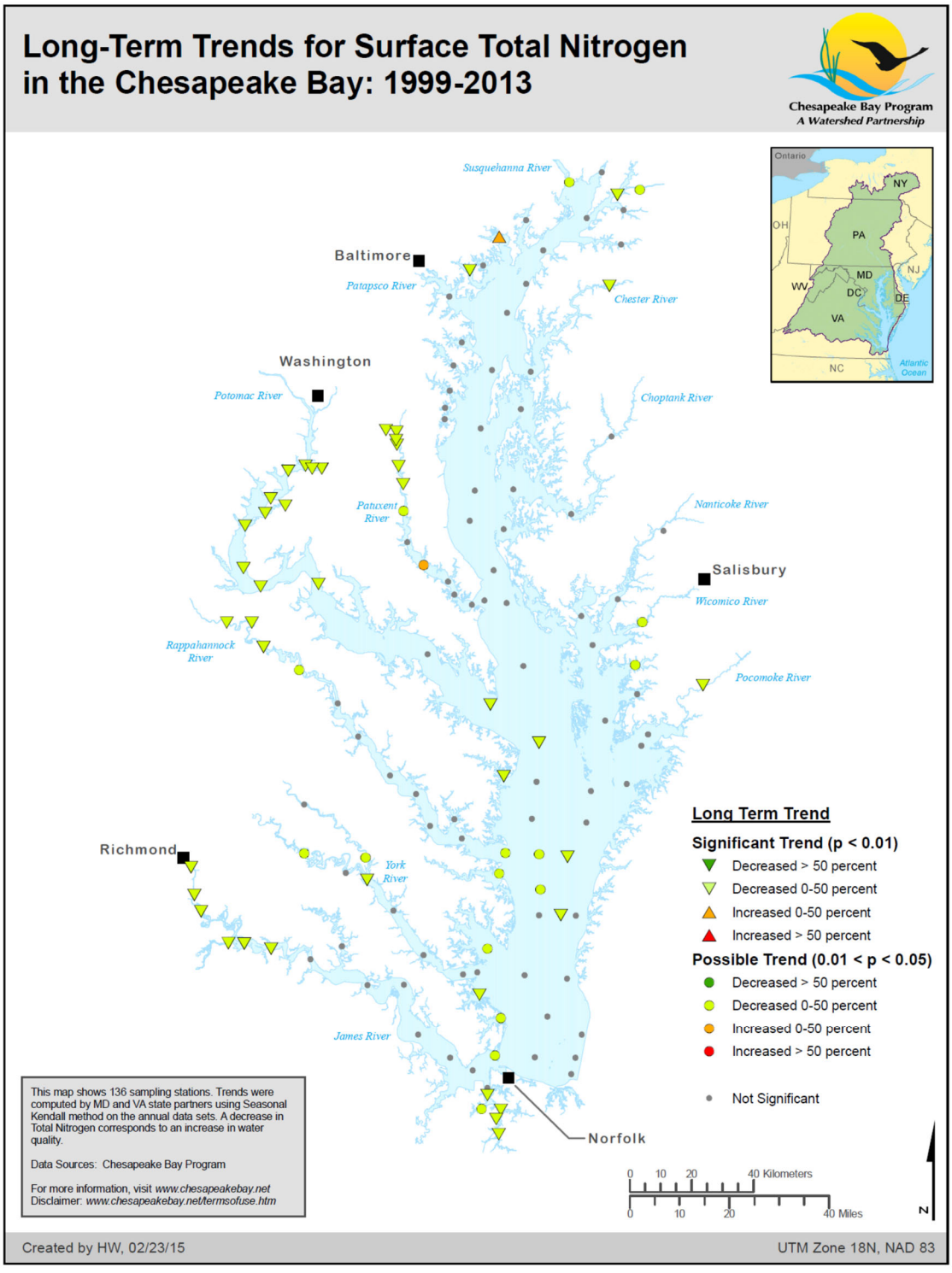


Figure 10. Total nitrogen yields in the Chesapeake Bay watershed (Source: Chesapeake Bay Program)

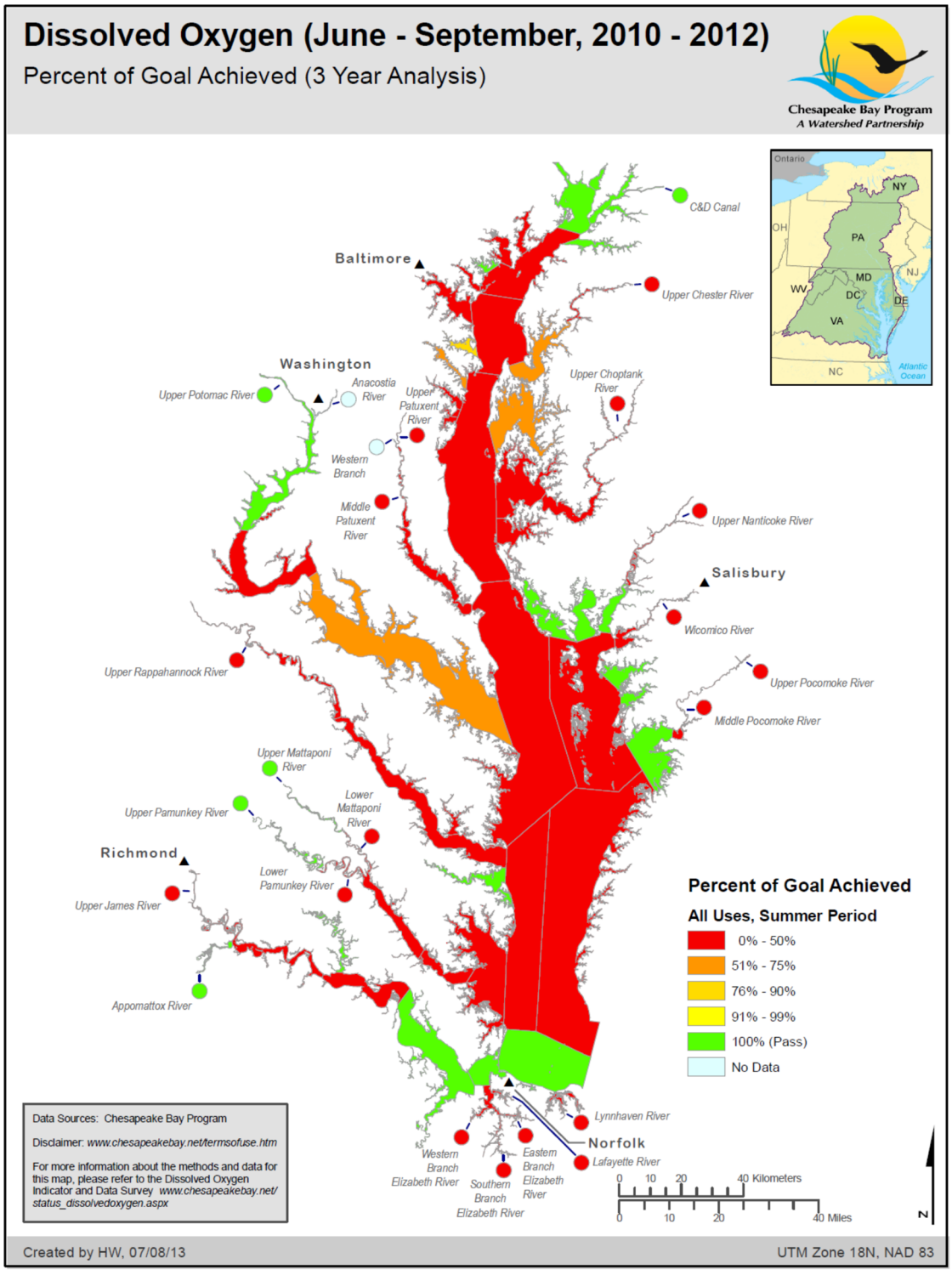


Figure 11. Dissolved oxygen in the Chesapeake Bay watershed. (Source: Chesapeake Bay Program)

