Atlantic States Marine Fisheries Commission

Atlantic Striped Bass Management Board

May 4, 2026
1:15 – 3:30 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 *(C. Batsavage)*	1:15 p.m.
2.	Board Consent • Approval of Agenda • Approval of Proceedings from February 2026	1:15 p.m.
3.	Public Comment	1:20 p.m.
4.	Discuss 2027 Benchmark Stock Assessment *(K. Drew)* • Provide Guidance to Stock Assessment Subcommittee on Biological Reference Points and Spatial Management	1:30 p.m.
5.	Discuss Work Group on Future Striped Bass Management *(T. Kerns)* • Provide Guidance on Work Group Composition, Task Details, and Timeline	2:30 p.m.
6.	Update on Addendum III Implementation for Maryland Season *(M. Luisi)*	3:10 p.m.
7.	Discuss Timeline and Process to Provide Feedback on the NOAA Fisheries Striped Bass Aquaculture Plan (*T. Kerns*)	3:15 p.m.
8.	Elect Vice Chair **Action**	3:25 p.m.
9.	Other Business/Adjourn	3:30 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.

MEETING OVERVIEW

Atlantic Striped Bass Management Board
May 4, 2026
1:15 p.m. – 3:30 p.m.

Chair: Chris Batsavage (NC) Assumed Chairmanship: 2/26	Technical Committee Chair: Tyler Grabowski (PA)	Law Enforcement Committee Rep: Sgt. Jeff Mercer (RI)
Vice Chair: Vacant	Advisory Panel Chair: Eleanor Bochenek (NJ)	Previous Board Meeting: February 5, 2026
Voting Members: ME, NH, MA, RI, CT, NY, NJ, PA, DE, MD, DC, PRFC, VA, NC, NMFS, USFWS (16 votes)		

2. Board Consent

- Approval of Agenda
- Approval of Proceedings from February 2026

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

4. 2027 Benchmark Stock Assessment: Biological Reference Points and Spatial Management (1:30-2:30 p.m.)
Background • The 2027 benchmark stock assessment is underway with peer review scheduled for March 2027. • In February 2026, the Board received a request from Stock Assessment Subcommittee (SAS) seeking guidance from the Board to inform exploration of different types of biological reference points and to inform potential development of reference points for different regions **(Briefing Materials)**. • The SAS requests this guidance by May 2026.
Presentations • Request for Board Guidance by K. Drew
Board guidance for consideration at this meeting • Guidance on biological reference points and spatial management for the benchmark stock assessment.

5. Work Group on Future Striped Bass Management (2:30-3:25 p.m.)

Background

- In October 2025, the Board approved the establishment of a Work Group (WG) on future striped bass management considering recent low recruitment and impacts on the stock as those weak year classes mature. The Board included list of tasks for the WG to address.
- In February 2026, the Board provided initial guidance and several ideas on WG composition and tasks.
- Based on that initial guidance, staff developed more specific options for WG composition, process, and timeline for Board consideration in May 2026 **(Briefing Materials)**.

Presentations

- Request for Board Guidance by T. Kerns

Board guidance for consideration at this meeting

- Guidance on Work Group composition, task details, and timeline.

6. Update on Addendum III Implementation for Maryland Season (3:25-3:30 p.m.)

Background

- In February 2026, the Board approved state implementation plans for Addendum III to Amendment 7 on total length and the Maryland Chesapeake Bay recreational season.
- Maryland's implementation plan notified the Board of the state's decision to move forward with implementing the new recreational season baseline and was working through its state process for implementation at the time.
- On March 31, Maryland announced the state 2026 recreational striped bass regulations.

Presentation

- Update on Maryland Season Implementation by M. Luisi

7. Discuss a Timeline and Process to Provide Feedback on the NOAA Fisheries Striped Bass Aquaculture Plan (3:15-3:30 p.m.)

Background

- In January 2024, NOAA Fisheries Office of Aquaculture provided a presentation to the ISFMP Policy Board on aquaculture in the EEZ, specifically of Atlantic striped bass.
- The Policy Board requested NOAA Fisheries provide further information on several issues including environmental concerns, economic concerns, and enforcement/legal concerns.
- NOAA Fisheries developed a report on both the science and environmental issues as well as legal and policy issues regarding striped bass aquaculture **(Meeting Materials)**. This report was presented to the Board at the February 2026 meeting. The Board asked questions and has some feedback but NOAA is seeking more official

Presentations

- T. Kerns will present a timeline and process to provide feedback to NOAA's Striped Bass Aquaculture Plan

7. Elect Vice-Chair

8. Other Business/Adjourn (3:30 p.m.)

Atlantic Striped Bass

Activity level: High

Committee Overlap Score: Medium (TC/SAS/TSC overlaps with BERP, Atlantic menhaden, American eel, horseshoe crab, shad/river herring)

Committee Task List

- TC-SAS-TSC – Conduct the 2027 Benchmark Stock Assessment, including Data Workshop in 2025, Methods Workshop in early 2026, and Assessment Workshop in mid-2026
- TC – June 15: Annual compliance reports due and data deadline for benchmark assessment

Technical Committee (TC) Members: Tyler Grabowski (PA, Chair), Lars Hammer (ME), Gary Nelson (MA), Nicole Lengyel Costa (RI), Kurt Gottschall (CT), Caitlin Craig (NY), Brendan Harrison (NJ), Margaret Conroy (DE), Alexei Sharov (MD), Luke Lyon (DC), Ingrid Braun-Ricks (PRFC), Shakira Goffe (VA), Robert Corbett (NC), Jeremy McCargo (NC), Tony Wood (NMFS), Jimmie Garth (USFWS)

Stock Assessment Subcommittee (SAS) Members: Margaret Conroy (DE, Chair), Gary Nelson (MA), Nicole Lengyel Costa (RI), Mike Celestino (NJ), Alexei Sharov, Brooke Lowman (VA), John Sweka (USFWS), Tyler Grabowski (PA), Katie Drew (ASMFC), Samara Nehemiah (ASMFC)

Tagging Subcommittee (TSC) Members: Gary Nelson (MA), Jessica Best (NY), Brendan Harrison (NJ), Ian Park (DE), Angela Giuliano (MD), Beth Versak (MD), Jim Gartland (VIMS), Stuart Welsh (WVU), Mike Mangold (USFWS), Julien Martin (USGS)

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

ATLANTIC STRIPED BASS MANAGEMENT BOARD

The Westin Crystal City
Arlington, Virginia
Hybrid Meeting

February 5, 2026

These minutes are draft and subject to approval by the Atlantic Striped Bass Management Board.
The Board will review the minutes during its next meeting.

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INDEX OF MOTIONS

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

2. **Approval of Proceedings of October 2025** by consent (Page 1).

3. **Move to approve Addendum III State Implementation Plans** (Page 2). Motion by Joe Grist; second by John Clark. Motion carries (Page 5).

4. **Move to adjourn** by consent (Page 32).

ATTENDANCE

Board Members

Megan Ware, ME, proxy for C. Wilson (AA)
Steve Train, ME (GA)
Rep. Allison Hepler, ME (LA)
Renee Zobel, NH (AA)
Doug Grout, NH (GA)
Dennis Abbott, NH, proxy for Sen. Watters (LA)
Nichola Meserve, MA, proxy for D. McKiernan (AA)
Ray Kane, MA (GA)
Jason McNamee, RI (AA)
David Borden, RI (GA)
Eric Reid, RI, proxy for Sen. Sosnowski (LA)
Matt Gates, CT (AA)
Bill Hyatt, CT (GA)
Craig Miner, CT proxy for Rep. Gresko, CT (LA)
Marty Gary, NY (AA)
Emerson Hasbrouck, NY (GA)
Joe Cimino, NJ (AA)
Adam Nowalsky, NJ, proxy for Sen. Gopal (LA)
Kris Kuhn, PA, proxy for T. Schaeffer (AA)
Loren Lustig, PA (GA)
John Clark, DE (AA)
Roy Miller, DE (GA)
Craig Pugh, DE, proxy for Rep. Carson (LA)
Michael Luisi, MD, proxy for L. Fegley (AA)
Robert Brown, MD, proxy for R. Dize (GA)
David Sikorski, MD, proxy for Del. Stein (LA)
Joe Grist, VA (Acting AA)
Chris Batsavage, NC, proxy for K. Rawls (AA)
Daniel Ryan, DC, proxy for R. Cloyd
Ron Owens, PRFC
Max Appleman, NMFS
Chris Wright, NMFS
Rick Jacobson, US FWS

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

Ex-Officio Members

Tyler Grabowski, Technical Committee Chair
Margaret Conroy, Stk. Assmnt. Subcommittee Chair
Lt. Jeff Mercer, Law Enforcement Committee Rep.

Staff

Bob Beal
Toni Kerns
Tina Berger
Madeline Musante
Alexander Law
Caitlin Starks
Emilie Franke
Tracey Bauer
James Boyle
Chelsea Tuohy
Pat Campfield
Katie Drew
Jeff Kipp
Samara Nehemiah
Jainita Patel

These minutes are draft and subject to approval by the Atlantic Striped Bass Management Board.
The Board will review the minutes during its next meeting.

The Atlantic Striped Bass Management Board of the Atlantic States Marine Fisheries Commission convened in the Jefferson Ballroom of the Westin Crystal City Hotel, Arlington, Virginia, via hybrid meeting, in-person and webinar; Thursday, February 5, 2026, and was called to order at 8:30 a.m. by Chair Chris Batsavage.

CALL TO ORDER

CHAIR CHRIS BATSAVAGE: Good morning, everyone. I would like to call the Striped Bass Management Board meeting to order. My name is Chris Batsavage; I am the Administrative Proxy for North Carolina, and I'll be serving as Chair.

I want to thank Megan Ware for chairing this Board for the last two years, it was a very busy two years. We'll see how the next two years go. Before I get into the other items I'll just look to Toni Kerns to see which Board members are attending online.

MS. TONI KERNS: We have Steve Train from Maine, Emerson Hasbrouck from New York, and then for NOAA Fisheries, Chris Wright is starting us off and then Max Appleman will be on in about 20 or 30 minutes and he'll take over.

APPROVAL OF AGENDA

CHAIR BATSAVAGE: Move on to approval of the agenda. Are there any additions or modifications to the agenda? Seeing none; that is approved by consent.

APPROVAL OF PROCEEDINGS

CHAIR BATSAVAGE: Next is approval of the proceedings from our October 2025 meeting. We received edits from Doug Grout on Page 24 of the proceedings, but are there any other edits that Board members have from those proceedings? Seeing none; those proceedings are approved by consent with those edits that will be made.

PUBLIC COMMENT

CHAIR BATSAVAGE: Next up is Public Comment. This is for items not on the agenda. Just so the public knows, I will be offering opportunities to provide comments for items on the agenda later when they come up. There will be some limited time to provide any comments at that point. Just looking for any comments for things not on the agenda right now. Looking in the room I don't see anyone. Okay, Captain Robert Newberry.

CAPTAIN ROBERT NEWBERRY: Can you hear me, okay?

CHAIR BATSAVAGE: Yes, if you can keep your comments to two minutes. I apologize for the short time period.

CAPTAIN NEWBERRY: No problem, it will be quick. I would just like to have a moment of silence for those crew members on the boat in Cape Cod that passed away the other day, if we could. That is all I'm asking for, for this Commission right now.

(Whereupon a moment of silence was observed.)

CHAIR BATSAVAGE: Thank you for that.

REVIEW AND CONSIDER APPROVAL OF ADDENDUM III STATE IMPLEMENTATION PLANS

CHAIR BATSAVAGE: Next up is Review and Consider Approval of Addendum III State Implementation Plans. Emilie Franke will go through that presentation.

MS. EMILIE FRANKE: I will be going over the Addendum III State Implementation Plans. Those were due on December 31, and those were primarily regarding the total length definition in Addendum III. We also received notification from Maryland on its decision on their recreational season.

The Plan Review Team did meet on January 13 to review the implementation plans. As far as total length; in the Addendum there are two elements as part of the definition. One is squeezing the tail and two is a straight-line measurement. These elements have to apply to both sectors. States could implement the definition that was provided in the Addendum, which is listed here on the screen, or states could submit alternative language for Board consideration that meets those two elements.

States have an implementation deadline of January 1st 2027. Overall, the Plan Review Team found that all state implementation plans were consistent with the total length measures in Addendum III. Nine of the 14 jurisdictions plan to implement the provided definition in Addendum III verbatim or with very slight modifications.

Many states do plan to implement this year, but all states do plan to meet that January 1st 2027 deadline. Then there were five states who provided their existing definitions of total length, which already meet the required elements, so therefore there are no regulatory change necessary for those five states.

Just a couple notes of interest from the PRT. The PRT notes that Delaware actually plans to implement this definition of total length for all of their species that use total length best size limits. Then the PRT also notes that some states included additional elements in their definition, so for example requiring the fish to be laid flat or requiring the mouth to be closed.

Then for the Maryland recreational season, Maryland's plan specifies that Maryland has chosen to move forward with implementing the new recreational season baseline, and Maryland notes that those new season regulations are currently awaiting review and approval with an expected effectively of March. That's all I have.

CHAIR BATSAVAGE: Thanks, Emilie. Any questions for Emilie on this presentation? Yes, Nichola Meserve.

MS. NICHOLA MESERVE: Thanks for the succinct presentation, Emilie. Don't mean to put anyone on the spot, but reading through the Implementation Plan, I was unclear whether the District of Colombia had made a regulatory change as opposed to just an announcement. Just the wording wasn't clear to me as to whether it was actually a regulatory change.

MR. DANIEL RYAN: It was not a regulatory change. It goes out in the form of an annual announcement. It's an announcement from our director. The season is announced with any ASMFC regulations that need to be followed. That hit the DC Register on January 31, so we've already implemented those changes and they are in affect.

CHAIR BATSAVAGE: Kris Kuhn.

MR. KRISTOPHER M. KUHN: Not necessarily a question, just a point of clarification. It was pointed out that Delaware intends to implement for all species and so does Pennsylvania. It is outlined in our implementation plan.

CHAIR BATSAVAGE: Any other questions or clarifications on the Implementation Plan? Seeing none; we'll be approving these implementation plans. We have a motion prepared if someone would like to make that. I see Joe Grist.

MR. JOSEPH GRIST: **Move to approve Addendum III State Implementation Plans.**

CHAIR BATSAVAGE: Thanks, and second by John Clark. Any discussion on the motion? Is there any public who would like to comment on this motion to approve the State Implementation Plans? We have two commenters, first I'll go to Brian Hardman, and if you can keep the comments to two minutes that would be great.

MS. KERNS: Brian, if you're speaking, we cannot hear you. What we're going to do is Chris, maybe go to Captain Newberry first, since we know his mic works, and then come back to Brian.

CHAIR BATSAVAGE: While we work out the audio issues, Brian, we'll go to Captain Robert Newberry.

CAPTAIN NEWBERRY: Just one first question. This is the implementation we're talking about is moving forward with the measurement and the baseline adjustment that Maryland has moved forward with, am I correct?

MS. KERNS: Yes.

CAPTAIN NEWBERRY: Okay, we just have a major concern here in Maryland, because when we left the Dewey Beach meeting, back the last meeting that we had, Maryland was going to come back and set up a meeting on the eastern shore and on the western shore for this baseline discussion, and then have a workgroup.

That was not done. They immediately went into the scoping process, and to this date we have not had any type of a meeting to discuss this. The adverse impact of this baseline adjustment that shuts down the entire month of August is extremely detrimental, not only to the fishery, but to the economics of Maryland.

The other major issue that we have is that University of Massachusetts, along with the Woods Hole Institute has done research on handling and catching of these fish, specifically during the spawning season, and it is very adversely affecting not only the spawning but the health and the condition of these fish. It is our major concern with the industry, both the commercial and recreational and charterboat industry in Maryland that this really should not move forward until there is better research done.

Because if we're trying to protect this spawning stock by 2029, targeting these fish specifically during the months of March, April and May; pre spawn and post spawn, now that we have a study out there that has been completed, is going to be very detrimental. We have agreed, charter, commercial and recreational not to have a trophy season, which is that time. Now they are just using an excuse to have a catch and release. I do not think we should move forward with this, and I thank the Commission very much.

CHAIR BATSAVAGE: Thank you for the comments. Are there any other members of the public who would like to comment on the motion?

MS. KERNS: Brian, I see that your mic is open, but we're not hearing you. We still don't hear you, Brian. My guess is his mic is not connected. Sometimes what works for me is logging out and then logging back in, but my technical expertise is low. But we still can't hear you. I apologize, Brian.

CHAIR BATSAVAGE: Sorry about that, Brian. Okay, so in the interest of time we'll come back to the Board on this. Is there any need to caucus? Yes, Adam Nowalsky.

MR. ADAM NOWASLKSY: I was just wondering if Maryland wanted to respond on the record to that question about what transpired, just so that everyone is clear.

CHAIR BATSAVAGE: I'm looking to Maryland to see who wants to respond.

MR. MICHAEL LUISI: Sure. I don't have a whole lot to say. We left the Dewey Beach meeting and then we entered into our own state regulatory process, for which we followed each and every stop along the way, in order to inform and receive feedback from the public. We had a public scoping process that generated over 1200 comments that we used to guide our decisions.

The claims that were made about work groups and public hearings in different sides of the Chesapeake Bay, that was something we considered, but decided ultimately to stick to the format that we did. Again, we've met every one of our regulatory requirements in order to move that idea forward. It's still in process; it's not at the end of the road yet.

