Atlantic States Marine Fisheries Commission

Atlantic Menhaden Management Board

May 7, 2025
1:15 – 3:15 p.m.

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. Clark*)	1:15 p.m.
2.	Board Consent • Approval of Agenda • Approval of Proceedings from October 2024	1:15 p.m.
3.	Public Comment	1:20 p.m.
4.	Consider Final Report from Work Group on Precautionary Management in Chesapeake Bay *(M. Gary)* **Possible Action**	1:30 p.m.
5.	Progress Update on 2025 Ecological Reference Point Benchmark Stock Assessment *(K. Drew)*	2:50 p.m.
6.	Provide Direction to Technical Committee on 2026-2028 Stock Projections (*K. Drew*)	3:00 p.m.
7.	Other Business/Adjourn	3:15 p.m.

The meeting will be held at The Westin Crystal City (1800 Richmond Highway, Arlington, VA; 703.486.1111) and via webinar; click here for details

Atlantic States Marine Fisheries Commission

MEETING OVERVIEW

Atlantic Menhaden Management Board
May 7, 2025
1:15 – 3:15 p.m.

Chair: John Clark (DE) Assumed Chairmanship: 5/24	Technical Committee Chair: Caitlin Craig (NY)	Law Enforcement Committee Representative: David Bailey (MD)
Vice Chair: Vacant	Advisory Panel Chair: Meghan Lapp (RI)	Previous Board Meeting: October 22, 2024
Voting Members: ME, NH, MA, RI, CT, NY, NJ, PA, DE, MD, PRFC, VA, NC, SC, GA, FL, NMFS, USFWS (18 votes)		

2. Board Consent

- Approval of Agenda
- Approval of Proceedings from October 2024

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 should use the webinar raise your hand function and the Board Chair will let you know when to speak. 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 Board 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 Final Report from Work Group on Precautionary Management in Chesapeake Bay (1:30 –2:50 p.m.) Possible Action

Background

- In August 2024, in response to concerns about the Chesapeake Bay ecosystem, the Board established a Work Group to evaluate potential actions for additional precautionary management in Chesapeake Bay.
- The Work Group met nine times from September 2024 to April 2025 to consider potential management options, including time/area closures, and develop a report based on Chesapeake Bay predator and fishery data **(Briefing Materials)**.

Presentations

- Review of Work Group Report by M. Gary

5. Progress Update on 2025 Ecological Reference Point (ERP) Benchmark Stock Assessment (2:50 –3:00 p.m.)

Background

- The ERP benchmark assessment will be peer-reviewed by a panel of independent experts at SEDAR 69 the week of August 11th, 2025.

- The ERP Benchmark Assessment and the Atlantic Menhaden Single-Species Assessment Update are both scheduled to be completed for the 2025 Annual Meeting.

Presentations

- Update on the ERP Stock Assessment by K. Drew

6. Provide Direction to Technical Committee on 2026-2028 Stock Projections (3:00–3:15 p.m.)

Background

- The Board sets an annual or multi-year TAC using the best available science, and the current TAC is set through 2025.
- The TC completes projection runs based on recommendations from the Board.

Presentations

- Request for direction for stock projections by K. Drew

7. Other Business/Adjourn

Atlantic Menhaden

Activity level: High

Committee Overlap Score: High (SAS, ERP WG overlaps with American eel, striped bass, northern shrimp, Atlantic herring, horseshoe crab, weakfish)

Committee Task List

- 2025 Single-species and Ecological Reference Point Stock Assessments
- Annual compliance reports due August 1st

TC Members: Caitlin Craig (NY, Chair), Mike Mangold (USFWS), Robert Corbett (NC), Keilin Gamboa-Salazar (SC), Jason McNamee (RI), Eddie Leonard (GA), Jeff Brust (NJ), Matt Cieri (ME), Ingrid Braun-Ricks (PRFC), Micah Dean (MA), Kelli Mosca (CT), Shanna Madsen (VMRC), Chris Swanson (FL), Sydney Alhale (NMFS), Amy Schueller (NMFS), Alexei Sharov (MD), Garry Glanden (DE), Heather Walsh (USGS), Katie Drew (ASMFC), James Boyle (ASMFC)

SAS Members: Amy Schueller (NMFS, SAS Chair), Caitlin Craig (NY, TC Chair), Brooke Lowman (VA), Matt Cieri (ME), Chris Swanson (FL), Sydney Alhale (NMFS), Jason McNamee (RI), Alexei Sharov (MD), Jeff Brust (NJ), Keilin Gamboa-Salazar (SC), Katie Drew (ASMFC), James Boyle (ASMFC)

ERP WG Members: Matt Cieri (ME, ERP Chair), Andre Buchheister (HSU), Jason Boucher (NOAA), Michael Celestino (NJ), David Chagaris (FL), Micah Dean (MA), Jason McNamee (RI), Amy Schueller (NFMS), Alexei Sharov (MD), Genny Nesslage (UMD), Howard Townsend (NFMS), Shanna Madsen (VMRC), Jainita Patel (ASMFC), Katie Drew (ASMFC), James Boyle (ASMFC)

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

ATLANTIC MENHADEN MANAGEMENT BOARD

The Westin
Annapolis, Maryland
Hybrid Meeting

October 22, 2024

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INDEX OF MOTIONS

1. **Approval of agenda** by consent (Page 1).

2. **Approval of Proceedings of August 2024** by consent (Page 1).

3. **Motion to approve the Fishery Management Plan Review, state compliance reports, and *de minimis* requests for PA, SC, GA and FL for Atlantic Menhaden for the 2023 fishing year** (Page 17). Motion made by Doug Grout; second by Jim Gilmore. Motion approved by consent (Page 17).

4. **Motion to elect Joe Cimino as Vice-Chair of the Atlantic Menhaden Management Board** (Page 21). Motion approved by consent (Page 21).

5. **Move to adjourn** by consent (Page 21).

ATTENDANCE

Board Members

Megan Ware, ME, proxy for Pat Keliher (AA)
Rep. Allison Hepler, ME (LA)
Steve Train, ME (GA)
Cheri Patterson, NH (AA)
Dennis Abbott, NH, proxy for Sen. Watters (LA)
Doug Grout, NH (GA)
Nichola Meserve, MA, proxy for D. McKiernan (AA)
Rep. Jennifer Armini, MA (LA)
Ray Kane, MA (GA)
Nicole Costa, RI, proxy for J. McNamee (AA)
Eric Reid, RI, proxy for Sen. Sosnowski (LA)
David Borden, RI (GA)
Matthew Gates, CT, proxy for J. Davis, CT (AA)
Rep. Joseph Gresko (CT) (LA)
Rob LaFrance, CT, proxy for Bill Hyatt (GA)
Marty Gary, NY (AA)
Jim Gilmore, NY, proxy for Assy. Thiele (LA)
Emerson Hasbrouck, NY (GA)
Joe Cimino, NJ (AA)
Adam Nowalsky, NJ, proxy for Sen. Gopal (LA)
Jeff Kaelin, NJ (GA)
Kris Kuhn, PA, proxy for T. Schaeffer (AA)
Loren Lustig, PA (GA)
John Clark, DE (AA)
Roy Miller, DE (GA)
Lynn Fegley, MD (AA)
Dr. Allison Colden, MD, proxy for Del. Stein (LA)
Russell Dize, MD (GA)
Pat Geer, VA, proxy for Jamie Green (AA)
James Minor, VA (GA)
Chris Batsavage, NC, proxy for K. Rawls (AA)
Chad Thomas, NC, proxy for Rep. Wray (LA)
Jerry Mannen, NC (GA)
Ben Dyar, SC, proxy for Blaik Keppler (AA)
Mel Bell, SC, proxy for Sen. Cromer (LA)
Dr. Malcolm Rhodes, SC (GA)
Doug Haymans, GA (AA)
Spud Woodward, GA (GA)
Erika Burgess, FL, proxy for J. McCawley (AA)
Gary Jennings, FL (GA)
Ron Owens, PRFC
Max Appelman (NMFS)
Rick Jacobson (USFWS)

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

Ex-Officio Members

Staff

Bob Beal
Toni Kerns
Tina Berger
Madeline Musante
Caitlin Starks
Jeff Kipp
Tracy Bauer
James Boyle
Katie Drew
Jainita Patel
Chelsea Tuohy
Emilie Franke

The Atlantic Menhaden Management Board of the Atlantic States Marine Fisheries Commission convened in the Capitol Ballroom via hybrid meeting, in-person and webinar; Tuesday, October 22, 2024, and was called to order at 2:30 p.m. by Chair John Clark.

CALL TO ORDER

CHAIR JOHN CLARK: It's 2:30, this meeting of the Atlantic Menhaden Management Board is now called to order. I am John Clark; I am chairing this Board today and I am the Administrative Commissioner for the state of Delaware.

APPROVAL OF AGENDA

CHAIR CLARK: Let's move right on to the consent items. Does anybody have any objections or additions to the agenda? Seeing none; the agenda is approved by consent.

APPROVAL OF PROCEEDINGS

CHAIR CLARK: Any revisions to the proceedings from August, 2024? Seeing none; those are approved by consent.

PUBLIC COMMENT

CHAIR CLARK: We're going to move on to Item 3, Public Comment for items that are not on the agenda. We're asking those to raise their hands, and I see Mr. Zalesak and Mr. Lilly, and once again these are items not on the agenda.

We know there is an item on the agenda that people are very interested in, and if we have time during that we may take some additional comment. Is there anybody else who had their hands up? I think it was just, is somebody else in the back there? Okay. Holy Chamoli, okay, we've got a bunch. Two minutes a piece, and are we ready? All right, go right ahead, Mr. Zalesak.

MR. PHIL ZALESAK: Because I would like to save my three minutes to the end after Mr. Martin Gary has spoken. I would like my three minutes; I just drove two and a half hours to speak here for two minutes.

CHAIR CLARK: Okay, so I'm not understanding you. You are saying you want to wait to make your comments until one of the other?

MR. ZALESAK: Well, let's just do this. Why don't you start the clock and you can stop me anytime you want. The difference, I want saved for the end of this meeting, because I don't want to drive two and a half hours for nothing. Is that fair?

CHAIR CLARK: In other words, when we get to the other items you may want to make a different comment, is that your point?

MR. ZALESAK: I would like to make three minutes of comments at the beginning, the middle and the end.

CHAIR CLARK: Well, in any event, let's take what we have in front of us right now, Sir. Go right ahead and make your comment to the items that are not on the agenda.

MR. ZALESAK: My name is Phil Zalesak; I am a member of the Save Our Menhaden Coalition. First, I would like to thank the Board for establishing a Menhaden Work Group to address the problem of localized depletion in the Atlantic menhaden in the Chesapeake Bay. Second, the Board is in desperate need of your leadership, Mr. Chairman. Why? Consider the Commission's history and policy. Localized depletion of Atlantic menhaden in the Chesapeake Bay was identified in 2004 as part of Special Report '83, 20 years ago.

CHAIR CLARK: Phil.

MR. ZALESAK: Let me finish, this is history.

CHAIR CLARK: Like I just said, Phil, this is for items not on the agenda. We are going to be talking about the situation in the Chesapeake.

MR. ZALESAK: I'm talking about history.

CHAIR CLARK: Okay, well let's just keep it to history then, fine.

MR. ZALESAK: We talk about 20 years ago this Board already identified a problem. All right and now we're saying localized depletion, it was explicitly defined in 2009, five years later 16 years ago. Now here is another thing that I would like you to bring up at the Policy Board meeting, Mr. Chairman. Further the Board and the Commission process for accommodating public comment is ridiculous.

A member of the public could spend a weekend preparing comments pertinent to the meeting at hand, but is unable to make comments, due to Commission policy. I want you to bring it up at the policy meeting. This is truly stupid and an insult to the citizens of this country. Finally, I respectfully request you do the following. Direct the Workgroup to use 2009 definition of localized depletion of Atlantic menhaden in the Chesapeake Bay.

MR. CLARK: Okay, I'm going to stop you there, Phil. You're talking about something that is on the agenda, okay.

MR. ZALESAK: Then I would want the balance of my time, a minute and a half, whatever it is for the end. Thank you.

MR. CLARK: Once again, about the comments for Atlantic States. There is a very lengthy public comment period for written comments, and the comments at the meeting obviously are restricted, because of the agendas we have. In any event, we'll move on to our next commenter, which is Mr. Tom Lilly, correct?

MR. TOM LILLY: Yes, Sir. I'm Tom Lilly, as you all know, I'm from White Haven, Maryland, down on the eastern shore, about 100 miles south of here. The first thing I would like to say is on behalf of 9 million Marylanders, and probably a million children that love and treasure Chesapeake Bay, 25 to 50 organizations, probably a half million recreational watermen. I want to thank all of you delegates from the states that are here this morning, and in the past have supported Maryland, because Maryland is trying to restrain the factory fishing, as you know.

I want to thank everyone of you. I wish I could meet you personally, and thank everyone of you for helping Chesapeake Bay in this time of need. What I wanted to say here this morning is that unless you take decisive action here, there will be thousands of Chesapeake Bay osprey babies dying on the nest this spring.

This is the avian species, as you know, that you chose as your ERP indicator of whether or not menhaden harvest was excessive. That indicator is failing, as is your other indicator the striped bass, which is as you know the flagship species of the Commission. Now, we know what is going to happen this year unless something is going to be done.

History is going to repeat itself, and there are going to be thousands of these babies, maybe tens of thousands dying in the nest. But this spring is going to be different. I'll tell you why. The people that care about the Bay are alerted to what is going to be happening. I think many of them will not stand by and just watch once these babies starve. I think they are going to begin to feed them. Osprey nests and babies can be viewed with inexpensive cameras on extension poles. Feeding menhaden saves babies and the parents from the anguish of selecting.

MR. CLARK: Tom, your time is up, and as we discussed earlier, if you want to just wrap it up. I know you had some thankyous; you wanted to make. If you can take it to that.

MR. LILLY: Okay, thank you, John. My concern here is that unless you act people will have to feed these babies in the nearby nests themselves. If they don't, ospreys are going to begin to die out in their areas. Whenever we intervene in nature, especially with feeding babies, there are risks and unknown consequences.

There can be mistakes, even when we try our best. I guess what I'm asking you, John, I'll say I'll wrap this up is that don't put the burden of feeding these baby ospreys on the public. They will do it if they have to. It will take a lot of organization, education and dedication, but they can do it.

I've done it myself on the Wicomico River, and it's an incredible feeling when you see young ospreys on the verge of death coming back and a month later fledging and flying away. Folks, let's use preventative management here. That is what we need to help us help the Bay.

CHAIR. CLARK: Okay, Tom, thanks, you are talking about the ospreys. Now you're starting to talk about management again. Do you want to just point up your thankyous, because we have other people who would like to speak.

MR. LILLY: Okay, thank you, Mr. Chairman, thank you everybody, appreciate it.

CHAIR CLARK: Thank you, Mr. Lilly, and next up I saw we had some other hands over here. Will you please approach the public microphone. Please, introduce yourself, and then just go right ahead into your comment, thank you.

MR. BEN LANDRY: Good afternoon, Mr. Chairman, members of the Board. My name is Ben Landry, I am with Ocean Fleet Services, representing the Menhaden Reduction Fishery. As most of you probably know, I have addressed this Commission a number of times, although it has been more rare of late to come to the open microphone portion of the meetings, typically. I guess that time is filled up by people telling you how poorly a job you're doing.

But I felt that this issue is too critical of an issue to not bring up to you guys. I wrote one out to you guys for the second year in a row. The Department of Maryland Menhaden Young of Year Survey has identified that the stock has reached levels not seen in the past 35 years. In fact, their exact phrasing is that menhaden abundance was nearly equal to last year, which was the highest measured year since 1990.

This is a message that I am not sure you are hearing, as you sit on this Board. There are many menhaden that are serving as forage to predators in the Bay and outside of the Bay. I would commend you guys for your ERP work from 2020. Secondly, it is an unusual situation, where our comments to the Chesapeake Bay Working Group, which I understand is a topic for later, not going to address it.

But we did receive a written critique from a rather high-profile individual on the issue in the supplementary material. There is not enough time in here to respond to every criticism leveled in the letter, but a formal response will be provided to each of you. But a few points are worth mentioning. The critic, an academic researcher, questioned the information.

CHAIR CLARK: Please, just wrap it up, please, Mr. Landry.

MR. LANDRY: Basically, questioned the information that USGS science has provided you in August. The utility of the information produced by the colleagues of the Cornell Lab of Ornithology. All existing bird research needs to be considered by this Commission in its decision making, and not rely on the views of one researcher. Science should rule the day at this Commission, not politics. I respectfully ask you to carefully review and consider the merits of our response to these comments. Thank you.

CHAIR CLARK: Thank you, Mr. Landry. Do we have any other commenters? Right there, walk up to the microphone, please, introduce yourself, and then you can go right into your comments.

MR. BRIAN COLLINS: Thank you for the opportunity to comment. My name is Brian Collins, I'm a concerned citizen from Virginia. Related to what we just heard, that is the typical type of discussion that confuses the matter, because when we say

there is a lot of menhaden, it's only based on the ocean surveys. But I understand, and you all can clarify later if you want, there is no survey of menhaden in the Chesapeake Bay, the quota is based on historical catch. To transfer the ocean quota measurements to the Chesapeake Bay is a leap of faith. Chesapeake Bay is a separate ecosystem, and we know that osprey nests are failing. We know the striped bass are collapsing, and we also know that ASMFC is having trouble addressing the challenges. The challenge for fixing striped bass issues ignores industrial fishing of menhaden in the Chesapeake Bay, the nursery for the majority, large majority of east coast striped bass.

It's amazing how that is omitted. I would like to know, what is the quota for the predators in the Chesapeake Bay, osprey, striped bass and the other ones, and sportfishing. There is a 112-million-pound quota for industrial fishing in the Bay, 51,000 metric tons. There is nothing set aside, there is nothing that we know that shows that there is any menhaden left after industrial fishing takes their quota.

There is no proof, there is no data, there is no research. I don't see how this Commission can endorse that without taking some type of proactive action related to it, not to mention the fact that 112,000 metric tons, 230-million pounds can be caught right at the mouth of the Chesapeake Bay, which is actually just outside the Chesapeake Bay Bridge Tunnel, which is technically in the Bay. Nothing is stopping industrial fishing from fishing them out. Thank you very much for my opportunity to comment.

CHAIR CLARK: Thank you, Mr. Collins. Do we have any other public commenters? Yes, Ma'am, walk right up to the microphone, introduce yourself, and then go right into your comment.

MS. TOMOKO HAMADA: Thank you, Chairman, and everybody. My name is Tomoko Hamada, I am a professor America of the College of William and Mary, an organizer of Osprey Watch Alliance. We observe ethnographically every nest in our area. I am a Virginia resident, and we started warning signal in Mobjack Bay.

This year, we observed 1500 osprey nests, and among 152 pairs that successfully brooded within the mainstem area of Chesapeake Bay, more than half had only one chick, the rest of the chicks died, leaving main stem pairs of 1.1 young. This is real today. Many pairs did not lay clutches. This is the first time the first time we observed birds arrived on time, usually mid-February through early March, and they defended their nests. But they never laid eggs.

This is the first time this behavior was observed. Likely explanation is females were not able to reach the adequate preserver for body conditions required to lay eggs. As you know, males feed females the fish, and Virginia is the only east coast state that still allows menhaden reduction fishing in state waters. Menhaden are traditionally osprey's food.

In this year we know that osprey crisis extends not only Mobjack Bay, but whole middle range of Chesapeake Bay. We know that because we observed, we record and we do the data. This menhaden controversy which goes back to a long, long time, but as far as osprey watchers are concerned, it is the menhaden industrial reduction fishing versus osprey.
Atlantic States Marine Fisheries Commission has established this Working Group and we need to really pay attention to the crisis of osprey. You heard this many, many times. I recommend at least seasonal closing so that baby chicks have food to grow and leave. It's usually late February to early summer. Thank you very much.

CHAIR CLARK: Thank you, Ms. Hamada, thank you for your comment. I believe we have one more commenter online, Jim Fletcher. Please introduce yourself, and then go right into your comment, Mr. Fletcher.

MR. JAMES FLETCHER: James Fletcher; United National Fishermen's Association. I've listened carefully, but you are not addressing the case of nano plastics, microplastics and plastics blocking the gills of the larval fish and other fish. If the people that are concerned about the osprey would look, they will find out that those animals are dying from microplastic, nano plastics and plastics.

If you look at the hard crabs, the striped bass, the speckled trout. All of them are being affected by microplastics and nano plastics in the larval stages. ASMFC needs to devote a study to microplastics and nano plastics, and the eggs of the fish. It is imperative, and the simplest way to do it, and I know ASMFC does not have the authority, but is to ask each and every state to begin a project of ground applicating all waste water.

Ground application or some other way that the waste water does not come into the Bay. But I'll ask you again as my time runs out, devote a group to look at the effects of nano plastics and microplastics on all of the fish, because what you don't see is when that larval fish hatches at the surface, wherever it is, the first thing he has to feed on is the plankton. But the second thing that there is nano plastics and microplastics. Thank you for your time, on behalf of the United National Fishermen's Association.

CHAIR CLARK: Thank you, Mr. Fletcher. That concludes our public comment for items that are not on the agenda.

REVIEW UPDATE FROM WORK GROUP ON PRECAUTIONARY MANAGEMENT IN CHESAPEAKE BAY

CHAIR CLARK: We will now move into our next item, which is to Review the Update from the Work Group on Precautionary Management in Chesapeake Bay. Before I turn it over to the Chairman, I would just like to say I had the opportunity to listen to the two.

I believe they were both three-hour sessions that the Workgroup put in, and then the Work Group put in a bunch of time after that. I just want to commend them for very good discussions and lots of great thoughts about a very complicated issue, and an issue that has great public concern, of course, so let me turn it over to the Chairman of that Group. The Work Group is ably chaired by Marty Gary of New York, so fill us in, Marty.

MR. MARTIN GARY: I appreciate the kind words. Just to bring everybody up to the same page, get everybody on the same page. At the August Board meeting a motion was made and approved to form this Work Group to address precautionary measures, the issue of precautionary management measures in Chesapeake Bay.

The Work Group was formed, and I was nominated as Chair, and I am honored to have that privilege. The Work Group met twice on September 13 and on October the 2nd. There were also two sub work groups that were formed, and they both met, a bird work group to address piscivorous birds, focusing on osprey, but also including other species such as brown pelicans and bald eagles. The second work group that worked with piscivorous fish species with the focus on striped bass, bluefish, weakfish, but also included species that have been present in the Chesapeake Bay readily in recent years, including red drum, spotted sea trout and cobia. Ideally, this Work Group would have finished its work and provided a full report, with recommendations to the Board at this meeting.

That did not happen. Not only did we not get to a final report, we did not achieve a progress report. This was partly attributable to the short amount of time we had to work with, and the complexity of the topic and the scope of that topic. As with any group there is always a chemistry component you have to resolve to get good discussions for complex issues underway.

I felt like we got there as we entered the second meeting, so I just want everybody to understand this Work Group, as you characterized, John. You sat in on those meetings. It's a complicated issue,

but the Work Group members are exemplary. We have the right members, I think, to work through these discussions.

The Work Group didn't get to specific management recommendations to bring to the Board at this time, but they did develop a problem statement. That problem statement was sent to the Board as part of your supplemental materials, and added context to the memo that accompanied it. I think staff had some slides. I would like to transition to those now if I could.

We start off with, well we'll start off with the Board task. To consider and evaluate options for further precautionary management of Chesapeake Bay menhaden fisheries, including time and area closures to be protective of piscivorous birds and fish during critical points of their life cycle. That is just to remind everybody what the Board task to this Work Group was.

Based on this task the Work Group developed a draft problem statement, and this is a more distilled version of the one that is in your memo, but essentially it boils down to, there is inadequate availability of menhaden to support overall predatory demand in the Bay. Then just as a Work Group update.

This is an interpretation of the Work Group from the task the Board gave us to develop potential management strategies to address the hypothetical problem statement, but that is the responsibility, from the view of the Work Group it is the responsibility of the Board to evaluate the validity of that statement, and determine if and when it is necessary to implement management measures.

We're viewing this as a hypothetical, and the Work Group would appreciate additional guidance from the Board, if in fact that is their intent. One other item I want to mention, because of the complexity we encountered in these discussions, and given the holidays are coming upon us. We felt like developing a final product for the Board for the winter meeting was also going to be a challenge.

We agreed that it would be desirable if we could commit, with the intent to bring that final report back to the Board at the spring meeting. At that point I will go ahead and take questions, and I'll do my best to answer those, but certainly would lean upon my fellow members of our Work Group. I also, before we jump into that Mr. Chair. I just want to thank James for all of his hard work, he put in a lot of time working with a lot of different folks and a lot of folks from the public who are engaged and very interested in this work and these discussions. I certainly appreciate all of James hard work, so back to you Mr. Chair to open up for questions.

CHAIR CLARK: Thank you, Marty for the summary and for all the work the Work Group has put in. As you said, now we're at a point where we need more Board guidance on this, so can I see some hands who would like to start with either questions or discussion items? Allison.

DR. ALLISON COLDEN: Thank you, Marty for so eloquently presenting our work. I just wanted to reiterate, with respect to the problem statement. Myself and Spud Woodward, we had the unenviable task of being the authors, the drafters for that problem statement, after much consideration and debate by ourselves and our fellow Work Group members. I just want to state on the record that it reflects kind of a very broad interpretation, several different types of interpretations of the Board charge.

Wrapping our heads around that and drafting around that was slightly challenging, so I just wanted to provide a little bit of that context on where the problem statement landed, and hope for some great discussion and feedback from the Board through the day to help guide development of our next round of discussion. Thank you.

CHAIR CLARK: Thanks, Allison, and Spud, would you like to add anything to that?

MR. SPUD WOODWARD: Sure. One of the things we struggled with was we were asked to identify a mechanism to effect precautionary management. We felt very strongly that the more we could explicitly state the conditions that created this theorized problem, the better we could link the solutions back to a problem.

That was sort of our mindset when we were developing this, is that it was some point, and we were specifically asked about time and area closures, but that is just one of many possibilities that might be used to address this theorized inadequate supply. But I want to emphasize that, because that is really important.

It was not our charge to determine the validity or lack thereof, of whether there is an inadequate supply, it is to identify the things that could be used as a solution to an inadequate supply, and some of those are anthropogenic, some of them are not. We're dealing with a complicated situation in a changing environment, and so I hope that our problem statement accurately captures that, and that it will be the catalyst for us to move to the next step in this process.

CHAIR CLARK: Our first comment is from Dennis Abbott.

MR. DENNIS ABBOTT: A simple question to Marty. Could you refresh me as to who was on the Committee, I don't know that, and I do appreciate the work that you're doing, and I know the public is very interested. I mean it's like preaching to the choir, getting a good final result and careful result of your efforts in the future.

MR. GARY: Thank you, Dennis, I don't have a list in front of me, but I think I can reconstitute it. Going north to south, Ray Kane from Massachusetts, Rob Lafrance from Connecticut next to me, I represented New York. Joe Cimino from New Jersey, Mike Luisi, I'm sorry, take it back, Allison Colden from Maryland. I'm so used to saying Mike or Lynn, one or the other, but it was Allison. Pat Geer from Virginia, did I miss somebody, I probably did. (Loren) I'm going to have to make that up to you, Loren, you know I will, and Loren Lustig, so thank you, Loren. Did I get Pat from Virginia, right? Pat Geer. Okay, that is why we're a big team, and Spud Woodward from Georgia. I think I got it with a little help from my friends, Dennis. Thanks.

CHAIR CLARK: Further questions, discussion. Looking around. Hold on, Mr. Zalesak, let me just wait on the Board. Did somebody have their hand raised, ah, Mr. Cimino.

MR. JOE CIMINO: Can we get the task up again, if we could? I apologize, Mr. Chair, because this is going to be a very sweeping comment. You know one of the things that Phil and others have kept pointing out is a definition of localized depletion that was presented to the peer review group that was looking at this in 2009.

One of the peer review reports from a Mr. McGuire, suggested that he certainly did not have a comfort level with that definition, that it was somewhat subjective. He says that with the same information it wouldn't consistently lead to the same conclusions. That definition doesn't just include basic ecological needs, it includes economic and social and cultural functions, which I think are obviously somewhat subjective and a challenge.

I take this task to suggest that we need to at least explore simply the ecological need. Obviously, as a Board we have a broader mandate, we have to consider the economic and social impacts. But going back to what Spud said, you know I think that this Working Group's exploration is to provide tools to this Board, you know to decide whether or not, if there is an ecological need, if there is something that can be done in preventing additional removals to something like time and area closures.

I think without question that would be a tough decision. It would be all gear types. But some of the concerns of the public, take for example the very real concern of what is happening with osprey,

is happening elsewhere. In our state of New Jersey in 2022 and 2023, nest production was not great, it was some of the lowest years ever.

We don't have a report for 2024 yet, but within Vonnegut Bay it was something like 60 percent nest failure, and they are simply not even laying eggs, with higher abundance and availability of menhaden. You know the idea that the striped bass juvenile recruitment issues are tied to this, and yet we're seeing that in every river system that we have.

I've heard weakfish mentioned, weakfish have collapsed from Massachusetts to Florida. You know I think these are much broader issues. I'm not saying that means we walk away from menhaden management and the concerns that we have in the Chesapeake Bay, but I don't think it's a simple fix.

CHAIR CLARK: Thank you, Joe, anybody else from the Board here? Lynn Fegley.

MS. LYNN FEGLEY: I really just want to thank Marty and the Work Group for taking this on, because it was not an easy charge, it is not an easy problem. I think at the end of the day, this is an exercise in examining precautionary management, and that is a difficult and divisive issue, it always is. I'll admit that when I first saw the memo, I was a bit disappointed with the problem statement, as it was written.

But I think hearing Spud's explanation made me feel better about it, and I would like to make sure that the Work Group leaves here feeling like it got the guidance it needs. In my mind this is really a scenario building exercise. We know that there is no linear one-to-one relationship here. We are asking a precautionary question.

But it does seem that what if, if the idea is to maximizes the opportunity for animals such as piscivorous birds, predatory fish. If the idea is to maximizes their odds, to maximize their asset to the forage they rely on, in this case menhaden, what are some scenarios that would accomplish that? That is really as simple, and nothing is simple, but that is how it shows up in my mind. I fully understand the complications here, and I very much thank everyone, the Work Group for taking this on, and would welcome more discussion if we need to further refine the task at hand.