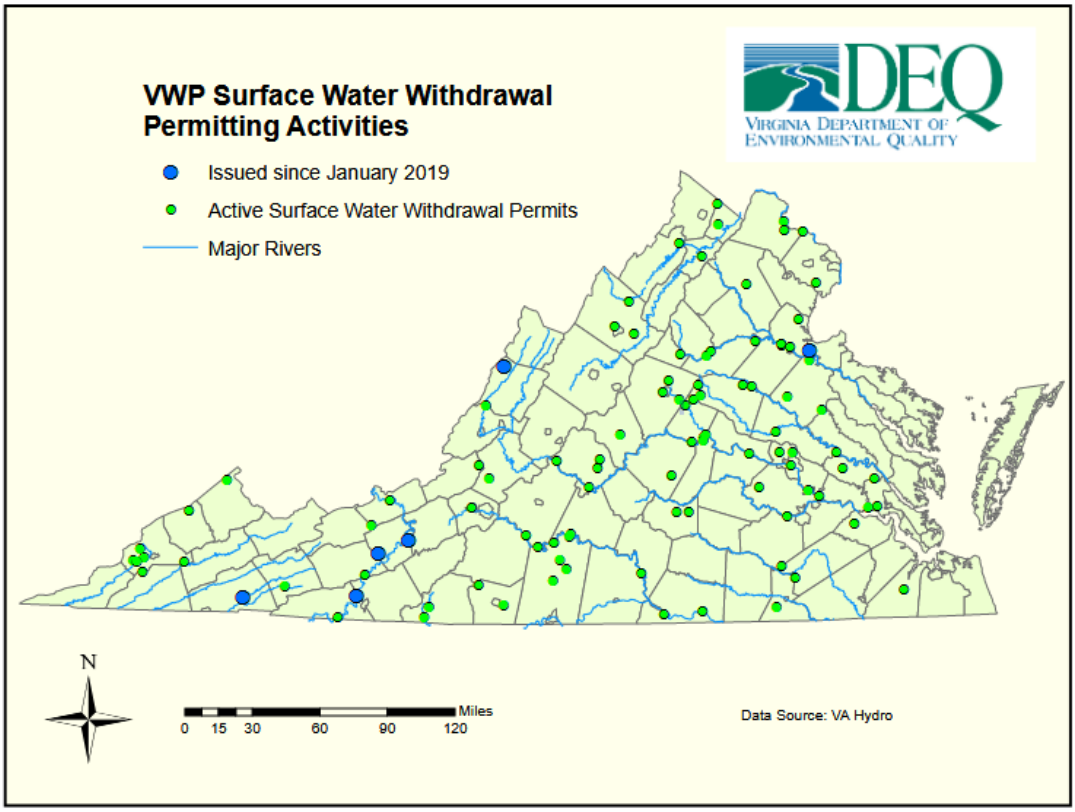


Figure 12. Surface water withdrawal permitting activities. Source: VDEQ (2020: fig. 4).

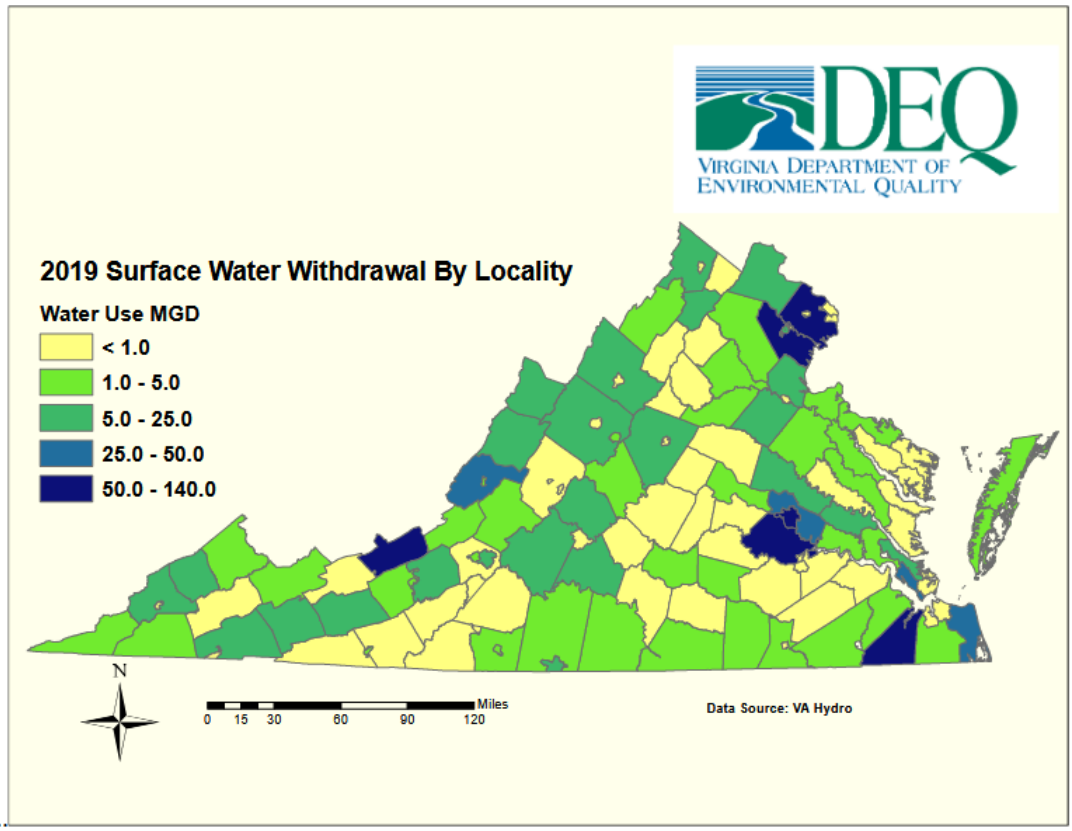


Figure 13. Surface water withdrawals. Source: VDEQ (2020: fig. 8).

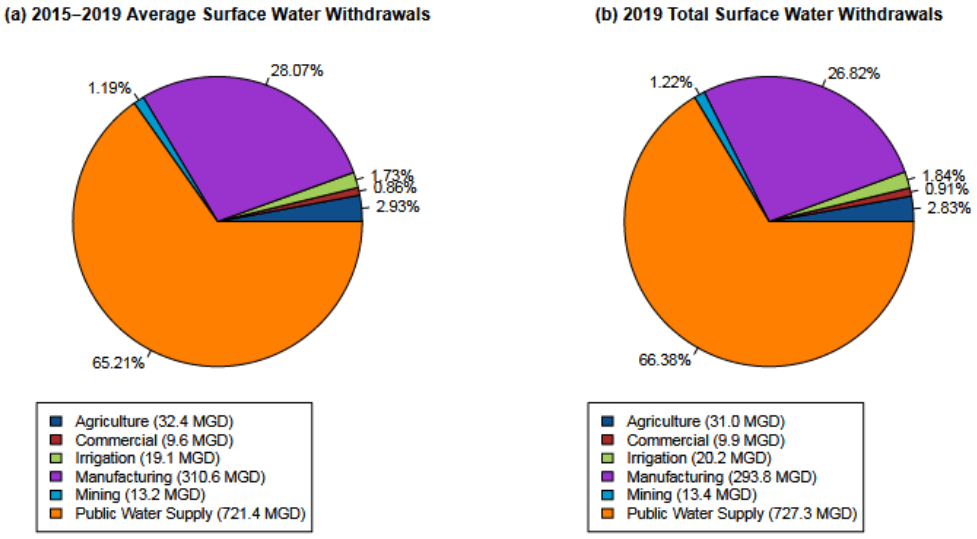
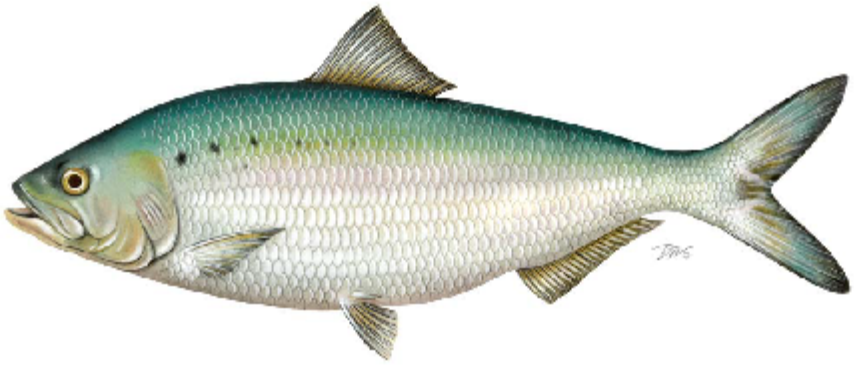


Figure 14. Surface water withdrawals by type. Source: VDEQ (2020: fig. 11).

DEPARTMENT OF ENERGY & ENVIRONMENT

GOVERNMENT OF THE DISTRICT OF COLUMBIA

District of Columbia's American Shad Habitat Plan



Submitted to

Atlantic States Marine Fisheries Commission

Prepared by

Joseph Swann

District Department of Energy and Environment

June 16, 2021

District of Columbia's American Shad Habitat Plan

District Department of Energy and Environment

This habitat plan is being submitted by the District Department of Energy and Environment and covers the portions of the Potomac and Anacostia Rivers which fall within the borders of the District of Columbia. Historically adult and juvenile American shad populations have been present through all portions of the Potomac and Anacostia rivers within the borders of the District of Columbia. This plan will show what habitat is available for spawning and juvenile American shad within the District of Columbia.

Habitat Assessment

Potomac River

A) Spawning Habitat
   Historical and current accessible in river and estuarine spawning habitat extends roughly 18.8 km and covers 1,388 hectares. This habitat represents the entire portion of the Potomac River as it flows though the District of Columbia.
B) Rearing Habitat
   Historic and currently utilized in river and estuarine rearing habitat extends roughly 18.8 km and covers 1,388 hectares. This habitat represents the entire portion of the Potomac River as it flows though the District of Columbia.

Anacostia River

A) Spawning Habitat
   Historical and current in river and estuarine spawning habitat stretches roughly 11 km and covers 378 hectares. This habitat represents the entire portion of the Anacostia River as it flows though the District of Columbia.
B) Rearing Habitat
   Historical and currently utilized rearing habitat stretches roughly 11 km and covers 378 hectares. This habitat represents the entire portion of the Anacostia River as it flows through the District of Columbia.