Things could still happen along the way, and what we put in the implementation plan was that if we get to a point where the administration no longer wants to pursue a baseline approach, as it was presented to this Commission, we would fall back to our rules from the previous year. I can't speak to what is going to happen, because we're still in the middle of the process. But hopefully that addresses the concerns raised by the public.

CHAIR BATSAVAGE: Robert T. Brown.

MR. ROBERT T. BROWN: It was our understanding at the last meeting that status quo was where we were supposed to be at. The baseline is really not status quo as we presented, which did pass. The commercial and the charter boats have grave concern about our spawning stock being inundated with catch and release for that time period of April/May.

I would like to know, where does the status quo come into play with the standing of Maryland doing this new baseline. The status quo was voted on first, and I think it should be going through one more year before the baseline could be implemented or be allowed to implement it.

CHAIR BATSAVAGE: Let's go to Bob Beal, and Dave Sikorski, I have next.

EXECUTIVE DIRECTOR ROBERT E. BEAL: Let Dave go first, then I'll comment.

CHAIR BATSAVAGE: Great, Dave Sikorski.

MR. DAVID SIKORSKI: I just wanted to go back a little bit further in time, because when the conversation around a baseline started and this Commission was willing to consider the proposal that ultimately came forward and was approved. The Department organized the stakeholder workgroup.

I participated in it. Robert T. participated in it as the delegation, and that stakeholder workgroup included broad sweeps of the recreational fishery, private anglers, for-hire components that are in different components of for hire. We worked through multiple meetings, and that's how the baseline proposal that ultimately was presented here and approved was created.

It is obvious that there was some opposition within that process, but the majority of participants guided the Department. The Department made their decisions; we presented them here. We approved them here as a Commission, and now the Department has chosen to move forward with their process, as Mike mentioned.

There has been plenty of opportunity for stakeholders to participate, in my perspective. I participated in all those to make sure that all perspectives have been heard. As Mike said, the vast majority of input during the initial two-week scoping period which the Department does was about 70-30 support for the baseline to move forward, and that is why we are here where we are today. Just to clarify all that for the record.

CHAIR BATSAVAGE: Next up, Bob Beal.

EXECUTIVE DIRECTOR BEAL: Dave said some of the things I was going to say. Just as a reminder, you know the Board gave Maryland the flexibility to implement either status quo or the new baseline option that they brought forward for consideration. The Board reviewed it, said these are very similar level of conservation. It's solely a Maryland decision now.

Choosing status quo or choosing a new baseline is a Maryland process. It's not really in the Commission's hand anymore. The Commission gave the flexibility to the state to choose one or the other. I appreciate the public comments and I'm not trying to diminish the potential impacts and concerns anyone has. But it is a Maryland decision, or a completely Maryland decision not an ASMFC decision.

CHAIR BATSAVAGE: I appreciate that clarification. Any other discussion by the Board? Is there any need to caucus? In the interest of staying on time, **is there any objection to approving the State Implementation Plans? Okay, seeing none; those are approved**. Thanks.

DISCUSS WORK GROUP ON FUTURE STRIPED BASS MANAGEMENT

CHAIR BATSAVAGE: Next is to discuss the Work Group on Future Striped Bass Management, and Emilie has a presentation for that.

MS. FRANKE: I will go over the content from the staff memo that was provided in the main meeting materials requesting guidance from the Board on this Work Group on future striped bass management. In October at the annual meeting the Board did approve the establishment of a Work Group on future striped bass management, and so today staff is seeking guidance on the composition of the Work Group, details about the tasks and the timeline.

I think it is helpful to see the motion. This is the first part of the motion. The tasks aren't listed here; I'll get to those in a minute. But I am just going to quickly read it. Establish a Work Group to develop a white paper that could inform a future management document. The Work Group should include representation from all sectors, in addition to scientists and managers.

The goal of this Work Group is to consider how to update the FMPs goals, objectives and management of striped bass beyond 2029, in consideration of severely reduced reproductive success in the Chesapeake Bay. The Work Group should utilize public comment, including that received during Addendum III to inform its research in management recommendations and work with the Benchmark Stock Assessment Subcommittee to incorporate ideas and deliver necessary data products.

Then there was a list of six tasks that the Work Group should include. I'll get to those in a little bit. First on the Work Group composition. The Board motion does indicate participation by all sectors, scientists and managers, but does not provide specifics. Staff is seeking guidance on the size and composition of the Work Group and the process for selecting Work Group participants.

A couple questions just to help for discussion. What would be the maximum size of the Work Group to ensure the group will function effectively? Will each Work Group seat be allocated by category to ensure representation of the full geographic range and diversity of stakeholder interest? Will there be a specific nomination process?

For example, would each state nominate a certain number of participants? Then how will individuals be chosen? As far as the task details and timelines and deliverables. In thinking through these the memo provides some notes from staff on sort of how those tasks might fit in with the current stock assessment, and sort of how those overlap.

It seemed that most of the tasks do require some level of information gathering before the Work Group would meet, and/or completion or at least some progress on the benchmark assessment before the Work Group would meet. Just something for the Board to think about as sort of the timing of when this Work Group would fit into things. As a reminder, the benchmark is scheduled for peer review in March of next year. The first task was to review the biological reference points and consider recruitment sensitive model-based approaches. Just a couple notes from staff here. As we will do at our next agenda item today, the Full Board is being asked for guidance on the biological reference points right now in the process.

Sort of one potential avenue is if through the assessment process the Stock Assessment Subcommittee is able to develop multiple options for biological reference points, that do pass peer review, maybe the Work Group could provide input on that eventual list of BRP options next year. Just one thought on how the Work Group might fit in there.

The next task is to formally review hatchery stocking as both a research tool and a management tool with a cost analysis. Some thoughts on what information is needed there. There are a couple of task Commission reports on striped bass stocking. Those reports were compiled back in the nineties, so or course reviewing those.

We could gather information from state agencies on past and current stocking. Looking at North Carolina for current stocking here and asking questions about performance, resource needs, environmental concerns, genetic or disease concerns, and perhaps a literature review of stocking for other diadromous species in sort of open estuaries, open environments could be useful here.

The next task was to evaluate the potential for other river systems to contribute to the stock. Again, I think there would be a need to compile the available information of the river systems, you know talking to state agencies if there are other particular river systems that have been sort of monitored for potential spawning activity.

There have been some recent genetic studies on the spawning origin of striped bass, so those would be added to the background information of the current stock assessment as well. The next task is about recruitment, to explore the drivers of recruitment success and failure in the Chesapeake Bay, Delaware and the Hudson in light of changing climate and environmental conditions, including potential impacts from invasive species.

One note here is the Stock Assessment Subcommittee is already conducting a literature review on this topic and the SAS is also considering which potential drivers of recruitment could potentially be incorporated into the assessment model. The SAS is already working on this question at this point.

The next task is to explore the reproductive contribution of large and small female fish, and the implications of various size-based management tools. A couple notes here. Of course, there is some information in the past assessments on the reproductive contribution of different size striped bass. We could also talk to state agency staff who work on these spawning surveys about what they're seeing.

Then after the assessment is complete, the TC and SAS could provide input on size-based management tools, you know depending on what the Board might be considering for the next management action. The final task was looking at methods to address discard mortality in the catch and release fishery. An important note here is we're all familiar with the Massachusetts DMF release mortality work that is still underway. When that work is available, one potential avenue was the Work Group could sort of look back at the Work Group we had last year in 2024 on release mortality, look at that report sort of in light of the new findings from the Massachusetts DMF work, and the other recent studies, for example from UMass Amherst and sort of update that report or revisit those topics with this new information.

Again, those were some thoughts from staff on what might need to be done in advance of the Work Group meeting, in order to ensure the Work Group has the information they need to have a productive discussion. That's just a starting point. You know we're really looking for Board guidance on these tasks, the timing, and then as I mentioned the composition of the Work Group.

CHAIR BATSAVAGE: First look for questions on the presentation before we jump into guidance and discussion. Just to kind of give a sense of kind of the flow of things, besides what Emilie pointed out is absolutely kind of exhausted any questions. I'm going to go to Marty Gary first, since him and his staff have put together this motion for the Work Group to provide his perspective and then go to others. But first I'll look for any questions on the presentation. Roy Miller.

MR. ROY W. MILLER: I was wondering if Item, I guess it was Item 4, Exploring Drivers of Recruitment Including Impacts from Invasive Species. I was wondering if we should maybe carry that one more step. If we find there are drivers of invasive species, what would be a strategy to lessen that impact?

That is something that fisheries agencies have some control over, unlike climate change and spring rains and that kind of thing. I would just throw that out there as something that we should give some collective consideration to, particularly if we feel it's an important problem, what can we do about it?

CHAIR BATSAVAGE: Any other questions on the presentation? Kris Kuhn.

MR. KUHN: Yes, I just had a question regarding the stocking of striped bass. I am somewhat familiar with North Carolina's efforts, but you referenced some other stocking efforts. Do you have any examples of those, and were they evaluated and if so, how?

MS. FRANKE: No examples yet, I think that would be the goal. If there were other species that could be looked at as an example, other diadromous species in sort of open environments, not in sort of a closed lake or anything like that, to look to. I think that that could be helpful. But the only current stocking of striped bass along the coast, again with an open environment that I know of right now is in North Carolina.

MR. JOHN CLARK: Just on the stocking, Mr. Chair. I'm familiar with, we have a consultant in Delaware that has been, we've been giving him a permit to take spawning striped bass for how long, Roy, probably about 30 years, 35 years. I think he was contracted by a power plant in Maryland to stock. Is that Vienna that they go in, Dave? There is another example of striped bass stocking.

MS. FRANKE: Where are they stocking those striped bass?

MR. CLARK: They would be able to get into the Chesapeake, I believe, that was the plan was to let them go there, to make up for what the Power Plant was impinging.

CHAIR BATSAVAGE: Any other questions on the presentation? Yes, Dave Sikorski.

MR. SIKORSKI: Just so I don't forget. Emilie, I'll follow up with you and I think the Department can as well, to talk to you about some of the other past Chesapeake work. But I happen to have a board member that participated in the hatchery work in Vienna at the Power Plant. I can connect you with him separately, you can talk about that history I think in the early nineties was what his time focused on that operation.

CHAIR BATSAVAGE: Thanks, this is good.

PROVIDE GUIDANCE ON WORK GROUP COMPOSITION, TASK DETAILS, AND TIMELINE

CHAIR BATSAVAGE: I think we're definitely starting to transition into the guidance and discussion on this topic. As promised, I will go to Marty Gary first, and I was looking for other hands from Board member who want to provide some guidance on this Work Group. Marty.

MR. MARTY GARY: New York delegation made the motion. I just want to take one step back to explain. Faced with the choice we had back at the October Board meeting of the 12% reduction in status quo. You know we walked into that not really being happy with either one of those choices. Now we know the 12% reduction, which was fraught with some uncertainty with some of the catch estimates through Wave 4.

Now we have Wave 5 data. Katie will tell us a little bit later that it looks like that continues, and we're still probably dealt a negative something like 21%. If we assume that Wave 6 from '25 matches '24. It turns out that maybe that was a good decision, so that pivots us back to the status quo. We weren't terribly excited about doing nothing.

We're limited, right with this Board in the tools that we have available to us. Work Groups are frankly one of the only tools we have. We consulted with leadership and staff over at ASMFC and came to the conclusion that that was our best path forward to form a Work Group. But the driver here, I don't want any of the Board members to lose sight of this, is this accrual of poor year classes in the Chesapeake Bay and now in the Hudson River.

If you haven't heard, they released yesterday the 25 Hudson Index, which was its third consecutive poor index. Also, in the lower 25% quartile. Both the Hudson and the Chesapeake, which combined produce about 90% to the coastal stock have been in long term recruitment failure. This weighs heavily on the delegation's mind when we made the motion.

For me personally. You know I look around this room. There is a huge depth of experience and knowledge. I mean everybody here has a long history with this species. I personally crossed the 40-year bar working with this species last year.

But yet I look across the table and I see people like Dennis Abbott, Doug Grout, Roy Miller. They've got an even longer baseline than I do. I think that what comes to my mind and what came to our delegation's mind was, from an experiential standpoint we know what lies ahead. The thrust of this motion is really to prepare us to have these discussions with our public amongst us as a Board, to figure out how we are going to manage this fishery at a lower-level abundance as we get into 2030s.

Having first hand seen as a young biologist that started in the mid-eighties at the onset of the moratorium in Maryland, and seeing what bad looks like at close range. I can tell you, I know what it looks like and I see what's ahead. What scares me is not underachieving the FMP requirement for reaching the SSB target in 2029.

What scares me is, what does this fishery look like in 2034, '35 and '36. We talked extensively among our delegation, and we really feel like this is our only and best path forward to have this Work Group. We tried to put together what we could post haste, and that is what you saw in the motion. Was it well thought out?

It was thought out to the best of our ability. What we were trying to accomplish was listen to our public with empathy and try to understand what they were saying. There were mentions of hatchery, looking at possible shifts where spawning is occurring. Do we necessarily, the staff or myself as an individual agree with those? Not necessarily, but that is what our public is saying to us over and over and over again.

We were trying to include things that we were hearing from our public and incorporate that into the motion. At the same time there is some intermingling of technical items in there, and some items lend themselves more to policy development. There needs to be some triage done on that. I'm not sure exactly how to do it.

I hope there is a path forward, where this Board we can remove some things that are better under the purview of the Stock Assessment Subcommittee and the Technical Committee and maybe add some things for this Work Group. In addition to the things that are listed in there, there is the constituency of the Work Group.

Our intention again was to listen to the public. What we were hearing was, they are going to go down this pathway and they are going to have the same people in an insular way talking about the same issues, without really giving the public a chance to participate. It was an effort. Its intention was to make it more inclusive.

I'm not sure, because we all know once you get to a certain critical mass it becomes very difficult to balance, so I'm not sure what the best pathway therefore there is. Maybe it is something like the most recent Menhaden Management Work Group, where we had excellent participation from the public and we made sure that the public that did attend engaged in those discussions, had ample opportunity to ask questions and comment.

I don't know what the solution is there, because that is a very delicate balance in terms of the total numbers you have and the representation that you have. Lastly the timeline. We're going to get a lot of new information coming forward. MRIP calibration will have potentially new information on release mortality. Natural mortality in the Chesapeake Bay, there is new research emerging there that may be built into the benchmark. New information is going to be coming forward incrementally. I don't know about the timeline; the benchmark being delivered potentially in May or August of 2027. It's not that far away, but maybe this starts this discussion, and maybe this group can continue. I'm not 100% sure.

I don't know that this is a mechanism for us to really, truly get that conversation across the finish line, so we can start talking about what this fishery is going to look like in the 2030s. But at the very least, I hope it's the start of that process. That was really what our intention was in New York. I guess, Mr. Chair, I'll stop there and hopefully that made sense to everybody.

CHAIR BATSAVAGE: That kind of laid out what we need to do here. Your perspective on this I think is the way to get things kicked off. Before I go to other Board members, and I think when we do, we'll need to establish what we want to hit first. I want to go to Emilie or the staff in general on the idea of possibly adding or removing tasks that are in the motion. That will probably help guide us later as we discuss how to handle this Work Group. Emilie.

MS. FRANKE: If the Board wanted to change the task list. You know I think if there was Board consensus around adding or removing a task it wouldn't need a motion. If there was not Board consensus or someone wanted a motion we could do it that way as well.

CHAIR BATSAVAGE: There is a lot here, and needless to say we are not going to be finalizing everything on this Work Group at this meeting. We'll continue on into the next one. But I think if we can at least start getting some ideas on the Work Group composition and the timing.

Build on that, think about it some more after this meeting and come back and drill down and possibly finalize things at the spring meeting will be great. I guess we'll start with any thoughts on Work Group composition. Marty pointed out some ideas on that in his comments, looking for others. I have Doug Grout, Jay McNamee and then John Clark.

MR. DOUGLAS E. GROUT: I'll try and provide my suggestions for this. A lot of this depends on how many people are going to step up to participate in this Work Group. In an ideal situation, I always find getting above a dozen people in a Work Group just becomes unmanageable. What I came up with is for industry representation we have an AP that we would try and solicit someone from the rec community, someone from the for-hire community that is on the AP, someone from the commercial fishery.

If we were not able to fill that out from the AP, we do have Commissioners that are fishermen, both commercial, for-hire that might be able to also fill that step. I was looking at 1 from each sector, I think because some of these tasks will involve Technical Committee and Stock Assessment Subcommittee that we would have the Technical Committee Chair and the Stock Assessment Subcommittee Chair.

Then from the Board I would offer as a suggestion trying to come up with one commissioner from an ideal situation from the Chesapeake Bay jurisdictions. One from the Delaware Bay jurisdictions, New York/Hudson, because those are three primary spawning areas. Then maybe someone from Southern New England, someone from Northern New England, and if you are willing the Board Chair on this. That would come out being about 11 people, just if you're willing. But again, that would be an ideal distribution and scenario. It all depends on who we get willing to participate.

CHAIR BATSAVAGE: Thanks, Doug, I'll think about whether I want to be part of that. No, that's great, definitely get some ideas out on composition. That is definitely needed, and try to work through who all is going to be on here, because yes, you want the right representation but if you have too much it is hard to accomplish anything. Next up I have Jay McNamee.

DR. JASON McNAMEE: Thanks, Emilie, for kind of like summarizing all of that stuff. I was thinking about this Working Group and its like, what we are trying to do I think is impossible. It's overwhelming, I'll say it that way. First, I am going to offer a question. I'm not expecting an answer right away, but maybe it might be something when I'm done yammering away here someone could comment on.