CHAIR CLARK: Next up we have Rob LaFrance.

MR. ROBERT LaFRANCE: Lynn, I'm really curious to hear what you feel some of the short fallings of our statement are. I think that is exactly what we're trying to do at this point in time, is we put together a problem statement and we're back here with the Board to see if we're on the right direction. It's a complicated issue. I think the fact that we broke it into two specific working groups, one on birds, one on fish was really helpful.

But when you start to dig into those things, you really find there is an abundance of information, there is abundance of data. It's a big area with a lot, we were there last night, it's an amazing place. I think what I'm hopeful today what we get from this Board meeting is some direction, some additional direction. Some of the things that you feel might be shortcomings of the report. I'll just leave it at that for this time.

CHAIR CLARK: I've got Russel and then Jeff Kaelin. Go ahead, Mr. Dize.

MR. H. RUSSEL DIZE: I feel much better about this since Marty said who was on the Committee. I have faith in all the Board members that he named, and I'm sure they will come up with a solution. The problem in Maryland this year was we had 0 menhaden. We didn't have enough menhaden for our crab potters to get crab bait.

Crab bait that they had to buy came out of Maine. That is a problem. I'm sure you will work to find out why. We don't know why. Spud said, it could be environmental, you know, I don't know. The point is, we had no menhaden in Maryland. I think Virginia had menhaden; I think the first boat did all

right in Virginia. We had none. But we have fixed-gear net in Maryland, we have pound nets. They don't move. If they don't come to it, you don't catch it. Like I said, I've got faith in Marty, I've got faith in this group, and I'm sure they will come up with some ideas. Along the way, think about small closure, like don't open the season and purse net until the end of June, allow some of them to come up the Bay. I'm probably sounding like I'm covetous of the menhaden for Maryland, and I am. I represent fishermen, I am a fisherman.

We need menhaden. We had an abundance of dolphin in our area this year, because we've got billions of little spot, maybe four inches long, three inches long. We think that is what they were feeding on, but we had all the way to the head of Miles River, and some of these small rivers, we had dolphin. They didn't have the menhaden to chase, so they were chasing other fish. Anyway, I feel good about this Committee. Thank you very much.

CHAIR CLARK: Next up we have Jeff Kaelin.

MR. JEFF KAELIN: You know I've been around the menhaden fishery for a long time, I've been going to menhaden meetings for probably 30 years with most of you around the table as an advisor. A couple of things I just wanted to point out. If you look on our website for menhaden, you'll see that the result of our assessment, which was probably one of the most data rich assessments on the east coast, maybe even the United States.

It projects that there is over 4 million metric tons of Atlantic menhaden in the ecosystem, beyond and after the quotas are provided through the fisheries, which are a fraction of what they've been historically. It's a coastwide managed fishery, as we all know. As far as localized depletion goes, as Joe points out, 2009 or whenever this was discussed with the peer review, we were all there, many of us were there.

Localized depletion was just determined to be something that is too subjective to be a real scientific fact. In fact, we took that same argument to the federal courts after the New England Fishery Management Council and National Marine Fisheries service created time and area closures for the midwater trawlers, only the midwater trawlers, in that fishery.

The federal judge determined that the localized depletion arguments that were being made to support those closures had no relationship to the science whatsoever, it was not justified in any way, shape or form. This was an amendment that took three or four years to establish. There are a couple of ways to look at these issues.

I live in Cape May, and I live on the canal there. We have the eagles there; we have ospreys there. The ospreys that I have there didn't hatch, they didn't fledge this year. We had a problem with the menhaden fishery the last two years there, because there has been a big wedge of cold water from the Labrador current that has been down on the shelf over the last couple years.

We never started taking menhaden a year ago until August, because the water was so cold. You know there is a lot of reasons here why things aren't perfect in every single square mile of the coast. But the evidence that we have, the science that we have in front of us is, you know that these animals should be able to survive, and if they don't, there could be a lot of competition. Again, I don't remember seeing brown pelicans in Cape May before the last couple of years, so lots of things are changing. It's easy to blame a particular group of fishermen who are working under a quota that has been established under, again one of the most conservative and a data rich assessment on the east coast. I think we've got to look a little further than that, and I'm glad that we're going to examine some ecological issues with the Work Group over time. I think that is extremely important, and I commend their work as well.

CHAIR CLARK: Next up we have Allison Colden.

DR. COLDEN: I think the Board discussion thus far has been very reflective of some of the conversations that we had in the Work Group, which is not surprising. But also, you all can see how, given so many unknowns both with menhaden populations as they exist in the Chesapeake Bay, as well as environmental conditions.

On top of environmental conditions continuing to change, we get into a situation where there is so many unknowns that it is hard to pin down or move in a direction of coming up with some of these options. My thought, and the way that I've been approaching this, and have discussed with the Work Group is, all of these changes are not necessarily things that we can quantify.

But they are the context in which this Board has to make decisions about the menhaden fisheries, about the future of ecosystem management for menhaden. I believe if it is taken in that regard as context by which we need to guide our policy and decision making, because at this point it is policy, more so than having specific silver bullets to nail down mechanisms, causes, interrelationships.

If we are to take this as context for management or policy moving forward, I think that that significantly simplifies and clarifies some of the tasks that the Work Group has been putting forward. I just wanted to put that out there as my interpretation, to see if that resonates with folks, because I think that that makes the path forward a lot easier, but I think you all can see now some of the arguments and some of the issues and unknowns that make this a complicated conversation.

CHAIR CLARK: Thank you, Allison, it certainly is a complicated issue. That is your suggestion for the Work Group's path forward. Are there further comments from the Board here? Joe Cimino.

MR. CIMINO: There is one other thing that I was thinking of that in particular I mentioned that I took this very much as a biological ecological issue. Again, going back to the three peer reviewers from 2009 looking at this issue. Dr. Malcolm Hadden said that food limitation of predators may occur in the future in the Chesapeake Bay, there is very weak evidence at the present.

There was one peer reviewer that looking at the data presented to them didn't think it was happening. He referred to it as the primary issue is more one of allocation rather than localized depletion, and allocation issues can not be solved scientifically. I think if this Board does want to consider not just all removals, but only removals from one specific gear type, then that is an allocation issue. I don't think that is the charge of this Work Group, at least not in my mind, and certainly not the motion that I voted for. If that is going to be a future consideration, I think that needs to be a whole new Board discussion.

CHAIR CLARK: As everything that we've heard so far points out, this is a very complicated issue and there are lots of policy complications also. Further comments or guidance from the Board for the Work Group? David Borden.

MR. DAVID V. BORDEN: Quick question. Will we get a briefing at the next meeting on status report on this? I know there is a formal report that is going to be due in the spring, but will we get a briefing on it?

CHAIR CLARK: Do you want to answer that, James? Looks like Toni wants to answer it.

MS. TONI KERNS: I guess I don't anticipate we'll need a Menhaden Board meeting in the winter if this is the only thing that we would be doing, and this Work Group has sort of suggested that they don't want to provide an interim report, because they won't have as much done yet. We could give an update during Policy Board, but I don't think we would do it during Menhaden Board, because I don't think we'll need one.

CHAIR CLARK: Okay, are there further comments from the Board? For the Work Group, have you

gotten much guidance? I know that it seems about as clear as mud still. I'll be glad to just be listening and not being part of it. Marty, do you have anything specific that you would like to get further?

MR. GARY: I know that we have our Work Group members here and we've all discussed offline and at this meeting here in Annapolis. I just look to them. I know we've already taken upon ourselves to try to seek out data from like for instance ChesMMAP to solve some of the fish predation issues, and we're still working through a lot of the bird data.

We have plenty of work we can create on our own, but I would say maybe I'll turn it back to my fellow Work Group members for one last call if things aren't specific enough. I know Allison and Spud have spoken up. But it looks like Pat will weigh in.

CHAIR CLARK: Go right ahead, Pat.

MR. PAT GEER: I guess this goes out to my fellow Work Group members, but I'm wondering if there would be a benefit of having somebody who is on the ERP sit on this Work Group, so that we're not going down a path that they've already gone down or have already considered.

CHAIR CLARK: I guess we could find that out. Can I turn that over to you, Katie?

DR. KATIE DREW: I mean, obviously the ERP group is working on the stock assessment right now, so any time that takes them on this Work Group is less time that they can spend on ERP assessment. But I think we could potentially look into at least people joining the call to provide some context or help answer questions about what you guys have done or need to do that we're doing to avoid some overlap in that issue. I don't want to commit anyone specific or to a full participation as a Work Group member, but I think we could arrange some consultation for sure.

MR. GEER: Yes, mainly we're just, no, we've already done that. Then point us in the right direction to get that information. That's all.

CHAIR CLARK: Thanks, Pat, thanks, Katie, anybody else from the Work Group? There is Marty.

MR. GARY: There is one other item I omitted, I think, in my notes. We had a discussion about the potential to possibly need to reach out to the TC for some items, but also understanding that if I have my facts correct that the ERP and single-species assessment is due next year, that that could potentially impact the delivery of that. I'm not 100 percent sure I had that right, Katie, but I just wanted the Board to be aware, if we do need to answer some of these questions and engage with the TC, there may be some complications.

CHAIR CLARK: Thanks, Marty, well this really is a dilly of a pickle. Okay, go right ahead, Rob.

MR. LaFRANCE: I just wanted to sort of follow behind what Pat said. I think getting the data, knowing the data that we're looking at and putting it in a format that is going to be helpful to the modelers and statisticians to better understand it is really helpful. I think the other thing we're looking at is, what is the information that we're able to get that can help us make recommendations.

But that same information could be beneficial to whatever stock assessment models that we're looking at. I think that from an efficiency perspective, something we want to do. I also think that the data themselves are complicated, and so having availability to other scientists within our states who are knowledgeable about fishery issues would be really helpful, particularly as we look at bird/fish interactions.

CHAIR CLARK: Anybody else on the Board here? I see you both in the audience there, and just want to make sure we've exhausted our discussion here at Board. Anybody online? Okay, no Board members are online. Last call for the Board, and then we do have time for a couple of public comments.

But hold on a second, Mr. Lilly, I just want a once, twice, going three times. We're going to take some public comment now on this specific issue that I know you and Mr. Zalesak would very much like to speak on. Once again, even though you've been here before, state your name again before you start speaking, Mr. Lilly.

MR. LILLY: To the point, I understand kicking the can down the road, but why do you have to kick it all the way down to the spring meeting? If something happens at the spring meeting you have to watch an addendum, it's much too late for this year and you all know it. You have a winter meeting coming up in January, I guess what is it, three complete full months to do their job. All the statistics are well known. The only chance Chesapeake Bay has is for these options to come in front of this Board at the winter meeting, not the spring meeting. I beseech you, don't kick this down the road another year. The Chesapeake Bay can't take it. The people of the Bay can't, the watermen, the ospreys. Everything that lives in the Chesapeake Bay depends on your decision today. Don't kick down the can to the next meeting. The winter meeting, not the spring meeting. Thank you.

CHAIR CLARK: Thank you, Mr. Lilly, and just to reiterate. As a Board we need the science to work on, we can't just act by our desire.

MR. LILLY: You have the science the ERP science too. The two indicated species are in dire trouble, and that is your science. Respectfully, Chairman Clark, you have all the science you need.

CHAIR CLARK: Well, it's putting everything together and turning it into policy. Thank you, Mr. Lilly and next up we have Mr. Zalesak.

MR. ZALESAK: I believe he brought up science, because let's clear something up. This was sent to me by one of the Save Our Menhaden Coalition members. It says, Dr. Jerry Ault, the internationally renowned forage fish expert and ecosystem modeler has found fundamental flaws in the basis of the menhaden stock assessment.

The Liljestrand Team is issuing a correlation on this modeling error, which is the basis for the current total allowable catch, and he's stating that the mortality rate is off by 2.5, which means the Atlantic menhaden are dying two and a half times more than people think, so that is to clear up one thing. That's one point I would like to make.

Now, you don't have to make this complicated. You could make this simple and actually report out this in the winter, or worse case this spring, and I'll tell you why. Limit the scope of the fishery investigation to striped bass, bluefish and weakfish in accordance with the ERP. Throwing all these other fisheries into it is just muddying up the water.

Limit the scope of bird study to osprey, which nests in the main stem of the Chesapeake Bay, not all osprey, not all birds, it doesn't make any sense. Limit it, and request the final report by the spring of 2025 at the Atlantic States Marine Fisheries Commission meeting. Here is the other thing. The e-mail that I sent you, Mr. Chairman, last Friday, has a format of how you should present your data.

I was a flight test engineer in the past, I used to do tests and evaluation and modifications to aircraft. I've given you a format which you could use, and it would address each one of the questions which you gentlemen had here. The science is wrong that you're using. You don't need to look at the canals on Mars, you need to look at what is pertinent to the problem at hand, and I thank you for your time.

CHAIR CLARK: Thank you, Mr. Zalesak, and Sir, just come up to the microphone, introduce yourself, and then state your comment.

MR. COLLINS: Thank you, my name is Brian Collins from Virginia. I think it is important for ASMFC to make it clear to the public, who is very distraught by the osprey failures that there won't be any change next year, it will be the same catch that, if I understand it right, in the spring you all will have a problem post here.

The other thing that is very worrisome and it's contributing to the probably impossibility of coming up with an answer is, you don't have any data on how many menhaden are left in the Bay after industrial fishing takes their share. If you talk to fishermen they'll tell you, they don't see any. The osprey and striped bass are failing.

It seems like what is needed is instead of just using historical catch, this reference to ocean stock is, pardon the reference, it's a red herring. It's like it's a distraction. The ocean is a separate ecosystem from the Chesapeake Bay, and it appears that the Board members on ASMFC don't get it.

I think the public does, and they feel like something is terribly wrong. I hope that we can get on track and find a way to monitor the stock of menhaden that are in the Chesapeake Bay, so that we can assure that there is availability for striped bass, osprey, sport fishermen and the rest of the predators. Thank you for the opportunity to comment.

CHAIR CLARK: Thank you, Mr. Collins, is there anybody else in the room that wanted to make a comment? Not seeing one, oh we have somebody online, James? Okay, we have Pete Aarrestad that would like to make comment. Go right ahead, Mr. Aarrestad. All right, very good. Any last comments on this issue from the Board? Excuse me, I didn't see you, Sir. Okay, would you come up to the public microphone, state your name and then go ahead and make your comment.

MR. RICK HERNDON: My name is Rick Herndon; I live in southern Maryland. I live closes to a highway that serves a lot of Chesapeake Bay and Potomac River. I've listened to people talk about this, and I really don't get it. There is only one reason the menhaden are disappearing from the Chesapeake Bay, and that is the reduction fishery.

It's not complicated, the menhaden are a food for the many fish and birds. It's not complicated. There is plenty of menhaden in the ocean, and what we would ask is that you would ask the reduction fishery to fish in the ocean and not in the Bay. Currently, they fish in the Bay until they cannot catch anymore menhaden, and you can follow this by the reported catching's that are online where they catch the fish.

When the season opens, they catch the fish in the Bay, when they can't catch anymore, they move into the ocean. If you want to make this difficult, I mean you can't, it's not difficult. There is only one reason the menhaden are not coming into the Bay, and that is because they are being caught right at the mouth and just inside the mouth of the Bay. I thank you very much.

CHAIR CLARK: Thank you, Mr. Herndon. Do we have anybody else from the public that would like to make comment? I do not see one. I think I speak for the Board when I can say to those of you that have commented from the public that we greatly appreciate your concerns, and we are, as I think you've heard here, we are trying to address these concerns, and I realize we are not moving as fast as you would like, but we are moving, and we have heard you and once again, I know this is a sacrifice you make to come here to make these comments, and it is greatly appreciated. Thank you.

With that we will move on to our next agenda item, which is Progress Update on the 2025 Ecological Reference Points Benchmark Stock Assessment, and that will be from Katie Drew. What happened? Oh, son of a diddly. Okay, I missed that.

CONSIDER APPROVAL OF FMP REVIEW AND STATE COMPLIANCE FOR THE 2023 FISHING YEAR

CHAIR CLARK: Okay, the next item is Consider Approval of Fishery Management Plan Review and State Compliance for the 2023 Fishing Year. I should wear glasses, I think.

MR. JAMES BOYLE IV: I'll jump right in. Here is a quick overview of the presentation. I'll just start with a reminder of the status of the stock in the FMP, before providing the 2023 landings and monitoring information. In 2023 the fishery

operated under Amendment 3, it was also the first year that Addendum I to Amendment 3 was implemented, after being approved at the end of 2022, which made changes to the coastwide allocations and the incidental catch and small-scale fishery provisions.

Also new this year, the total allowable catch or TAC for the 2023 to 2025 fishing seasons were set at 233,550 metric tons, based on the Board approved ERPs. Based on the 2022 single species stock assessment update, fishing mortality is below both the ERP target and threshold and fecundity is above both the ERP targets and threshold.

Therefore, the stock is not overfished and overfishing is not occurring. A new single-species assessment update and benchmark ERP assessment are scheduled to be presented to the Board in the fall of 2025. Moving on to 2023 landings, the total commercial Atlantic menhaden landings in 2023, including directed and episodic event set aside landings are estimated at 166,844 metric tons, or about 367.8 million pounds, which is approximately a 15 percent decrease relative to 2022, and is about 71 percent of the TAC.

There were no reported landings out of the incidental catch and small-scale fisheries provision. There was an overage in Maine incurred of about 807,416 pounds, which was deducted from their 2024 quota. The 2023 harvest for the reduction fishery is estimated at 117,019 metric tons, or about 258 million pounds, which is a 13 percent decrease in 2022 and 15 percent below the previous five-year average, which is about 303 million pounds.

As far as the Chesapeake Bay reduction fishery cap, the reported reduction landings in the Bay were less than 40,000 metric tons, which is under the cap of 51,000 metric tons. This figure shows landings from the reduction and Bay sectors through time, with 2023 added. The reduction landings correspond to the left-hand access and bait landings to the right. Please note the different scales. The reduction landings are an order of magnitude larger than the bait landings. Despite the decline last year, generally the trend continues to show a decline in reduction landings overall and an increase in the variable bait landings. As previously mentioned, there were no incidental catch/small-scale fishery landings in 2023. The PRT made a particular note of this significant decrease, given that one of the purposes of the commercial allocation changes in Addendum I was to reduce the landings under this provision. Maine was the only participating state in the episodic event set aside program and landed 1,274 metric tons, or about 2.8 million pounds, which is a 36 percent decrease from 2022, and 55 percent of the set aside.

However, 185,538 pounds of that total were reported after the remaining set aside was redistributed to the states, which created an overage. Quota transfers in 2023 and 2024 covered that overage, therefore there was no deduction from the 2024 set aside. There were five state to state quota transfers in 2023, a decrease from ’24 and 2022. Similar to the incidental catch landings the PRT made to do a note of the significant decrease, given that another goal of the commercial allocation changes in Addendum I was to reduce the need for quota transfers.

For biological monitoring, non de minimis states are required to conduct biological sampling based on their bait landings, as well as their geographic region. From Maine to Delaware, they are required to take one 10 fish sample per 300 metric tons of bait landing. From Maryland to North Carolina, it is one 10 fish sample per 200 metric tons.
In 2023 Connecticut was not able to collect their required samples, but did note the fishery independent samples from the Long Island Sound Trawl Survey collected 108 and 525 length samples over 158 tows. In previous years the PRT has had discussions about the sampling requirement, and particularly substituting fishery independent samples, but makes no further recommendations at the Stock Assessment Subcommittee is already reviewing this requirement as part of the single-species stock assessment.

Pennsylvania, South Carolina, Georgia and Florida continue to request *de minimis* status and all qualify based on their commercial landings, same as last year. With that the action for the Board to consider today are to approve the 2023 FMP Review, state compliance reports, and de minimis requests. With that I am happy to take any questions.

CHAIR CLARK: Any questions for James? Not seeing any. There is a question online? Okay, no questions online either. All right then, I believe we probably have a motion ready for this, because this is an action item, and in that case, we will need somebody to make the motion. We have Doug Grout.

MR. DOUGLAS E. GROUT: **I move to approve the Fisheries Management Plan Review, state compliance reports, and *de minimis* requests for Pennsylvania, South Carolina, Georgia and Florida for Atlantic Menhaden for the 2023 fishing year.**

CHAIR CLARK: Thank you, Doug, and second, we have Jim Gilmore. I'm guessing we don't need any discussion of this item. Are there any objections to approval of this motion? Not seeing any, **the motion is approved by consent**. Okay, thank you. That concludes Item Number 4.

PROGRESS UPDATE ON 2025 ECOLOGICAL REFERENCE POINT BENCHMARK STOCK ASSESSMENT

CHAIR CLARK: Now we move on to the Progress Update on 2025 Ecological Reference Point Benchmark Stock Assessment, and go right ahead, Katie. Thank you.

DR. DREW: This will be fairly brief, but I just wanted to remind the Board about our assessment timeline, since that did come up. We have progressed through this timeline, and our current next milestone is the Methods Workshop 2, which will be held in person the week of November 4th in Arlington, Virginia, and that will cover several items, which I'm going to talk about in more detail. But that will be held in person the week after next, and we are then scheduled to have an Assessment Work Shop in February to March.

We haven't set the exact date, but we'll decide on that once we see the progress we make at this modeling work shop, the Methods Workshop, with the goal of having this be peer reviewed in August 2025 through the SEDAR process, so that it can be presented to the Board at our annual meeting in October of next year.

At the Methods Workshop 2 we'll be reviewing the results of the single species assessment update, and reviewing progress on ecosystem model development, as well as discussing model comparison criteria and some of the ERP scenarios that we would like to incorporate as we continue the model development.

The other major item which may be of interest to the Board and/or the public is developing a plan to address this M question. As has been brought up before, Dr. Ault and his colleagues reanalyzed the historical menhaden tagging data and estimated an M that was lower than we use for the single species assessment.

However, the SAS is not really going to be able to resolve the discrepancies between the estimate that Ault et al are getting and the estimate that Liljestrand et al got. They have not been able to make a recommendation on what the preferred M is. They are noting that there are differences in number one, the effort time series that is used in this model.

The fishing effort helps estimate some of the migration weights as well as basically helping to separate out how much of the fish disappearing is natural mortality and how much of it is fishing mortality? Liljestrand et al were able to have access to a confidential dataset of effort that was more spatially explicit.

Ault et al was not able to get that confidential data, and so reconstructed an effort time series from data that were available. But obviously there are discrepancies there. In addition, the two datasets that are used are slightly different, so they are both based on that historical tagging dataset that was reported in Coston, where those results of the tags and the recaptures were summarized for a monthly level, which Liljestrand et al used.

A secondary dataset was developed from the original paper historical records that were re-digitized several year ago. However, Liljestrand et al found that when they examined that dataset, although it was more fine scale, in terms of the available data of tags and recaptures that were recorded, it was missing a number of batches of tags that were reported in the Coston dataset, so it appears that the paper records that were digitized through this process were not the complete Coston dataset.

As a result, Liljestrand et al used the Coston dataset, which they felt was more complete, but was summarized to a more generalized level. Ault et al used the finer scaled data, which appeared to be missing some of the batches of tags that were released. Both of these things may be contributing to the different estimates of natural mortality that we are getting out, and the Technical Committee and the SAS would like to dig more into this issue overall, and come up with a firm recommendation on which M to use, or what the best estimate of M used in this assessment is.

As a note, changing the estimate of M is part of ASMFCs per those guidelines for a benchmark assessment, that is changing the estimate of M requires a benchmark assessment. At this point, we're going to have the final decision on M peer reviewed through the ERP benchmark. The ERP benchmark does include a TOR.

TOR Number 1 is to review and evaluate the fisheries dependent and fishery independent data use in the Atlantic Menhaden Single Species Assessment and the other ERP species assessment, and then justify the inclusion, elimination or modification of these datasets. The change in natural mortality would be the only change that we would be making to the single species assessment.

We feel that we could be peer reviewed through the ERP benchmark process, so that we can have this specific issue resolved and then peer reviewed, and ready to go as part of the management advice that we provide in October. That is all that I have on what is coming up, and I am happy to take any questions.

CHAIR CLARK: Thanks, Katie. Before we take questions, would you just quickly explain the implications of the changing M, just so it is on the record so people know.

DR. DREW: With these models, using a higher M will result in a higher estimate of biomass or abundance of menhaden in the single species assessment model. If the M that we are using is too high, then we will be overestimating the population size of menhaden. The overall trends will be the same. In general, the M is really just a scaler.

I think when we've looked at this in the past with the single-specie assessment, it did not change stock status relative to the single species reference points. However, this assessment does feed into that ERP reference point assessment, and I don't think we have a good grasp on what the implications will be for the ERP reference points themselves. While definitely the scale of the population will change, I don't think it's clear to us how that will affect our perception of the stock status from an ecological perspective.

CHAIR CLARK: Thanks, Katie, and with that we'll move right to questions. I think I saw Allison. Go right ahead.

DR. COLDEN: Thank you for the update, Katie. Just two clarifying questions related to the natural mortality issue. Could you remind us about the timing of the ERP benchmark.

DR. DREW: Yes, that was the original table that we just presented is going to be peer reviewed in August, and then the results will be presented to the Board at the October meeting. The assessment, the single species will come along with that the whole way.

DR. COLDEN: Okay, thank you. Then when we, I think the last time we discussed this as a Board, there was the thought that the group would be just doing some sensitivity runs with respect to natural mortality. Should we expect, based on this conversation and the additional Methods Workshop, that you all will be exploring things beyond just sensitivity runs, with respect to the natural mortality rates?

DR. DREW: Yes, I think we, well there is the potential that after reviewing the available datasets and various studies, if the SAS recommends changing the natural mortality rates, then we would provide a fully new model as the base model. There would be still sensitivity runs to explain the effects of this change.

If after reviewing it the SAS feels that the Liljestrand method or estimate is the best available science, then we would go forward with that, but we would include those additional runs with the lower estimate of M, and have all of that signed off on by the peer review panel.

CHAIR CLARK: We have a question from Emerson. Go right ahead.

MR. EMERSON C. HASBROUCK: Thank you, Katie. I understand you have to fill a value ending with a discrepancy in M, but if M actually or might be lower, wouldn't there be a retrospective in the prior benchmark, or maybe the single species or the ecological reference points you don't want a retrospective?

DR. DREW: We do for the single species assessment, and there is a retrospective pattern, but I would say it's not as bad as some we've seen in other species. I don't think the pattern that we see is enough to have flagged that as a potential concern. I think we would say that is maybe not a diagnostic one way or the other necessarily, as to which is superior.

Certainly, we would be looking at the retrospective pattern as a potential diagnostic, as we compare the runs with these different estimates of natural mortality. But if not, the pattern that we see is not significant enough to have caused that level of concern.

CHAIR CLARK: Any further questions? Yes, Rob LaFrance.

MR. LaFRANCE: Not a question but a comment. I want to thank you, Katie, for being able to get this done in a timeframe before a complicated work. The fact that we're going to get something back peer reviewed hopefully by November 2025. I think that is outstanding, and I just want to thank you.

CHAIR CLARK: That is certainly the case. Nothing simple about menhaden and greatly appreciate all the work that goes into that. Any further questions or comments? Okay, seeing none, that concludes that item. Then we're moving on to Item Number 7, which is Elect a Vice-Chair. Let me recognize Mr. Mel Bell of South Carolina for this.

MR. MEL BELL: I would **move to elect Joe Cimino as Vice-Chair of the Atlantic Menhaden Management Board.**

CHAIR CLARK: Do we have a second? Yes, we do. Ray Kane. **Any discussion on this motion? Seeing none**; like you don't have enough to do, Joe. We are glad to have you on as the Vice Chair of this Board. Okay that concludes Item Number 7.

OTHER BUSINESS/ADJOURNMENT

Is there any other business to come before the Board?

Not seeing any; just before we finish up, just once again I wanted to thank James and the Work Group

for all their work on this, it's a very difficult problem and once again thanks to Katie and the Stock Assessment Committee the ERP Committee. This is a heck of a lot of work that has gone into this, and great job. Okay, do we have any objection to adjourning? Seeing none then we are adjourned.

(Whereupon the meeting adjourned at 3:45 p.m. on October 22, 2024)

Atlantic States Marine Fisheries Commission

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MEMORANDUM

TO: Atlantic Menhaden Management Board

FROM: Atlantic Menhaden Work Group

DATE: April 23, 2025

SUBJECT: Precautionary Management of Chesapeake Bay

Executive Summary

At its August 2024 meeting, the Atlantic Menhaden Management Board (Board) agreed to form a Work Group of Board members to "consider and evaluate options for further precautionary management of Chesapeake Bay menhaden fisheries, including time and area closures to be protective of piscivorous birds and fish during critical points of their life cycle." This charge asserts there is an inadequate supply of menhaden to support overall predatory demand in the Bay. However, the Work Group addressed this charge without determining if there is or is not an adequate supply of menhaden to support predatory demand in the Bay. Instead, it has developed feasible management approaches, and it is the responsibility of the Board to determine if or when it is necessary to implement them. The Work Group represented a balance of different backgrounds, regions, and perspectives; the members were:

Martin Gary (NY, Chair), Ray Kane (MA), Rob LaFrance (CT), Loren Lustig (PA), Joe Cimino (NJ), Allison Colden (MD), Pat Geer (VA), Spud Woodward (GA).

The Work Group met nine times between September 2024 and April 2025 via webinar and in-person to discuss alternatives for precautionary management in Chesapeake Bay that could be considered if the Board chooses to initiate a management document. Additionally, the Work Group created two subgroups, which each met once in September 2024, to begin evaluating data sources for piscivorous bird and fish species, respectively. In addressing the Board task, the Work Group developed the following questions to guide their consideration of potential management approaches:

1. What is the problem any management action would address?
2. What are the priority species to consider, and what are the critical points of their life cycle?
3. What data can be used to support this discussion?
4. For each management strategy discussed, what are the benefits and implications?
5. How would the performance of potential measures be evaluated?

The availability of menhaden may be affected by changes in total abundance, size distribution of the population, and timing of presence and spatial distribution in the Bay, which can be caused by fishing pressure, environmental conditions, habitat suitability, and/or changing predation pressures on a limited spatial and temporal scale. Such changes in menhaden availability may affect the species' ability to fulfill its ecological and/or economic functions. Recent observations of below average commercial fisheries landings and declining population reproductive rates of ospreys within the mainstem Chesapeake Bay suggest that availability of menhaden in Chesapeake Bay is likely changing due to one or more of the above drivers.