Threats Assessment

Barriers to Migration

A) Inventory of Dams
   There are no dams on the main stem of the Potomac or Anacostia rivers within the District of Columbia. The only dam of note is the dam at Peirce Mill on Rock Creek, a tributary of the Potomac River. This dam is managed by the National Park Service and serves as a historic and

aesthetic site for the park service. The dam is located 11 km upstream from the mouth of Rock Creek. Although the dam presents a barrier to migration for river herring, there is no evidence that American shad have ever reached the base of the dam. A Denil fish ladder has been constructed to allow passage of fish around the dam. Data is currently not available as to the effectiveness of the ladder for herring. Additional Information regarding the dam at Peirce Mill can be found at www.nps.gov/pimi/index.htm.

B) Inventory of other human induced physical structures
No data available

C) Inventory of altered water quality/quantity
No data available

Water withdrawals

A) Inventory of water withdrawals
No data available

B) Assessment of water withdrawals
No data available

Toxic and Thermal discharge

A) There is one known thermal discharge located within the District of Columbia: Blue Plains Sewage Treatment Facility. This facility is managed by DC Water located at:
5000 Overlook Ave SW
Washington, DC 20032
Current actions:
The Department of Energy and Environment has no evidence that the discharge has any detrimental effects on the migration and utilization of spawning habitat for American Shad. A complete overview of the operations and regulatory oversight of this facility is available at www.dcwater.com

B) Additional discharges within the District of Columbia include combined sewer overflows. This is a system in which high rain events cause storm water runoff to mix with sanitary sewers, and excess loads are discharged into the Potomac and Anacostia rivers as well as Rock Creek. This system of sewer lines are also managed by DC Water located at:
5000 Overlook Ave SW
Washington, DC 20032
Current actions:
The Department of Energy and Environment, Fisheries Research Branch has no regulatory authority regarding these discharges. DC Water has detailed records and reports with oversight from the U. S. Environmental Protection Agency. Currently there are multiple projects in place to help update the city's sewage treatment facilities, ultimately reducing the number of discharges into the rivers and Rock Creek. A complete list of these projects as well as their progress can be found at www.dcwater.com.

Channelization and Dredging

A) There is no known channelization or dredging projects located within the District of Columbia at this time.

Land use

A) Inventory of land use
The District of Columbia is a highly urbanized area, there have been no significant changes to land use.

Atmospheric Deposition

A) Atmospheric deposition assessment
No data available

Climate Change

A) Climate change assessment
No data available

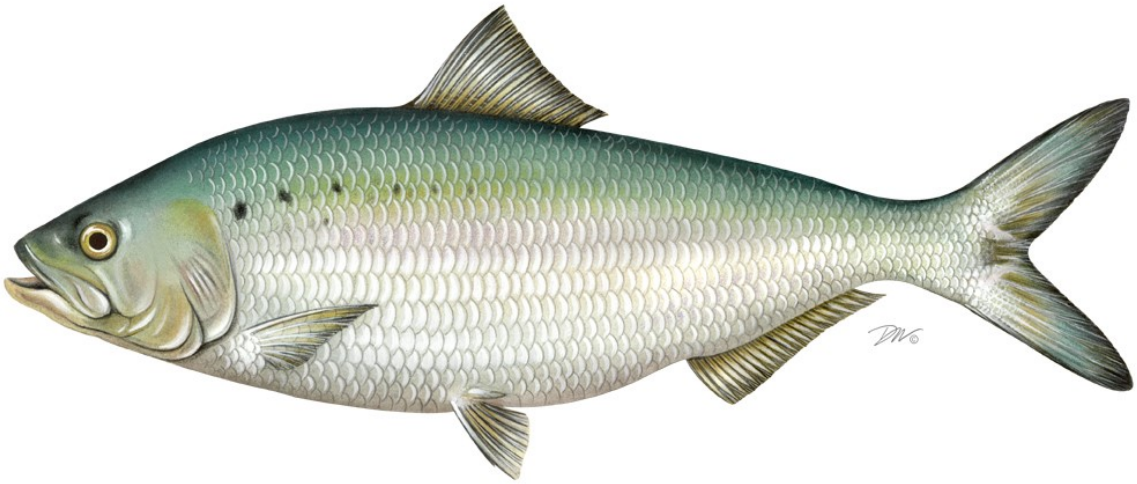
Competition and Predation by Invasive and Managed Species

A) Invasive species assessment
The Department of Energy and Environment has been monitoring the population trends of three invasive species within the District of Columbia. These species include the blue catfish, flathead catfish, and Northern snakehead.
Current Actions:
The Department of Energy and Environment has an ongoing study examining stomach contents of the invasive blue and flathead catfish. To date, more than 1000 blue and flathead catfish digestive tracts have been examined with no American shad observed. The opportunistic nature of these catfish still poses a potential impact to American shad populations within the District of Columbia.
Goals:
The District Department of the Environment has plans to continue this study to further understand the impacts that both the blue and flathead catfish has on the resident and anadromous species within the District of Columbia.
Timeline:
The catfish stomach analysis study will continue until enough data has been gathered to determine the effects of these invasive species on the native and managed species of the District.

New York American Shad Habitat Plan

New York State Department of Environmental Conservation

Division of Marine Resources



June 2021

Acknowledgements

We wish to thank the following individuals for providing their expertise to the development of this plan: Kathy Hattala, Robert Adams, Brian DeGasperis, Sarah Fernald, Rich Pendleton, Dan Stich, Libby Zemaitis, Dan Miller, Heather Gierloff, Liz LoGiudice, Scott Cuppett, Megan Lung and Tom Niekrewicz.

Introduction:

Amendment 3 to the Atlantic States Marine Fisheries Commission (ASMFC) Interstate Fishery Management Plan required all states and jurisdictions to develop an Implementation Plan, which consists of two components: 1) a Sustainable Fishery Plan (for jurisdictions wishing to keep fisheries open) and 2) a Habitat Plan for American Shad *(Alosa sapidissima*). The requirement for a Habitat Plan was in recognition of the fact that much of the decline in American shad stocks along the Atlantic coast is related to degradation of spawning and juvenile habitat from anthropogenic impacts caused by barriers to migration; water withdrawals; toxic and thermal wastewater discharge; channelization, dredging and instream construction; inappropriate land uses; atmospheric deposition; climate change; competition and predation by invasive and managed species; fisheries activities; and instream flow regulation. Restoration, protection, and enhancement of American shad habitat is a key component of rebuilding populations of this species to levels that will support their ecological, economic, and cultural roles.

The purpose of the Habitat Plan is to provide detailed recommendations to reduce or mitigate the impact of the following threats on American shad habitats in the Hudson River: dams and other obstructions to migration, water quality and contamination. Additional detailed recommendations are provided for habitat protection and restoration; state permitting programs; and American shad stock restoration and management. While Amendment 3 proposes the development of habitat restoration and protection programs, implementation of these programs is not required. This document serves as New York's American Shad Habitat Plan and as detailed below, draws heavily upon existing documents and efforts.

New York's American Shad habitat is limited to the Delaware and Hudson River and its tributaries (Figure 1). This document focuses on a habitat assessment of New York's American Shad habitat in the Hudson River and its tributaries. The Delaware portion of New York's habitat plan is addressed in the Delaware River American Shad Habitat Plan (Delaware River Fish and Wildlife Management Cooperative, 2020).

Hudson River Habitat Assessment (Spawning and Nursery Habitat):

The Hudson River flows from Lake Tear of the Clouds in the Adirondacks to the Battery in New York City. It is tidal to the Federal Dam in Troy, 246 km from the Battery (Figure 1). The location of the salt front varies, depending on freshwater inputs from Hudson River tributaries and tidal flow, and generally fluctuates from Tappan Zee (km 45) to Newburgh (km 95). The river includes two major estuarine bays: Haverstraw Bay (km 55) and Tappan Zee Bay (km 45). These bays are mainly shallow water less than four meters deep where the river extends up to five and a half kilometers from shore to shore. The river also includes a narrow and deep section, the Hudson Highlands, where the river is less than one kilometer wide and over 60 meters deep (Stanne et al. 2007).

American shad predominantly spawn in the sandy, gravelly shoals and shallow water areas in the main stem of the upper half of the Hudson River Estuary, from Kingston (km 144) to Troy (km 246). The nursery area includes this area and extends south to Newburgh Bay (km 90), encompassing the freshwater portion of the Estuary (Figure 1) (Hattala and Kahnle 2007). American Shad also use some of the larger tributaries of the Hudson River for spawning, although a detailed assessment of all tributaries has not been completed. The tributaries that provide the most significant contribution of American Shad habitat include the Rondout and Stockport Creeks and the upper Hudson. The first barrier on Claverack Creek which is a tributary of Stockport Creek may block a small amount of habitat for shad, but it is not known for sure (Figures 2-4).

The historical upstream limit for anadromous fish in the Hudson River was the natural falls at Fort Edward/Hudson Falls, NY (Zeisel 1988). Natural falls at the confluence of the Mohawk River and the Hudson prevented fish from moving into the Mohawk System. With the rise in commercial shipping at the beginning of the 19th century, there was a desire to connect the ocean-going ships to Midwestern states. The Erie Canal was completed in 1825, linking the Hudson River near Waterford, NY (roughly 5km north of Troy, NY) to the Great Lakes through a series of locks mostly within the Mohawk River system. Today the Erie Canal consists of 34 locks from Waterford to the Niagara River. In addition, six hydropower facilities are now in operation along the Mohawk corridor. During the same period as the Erie Canal construction, there was a push to move timber and other commodities from Canada and northeastern states to New York and then on to Midwestern states. The Champlain Canal was finished in 1823 linking the Hudson River to Lake Champlain, through a man-made canal from Waterford to Fort Edward. The canal was later moved to the upper Hudson River around the 1900's. The canal now runs in mainstem upper Hudson River from Waterford, NY to Fort Edward, NY with the remainder running in a man-made structure to Lake Champlain (Figure 4). The current Champlain Canal consists of eleven locks (including 7 dams) operated from Waterford, NY to Whitehall, NY (Lake Champlain).