I wondered like, you know this sort of thing. It feels, because it is so big and diverse across the coast. I was thinking about kind of like a multi-faceted process. You know the Working Group, I agree with Doug. You can't have it be gigantic, because you just can't. We might as well just kind of use the Board or something like that.

Yes, keeping it smaller I think makes sense, and it is challenging, because then we have to pick people, and we'll just have to work our way through that. I appreciated Marty's comment about the menhaden group. That seemed decent. Maybe there is some overlap between what Doug suggested and that we can kind of look up.

This multifaceted approach I'm talking about, facilitated workshops, surveys, probably like a collection of things that then feed into a core working group that kind of processes the information. I don't know that we have a version that we've done in recent history at least that does something like that.

I wondered if there might be an opportunity to communicate with the SESS. You know this is the sort of thing that Social Scientists think about in particular. There may be some strategy when you have a big enormous problem like this, but you need to like take action. There is probably like an optimal structure for doing that sort of thing that they might know about and help us with.

I just wanted to make sure that we're using that resource, getting some feedback from them. I like the idea of having a core working group, but then getting information from a broader spectrum. I will acknowledge that this is my second, if not more thing this week that I'm offering, that probably costs a lot of money and is probably not budgeted.

But sometimes its good to just get ideas out and apply the pragmatism afterwards how we can afford it or whatever. I think that could be good getting broad perspectives, but like in a structured, facilitated way, surveys and facilitated workshops feeding that into the Working Group, kind of like a hierarchical approach, trying to condense it down. Just a couple of thoughts from me.

CHAIR BATSAVAGE: Appreciate that. Next up I had John Clark.

MR. CLARK: Just kind of building on things that have been said by Doug and Jay. I agree with Doug about the size. I was wondering if perhaps it could be started more along the lines of the menhaden working group. I was fortunate enough to be the Chair of the Board when Marty chaired the Work Group, and that size seemed to work well, and having the meetings open to the public was a great way to get the input.

I'm just afraid having been through the Stakeholder Engagement Workshop last week for Horseshoe Crab that just choosing one person from each sector, because of the diversity of views out there within these sectors, that it is going to put a lot of pressure on those people who are chosen to sort of represent such a wide range of views, or some of them may just want to represent their own view on the issues.

I was wondering if maybe start with a smaller group of the Board with the meetings open to the public. Then when we have some of the issues more focused, at that point then transition to a group that includes more of the public input. Just because I think it sounds rather unwieldly at this point.

CHAIR BATSAVAGE: David Borden.

MR. DAVID V.D. BORDEN: I'm going to kind of follow up on a couple of the previous comments, Jason's comment and also John's comment. One of the things that I am struggling with the most is the public participation process and how we integrate that. That to me is the most difficult thing. I think the rest of us can collectively figure out how to winnow this down to a workable group.

This follows on John's comment. I think it's kind of an impossibility to find one or two people or five people that are going to represent the interest of the recreational community up and down the coast, because it's all different. I mean you pick on a little tiny state of Rhode Island. The three of us would have difficulty picking one person in the recreational community to represent it.

One of the options that we've discussed a little bit among our delegation is this issue of facilitated workshop. There may be some merit in us considering having a facilitated workshop, where each of the states get to invite X number of individuals, whoever they think are the important people from their jurisdiction to attend a workshop.

Then basically, run through a whole series of issues, give them a briefing on stock status, what some of the projections look like going forward, what the current objectives are, the FMP. Then ask them to kind of consolidate their preferences, so we get information directly from the constituency.

Then feed that into the workgroup and let the workgroup kind of deal with it, in terms of how they fashion recommendations and options. I'm not saying that I'm wed to that idea, but I'm troubled by our inability to get information directly from the constituency, and that is one of the ways we could do it, with a facilitator.

CHAIR BATSAVAGE: Mike Luisi.

MR. MICHAEL LUISI: I think I'm thinking along the same lines as David, and I'll just offer my thoughts. The 12 number, the people. Twelve people, I think is a good number to try to strive for. Whether that is represented by folks around this table in addition of some AP members. In my mind I see it as, if we have a solid, 10-12 people who are considered the Working Group.

Maybe through this facilitated discussion over a period of time, that discussion could host different meetings that are all inclusive of the sector that we would be discussing. Maybe we as administrative folks bring a person or two with us, you know to make sure that they are there for that discussion if it is regarding the recreational fishery or the for-hire fishery, if that is the focus of that work group discussion.

But then that would also allow, you could open it to the public. But that public would be limited to that sector. Others can listen, but I think the participation would be focused on membership from up and down the coast, to affiliate with whatever sector it is they are representing, could offer that selected work group that feedback.

That work group can then be informed well enough to be able to have the conversations about the future, and what the expectations are, and what the true reality that we're staring down the barrel at right now is. Just some thoughts from me.

CHAIR BATSAVAGE: Any other thoughts on work group composition? We've got some similarities and some differences, any ideas here? Again, we'll come back next meeting and try to narrow this down more. Just look for hands on that, but if not, yes, Roy Miller.

MR. MILLER: I just wanted to add to follow up on what Mike just said and Jay and John and Dave. Granted, having a workgroup over 11 is unwieldy, but you could form sub workgroups, if you will, on specific topics that require more diverse and general input, and they would report back to the main group. That might be one way to hold the overarching workgroup size down, and yet still get the input that you would need from the public in, and the scientific and management sectors.

CHAIR BATSAVAGE: Any other thoughts on that before we move on to some guidance on the timing and possibly the tasks? I guess we'll just kind of make sure we get staff the guidance they need here for this meeting and build upon it. Look for any guidance on, well we can concentrate on workgroup, is this for Work Group? Dave, I'll go to you right now and then that will kind of continue on.

MR. BORDEN: I'm going to defer to you. I just want to talk about economic aspects for a minute, and whether or not we're going to cover that. I might have some suggestions, but I'll defer to you. You handle that when you think it's appropriate in the discussion.

CHAIR BATSAVAGE: We'll handle it now.

MR. BORDEN: Okay, great, thank you very much, Mr. Chairman. My question is to the group here. Are we going to factor in some consideration of an economic? I totally understand, I would point out, we don't have an economist on staff. I mean this is an issue. If we're going to get into the weeds on this and get into the goals and objectives, there are economic consequences for the coastal communities up and down the coast, based on the strategies that we're going to discuss.

How do we integrate that into the discussion or when do we integrate it? One of my suggestions would be, since we don't have an economist to deal with this and we have a Socioeconomic Committee that have economists on it. But one way to deal with it would be the staff could put together, and I brought the example of it.

At the annual meeting they put together this summary of economic input, the values of the fisheries up and down the coast, which I thought was incredibly useful and I thank the staff for doing it. Striped bass is included in that. There are a couple of studies that have looked at economic values of striped bass.

I'm not going to get into the weeds on those, but the values are in the billions. It is an extraordinarily valuable fishery, so how do we factor economics into this, or are we going to basically not consider economics, because the decisions we're going to make going forward are going to have economic implications.

My suggestion is that if people around the table want to consider economics as part of this, I think there is a logical starting point, given the fact we don't have economists on staff. NOAA does, in fact a lot of the data that went into the analysis that the staff put together came through the NOAA One Stop Shop economics program.

We could ask a representative of that program to come to a subsequent meeting, and basically talk to us about how they put together the numbers, what type of analyses they can do, that type of thing. It wouldn't put a burden on our own staff; we would basically get an update from NOAA on what are their capabilities and what type of analysis do they do?

CHAIR BATSAVAGE: Yes, that can definitely tie in to potential work group composition and maybe even the tasks that this work group is going to do, and have the help of economists to guide us on that. I saw Eric Reid's hand up.

MR. ERIC REID: To David's point, the value of the fishery is one thing, it's worth X amount of millions of billions of dollars. But there are certain segments of our stakeholders that really, it's understanding what the input costs are. I mean the cost to run a charterboat or a commercial boat, even a private boat flies through the roof, and the margins have become so small.

I mean that is why we talk about trip limits, because the margins are so small. If we're going to consider economics we should try to understand the change over time of input costs, because that is going to affect our stakeholders going forward. Economics is important, I like talking about money, sort of, other people's money, I suppose, not my own. But this is really developing policy going forward. I think that should be the critical focus. We understand the trend in the fishery right now of recruitment. We understand that and we have to be prepared for that. That is why we have this working group, and I thank Marty for doing it.

But we have to understand what we might be headed for, and be ready to deal with our policy decisions. Then all of this other stuff will be fine. As far as the composition of the working group. I was trying to figure out how David and Roy's ideas meet somewhere in the middle. I do agree that no more than 12 or at the most 15 people would work.

But I do agree that there is the ability to build a corporate pyramid and make that work. You know you've got sub groups and then you have the working groups, and then you have maybe "the working group." That's how we're going to best serve our stakeholders and ourselves. It's not impossible, I don't like the word impossible, it's going to be necessary. I don't care, it's not impossible, Mr. Phelps, Dr. Phelps or whatever his name was, but we can do it and we have to do it.

CHAIR BATSAVAGE: Thanks, yes, it is definitely kind of tying into the other items that staff need some guidance and feedback on is the timing of the Work Group, and maybe thinking about the task list as well. In preparing for the meeting think about the timing of this Work Group and the tasks, and when things would be available.

There is a potential this Work Group and possibly sub groups could be convened for a pretty long time, much longer than typical work groups that ASMFC Boards have. I think we need to keep in mind of that is just how much of a commitment could we expect from members of the Work Group from a time standpoint on this. I think that's going to be key to figuring out when we actually want this Work Group formed and start working on things.

I think this is kind of two-fold here. It's when do we want this Work Group to get started, and maybe also take a look at the list of items. Yes, I think we'll be kind of hitting the to be continued button on some of this, at least get some ideas out now. You know we can think about it over the coming months before we meet again in the spring. I just want to kick off some of that with guidance from any Board members on those items. Megan Ware.

MS. MEGAN WARE: Thanks, and I'll say thanks to Marty for your comments, and kind of at least centering us on how this came to be and what your vision is. When I look at the list, I'm seeing maybe two things that I think are more in the policy side of thing than the science. That would be the discard mortality study and understanding management implication for that and the hatchery task.

The other four seem very rooted in the assessment process and what we might get out of that or all that comes out of that is developed. I'm wondering if kind of the two more policy ones are easier ones to ramp on now. I want to be very conscious of how much we are asking of the Stock Assessment Committee right now and the workload we put on them, because that for me is the high priority is that 2027 Benchmark Stock Assessment. I don't want to jeopardize that in any way. I don't think that is what Marty is intending either. But I think that is a critical turning point or decision point, that assessment and what we get out of that. I think there may be things we can get from that as the assessment is developed. But some of these I think are quite dependent on the outcome of that assessment.

CHAIR BATSAVAGE: Any other comments on timing and task list? Doug.

MR. BORDEN: I would agree with Megan that those are two things that at least this year the Working Group could work on and address. Some of the other things that we're going to get from the Technical and Stock Assessment Committee are pieces of information that we may need to use to look at.

One of our products is to look at updated goals and objectives in management beyond 2029, once we have that kind of information, we can then take that in. I think there is something that leads me to believe that this Work Group could start working. I don't know when that information would be available, but maybe this summer, maybe earlier, I don't know. That would be up to what staff and TC thinks when they can provide that information for us.

To me with that in mind, I think we do need to try and put together this working group. One of the suggestions I had for who, if we had this flood of people more than we could handle that wanted to be on this working group, then I think it would be the Chair and Vice-Chair working with staff would typically decide which people would be on it. Maybe using the guideline of what I put out for what would be our composition.

CHAIR BATSAVAGE: Next up I have Jay.

DR. McNAMEE: I'll third both Megan and Doug on those two tasks, the hatchery one and the discard mortality one feel like they are all connected, but those two feel like kind of unique and separable, things that can be discussed. The rest of them are like really interrelated, and I also agree with them, they are connected to the technical work that is already kind of going to go on.

This is maybe not helpful, but I was thinking, the real value of the Working Group, it's almost like they could interact with the Stock Assessment Committee, because there are these ideas. I think the Stock Assessment, Technical Committee, whoever is working, whichever technical body is working on each individual element.

You know they are kind of developing the tool, and the Working Group could say, hey. We know that you have this hammer. Can you make a refined cut in this piece of glass with that hammer, and they can say, no, no, you can't. It is that kind of interaction that will help guide the technical folks as to the types of things that the managers are interested in seeing from these different tools.

I guess the point it, I think they can all stay there. I think a lot of them are really highly overlapped, as far as what they are actually looking at. It's more of an opportunity to kind of guide some of the technical work that is going on or clarify what can and can't be done. Yes, you've got those two pieces, and then the rest is kind of like a blob of interrelated things that I think bouncing back and forth between the Working Group and the technical folks, I think could be a valuable approach there.

CHAIR BATSAVAGE: Dennis Abbott.

MR. DENNIS ABBOTT: Sitting here looking at things from my view, from 20,000 feet up and kind of from my simple point of view of things. I think I agree with everything that everyone has said, I have no disagreement with anything. But I think it is very important before we even start, that we set up priorities.

You know all the things that Emilie talked about, some of those are surely more important than others. I don't think we should task this Working Group with tackling all of these things. There have got to be some that are much more important than others. Like Roy Miller mentioned predation and invasive species and all of this business.

You know I view that as having a much higher value than looking into growing hatchery fisheries. Just from my point of view. I am also, not unclear, but a number of people have mentioned goals and objectives. I sit here and I say, what are our goals and objectives? Do we expect in 2031 that we're going to really be able to improve this stock?

Are we fooling ourselves? You know I really has that as a question in my mind. I think part of this Working Group really should provide some sort of an output that informs people with an understanding of where we are. I don't think we've done that enough. I think we're probably creating false expectations to tell people that things are going to get rosy somewhere down the road.

Doug Grout at other meetings and other folks have talked about, you know getting SSB up by 2029 is a goal of ours, and already admitting that down the road further we're not going to be better off. I mean the young of the year is telling us a bad story. I don't think there is anything that we're going to do is probably going to improve that. The outcome of this Working Group, we should be looking to provide a greater understanding of where we are.

Are we intending to just satisfy the public? I don't think so. Are we expecting to improve the condition of the stock through this Working Group? I question our ability to do that. We may get a better understanding of where we are and where we want to go. But I think that the first thing, to go back to what I said is, we have to set realistic priorities and then we have to be very clear in our goals and objectives, and message that to the public.

CHAIR BATSAVAGE: Thanks, Dennis, appreciate just trying to add some structure here and really try to answer some important questions. We're getting a lot of ideas on who is going to be on this, how we're going to approach these. I haven't heard much about maybe adding or removing anything. But as I mentioned, we will be discussing this further at the next meeting. Emilie, do you have any input? I also look to see if there is anything more you need from the Board on that. I'll go to Emilie, and then I have Matt Gates.

MS. FRANKE: Obviously, these questions about the Work Group are big questions, so didn't expect to answer them all today. I think from staff perspective, my plan ahead of the spring meeting. You know this was a very general memo, laying out some questions. I think for the spring meeting, based on all the guidance.

You know there are a couple different sort of paths for work group composition, maybe a couple different ways to think about the Work Group timeline based on some of this sort of policy versus science tasks. My plan for the spring meeting would be to provide another staff memo with sort of more specific options for the Board to think about.

You could compose the Work Group such like Option A, Option B, and we could sort of have two different timelines. Really provide more specific roadmaps for the Board to think through and maybe kind of pick one to go down at the spring meeting, so that is my plan right now.

CHAIR BATSAVAGE: That definitely adds a little clarity from my perspective on this. Matt Gates.

MR. MATTHEW GATES: Following up a little bit on what Dennis was talking about. We're going to have a little bit of a discussion about the stock assessment and reference points coming up. I think something that the working group could look at is, what are the possible changes to what the reference points might be. How is that going to impact our management?

Is that going to get us out of this cycle of constantly ratcheting down our rules, to try to maintain a stock that productivity is changing in? I guess I wanted to just get an idea of what those changes might look like, and how is that going to affect the management decisions we have going forward?

CHAIR BATSAVAGE: As promised, I will see if the public has any comments on this agenda item, before I'll do just one last look around the table and online, to see if any other Board members have any thoughts on these questions that staff are looking to kind of help refine this Work Group more. Marty.

MR. GARY: Before we depart from this topic, I just wanted to thank the Board members for some thoughtful dialogue on this, really appreciate it. I think I touched on this a little bit in October, when we put the motion on the table. I just wanted to share with you.

I think one of the blessings and privileges of knowing some of the people that were involved in arguably one of the most difficult decisions in fisheries management, shutting down a fishery for five years in Maryland. Some of those people are no longer with us, but what I was able to learn in those years afterwards talking to them.

What I think we're going to be challenged with is, so the lower level of abundance managing this fishery, and given in a manner that we don't lose access and connectivity to it. The sociocultural benefits, the economic benefits, we can maintain those without sacrificing conservation, the adequate and necessary conservation for the species is a tightrope to walk. But if those folks were still around, what they would tell you is, it sounded like a great conservation story, great success story, they shut it down for five years and it came back, because it was resilient. But they would also tell you there is a lot of collateral damage. The challenge is, how do you manage that and maintain the access and keep folks connected to that resource, because they care the most about it, the ones that are connected to it. I think that is just a theme that we need to consider as we go forward. I just wanted to share that.

CHAIR BATSAVAGE: Okay, I'm going to see if there are any members of the public who would like to provide some short comments on this agenda item. I see a couple online. First up is Julie Evans, and Julie and others, if you can keep your comments to two minutes or less that would be great, just so we can maintain our schedule this morning. They will go in the order that I see them online here, so Julie, you are up first.

MS. KERNS: Julie, you just need to unmute yourself, let's go to Tom then next, instead.