Potential Management Approaches

Based on the life history of the predators examined, the nature of Chesapeake Bay menhaden fisheries, and recent changes in menhaden availability, the Work Group discussed a number of precautionary management options that the Board could consider for further action. The approaches listed below could be implemented individually or in combination, depending on the Board's risk tolerance and management goals. A full description of the background information considered and the potential management options under each approach can be found in the Work Group report.

A. Seasonal Closures

Many of the species examined are seasonal inhabitants of Chesapeake Bay, utilizing the area as spawning and nursery grounds. Some species, like striped bass, have population contingents that are full-time residents in the Bay while other individuals leave the Bay to join the coastal migratory stock. Bird predators, particularly osprey, show high consistency in their arrival and departure times in the Chesapeake Bay, with only slight variations from year to year due to weather patterns.

Due to the seasonality of predator demand in the Bay, seasonal closures may be a management option that could reduce menhaden harvest during certain times of the year that are critical to predators' life cycles. This option presumes that decreasing menhaden harvest during these times of year will allow more menhaden to be available as forage for predators. Although, the Work Group noted concerns that implementing seasonal closures may lead to a concentration of harvest effort during other times of the year with unknown or unintended consequences. The Work Group discussed a suite of possible seasonal closure options, which focus primarily on the needs of the osprey population as a proxy for other predators as they exhibit relatively predictable seasonal habits and are showing signs of food stress. Ospreys have the highest and most critical bioenergetic requirements between May 1st and August 15th, and the range of options discussed includes subsets of this timeframe with considerations for the impacts to ospreys and menhaden fisheries.

B. Area Closures

A September 13, 2024, press release by Dr. Bryan Watts of the College of William and Mary's Center for Conservation Biology, compiled the 2024 osprey breeding performance in Chesapeake Bay. The study found all nesting pairs in waters with salinity greater than 10 ppt had some level of deficiency while the upriver sites were considered reference sites having a surplus at 1.36 young per nesting pair. Six of the Bay sites had what was defined as "major deficit" with < 0.6 young/pair.

Based on the results of this study and the Board task, the Work Group discussed a range of spatial closures that may increase the availability of menhaden for ospreys throughout the Bay, particularly in areas that exhibited the highest reproductive deficit. The Work Group considered mapping fishing effort over the 12 study areas to better inform potential targeted closures, but there was not a consensus within the group on the use of this method.

Additional closure options discussed by the Work Group include closure of all Chesapeake Bay (including or excluding existing MOU areas), closures based on fishing effort, or closures based on areas with the most scientific information on osprey reproduction and survival.

C. Effort Controls

The implementation of quota periods or days out provisions could be used to distribute fishing effort more evenly throughout the season. These provisions are similar to management of the Atlantic herring fishery in which quota periods are used to manage catch toward bimonthly, trimester, or seasonal quotas to effectively manage catch to meet the needs of the fishery and bait market demand.

D. Gears Included in Potential Management Actions

The Work Group discussed the possibility of restricting potential seasonal and/or spatial closures to certain gear types or sectors based on landings or potential impacts to other fisheries but did not reach a consensus on the use of this approach. The Board will need to closely consider the applicability of management options across gears and sectors if further action is taken.

E. Decreasing Chesapeake Bay Reduction Fishery Cap

The Board could further reduce the Chesapeake Bay reduction fishery cap, which is currently based on historical landings, to reduce the impacts of reduction fishing in Virginia waters of the Chesapeake Bay. This would presumably leave additional menhaden as forage in Bay waters for all predators. This option could be combined with quota periods or other effort controls to help

distribute effort more evenly throughout the fishing season. In the past, reductions in the Bay cap have reflected recent Bay landings, usually from the previous five years. While more than 5 years have elapsed since the last update of the Bay cap, average landings have been at or near the 51,000 metric ton cap, indicating a reduction based on landings is likely to be small, if there is a reduction at all. Therefore, the Board may need to consider a novel approach to setting the Bay cap based on information provided by the Work Group or from other sources.
Reduction of the Bay cap is a conservative option considering it only impacts the reduction fishery within Chesapeake Bay. Reducing the Bay cap does not impact the quota allocation of the reduction fleet, only the amount of the allocation that may be caught within Chesapeake Bay waters. This option also precludes any negative impacts to bait fisheries which serve crab and lobster fisheries along the coast as it only applies to the reduction fishery. The Work Group also noted that the Bay cap is a precautionary measure and further research is needed to develop a biologically-based cap.

F. Research Recommendations

In reviewing the information to meet its charge, the Work Group identified several areas in need of additional research and data to address questions beneficial to ecological management of menhaden fisheries in Chesapeake Bay and beyond. The resulting research recommendations can be found in the Work Group report.

Work Group Report

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Background

In August 2024, USGS staff presented to the Board a summary of the latest information regarding osprey abundance, spatial and temporal distribution, dietary demands, and timing of fledge in the Chesapeake Bay region, as well as ongoing research and information gaps. Osprey data comes from two primary sources: the North American Breeding Bird Survey and the eBird database. Long term trends show significant population growth from both a continental and regional perspective. Since 1966, osprey abundance has shown a 299% increase in North America, a 587% increase on the Atlantic coast, and a 1,801% increase in Chesapeake Bay. However, since 2012, eBird data estimates show declines in some areas around Chesapeake Bay, particularly in the lower Bay where local reproductive rates have declined sharply since 1975 to below the population maintenance level. There are numerous pressures that may affect osprey reproduction, including food availability, habitat loss leading to greater levels of inter- and intraspecific competition, disease, algal blooms, inexperienced breeders, environmental contaminants, and water depth and clarity. Additionally, abundance indices in other Atlantic and Pacific coast states show similar plateauing and short-term declines since 2012. Osprey diet composition varies by salinity in different regions of the Bay with menhaden being the second-most consumed species in the higher salinity areas, including the lower Bay. Ongoing research in Chesapeake Bay seeks to compare the availability of osprey prey, including menhaden and other fish species, between current and historical populations.

Osprey Residence and Prey Needs in Chesapeake Bay

Ospreys begin to arrive in lower Chesapeake Bay in late February and arrival peaks by mid-March, and slightly later in the more northerly portions of the Bay (Bent 1937; Reese 1991; Watts and Paxton 2007). Most breeders are here by late March. A cutoff for arrival of breeders is typically taken to be 15 April.

Departure schedules for breeding adults and hatch-year birds differ by as much as a month with adults initiating migration in late August through mid-September and hatch-year birds leaving later (Poole 1989; Watts and Paxton 2007). It should be noted that during the early fall there is a mix of resident birds and migrants (from northern breeding populations beyond the Bay).

The most bioenergetically demanding period during the annual cycle is when osprey pairs are raising broods. Historically, this period has been from mid-May through mid-July (B.D. Watts, The Center for Conservation Biology, William and Mary, written communication, December 4, 2024). Figure 1 indicates that the period of highest energy demand at the population level is

from mid-May through mid-August. It is important to note that the period of peak demand is not necessarily the period of critical demand. Most broods are lost within the first 2 weeks of development. Their demand is relatively low at that age, but the adults must meet that demand, or they will die. Older chicks have more energetic reserves and can overcome short periods of food deficit; young chicks cannot. It is critical that enough fish be available that can be captured by adults and delivered to the nest during the May period so that broods can make it through this bottleneck.

Ospreys prefer to nest over water when appropriate substrates are available, presumably related to the "escape from ground predator" benefits (Poole 1989). Prior to the 1960s, the majority of nests were on snags and live trees. Since the 1960s, the majority of nests have shifted to human-made structures (Watts et al. 2004; Watts and Paxton 2007). There have been a couple of waves of the appearance of human-made structures including the rapid expansion of aids to navigation during the 1970s, and then later the rapid expansion of private osprey platforms since the 1990s. Thus, there have been shifts in substrate use over time, but the general requirements remain unchanged. Ospreys prefer stable structures that offer protection from predators and are near adequate sources of fish (Poole 1989; Watts and Paxton 2007).

Ospreys exhibit high nest site fidelity. Generally, once a nest site has been established, the pair will use it for many years or until there has been a change to the structure (Poole 1989). If the nest is lost to weather or to human removal, the pair will rebuild the nest. However, if the structure itself is lost or altered in some functional way, the pair is forced to select another structure typically within a short distance of the original nest. If no appropriate structure is available after its loss, the pair will move and find a new place. Nest substrate can certainly be limiting in various parts of the Bay, but more so historically than now due to the proliferation of nestable human-made structures.

In some populations most of the foraging is within site of the nest (< 2 km), but in others it can range much further (15-20 km). Some individuals have preferred hunting areas and spend quite a bit of their time in those areas, while others are much more variable in where they forage. Across pairs, a high proportion of prey come from within 10 km of the nest site (Poole 1989).

Osprey have evolved a behavioral mechanism to match the brood demand to the available food. Many pairs in Chesapeake Bay hatch three chicks. If there is enough food to provision all of the chicks, then all will develop and grow synchronously and survive. If there is not enough food to sufficiently provision the three chicks, then a dominance hierarchy will form, and subordinate chicks will be fed last and may die. This process is referred to as brood reduction – reducing the brood and associated metabolic demand to match food availability. If the dominant chick does

not get enough food, the nest will fail. Brood reduction on a large scale is an indicator of food stress (Poole 1982; Hagan 1986; Eriksson 1986; Bowman et al. 1989; Steidl and Griffin 1991; Machmer and Ydenberg 1998).

For Mobjack Bay, substantial declines in reproductive rates, overall provisioning rates, provisioning rates with menhaden, proportion of the diet comprised of menhaden and diet quality have been documented. An increase in male foraging time and brood reduction has also been observed. Importantly, reproductive rates have transitioned from surplus to deficit (Academia and Watts 2023; Watts et al. 2024) and brood size has declined significantly (Watts et al. 2024; Table 1).

In 2024, 12 study areas were monitored in Chesapeake Bay including 10 within the main stem of the Bay (salinity >10 ppt) and 2 in the lower salinity reaches (<1 ppt). All main stem sites were in reproductive deficit, while the 2 lower salinity reference sites were in reproductive surplus. During the nesting period, osprey are dependent on one to two species for prey. In Mobjack Bay, menhaden comprised nearly 75% of fish provided to broods in the late 1980s (Watts et al. 2024). Currently, it is believed that ospreys nesting in much of the main stem of the Bay are menhaden dependent with menhaden comprising 44% of the osprey diet at Poplar Island and 24% in the lower Bay near the Eastern Shore of Virginia. Osprey in low salinity areas do not depend on menhaden as prey (Glass and Watts 2009; Lazarus et al. 2016), instead relying on fish abundant in these regions, including catfish, gizzard shad, and Atlantic croaker.

Menhaden Fisheries in Chesapeake Bay

The Atlantic menhaden commercial fishery in Chesapeake Bay consists of a reduction fishery and a bait fishery. The Virginia reduction fishery has been in operation for 147 years in Reedville, Virginia, and provides fish meal, fish oil, and fish soluble products. The bait fishery is the primary source for the blue crab pot fisheries and chum bait from Delaware to Florida, as well as a provider to the New England lobster fishery.

Virginia's menhaden quota for 2023 was 388,140,547 pounds (75.21% of coastwide quota); Maryland's quota was 5,965,566 pounds (1.17% of coastwide quota). Virginia further allocates its in-state quota between sectors with the reduction fleet receiving 90.04%, the purse bait sector receiving 8.38% and the non-purse seine bait fisheries receiving 1.58%. Purse seine gears including bait purse seiners comprise the overwhelming percent of Virginia's menhaden harvest over the past five years (2000 – 2024) at 98.4% (88.7% reduction and 9.7% bait). Gill net and pound net harvest for bait are 0.80% and 0.77% respectively. Maryland's commercial fishery is

exclusively a bait fishery and is primarily harvested by pound nets. Between 2019-2023, Maryland has landed an average of 35.9% of its total quota, approximately 2.8 million pounds.

Virginia Purse Seine Fisheries

The Virginia purse seine fisheries (both reduction and bait) use spotter aircraft to locate schools of menhaden and direct vessels to the fish. When a school is located, two purse boats, with a net stretched between them, are deployed. The purse boats encircle a portion of the school and close the net to form a purse, or bag. The net is then retrieved to concentrate the catch, and the mother ship comes along the side and pumps the catch into refrigerated holds. Individual sets can vary from 10 mt to more than 100 mt, and large vessels can carry 400-600 mt of refrigerated fish.

Purse Seine Reduction Fishery

The menhaden reduction fishery is seasonal as the presence of menhaden schools is dependent on the temperature of coastal waters. Two fairly distinct fishing seasons occur: the "summer fishery" and the "fall fishery". The summer fishery begins in April with the appearance of schools of menhaden off the North Carolina coast. The fish migrate northward, appearing off southern New England by May-June. The fall fishery begins when migratory fish appear off Virginia and North Carolina. In early fall, this southward migration is initiated by cooling ocean temperatures. By late November-early December, most of the fish are found between Cape Hatteras and Cape Fear, North Carolina.

The Virginia Chesapeake Bay menhaden purse seine season starts the first Monday in May and ends the third Friday in November, while the ocean season (east of the Chesapeake Bay Bridge Tunnel) ends the Thursday before Christmas (Code of Virginia, § 28.2-410). In 2024, the Bay season was May 3 through November 15, or 197 days, and the ocean season through December 19 (231 days). The presence of menhaden schools is dependent on water temperature, as such, catch and effort varies across the season. The industry logs daily activity on the Captain's Daily Fishing Reports (CDFRs), which include information on vessel, date, time, location, estimated catch, reporting area and weather conditions for each set.

In general, there has been a decline in the overall effort in the reduction sector since the early 2000's with effort in the Bay accounting for just under half the total effort (49.29%) over the past five years (Figure 2), though effort in the Bay is capped at 51,000 metric tons based on the current Chesapeake Bay reduction fishing cap established in Amendment 3 to the Atlantic menhaden FMP. Over the past ten years (2015-2024), 49.50% of the reduction Bay effort and

46.09% of the Bay harvest occurred prior to July 15 (Figure 3, Tables 2 and 3). However, this is highly variable with the past two years' catch and effort significantly below average until the end of June (Table 3), after June both years were near or above the 5-year and 25-year averages (Figures 4 and 5, Table 3).

Spatially, each net set is reported to one of 7 areas in the Bay and 2 areas in Virginia's coastal waters (Figure 6). Catch and effort are greatest in the northwest area of Smith Point, with 33.20% of effort and 27.96% of harvest over the five most recent years (2020-2024) (Figure 7). Through July the Smith Point area has the highest activity, after which activity is highest in areas of the lower Bay near the mouth and along the Eastern Shore (Oceanview, Cape Charles, and York River) August 1 through September 15 (Figure 7). Activity in the Bay wanes beginning in October with less than 4% of the total bay effort occurring the remainder of the season.

Purse Seine Bait Fishery

The purse seine bait fishery catch and effort shows similar trends, with 2023 weekly harvest reports well below average through the week ending July 21, while 2024 reports were similarly below average nearly the entire season (through the week of November 8) (Figure 8). Purse seine catches are typically low the first two weeks in May but pick up substantially through the end of the month and into July. This increasing harvest trend was not observed in 2023 until late June (Figure 8). These below average and significantly below average purse seine harvest reports early in the 2023 and 2024 seasons warrant further examination given the latter part of the season was at or above normal.

Activity of the purse seine bait fishery is distributed differently than the reduction sector with effort rising steadily in late May and remaining consistent through July, following by a steady decline through October (Figure 7). The Smith Point reporting area again dominates catch (34.25%) and effort (37.87%), followed by Cape Charles (C=23.24%, E=16.68%), Silver Beach (C=15.47%, E=12.62%), and the northeasterly area, Pocomoke Sounds with 11.71% of the catch and 14.72% of the effort over the most recent 5-year time period (Figure 7).

Overlap with Osprey Study Areas[1]

Of the 6,257 menhaden Bay purse seine net sets reported on the CDFR's between 2020 and 2024, only 113 net sets (1.81%) occurred in just four of the Watts et al. 2024 osprey study areas (Fleeton Bay, Mobjack Bay, Eastern Shore, and Piankatank River) (Figure 9 and Table 5). The osprey workgroup indicates that May and June are the most sensitive times for osprey (USGS,

[1] Members of the external Osprey Work Group cautioned the Board Work Group against using the Watts et al. 2024 study areas in this manner as they assume menhaden biomass is static and that the effects of menhaden harvest are restricted to the local area of harvest

personal communication, ASMFC Menhaden Board Meeting, August 2024). The CDFRs indicate that 8.41% of the May effort occurred in one three study areas: Fleeton Bay – 59 sets or 7.88%; Eastern Shore – 3 net sets or 0.40%; and Piankatank River – 1 net set (0.13%) (Figure 7 and Table 5). June had 1.15% of the purse seine net sets in proximity to the Fleeton Bay (N=7, 0.54%) and Eastern Shore osprey study areas (N=7, 0.62%) (Table 5). Mobjack Bay has been the center of attention regarding recent osprey nesting studies, however only 22 menhaden purse seine net sets occurred in the osprey study areas over the past five years, and none during the critical May to June window for osprey (Table 5). Most of that Mobjack Bay purse seine effort occurred in August of 2021 (N=14) and 2022 (N=7).

Non-Purse Seine Bait Fisheries

Menhaden from bait fisheries is primarily harvested by pound nets, gill nets, and haul seines. Virginia's non-purse bait harvest is dominated by gill nets (50.84%) and pound nets (48.95%) with haul seines at 0.15% over the past five years. The pound net fishery in the Chesapeake Bay region is carried out by numerous small, non-refrigerated vessels. Maximum hold capacity of these pound net vessels is 9 mt or less, but daily catches are usually well below vessel capacity and are limited by the number of fish encountered in the fixed gear. The majority of these fish supply the local blue crab fishery.

Pound Net Fisheries

Pound nets comprise 0.16% of the overall menhaden harvest annually in Virginia (average= 2.10 million lbs) and 97.23% in Maryland (average=2.24 million lbs) over the past five years. Annual catch-per-unit effort (CPUE) measured as lbs per net-day has been relatively stable on the Potomac River (2,434 lbs per net day) with the exception of 2023 and 2024 when CPUE declined sharply. Similar estimates in Virginia and Maryland have been significantly below the 10-year average (MD = 2,242 lbs per net-day, VA=2,053 lbs per net day) for both 2023 and 2024 (Figure 10). On a monthly basis, menhaden first appear in pound net catches in March, peak during the summer months, with a steady decline in harvest into the fall (Figure 11). Harvest for the last two years (2023 and 2024) was generally at or below both the 5 and 10-year averages in Maryland, while Virginia's monthly harvest was significantly below average April through October, 2024 (Figure 11).

As shown in Figure 12, pound net distribution in the Chesapeake Bay is primarily located on the lower Eastern Shore and Northern Neck on the western side of the Bay with a small number of pounds in Virginia Beach, northern Eastern Shore, and the tributaries. VMRC harvest reporting areas were used to represent spatial coverage by month (Figure 13). Pound net harvest tracks

the location of pound nets well, with 83.62% of all harvest (2020-2024) occurring in the Chesapeake Bay Upper West Area (CBUW) with the Rappahannock River at 10.42% (Figure 13).

Overlap with Osprey Study Areas

Of the 136 Virginia licensed pound nets in 2024, 10 occurred within the Fleeton Bay osprey study area with another 22 just to the north (Figures 12 and 13). Eight pound nets were located in the Eastern Shore osprey study area and 6 in proximity to the Lynnhaven study area. The MRC reporting area CBUW (Chesapeake Bay Upper West) (Figure 13) is where the bulk of the pound net harvest originates (83.62%) – Fleeton Bay occurs in that reporting area. Over the past 5 years (2020-2024), 37.54% of all pound net harvest was reported from this area during March to June (Figure 13).

Gill Net Fisheries

Gill nets comprise 0.15% of the overall menhaden harvest annually in Virginia (average= 2.06 million lbs) and 2.73% in Maryland (average=62,988 lbs) over the past five years (Figure 14). Maryland harvest has averaged 206,508 lbs annually over the past ten years but has observed significantly lower harvest since 2021. Virginia has averaged 2,132,885 lbs the past ten years but significantly below that value in 2023 and 2024 (Figure 14). Gill net harvest of menhaden is primarily February to April in Virginia waters and March to April in Maryland (Figure 15). Catches appear to be delayed somewhat in Maryland with the peak month of harvest in April. The 2024 harvest for nearly every month was significantly below the 5 and 10-year averages in Virginia waters.

Spatial distribution of gill net activities is more dispersed than pound nets. In Virginia, Western Upper Bay (CBUW) dominates harvest during the peak months of March and April and comprises 32.92% of the total gill net harvest. The Eastern Upper Bay (CBUE) represented 20.30% of the 5-year total but harvest was down in that area in 2024 compared to previous years.

Overlap with Osprey Study Areas

Menhaden harvest from gill nets is more complicated than that from pound nets. In Virginia, various types of gill nets are utilized (anchored, staked, drift, etc), targeting a number of species (bluefish, blue catfish, croaker, black and red drum, striped bass, Spanish mackerel, speckled trout, gizzard shad, and menhaden) throughout the year. Maryland banned the use of anchored and staked gill nets in 1992. Drift gill nets are permitted but must be attended at all times.

Menhaden are mostly caught with anchored gill nets in the spring months (March to May) in Virginia's western Bay (CBLW and CBUW - (Figure 16) with 68.71% of the 5-year harvest occurring during that three-month period (Figure 16). The Eastern Shore osprey study area is included in the CBUE reporting area with 9.48% of the overall harvest, with the lower Chesapeake Bay reporting area at 3.15% (Figure 16). The York River reports 15.05% of the overall menhaden harvest with gill nets, James River has less than 0.7%, the Poquoson River at 0.53%, Piankatank River at < 0.5%, and Rappahannock River at 6.41%. Overall, the Mobjack Bay gill net harvested was 7.52% over the past five-years, with 6.07% of that harvest in March and April. The single highest month of harvest in Mobjack Bay occurred in March 2021 (Figure 17).

Background on Additional Piscivorous Bird and Fish Predators

Cormorants and Pelicans

Double-crested cormorants and brown pelicans are two additional predators of menhaden whose numbers are increasing in Chesapeake Bay. Atlantic menhaden make up 50-55% of the diet of cormorants and 74% of the diet of brown pelicans by weight. Other important fish for cormorants were spot (8-27% of diet) and Atlantic croaker (13-16% of diet). For brown pelicans, bay anchovies were also important (14% of their diet)(Watts and Duerr 2009). Breeding of the Double-crested Cormorant in Virginia was first confirmed in 1978 on a small, vegetated island in the James River near Hopewell. Colonization of Virginia represents an expansion beyond the historic range following a low during the DDT era (1940s-1972). After 1984, the Virginia population expanded rapidly to 5 colonies by 1995 containing more than 400 pairs. The seaside of the Delmarva was not colonized until 1995. Between 1993 and 2018 the population has increased by 1416% from 354 to 5,012 pairs. Most of this increase is accounted for by the rapid expansion of the Shanks Island colony. The colony has expanded from 6 pairs in 1993 to 907 pairs in 2003 to 1, 636 in 2008 to 2,369 in 2013 to 5,012 in 2018. This trend continued until 2023, when erosion significantly deteriorated Shanks Island, leading to a significant drop in cormorants located within Virginia to just over 3000 breeding pairs (Watts et al. 2019).

Double-crested cormorants live in the Chesapeake Bay area year-round, but winter is an especially important time, as they overwinter around the bay and along the south Atlantic. There are two migration dates; initial arrival in the spring, with the earliest departure for spring migration around March 26th, and the latest around May 12th and departure for the winter, where some populations migrate south to wintering grounds in the fall, with the average departure date for fall migration around October 1st (Watts et al. 2019).

The Brown Pelican was first found breeding in Virginia on Fisherman Island in 1987. During this same year, birds were also found nesting on Metomkin Island. Colonization of Virginia represents a northward range expansion from North Carolina that extends beyond the historic range and follows recovery of southeastern populations from contaminants. Since its discovery, the Shanks Island colony has grown exponentially apparently fueled by continued immigration. In 1993, there were only 53 pairs documented in this colony. By 1999, the colony supported 913 breeding pairs. The colony reached a peak in 2013 with 1,857 pairs and has now declined to 1,753 pairs. The Wreck Island colony has shifted south on the island over the past couple of years, expanding dramatically and now including 1,493 pairs (Watts et al. 2019).

Virginia is the northernmost state that supports a year-round brown pelican population, especially further south in the state near Virginia Beach and at the mouth of the Chesapeake Bay. Nesting and egg laying occurs between March and May, with females laying 2 to 3 eggs per clutch. Eggs then take about 30 days to hatch, and first flight takes around 75 days (Watts et al. 2019).

Striped Bass, Cobia, Red Drum, Spanish Mackerel, Spotted Seatrout, Weakfish and Blue Catfish

The present Ecological Reference Point (ERP) assessment models developed for Atlantic menhaden consider only four predatory fish species (striped bass, bluefish, weakfish, and spiny dogfish), with striped bass fitting the models best. These species have historical significance in the Chesapeake Bay and have been well studied. The latest coastwide assessments indicate striped bass is overfished, bluefish are presently rebuilding, weakfish are depleted due to high levels of natural mortality, and spiny dogfish reproductive output is declining but stabilizing (ASMFC, 2024).

Commercial and recreational harvest for all these species (with the exception of spiny dogfish) have shown a negative trend for the last ten to twenty years in the Chesapeake Bay (Figures 1 and 2). To the contrary, other migratory species, such as cobia, red drum, spotted seatrout and Spanish mackerel have increased in abundance and length of residency in the bay due to warming water temperatures (Figures 18 and 19). In addition to these estuarine species, the introduced blue catfish population is expanding (Figure 20), causing concerns for the Bay states due to its diet of important species such as blue crabs, alosines, and menhaden. As the Bay's population of these traditional species declines, so does their ecological demand for forage species such as menhaden. As other species abundance increases, their forage demands will increase but the overall effect of this species shift on predatory demand of piscivorous fishes on menhaden is unknown.

Abundance of Key Bay Predators

Commercial and recreational harvest data can be used to reflect the abundance of a species within the Chesapeake Bay in recent years. Blue catfish numbers are up as much as 287% (MD) and 72% (VA) compared to the 20-year average (Figure 20 and Table 4). Both states have seen a doubling of recreational cobia catch compared to the 20-year average with Virginia seeing a 76% increase in commercial harvest. Red drum commercial harvest is strictly controlled by the Red Drum Fishery Management Plan (ASMFC, 2022) with recreational catch trending upwards - especially in Virginia. Spanish mackerel and spotted seatrout have seen some of the largest increases in catch in recent years with mackerel increasing 129% commercially in VA and recreational catch up 157% (VA) and 192% (MD). Seatrout has observed a 70% increase commercially (VA) and with recreational catch up 46% (MD) and 57% (VA) over the past 20 years (Table 4, Figures 18-20).

Commercial harvest data from ACCSP and recreational total catch information (A+B1+B2) from MRIP were explored back to 1990. Three of the four species used to model the Menhaden ERP assessment have shown declines in both commercial harvest and recreational catch during the past 5-years compared to the 10-year and 20-year averages (Table 4, Figures 18 and 19). Commercial striped bass harvest has declined 28% in VA and 19% in MD, with declines of 58% and 27% respectively in the recreational catch. Bluefish recreational catch has declined 65% (MD) and 25% (VA) compared to the 20-year average, while commercial harvest has declined 77% (MD) and 50% (VA) (Table 4). Weakfish have observed the largest decline with recent years 88% (MD) and 66% (VA) below the 20-year commercial average and 84% (MD) and 29% (VA) below the 20-year recreational catch. Spiny dogfish has a mixed signal with recreational catch increasing in Maryland (24%) as is commercial harvest in Virginia (77%) (Table 4). However, only 2.39% of the Virginia dogfish harvest has occurred in the Bay over the past five years (2000 – 2024), with the bulk coming from coastal waters (95.88%) and seaside tributaries and lagoons (1.73%).

The predators included in the ERP assessment model were chosen because of their dependence on menhaden as forage, though the relative dependence on menhaden varies by species with striped bass having the largest relative dependence (15.9% by weight; 11.7% by number) and weakfish having the smallest relative dependence (<1%) (Bonzek et al. 2022).
Other species with increasing abundance in Chesapeake Bay that may be influencing forage species demand have few to no Chesapeake Bay diet studies and no fishery independent surveys designed to monitor their abundance. However, diet studies from southern states (North Carolina to Georgia) with a longer history of surveys and diet studies may clarify the

forage demand of these species. All of the species increasing in abundance in Chesapeake Bay are known to prey on menhaden, with the relative importance varying by season or ontogeny. Large spotted seatrout and Spanish mackerel had the highest diet composition of menhaden (31.5% and 40%, respectively) followed by small red drum (27.4%), and cobia (1.53%). A study of the upper portions of Virginia major tributaries (James, York and Rappahannock Rivers) found menhaden comprised 0.425 to 5.00% of blue catfish diet by weight (Schmitt, et al. 2018).

Diet Studies in Chesapeake Bay

The VIMS Chesapeake Bay Multispecies Monitoring and Assessment Program (ChesMMAP) and Northeast Area Monitoring and Assessment Program (NEAMAP) are the most comprehensive diet studies of ecologically, commercially, and recreationally important fishes in the Chesapeake Bay and adjacent coastal waters. The ChesMMAP began in 2002 and samples four times a year (March, June, September, and November) in the mainstem bay from the head of the Bay at Poole's Island, MD to the mouth of the Bay just outside the Chesapeake Bay Bridge Tunnel. (ChesMMAP 2024). NEAMAP began conducting both a spring and fall survey in 2008, sampling from Cape Cod, MA south to Cape Hatteras, NC, targeting both juvenile and adult fishes (NEAMAP 2024). Both surveys develop age specific abundance estimates of various species for stock assessments, as well as complete annual representative ageing and gut contents on a suite of species. The diet data were instrumental in developing the ERP predator prey models for menhaden. Included below are a diet summary of those ERP predators. A summary of the menhaden percent of diet for each of the species below along with location and time of the study and reference appear in Table 6.