Downstream of the Erie and Champlain Canals, a 3-m-high dam was constructed in 1826 at Troy, NY, roughly 56 kilometers from the traditional head of tide at Fort Edward. This dam was made of log cribwork and filled with stone; likely impassable for shad at all but the highest spring floods (Stevenson 1899). In 1915, the US Army Corps of Engineers replaced the old dam with a new concrete structure, which included a lock. In 1921, a hydropower unit was fitted to the dam. Undoubtedly, American shad spawning and nursery habitat was lost after the construction of the Federal Dam at Troy. However, any passage or improved passage of fish above this dam would provide just under nine additional kilometers or 3.5% of habitat before the next lock and dam system on the Champlain Canal (C1) north of Waterford, NY. Movement above the Federal Dam would expose adults and YOY to mortalities associated with both upstream and downstream passage at the hydropower facility, a cost that may outweigh the benefits of a minimal increase in habitat. Furthermore, the huge commercial landings reported in the late 1800s as well as the 1930s and 1940s indicate that spawning and nursery habitats in the 245 river kilometers below the Federal Dam are enough to support large populations of American shad.

Historically shad had access to 65.5 km^2 habitat prior to barriers to migration. Most habitat loss was due to the construction of barriers at the Federal Dam in Troy, NY, and the Champlain Canal (Figure 1). In addition, approximately 9 km of habitat was lost through the construction of barriers on key Hudson River tributaries (Figures 2-4). Currently, American Shad can access approximately 59 km^2 in the mainstem of the Hudson River, a 9% loss from the historic available habitat (Stich et al. 2021, in prep).

Perhaps the greater loss of habitat in the Hudson River Estuary was not due to barriers to migration, but rather conversion of habitat during the dredging and channelization of the upper portion of the estuary. A quantitative assessment of preferred habitat now converted to habitats not preferred by shad has not been conducted. However, as an example, approximately 57% of the intertidal shallow water habitat (1,821 hectares) found north of the City of Hudson (km 190) was lost during the middle of the 19th century due to dredge and fill operations (Miller, 2006).

Hudson River Threats Assessment:

1.Barriers to Migration inventory and assessment:
Tributaries once flowed freely, with unobstructed hydraulics, from the upland valley to the wide estuary. Barriers to migration have changed the hydrology and water quality of the tributaries as well as the mainstem of the Hudson River estuary. During an informal assessment of barriers, it was noted there are 10 dams known or suspected to have an impact on American Shad migration (Table 1). Table 1 includes information about each dam such as height, length, year constructed and location. The associated dams are spread throughout the freshwater portion of the river and include the dam on the mainstem at the head of tide (Federal Dam in Troy, NY) and the dams on the Champlain Canal. Dams on this list will be updated by DEC and partners as needed to reflect any changes in prioritization.

A coastwide assessment on the impacts of dams on the availability of spawning habitat and spawner potential was included in the most recent stock assessment (ASMFC 2020). The installation of dams coastwide, particularly in the northern range, resulted in significant habitat loss. Recent modelling efforts (Stich et al. 2019; Stich et al. 2020) to evaluate the impacts of those dams further demonstrates that dams have significantly reduced shad spawner potential. Removing dams, while sometimes impractical, would restore much of the lost habitat and spawner potential. However, because of the mortality associated with upstream and downstream movement through fish passage devices, the installation of fish passage at these sites would only represent minimal gains for shad stocks.

Fortunately, dams have a relatively small impact on American shad in the Hudson River. While shad are prevented from reaching nearly 40% of their historic habitat coastwide, the Hudson stock has lost access to just 9% of historic habitat (ASMFC, 2020). There are a few dams, if removed, that would undoubtedly benefit shad in the Hudson River (notably, the Federal Dam on the main stem Hudson in Troy, NY and the first barrier on the Rondout Creek in Eddyville, NY), but the lack of access to historic habitat did not cause the stock collapse. Furthermore, Stich et al. 2021 (manuscript in prep) suggests that most passage scenarios, with the exception of 95-100% upstream and downstream adult and juvenile survival, would result in populations lower than scenarios where no passage was allowed, indicating that the amount of available habitat is likely not limiting recovery. While we do not feel access to historical habitat is limiting recovery, we believe that improvements to habitat quality such as water quality, restoration of side channels, tidal wetlands, and submerged aquatic vegetation will result in improved recruitment of juvenile shad, a crucial component needed for stock recovery.

The Troy Dam's owner (Green Island Hydropower) has been required to install fish passage as part of the FERC re-licensing process. It is not yet known what the upstream and downstream mortality will be resulting from the operation of this passage structure. Stich et al. 2021 (manuscript in prep) notes it is unknown to what degree this access is beneficial or detrimental to American shad given the

uncertainty around the mortality rates for adult and juvenile fish moving above the dam and back over the dam. The different model scenarios explain only the highest rates of adult and juvenile downstream survival or low rates of upstream fish passage maintained or increased the population.

2.Water withdrawals:

American shad, and other fish, are negatively impacted by water withdrawals on the Hudson River. Shad are killed both on the impingement screens of these sites and from entrainment in the cooling water of steam electric plants. Steam electric plants alone are permitted to use nearly 5 billion gallons of Hudson River water per day. A river-wide ichthyoplankton survey occurred annually in the Hudson River Estuary through 2016, conducted by consultants under contract with the Hudson River Generating companies. To better define impacts of the once-through cooling systems on fish, estimates of mortality on various ichthyoplankton life stages were calculated using two models, the Empirical Transport Model and the CEMR (Conditional Entrainment Mortality Rate) model. Detailed methodology for both models can be found in CHG&E et al. (1999). Estimates of mortality are expressed as conditional entrainment mortality rates, or the percent reduction in a year-class which would be due to mortality from entrainment through once- through cooling water systems if no other causes of mortality operated. Loss estimates for the Hudson River Estuary include one major office complex air conditioning unit, two nuclear, one waste-fuel, and five fossil-fuel power plants located throughout the Hudson Valley above New York City. CEMR at these facilities combined has ranged from 16% to as high as 52% during the period 1974 to 1997 (CHG&E et al. 1999). An estimated average of 20% was assumed for the period 1952 to 1973 when major power plant once-through cooling systems came online (CHG&E et al. 1999).

3.Anthropogenic Habitat Changes

a. **Dredging/Channelization:** Historic shad habitat was also affected by the continued use and improvement of the commercial navigation channel between New York City and Albany. Through the middle of the 19th century, the northern third of the estuary below the Federal Dam at Troy, NY was a braided river-channel system dominated by vegetated shallows and intertidal wetlands. Side channels and backwaters in this section provided important shallow water and intertidal habitats (potentially vegetated nursery habitat) that were isolated from the higher energy regime of the main channel. Complex river systems with intertidal marshes and braided river channels, including side channels and backwaters, contain refuges for fishes during high velocity events. These habitats were largely altered by the early twentieth century due to the dredge and fill activities associated with improvement and maintenance of the federal navigation channel allowing larger, ocean vessels to reach Albany. Miller et al. (2006) approximates 57% of the intertidal shallow water habitat (1,821 hectares) found north of the City of Hudson (km 190) was lost during the middle of the 19th century. The Hudson River Estuary Habitat Restoration Plan (Miller 2013) identifies four priority habitats for restoration: shorelines, tributaries, intertidal and shallow water habitats which include spawning, nursery, forage, and refuge areas. Restoration of these habitats will involve tradeoffs between lost habitats and those habitats that currently occupy the river. Any restoration will need to consider these tradeoffs as well as property ownership.

   b. Land Use: Shad habitat was also altered by the building of infrastructure along the shore of the Hudson River. An alteration not well researched or understood is the potential barriers posed by the railroad causeways built along both the east and west sides of the Hudson River,

cutting off shallow bays, often containing tributary mouths. The causeways have transformed the once contiguous open bays to the Hudson River mainstem by restricting the interaction between the shallow bays and river. While these connections still exist, they are much different today than they were historically. Exchange between shallow bays and the main stem of the Hudson is restricted by bridge and culvert openings under the tracks. The impacts of this funneling effect on water quality, and access from the Hudson into tidal bays and tributary mouths, are not well understood. These structures have also created back waters and highly functioning marshes that are habitat for fishes and other important wildlife species, but there are some areas that could be targeted for restoration for habitat improvement. The railroad tracks support a major commuter and freight railroad and planned restoration will need to be coordinated with and approved by the owners of the structures.

4.Climate Change: Climate change is affecting the Hudson River Estuary on a local level. Sea level is rising, water and air temperatures are increasing, extreme precipitation is occurring more frequently, punctuated by interim periods of drought.