CHAIR BATSAVAGE: We'll go to Tom, and then see if Julie can get her audio to work, and also look for other hands in the process.

MS. KERNS: Tom, you just need to unmute yourself by clicking that red microphone button. We're going to go back to Julie Evans. Julie, you should be able to unmute yourself. Mr. Chair, neither person is unmuting themselves on their end, so I don't know what to do.

CHAIR BATSAVAGE: Sorry about the technical difficulties, but yes, in the interest of time we will have to move on. But the public is always able to contact their Board members in their states and provide their comments before the next meeting.

DISCUSS 2027 BENCHMARK STOCK ASSESSMENT

CHAIR BATSAVAGE: Moving on to the next agenda item is to Discuss the 2027 Benchmark Stock Assessment, and Katie Drew will have a presentation for us.

DR. KATIE DREW: I am here to relay some comments or requests from the Stock Assessment Subcommittee for guidance from the Board on biological reference points and spatial management, to help us guide our assessment. I think in a lot of ways this is maybe a little dry run for some of the stuff that the Board Work Group will be discussing in much more depth, once the assessment is complete.

But today I am going to be giving you a little background on the current biological reference points for striped bass, sort of the history of where they came from and what our current reference points are. Then ask for Board guidance, or lay the stage for the Board input on biological reference points and some spatial management questions, and then give you the timeline of the next steps, including when we're looking to receive this information by. For our current reference points, just as a reminder so we're all in the same page.

Our SSB threshold is the estimate of female SSB, spawning stock biomass in 1995 from the most recent stock assessment. That value specifically is about 89,513 metric tons or 197 million pounds. The SSB target is 125% of that threshold value, which is about 111,892 metric tons or 247 million pounds. Our F threshold is the F rate that is needed for the SSB to stabilize at that SSB threshold in the long term, so about F equals 0.21. Basically, if we fish at F equals 0.21 in the long term, SSB will stabilize at the threshold, and similarly the target is the rate needed for SSB to stabilize at the SSB target in the long term, so 0.17 in current terms. Because the recruitment trigger was tripped in 2022, the F target and the F threshold calculations are using the low recruitment regime of about 2008 to 2023 for the calculations.

When we do not trip the trigger, we use a longer time series that includes historical periods of high recruitment, and as a result in those cases our F rate will be higher, that is you can sustain a higher level of fishing mortality and still reach the threshold and the target when you have that higher recruitment coming into the system in the future.

These target and threshold definitions for SSB were adopted through Amendment 6 in 2003. This was basically chosen because we had declared that the stock was rebuilt in 1995 based on number one, a projection model that indicated that female SSB in 1995 had reached the levels that we were estimating for 1960 to 1972, so the stock was rebuilt.

That was that '60 to '72 was our target range. Our stock assessment does not actually go back that far, but this projection model used the relationship between the Maryland JAI, which does go back that far and future SSB levels, in order to essentially predict what that SSB level was in1960 to '72, and that was the target for rebuilding, and do we were considered rebuilt at that point.

In addition, our spawning stock biomass indices showed an increase in proportion of Age 8+ of those mature female fish in the spawning population, indicating that we were seeing an expansion of the age structure and a more resilient spawning population. Under those conditions, 1995 was our threshold.

That was what the Board chose for Amendment 6. The Board then defined the target as 125% of the threshold, to reflect a desire to strive for a higher population size than was realized in 1995. The Board was happy with where we were in 1995. We did not want to be below that value, but we thought we could do better.

That target was sort of 125% was somewhat arbitrary, but it reflected the Board's goal of 1995 was good but we could do better. During this time Amendment 6 then set the F threshold at Fmsy of 0.41, and set the F target equal to 0.3, which was equivalent to an exploitation rate of 0.24%.

We had an F target that was lower than your full Fmsy estimate, but it was projected to provide a higher long-term yield and more protection to the stock, in terms of maintaining SSB. The Chesapeake Bay and the Albemarle Roanoke Region were given a lower F target, that 0.27 to account for the fact that these regions have a higher fishing pressure on immature fish in these nursery areas.

The SSB and the F reference points from Amendment 6 were not linked conceptually. They essentially came from two different models. We had our Fmsy or MSY based reference point on F side, and then this more historical empirical reference point on the SSB side. During the 2013 benchmark, projections indicated that if the population were fished at that F threshold, in the long-term the population would decline below the SSB threshold, and the same for that target rate. If we fished at that F target, we would see the population decline below the SSB target, based on the history of recruitment that we have seen in the fishery so far. The F threshold and the F target were redefined during this assessment, so that fishing at the F reference point would allow the stock to reach that associated SSB reference point in the long term, given the historical recruitment that we had seen.

The TC and SAS essentially made that decision during the stock assessment, and chose to maintain the biological reference point definitions for SSB and change the definition for the F reference points for two main reasons. One was the emphasis in the FMP on maintaining stock size at or above that SSB target on increasing the abundance of that Age 15+ fish and maintaining a broad age structure.

In addition, there was a lot of uncertainty in the stock recruit relationship that is crucial to estimating that Fmsy reference point. The TC and the SAS essentially had morse confidence in our estimates of SSB as a target and threshold than we had in our estimates of MSY. After that 2013 assessment the Board adapted these new reference points in 2014 through Addendum IV. During the 2019 benchmark we came back to this issue again.

I think leading up to the 2019 benchmark I think we started sharing some concerns about the reference point values, are they too high, are they biologically plausible, et cetera. We came back to this to kind of reconsider. We explored other options, including spatial biological reference points that would align with the spatial model that was under development.

We looked at some SPR based reference points, like 40%SPR, and in the end none of this kind of worked out through the assessment process. The spatial model was not accepted for management use, so those spatial reference points were off the table. The SSB reference points associated with those single stock SPR reference points, like your F40% were much higher than the current SSB target, which we felt did not really address some of those concerns.

We maintained the current definition from the 2013 benchmark Addendum IV, and used those during the benchmark, and then maintained for current management use. As I've said, we've had some commissioners and stakeholder's express concerns that the current SSB reference points are too high, that they are not biologically attainable.

I just wanted to point out that SSB actually did exceed the target for several years, so from 2002 to 2005 our point estimates are above that target, and the confidence intervals on SSB include the target for about a 10-year period there from 2000 to 2010, which is in that sort of green/teal box on this plot.

You can see this is female SSB over time with the confidence intervals from the model, that red line, solid red line across is our SSB threshold. The dashed black line across is our SSB target, and so I'm highlighting that period of high SSB that encompass the target from 2000 to2010.

However, during this time period F was above that revised target in the end, in fact above the threshold for most of it. That spot is highlighting the same 2000 to 2010 period. At the time, obviously when we were doing the assessment during this time period, our F threshold was Fmsy that 0.41 value. We were below that 0.41. We were not considered overfishing at the time. It's only in looking back that we see our F was higher than would have allowed the population to achieve or maintain that SSB target and threshold in the long run. The other thing that I want to point out is that this period of high SSB and high F was supported by a series of strong year classes from 1993 to 2003.

Those are highlighted in yellow on this graph here, so these are the Age 1 estimates from the assessment model, and you can see we had a series of recruitment events that were above that average long-term recruitment over the time series. That fed into the stock highlighting the 2000 to 2010 period of our high SSB and high fishing mortality.

We had a series of strong year classes feeding into that to support the SSB levels that we were seeing and the F levels that we were seeing. Subsequently, as you can see, our recruitment regime has changed. While prior to about 2003 to 2008 we had more recruitment events above the average then below it.

Right now, we are in a period where most of our recruitment events are below that long term average. While the SSB target is still attainable, the F rate required to do so may not be accessible to managers and stakeholders under the current recruitment levels. During this time of high SSB and high F we also had a high recruitment to feed into and support SSB and support a higher level of fishing mortality.

We do not have that level of recruitment currently at the moment, and so we are estimating a lower fishing mortality target and threshold. Depending on how recruitment goes into the future that threshold may change and come down even lower. We are exploring other reference point definitions to specifically address TOR #6.

This discussion around, you know that managers and stakeholders had about reference points is certainly in our mind as we go forward with this. To develop biological reference points that best address managers objectives, the SAS is seeking guidance on two main topics. How does the Board want the balance essentially preserving SSB versus allowing fishing?

Then what is the Board thinking about from a spatial management framework? To be clear, we do not need by May for you guys to come to consensus on these issues, and we don't need you to pick a specific reference point definition at this point. You guys will have to at some point in the future. But basically, right now what we are looking for by the spring meeting is a range of opinions and factors that the Board considers important for managing this species.

We can sort of understand the area that we have to work with, what is the Board concerned about? We can maybe develop tools that will allow the Board to evaluate these tradeoffs more quantitatively. But we want to provide things that the Board would like to see, so that they can be peer reviewed.

We would like to sort of avoid things that the Board is not interested in, and not waste our time on that if it is a nonstarter for management. Like I said, you don't have to come to consensus if some of the Board is very much in favor of a certain approach and the other half of the Board does not. We can explore both of them, and then you guys can fight that out sometime down the road. A little more detail in what we're actually looking for here. Again, as I was saying, there is a tradeoff between preserving SSB and allowing fishing mortality. If you have higher F reference points that will lead to associated lower SSB in the long term. If we want to achieve a higher SSB that will require a lower fishing mortality, especially during a period of low recruitment that we see now.

Lowering the SSB reference point will likely allow for a higher fishing mortality target and threshold. I think it depends on sort of our assumptions about recruitment going in, but ideally lowering the SSB reference points will allow for a higher F target and threshold. But this will not necessarily increase catch.

SSB is not just valuable as these are the spawning fish, yes. But these are also the larger fish in the ocean region. A lower SSB does mean lower abundance of 28 inch+ fish in general, and therefore potentially lower catch rates and lower encounter rates in the ocean region. Just lowering that threshold and saying okay, we're going to loosen up regulations, does not mean that you will be able to, again return to the catch rates that we saw during 2003 through 2010.

It would be helpful to receive input on things like, you know what is the preferred balance between SSB and F. The relative importance of things like maximizing yield versus maximizing catch rates for the availability of trophy size fish. What is an acceptable level of risk when it comes to preventing stock collapse?

How important is it to maintain SSB, so that when environmental conditions do become favorable, we have a strong SSB to contribute, jump start future recruitment. Are there alternative metrics for stock health such as total abundance or abundance of specific size or age classes instead of female SSB?

I folded these two ones at the bottom that maybe are low hanging fruit for the Board to consider, in terms of is there a preferred historical time period for our F reference points or for SSB reference points? That is right now we've sort of linked to that 1995 value. Is there an alternative point where the Board was satisfied or dissatisfied with fishery performance that we could consider as a target or a threshold?

Similarly, if we want to switch to a more, we like the F rate during this time period and we would like to have that as our target and threshold, and then take the lower SSB target and threshold that is associated with that. Is there a lower limit on that SSB level relative to 1995 levels or based on a historical preferred period? There are options for going back to an empirical reference point that are not specifically tied to 1995 but could be tied to other metrics that the Board is interested in.

The other question that we have for the Board is related to biological reference points and spatial management. We are continuing development of a spatial model. Hopefully it will work out for the peer review process, maybe it won't. We can't say at this point. But as a reminder, we currently have a single coastwide set of reference points, but we have separate regional management regimes. As we work on this spatial model, this will provide additional questions or challenges for management of how do you manage spatially. It will provide at least maybe when you get to those challenges you can say more options for the Board to consider. Number 1, is the Board actually interested in spatial reference points, that is having specific targets and thresholds by region to evaluate stock status against, or would the Board prefer to keep using sort of a coastwide meta population reference point and use spatial management regimes to attempt to achieve those targets?

Something to consider about this is, okay what happens when one region exceeds the F threshold but another region does not? If the Chesapeake Bay exceeds the F threshold but the ocean is below their F threshold, does only one region take a reduction or if one region was overfishing two years prior to the assessment, but has now dropped below the threshold, and the one region is overfishing now.

Does that region that is overfishing in the terminal year of the assessment take the reduction and does the region that was overfishing prior to the terminal year get a pass? I think these are things to think about, in terms of how we would want to use a spatial reference point in an actual management framework versus using a single reference point and using other management tools to manage specific regimes to address those regional needs.

One maybe more specific question is, would a Delaware/Chesapeake Bay Region be acceptable to the Board or would the Board prefer to see Chesapeake Bay distinct from other regions the way it is now. Delaware Bay and Chesapeake Bay, the genetic tools that we have now cannot really find a difference between these two fish from these two regions.

There appears to be a single genetic Chesapeake/Delaware Bay stock. This is likely due to one recolonization from the Chesapeake Bay after the Delaware Bay stock was reduced to extremely low levels, and also, we've seen now with our acoustic tagging frequent movement of both juvenile and adult fish between the Chesapeake Bay and the Delaware Bay using that canal.

There is a lot more genetic mixing than there used to be of the spawning population and of the juveniles. A single region may be more biologically realistic. But we are not locked into that from a management perspective, we are not locked into that from an assessment perspective. We are going to try modeling these separately, but we're not sure that we have the data to actually separate these two regions out.

If we cannot develop a three-stock model or a three-region model, is the Board interested in pooling Delaware/Chesapeake Bay together, or would the Board like to see Chesapeake Bay separate and pool Delaware Bay with the Hudson River for this ocean fleet that we currently use now? Similarly, is the Board interested in developing biological reference points for the Hudson River as a separate stock or a separate region, if it is supported by the data?

These are the questions that we're putting out to you. I think we could have maybe you guys can spitball a little bit if you have time now. But the most important part is that we receive some guidance to the SAS during the May Spring meeting. We will be having a methods workshop in March to sort of start the discussion on our, well hopefully continue and finalize some of our modeling decisions. But we don't really need the reference point stuff until later in the summer through our likely August 2026 Assessment Workshop, and again as we've discussed, we are on track to be reviewed through the Northeast Fishery Science Center Spring Research Track in 2027, which is likely going to be March of 2027. Ideally, we can prese the reference points and maybe some options, or maybe just some reference point methodology to the Peer Review Panel for approval.

When we come back to the Board with this assessment in spring or summer of 2027, you'll receive the reference point options that include some of the things that you are concerned about for your consideration and/or for the Work Group's consideration, as we move forward after that. At that point I'm happy to take questions.

PROVIDE GUIDANCE TO STOCK ASSESSMENT SUBCOMMITTEE ON BIOLOGICAL REFERENCE POINTS AND SPATIAL MANAGEMENT

CHAIR BATSAVAGE: As Katie mentioned, the feedback from the Board is really needed at the Spring Meeting. The presentation really kind of lays out just the history of the reference points and just some thoughts about tradeoffs, as far as exploring different reference point options.

I really don't have time to kind of get into the ideas today, but this is definitely food for thought for the Board members to think about and present their ideas in May. But for now, I'll see if there are any questions on the presentation that help folks in the coming months. We have John Clark.

MR. CLARK: Thank you, Katie, for another masterful presentation of a lot of complicated information that makes it clear and yet, wow! That's a lot there. I'm going to just start with a couple simple questions or a simple question. You said that the Amendment 6 target F of 0.3 with an exploitation rate of 24%. What is the current exploitation rate?

DR. DREW: We estimate or we are projecting I believe that F in 2024 is going to be about 0.014, the exploitation rate is slightly different than the F rate specifically. But I think in that range it would be close to a 12 or 14% exploitation rate.

CHAIR BATSAVAGE: Next up is Jay McNamee.

DR. McNAMEE: Thanks, Katie, great synthesis of all that. My first question, I have ideas but we're not doing that today, is that correct. Okay, but I do have a question, and that is the concept of spatial BRPs is interesting. I think there will be a lot of interest about that with the Board. However, I am thinking back, and I think it was black sea bass where this came up as an element in the Peer Review, where we have, I think, this is like in my head and it was a long time ago.

At least one of the peer reviewers was pretty dogmatic about the fact that you could not parse the reference points out in the way that we were sort of intending. You know the idea was there is one F on this stock, you can't like have five Fs or three Fs or whatever. I just offer that maybe to temper expectations more than anything else.

I think this notion of we have a spatial model that is awesome, we can now get an F of Chesapeake and a F for the Northern Region and the Ocean and like all of these things we might be thinking about. It's probably more nuanced than that, but Katie, I guess my question is, have you guys thought about that? Potentially we've evolved our thinking in that and I'm just not caught up on that. Maybe you think there is a method for kind of developing spatially explicit like F rates for instance.

DR. DREW: Yes, great question, I think perhaps we had the same reviewer, because the 2019 benchmark there was also a reviewer who was like, I don't think the spatial F reference point is appropriate. We disagreed with that. But it is something in our mind of, if we go forward, if the Board is interested in that, I think we would have to think very carefully about how we would use this, how we would define it and what does that mean for the overall health of the stock.

I think you can allocate F in a management framework, and I think having a single reference point is an implicit allocation of F into that reference point. But obviously reviewers can disagree with me. But I think the SAS has, that is in the forefront of the SASs mind that reviewers have been critical of that in the past.

If the Board is interested in that, I think we would put a lot of work and time into making sure it was justifiable and supportable. If the Board is not interested in that and recognizes some of the challenges of that, from a management standpoint. Then I think we would put more emphasis on how to develop a robust coastwide single reference point, and then how to develop management regimes that could support that more spatially.

CHAIR BATSAVAGE: Next up I have Bill Hyatt and after that Emerson Hasbrouck online.

MR. WILLIAM A. HYATT: One of the things that sort of constantly eats at me with this discussion is, kind of trying to visualize what the baseline would look like going forward, given where we are now. Our fishing effort right now, our fishing mortality, fishery exploitation is low. Our regulations are very restrictive.