Striped Bass diet in the Bay is known to consist of numerous species from mollusks, annelids (worms), Arthropods (shrimp, crabs, mysids, etc.) and a number of finfishes (CHESMMAP, 2024). From the stomach contents collected from 2002 to 2020 cruises, diet composition of striped bass consists of 63.2% fish by weight (%W), 17.0%W and 26.1% by number (%N) for crustaceans, 11.7%W and 9.9%N for worms, 6.2%W miscellaneous items, and 1.9%W mollusks (Bonzek et al. 2022). Bay Anchovy comprises the largest portion of the diet with 33.0% by weight(%W) and 33.8% by numbers (%N). Mysids are second with 7.3% by weight and 12.2% by number. Menhaden comprise 15.9% of Striped Bass diet by weight and 11.7% by number during this 19- year period. (Bonzek et al. 2022).

Bluefish are highly piscivorous with CHESMMAP data from 2000-2021 indicating bay anchovy constitutes 53.4% of the diet by weight (%W) and 52.0% by number (%N). Spot constitute 9.3%W and 5.8%W, with all fish species representing 88.9%W and 83.0%Wr (Bonzek et al. 2022). Menhaden comprise 5.0%W and 4.7%N (Bonzek et al. 2022).

Weakfish diet data from CHESMMAP (2000-2021) suggest the diet is primarily fishes (68.3%) and crustaceans (25.6%) by volume. By numbers, fishes comprise 53.3% and crustaceans 39.9% (primarily mysids at 21.8%). Bay Anchovy are 31.3% of the diet by number and 40.5% by volume. Menhaden make up only a small portion of the weakfish diet < 1% (possibly due to truncation of the weakfish size range associated with high natural mortality of Age 1+ fishes) (Bonzek et al. 2022).

Spiny Dogfish do not typically venture far into the bay (< 2.5% of harvest) and are generally observed in coastal waters by NEAMAP. Diet information collected from spiny dogfish indicates roughly half of their diet by both weight (%W) and numbers (%N) were fishes. Menhaden (7.8%W, 5.1%N), striped bass (2.3%W), butterfish (2.1%W, 2.1%N) and scup (2.2%W, 2.0%N) are the most prevalent identified fishes, with longfin squid (9.7%W, 7.1%N) and bloodworm species (10.1%W, 10.6%N) the most prevalent invertebrates over a 10-year period (2007 – 2016) (Bonzek et al. 2017).

Other species with increasing abundance that may be influencing forage species demand have little to no Chesapeake Bay diet studies. None of these species have effective fishery independent surveys in the Bay to monitor abundance or diet composition. States to the south (GA to NC) have numerous studies in the literature that may clarify the forage demand of these species.

Cobia: Commercial and recreational cobia harvest has increased substantial over the past 10 years (Figures 18 and 19). The species feeds mostly on crabs (blue crab and lady crabs) with the relative importance of those species (index of relative importance) 2-3 orders of magnitude higher than any other species (Arendt et al. 2001). This study found these two species comprising 76.82% of the diet by numbers and 78.62% by volume. Menhaden were found to be 0.14% of the diet by numbers and 1.53% by volume (Arendt et al. 2001).

Red Drum are opportunistic feeders, and diet can shift with changes in age, habitat, season variability, and fluctuations in prey availability. In North Carolina red drum diet composition is comprised primarily of decapod crustacea (shrimp and crabs) and finfishes. Age 0-1 fish (100-400mm) eat primarily penaeid shrimp 30.7%W, menhaden 27.4%W and blue crabs at 9.6%W, with all decapod crustacea at 42.6%W and finfishes at 55.8%W (Facendola and Scharf, 2012). Diets in Age1-2 fish (400-700 mm) is shifted primarily to blue crabs (35%W), menhaden (15.4%W), Pinfish (10.1%W), and only 1.1%W of penaeid shrimp, with the percent of finfishes increasing to 61.1%W (Facendola and Scharf, 2012). In a study of larger fish (> 750 mm) diets consisted mainly of blue crabs (50.7%W), menhaden (11.9%W), and shrimp (3.0%W), with all

finfish totaling 38.8%W and all decapod crustacean at 56.7%W (Peacock, 2014). These and other studies had similar species composition in the diet for fishes typically found in the Bay, including spot, croaker, mullet, tonguefish and mullet.

Spotted Seatrout: As juvenile spotted seatrout grow (greater than 30 mm in length), the dominant prey shifts to penaeid and palaemonid shrimps, which remain important in the diet of adults (McMichael and Peters 1989). As adult spotted seatrout increase in size, pelagic fishes and penaeid shrimps become increasingly important in their diet (Mercer 1984). Diet analysis of spotted seatrout in the lower Cape Fear River, North Carolina, revealed that Atlantic menhaden and brown shrimp are the dominant prey items of spotted seatrout during the summer and fall, and other important prey species included pinfish, spot, and striped mullet, indicating that spotted seatrout are mainly piscivorous after reaching age 1 (Tayloe and Scharf 2006). By size in coastal Georgia, small spotted seatrout < 300 mm consume primarily grass shrimp (13.2%N) and menhaden (9.4%N). Medium fish (301-500 mm) primary food items were fish (56.8%N), specifically menhaden (15.6%N,) with penaeid shrimp (12.1%N) the most prevalent invertebrate. Large specimens (> 500 mm) were exclusively piscivorous with menhaden at 31.5%N (Music and Pafford, 1984). For all size classes combined fishes comprises 41.8%N of diet (menhaden 20.1%N), with crustacean at 9.2%N (penaeid shrimp at 13.1%N and grass shrimp at 7.6%N) (Music and Pafford, 1984).

Spanish Mackerel: Nearly exclusively piscivorous, particularly at large size classes. A study off the Georgia coast found the fish portion of the diet of juveniles (9-42cm) to be 97.9% by weight (%W) and 89.6% by number (%N), with anchovy species comprising the bulk (64.9%W and 39.5%N, with an occurrence rate, of 44.5%) (Finucane et al. 1990). A study from North and South Carolina samples found fishes to be a similar portion of the diet (97.7%W) with anchovy species consisting of 29.7%W, nematodes 1.5%W, squid species 0.4%W, and digested fish material at 58.7%W (Saloman and Naughton, 1983). A study off Cape Canaveral, FL found fishes to comprise 93.5% of diet by weight (%W) and 86.7% by number (%N), with key species being anchovies (21.3%N, 22.6%W) clupeids – including menhaden (5.3%N, 22.6%W) and squid species (13.3%N, 6.5%W) (Naughton and Saloman, 1981). A recent NOAA study in the Gulf of Mexico indicated that age 0-1 Spanish mackerel diet can consist of up to 40%W Gulf menhaden (over 5-year classes) while Age 1+ mackerel diet is around 20%W menhaden (Berenshtein et al. 2021).

Often menhaden are not easily identified in gut contents and may be labeled as “clupeids” or “unidentified fish”. A study in the Northern Gulf of Mexico/America to quantify the importance of Gulf menhaden as a prey item found the estimated contribution of identifiable menhaden to the diets of all predators generally ranged between 2% and 3% (Sagarese et al. 2016). Diet

compositions were then adjusted for unidentified prey using the proportion of fish species biomass in the ecosystem, indicating five predator groups with a relatively large dependence on Gulf menhaden prey were juvenile King Mackerel, juvenile and adult Spanish Mackerel, Red Drum, and Blacktip Sharks (Sagarese et al. 2016).

Blue Catfish were introduced to the Chesapeake Bay upper tributaries in Virginia beginning in 1973 to 1985 to enhance trophy fishing opportunities for freshwater anglers. The species has a much higher salinity tolerance (typically found at 17 ppt) then native catfish species and become piscivorous at a smaller size and age. They have been very prolific (Figure 20) spreading to nearly all tributaries of both the western and eastern side of the bay. They are an omnivorous, or trophic generalist species of fish. Because of this, their diet varies by waterbody, salinity and the availability of prey items, but studies indicate that their diet most often consists of small fish, crayfish, mollusks, and plant matter. At larger sizes, Blue Catfish become increasingly piscivorous, and transition to primarily consuming other fish. A study of the upper portions of Virginia major tributaries (James, York and Rappahannock Rivers) found menhaden comprised 0.425 to 5.00% of blue catfish diet by weight (Schmitt, et al. 2018).

Species Health

A standardized health condition index could be used to examine if striped bass and other piscivores are stressed in the Bay. One of the simplest methods is the Fulton's Condition Factor (k_c) which has been used for over 100 years. (Fulton, 1911; Stevenson and Woods, 2006). While this analysis can track the relative condition of fish over the season and interannually, the opportunistic foraging habits of many of the species described above precludes the direct relation of health indices to fluctuations in menhaden biomass or availability.

Condition factors may vary seasonally during spawning and when stressed by environmental conditions such as water temperature or low dissolved oxygen, as well as species specific physiological and morphological differences. For this exercise, an annual factor is produced from a number of datasets from the Maryland Department of Natural Resources, Potomac River Fisheries Commission, and Virginia Marine Resources Commission for striped bass and other known predators of menhaden in the Bay.

Fulton's Condition Factor

The Factor is simple to compute and only requires length (in cm) and weight (in grams). A factor of 1.0 is considered normal for most finfishes with 1.2 very healthy, and below 0.8 under stress. The formula is:

$k_c = (\text{Weight} / \text{Length}^3) * 100,$ Weight in grams, Length in cm

Eight data sources were used to develop annual condition factors for striped bass. A total of 298,232 individual striped bass were evaluated with the average annual number of samples from the projects ranging from 243 to 3473. A cursory review of the samples was conducted with outliers from the linear length vs weight curve removed from the analysis .

Striped Bass Health: The use of Fulton's Condition Factor as a measure of the Bay's Striped Bass population health would indicate the fish are not starving and would be considered healthy (Figure 21). These datasets represent the entire Chesapeake Bay, numerous gear types, across all months in any given year. The time series was examined back to 1990 when Striped Bass were still under a moratorium. In general, these data suggest the Bay's striped bass are healthy, with k_c's above the 0.8 threshold on an annual basis (Figure 21). Conditions appear to be trending upward and often exceeding the very healthy 1.2 threshold for data collected primarily during cool water months (October – March) (Figures 21 and 22). These data all show similar trends and appear to capture expected declines in k_c during warm weather months (when fish are most stressed) suggesting this reflects expected seasonal dynamics in foraging behavior and physiological stress (Figure 22).

Health of other Bay Predators: Similar methods were applied to other Bay predatory species to develop Fulton's Condition Factor for each. Only information from VMRC projects was used for this exercise. Long-term blue catfish and spiny dogfish length/weight data was not available at this time. Red drum, spotted seatrout, and weakfish all had k_c values fluctuating around the normal threshold of 1.0 or above (Figure 23). Interestingly, the pelagic species (bluefish, cobia and Spanish Mackerel) all have k_c values typically well below the 1.0 normal threshold, with the median for bluefish at 0.93 (range from 0.83 to 122). Cobia ranged from 0.80 and 1.37 (median=0.90). Spanish mackerel was much lower with k_c values ranging from 0.49 to 0.89, median = 0.54 (Figure 23). Given the k_c values were generally stable for each of these species over the time series, there may be morphological differences with pelagic species compared to sciaenids that requiring scaling the condition threshold for specific species.

In general, the health index measured by Fulton's Condition Factor, seems to be slightly increasing or stable for all species, suggesting the health of these species over time has not changed substantially.

Potential Management Approaches

Based on the life history of predators examined, the nature of Chesapeake Bay menhaden fisheries, and recent changes in menhaden availability, the Work Group discussed a number of precautionary management options the Board could consider for further action. The options listed below could be implemented individually or in combination, depending on the Board's risk tolerance and management goals.

Seasonal Closures

Benefits and challenges of potential strategies discussed are summarized below for several potential scenarios:

1. May 15 – August 15: This period covers the period of highest energy demand for the osprey population in Chesapeake Bay. Cormorants, striped bass, and red drum are also present in Chesapeake Bay during this time. Between 2020-2024, 60.72% (Table 3) of the cumulative reduction harvest of menhaden in Chesapeake Bay occurred during this time. Purse seines harvesting bait had a cumulative harvest for that same time period of 47.51%.. Virginia's gill net and pound net fisheries harvest 43.42% and 49.28% of the annual harvest during this time period.

2. May 1 – June 30: This period covers the period of critical demand for early chick survival for osprey in Chesapeake Bay. Cormorants, striped bass, red drum, and cobia are also present in Chesapeake Bay during this time. Between 2020-2024, 29.36% of the cumulative reduction harvest of menhaden in Chesapeake Bay occurred during this time. Bait purse seines harvested 22.08% of its annual average during these two months, with gill nets at 60.14% and pound nets at 21.41%.

3. May 1 – May 31: This period is a smaller subset of the options listed above to cover the first two weeks of the typical hatching season. This period would impact 10.69% of the purse seine reduction sector's annual Bay harvest (2020-2024) and 3.74% of the purse seine bait harvest based on the past 5 years. Gill nets are typically catching menhaden in the early spring with a May closure impacting 9.26% of the average annual harvest. The pound net harvest for the month of May in Virginia is 13.55% of the annual harvest. The pound net harvest for the month of May in Maryland is 5.76%.

Area Closures

Spatial Analysis of Fishing Activity

To explore if menhaden may play a role in the deficiencies outlined in Watts (2024), Captain Daily Fishing Reports (CDFRs) from menhaden purse seine activities were mapped against these 12 areas (Figure 9). Male osprey are known to travel up to 10 km from their nest while hunting for food (Pool, 1989). If the precise location of these 571 nests was available, a 10km buffer could be placed around each nest to determine the timing and level of fishing activity occurring in these 12 study areas. Unfortunately, the location of the sprey nests is not available at this time so similar polygons representing the 12 areas were created (as they appear in Dr. Watt's September 13th press release) (Figure 9).

It should be noted that members of the external osprey Work Group, which included representatives from USGS, USFWS, Maryland National Capital Park & Planning Commission and Dr. Watts from the College of William and Mary cautioned the Work Group against using the Watts et al. 2024 study areas in this manner as they assume menhaden biomass is static and that the effects of menhaden harvest are restricted to the local area of harvest. Instead, they suggest that the high concentration of reduction fishery net sets at the mouth of Chesapeake Bay could act as an 'intercept' fishery, preventing the ingress of large numbers of fish into Chesapeake Bay during key points of the season. Fishery-dependent data from daily CDFR's suggests that reduction fishing effort near the mouth of the Bay is concentrated during August and September compared to the upper Bay in May and June. Fishery-dependent data from daily CDFR's suggests that reduction fishing effort near the mouth of the Bay is concentrated during August and September compared to the upper Bay in May and June (Figures 6 and 7). This could suggest that reduction harvest is not limiting menhaden ingress, but surveys of menhaden migration and biomass in the Bay would be required to determine whether these trends are driven by menhaden availability or fishing operations.

Management Area Restrictions

Chapter 4 of Title 28.2 of the Code of Virginia addresses the taking of menhaden with purse seines. Closed areas are defined in § 28.2-409 and excludes most tributaries, bays and creeks off the mainstem Bay. The Bay season is defined as the first Monday in May until the third Friday in November (§ 28.2-410). In April 2023 a memorandum of understanding was signed between industry and VMRC to agree not to deploy or set a net around particularly sensitive areas. A one-half nautical mile buffer was created on either side of the Chesapeake Bay Bridge Tunnel (CBBT) to reduce user conflicts with recreational anglers. Two one-nautical mile buffers were

established from the shoreline: 1) along the Eastern Shore of the Chesapeake Bay from the Occohannock Creek south to the CBBT; and 2) From the James T. Wilson Fishing Pier (Buckroe Beach) south along the Hampton Roads Bridge Tunnel to Sandbridge Fishing Pier in Virginia Beach. Since being established, the purse fisheries have a 98.85% compliance rate in 2023 and a 99.47% in 2024 based on the location coordinates reported on the CDFRs.

Based on the areas of operation of menhaden fisheries, the Work Group discussed the following spatial closure options. These spatial closures can be considered on their own or in combination with seasonal closures and/or effort controls.

1. All Chesapeake Bay
    a. Virginia waters of Chesapeake Bay as defined by § 28.2-409 of the Code of Virginia and excluding areas covered by MOU
2. CDFR areas at the mouth of the Bay (Ocean View and Cape Charles)
3. By landings in CDFR reporting areas
4. Watts (2024) study locations
5. Mobjack Bay – Mobjack Bay is the most well-studied area for osprey in the lower Chesapeake Bay with considerable historical and recent data. Declining osprey reproductive rates, provisioning rates, provisioning of menhaden, diet quality, brood reduction, and an increase in male osprey foraging time have all been observed in Mobjack Bay.
6. Fleeton Bay – most likely to be impacted by all menhaden fisheries; purse seine, gillnet, and pound net fishing effort

Effort Controls

The implementation of quota periods or days out provisions could be used to distribute fishing effort more evenly throughout the season. These provisions are similar to management of the Atlantic herring fishery in which quota periods are used to manage catch toward bimonthly, trimester, or seasonal quotas to effectively manage catch to meet the needs of the fishery and bait market demand.

Gears Included in Seasonal and/or Area Closures

The application of seasonal or spatial closures to Chesapeake Bay menhaden bait fisheries, particularly pound nets and gill nets, would likely have significant economic and follow-on fishery impacts. Bait harvested in Chesapeake Bay typically supports in-state blue crab fisheries as well as crab and lobster fisheries along the Atlantic coast. It is unknown whether other states

or sources of bait would be available to backfill the landings that would not occur under closures of bait fisheries in the Bay, depending on the magnitude of the closures. These fisheries are also promulgated by small-scale and/or stationary gears with limited capacity (due to regulation or safety concerns) to move fishing efforts offshore. These actions could also impact the ability of watermen to land other species from non-directed gears, resulting in unintended economic impacts to other fisheries. The Board must weigh what would likely be an economic hardship for menhaden bait harvesters and those dependent on that bait for other fisheries with the potential for biological implications for their predators. A time or area closure could mean the reduction fleet has farther to travel to harvest fish at added expense. Further the purse seine skiffs that set the purse seine nets are only 40 ft in length and are subject to the same safety concerns as other bait harvesters when seas exceed 3 ft. The work group is unable at this time to provide a full analysis of the impacts these closures could have on the reduction fishery.

Decreasing Chesapeake Bay Reduction Fishery Cap

Recognition of the potential impacts of reduction fishing in Chesapeake Bay have been reflected in ASMFC's management of the menhaden fishery for at least two decades. In 2005, Addendum II to Amendment 1 instituted a harvest cap on the reduction fishery in the Chesapeake Bay. This cap was based on average landings from 2000-2004 and was set for the 2006-2010 fishing seasons. Addendum III (2006) to Amendment 1 revised the cap to 109,020 mt, based on average landings from 2001-2005, for the 2006-2010 fishing seasons. Addendum IV (2009) extended the cap through 2011-2013 at the same levels as established in Addendum III. Amendment 2 (2012) reduced the Chesapeake Bay cap by 20% to 87,216 mt. Amendment 3 (2017) reduced the Chesapeake Bay cap to 51,000 mt, based on average landings from 2012-2016. In 2019, the Commonwealth of Virginia was found out of compliance by ASMFC for failing to update the Bay cap to the new level of 51,000 metric tons. The decision was appealed to the Department of Commerce where the Secretary upheld the ASMFC action. Virginia updated their regulations and came into compliance prior to the start of the fishing season. The development of the Bay cap, the Board's continued action to update the cap, and the actions of the Department of Commerce reinforce that managing reduction harvest within the Chesapeake Bay is appropriate and necessary.

The Board could further reduce the Chesapeake Bay reduction fishery cap, which is currently based on historical landings from the 5 years prior to enactment. This would presumably leave additional menhaden as forage in Bay waters for all predators. Landings in recent years have been at or near the full Bay cap; therefore, the Board would need to consider a novel approach to setting the Bay cap based on information provided by the Work Group or from other sources if this option is implemented.

Research Recommendations

In reviewing data and information to meet its charge, the Work Group identified several areas in need of additional research and data to address questions beneficial to ecological management of menhaden fisheries in Chesapeake Bay and beyond. Those research recommendations are as follows:

1. Investigate menhaden environmental condition preferences to analyze potential shift in seasonal availability
2. Diet studies on other key predators in Chesapeake Bay (fish, birds, mammals, etc.)
3. Survey of menhaden abundance and biomass in Chesapeake Bay
4. Investigate osprey in other estuaries to determine if there are similar issues
5. ERP Work Group continue to explore inclusion of other predator species in future assessments
6. Study specific osprey areas with major deficiencies in reproductive output relative to menhaden fisheries (e.g. Mobjack and Fleeton Bays)

Additionally, the external osprey Work Group provided research recommendations to the Board Work Group which are as follows:

1. Execute a menhaden biomass survey in the Chesapeake Bay
2. Evaluate long-term datasets for osprey breeding performance
3. Relate historical data with menhaden abundance estimates
4. Create an economical metric of food stress to measure at scale
5. Develop an osprey-menhaden CPUE model

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Tables

Table 1. Estimates of osprey population reproductive rates and brood size 1970's to 2021. Source: Watts et al., 2024

Parameter	1974-75	1985	2006-07	2021	F-statistic	p-value
Nests (N)	75	68	132	68		
Clutch Size	2.7 ± 0.08	3.0 ± 0.09	3.0 ± 0.27	2.7 ± 0.09	2.2	0.084
Reproductive Rate	1.7 ± 0.10	1.4 ± 0.11	0.8 ± 0.08	0.3 ± 0.11	34.9	<0.001
Brood Size	2.0 ± 0.10	1.8 ± 0.10	1.5 ± 0.09	1.2 ± 0.17	10	<0.001
Estimated reproductive rate required for a stable population within the Chesapeake Bay is 1.15						

Table 2. Semi-monthly purse seine reduction Bay effort by year (2015-2024) compared to the ten-year average. Shaded cells indicate a how a specific period and year compared to the ten-year average. Source: NOAA CDFRs.

Temporal Distribution of Reduction Purse Seine Effort 2015-2024

	Year										2015-2024 Net Sets		
Period	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	N	$Avg_{2015-24}$	Pct
15-May	208	4	0	48	206	128	117	39	0	4	754	75.4	6.23%
31-May	288	428	29	217	412	108	229	100	2	22	1,835	183.5	15.17%
15-Jun	207	275	221	199	77	121	85	346	92	106	1,729	172.9	14.30%
30-Jun	101	130	82	138	60	60	113	96	175	92	1,047	104.7	8.66%
15-Jul	87	13	77	108	6	20	23	104	64	125	627	62.7	5.18%
31-Jul	36	7	74	9	0	72	236	132	311	268	1,145	114.5	9.47%
15-Aug	75	59	43	58	146	108	231	235	95	232	1,282	128.2	10.60%
31-Aug	72	80	73	70	225	122	166	260	210	185	1,463	146.3	12.10%
15-Sep	75	154	27	58	197	66	112	119	103	59	970	97.0	8.02%
30-Sep	77	25	0	26	200	5	92	37	97	128	687	68.7	5.68%
15-Oct	36	20	13	30	47	28	5	0	6	5	190	19.0	1.57%
31-Oct	9	56	19	5	3	43	0	0	1	3	139	13.9	1.15%
15-Nov	1	93	10	0	0	82	9	0	21	0	216	21.6	1.79%
30-Nov	0	2	0	1	0	2	0	0	0	0	5	0.5	0.04%
15-Dec	0	0	0	2	0	4	0	0	0	0	6	0.6	0.05%
Total	1,272	1,346	668	969	1,579	969	1,418	1,468	1,177	1,229	12,095	1209.5	
	Below Avg (2015-2024)												
	Significantly Below Avg												
	Significantly Above Avg												

Table 3. Purse seine reduction Bay harvest shown as cumulative percent across the season for the past five years (2020-2024). Source: NOAA CDFRs.

Purse Harvest by Date Relative to the Annual Harvest (as CumPct)								
		Year				Overall Average		
Date	2020	2021	2022	2023	2024	2020-24	2015-24	2000-24
15-May	12.34%	4.24%	2.08%	0.00%	0.02%	2.45%	4.27%	2.45%
31-May	20.32%	13.62%	5.02%	0.01%	0.38%	10.69%	18.08%	11.49%
15-Jun	28.92%	16.91%	21.77%	3.39%	5.30%	19.79%	28.09%	19.79%
30-Jun	33.15%	27.76%	30.96%	12.69%	13.40%	29.36%	40.19%	30.01%
15-Jul	35.33%	29.48%	46.23%	20.95%	22.62%	36.13%	46.09%	36.13%
31-Jul	44.73%	49.68%	55.46%	49.87%	46.25%	48.02%	56.91%	48.63%
15-Aug	55.52%	70.63%	67.08%	58.85%	65.03%	60.72%	68.08%	60.72%
31-Aug	73.02%	83.05%	84.91%	76.31%	84.82%	74.91%	81.21%	75.38%
15-Sep	80.56%	93.33%	97.00%	88.22%	92.22%	84.55%	90.54%	84.55%
30-Sep	81.02%	99.15%	100.00%	97.53%	99.69%	90.69%	95.88%	91.11%
15-Oct	83.47%	99.63%		97.69%	99.98%	94.66%	97.51%	94.66%
31-Oct	90.25%	99.69%		97.72%	100.00%	97.54%	98.88%	97.95%
15-Nov	99.33%	100.00%		100.00%		99.74%	99.91%	99.74%
30-Nov	100.00%					100.00%	100.00%	100.00%
Red Cells are at least 15% below the 5-year average								

Table 4. Menhaden purse seine fishing effort (number of net sets) in proximity to the 12 osprey nesting locations (N=571 nests) in 2024. Sources: Osprey Nesting Efficiency: Watts, 2024. Menhaden Fishing Effort: NOAA CDFRs.

				Purse Seine Sets in Proximity to Osprey Study Areas															
	Osprey Nesting Deficiency			May		Jun		Jul		Aug		Sep		Oct		Nov		Total	
Location	Color	Status	Rate	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Fleeton Bay		Major	< 0.6	59	7.88%	7	0.54%	9	0.66%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	75	1.20%
Mobjack Bay		Major	< 0.6	0	0.00%	0	0.00%	0	0.00%	21	1.14%	1	0.12%	0	0.00%	0	0.00%	22	0.35%
Eastern Shore		Moderate	0.6 - 0.8	3	0.40%	8	0.62%	3	0.22%	1	0.05%	0	0.00%	0	0.00%	0	0.00%	15	0.24%
Piankatank R		Minor	0.8 - 0.9	1	0.13%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	1	0.02%
Poquoson R		Major	< 0.6	0	0.00%		0.00%		0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
York R		Major	< 0.6	0	0.00%		0.00%		0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
Subtotal by Area and % of Total Effort				63	8.41%	15	1.17%	12	0.89%	22	1.19%	1	0.12%	0	0.00%	0	0.00%	113	1.81%
Total Purse Seine Sets 2020-2024				749		1,286		1,355		1,844		818		91		114		6257	
Choptank R (MD)		Major	< 0.6	Purse Seines Prohibited															
Patuxent R (MD)		Major	< 0.6																
Upper Rappahannock R		Surplus	> 1.1																
Upper James R		Surplus	> 1.1																
Elizabeth R		Moderate	0.6 - 0.8																
Lynhaven R		Minor	0.8 - 0.9																

Table 5. Commercial harvest in pounds and recreational catch (A+B1+B2) in number of fish by year, species, and Bay state. Sources: ACCSP and MRP.

Commercial Harvest in Pounds by Species and State								
	BLUEFISH*		SPINY DOGFISH*		STRIPED BASS*		WEAKFISH*	
YEAR	MD	VA	MD	VA	MD	VA	MD	VA
2019	22,990	192,431	678,625	6,113,834	1,747,499	1,389,039	912	39,724
2020	21,011	164,151	396,076	6,010,225	1,589,350	924,116	1,622	41,527
2021	11,063	123,721	442,508	3,597,475	1,610,800	1,123,353	897	28,952
2022	10,285	182,901	0	4,568,864	1,601,070	1,102,622	1,048	29,521
2023	16,422	142,025	850,527	6,018,055	1,705,809	1,179,060	1,498	33,356
Avg(90-23)	102,026	451,956	1,342,668	2,294,812	1,854,123	1,218,711	93,460	573,591
Avg(04-23)	72,291	323,993	640,888	2,975,707	2,033,468	1,579,655	9,797	102,308
Avg(14-23)	37,464	170,892	876,021	4,322,315	1,768,500	1,264,451	1,189	29,659
Avg(19-23)	16,354	161,046	473,547	5,261,691	1,650,906	1,143,638	1,195	34,616
5yr vs 20yr	-77.38%	-50.29%	-26.11%	76.82%	-18.81%	-27.60%	-87.80%	-66.16%
5yr vs 10yr	-56.35%	-5.76%	-45.94%	21.73%	-6.65%	-9.55%	0.53%	16.71%

Recreational Catch (A+B1+B2) in Numbers of Fish by Species and State								
	BLUEFISH*		SPINY DOGFISH*		STRIPED BASS*		WEAKFISH*	
	MD	VA	MD	VA	MD	VA	MD	VA
2019	311,736	723,012	24,015	13,113	7,745,291	699,617	17,929	840,088
2020	445,093	434,589	59,813	27,631	7,772,516	973,698	730	303,924
2021	242,964	448,744	13,692	4,179	4,479,971	600,768	9,756	279,865
2022	453,830	1,360,375	17,128	3,175	3,931,722	377,008	9,486	334,404
2023	615,459	430,776	59,591	137,804	3,635,178	629,242	52,803	230,594
Avg(90-23)	1,209,118	875,212	29,679	39,751	6,602,198	1,760,484	456,290	946,230
Avg(04-23)	1,198,840	903,227	28,154	42,398	7,582,510	1,567,275	113,529	561,252
Avg(14-23)	518,240	687,756	25,157	22,043	7,972,787	1,037,445	67,332	476,353
Avg(19-23)	413,816	679,499	34,848	37,180	5,512,936	656,067	18,141	397,775
5yr vs 20yr	-65.48%	-24.77%	23.78%	-12.31%	-27.29%	-58.14%	-84.02%	-29.13%
5yr vs 10yr	-20.15%	-1.20%	38.52%	68.67%	-30.85%	-36.76%	-73.06%	-16.50%

Table 5. (Continued) Commercial harvest in pounds and recreational catch (A+B1+B2) in number of fish by year, species, and Bay state. Sources: ACCSP and MRP.