The flooding associated with intense storms like named tropical storms Irene and Lee in 2011 can carry huge volumes of sediment into the Hudson, where it hinders the growth of submerged aquatic vegetation (Hamberg et al. 2017). These storms, in 2011, reduced submerged aquatic vegetation (SAV) abundance in the Hudson River by more than 90% with no appreciable recovery in 2012 or 2013 (Hamberg et al. 2017). Submerged aquatic vegetation is an important habitat for the development of young shad (Ross et al. 1997). If the frequency of SAV damaging storms increases in future years, there will likely be negative impacts on the recruitment of American shad. The historic northern one-third habitat of the Hudson River Estuary was a braided river with shallow water back channels and side channels and with the changes made by dredging and channeling the river may be less resilient to flooding (see Dredging/Channelization above). The acute but shorter-term impacts from flooding that affect fish during the large storms such as Irene and Lee may be reduced. For example, a sonic tagged, and otherwise resident, cohort of striped bass exhibited a novel migration pattern after the storms and left the estuary for the ocean (Bailey and Secor 2016).

In addition to the ecological changes we expect from climate change, the human responses to climate change impacts also threaten to negatively impact American shad. As sea levels rise and storms become more frequent, it would stand to reason that we will take increasingly more aggressive steps to prevent the flooding of cities and infrastructure. The suite of potential options that may be considered include shoreline structures, beach nourishment, levees, floodwalls, seawalls, and storm-surge barriers. A recent study by the Army Corps of Engineers (New York – New Jersey Harbor and Tributaries Study https://www.nan.usace.army.mil/Missions/Civil-Works/Projects-in-New-York/New-York-New-Jersey-Harbor-Tributaries-Focus-Area-Feasibility-Study/) sought to evaluate the impacts of a wide range of climate change mitigations, including a sea wall and storm-surge barrier system that stretched across the entire mouth of the Hudson River from Far Rockaway, NY to Long Branch, NJ. The impacts of such a major in-water infrastructure project to habitat that must be used by American shad is also a threat to their recovery. Important consideration must be given to Shad and their recovery to minimize or eliminate negative impacts of this and other in-water infrastructure projects.

Climate change is already having impacts on fishery resources. As average temperatures rise, mobile marine species are moving toward the poles and/or deeper water to stay cool. Shifts in the distributions and productivity of stocks can cause ecological and economic disruption. In the face of climatic shifts,

change is likely to be the only constant. Accordingly, managers will need to learn how to respond to and manage these changes. Managers will likely need to focus on sustaining ecological functions, rather than historical abundances. As conditions change, current conservation goals and management objectives may no longer be feasible. Successful climate adaptation will depend not only on adjusting management strategies, but also in reevaluating and revising, as necessary, the underlying conservation goals and objectives of fishery management plans (ASMFC 2018).

5.Invasive species:

The Hudson River estuary is vulnerable to the invasion of exotic species through a wide variety of means, typical of major estuaries, including: ballast water and shipping; release from aquaria; ponds and aquaculture; bait-bucket transfers by anglers, and fish stocking. In addition to these threats, the Hudson River is particularly susceptible to threats from aquatic invasive species because of the existence of the Erie and Champlain Canals. These canals were built in the early 1800s, breached the natural watershed divide of the Hudson River Estuary, and allowed for easy movement of aquatic invasive species from the Great Lakes, Lake Champlain, and any connected watershed. The canal system is the likely source of many non-native fish, bivalves, and snails in the Hudson River including the zebra mussel (*Dreissena polymorpha*) (Strayer 2016). There are many other invasive species poised to enter the Hudson River through the canal system including Round Goby (*Neogobius melanostomus*), Silver Carp (*Hypophthalmichthys molitrix*), Bighead Carp (*Hypophthalmichthys nobilis*) and a wide variety of invertebrates (Strayer 2016). The major disruption to the ecology of the Hudson River from these species, as seen first-hand with the invasion of the zebra mussel, will continue to threaten the recovery of American shad as long as invasive aquatic species can easily navigate through the Erie and Champlain Canals and other mechanisms of invasive species spread are not addressed.

The impacts of invasive species on the estuary, and its ecology, have already been significant. Five piscivores are native to the freshwater, tidal Hudson River (Daniels et al. 2011). Beginning in 1830 through present day, at least 10 additional piscivores have been introduced to the Hudson, including voracious predators such as black bass (*Micropterus salmoides* and *Micropterus dolomieu)* (introduced in 1830s), Northern pike (*Esox lucius*) (1840s), walleye (*Sander vitreus*) (1890s), and channel catfish (*Ictalurus punctatus*) (1976) (Daniels et al. 2005). The addition of these piscivores has likely impacted the recruitment of alosines; however, the magnitude and rate of predation by these species on juvenile and adult alosines in the Hudson River has yet to be fully explored.

The impacts of invasive animals have not been limited to fish. The introduction of zebra mussels in the Hudson in 1991, and their subsequent explosive growth in the river, quickly caused pervasive changes in the phytoplankton and plankton communities (Caraco et al. 1997), resulting in a dramatic increase in water clarity (up to 45%). These physical changes coincided with a decrease in growth rates and abundance of open-water species such as alewife and blueback herring (Strayer, et al. 2001).

Invasive plants, like Water chestnut *(Eleocharis dulcis),* have also had impacts on the habitats of the Hudson River that support developing American Shad. This ornamental macrophyte native to Eurasia was introduced to the Hudson River estuary in the 1930s (Strayer 2006). The establishment of these immense water chestnut mats each summer significantly reduces the amount of near-shore nursery habitat available to YOY alosines, cutting off areas that would likely have remained more productive

with native macrophyte beds. This plant outcompetes native macrophytes such as water celery, forming expansive, dense mats in most of the shallow water embayments in the tidal freshwater portions of the river. Sedimentation and turbidity within these mats are greatly increased and the dissolved oxygen levels within the mats is much lower than surrounding waters (Strayer 2006) (Schmidt and Kiviat 1988).

Hudson River Habitat Restoration Program:

The following actions and programs have been developed for restoration, recovery, and management to address the threats listed above.

1. **Restoration of barriers to migration:** As outlined in the threats section, the Hudson River Estuary has relatively few barriers to critical American Shad habitat and most of their historically available spawning and rearing habitats are still available. There are a few exceptions to this, and those barriers are highlighted in table 1. The first barrier on the main stem Hudson is slated for installation of fish passage (Troy Lock and Dam #1). It is unclear if addition of passage at this location will represent a positive change for American shad stocks given the uncertainty around mortality associated with upstream and downstream movement of adult and juvenile fish.

   Action: Removal of Dams/barriers to migration

   Progress: Assessment of dams and barrier culverts to restore fish habitat, and broader ecosystem goals, is a priority of the NYSDEC. Since 2016, 9 dams have been removed in the Hudson River Estuary watershed. Four of those dams were removed with support from the Department to meet conservation goals, with the additional 5 dams being removed for flooding and safety purposes. While the current dam removals have not explicitly restored any historic American Shad spawning habitat, broader ecosystem functions in the system have been improved, which arguably provides enhanced overall habitat for shad while they are in the Hudson system. While the opportunities to remove dams to restore shad habitat are limited in the Hudson, because of the general steep nature of the tributaries a short distance from the Hudson, and lack of dams on the tidal extent of the Hudson's tributaries, there are possibly some opportunities on larger tributaries, such as the Rondout Creek.

   DEC and partners will continue to make dam removal and barrier mitigation a priority through assessing, planning, and implementing restoration projects. DEC awards funding annually for dam removal engineering and construction. Several regional nonprofit partners are also engaged in dam removal, and it continues to gain momentum annually. A recent video was created by partners to raise awareness about dam removal, called Undamming the Hudson River (Undamming the Hudson River - YouTube). To achieve our dam removal goals, DEC will undertake an internal review of policies and procedures to see if there are more streamlined ways of removing dams.

   Timeline: Ongoing

Action: Assess Dams and Passage

Progress: The owner of the Green Island Hydropower facility at the Federal Dam in Troy, NY has been required to install fish passage as part of the FERC re-licensing process. It is not yet known what the upstream and downstream mortality rates will be resulting from the operation of this passage structure. Downstream mortality of adult and juvenile shad passing through turbines at the Federal Dam threaten to make this project an additional source of mortality on the Hudson River shad stock. This re-iterates the crucial need for constant evaluation of upstream and downstream passage efficacy to ensure that fish passage structures scheduled to be in operation within the next few years do not negatively impact shad recovery.

Timeline: Ongoing

2. **Reduce impacts of water withdrawals on American Shad**

Action: Manage water intake facilities

Progress: As part of the Clean Water Act, in New York State, all existing industrial facilities using water from the Hudson River must install and operate technologies on their cooling water intakes that will minimize impingement and entrainment. Of the 17 industrial facilities known to use Hudson River water for cooling, ten are operating technologies to minimize fish mortality, five are currently reviewing options, and two have been designed and are to be installed within the next five years. Several plants (i.e., Bowline, Danskammer, and Roseton) operated at less than 30% of capacity for most of the period from 2010-2016. Athens Generator uses a dry cooling system requiring no water from the Hudson River for cooling. Water withdrawal at Lafarge Cement Plant in Bethlehem is in the area of the river most vulnerable for developing shad larvae. Water withdrawal at this site is 25% of what it was in the late 1990s and impingement and entrainment have been effectively eliminated using wedgewire intake screens. The Albany Steam Electric Plant (now called Bethlehem Energy) was repowered and uses a hybrid closed cycle cooling system with a water intake fitted with wedgewire screens. This has nearly eliminated the impingement and entrainment of fish at this location. Indian Point Energy Center (IPEC) was closed in April, 2021 and will vastly reduce the amount of water required at that site. IPEC is currently permitted to use more than 2 billion gallons of water per day. The Empire Plaza operates a once through cooling system at Albany, withdrawing approximately 90 million gallons per day for air conditioning purposes. A recently issued SPDES permit requires the intake to be fitted with a wedgewire screen system which will eliminate impingement and nearly eliminate entrainment at this site.