We've had discussions at these meetings in the past where we've asked for the current situation be modeled out to, I think 2035. What we've seen is a curve that sort of peaks and then dips. But it is still pointed in that direction. I have difficulty sort of thinking about what direction we should be going, without having sort of a better feel for where we would level off, given our current highly restrictive management.

I mean you've described a lot of the tradeoffs that we're going to need to consider. I am trying to visualize that. Those tradeoffs from where? From what baseline, what foundation? I am wondering if you can give us, understanding that you haven't modeled out, understanding that there is a lot of uncertainty. Just given your experience with dealing with these types of models and situations and projections, where it looks like it would level off under the current highly restrictive regime using the current biological reference points.

DR. DREW: I don't think I can provide that right now, in terms of you know the projections that we did out to 2035, as you've noted. It really depends on what recruitment is going to be like going into the future. If we use that 2008 to 2023 range, which does include a series of very low reference points at the end, of recruitment events at the end, but also includes the 2015- and 2011-year classes as like rare events in there. You will at our current F level actually go beyond the SSB target. However, the projections where we just use, if we assume recruitment from 2019 to 2024, the most recent five years, that is our long-term average. That is where you start going down. Basically, we did not project out, but it had not stabilized between the target and the threshold.

I think it would likely go below our current threshold. That is under our current path, but the very low recruitment we've seen in the last five years. I think there is definitely a question of what is recruitment going to be like in the next ten years. We have built in a series of very weak year classes, so SSB does not have a lot to work on right now.

But is this a new normal? Are we going to see maybe the occasional spike of a very strong year class that will help sustain it into the future? That I think is really the challenging part and probably where the Board needs to think about is like, okay what level of SSB would you be happy with? What is acceptable in order not to restrict further?

MR. HYATT: If I can follow up. Critically, I don't see any reason to assume anything but that this 2019 current recruitment levels are anything but the new normal. I'm kind of thinking that any decisions relative to the tradeoffs that you're talking about would need to be made based on the assumption of a spawning stock biomass that is driven by that level of recruitment, and you're saying it's below the threshold.

DR. DREW: As you pointed out, it was going down it had not like so from 2029 and beyond. If we maintain the 2024 levels, which is slightly higher than what we are predicting for '25 or where things may go. F may continue to decline as this population declines and availability is less, and there is less interest and effort goes down. But yes, at those levels we had not projected it out far enough to see where it would stabilize. But the downward trend is not positive on that front.

MR. HYATT: I am very interested in knowing how far below the threshold that scenario would likely stabilize.

CHAIR BATSAVAGE: Next up I have Emerson Hasbrouck and then Joe Cimino.

MR. EMERSON C. HASBROUCK: Thank you, Katie, for that extensive presentation. I just wanted to follow up a little bit on the issue that Jay raised just a couple of minutes ago on spatial BRPs. Do we have any examples of where spatial BRPs are currently being used? If I'm following it correctly it was rejected for black sea bass. Essentially, are there any other species that successfully utilize spatial BRPs?

DR. DREW: I would say not within the Commission's framework or the Federal framework that I am aware of, or at least not for stocks where you have mixing between the stocks. But obviously we have separate reference points for tautog, and those are not necessarily that the mixing is extremely limited between those stocks.

But we have spatial reference points for them because we treat them as separate stocks. But yes, this is definitely a challenge, and it's something that if the Board was interested in, I think we would have to do a much deeper dive on the potential for this as an actual management tool, and see if there is any precedent to support it.

CHAIR BATSAVAGE: Joe Cimino.

MR. JOE CIMINO: Thank you, Katie, and I apologize, because I don't know how good a question this may be. I don't disagree with what Bill was saying that maybe we need to assume poor recruitment, as in using the most recent five years. But can you give us a sense of how dangerous it might be to assume that and then the opposite happens and we do have another 2015-year class or something like that?

What is the danger of ignoring the fact that we may get a strong class coming in?

DR. DREW: I think the danger would be that if we, I guess essentially reverse track of, instead of aiming for an SSB and aligning your F rate with that SSB and your recruitment assumptions. If we sort of instead try to aim for an F rate, I think the danger is that you would then allow that single strong year class as it comes through to be essentially hacked down before it has a chance to fully contribute to the population, and support the population.

If we are allowing that higher F rate then that means that strong year classes coming through are going to get hit as well. I think striped bass seems to have a life history where they are slow to mature. They are not fully mature until they are about Age 8. But they live up to 30 years. There is a sort of a life history strategy of surviving long enough so that you spawn and hit good conditions, and that you can maintain with that low natural mortality rate.

You know, a single year class or a single couple of year classes can help support that SSB. We are rebuilding essentially on the back of maybe two above average year classes here. I think allowing the staff to, or putting yourself in the position where a single strong year class comes through and is immediately harvested.

Maybe reduces some of the resiliency and sort of goes against the strategy that striped bass have, which is not lay a ton of eggs every year everywhere and have a lot of recruitment, a lot of productivity and turnover. It's more get all your cards lined up, get all your dominos in a row. Then when the right conditions hit you can sustain yourself in the long term. But I think that is something we could look at, in terms of like that question about what is the risk of stock collapse that the Board is comfortable with, et cetera, in as we develop this assessment further.

CHAIR BATSAVAGE: Last call for any questions. We'll be discussing this again at the May meeting. I think just in the interest time, and thank you, Katie. Yes, I think this is going to be really helpful for the Board to provide guidance at the next meeting.

NOAA FISHERIES REPORT ON CONSIDERATIONS FOR AQUACULTURE OF ATLANTIC STRIPED BASS

CHAIR BATSAVAGE: We'll move on to the next agenda item, which is a NOAA Fisheries report on Considerations for Aquaculture of Atlantic Striped Bass. We have Danielle Blacklock from NOAA Fisheries to give that presentation.

MS. DANIELLE BLACKLOCK: Good morning, everyone, thank you Mr. Chair. I am happy to be back with some of you again. I was here in 2024 with the Policy Board and this is the next step in our conversation as a result of that. Just to frame a little bit of why I am here talking to you about aquaculture. The U.S. imports about 15 billion dollars' worth of farmed seafood every year. That farmed seafood is coming from countries that we have no control over their rules, regulations and impact. It creates a real opportunity for domestic aquaculture to grow, because we know we have a marketplace that is needing more seafood. This has been acknowledged by the Trump administration through two executive orders. On the right-hand side, we have Executive Order 1391. You can consider this the Executive Order that has been completed.

This came out in 2020, it called for a whole host of aquaculture related activities, and we have done them. There is one that is still underway, which is identification of aquaculture opportunity areas. We have identified aquaculture opportunity areas in the Gulf of America and in Southern California. We are actively working hand in hand with the state of Alaska to identify areas of opportunity in the state waters of Alaska.

We anticipate that we will continue to move around the country. The Executive Order on the left, Executive Order 14276 calls for restoring American seafood competitiveness. This has a lot of wild harvest drivers in it, but it also calls for an America First seafood strategy, which asks for us to increase domestic aquaculture production and create more marketing and export opportunities.

Those are backdrop drivers that bring us to today. Why striped bass? Well, there are a number of reasons. One is we know a lot about striped bass. We know enough that in 2021 there was an entire journal special issue on aquaculture of striped bass. It is a species that has been farmed for a long time, and we have great information feeding into the knowledge base. We also at NOAA have been doing over the past eight years a process of identifying top marine candidate species.

There are 21, 22, depending upon who you ask, species that are ready for commercialization in the United States in marine waters. Well, it is really hard to bring 22 species online at the same time. We're looking to prioritize those and come up with the top few that really have technoeconomic possibilities and invest heavily in them.

This process has brought us through meetings with constituents, industry, as well as academia that are actively researching all of these. Through voting and process of prioritizing all of these species, Atlantic striped bass has consistently risen to the top as a candidate species of interest. Here you can see that it is ranked Number 3. Why it is becoming more and more of interest is because the research that has been done.

We are now in generation 8 of selected breeding, and it grows significantly faster than hybrid striped bass. Hybrid striped bass is what you're used to thinking of that you think about farmed striped bass, which is a mix between Atlantic striped bass and white bass. Well, Atlantic striped bass has a higher price point. It has a different marketplace, because hybrid striped bass is typically sold as a whole fish, and Atlantic striped bass farmed or wild is typically sold as a fillet.

But the market value is so much higher that we are watching hybrid striped bass farms switch to Atlantic striped bass. This is a reminder that I've talked to some of you before, although it was a different board. The goal here is to balance aquaculture development with protection of wild striped bass populations and the fisheries they support. It is essential for making sure the resilience of this iconic species. I grew up in Massachusetts. I would be disowned if I put striped bass at risk. My family goes out and fishes for striped bass. Just know that my roots are true when I have this conversation with you. What I flagged in 2024 is still true, that Atlantic striped bass is being farmed and it's entering our markets today. It's just not coming from the Atlantic seaboard, it's not coming from the federal waters along the Atlantic, of course, because of the moratorium on possession.

When we had the conversation in 2024, there were a number of issues that were raised by the Policy Board, concerns about illegal harvest and enforcement; Ocean use conflicts, economic feasibility, market competition, aquatic animal health and disease, environmental impacts and escapement and genetics.

We were asked for a white paper. In your supplemental materials you have a draft of that white paper at this meeting. We have gone through those lists of issues, and given you what the risks are, what the state of the science currently is, and what mitigation strategies could be employed should there be interest in opening the federal waters of the U.S. EEZ along the Atlantic Coast.

I'm going to walk you through in brief some of the tools that we've built for each of these areas, and ways that things could be done, although the paper is much more in depth. The first issue that was raised was enforcement. This is one that we know and have a lot of tools to make sure that wild harvested Atlantic striped bass is not intermixed with farmed striped bass.

A number of states already have provisions that protect that, and make sure that is not a challenge; Maine, New Hampshire, Massachusetts, North Carolina and Virginia also had a very clear rule. This can be done through a number of different methods. Dockside tagging seems to be the one of most interest and ease. But there are a number of other ways that this could be done as well.

Ocean Use Conflict Considerations. This is where NOAA has extraordinary expertise, and I don't use the word extraordinary lightly. We have through the National Centers of Coastal and Ocean Science a team of GIS specialists, and the amounts of data that they use is unbelievable. They use roughly 200 to 300 datasets.

Each dataset is a different type of fishery and where the folks are fishing or where are the endangered species or where are the marine mammals, or what does the bottom look like there. All of these layers on top of each other give us incredible intelligence about how to put in farms, stay out of the way, and minimize impact.

This is the siting. This Atlas is how much data goes into knowing where farms should go. This is hundreds and hundreds of maps laid on top of each other that show us where the right place is for aquaculture to grow could be. We have a powerhouse that can help support industry, regardless of what they are farming. We are the go-to house for all things siting analysis and marine spatial planning.

We have yet to have an applicant for federal waters farming not come to us and say, can you please place my farm. We actually ran an analysis in between 2024 and today for you all. To start looking at where Atlantic striped bass might be economically viable along the Atlantic seaboard. Just because they swim up and down the coast doesn't mean it makes sense to put a farm anywhere up and down the coast. Anywhere below 15 degrees C for extended period of time and the fish don't thrive. This temperature map, this color map is basically a temperature map. It shows that we're not sure that there is economic viability for Atlantic striped bass north of North Carolina. Farms north of North Carolina might have more difficulty getting the return on investment that they would expect.

This is an active area of research that our team is doing right now. But that is new science since the last time I was here. I talked a little bit about markets and economic considerations. From the standpoint of farmers, it's a species of interest because it grows quickly to make good money on it, and because there is an existing marketplace.

That also on the other side can be of concern. There is an existing marketplace and we don't want it flooded. What aquaculture could bring to this is consistent flow, not flooding. It's not in any farmer's best interest to flood a market. What we see with farms is delivery of the same amount every week.

It keeps it on menus, it keeps it in market places, it keeps it in the vernacular of people, it keeps in on grocery store shelves. That then creates an opportunity to grow the marketplace. That is what we have seen with other farmed species that have come online, is that the market has actually grown because of the consistent delivery.

Disease, when it comes to disease in fish nobody wants it. It is the nightmare of the farmer, it is the nightmare of the regulator, it is very scary to everyone involved. The way that in the United States typically we deal with disease is prevention. We have a lot of rules and regulations about stocking density, overcrowding, water flow.

All of these things are managed to make sure that the fish have the highest level of ability to stay healthy. In addition, we create vaccines. We actively are developing vaccines right now for sablefish in our Northwest Fishery Science Center, to make sure that they don't become ill. We are an agency of prevention and that is where I would anticipate anything goes with Atlantic striped bass.

There are very few therapeutants available. Anything that is used in the marine environment has to be done so under oversight of FDA. It is extremely rare to use antibiotics. But it is still a concern, and it is something that we would have to work on for Atlantic striped bass. Environmental Impact Considerations, this is another area where we have significantly more knowledge now and tools than we did even five years ago.

What I'm hoping you walk away with is the understanding that there are tools that could be deployed for Atlantic striped bass that didn't exist five years ago. We now have the ability to model an entire farm in the water, in the location that it would be, and understand where all of the effluent would go.

This takes data on fecal settling rates, feed settling rates, digestibility. It takes a lot of data to go into a model here, to actually have something meaningful come out the other end. But we've built that body of knowledge for a whole host of species, so we can model a farm and know, what's it going to do to the bottom? How do we make sure that farm is invisible when it comes to water quality 10 meters away from the farm? Ten meter downstream, I don't want to know that that farm existed. We have farms in the United States today that meet that standard.

It is not a standard, to be clear, but they meet that where the farm is completely invisible 10 meters away. We have the ability to model all of this and see what the bottom would look like, see what the water quality would look like, and they are required for EPA permits for any farm that has effluence, so any finfish farm.

Our scientists do the modeling that then feed into the EPA permits that are required. Another consideration that was raised in 2024 is genetic risk. Genetic risk is important. We have to make sure that the caught specifics in the wild are not impacted by the genetics of the farmed population, especially when there has been selective breeding.

A lot of farms currently are applying, not for striped bass but in other species, are applying for just F-1s, right having wild broodstock. That is great if you can make money doing that, but often like every other protein that we eat that we farm, selective breeding is critical to be able to grow fish faster, have them be meatier, lighter skeletons, all of that, lower food intake.

The way that we can protect the wild population, there is a whole host of tools in the toolbox. We have everything from many salmon farms are female only. That is not 100% right, females can still put off eggs. Then there are tools like triploidy, where you make a fish have three chromosomes so that they are sterile.

That has a 99% effectiveness rate. It's not 100. But now there is new technology that has come online that we are using in other species. It has not been applied to striped bass yet, which is 100% effective. Through genetic knockdown G-knockdown technologies, we have the ability to just make them not grow gonads, 100% effectiveness.

Now again, we have not done that for Atlantic striped bass yet. That research would take 4 to 7 years maybe, but the tool is there. We could make sterile Atlantic striped bass. Another tool that we have is better understanding what the potential impact would be through genetic risk assessments.

We have a team of modelers again, in our Southwest Fishery Science Center that their energy and expertise is on genetic modeling. We again can put a farm in the water, know what kind of species it is, you need to know what the population outside is. Is it a big population, small population? It's actually arithmetic, not just big or small that we use. You can model how much risk there is. You can think fundamentally it's pretty basic.

If you have a small population and a net, and a huge population outside, the risk is probably not very high of there being any challenges or changes in the external population. On the converse of that, if you have a big farm and a small wild population, the genetic risk becomes much higher, if you're not putting in sterile fish. But we have the ability to actually model that and give numbers of here's what you are looking at of potential changes in a wild population. Again, those models are only needed if the fish are not sterile. Here is more on the sterility and triploidy. I jumped the gun in telling you about the work that we're doing. We're also looking at this for sablefish. I had talked about the fact that we're developing vaccines for sablefish. We're also looking at sterility.

In the final piece on genetics is, genetics become a risk not only from gametes, potentially, but also from escapes, right? We don't want any escapes. We don't want spillage, which is just a couple of fish every time you are feeding or treating or anything like that. You also don't want a catastrophic event where the whole population is released at once.

We have also heavily invested in, as has the industry, in engineering for offshore, to make sure that you are building things in a robust nature, so that they can handle extreme weather. We're seeing sinking cages as becoming more of the norm. Things aren't staying at the surface the way they used to, so that you can get under the waves and under the swell.

We have in-house engineers that are working with external engineers, that are working with academic engineers, that are working with international engineers on actually developing guidelines and standards for offshore engineering for the United States. We anticipate there will be standards coming online in the next couple of years.

Finally, a lot of that backdrop of the science tools was not striped bass specific. But it started with, we know a lot about Atlantic striped bass. One of the ways that we know a lot about Atlantic striped bass is that NOAA has heavily invested in Atlantic striped bass research. It's not done in our labs, its' done through partnership with Sea Grant.

One of the major contributors to this body of knowledge is Striper Hub. It would be ludicrous for me to sit here and not mention them. They are a collaboration led out of NC State, and they are really the leading edge in research on Atlantic striped bass. Their research is currently being commercially farmed in the United States.

I mentioned this in 2024. It has only grown. There are applications in the Gulf of America for Atlantic striped bass that will use their eighth generation, ninth generation by the time they get there. There is also a number of farms on land that are farming Atlantic stripe bass. We're actually seeing in this cold snap a number of the farms in Texas, this is all anecdotal.

A number of the farms in Texas that farm red drum are seeing mortalities, because it is so cold. But a number of them have already switched to farming Atlantic striped bass, and the stripers are surviving. It will be interesting to see if that makes more switches in the future. That again is anecdotal but of interest. There is also Atlantic striped bass being grown in RAS facilities that is more experimental than commercial at this point.