Commercial Harvest in Pounds by Species and State

	BLUE CATFISH		COBIA		RED DRUM		SPANISH MACKEREL		SPOTTED SEATROUT	
YEAR	MD	VA	MD	VA	MD	VA	MD	VA	MD	VA
2019	2,093,539	3,020,489	0	38,711	0	2,616	0	213,290	0	135,729
2020	1,805,310	2,475,379	0	30,728	0	8,257	7,111	81,662	0	67,794
2021	2,209,281	3,110,369	0	30,798	0	18,671	6,006	173,514	0	52,692
2022	2,637,344	3,579,156	313	38,601	0	18,056	6,658	240,453	0	75,516
2023		3,987,460	0	31,277	0	16,885	0	199,843	0	75,868
Avg(90-23)	504,448	1,104,963	186	15,134	659	7,144	7,932	140,522	2,821	35,807
Avg(04-23)	876,108	1,877,376	56	19,353	565	7,824	4,191	79,214	182	47,963
Avg(14-23)	1,722,301	2,978,777	31	31,530	130	8,991	4,379	101,439	0	60,165
Avg(19-23)	2,186,369	3,234,571	63	34,023	0	12,897	3,955	181,752	0	81,520
5yr vs 20yr	149.55%	72.29%	11.99%	75.81%	-100.00%	64.83%	-5.62%	129.44%	-100.00%	69.96%
5yr vs 10yr	26.94%	8.59%	100.00%	7.91%	-100.00%	43.44%	-9.67%	79.17%		35.49%

Recreational Catch (A+B1+B2) in Numbers of Fish by Species and State

	BLUE CATFISH		COBIA		RED DRUM		SPANISH MACKEREL		SPOTTED SEATROUT	
YEAR	MD	VA	MD	VA	MD	VA	MD	VA	MD	VA
2019	743,596	2,339,025	251	226,324	6,998	606,226	168,596	414,441	371,100	3,114,208
2020	866,136	3,957,508	8,962	184,039	259,318	765,369	212,144	210,155	246,192	3,301,962
2021	632,878	1,113,286	16,775	235,244	20,005	1,505,470	237,737	452,598	101,964	3,399,938
2022	697,576	946,615	0	115,074	15,382	930,447	72,140	240,866	105,980	2,538,250
2023	1,292,298	1,725,268	0	214,053	102,338	1,268,608	74,183	565,362	68,570	3,960,041
Avg(90-23)	190,086	723,473	1,213	64,271	59,213	532,454	35,287	125,479	99,016	1,375,702
Avg(04-23)	306,803	1,123,705	1,951	95,689	94,200	713,407	52,360	146,656	123,013	2,079,124
Avg(14-23)	591,053	1,755,239	3,903	158,367	47,728	823,441	86,575	229,508	157,311	2,894,368
Avg(19-23)	846,497	2,016,340	5,198	194,947	80,808	1,015,224	152,960	376,684	178,761	3,262,880
5yr vs 20yr	175.91%	79.44%	166.35%	103.73%	-14.22%	42.31%	192.13%	156.85%	45.32%	56.94%
5yr vs 10yr	43.22%	14.88%	33.18%	23.10%	69.31%	23.29%	76.68%	64.13%	13.64%	12.73%

Table 6. Diet studies of Chesapeake Bay piscivorous fishes with reference to the relevance of menhaden to the diet.

Species	Menhaden ERP	Age or Size	Menhaden % of Diet		Years	Source/Location	Reference
			Weight	Number			
Striped Bass	Yes		15.9%	11.7%	2002-2020	ChesMMAP / Bay	Bonzek et al. 2021
Bluefish	Yes		5.1%	4.7%	2002-2020	ChesMMAP / Bay	Bonzek et al. 2021
Weakfish	Yes		< 1.0%	< 1.0%	2002-2022	ChesMMAP / Bay	Bonzek et al. 2021
Spiny Dogfish	Yes		7.8%	5.1%	2002-2022	NEAMAP / Ocean	Bonzek et al. 2007
Cobia	No		1.5%	0.1%	Jun-Jul 1997	Chesapeake Bay	Arendt et al. 2001
Blue Catfish	No		5.2%		2013-2016	James R.	Hilling et al. 2023
	No		0.4%		2013-2016	James R.	Schmidt et al. 2019
	No		3.5%			Pamunkey R	Schmidt et al. 2019
	No		5.0%			Mattaponi R	Schmidt et al. 2019
	No		1.1%			Rappahannock R	Schmidt et al. 2019
Red Drum	No	100-400mm	27.4%		2007-2009	New River, NC	Facendola and Scharf, 2012
		400-700mm	15.4%				
		> 750mm	11.9%		2007-2010, 2011-2012	NC DMF Longline Survey	Peacock, 2014
Spotted Seatrout	No	< 300mm		9.4%	1978-1983	Coastal Georgia	Music and Pafford, 1984
		301-500mm		15.6%			
		> 500mm		31.5%			
		Combined		20.1%			
Spanish mackerel	No	All Clupeids	22.6%*	5.3%	1978-1979	Cape Canaveral, FL	Naughton and Saloman, 1981
		Age0-1	40.0%		1980-2016	Gulf of Mexico	Berenshtein et al. 2021
		Age1+	20.0%				
*: Includes all Clupeids							

Figures

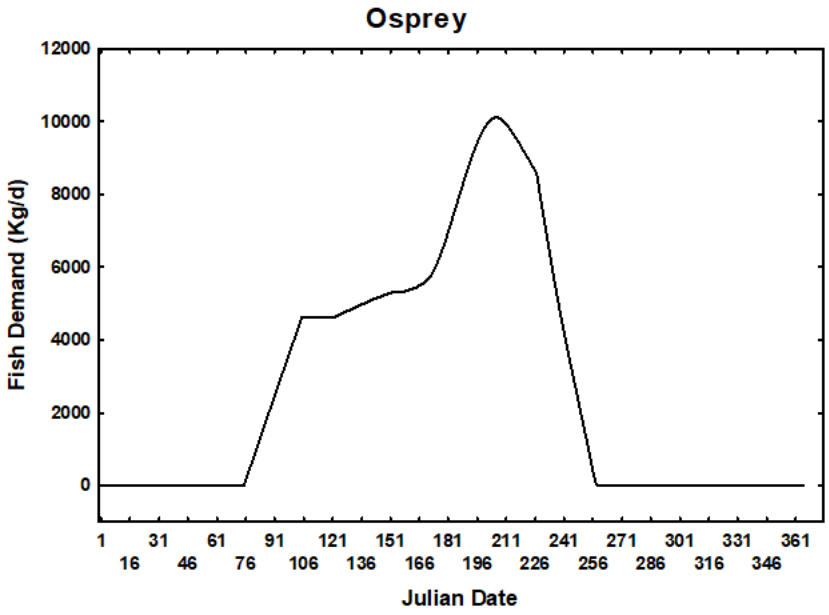


Figure 1. Seasonality of population-level metabolic demand for osprey in Chesapeake Bay. The period of highest energy demand is mid-May through mid-August. (B. Watts, unpublished data).

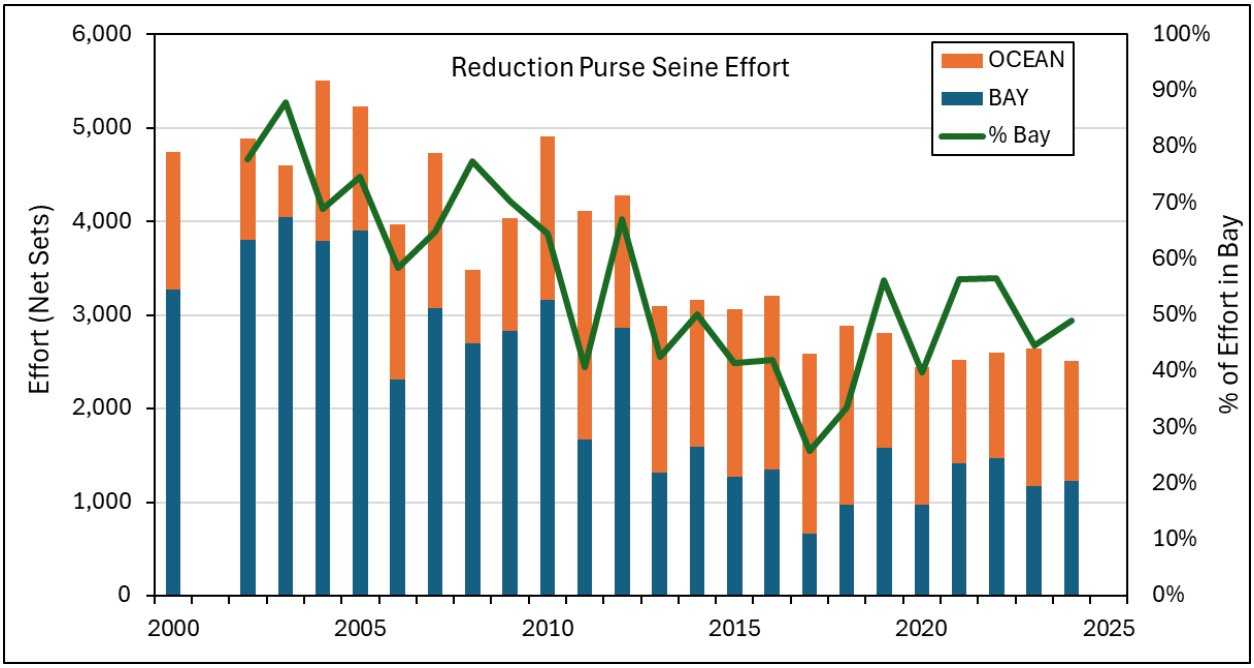


Figure 2. Virginia purse seine reduction effort separated into Bay and Ocean net sets.

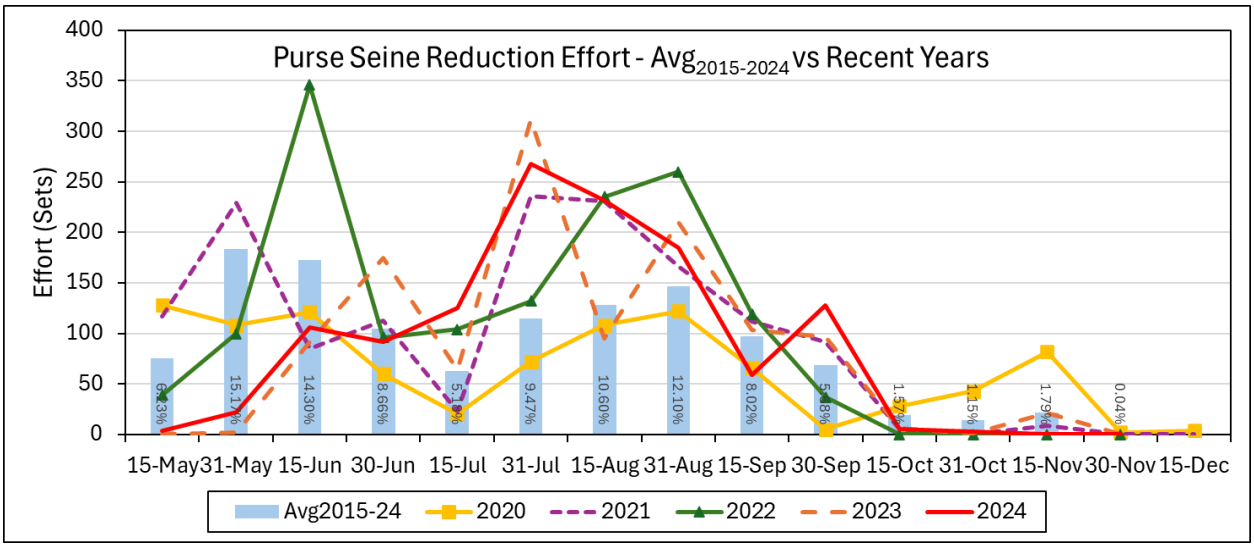


Figure 3. Semi-monthly purse seine reduction ten-year average(2015-2024) compared to the last 5 years (2020-2024). Percentages on the bar the percent of effort for that semi-monthly time period compared to the entire season.

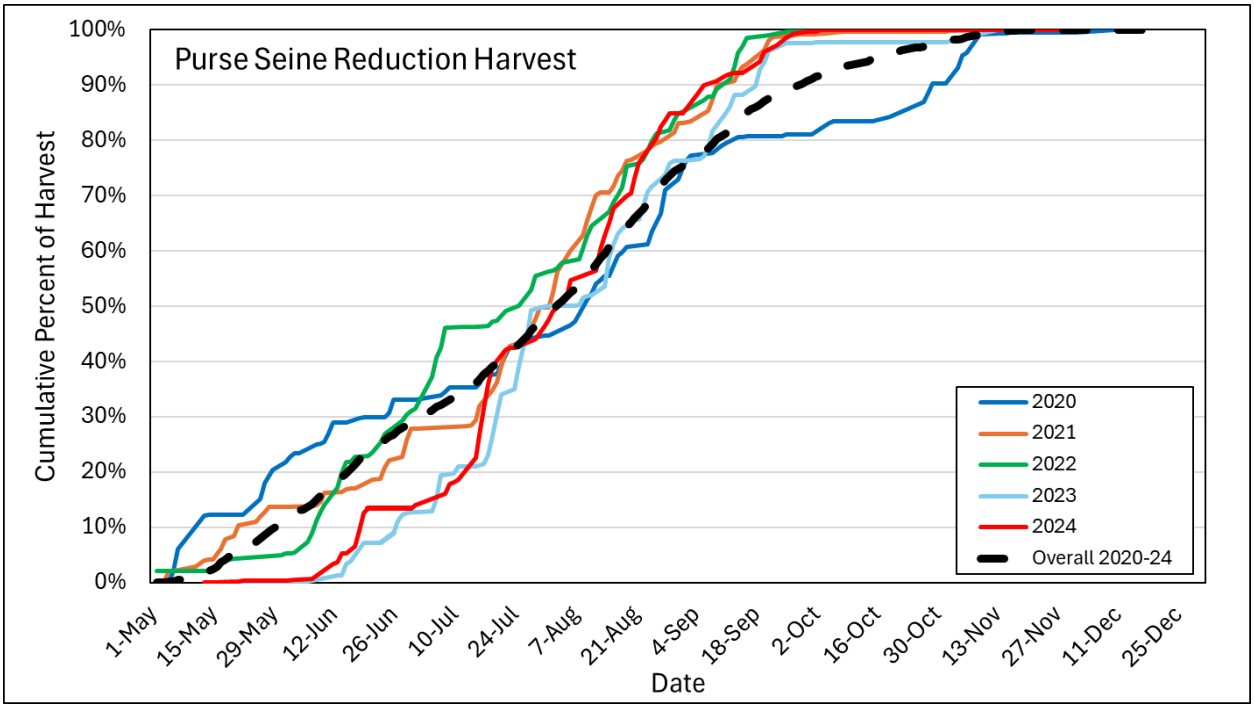


Figure 4. Cumulative percent of purse seine reduction harvest over the season for the most recent 5 years compared to the 5-year average.

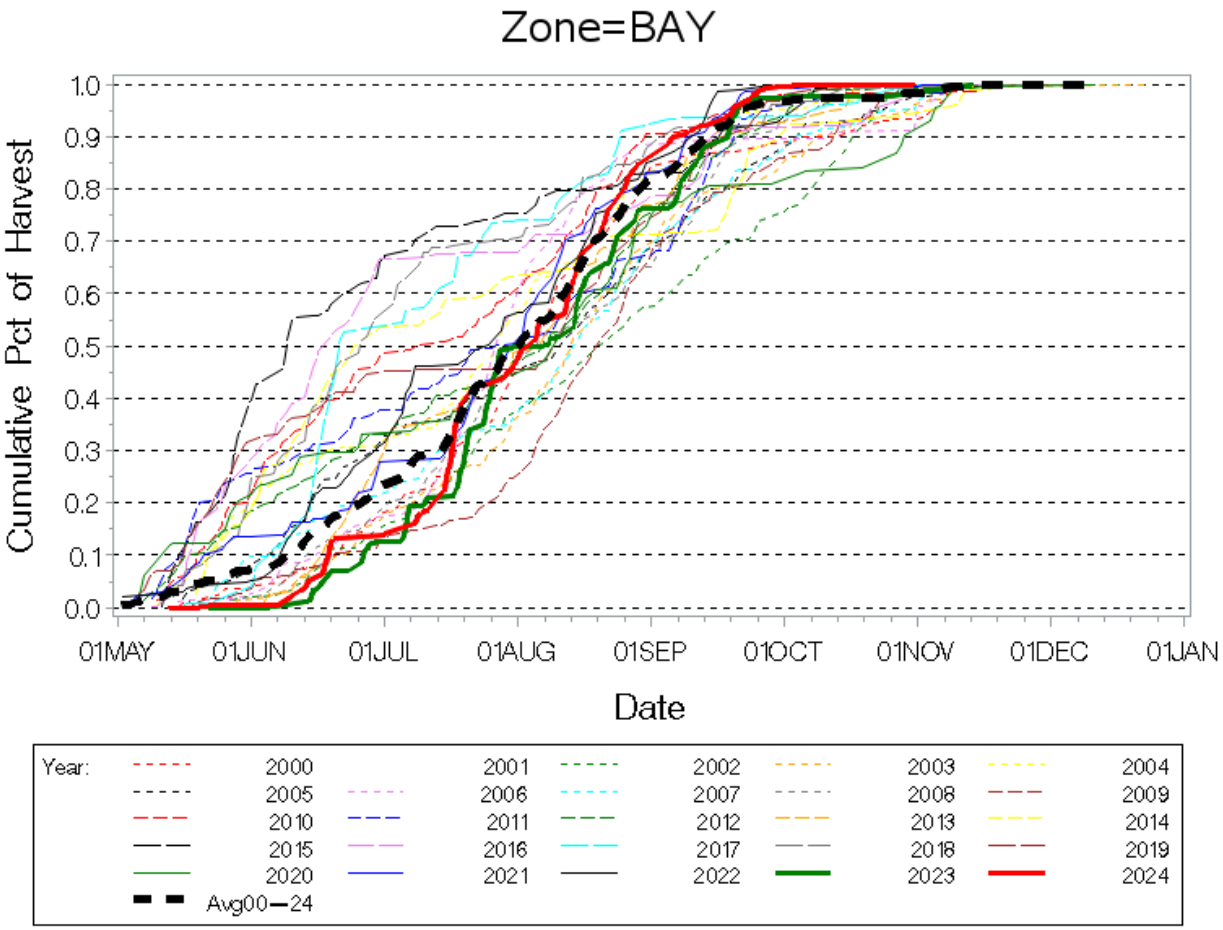
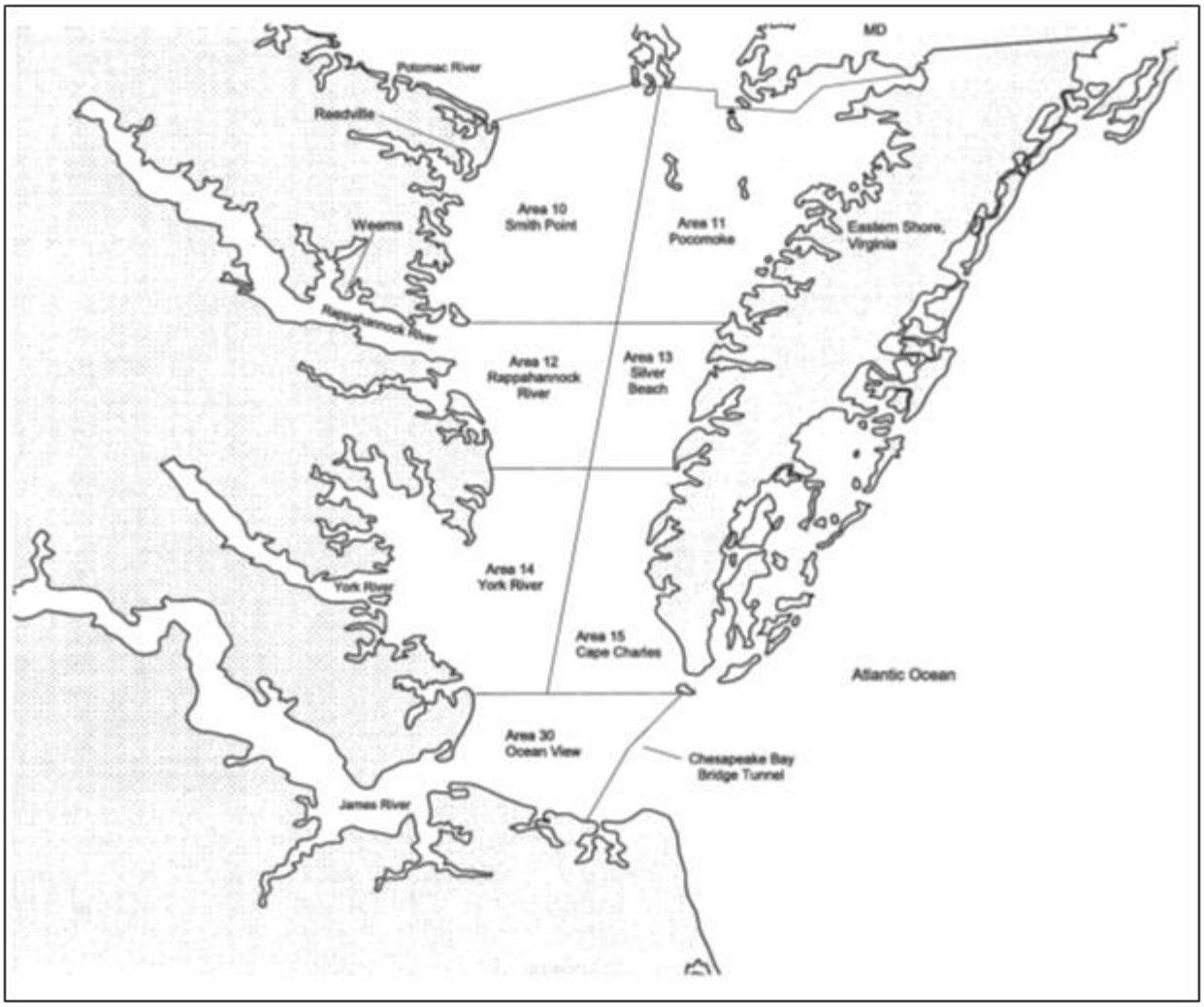


Figure 5. Cumulative percent of purse seine reduction harvest over the season for the most the past 25 years (2000 – 2024). Black dashed line is the 25-year average.



CDFR Program Virginia Reporting Areas

Chesapeake Bay					
	West		→	East	
North	Area	Name		Area	Name
↓	10	Smith Point		11	Pocomoke
	12	Rappahannock River		13	Silver Beach
	14	York River		15	Cape Charles
South	30			Ocean View	
Ocean					
↓	16			NMFS Water Code 625	
	17			NMFS Water Code 631	

Figure 6. NMFS menhaden reporting areas for the Bay and coastal water of Virginia. From: Smith, J.W. and W.B. O'Bier. 2010.

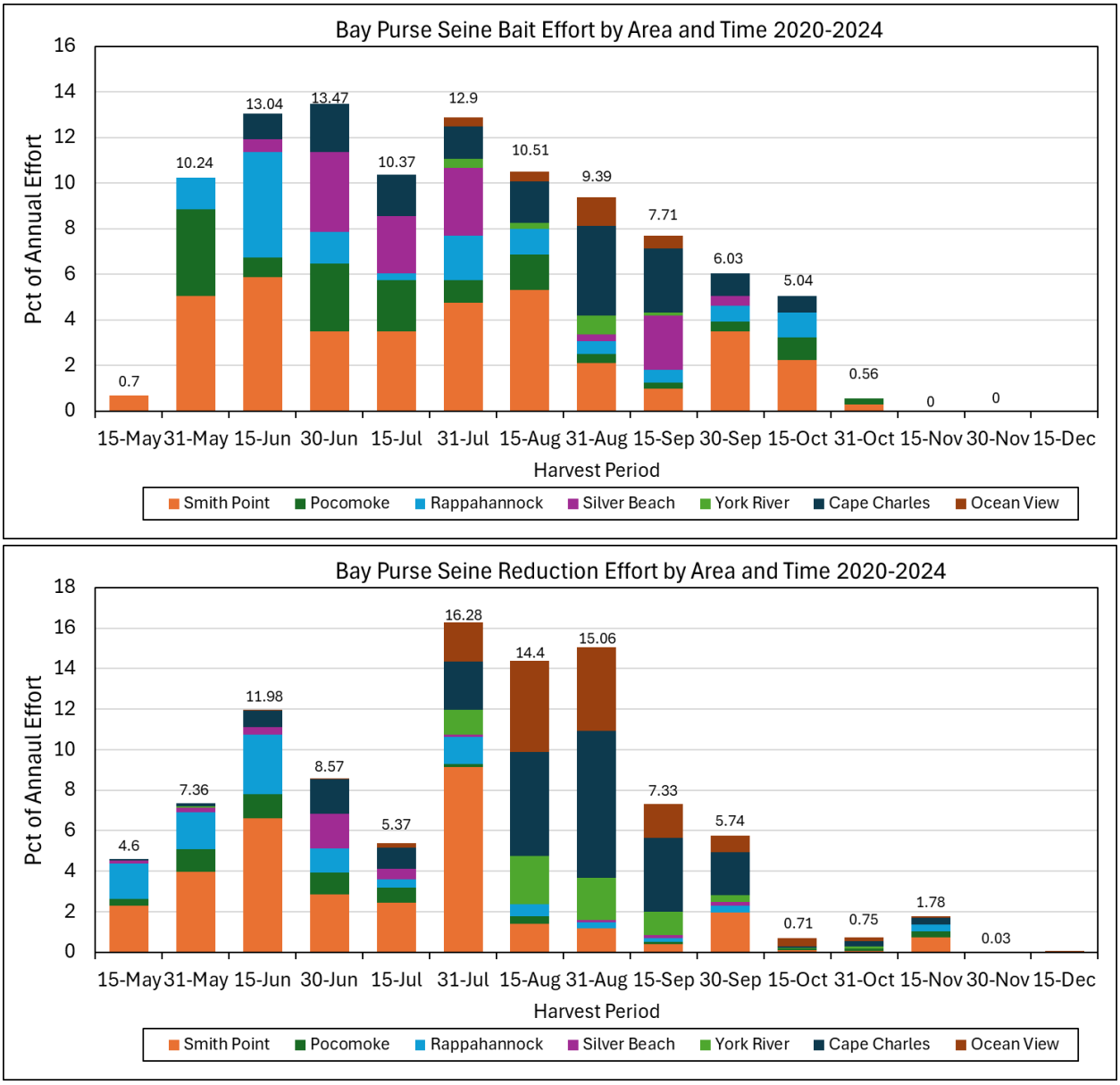


Figure 7. Menhaden purse seine reduction (top) and bait (bottom) effort by NMFS Chesapeake Bay reporting area and semi-monthly periods 2020 – 2024. Numbers above each bar present the percent of effort for that time period relative to the total effort.

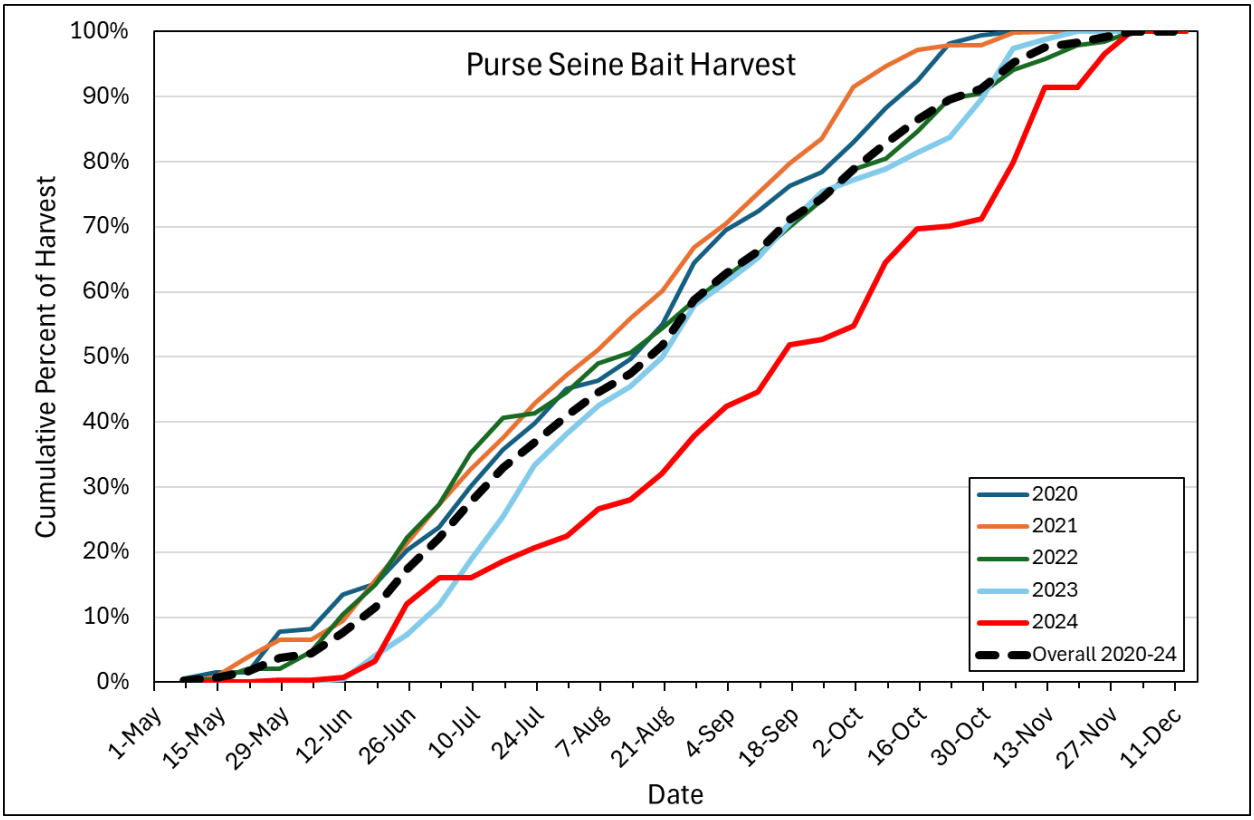


Figure 8. Cumulative purse seine bait weekly harvest reports compared to the 5-year average (2020-2024).