Timeline: Ongoing

Future actions:

- Ensure that new and existing water intakes proposed and installed in the Hudson River include provisions that are protective of American Shad.
- Quantify the number of existing water intakes in the Hudson River, particularly those in the vicinity of American Shad spawning habitat, that do not include provisions that are protective of American Shad.

3. Habitat Monitoring and Restoration:

Action: Restore vegetated shallow water and intertidal habitats

Progress: While we do not feel access to historical habitat is limiting recovery, we feel that improvements to habitat quality such as water quality, restoration of side channels and tidal wetlands, and submerged aquatic vegetation will result in improved recruitment of juvenile shad, a crucial component needed for stock recovery. The Hudson River Estuary Habitat Restoration Plan (Miller 2013) identifies several river and tributary restoration activities that will benefit alosines, including barrier mitigation and side channel restoration, the latter of which having the biggest impact for shad. The first of these side channel restoration projects was completed in July 2018 at Gay's Point (km 196), near Coxsackie, NY (NYSDEC-HRNERR 2019). The site originally consisted of an artificially created tidal embayment that was separated from the main river channel by dredge spoils. A channel was excavated through the dredge spoils to reconnect the northern end of the bay to the mainstem Hudson River. Increased tidal flow through the embayment should improve water quality, provide coarser-grained bed materials, and likely improve the quality of nursery habitat for juvenile fishes in this river section.

Post-restoration monitoring has been ongoing since the project was completed and in 2020 sampling occurred in spring, summer and fall between May and October. Monitoring is scheduled to continue through 2022. Data were collected to characterize water quality, sediment characteristics and the fish and benthic macroinvertebrate communities. Current velocities and depth profile data were collected during May and July. Juvenile American Shad were collected during sampling in 2018, but not collected during the 2020 sampling (AKRF 2021). A large diversity of fishes are using the newly created channel and over time the fishes will continue to use the side channel for foraging, nursery habitat and refuge.

Timeline: Ongoing-we will be working with partners to identify additional side channel restoration projects.

Action: Restore and maintain native Submerged Aquatic Vegetation

Progress: The vegetated portions of mud flats and intertidal wetlands provide critical nursery areas for small fishes, contribute significant dissolved oxygen to the entire estuarine system, and store sediments being delivered by both the main stem and tributaries. In total, this habitat type covers approximately 12,000 acres which includes an estimated 6,750 acres of intertidal wetlands, 3,250 acres capable of hosting annually variable submerged aquatic vegetation and 2,000 acres of the floating invasive water chestnut (*Trapa natans*). Research has identified significant challenges to their persistence from changes to water quality, existing and potential invasive species, sea level rise, and incompatible recreational use.

NYSDEC Invasive Species Managers need to understand better the interactions of native submerged aquatic vegetation (*Vallisneria americana*) and water chestnut (*Trapa natans*) in the Hudson River Estuary and Mohawk River by determining if the removal of water chestnut facilitates the return of native species. Outcomes of the research could include recommendations for restoration of native plant ecotypes, strategies for measuring and

addressing impacts of habitat shifts on fisheries, and assessment of recreational and economic benefits of water chestnut removal. Potential future invaders also need to be addressed by identifying which species are most problematic and their most likely invasion routes, and then beginning to develop suitable prevention and management plans.

Following the two large storms in 2010 submerged aquatic vegetation (SAV) disappeared from the historic areas. The flooding associated with intense storms like named tropical storms Irene and Lee in 2011 can carry huge volumes of water and sediment into the Hudson. The storms together reduced submerged aquatic vegetation abundance in the Hudson River by more than 90% and no appreciable recovery in 2012 or 2013 was detected (Hamberg et al. 2017). SAV is an important habitat for the development of young shad (Ross et al. 1997) and if the frequency of SAV damaging storms increases in future years, there will likely be negative impacts on the recruitment of American shad. SAV disappearance maybe be linked to the uprooting and/or removal of plants or from large amounts of sediment burying the plants (linked to Climate Change – see below). As funding becomes available NYSDEC will develop and implement pilot projects to restore native (SAV) beds, tidal wetlands, side channels, shallow water habitats, and native plant communities. The project will include monitoring following the restoration to assess the success of the restoration projects.

Timeline: Ongoing

Action: Habitat mapping and monitoring

Progress: DEC will continue to map key habitats in the Hudson, including the estuary's tidal wetlands, submerged aquatic vegetation beds, deep and shallow water river bottom, and shoreline from the Tappan Zee Bridge to Troy, enabling biologists to develop a better understanding of food webs and habitat use for Atlantic sturgeon, river herring, shad and striped bass. Submerged Aquatic Vegetation will continue to be mapped every five years with the most recent map layer completed for the 2018. Tidal Wetlands will be mapped every ten years to track changes in the wetland composition as well as document response to sea level rise/climate change. (Linked to climate change/habitat restoration). The mapping is completed using LiDAR technology with random ground truthing visits to confirm presence/absence as well as species and size of the patch.

Annual SAV monitoring uses volunteers that visit predetermined areas to note presence or absence of SAV. Since 2012, DEC staff and citizen-science volunteers have documented submerged aquatic vegetation (SAV) in the Hudson River estuary. Current research is contributing important information about SAV populations, prospects for recovery and best approaches for restoration. SAV change analysis is underway as a product of 2018 mapping. The analysis will be evaluated over the next year to identify locations that native SAV has persisted and locations that have been dominated by invasive water chestnut. Priority locations for future restoration and protection will also be identified. In addition, we are constantly working with partners to learn more about replanting of the native SAV (*Vallisneria americana*).

It is important to understand and monitor river habitat trends and threats, especially changes in location, coverage, community composition, and sediment accretion rates of submerged aquatic

vegetation, tidal wetlands, and shore zone habitats, as well as changes in bottom characteristics and habitat quality of river bottom habitats.

Timeline: Ongoing

4. Understand the impacts of climate change:

Action: Monitor distribution, migration patterns and spawning of American Shad

Progress: Changes in climate and weather patterns are affecting the fish and wildlife distribution, migrations patterns, and spawning phenologies. (IPCC 2014, Horton et al. 2014, Nack et al. 2019, Pirani and Boicourt 2018, Reidmiller et al. 2018, Rosenzweig et al. 2011). The onset of spawning for American shad was already 5.3 days earlier in 2012 relative to 1976. By the 2090s, it is predicted that the shad spawning season will be 12 days earlier and that the spawning season will be shortened by 4 days (Nack et al. 2019). It is unknown how these changes will affect the existing American shad ecology, including the availability of plankton to developing shad, changes to predator-prey interactions, and the iteroparity of the stock.

Timeline: Ongoing

Action: Monitor climate change impacts to the Hudson River and American Shad to identify and implement opportunities to adaptively manage and minimize adverse impact

Progress: Management of American Shad takes place locally in NY State as well as cooperatively through Atlantic States Marine Fisheries Commission (ASMFC). A Climate Change working group was established in 2018 to develop a guidance document to provide management strategies to assist the Commission with adapting its management to changes in species abundance and distribution resulting from climate change impacts (ASMFC 2018). A step wise approach is outlined in the document to guide implementation of adaptive management. Representatives from NY will continue to participate in the population assessment and decisions on coastwide management of American Shad.

Timeline: Ongoing

Future actions:

-Explore the implications to migratory fish of differential warming rates between the Atlantic Ocean and the Hudson River Estuary.

-Evaluate impacts of Northwest Atlantic Ocean heatwaves on the ecology of American Shad, including the timing and location of seasonal movements, impacts on prey abundance and availability, and disease and pathogens.

5. Invasive species monitoring and management

Action: Prevent the invasion of new invasive species. As outlined in the threats section above, the restoration of the watershed divide between the Hudson River Estuary and neighboring watersheds that

were eliminated through the creations of the Erie and Champlain canals remains the most beneficial actions that can be taken to prevent the invasion of aquatic invasive species in the Hudson River.

Progress: In May 2019 Governor Cuomo announced a sweeping initiative to examine how the Erie Canal system could be reimagined for the 21st century. One of the primary objectives of this effort is to assess how the Erie Canal can help mitigate impacts from flooding and ice jams to improve resiliency and *restore ecosystems in canal communities*. In January, 2020 the Reimagine the Canal Taskforce released a report that identified combatting the spread of invasive species as a priority for reimaging a 21st century canal system, and recommended studying strategies to counter invasive species to protect and enhance New York's waterways and the businesses that depend on them.

Timeline: Unknown

Future Actions: Provide technical support to efforts to study strategies to counter invasive species that may threaten American shad.