But this organization The Striper Hub is already doing selective breeding specific for recirculating aquaculture. As a reminder there are a suite of constraints. You know that there is a moratorium on possession in federal waters. That has a simple administrative fix but a much bigger conversation behind it. The signing of papers and moving papers is simple, but a bigger conversation. But there are also other challenges. There are challenges in getting farms in the water around the country. The permitting takes a long time. We are more coordinated than we have every been. We have these tools now. I mentioned the tools for understanding effluence and water quality modeling and benthic sedimentation rates and all of that. We didn't have that five years ago, but permits required it.

We have these tools that we've built to inform the permitting process. It's getting easier, we're going to start seeing more and more farms in the offshore environments. But it still is difficult. With that, I think we are up to next steps. I mentioned at the beginning that the memo that is in your supplemental materials was given to you as a draft. That is because the memo is for you.

We need to know that it is meeting your needs and it has met the mark. We don't have any official timeline, so I would leave that to Mr. Chairman of whether you want time to think about it and give us comments in writing, whether you want to have another conversation at your next meeting. The document was built and drafted for you to meet your needs based on the considerations that were elevated in 2024, and we're happy to continue to modify it, to make sure that it is meeting the mark. Thank you.

CHAIR BATSAVAGE: Thank you, Danielle. I will look for any questions and comments, and also to what Danielle asked for is further feedback from this Board, whether it's in the form of written comments or discuss this at a further meeting. Take all the questions, comments ands those points that she asked all at one time. Let's see a show of hands. I've got John Clark, Roy Miller and Joe Grist.

MR. CLARK: Thank you for the presentation, Danielle, it's really interesting. Just curious about the genetic strain that grows faster than a hybrid. That's pretty amazing. That is just selective breeding that's not genetic engineering, okay. How long does it take to grow to the market size of 3 to 7 pounds for these?

MS. BLACKLOCK: Eighteen months.

MR. CLARK: Wow that's fast!

MS. BLACKLOCK: Yes, I didn't say it on a mic, I just want to make sure people online can hear that it is not genetic engineered. It is absolutely selective breeding, and the genome, there is very little genetic difference, but it's showing these dramatic genes. It's quite significant.

MR. CLARK: What is the estimated capital outlay to start one of these farms, and do you have people that are interested in growing this on the Atlantic?

MS. BLACKLOCK: We do not have any active applications along the Atlantic. We do have active applications in the Gulf. I think that that is in part because people are knowledgeable that there is a prohibition on possession. That could be playing in. The capital outlay is something that we are looking to actually model a bit more, to better understand.

So far, the applications that are putting in are too small in number for me to share, it would be business proprietary information. But it's a significant cost to be able to go offshore into federal waters. We're looking at a slower return on investment, because the initial capital expenses are generally quite high.

MR. CLARK: Would you say millions rather than thousands or hundreds of thousands?

MS. BLACKLOCK: Yes, Sir.

CHAIR BATSAVAGE: Roy Miller.

MR. MILLER: Thank you, Danielle, for the fascinating presentation. I could ask lots of questions, but I just wanted to ask one for now and that is concerning the sources of broodstock. That was a major impediment to a hybrid and purebred striped bass aquaculture back in the 1990s, when people that wanted to get into this business were relying on live natural broodstock from the environment.

They needed permits from those of us in regulatory agencies, in order to collect these striped bass. What is the state of the art now, with regard to sources of broodstock? Can you avoid that bottleneck of having to capture wild females or males?

MS. BLACKLOCK: The state of the art now is what is happening at Striper Hub, which is on Generation 8, working towards Generation 9. They haven't had new broodstock in decades. I would consider that no longer a bottleneck. What would be a bottleneck would be scalability of what is currently research production into commercial production. Housing broodstock as you go down the generation lines becomes a large investment. I would say that that is more where the rubber meets the road today.

CHAIR BATSAVAGE: Joe Grist.

MR. GRIST: Thank you, Ms. Blacklock, for the presentation. Very interesting, the science is really intriguing, what you're talking about. But I have a concern with what is being promoted here, in that this almost sounds like we're popping up the next Walmart in the ocean versus all of our generational traditional inland fishery and families, and mom and pops that depend on striped bass harvest and the price point they get to survive through the year.

This sounds like an operation that comes in. This could be a huge risk to the individual watermen that are out here in the various states that depend on this as part of their business plan during the year. Has there been, and maybe it's in this document to bring some type of consideration or look at the socioeconomic impacts that this could present? Because once one of these gets up and running and they start making the profit, I can see the price of striped bass going down at a point they could take it out to compete everybody else.

MS. BLACKLOCK: It is never our intention at NOAA to supplant one food source of seafood with another; it is always in complement. We would absolutely happily dive into that a bit more. It is in the paper, and we also have more papers coming on the socioeconomic pieces. But as a driver for this it is never one for the other, it is always to have more and create more access and bigger markets. We are in a world where the U.S. does not play in the commodities seafood game as much as it used to, and how do we find a new normal there?

CHAIR BATSAVAGE: Jay McNamee.

DR. McNAMEE: Thank you for the presentation. I actually, the thoughts I was having were very similar to what Joe just offered. Maybe I'll just kind of restate to say, I did note there is a consumer awareness market section in the paper. But I think, I guess I didn't see that kind of direct economic impacts. It's just a gap in my view of just kind of like a really refined, very kind of specific economic analysis of how it could impact.

What would the levels need to be to not impact and complement in the way that you say. I just wanted to highlight that. Then just I had a thought. It's funny to me, I don't know if it is going to be funny to anyone else. But when you offered a comment about 100% effectiveness of some of the genetic, you know manipulation that you can do on these animals, I was just wondering if you saw Jurassic Park. It's a joke, sorry.

CHAIR BATSAVAGE: Thanks, Jay, always can use a little bit of levity at a Striped Bass Board meeting. Emerson Hasbrouck.

MR. HASBROUCK: Thank you, Danielle, for your presentation. I'm not sure what to make of this. My concerns are very similar to what Joe and Jay just voiced. You know all morning here we've been talking about rebuilding a wild stock of striped bass. It may not be officially the intent of NOAA to compete with wild harvest.

But the reality is that once all these additional striped bass, if they come into the market or when they come into the market, they are going to compete with wild harvest striped bass, and they are going to compete with our commercial fishing industry. That is my concern here. There is going to be a market impact here.

Is there kind of a hidden message here that we don't need to rebuild striped bass wild stock for commercial harvest, because we're queuing up aquaculture to replace wild harvest in the marketplace. That doesn't sit very good with me. The offshore culture that we're talking about here is going to have an impact on markets and market conditions.

There is also no benefit for the private recreational angler or the for-hire industry. You know one of the things we spoke about this morning, in terms of our working group looking at rebuilding the striped bass resource and what we're going to do after 2029.

One of the bullet items were striped bass culture and stocking for enhancement of wild resource. I don't see anything here that is going to help us directly address that bullet in terms of can aquaculture assist in rebuilding an enhancing wild stock. That is missing from this whole effort.

MS. BLACKLOCK: There is not a hidden message that farmed striped bass should replace wild striped bass. That is absolutely not the intention. It is that we can supplement the marketplace. We can make a year-round product, potentially. We can bring the economic viability into the coastal communities in different ways. It's a diversification conversation not a change of switching one for the other. I just want to make sure that that is clear. We can look more in depth at the marketplace. I hear you. You want a complete market assessment to better understand. That is something that we can take onboard and look at whether our team can get to more of a market assessment.

I think there was something else in what Emerson said that I wanted to come back to, but I can't recall. Oh, augmentation. What we have analyzed for you is not augmentation, although that could be a component of this. Certainly, you would want different types of fish grown.

I don't think that there would be as much of an appetite for eighth generation sterile fish going out, as a way to supplement, right. But a hatchery could run multiple programs. There are certainly ways where you can combine restorative aquaculture, population enhancement aquaculture with commercial throughout its life cycle aquaculture.

CHAIR BATSAVAGE: I have four more hands, I'm going to go to them and I think after we conclude this then what I suggest is Board members, send staff any ideas and thoughts on this aquaculture plan here and we may have this on the agenda for a future meeting this year. But I do want to go to the last four hands here, being mindful of the time. I have Megan Ware followed by Bill Hyatt.

MS. WARE: Thank you for the presentation. I think it might be helpful just to get some sort of potential scale or size, if we could compare that to our current wild caught quotas. I'm curious if there is current Atlantic striped bass aquaculture, the level of production ideally in pounds of that, or if there has been any analysis on what the minimum size of an operation might need to be to be profitable and the size of that. I think that would really give me a better sense of the scale we're talking about.

CHAIR BATSAVAGE: Bill Hyatt.

MR. HYATT: My point was actually touched on quite well by Emerson. Throughout much of my career I've been involved with hatchery operations, and those hatchery operations all had production targets and were production focused. But they also could be used at various times and ways for restoration efforts as well, and we made full advantage of that opportunity. I think this is something that in the long term might have some opportunity for public private partnerships, and that also circles around a little bit to the Work Group, as far as something to be considered, again, in the long term.

CHAIR BATSAVAGE: Loren Lustig.

MR. LOREN W. LUSTIG: Thank you, Danielle, for a very, very interesting presentation to us. You spoke, perhaps euphemistically about catastrophic events. I would like to learn more about that. Could you direct me to like an internet search. It would be helpful to know the year, the location and the species that would allow me to learn more about catastrophic events, please. A follow up question would be, has there been an event that you would categorize as such for striped bass?

MS. BLACKLOCK: There has not been an event that I know of for striped bass. But catastrophic we just call a system failure, where the complete stock in the net escapes. That can happen from a weather event, potentially, which again, that is why engineering has changed a lot over the years.

It also could happen from a predator entering into a net and creating a hole. There are a number of ways that it can happen, but we've seen engineering past most of these challenges, and it's not something that happens on a regular basis. It's not something you see every day. I would have to google it myself.

CHAIR BATSAVAGE: Nichola.

MS. NICHOLA MESERVE: I think one thing that I am left wondering from the presentation, see in there, was a discussion of food source for these potential aquaculture operations, and it ties into Megan's question about the scale of the operations and the scale of the inputs necessary, and whether that is another source of competition for our wild caught fish.

MS. BLACKLOCK: I did not present on feeds. Feeds overall over the past since 1990 have dramatically changed for aquaculture. They are all species specific and often proprietary formulas. I am going to speak in broad brush strokes. But in 1990, 90% of fed aquaculture fish feed was from fish oil and fishmeal.

That is down well under 25% today. There are many farms that have no fishmeal and fish oil going into them. There have been significant improvements, including from our researchers that found that you can use a plant-based diet and add taurine to make an effective feed that does not require the same components of a fishmeal and fish oil.

That is an active body of research. There are folks looking at black soldier fly, fermentation. It's an active area, not in NOAA but in industry itself, because there is a limited finite resource. It's a constantly changing food source. When it comes to scale, I am not sure what the food conversion, it might be in our paper. I just can't bring it to memory what the food conversion ratio is right now for Atlantic striped bass.

But another thing as we go through generations, they try to get the food conversion ratio down. Food conversion ratio is how much feed you're putting in to get fish fillet out. You want a low number; you need something three times its weight to get its weight out. I'm just not sure where it is, but it might be in the paper. We can make sure that it is in the paper of what the food conversion ratio is today.

CHAIR BATSAVASGE: Thank you again, Danielle, for presenting this updated information to the Board. As I said, if any Board members have any additional thoughts after looking through the report again, just show those to staff and perhaps we will invite Danielle back to another meeting, or just have this on the agenda in general. We'll figure that out as time goes. Again, appreciate the update on this information, definitely a lot to it.

ADJOURNMENT

CHAIR BATSAVASGE: Next up is Other Business, but in the interest of time I'm going to skip over that and just any other business will just go on to a future meeting. Just see if there is any objection to adjourning. Seeing none; thanks everyone, this meeting is adjourned.

(Whereupon the meeting adjourned at 11:04 a.m. on Thursday, February 5, 2026)

Atlantic States Marine Fisheries Commission

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MEMORANDUM

TO: **Atlantic Striped Bass Management Board**

FROM: **Emilie Franke, FMP Coordinator and Toni Kerns, Fisheries Policy Director**

DATE: **April 20, 2026**

SUBJECT: **Request for Further Board Guidance on Work Group on Future Striped Bass Management**

In October 2025, the Board approved the establishment of a Work Group (WG) on future striped bass management with the following motion:

> Move to approve in Section 3.4 Option A Status Quo and establish a Work Group to develop a white paper that could inform a future management document. The Work Group should include representation from all sectors in addition to scientists and managers. The goal of this Work Group is to consider how to update the FMP's goals, objectives, and management of striped bass beyond 2029, in consideration of severely reduced reproductive success in the Chesapeake Bay. The Work Group should utilize public comment, including that received during the Addendum III process to inform its research and management recommendations and work with the Benchmark SAS to incorporate ideas and deliver necessary data products. Work Group discussions should include the following topics:
>
> - Review BRPs and consider recruitment-sensitive, model-based approaches.
> - Formally review hatchery stocking as both a research tool and a management tool for striped bass w/ cost analysis.
> - Evaluate the potential for other river systems to contribute to the coastal stock.
> - Explore drivers of recruitment success/failure in Chesapeake Bay, Delaware, and the Hudson in light of changing climatic and environmental conditions, including potential impacts from invasive species.
> - Explore the reproductive contribution of large and small female fish and the implications of various size-based management tools.
> - Methods to address the discard mortality in the catch and release fishery.

In February 2026, the Board provided initial guidance on WG composition, task details, and timeline. Based on this initial guidance, staff have outlined potential options and additional questions seeking further Board guidance on how to proceed with the WG.

WG Composition

The Board motion indicates participation by all sectors, scientists, and managers but does not provide specifics. In February, Board members had several ideas on WG composition but

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acknowledged the challenge of keeping the WG at a manageable size (i.e., ~12-15 members) while also having adequate representation from each sector and region and noting the variety of viewpoints within each sector. Multiple Board members suggested expanding the WG process to include sub-groups focused on different tasks and/or suggested a larger process with specific avenues for gathering stakeholder input. Ideas for gathering broader input included conducting surveys, conducting facilitated workshops with participants across regions and sectors, and including time on WG agendas for public input (similar to the menhaden WG process). Board members suggested this broader input from sub-groups and/or stakeholder input processes would be transmitted back to a core WG for consideration. There was a suggestion to start the WG process by forming the core WG for initial discussion and to focus the list of topics, followed by a broader process once the issues are more focused.

Based on this guidance, staff have identified potential options for the core WG composition and process for broader stakeholder input along with additional questions for Board guidance below. This is **not** an exhaustive list of options.

Core WG (Maximum 12-15 people)

The following are potential options for the composition of the core WG. As suggested at the February meeting, broader stakeholder input may be gathered through avenues like workshops or topic sub-groups with all input transmitted through a core WG.

For all of these options, the following questions may need to be considered:

- Will each WG seat be allocated by category type to ensure representation of the full management range and diversity of stakeholder interests?
- Will there be a specific nomination process, e.g. each state can nominate x number of participants?
- How will individuals be chosen?

1. Core WG of Board Members

This would be similar to the typical ASMFC Board WG process.

2. Core WG of Board/Advisory Panel/Technical Committee Members

There was a suggestion at the February meeting for the WG to include 3 AP members (1 each for recreational, commercial, for-hire), 2 TC members (potentially the TC and SAS Chairs), and 6 Board members (Board Chair plus 1 from each spawning area/region: Chesapeake Bay, Delaware Bay, New York Hudson River, Southern New England, Northern New England).

3. Core WG to Include Members of the Public (this could be included with options 1 or 2)

The WG would include members who are not Board, AP, or TC members. The Board would decide what portion of the WG membership would be assigned to non-Board/AP/TC members.

<u>Process for Broader Stakeholder Input</u>
The following are potential options for gathering broader stakeholder input to inform core WG discussion. The WG process may incorporate multiple options. This is **<u>not</u>** an exhaustive list of options.

Note: There was a suggestion to ask the Committee on Economics and Social Science (CESS) for input on how to structure a process for stakeholder input. Once the Board provides more guidance on what the WG might look like, CESS could discuss this.

1. Sub-groups
The Board may identify some WG tasks that could benefit from forming a sub-group with technical experts/stakeholders with knowledge/interest in that particular topic (e.g., hatchery stocking). The Board would need to address similar questions as outlined above about who would be part of the sub-groups.

2. Facilitated Workshops
The WG may identify particular topics (or the larger WG question in general about how to manage beyond 2029) that would benefit from a facilitated workshop. This would require specific funding. The Board would need to consider who would participate at each workshop (i.e., input from each sector, region). One timing consideration to consider is completion of the stock assessment; conducting the workshop after the completion of the stock assessment may be beneficial so the most updated stock information is available.

3. Public Input Survey and/or Public Webinars
The WG may identify particular topics where a public input survey and/or public webinar may be useful to gather public input. The Board would need to consider if the input survey and/or public webinars would be developed coastwide or tailored to regions. If they are tailored to regions who would be the responsible staff (state or Commission). One point to consider is whether this would be repetitive of a future public comment period if the management approaches being discussed by the WG are included as options in a future draft addendum, which would have a dedicated public comment period with public hearings.

4. Dedicated Time for Public Input During WG Meetings
Time on each WG webinar agenda would be dedicated to public input.

Task Details and Timeline
As noted during the February meeting, from staff perspective most tasks seem to require some level of technical information gathering and/or completion of the assessment (peer review scheduled for March 2027) before the WG discussions could begin. The table at the end of this memo reflects initial staff notes on each task for Board discussion.