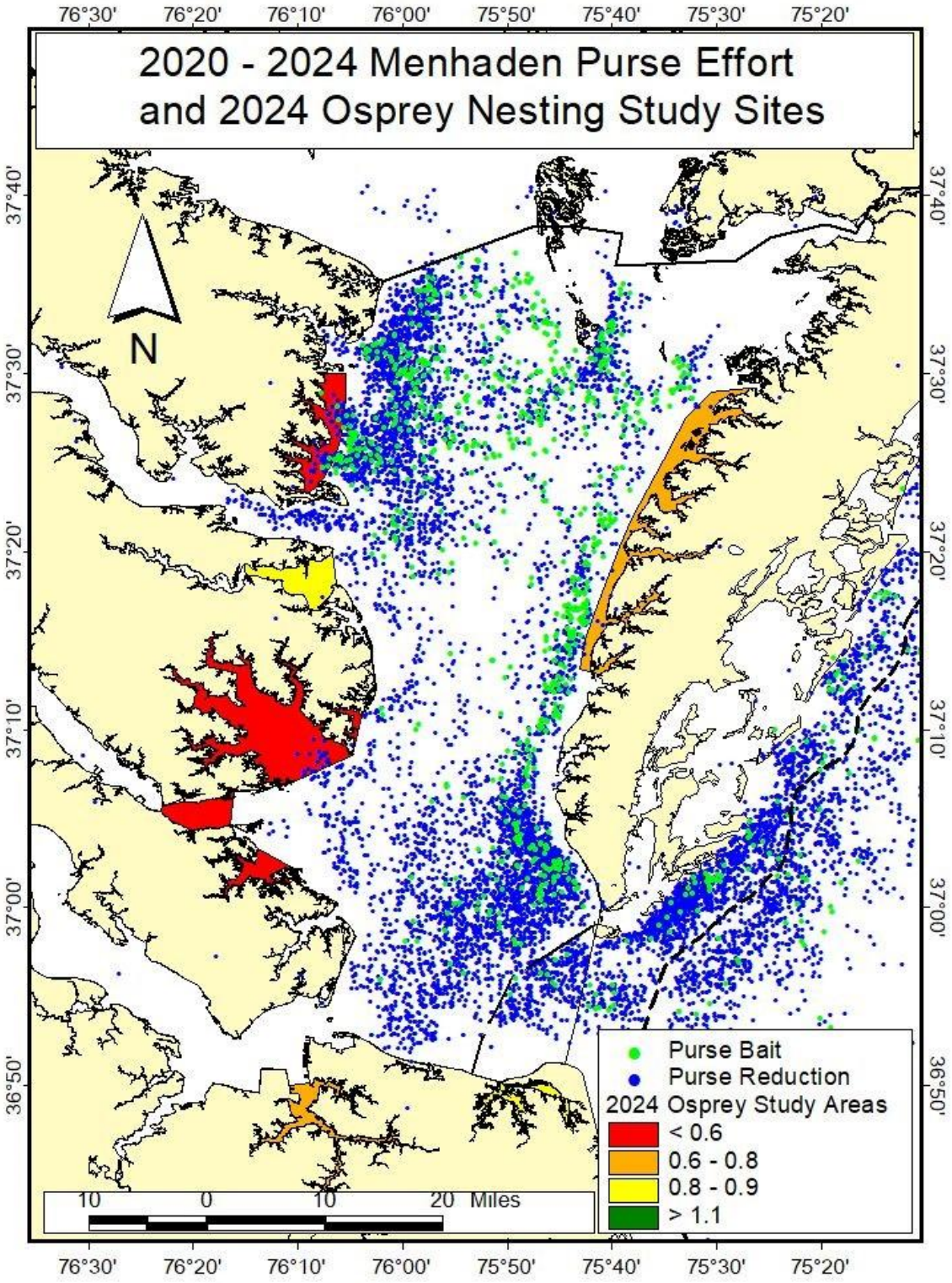


Figure 9. Menhaden purse seine fishing effort (2020-2024) relative to the Watts 2024 osprey reproductive success and nesting study areas.

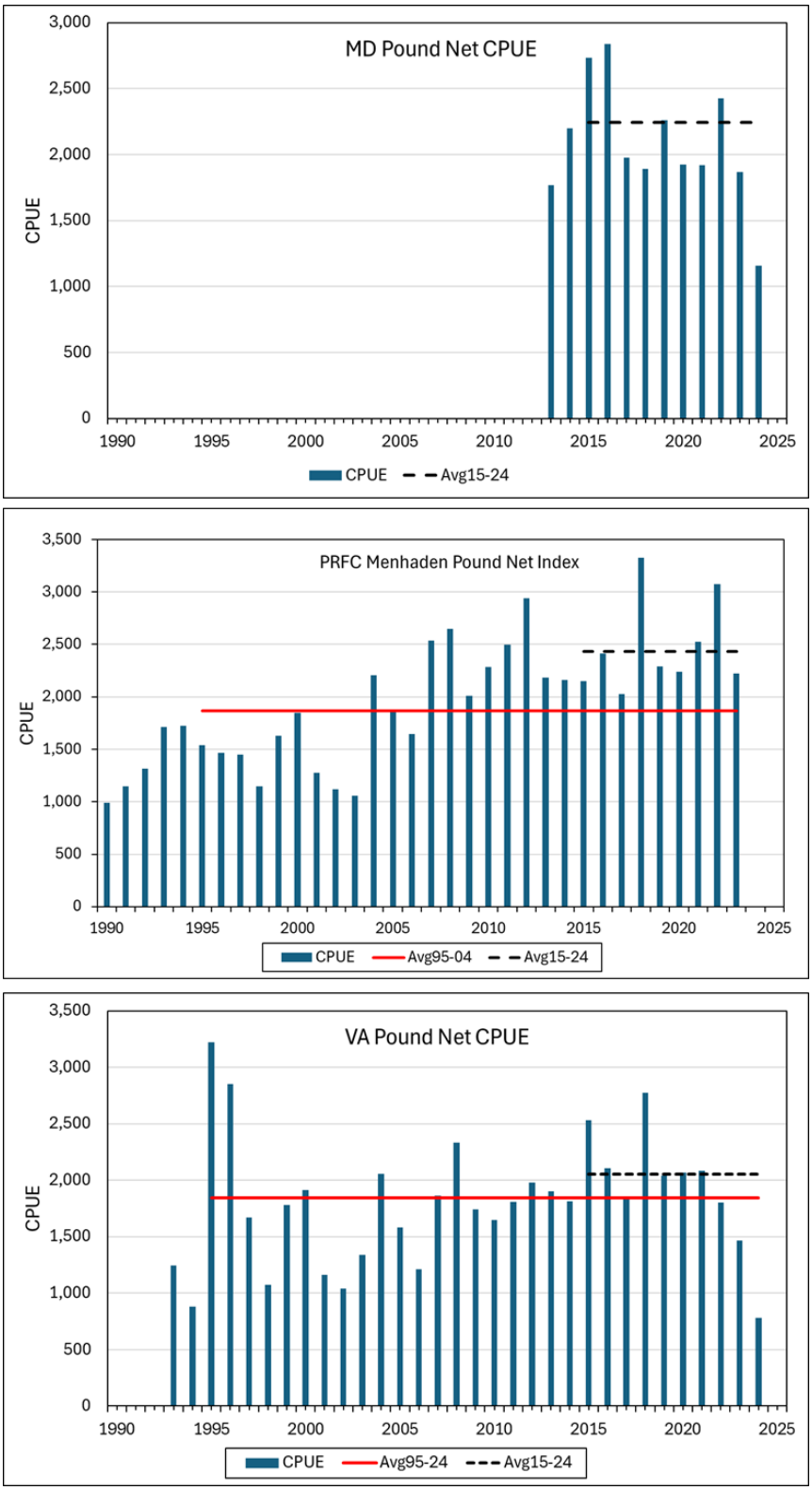


Figure 10. Annual menhaden Pound Net CPUE from Maryland, Potomac River, and Virginia. CPUE is in lbs per net day. Sources: MD DNR, PRFC, and VMRC.

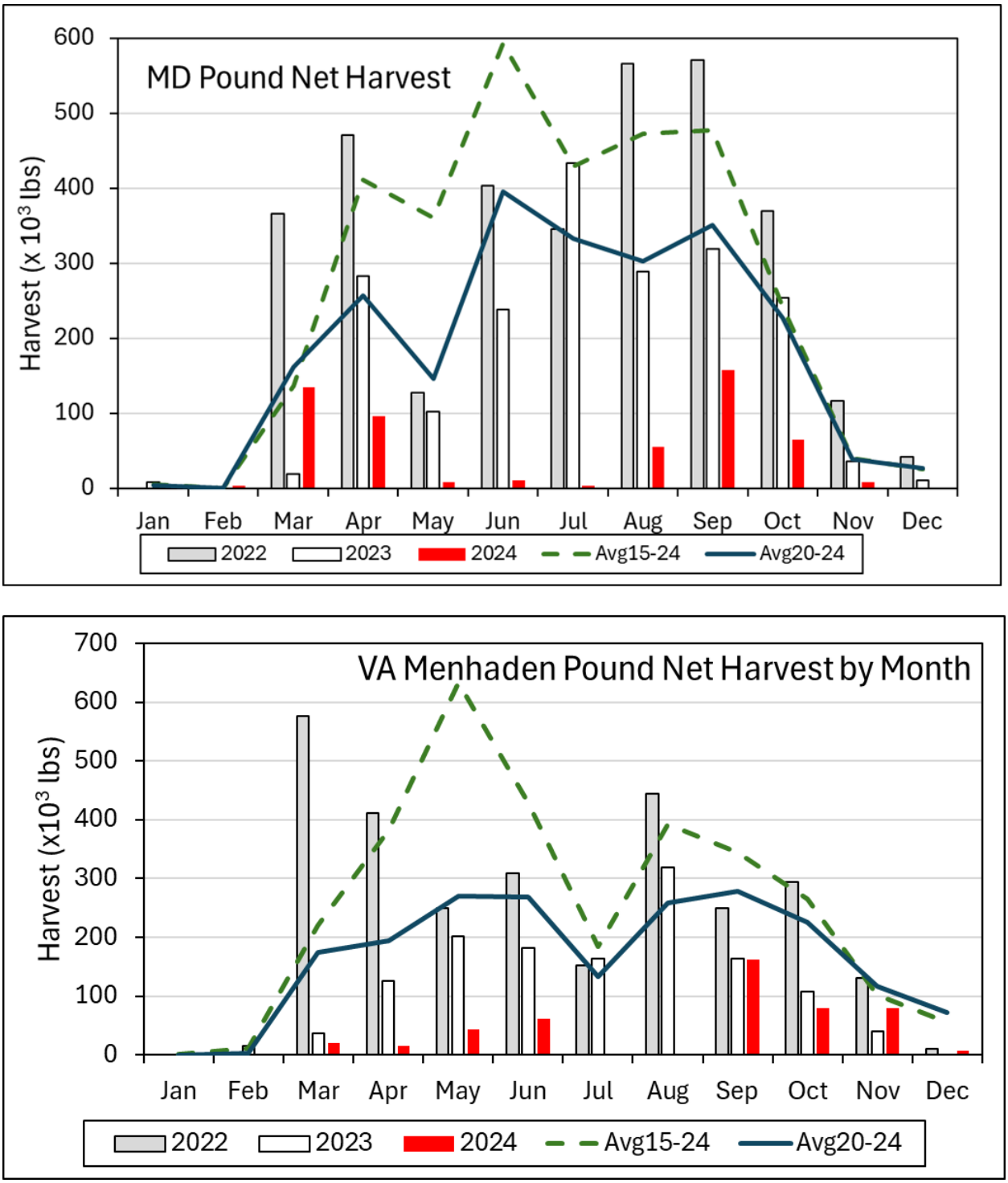


Figure 11. Menhaden monthly pound net harvest for Maryland (top) and Virginia (bottom) for the last three years relative the 10 and 5-year averages.

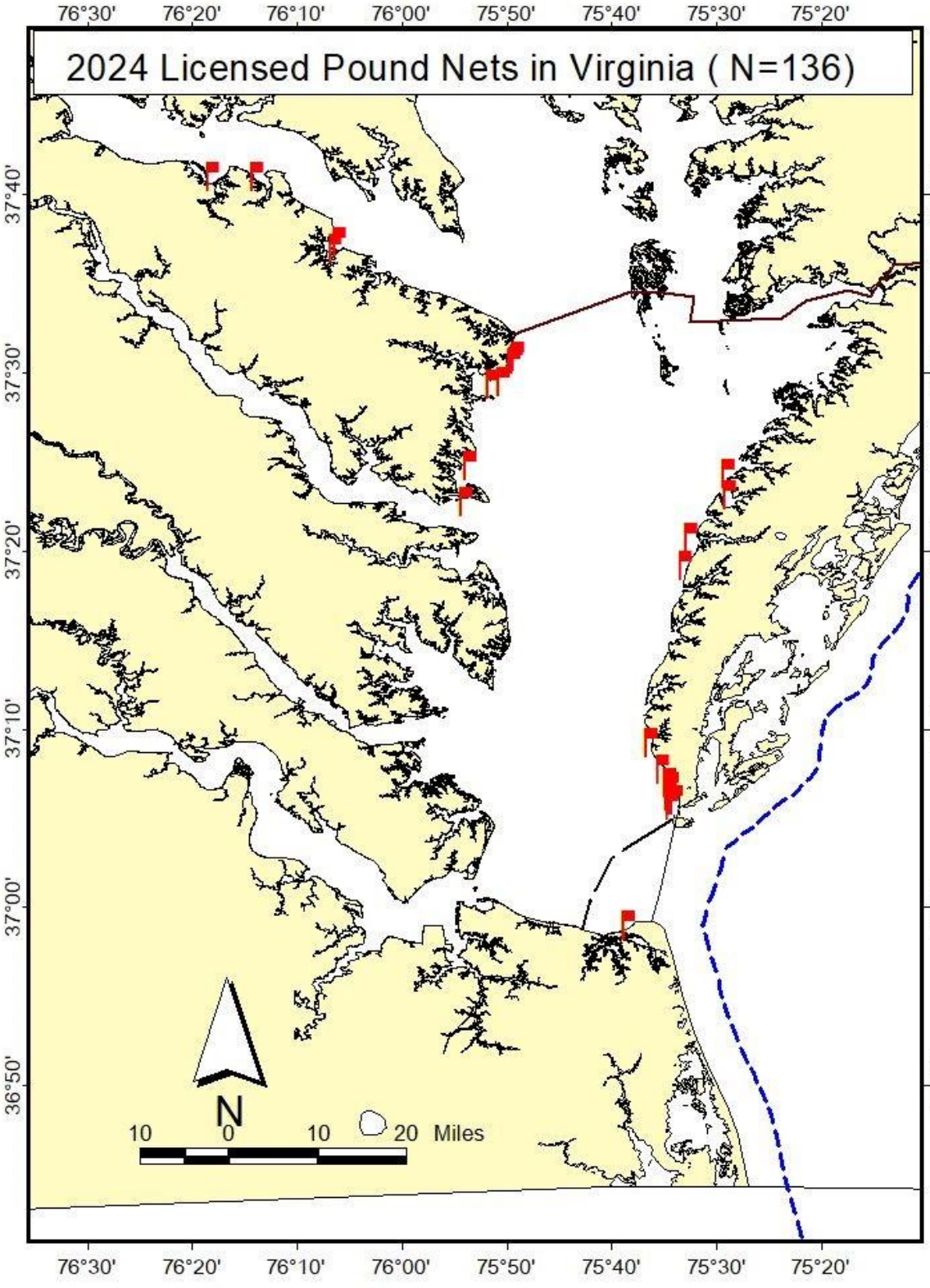
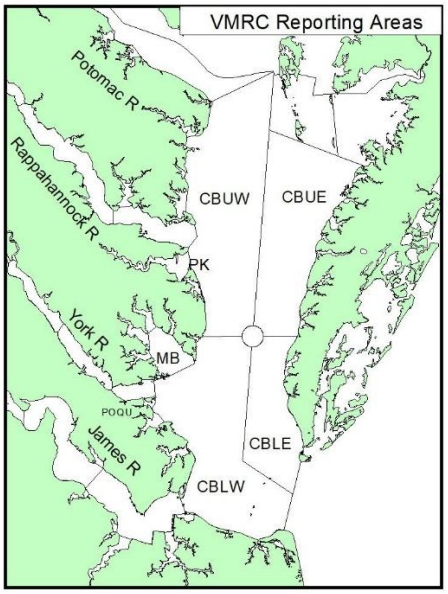


Figure 12. Location of 2024 licensed pound nets in Virginia.



VMRC Harvest Areas

Area	Description
CBLE	Ches Bay Lower East
CBLW	Ches Bay Lower West
CBUE	Ches Bay Upper East
CBUW	Ches Bay Upper West
JA	James River
POQR	Poquoson River
YK	York River
MB	Mobjack Bay
PK	Piankatank River
RA	Rappahannock River
PO	Potomac River

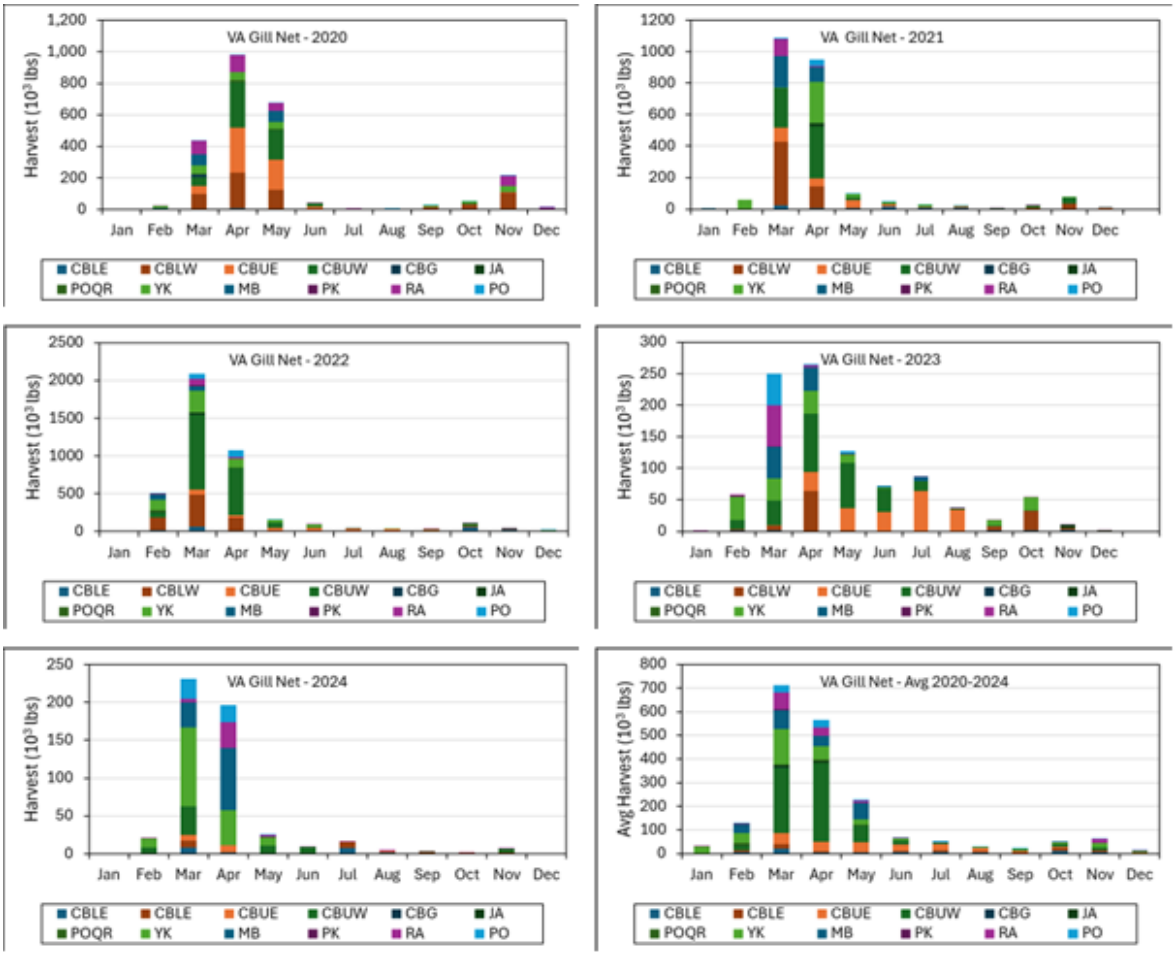
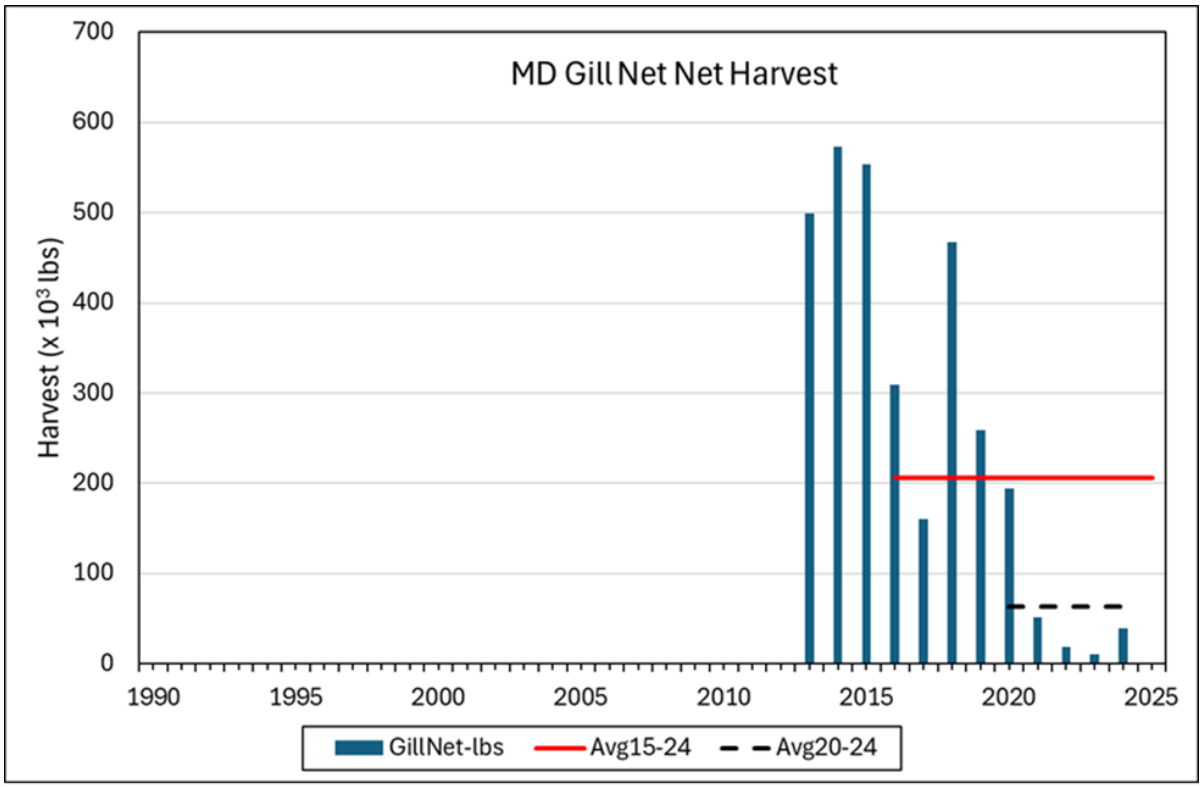


Figure 13. Virginia monthly pound net harvest by VMRC reporting area 2020-2024 Smaller water bodies were collapsed to reduce the number of reporting areas (see map).



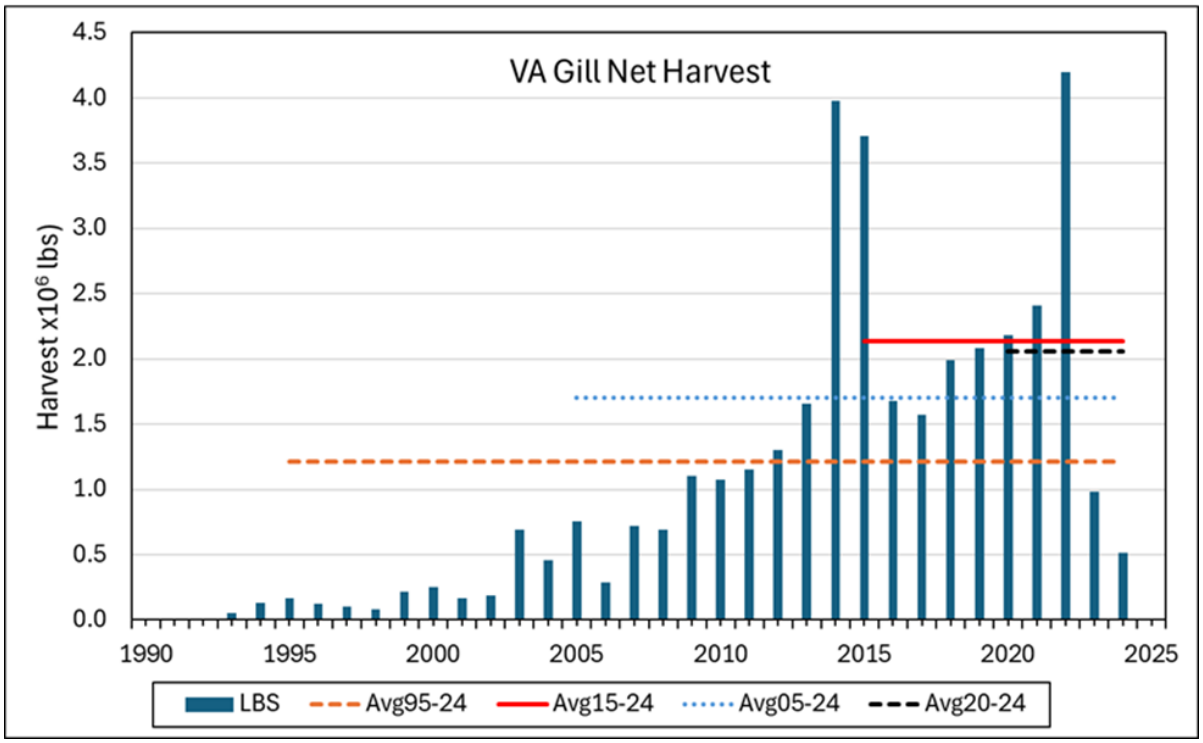


Figure 14. Menhaden gill net harvest for Maryland (top) and Virginia (bottom). Note that the scales on the y-axis are different: MD in thousands and VA in millions. Potomac River gill net data is not yet available. Sources: MD DNR and VMRC

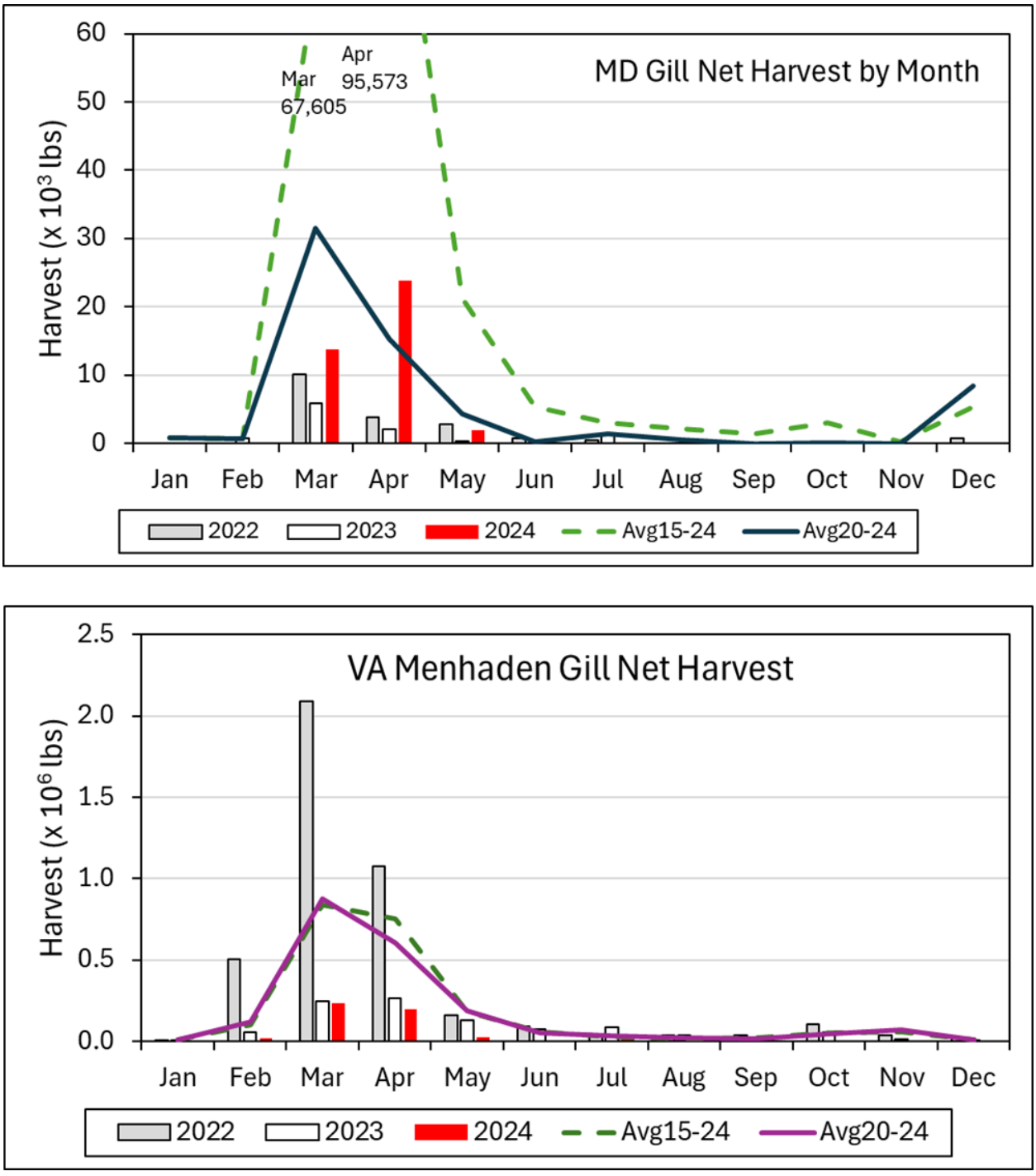
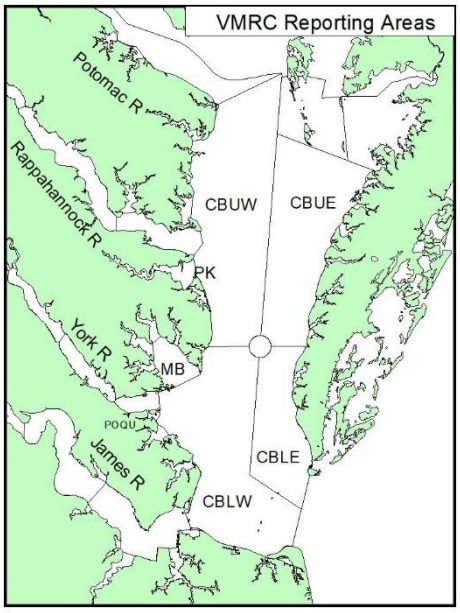


Figure 15. Menhaden monthly gill net harvest for Maryland (top) and Virginia (bottom) for the last three years relative the 10 and 5-year averages.