Action: Monitor for new invasive species

Progress: To combat the impacts of invasive species, DEC created and supports the Bureau of Invasive Species and Ecosystem Health (BISEH) within the Division of Lands and Forests. This group works across the state by providing expertise, assistance and action where invasive species are a threat. BISEH collaborates with numerous stakeholders including State and Federal agencies, non-governmental organizations, industry and notably through Partnerships for Regional Invasive Species Management (PRISMs). The Rapid Response for Invasive Species: Framework for Response was created to aid resource managers responsible for responding to newly discovered invasive species infestations. The policy outlines all the necessary components of an effective response, including coordination, communication, public outreach, planning, scientific analysis, information management, compliance with laws and regulations, resources, and logistics.
In addition to this statewide effort, The Hudson River National Estuarine Research Reserve is developing an estuary specific task to prioritize monitoring activities in the Hudson River estuary. This group will identify important pathways of introduction, critical species, and priority locations to develop catalyst ideas that will maximize the impact of early invasive species detection and response.

Timeline: Ongoing

Action: Management of invasive plant species

Progress: The addition of water chestnut to the Hudson Ecosystem has changed the water quality (dissolved oxygen, turbidity, sedimentation) in the vegetated shallows. Sedimentation and turbidity within these mats are greatly increased and the dissolved oxygen levels within the mats is much lower than surrounding waters (Strayer 2006), favoring species with wide tolerances for unfavorable environmental conditions (Schmidt and Kiviat 1988). The establishment of these immense water chestnut mats each summer significantly reduces the

amount of near-shore nursery habitat available to YOY alosines, cutting off areas that would likely have remained more productive with native macrophyte beds. Removal or management of the plants to improve American Shad nursery habitat may help with recovery. Currently, no plans for a project of this nature have been developed.

Timeline: Unknown

Future Actions: Pursue research partnerships to better understand the ecological effects of water chestnut invasion, the experimental removal on water quality and ecosystem services, and to better understand the dynamics that support the return of native SAV following water chestnut removal.

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Tables and Figures:

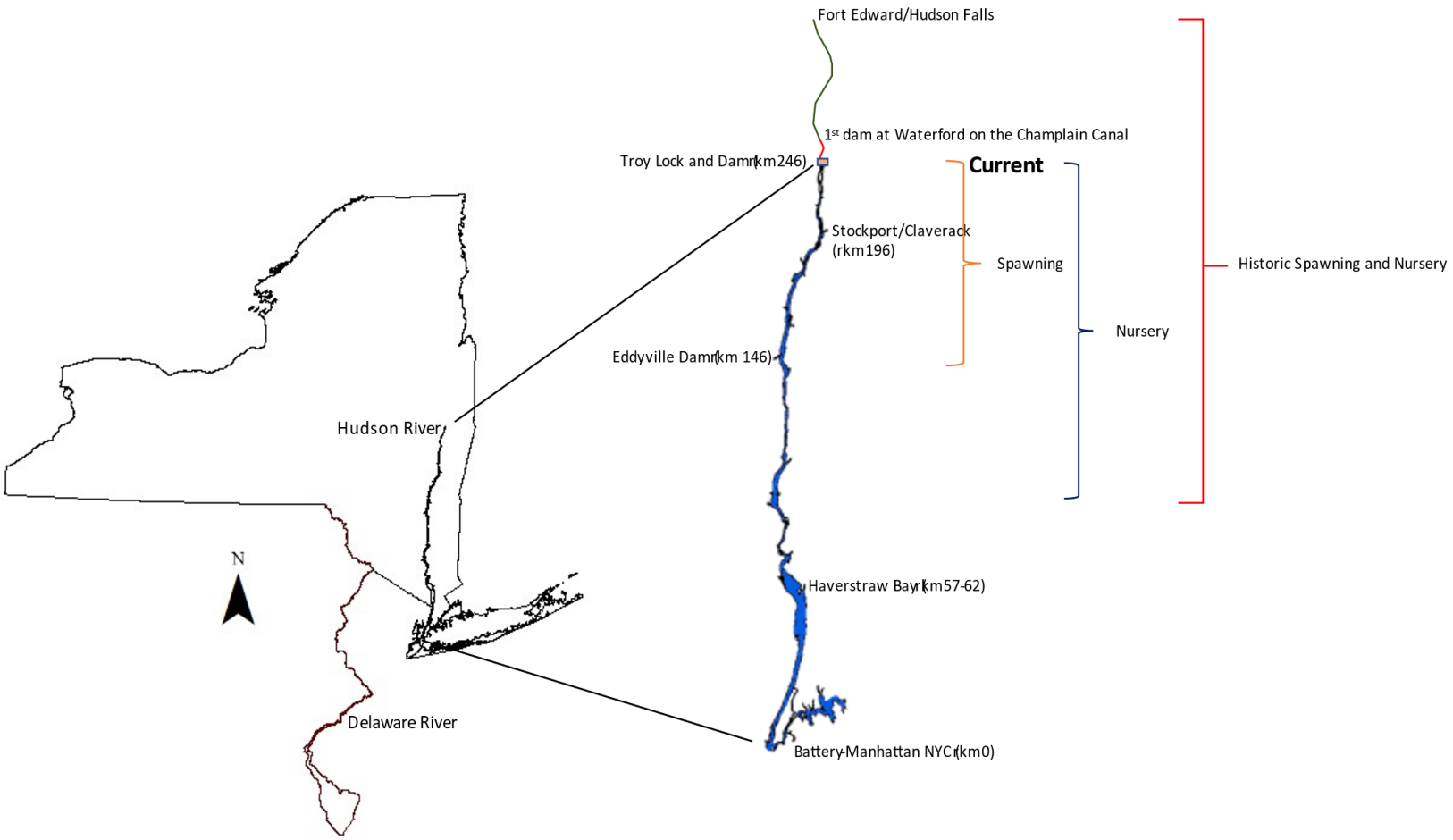

Figure 1: NY-Hudson River and Delaware Rivers. Locations of current and historic spawning and nursery as well as locations of dams.

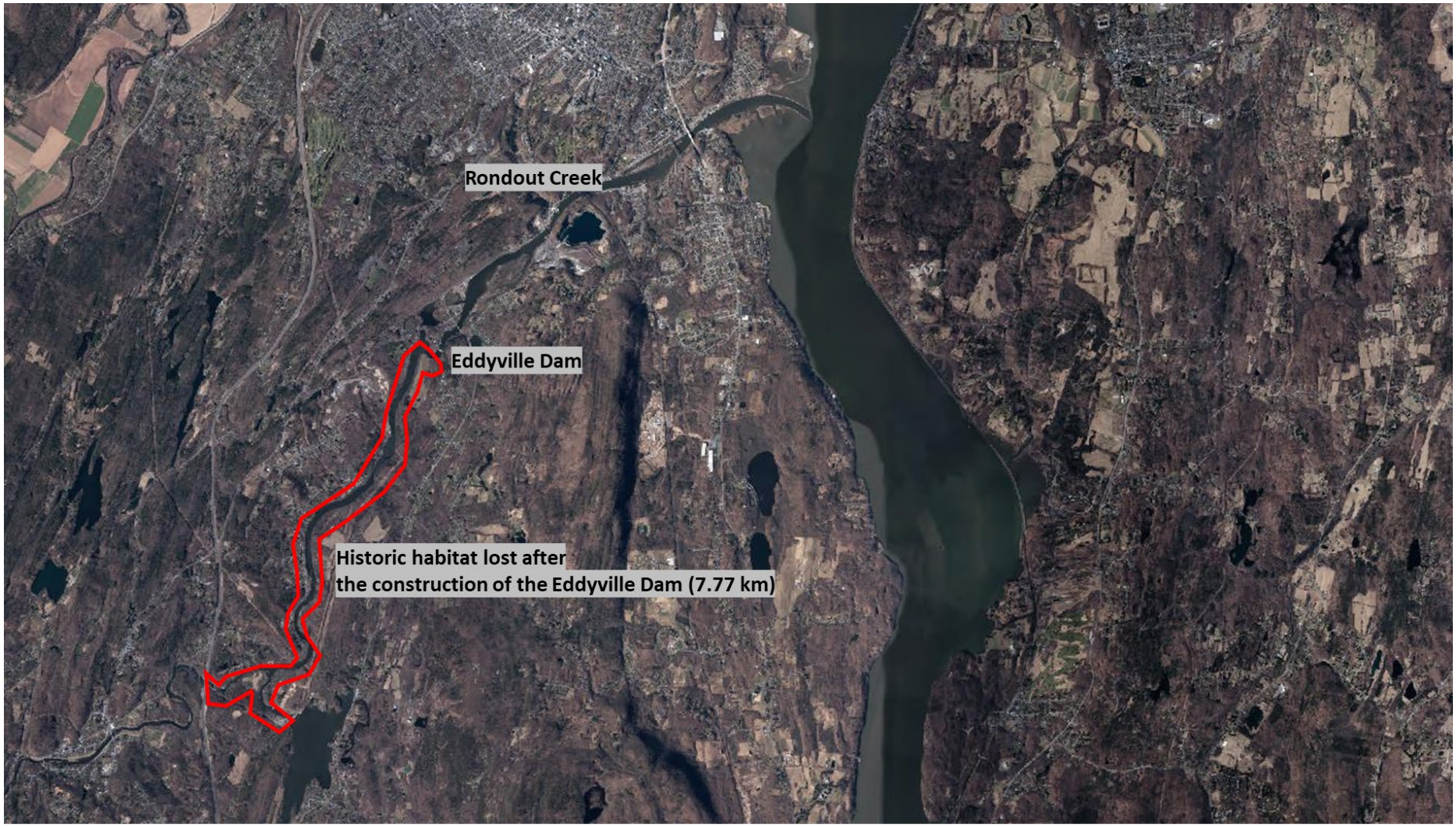

Figure 2: Map of the Rondout Creek with the Eddyville Dam located near Kingston, NY.