At the February meeting, some Board members noted a distinction between assessment-related tasks (biological reference points, recruitment drivers, spawning areas, size-based management) and other tasks which could be discussed sooner (recreational release mortality and hatchery stocking). Some Board members suggested prioritizing the list of WG tasks.

There were also suggestions to better integrate economics into the discussion. A few CESS members have volunteered to discuss this after the Board provides more guidance on what the WG will look like.

<u>Questions for the Board on WG Tasks</u>

- For the recreational release mortality task and hatchery stocking task, what is the Board's preferred timeline to begin WG discussions? Would a sub-group be needed?
- For the assessment-related tasks (BRPs, recruitment drivers, spawning areas, size-based management), it is staff's recommendation that any WG discussions would not occur until after the stock assessment is complete?

Table of WG Tasks and Staff Notes from February 2026 Staff Memo

Task from Board Motion	Staff Notes
Review BRPs and consider recruitment-sensitive, model-based approaches.	<u>Assessment Timing</u>: The full Board will be asked for guidance to the Stock Assessment Subcommittee (SAS) on developing alternative reference points. If the SAS is able to develop multiple options for reference points that pass peer review, the WG could provide input to the Board after the peer review on the various reference point options for application to management.
Formally review hatchery stocking as both a research tool and a management tool for striped bass w/ cost analysis.	<u>Information Needed</u>: Review past ASMFC reports on striped bass stocking (1990s). Compile relevant information from state agencies on past and current striped bass stocking efforts (current stocking in North Carolina) including performance of past stocking programs, resource needs, environmental/ genetic/disease concerns. Potential literature review of stocking for other diadromous species.
Evaluate the potential for other river systems to contribute to the coastal stock.	<u>Information Needed</u>: Compile available information on other river systems of interest outside the Chesapeake Bay, Delaware Bay, and Hudson River. The benchmark stock assessment will include review of recent genetic studies on spawning origin of striped bass.

Task from Board Motion	Staff Notes
Explore drivers of recruitment success/failure in Chesapeake Bay, Delaware, and the Hudson in light of changing climatic and environmental conditions, including potential impacts from invasive species.	Information Needed/Assessment Timing: Through the benchmark stock assessment, the SAS is conducting literature review on this topic and is considering which potential drivers of recruitment could be incorporated into the assessment model.
Explore the reproductive contribution of large and small female fish and the implications of various size-based management tools.	Information Needed/Assessment Timing: Compile available information on the reproductive contribution of different size striped bass. After the assessment is complete, the TC-SAS could provide input on size-based management tools.
Methods to address the discard mortality in the catch and release fishery.	Information Needed: The MADMF release mortality work is still underway. When that work is available, the WG could revisit the 2024 Board Work Group Report on Release Mortality in light of completed research from MADMF and other recent studies (e.g., UMass Amherst recent publications).

Atlantic States Marine Fisheries Commission

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MEMORANDUM

TO: **Atlantic Striped Bass Management Board**

FROM: **Atlantic Striped Bass Stock Assessment Committee**

DATE: **January 22, 2026**

SUBJECT: **Request for Board Guidance on Biological Reference Points and Spatial Management**

Term of Reference #6 for the 2027 Atlantic striped bass benchmark stock assessment is:

Update or redefine biological reference points (BRPs; point estimates or proxies for BMSY, SSBMSY, FMSY, MSY). Define stock status based on BRPs by stock component where possible.

As the Stock Assessment Subcommittee (SAS) continues work on the assessment, they request guidance from the Board in order to develop biological reference points (BRPs) if the Board is looking for alternatives to the current BRPs.

This memo describes the history and rationale for the current BRPs and lays out the two areas that the SAS is looking for guidance on from the Board.

History of Current BRPs

The current spawning stock biomass (SSB) threshold for Atlantic striped bass is the estimate of female SSB in 1995, and the current SSB target is 125% of that value. The stock is declared overfished when SSB drops below the threshold. The current fishing mortality (*F*) target and threshold are the *F* rates that will maintain the population at the SSB target and threshold, respectively, in the long term. Overfishing occurs when *F* exceeds the *F* threshold. Because the Amendment 7 recruitment trigger was tripped prior to the most recent assessment update, the current values for the *F* target and *F* threshold are calculated using the current low recruitment regime (2008-2023) (Figure 1). This results in a lower *F* target and threshold than would be estimated from the longer time-series of recruitment used when the recruitment trigger has not been tripped.

The 1995 value of SSB was chosen as the threshold because the stock was declared rebuilt in 1995 based on 1) an increasing proportion of age-8+ (mature) female fish in the spawning population as a sign of an expanding age structure and a more productive, resilient spawning stock; and 2) a projection model that used life history information and *F* rates from tagging and catch curves to estimate SSB from the MD young-of-year (YOY) index over time. The MD YOY index extends back to the mid-1950s, so the estimates of SSB after the moratorium in the late 1980s were compared to estimates of SSB pre-collapse (1960-1972) to determine whether the

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stock had recovered. The projection model indicated that in 1995, SSB was at the 1960-1972 reference level, so the stock was considered re-built to pre-collapse levels.

The threshold was set on the basis of empirical/historical metrics, including managers' and stakeholders' satisfaction with the stock condition in the 1960s. The target was a somewhat arbitrary level (25%) above the 1995 value. Since the stock is managed based on the target, it is important to have sufficient board input as to the values which should be reflected in the target level so that it is no longer based on a somewhat arbitrary decision.

From 2003 to 2013, the F threshold was defined as F_{MSY}, but during the 2013 assessment, projections indicated that the population would stabilize below the SSB threshold if it was fished at F_{MSY}. Therefore, the definition of the F target and threshold were changed to align with the definition of the SSB target and threshold. The decision to maintain the SSB target and threshold definitions and change the F target and threshold was based on the FMP objectives around SSB and population structure as well as concerns about the reliability of F_{MSY} estimates, given the uncertainty in the stock-recruitment relationship used to derive it. During the 2019 benchmark, SPR-based reference points were explored, but the estimates of $F_{40\%SPR}$ and $F_{30\%SPR}$ from the single-stock model were lower than the empirical F values and resulted in an SSB target and threshold that were much higher than the 1995-based target and threshold.

Although SSB exceeded the target in the early 2000s for four years and was close to the target (i.e., the confidence intervals on the estimates of SSB included the target) for 11 years (Figure 1), some Board members have voiced concerns that the SSB reference points are too high and are biologically unattainable, especially during the current period of very low recruitment.

Request for Board Guidance

The SAS is planning to explore both empirical BRPs and model-based BRPs (e.g., SPR-based reference points), including spatial BRPs through the 2027 benchmark. The SAS has identified two major questions that would benefit from Board guidance as the assessment progresses.

1. How does the Board want to balance preserving SSB and allowing fishing?
2. What does the Board want from a spatial management framework?

The SAS is not asking the Board to select a specific BRP definition or come to consensus on these questions at this time, but understanding the range of opinions and the factors the Board considers important will help the SAS develop BRP options that best address different management objectives.

Balancing SSB and F

There is a trade-off between preserving SSB and allowing fishing, and determining the best balance between these two parameters requires management input. If the Board wanted to establish a lower SSB target and threshold – for example, setting the target to the 1995 estimate of SSB and the threshold to some lower percentage of that value – then the F target and F threshold values could increase, depending on the assumptions about future recruitment. Or the Board could set higher F target and threshold values based on a stable period in the fishery and calculate the SSB target and threshold values associated with those *F* rates in the long term, which would be lower than the current values.

A lower SSB would mean lower availability of larger fish. Even if the *F* target is increased, that may not translate into a higher harvest or yield, since that *F* rate is applied to a smaller population. In addition, lower availability of larger fish means lower encounter rates overall, particularly for the ocean region.

If the Board is interested in considering options for a set of BRPs with a higher *F* and lower SSB targets and thresholds, it would be helpful to receive input on things like:

- the preferred balance between SSB and *F*
- the relative importance of maximizing yield vs. maximizing catch rates or the availability of trophy size fish
- acceptable level of risk when it comes to preventing stock collapse
- alternative metrics for stock health such as total abundance or abundance of specific size or age classes instead of female SSB
- a preferred historical time-period for *F* reference points (i.e., when was the Board satisfied with fishery performance?)
- a preferred historical time-period for SSB reference points
- a lower limit on acceptable SSB levels, relative to 1995 levels or based on the preferred historical time-period

These items represent a range of possible management objectives and are not necessarily mutually exclusive of one another. The SAS could explore methods to evaluate tradeoffs between objectives and estimate optimal reference points to achieve multiple objectives. What is needed by the SAS is direction from the Board as to what is most valued from the fishery.

BRPs in a Spatial Management Framework

Currently, striped bass are assessed with a single set of BRPs for the entire stock-complex with region-specific management regimes to account for differences in availability of fish and other spatial dynamics. The SAS is exploring a new spatial, stock-specific model for this assessment and is seeking guidance on what the Board wants from a spatial management framework and how the Board would like to handle regions like Delaware Bay and the Hudson River.

Delaware Bay removals are part of the “ocean” fleet in the current single-stock model. The Delaware Bay stock was grouped with the Hudson River stock to form an “ocean” stock in the previous two-stock spatial model that did not pass peer review in 2019. If the Delaware Bay cannot be modeled as a separate region, due to data limitations, it could be grouped with either the Chesapeake Bay region/stock or with the “ocean” region again. Grouping Delaware Bay with the Chesapeake Bay would better align with recent research on the genetic similarity of fish from these areas and the frequent movement of both adult and juvenile fish between Bays through the C&D canal, but it would mean any stock- or region-specific BRPs would represent a joint Chesapeake Bay-Delaware Bay region/stock.

It would be helpful to receive input from the Board on their objectives for spatial management, such as:

- Is the Board interested in spatial BRPs – that is, having specific targets and thresholds by region to evaluate stock status against – or would the Board prefer to keep coastwide reference points and use spatial management regimes to attempt to achieve those targets?
- Would a Chesapeake/Delaware Bay region be acceptable to the Board, or would the Board prefer to keep Chesapeake Bay distinct from other regions?
- Is the Board interested in developing BRPs for the Hudson River as a distinct region if the data supported that, or would the Board prefer to keep the Hudson River with the "ocean" region?

The SAS notes that, similar to the current management framework, having coastwide or broader spatial BRPs would not prevent the use of finer scale regional management regimes.

The SAS noted that researchers at Virginia Tech have been working on a spatial management strategy evaluation for striped bass. The SAS will consider any available results from that project, as well as recent public comments on FMP objectives, that could inform potential biological reference point development and stakeholder priorities.

Timeline

If the Board is able to provide guidance to the SAS by the May 2026 Board Meeting, prior to the Assessment Workshop in August 2026, the SAS will be better able to develop options for BRPs that reflect the Board's management direction. The SAS intends to have the BRPs or BRP methodologies peer reviewed along with the assessment models through the 2027 Northeast (NRCC) Research Track, making them available for management consideration as soon as the assessment and review process is complete.

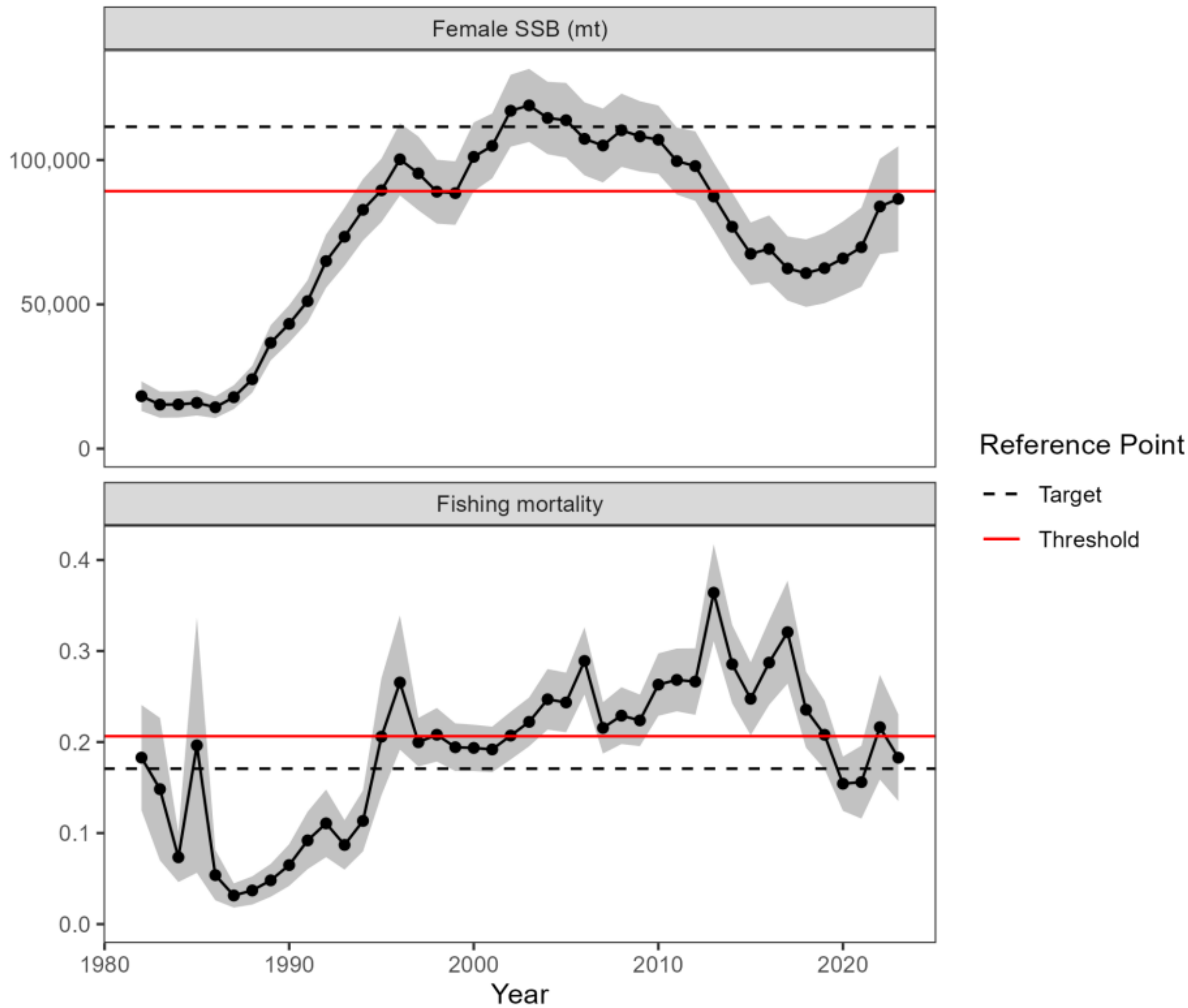

Figure 1. Female SSB (top) and total F estimates (bottom) plotted with their respective targets and thresholds. Shaded area indicates 95% confidence intervals of the estimates. Source: 2024 Stock Assessment Update.

Appendix 1: FMP Goal and Objectives in Amendment 7 Sections 2.3 and 2.4

The goal of Amendment 7 to the Interstate Fishery Management Plan for Atlantic Striped Bass is to perpetuate, through cooperative interstate fishery management, migratory stocks of striped bass; to allow commercial and recreational fisheries consistent with the long-term maintenance of a broad age structure, a self-sustaining spawning stock; and also to provide for the restoration and maintenance of their essential habitat.

In support of this goal, the following objectives are specified:

1. Manage striped bass fisheries under a control rule designed to maintain stock size at or above the target female spawning stock biomass level and a level of fishing mortality at or below the target exploitation rate.
2. Manage fishing mortality to maintain an age structure that provides adequate spawning potential to sustain long-term abundance of striped bass populations.
3. Provide a management plan that strives, to the extent practical, to maintain coastwide consistency of implemented measures, while allowing the states defined flexibility to implement alternative strategies that accomplish the objectives of the FMP.
4. Foster quality and economically-viable recreational, for-hire, and commercial fisheries.
5. Maximize cost effectiveness of current information gathering and prioritize state obligations in order to minimize costs of monitoring and management.
6. Adopt a long-term management regime that minimizes or eliminates the need to make annual changes or modifications to management measures.
7. Establish a fishing mortality target that will result in a net increase in the abundance (pounds) of age 15 and older striped bass in the population, relative to the 2000 estimate.

NOAA FISHERIES

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Charting A Course for Striped Bass: Science and Regulatory Innovation for Offshore Aquaculture

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

NOAA Technical Memorandum NMFS-F/OAQ-001
FEBRUARY 2026

Charting A Course for Striped Bass: Science and Regulatory Innovation for Offshore Aquaculture

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U.S. Department of Commerce
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1 Executive Summary

Striped bass (*Morone saxatilis*) is one of the most valued fish species along the Atlantic coast of the United States (U.S.), noted for its ecological, cultural, and economic importance. Recreational and commercial fisheries have long depended on this species, but harvest in federal waters of the Exclusive Economic Zone (EEZ) along the East Coast has been prohibited since 1990. While the moratorium was vital for rebuilding wild stocks, it also blocks the potential to develop striped bass aquaculture offshore, despite major advances in science, technology, and management that now make such development both feasible and promising. Balancing aquaculture development with protection of wild striped bass populations and the fisheries they support is essential for ensuring the resilience of this iconic species. Over the past three decades, substantial progress has been made in aquaculture biology, offshore engineering, disease management, and regulatory oversight. Controlled breeding, biosecurity protocols, site selection tools, and environmental monitoring now allow offshore aquaculture systems to reduce risks of escapement, disease transmission, and ecosystem impacts. At the same time, governance frameworks have evolved to better integrate aquaculture with other ocean uses and conservation objectives. These advances suggest that offshore production of pure-strain striped bass could be feasible under a carefully designed regulatory structure that distinguishes aquaculture from wild harvest and ensures accountability, traceability, and environmental safeguards.