VMRC Harvest Areas

Area	Description
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CBUW	Ches Bay Upper West
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POQR	Poquoson River
YK	York River
MB	Mobjack Bay
PK	Piankatank River
RA	Rappahannock River
PO	Potomac River

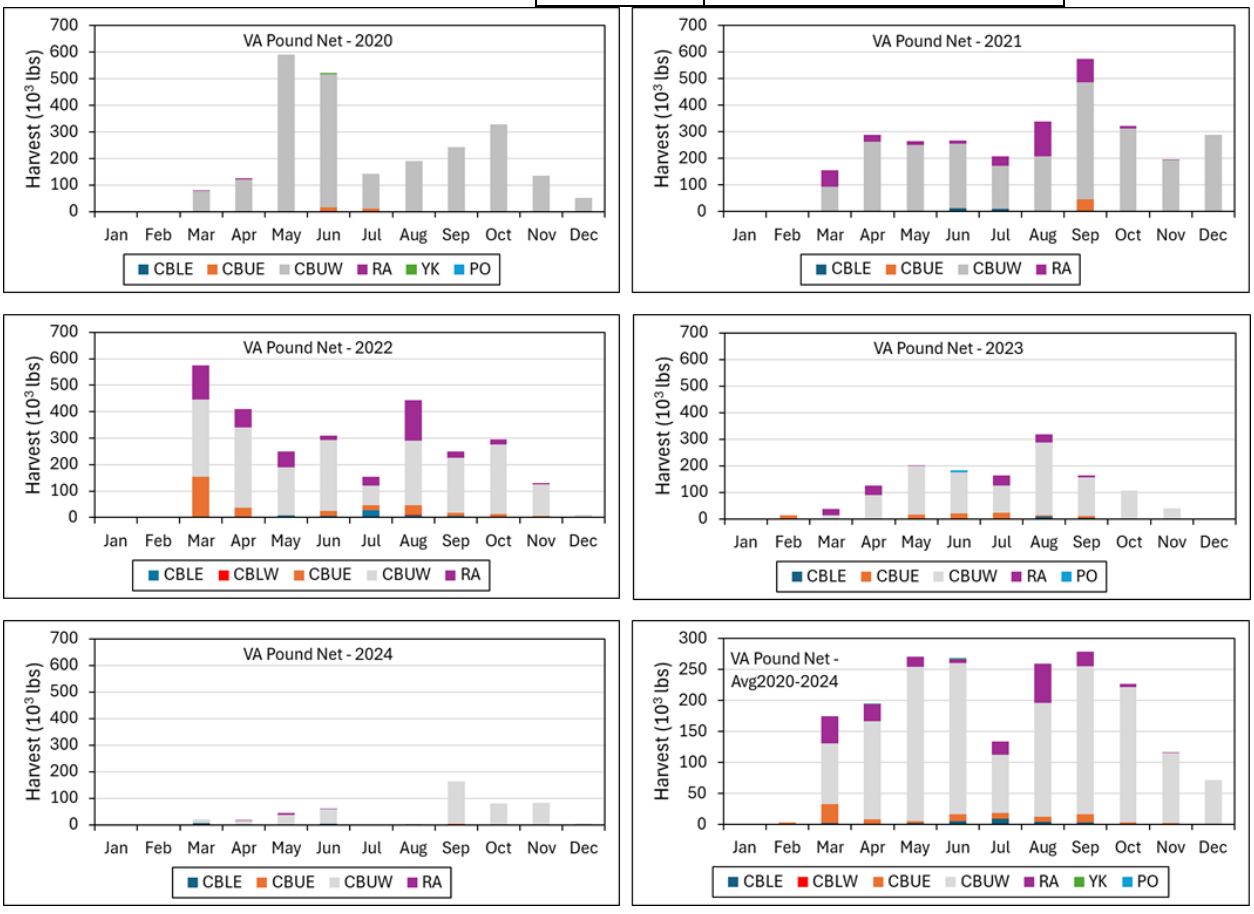


Figure 16. Virginia monthly pound net harvest by VMRC reporting area 2020-2024 Smaller water bodies were collapsed to reduce the number of reporting areas (see map).

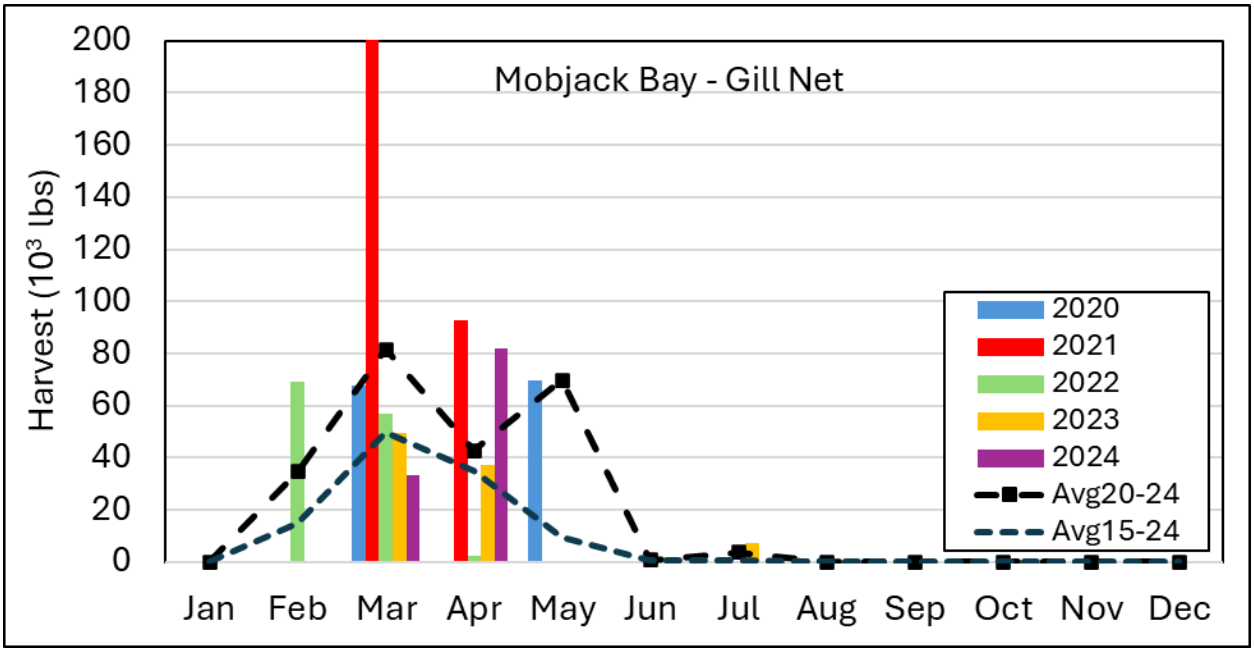


Figure 17. Mobjack Bay gill net menhaden harvest by year and month relative to the 5-year average (2020-2024) and ten-year average (2015-2024).

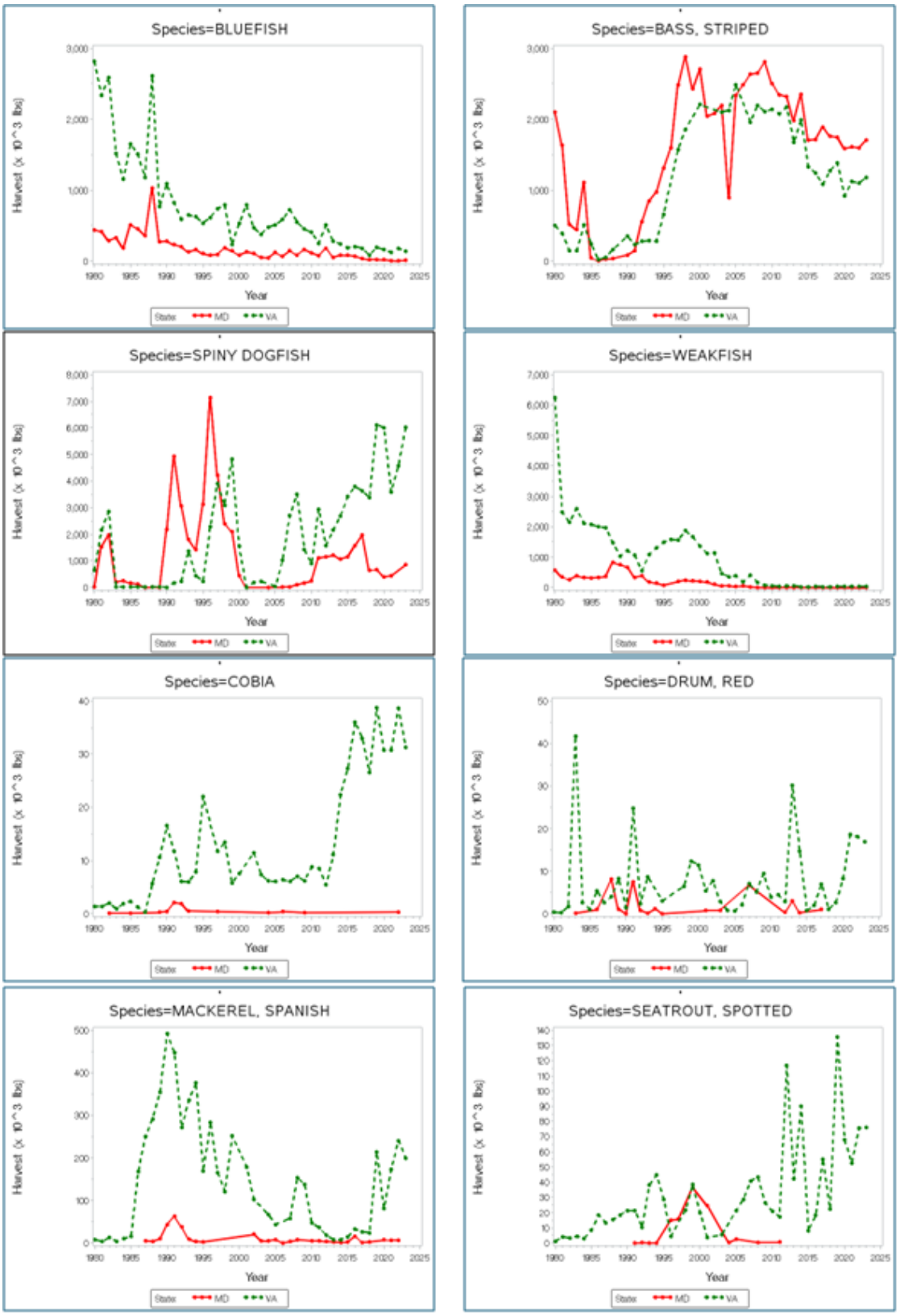


Figure 18. Commercial Harvest for Key Bay Predators. Source: ACCSP

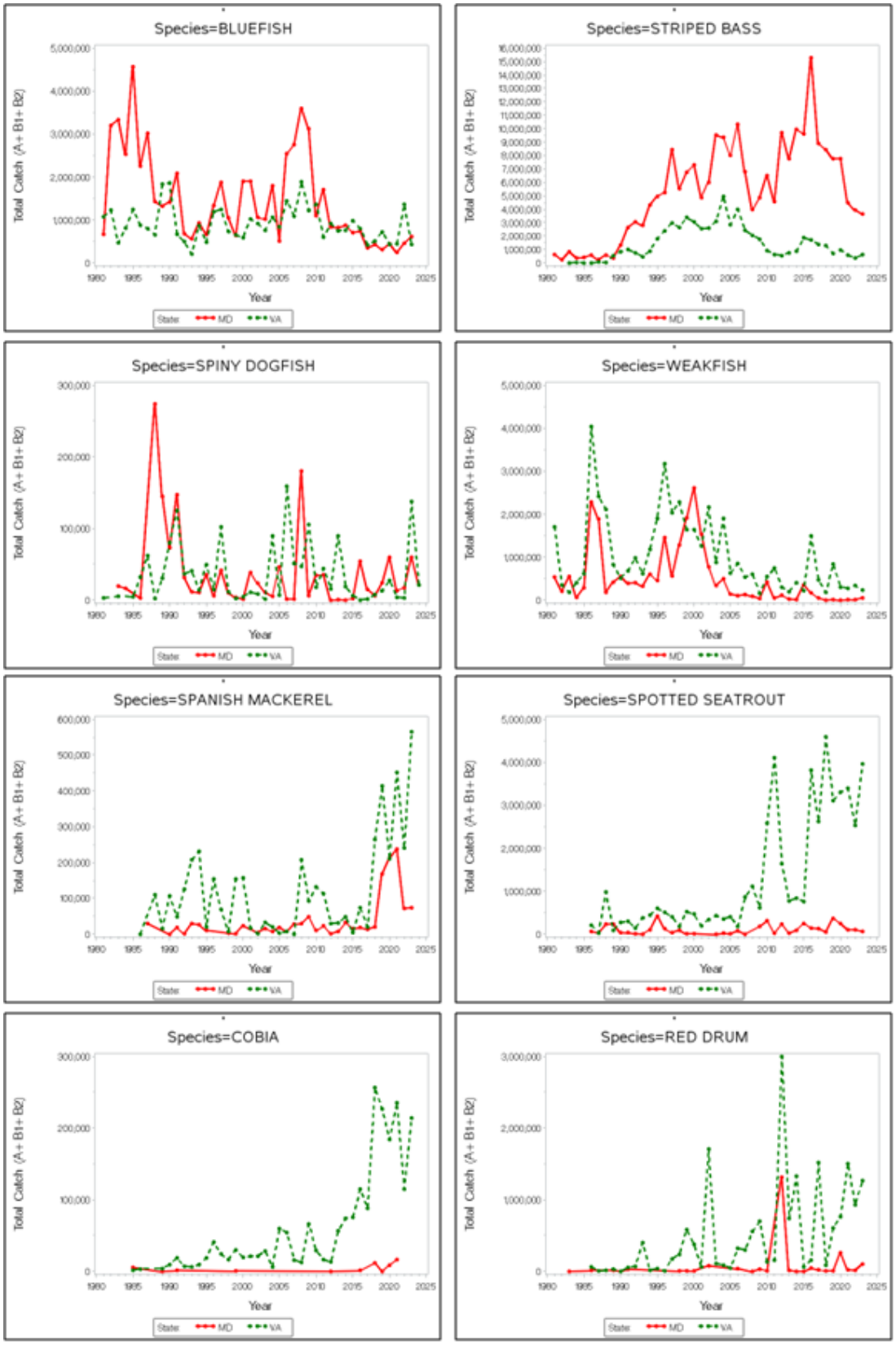


Figure 19. Recreational Catch of Key Bay Predators. Source: MRIP

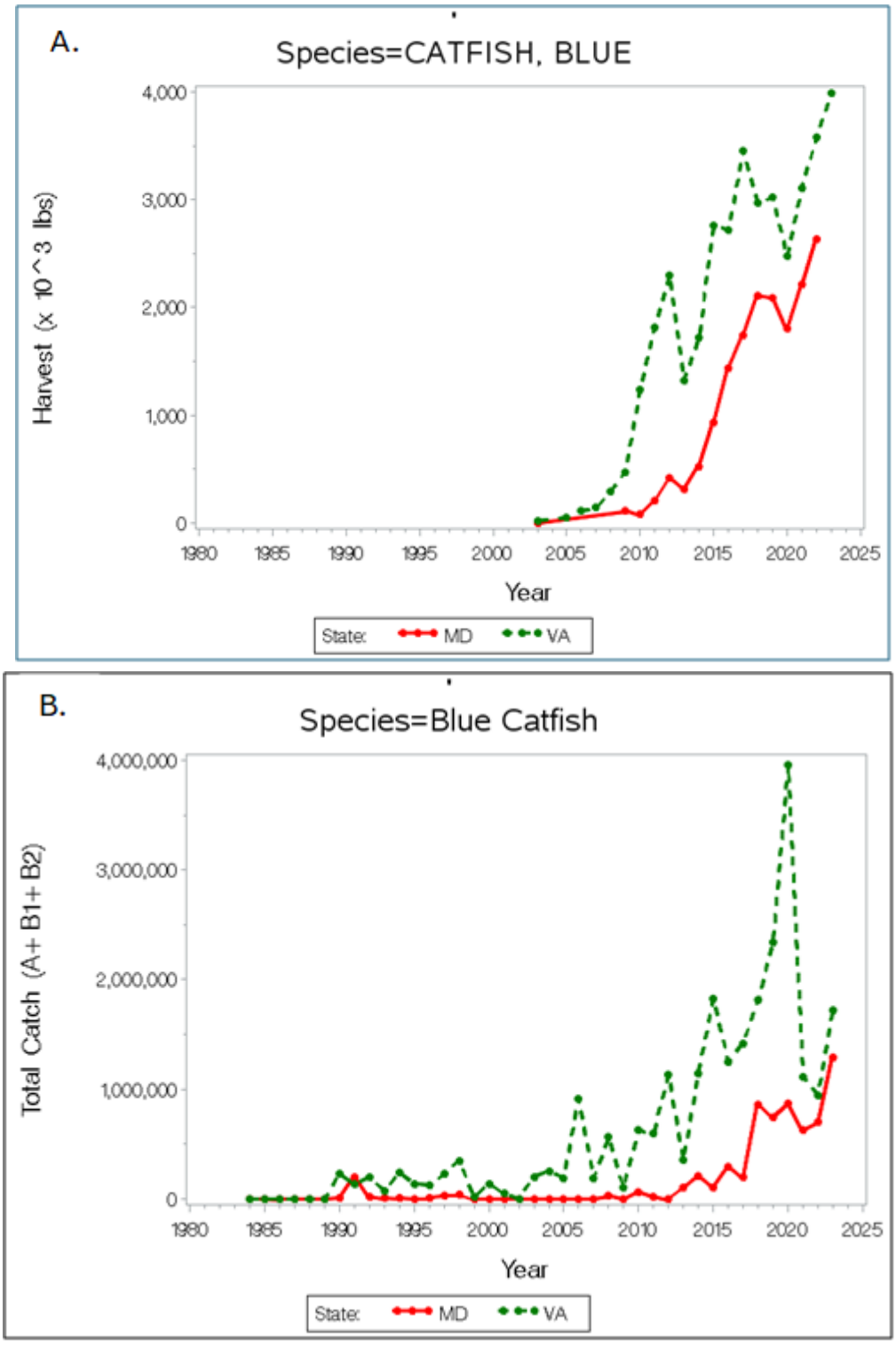
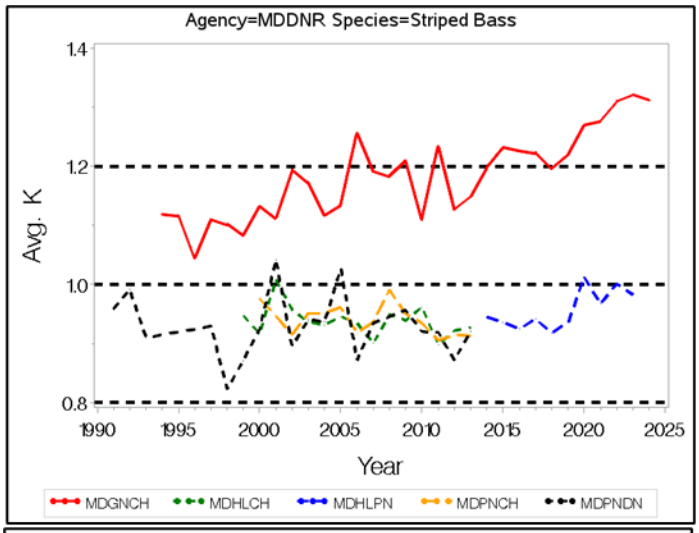
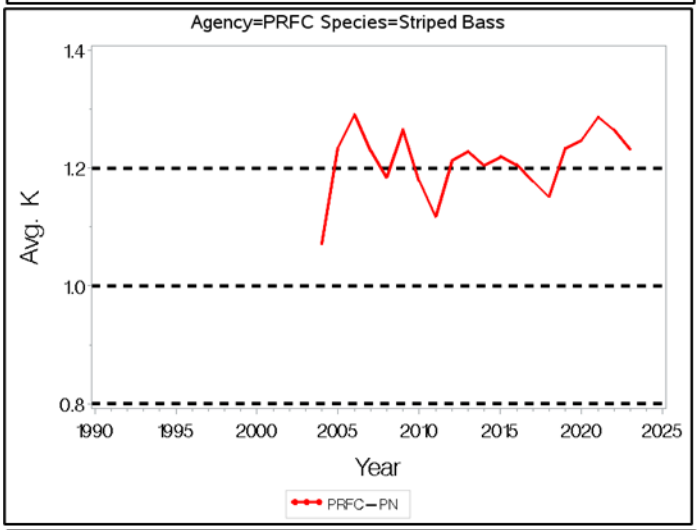


Figure 20. Blue Catfish Commercial (A) harvest and recreational catch (B) for Maryland and Virginia. Sources: ACCSP and MRIP





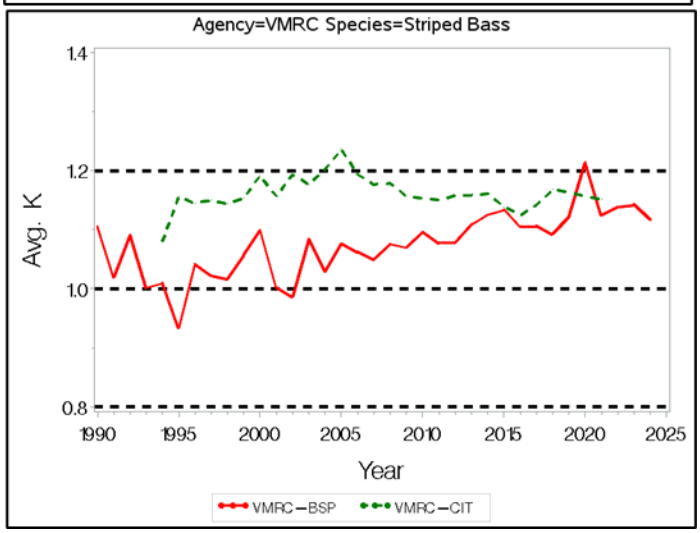


Figure 21. Striped Bass annual Fulton's Condition Factor by agency and project: 1 = normal, > 1.2 = very healthy, < 0.8 = stressed.

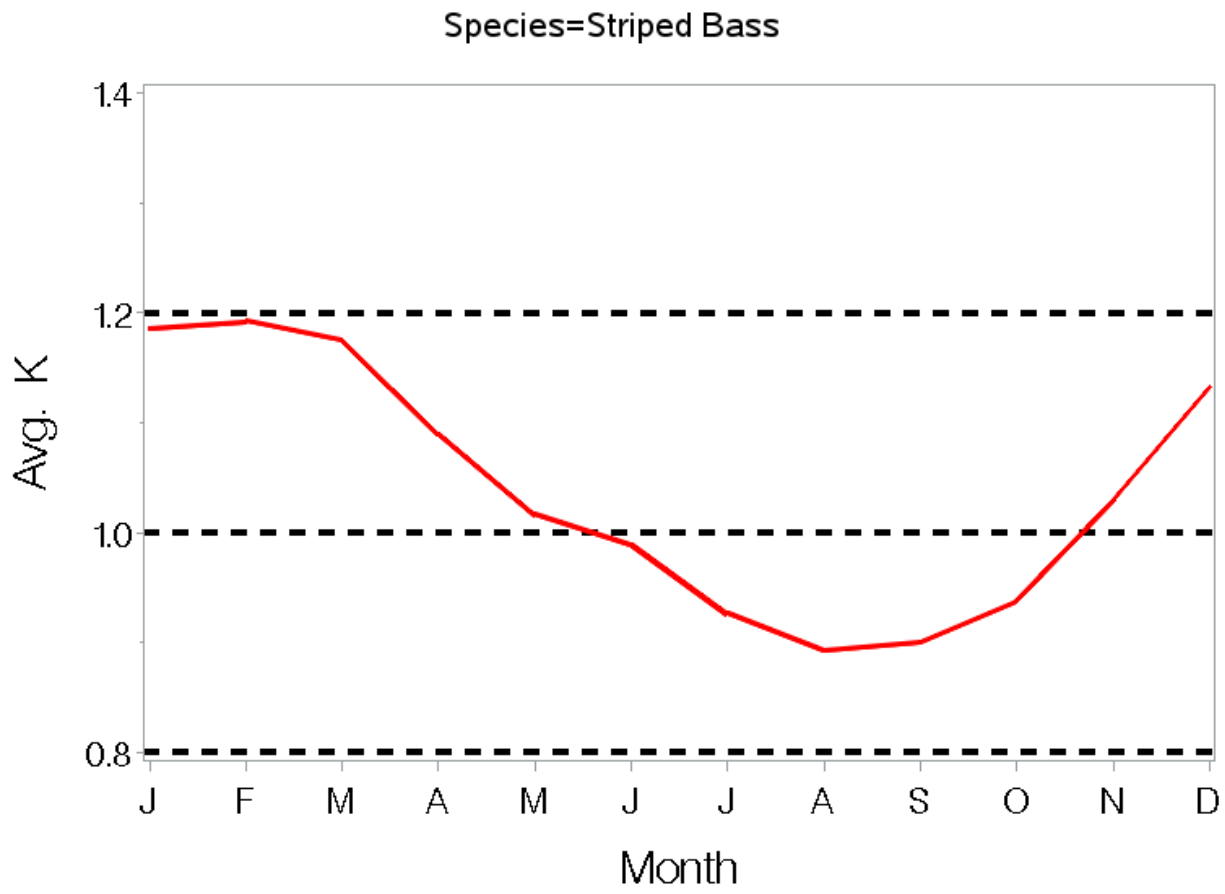


Figure 22. Striped Bass Fulton's Condition Factor by month for all agencies and projects combined.

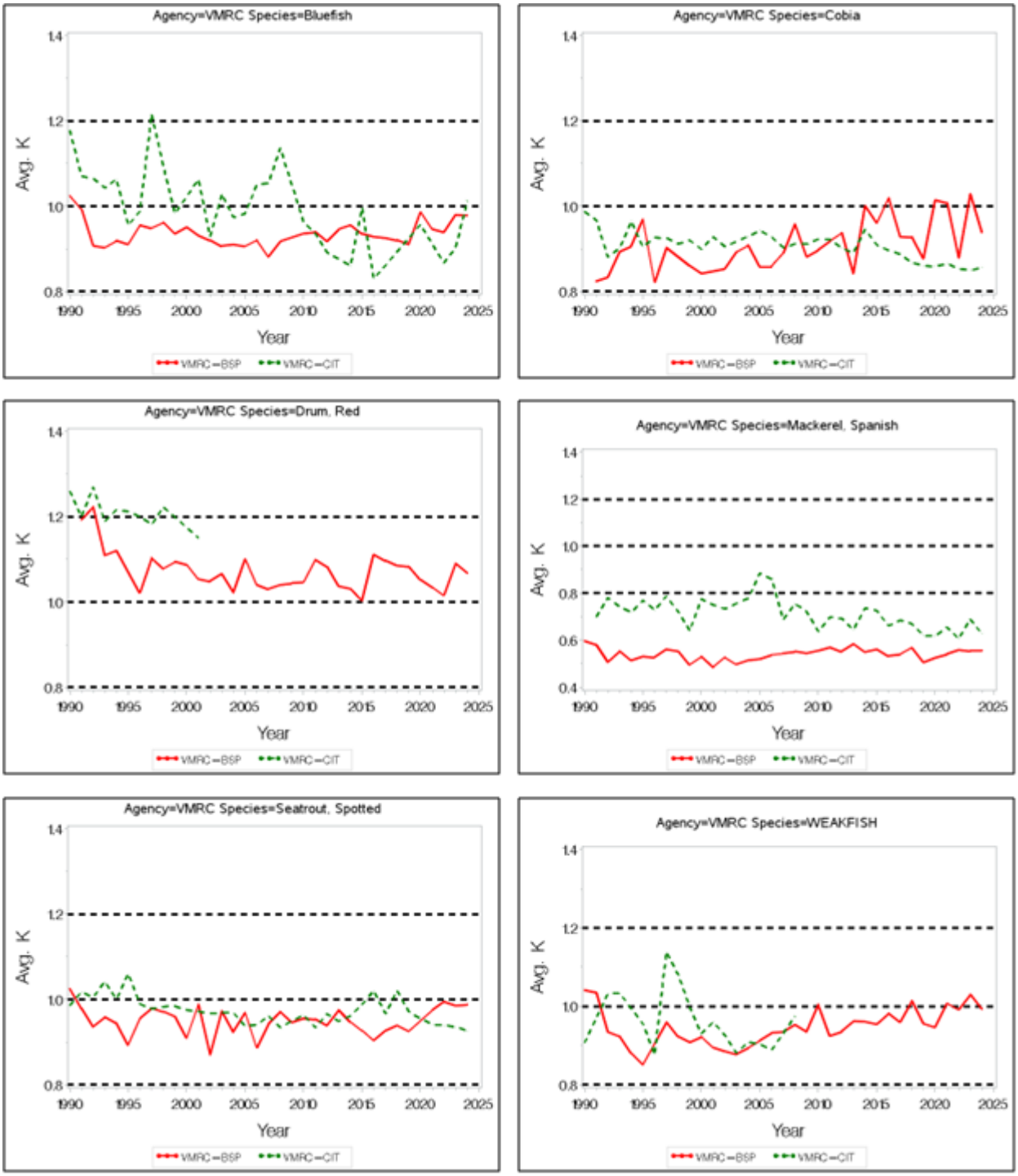


Figure 23. Fulton's Condition Factor for other bay predators for Virginia based projects only. Information for blue catfish and spiny dogfish is not available currently.

March 20, 2025

Response to Questions on Chesapeake Bay Osprey (*Pandion haliaetus*) Foraging Needs

Workgroup Members
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What is the general timeframe of residence of ospreys in Chesapeake Bay?

Residency is generally 1 March through 15 September.