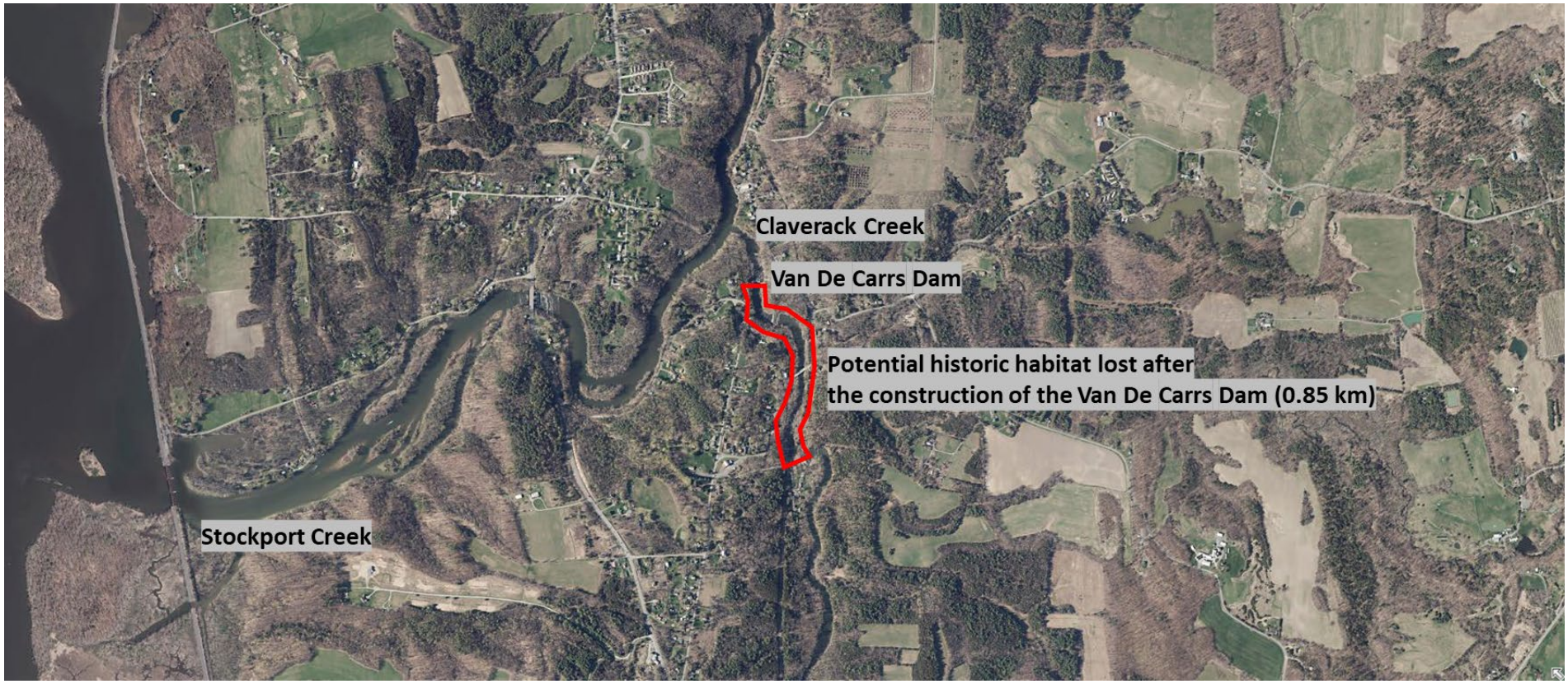

Figure 3: Map of the Stockport Creek and Claverack Creek with the Van De Carrs Dam located near Stockport, NY.

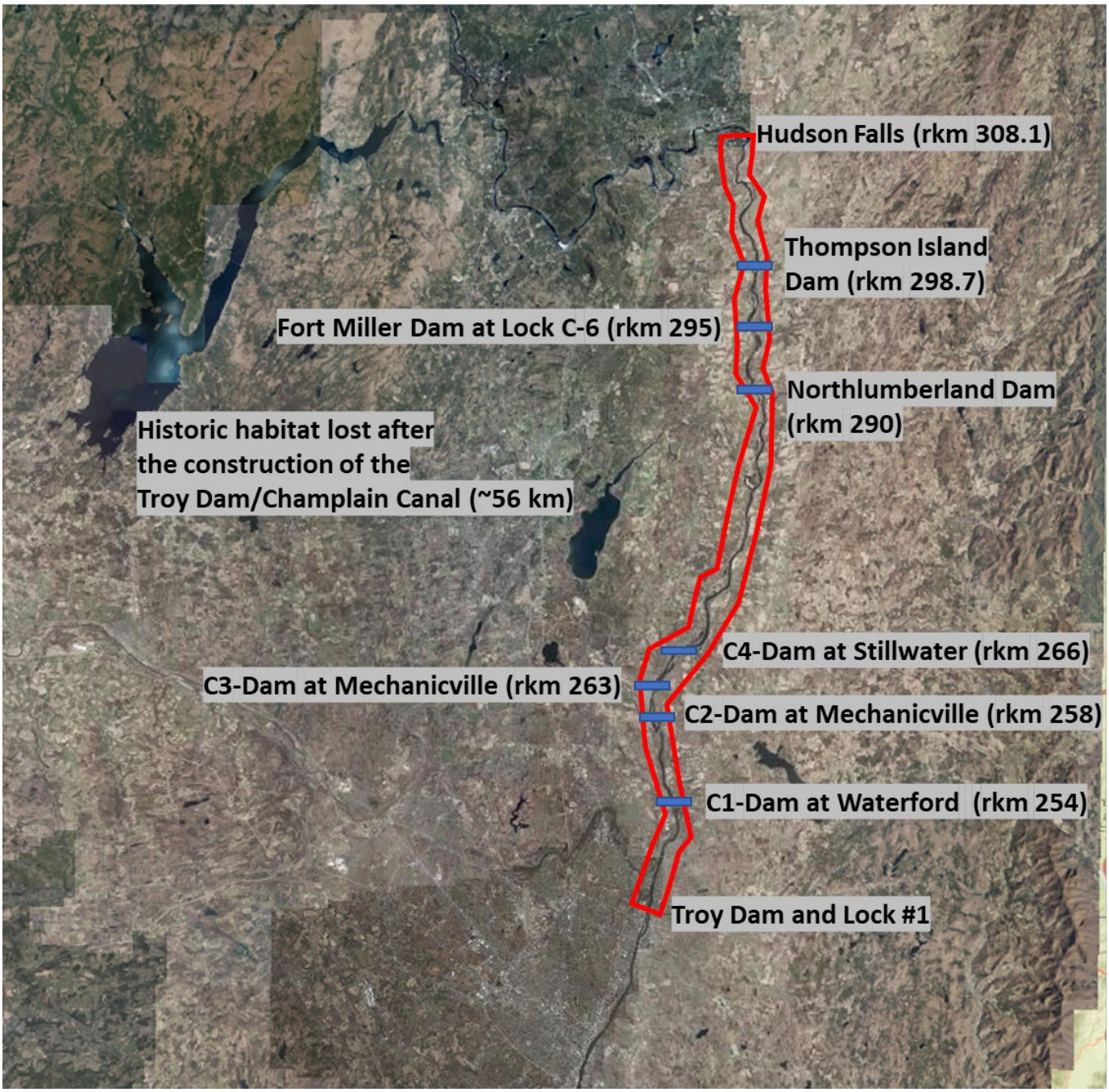

Figure 4: Historic habitat above the Troy Dam located in Troy, NY. This map also includes the dams located on the upper Hudson River (Champlain Canal) from Waterford, NY to Hudson Falls, NY.

Dam Name	Tributary	Year Built	Town	County	Dam Height (feet)	Dam length (feet)	Kilometers of blocked habitat	Hydroelectic facility
193-0166A (Eddyville Dam)	Rondout Creek	1850	Esopus	Ulster	12	220	7.77	No
Van De Carrs Dam	Stockport/Claverack Creek	1904	Stockport	Columbia	18	230	0.85	No
Troy Lock and Dam #1	NA	1914	Troy	Rensselear	20	1000	8	Yes
Lock C1-Dam at Waterford	NA	1912	Halfmoon	Saratoga	24	1050	6	No
Lock C2-Dam at Mechanicville	NA	1899	Halfmoon	Saratoga	23	963	5	Yes
Lock C3-Dam at Mechanicville	NA	1965	Mechanicville	Saratoga	37	1220	3	Yes
Lock C4-Dam at Stillwater	NA	1955	Stillwater	Saratoga	14	1400	24	Yes
Northlumberland Dam	NA	1870	Schuylerville	Washington	16	805	5	No
Fort Miller Dam at Lock C-6	NA	1985	Fort Miller	Saratoga	5	1320	3.7	Yes
Thompson Island Dam	NA	1910	Fort Miller	Washington	15	736	9.6	No

Table 1: List of dams known and suspected to limit American Shad access to historical habitat in the Hudson River and tributaries.