When do they typically arrive and when do they typically leave? How variable are those timelines?

Ospreys begin to arrive in the lower Bay in late February and arrival peaks by mid-March, and slightly later in the more northerly portions of the Bay (Bent 1937; Reese 1991; Watts and Paxton 2007). Most breeders are here by late March. A cutoff for arrival of breeders is typically taken to be 15 April. A second wave of birds arrives in the Bay in late May. These are subadults that are prospecting for territories that will be used the following year. These birds pair up and will often build a partial nest but do not lay eggs (referred to as house sitters; Poole 1989). Since these house sitters have not recruited into the breeding population, these pairs are not considered in estimates of population size or in calculating demographic rates.

Departure schedules for breeding adults and hatch-year birds differ by as much as a month with adults initiating migration in late August through mid-September and hatch-year birds leaving later (Poole 1989; Watts and Paxton 2007). It should be noted that during the early fall there is a mix of resident birds and migrants (from northern breeding populations beyond the Bay).

Arrival and departure are consistent year to year with some adjustments for weather, and the schedule could shift with climate change over time. It is likely that arrival time in the Bay advances with age of bird up to some stable point. Many resident birdwatchers who observe pair arrival report that birds have arrived at "their" nest often on the same date for years.

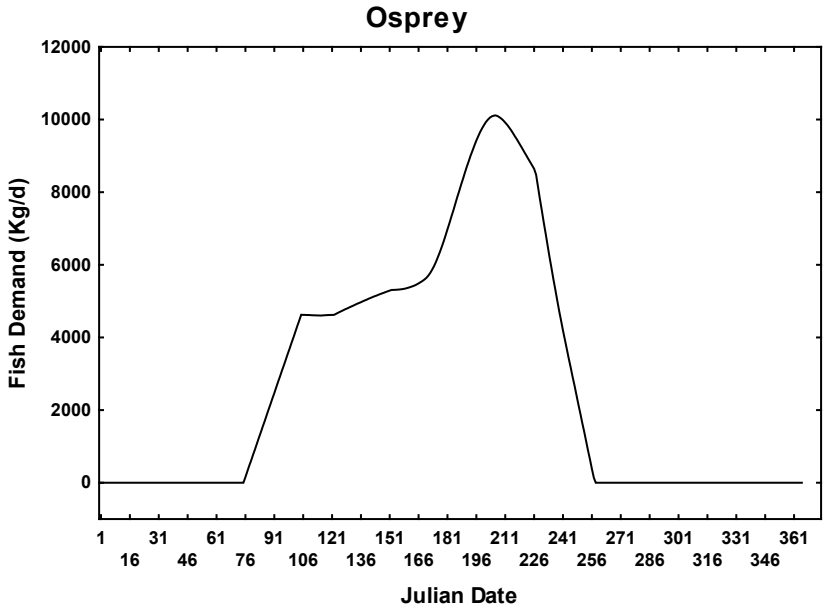
What is the general sequence of events during residency and when do they typically occur?

Adult Arrival – Late February through mid-April.
Nest Building – Peak 15 March – 15 April, but nest work can occur anytime.
Female Preparation for Laying – 1 to 31 March – effort includes female provisioning by male.

Laying – Early April through early May – Late layers are less successful; 2024 had both a high percentage of non-nesting adults and late clutches, observations that have not been previously documented.
Incubation – 39-day incubation period, both adults share duties, but female does more.
Hatching – Peaks during the second half of May.
Brood Rearing – First 3 weeks is the most critical period, male does most of the hunting, female does most of the brooding and care of young (referred to as nestlings or chicks), with the brooding period lasting 7-8 weeks.
Fledging – Most young (around 55-60 days old) in the Bay fledge in July (fledglings are young that are learning to hunt), and in 2024 some broods fledged later.
Post-fledging Period – Period between fledging and migration is a very vulnerable time for offspring. During the early part of the period, young are dependent on adults for food but less so over time as they learn to forage on their own.

Are there certain aspects of osprey life history during their residency in Chesapeake Bay that are more bioenergetically demanding than others? When do those activities occur? Are there estimates of consumption rates/needs?

The most bioenergetically demanding period during the annual cycle is when osprey pairs are raising broods. Historically, this period has been from mid-May through mid-July. In terms of population-level metabolic demand, estimates of the seasonality from years ago appear in the graph below (B.D. Watts, The Center for Conservation Biology, William and Mary, written communication, December 4, 2024). This graph was for a population size that is basically equivalent to that in the main stem of the Bay - the menhaden (*Brevoortia tyrannus*)-dependent area. Overall demand was estimated to be only about 1.2 million kg/year (seasonal peak is only around 10,000 kg/d). This indicates that the period of highest energy demand at the population level is from mid-May through mid-August. It is important to note that the period of peak demand is not necessarily the period of critical demand. Most broods are lost within the first 2 weeks of development. Their demand is relatively low at that age, but the adults must meet that demand, or they will die. Older chicks have more energetic reserves and can overcome short periods of food deficit. Young chicks cannot. It is critical that enough fish be available that can be captured by adults and delivered to the nest during the May period so that broods can make it through this bottleneck.



How does forage availability relate to consumption rate (how much biomass is needed relative to consumption to account for encounter rate, handling time, etc.?)

This is really the central question that remains to be resolved to understand the relationship between the stability of the osprey/consumer population and management of the fish stock. We know from various piscivorous bird studies around the world that reductions in fish stock can lead to reductions in avian provisioning rates that result in brood reduction and low reproductive rates (e.g., osprey: Poole 1982; Hagan 1986; Eriksson 1986; Bowman et al. 1989; Steidl and Griffin 1991; Machmer and Ydenberg 1998). Observations of declines in provisioning rates in parts of the Bay have resulted in reproductive rates below maintenance. Osprey very likely have a Type II functional response curve (i.e., consumption rate rises with prey density, but gradually decelerates until a plateau is reached at which consumption rate remains constant irrespective of prey density), such that a rapid increase in foraging rate with increasing prey density leads-to a population asymptote (B.D. Watts, The Center for Conservation Biology, William and Mary, written communication, December 4, 2024). If we could understand where along that curve osprey need to be to break even demographically, we could then solve for what density of fish they require. An independent assessment of fish abundance for a few osprey pairs (n = 15-20) could enhance our understanding of this relationship. Currently, such fish abundance data are not available to describe this relationship. One approach may be to develop a catch-per-unit effort foraging model and solve for relative fish abundance. This approach could support a better understanding of spatial and temporal variation in menhaden availability and its relationship to reproductive rates.

How do osprey typically identify and select nest sites?

Little is known about the nest selection process itself, but quite a bit is known about patterns of substrate use. Ospreys prefer to nest over water when appropriate substrates are available,

presumably related to the "escape from ground predator" benefits (Poole 1989). Use of duck blinds has been studied throughout the Bay and the probability of occupancy increases dramatically around >25-m offshore Watts and Paxton 2007). Prior to the 1960s, the majority of nests were on snags and live trees. Since the 1960s, the majority of nests have shifted to human-made structures (Watts et al. 2004; Watts and Paxton 2007). There have been a couple of waves of the appearance of human-made structures including the rapid expansion of aids to navigation during the 1970s, and then later the rapid expansion of private osprey platforms since the 1990s. Thus, there have been shifts in substrate use over time, but the general requirements remain unchanged. Ospreys prefer stable structures that offer protection from predators and are near adequate sources of fish (Poole 1989; Watts and Paxton 2007).

Are they well-established over time or do they move annually?

Ospreys exhibit high nest site fidelity. Generally, once a nest site has been established, the pair will use it for many years or until there has been a change to the structure (Poole 1989). If the nest is lost to weather or to human removal, the pair will rebuild the nest. However, if the structure itself is lost or altered in some functional way, the pair is forced to select another structure typically within a short distance of the original nest. Loss of nest substrate happens regularly due to various forces, such as ice flows eliminating duck blinds in particular years or more systematically as in the recent removal of many aids to navigation throughout the Bay by the U.S. Coast Guard (Watts and Paxton 2007). If no appropriate structure is available after its loss, the pair will move and find a new place. Nest substrate can certainly be limiting in various parts of the Bay, but more so historically than now due to the proliferation of nestable human-made structures.

What is the typical foraging range for osprey?

The distance that adult osprey forage from the nest varies from site to site. In some populations most of the foraging is within site of the nest (< 2 km), but in others it can range much further (15-20 km). Some individuals have preferred hunting areas and spend quite a bit of their time in those areas, while others are much more variable in where they forage. Across pairs, a high proportion of prey come from within 10 km of the nest site (Poole 1989).

What is the behavioral response if sufficient forage is not found within the typical range – looking farther afield, prey switching, something else?

Ospreys are adaptable foragers and certainly will adjust their hunting strategy as conditions change. This includes switching to less preferred prey, spending more time foraging, foraging farther away from nests, changing hunting tactics, etc. However, like all predators, ospreys have to maintain a positive energy balance. If they must travel too far or spend too much time to obtain the forage they need, then costs may exceed returns and their location is not viable. The limit to viability during the brood rearing period requires that adults meet the energetic demands of the brood. If they cannot, then the nest will fail. Recent diet simulation research suggests about 60% of the diet must be in the high-lipid category (including menhaden, eel, mackerel, etc.) to break even (B.D. Watts, The Center for Conservation Biology, William and Mary, written communication, December 4, 2024). This is not the case in some parts of the Bay. Prey

switching is not a panacea. Diet quality in terms of energy density has declined by 50% since the 1980s due to increased use of low-lipid prey (e.g., striped bass, white perch) by osprey (McLean and Byrd 1991, Glass and Watts 2009, Academia 2022).

What are the individual and population level impacts of insufficient forage for ospreys?

If an individual is not able to obtain enough fish to meet its basal metabolic demands, it will either emigrate or die. This presumably is what drove the evolution of their migration and also why they live in proximity to bodies of water. In terms of reproductive rate and broods, osprey have like many birds evolved a behavioral mechanism to match the brood demand to the available food. Many pairs in the Bay hatch three chicks. If there is enough food to provision all of the chicks, then all will develop and grow synchronously and survive. If there is not enough food to sufficiently provision the three chicks, then a dominance hierarchy will form, and the most subordinate young will be fed last. If this chick does not get enough food, it will die. If the second chick does not get enough food, it will also succumb to starvation. This process is referred to as brood reduction – reducing the brood and associated metabolic demand to match food availability. If the dominant chick does not get enough food, the nest will fail. Brood reduction on a large scale is an indicator of food stress (Poole 1982; Hagan 1986; Eriksson 1986; Bowman et al. 1989; Steidl and Griffin 1991; Machmer and Ydenberg 1998).

At the population level, the principal driver is whether or not adult pairs are producing enough young to offset average adult mortality. If they are producing just enough on average, then the population is expected to be stable. If they are producing a surplus, then the population is either stable or increasing depending on the circumstance. If the population is in deficit, then it would be expected to decline unless it is receiving immigration from another population. Net dispersal is why population size alone does not always follow local reproductive success.

How are those impacts typically measured?

There are a number of metrics that have been quantified that may be related to food stress. Some of these are generic (e.g., reproductive rate, brood reduction) and do not isolate food stress from other causes and other metrics are too costly to implement at scale (e.g., provisioning rate, nestling growth rate).

Notably, osprey nests have been monitored throughout fairly large portions of the Bay since the 1960s (Reese 1968; Reese 1969; Reese 1970; Henny 1974; Reese, 1975; Reese 1977; Rattner et al. 2004; Watts et al. 2004; Lazurus 2015; and Lazarus 2016). Coverage has been less consistent since the 1990s, but over the past couple of years there has been greater effort to increase geographic coverage of osprey reproduction in the Bay. This information is used to generate a number of metrics that are used to gauge impacts, including nesting success rate, reproductive rate, chick loss rate (brood reduction), percent one-chick broods, etc. Efforts are planned to develop some metrics that are practical, can be implemented at scale and reflect food deficit stress.

How have those indicators changed in Chesapeake Bay over the past 10-20 years?

For at least Mobjack Bay, substantial declines in reproductive rates, overall provisioning rates, provisioning rates with menhaden, proportion of the diet comprised by menhaden and diet quality have been documented. An increase in male foraging time and brood reduction has also been observed. Importantly, reproductive rates have transitioned from surplus to deficit (Academia and Watts 2023; Watts et al. 2024).

In 2024, 12 study areas were monitored in the Bay including 10 within the main stem of the Bay (salinity >10 ppt) and 2 in the lower salinity reaches (<1 ppt). All of the 10 sites were in reproductive deficit, while the 2 lower salinity reference sites were in reproductive surplus. It is believed that ospreys nesting in much of the main stem of the Bay are menhaden dependent. Osprey in the low salinity sites do not depend on menhaden as prey (Glass and Watts 2009; Lazarus et al. 2016).

In 2025, we plan to work across four salinity zones to examine reproductive rates to see if the Bay-wide population is at risk due to the low reproductive rates in the main stem of the Chesapeake. The four salinity zones would include low salinity (0 to <5 ppt), low mesohaline (5 to <12 ppt), high mesohaline (12 to <18 ppt), and polyhaline (18 to 30 ppt).

Is there a comprehensive list of osprey nest sites in the Chesapeake (which are natural and which are artificial)?

The last systematic survey of the Chesapeake Bay osprey population was completed in 1996 (Watts et al. 2004). This survey has been converted to a digital coverage with all nests mapped and all substrate types indicated. We do not have an updated coverage for the entire Bay. We have nest locations and substrate types for select study areas throughout the Bay totaling approximately 1,000 nests. As described previously, ospreys reproducing in the Chesapeake Bay nest primarily on human-made structures. As of the 1990s, greater than 90 percent of Chesapeake Bay osprey nests were located on human-made structures (Watts et al. 2007). Osprey pairs are distributed throughout the entire tidal portion of the Bay and beyond, wherever appropriate conditions are available.

RESEARCH DIRECTIONS TO MORE FULLY CHARACTERIZE THE RELATION OF MENHADEN TO THE SUSTAINABILITY OF OSPREYS IN THE CHESAPEAKE

Establishing a menhaden monitoring program for the Chesapeake Bay

Currently, there is no effective and biologically robust monitoring scheme of menhaden within the Chesapeake Bay ecosystem. This lack of a fisheries-independent assessment prevents evaluation of the potential impact of harvest on menhaden, which is required to set appropriate harvest regulations with respect to the needs of osprey. The lack of monitoring data on the scale of natural consumer populations also prevents directly linking changes in consumer populations to menhaden stock. Designing a menhaden monitoring program could support detection of spatial variation in menhaden abundance and identification of trends over time.

Summarizing and evaluating long-term historic data for the osprey in the Chesapeake Bay

Osprey breeding performance has been monitored throughout a large portion of the Chesapeake Bay for more than 50 years, including tens of thousands of nests and reproductive observations. A few papers have been published that address a specific list of questions. Gathering and compiling the existing raw monitoring data will create a . dataset that could allow for the evaluation of spatial and temporal patterns in breeding performance over a long time period.

Examining the historic relationship between osprey demographics and menhaden stock along the Atlantic Coast

Dozens of osprey monitoring programs exist along the Atlantic coast. Many of these programs were initiated during the DDT era and have continued for decades. Other monitoring efforts have been initiated in recent years or decades. An ongoing project by the Center for Conservation Biology (B.D. Watts, William and Mary, written communication, August 20, 2023) is to merge range-wide osprey monitoring efforts into a single dataset that may be used to evaluate the demographic response of breeding osprey to menhaden fluctuations. We plan to 1) develop an overview of existing monitoring data using a metadata template, 2) invite researchers with datasets to join a coalition and submit nest by nest data in a standardized format, 3) archive datasets in a common repository, 4) merge all data into a single centralized dataset and 5) evaluate the response of osprey demographics to menhaden and other explanatory variables within the appropriate spatial scale.

Investigating the role of climate in menhaden abundance in the Chesapeake Bay and related consumer populations

There is mounting evidence that natural events such as the Atlantic Multi-decadal Oscillation (AMO) may be shifting the center of biomass of menhaden to the north and may also be changing the phenology of entry into the Chesapeake Bay (Ney et al. 2014; Midway et al. 2020). Changes in abundance and phenology of menhaden related to climate change effects may be directly linked to recent shifts in consumer populations like osprey. Understanding these changes is critical to understanding options for mitigation.

Developing a metric of food stress in osprey that may be used as a monitoring tool for ecosystem conditions

Compile both recent and historic monitoring data to screen a number of candidates for development of a metric that may be measured economically and at scale for use as an effective indicator of food stress in osprey.

Developing an osprey catch-per-unit-effort (CPUE) model for menhaden

One of the challenges in understanding the relationship between osprey brood provisioning, demography and menhaden stock is that we have no estimates of menhaden availability on the local scale. One potential work around for this void is to develop a CPUE model (prey capture/time spent hunting) for males provisioning broods. Development of a CPUE model for menhaden (and other fish species) would allow us to better define the state space where osprey may meet demographic requirements within the time available for hunting. A CPUE-

demographic framework could lead to a simple monitoring program based on male hunting that would inform whether or not stock levels are adequate to sustain a viable osprey population. The intent in building the CPUE model would be to develop a metric that would be practical to apply on a broad scale to indicate when/where menhaden abundance is adequate to sustain the osprey population.

During the 2023 breeding season, we completed a proof-of-concept for pairing high output, three-dimensional tracking of males with nest cameras (B.D. Watts, The Center for Conservation Biology, William and Mary, written communication, August 20, 2023). This pairing can allow for quantifying male time budgets, determining the time allocated to hunting, estimating the duration of hunting forays (both length and time), identification of hunting areas, determining captures/attempts ratios and the identification of fish captured. These metrics could allow for the assessment of species-specific provisioning rates and the development of species-specific CPUE models.

OTHER ISSUES OF CONCERN

Overlap between menhaden harvest sites and osprey breeding

One approach to evaluate the relationship between commercial harvest of menhaden and impacts to osprey reproduction could be to quantify overlap between menhaden net sets and osprey study areas (i.e., locations where we have recently quantified reproductive rates). This approach assumes that menhaden are spatially static such that the impact of harvest is restricted to the locality of capture. Most of the net sets are concentrated around the lower eastern shore where menhaden enter the Bay. In effect, menhaden are being intercepted as they migrate into the Bay. This activity impacts downstream consumers just as dams restrict the migration of fish up into tributaries and impact consumers above the dam. A more realistic assumption could be that there is high connectivity between localities throughout the Bay, such that actions in one place are likely to impact availability of menhaden to consumers elsewhere. If there is high connectivity throughout the Bay, then we would expect low correspondence between where fish are taken and impacts to other specific locations.

Density-dependence in osprey reproductive rates

The decline in osprey reproductive rate may be driven by the increase in osprey numbers such that the increased numbers are cropping down the menhaden stock - a density-dependent process that is likely playing out. As has been indicated elsewhere, osprey do not have the capacity to crop down menhaden. McLean and Byrd (1991) point out that osprey consumption represents a fraction of one percent of the commercial harvest. Even if we consider all of the bird consumers during the breeding season, the consumption is less than five percent of commercial harvest (B.D. Watts, The Center for Conservation Biology, William and Mary, written communication, January 28, 2025). This is consistent with an “upper-limit” estimate of double-crested cormorant consumption of menhaden along the coast of North Carolina (Watts et al. 2023). Osprey simply do not have the metabolic capacity to exert control of menhaden stock.

Although it is possible that behavioral interactions among nearby pairs of nesting ospreys could reduce time spent foraging and impair productivity, this has not been apparent in the

Chesapeake Bay in the past. In fact, ospreys are considered to be colonial or semi-colonial breeders when prey are readily available, with nesting pairs situated on nearly every aid to navigation moving up a tributary or on electrical transmission power poles in proximity to a water body (Poole 1989).

Other stressors that could affect osprey reproduction and the population in the Chesapeake Bay

Other processes and stressors (e.g., habitat loss, interspecific competition, disease, predation, toxicants, invasive species) can cause declines in avian populations, and in some instances Chesapeake Bay ospreys have been or may be vulnerable to these stressors. Environmental contaminants (e.g., DDT and metabolites, PCBs), that were at one time suppressing reproductive rates of ospreys in the Chesapeake Bay, no longer seem to be evoking such effects (Watts and Paxton 2007; Lazarus et al. 2015, 2016). Disease events (e.g., avian botulism, highly pathogenic avian influenza, West Nile virus), and harmful algal blooms -have occasionally affected large numbers of waterbirds in the Bay, but have not been found to evoke significant mortality events in ospreys (e.g., Watts and Paxton 2007; Lankton et al. 2022; Rattner et al. 2022; Southeastern Wildlife Cooperative Disease Study 2024). Other anthropogenic hazards and activities (e.g., electrocution, collisions with building and vehicles, shooting, discarded fishing tackle) have affected individual ospreys but without major consequences to their population.

There are many natural structures, duck blinds and human-made platforms for nesting ospreys in the Chesapeake Bay. Nesting structures for ospreys are at a surplus. Notably, in some areas of the Bay a fraction (~10%) of the human-made osprey nest platforms (e.g., Choptank River in 2024) are being used by Canada geese (*Branta canadensis*) making them unavailable for nesting ospreys (Rattner and Day 2024).

Interspecific competition between bald eagles (*Haliaeetus leucocephalus*) and ospreys, including kleptoparasitism (stealing food) and other antagonistic behaviors, is well documented (e.g., MacDonald 1994). One detailed study in Florida indicated that bald eagles did not exclude nesting ospreys, but did possibly contribute to lower nesting success (e.g., Ogden 1975).

However, over the past 50 years, bald eagle, osprey and heron populations have seemingly jointly recovered in the Chesapeake Bay (reviewed in Cruz et al. 2019). From the 1970s to 2020, the bald eagle population increased from 60 to about 3,000 breeding pairs, whereas the osprey population increased from 1,450 breeding pairs in 1973 to about 10,000 breeding pairs (Watts et al. 2007; Watts and Paxton 2007; US EPA Chesapeake Bay Program 2025). Bald eagle density is about an order of magnitude greater in tidal freshwater regions of the Bay where osprey reproductive success is high compared to lower eagle density in the main stem of the Bay where osprey reproduction is marginal or poor (Watts et al. 2007). However, the number and productivity of nesting bald eagles and of ospreys in various segments of the Bay have yet to be rigorously compared. Such a comparison could be undertaken to elucidate the possibility of interspecific competition affecting osprey productivity.

It is certainly possible that reduced prey availability, exposure to environmental contaminants, disease and interspecific competition could all be contributing to impaired osprey reproduction and productivity in parts of the Bay. Based on existing information, limited prey availability is seemingly the principal driver of poor reproductive success in the 2024 study areas.

COMMENTS ON MANAGEMENT OPTIONS

Seasonal Closures

Osprey and other bird species that depend on menhaden within the Chesapeake Bay are most sensitive to food shortages in the May and June time period. Mitigation measures designed to protect osprey or other bird species could attempt to insure high menhaden availability during this seasonal window.

Spatial Restrictions in Harvest

The current distribution of harvest appears like an intercept fishery, where fish are being harvested just before or as they enter the Bay. This effectively places the entire Bay in a compromised downstream position. If spatial restrictions are imposed, they could be around the mouth of the Bay where menhaden gain entry.

Use Osprey as Formal Ecological Reference Point

Osprey are a sensitive indicator of menhaden abundance within the main stem of the Bay. They could be formally listed as an ecological reference point and included within ecosystem management strategies. Specific reference conditions could be formally developed for osprey.

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Edwin Hustead
739 South Union Street
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Hustead@me.com

To: Atlantic States Fisheries Commission

I am very concerned about the serious depletion of Ospreys in the Chesapeake Bay. This depletion is close to that caused by the use of DDT and other chemicals before Rachel Carson's book Silent Stream.

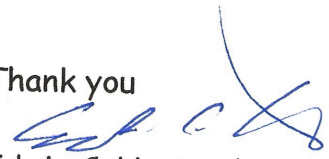
Bryan Watts, Director of the Center for Conservation Biology at William and Mary has studied the reasons for the reduction in viable nests. His paper, Failing Nests for Chesapeake Ospreys, found that "Osprey reproduction rates had sunk even lower than before the DDT ban in the 1970s, with only 17 of 167 nests containing live chicks in one survey" .

Menhaden are the primary food for Ospreys in the Chesapeake Bay . Other nearby nesting areas, such as the Potomac and James rivers have not shown this shocking loss. Watts has found that Ospreys in those rivers have a more varied fish diet and rely much less on Menhaden.

I am aware of the study by Robert Latour that questions the methods and results used by Watts. But a 10% viability rate is so low that it is difficult for me to believe that there is any other major reason for the decline. My view is that the decline in the viabiality of Osprey must be largely a result of the reduction of Menhaden.

I ask the Atlantic States Marine Fisheries Commission to consider reducing the quota on taking Menhaden from the current limit of 112,000,000 pounds a year to a limit that will restore the health of Ospreys in the Chesapeake Bay.

Thank you



Edwin C. Hustead

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James Boyle

From: Info (ASMFC)
Sent: Monday, April 7, 2025 10:23 AM
To: James Boyle
Cc: Toni Kerns
Subject: FW: [External] New website contact submission from Contact Us

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From: info@asmfc.org <info@asmfc.org>
Sent: Sunday, April 6, 2025 3:20 PM
To: Info (ASMFC) <info@ASMFC.ORG>
Subject: [External] New website contact submission from Contact Us

Name
Theresa Lown
Email
sashalown@comcast.net
Comments
The Spring 2925 issue of "Living Bird" highlights the precipitous drop in healthy osprey in Chesapeake Bay is alarming and infuriating. The menhaden are being overfished by Omega Protein, who predictably denies it, citing you people sanctioning it all. The fish belong to the birds, its their only real food source. Re-evaluate your science please. Consider the effects of climate change on the fish. Maybe your "quotas" are out of date. Birds and fisf first please. Corporations need to stop with the greed, its unsustainable. Lobster trap lines are torturing all the sea life, do you care?

James Boyle

Subject: RE: [External] decline of natural habitation in the Bay

From: John Majane <jamajane@verizon.net>
Sent: Tuesday, December 17, 2024 3:16 PM
To: Emilie Franke <EFranke@ASMFC.org>
Subject: [External] decline of natural habitation in the Bay

Madame

Years ago (60s 70's) we would go out on the Bay and bring in croakers, blues and occasionally a rock.

We all know now that only the pros can get a fish!

The feed stock is depleted and no amount of fishing restrictions will bring back the catch!

Yet overfishing for menhaden continues helping Canadian farmers.In fact as a result of a relatively recent incursions by a water skier with the net closing activity of the Canadian contractor resulted in an immediate reaction from our MD legislature. Fines and legal action.

Many years ago when fish were plentiful Kent Is. suffered dead menhaden smell. No more.

Real estate interests influencing Bay feed stock? And the catch volume?

I guess we all know whom runs things in MD.

John Majane
7812 Carteret Road
Bethesda MD 20817-1916
301-469-0462

James Boyle

From: G2W2
Sent: Friday, November 15, 2024 9:45 AM
To: James Boyle
Cc: Katie Drew; Toni Kerns
Subject: FW: Comments

From: Pierrepont, Stuyve <Stuyve.Pierrepont@marsh.com>
Sent: Friday, November 8, 2024 10:59 AM
To: G2W2 <G2W2@asmfc.org>
Subject: [External] Comments

I am not a scientist but I have been listening in on some of these meetings so that I can learn how this process works. I'm really trying to understand why we have gotten into such a horrible state with our forage fish on the east coast. How is it that Atlantic herring, mackerel, shad, river herring, eel, and many predator species are overfished and declining. Is it faulty science, is it regulatory capture, is it institutional groupthink, is it industry influence in management and nmfs, is it the fact that the department of commerce was set up to support commercial fishing?

After listening to some of this meeting. It is clear that you are all very smart people with good intentions. However, clearly you do not make sound precautionary decisions sometimes, and the consequences are stark.

For example, I know that some of you were involved in the Atlantic herring assessment that recommended catch levels that allowed the stock to be overfished. Three bad years of recruitment in a row and the fishing industry destroyed the spawning stock. Now there have been 6 bad years of recruitment and the stock won't rebuild until at least 2031, if ever. Of course this hurts the ecosystem and the predators who rely on them, but it also hurts the fishing economy.

I will wrap up by saying that as you move forward with this menhaden ecosystem assessment, I urge you to take a precautionary approach at every turn. The natural mortality parameter is precisely the kind of thing that this committee should be VERY concerned about. In the end you should pick a conservative M, not a radical outlier. Otherwise, you risk putting the stock of the most important fish in the sea into the tank, and destroying the forage base for striped bass and dozens of other species. It is on your shoulders to solve this forage fish crisis.

Respectfully, Stuyve

R. Stuyvesant Pierrepont III
917 282 5110 (c)
Stuyve.pierrepont@marsh.com

James Boyle

From: Patricia VonOhlen <wvonohlen@gmail.com>
Sent: Wednesday, November 27, 2024 5:03 PM
To: Comments
Subject: [External] Please limit Menhaden catch

Follow Up Flag: Follow up
Flag Status: Flagged

Hello,
I'm just a lowly citizen but I'm concerned about the health of the Chesapeake Bay and specifically the wildlife that depends on the bay waters. I've personally noticed a decline in osprey. Also, my husband has been a striped bass recreational fisherman for years and unfortunately he has not been able to catch any for the last couple of years. It seems they are no longer in our waters. I've read that the commercial over harvesting of menhaden is a likely cause of both of these important species having declining numbers.

I'm hoping that your group will take measures to protect the menhaden by limiting the allowable catch. It seems the health of the Chesapeake Bay depends on these important fish.
Thank you for caring about the Earth and working to protect it.

Patricia VonOhlen
9801 River Rd
Newport News, VA 23601
wvonohlen@gmail.com
757-218-3178

James Boyle

From: Comments
Sent: Wednesday, November 27, 2024 3:17 PM
To: James Boyle
Subject: FW: [External] Limit the Menhaden Catch to Save the Osprey

-----Original Message-----
From: Gwyn Williams <geebee219@gmail.com>
Sent: Wednesday, November 27, 2024 12:43 PM
To: Comments <comments@asmfc.org>
Subject: [External] Limit the Menhaden Catch to Save the Osprey

I own waterfront property, and we used to have osprey breeding, but for the last several years, it's all over for them, and I heard it's because of over-fishing of menhaden.

I am a nature lover and ask you to please support additional controls over the menhaden harvest.

The situation is quite shocking to waterfront homeowners.

Thanks for reading,
Gwyn Williams
Yorktown, VA