The purpose of this discussion paper is to identify the legal, policy, and scientific constraints on the production of cultured pure-strain striped bass in federal waters and outline the economic and environmental topics raised by the Atlantic States Marine Fisheries Commission (ASMFC). At the 2024 Winter Meeting of the ASMFC, Danielle Blacklock, Director of the NOAA Fisheries Office of Aquaculture, led the Interstate Fisheries Management Program (ISFMP) Policy Board in a discussion on the future of aquaculture and the potential role of Atlantic Striped Bass in U.S. seafood production. The Board raised longstanding concerns, describing issues on escapement, ecosystem impacts, enforcement related to the existing moratorium in the EEZ and illegal harvest, competition with wild-caught markets, economic feasibility, and the challenges of managing aquaculture alongside other ocean uses.

Building on this exchange, this Technical Memorandum provides historical context, summarizes the Commission’s concerns, and identifies potential pathways forward. It examines the biological foundations, regulatory history, technological readiness, environmental considerations, market dynamics, and governance needs for striped bass aquaculture. The memo highlights how coordinated science, policy, and industry innovation could support sustainable offshore farming of this species in a way that complements wild stock conservation and contributes to U.S. seafood supply and coastal economies.

NOAA Fisheries, in coordination with ASMFC, could amend the relevant regulatory provisions to allow aquaculture as an explicit exception to the EEZ moratorium on the fishing, harvest, possession, and retention of striped bass. The sections that follow summarize the key regulatory and scientific issues and outline proposed next steps.

Summary of Key Regulatory and Science Issues

1.1 Enforcement Considerations

Fishery managers have expressed a need for strong, enforceable assurances that the development of an aquaculture market for pure-strain striped bass will not create incentives for illegal harvest or lead to negative impacts on wild stocks and the fisheries they support. The ASMFC (through its Law Enforcement Committee), state agencies, and NOAA Fisheries' Office of Law Enforcement (OLE) collaborate extensively on interjurisdictional fisheries enforcement. State precedents for labeling and tagging farmed product offer models for ensuring consumer confidence and preventing substitution of wild fish into aquaculture supply chains. Product differentiation and proper enforcement mitigate these challenges by providing better accountability on the water and enabling law enforcement to track a fish from its origin. Strategies could be developed for regulatory frameworks to ensure that aquaculture-raised striped bass are accurately labeled and traceable throughout the supply chain.

1.2 Economic Contributions

Market demand strongly supports the development of a domestic striped bass aquaculture sector. U.S. seafood consumption continues to outpace supply, with the majority of products imported. The development of a robust striped bass aquaculture industry has the potential to generate similar spillover benefits, particularly for coastal communities. Recent economic research suggests that striped bass aquaculture is most profitable in offshore net-pen systems, with breakeven prices comparable to those of commercially farmed red drum (*Sciaenops ocellatus*). Demand-side conditions are favorable, yet production cost challenges and regulatory inconsistencies, especially in states with gamefish designations, may be addressed. Interstate transport and sale of pure-strain farmed striped bass could present barriers for market development that will require synergies between state and federal regulations to avoid enforcement challenges and ensure transparency. A complete understanding of the impacts that a farmed striped bass industry will have on existing imports and wild-caught alternatives will require further analysis on potential production volumes and targeted markets. However, introducing farmed striped bass into non-traditional retail and food-service channels could expand consumer exposure to the species, increasing overall demand for both farmed and wild-caught products.

1.3 Managing Ocean User Conflicts

The identification of suitable areas for aquaculture development, coupled with careful site selection and management, is fundamental to ensuring the long-term success and sustainability of offshore aquaculture. In the U.S., where competition for nearshore space is intense, expansion into the EEZ provides opportunities for larger sites with fewer nearshore user conflicts and greater social acceptance among commercial and recreational fishing communities. As part of NOAA's National Ocean Service, the National Centers for Coastal Ocean Science (NCCOS) plays a central role by developing science-based inclusive decision tools to inform precision siting for aquaculture and other sectors of the ocean economy.

1.4 Environmental Concerns

In the context of striped bass aquaculture, potential environmental effects can be grouped into several categories: (1) water quality, (2) benthic and sedimentary processes, (3) interactions with marine life and habitats, (4) cumulative and landscape-scale effects, and (5) mitigation strategies, including novel approaches such as integrated multi-trophic aquaculture (IMTA). Modern production technologies, standardized operating procedures, and best management practices reduce risks of degradation to water quality, benthic habitats, and marine life. All of these issues are managed by the Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE), in coordination with NOAA through consultations under existing federal law. EPA generally applies water quality models to characterize interactions between effluent and the receiving environment. Further, the NOAA NCCOS has ongoing collaborations with the EPA to provide depositional and water quality modeling products and science advice to support agency permitting and associated environmental reviews and consultations for finfish aquaculture projects proposed for federal waters.

1.5 Escapement and Genetic Concerns

Escape events are among the most widely recognized ecological risks associated with marine finfish aquaculture. Recent advances in genomic technologies now enable high-resolution monitoring of striped bass population structure. These tools have been applied to striped bass, where they have clarified stock composition and informed management across the species' range. Decades of hatchery experience, the success of the hybrid striped bass industry, and advances in selective breeding and fish health management have established a strong technical foundation for farming pure-strain striped bass. Offshore net-pen systems, which have been successfully demonstrated internationally, provide suitable growing conditions while reducing many environmental pressures on coastal ecosystems. Emerging tools in genetics, automation, and biosecurity further strengthen the case for expansion into offshore environments. Additionally, NOAA and partners have developed models to evaluate genetic and ecological risks associated with aquaculture escape events. The intent of these tools are to support risk-based assessments of offshore aquaculture operations and to inform the development of management and engineering strategies that reduce the potential adverse effects of escape events on wild populations.

1.6 Disease

Equally important to environmental performance is maintenance of aquatic animal health. Disease represents one of the most significant operational risks in striped bass aquaculture and requires continuous, proactive management. Striped bass are susceptible to a range of pathogens and parasites, with recent research improving understanding of disease dynamics in both wild and farmed populations. Even well-managed farms may periodically require therapeutic intervention to control outbreaks, limit mortality, and protect animal welfare.

The Food and Drug Administration (FDA) provides centralized oversight of aquaculture therapeutants, ensuring that their use is scientifically justified and environmentally protective. At present, no antibiotics are approved for striped bass or most marine finfish species, reinforcing the importance of preventative health strategies. For striped bass aquaculture, disease prevention is therefore the primary line of defense, relying on vaccination where available, rigorous biosecurity protocols, water quality management, and structured health-monitoring programs to enable early detection and response. By integrating science-based biosecurity, judicious therapeutic use, and informed site selection, offshore aquaculture operations can reduce pathogen pressure, safeguard stock health, and minimize both economic losses and environmental risks. Comprehensive health-management frameworks that emphasize prevention, surveillance, and targeted intervention are thus essential for the sustainable development of offshore striped bass aquaculture.

1.7 Summary of Next Steps

Production of striped bass is already occurring abroad, with farmed product entering U.S. markets and competing with domestic seafood. The commercial appeal of cultivating pure-strain striped bass is therefore grounded in the existence of an established and recognized market opportunity. While demand in many regions remains seasonal, a key opportunity lies in expanding striped bass into a stable, year-round product that can complement and relieve pressure on wild fisheries while increasing total supply.

Realizing this opportunity will require coordinated progress across science, industry, and governance. Priority research needs include continued broodstock and selective-breeding programs, deployment of genetic safeguards, offshore production trials, fish health management, and development of sustainable feed strategies. At the same time, policy modernization will be essential, including reforms to regulatory frameworks in the EEZ, strengthened interagency coordination of federal permitting, expansion of marine spatial planning tools, and supporting workforce development and stakeholder engagement.

Striped bass aquaculture represents a strategic opportunity to expand domestic seafood production, strengthen coastal economies, and reinforce conservation of wild stocks. When science, governance, and markets are aligned, offshore farming of this species can move from technical feasibility to commercial reality, helping the United States advance national goals for seafood security, economic growth, and resilient coastal communities while coexisting with and supporting the long-term sustainability of commercial and recreational fisheries.

2 Overview

2.1 Biology and Distribution of Striped Bass

The striped bass (*Morone saxatilis*) is one of the most important sport fish and commercial fisheries along the Atlantic coast of North America. It is an all-time favorite for anglers. It belongs to the family Moronidae, which comprises both freshwater and anadromous taxa. In North America, the genus *Morone* is represented by four species: striped bass, white perch (*M. americana*), white bass (*M. chrysops*), and yellow bass (*M. mississippiensis*). Striped bass is the largest and longest-lived member of the group, with individuals documented to live more than 30 years and reach weights exceeding 100 pounds, although fish over 75 pounds are rare (Bowers, 1900; Smith, 1907).

Striped bass populations display regionally distinct migratory behaviors along the U.S. Atlantic coast. North of Cape Hatteras, North Carolina, adults are anadromous, ascending freshwater or brackish rivers in spring to spawn before returning to the coastal ocean (Rulifson & Dadswell, 1995; Morris et al. 2003). Major spawning grounds on the U.S. Atlantic coast includes the Chesapeake Bay (Virginia and Maryland), the Hudson River, and the Delaware River, although smaller spawning populations exist in several other bays and rivers as well, including the Albemarle Sound-Roanoke River (North Carolina) and the Kennebec River (Maine). Larval and juvenile recruitment occurs in estuaries, where young fish typically reside for one to two years before dispersing offshore. Seasonal migrations extend northward to Nova Scotia during summer and southward to Virginia and North Carolina during winter, where spawning occurs in spring (Greene et al., 2009). In the Chesapeake Bay, migration patterns differ by age and sex, reflecting ontogenetic variation in maturity (Kohlenstein, 1981). The Hudson River stock shows similar dynamics, with both resident and ocean-migratory contingents (McLaren et al., 1981). In the Bay of Fundy, adults migrate downstream after spawning, while juveniles either remain in rivers or disperse along the coast (Rulifson & Dadswell, 1995).

In contrast, striped bass populations south of Cape Hatteras, extending to the St. John's River in northern Florida and into the Gulf of America, are primarily riverine and potamodromous, lacking consistent oceanic migrations (Setzler-Hamilton 1980; McIlwain, 1980). Historically, the Gulf range extended from the Suwannee River, Florida, westward to rivers of the Lake Pontchartrain basin in Louisiana (Pearson, 1938; Merriman, 1941; Barkuloo, 1961, 1967; GSMFC, 2006). Today, the only remnant population persists in the Apalachicola–Chattahoochee–Flint (ACF) river system spanning northwest Florida, Georgia, and Alabama. No records exist of Gulf specimens captured in open ocean habitats, although telemetry studies indicate that ACF striped bass occasionally enter the Gulf and migrate along the coastline (McIlwain, 1980; Fruge, 2006; Long et al., 2013).

Commercial landings of striped bass in the Gulf ended in the 1960s, however, coastal stock enhancement and contributions from reservoir escapement have created recreational fisheries in some areas. Although not native to Texas, striped bass are occasionally reported in estuaries and rivers as escapees from stocked reservoirs. These reports, documented by Texas Parks and Wildlife through gill net and creel surveys, occur mostly in Sabine, Galveston, and Matagorda Bays (Texas Parks and Wildlife, n.d.).

Beyond their native range along the Atlantic and Gulf coasts, striped bass were successfully introduced to the Pacific coast in the late nineteenth century (ca. 1879). Within a decade, they supported vibrant recreational and commercial fisheries from southern California to the Columbia River, Oregon (Nichols, 1966). An introduction to Kauai, Hawaii, in 1920 was unsuccessful, as the transplanted California fish failed to survive (Randall, 1987).

2.2 Striped Bass Fisheries Management

Management of Atlantic striped bass is coordinated through the Atlantic States Marine Fisheries Commission (ASMFC), which works in partnership with state and federal agencies to assess population status and implement regulatory measures across the species' range (ASMFC, 2022a). The management unit includes all coastal migratory striped bass stocks from Maine through North Carolina. ASMFC has primary authority for striped bass management within state waters, while NOAA Fisheries (NMFS) has management authority in federal waters. Federal waters under the Magnuson-Stevens Fishery Conservation and Management Act are defined as the Exclusive Economic Zone (EEZ), which extends from the seaward boundary of state waters out to 200 nautical miles offshore.

Stock assessments have consistently documented the species' natural population variability and periods of overexploitation. Severe overfishing during the late 1970s and early 1980s led to a coastwide collapse, prompting the adoption of a moratorium and strict harvest controls in the mid-1980s (Richards & Rago, 1999; ASMFC, 1990). These actions facilitated recovery, and by the mid-1990s the stock was declared rebuilt (ASMFC, 1997).

Since recovery, striped bass have remained among the most intensively managed fisheries along the Atlantic coast. Regulatory tools have included size and slot limits, seasonal closures, quotas, and gear restrictions, with measures adjusted adaptively in response to new scientific assessments (ASMFC, 2022a). Despite these efforts, the 2018 benchmark stock assessment concluded that the stock was overfished and that overfishing was occurring (NEFSC, 2019). In response, the ASMFC enacted harvest reductions in 2020 to curb fishing mortality and initiate rebuilding (ASMFC, 2020).

Total removals in 2021, including commercial harvest, commercial discards, and recreational harvest and release mortality, were estimated at 5.1 million fish, similar to

2020 levels (ASMFC, 2022b). Recreational removals accounted for approximately 86% of this total, reflecting the dominance of the recreational sector. The commercial fishery, managed under state-specific quotas, has maintained relatively stable landings since 2004, while the recreational fishery is managed through bag limits, size restrictions, and seasonal closures in some jurisdictions (ASMFC, 2022b).

Broader management reforms were codified in Amendment 7 to the Interstate Fishery Management Plan (FMP), approved in 2022. Amendment 7 introduced more precautionary recruitment triggers, clarified conservation equivalency standards, enhanced measures to reduce recreational release mortality, and reaffirmed the requirement to rebuild the stock by 2029 (ASMFC, 2022a). Addendum I, approved in May 2023, further allowed for voluntary transfers of commercial quota in the ocean region, contingent on stock status (ASMFC, 2023).

Following the 2024 Stock Assessment Update, which determined the stock remained overfished though not experiencing overfishing, the ASMFC initiated Draft Addendum III in December 2024. This addendum, currently under development, is intended to provide new recreational and commercial measures for implementation in 2026 to ensure rebuilding by 2029 (ASMFC, 2024a). The Board is expected to finalize the addendum following public comment in late 2025, with implementation planned for early 2026 (ASMFC, 2025).

This evolving management framework illustrates the dynamic and adaptive nature of striped bass governance. The challenge remains to balance sustainable harvest opportunities with long-term conservation goals for a species that holds ecological, cultural, and economic importance along the U.S. Atlantic seaboard.

2.3 Legal History of Striped Bass Management

2.3.1 Atlantic States Marine Fisheries Commission and the Striped Bass Conservation Act of 1984

The ASMFC, established in 1942 through an interstate compact, was created to coordinate management of interjurisdictional fisheries along the Atlantic seaboard, including striped bass (ASMFC, 2022a). The Commission is composed of representatives from 15 states, the District of Columbia, the Potomac River Fisheries Commission, and federal agencies including NMFS and the USFWS. Collectively, these entities hold primary management authority and adopt regulations consistent with the Interstate FMP (ASMFC, 1990).

By the mid-1970s, striped bass populations had declined to historic lows. In 1979, Congress directed NMFS and USFWS to conduct a comprehensive study of the causes of this decline, examining environmental change, predation, competition, and fishing mortality (U.S. Congress, 1979)[1]. In response, ASMFC adopted the first Atlantic Striped Bass FMP in 1981 (ASMFC, 1981). To strengthen implementation, Congress enacted the Atlantic Striped Bass Conservation Act of 1984 (Pub. L. 98-613), which required states to implement ASMFC's striped bass regulations and established a federal enforcement backstop (U.S. Congress, 1984).

The Striped Bass Act empowered ASMFC to notify the Secretaries of Commerce and the Interior if a state failed to comply with the interstate FMP. Upon such notification, the Secretaries could jointly impose a moratorium on striped bass fishing in that state's waters (ASMFC, 1990). This enforcement authority, unique among the interstate marine fishery commissions, has proven effective in ensuring state compliance with ASMFC management actions (NMFS, 2020a).[2]

Congress strengthened the Striped Bass Act through amendments in 1988, authorizing the Secretary of Commerce acting through NMFS to regulate striped bass within the federal waters of the EEZ (U.S. Congress, 1988). Using this authority, the Secretary may develop offshore regulations, but any regulations are required to be consistent with the Magnuson–Stevens Fishery Conservation and Management Act (16 U.S.C. §1851 et seq.) and compatible with the ASMFC striped bass FMP. The 1988 and subsequent amendments also authorized NMFS and USFWS to carry out annual studies and population assessments of striped bass. The amendments also mandated biennial stock assessment and management reports from the Secretaries to ASMFC and Congress, expanded requirements for public participation in preparation of management plans, and provided dedicated annual funding for striped bass research and assessment (NMFS & USFWS, 1990).

In November 1990, NMFS implemented a moratorium on the harvest and possession of striped bass in the EEZ under the Striped Bass Act (55 Fed. Reg. 40184, 1990). This action was designed to reinforce ASMFC's rebuilding program, provide additional protection for striped bass thereby reducing fishing mortality, and ensure the effectiveness of state regulations. The moratorium remains in effect today (NMFS, 2020b). Amendment 4 to the Striped Bass Plan, adopted in 1989, allowed for limited increases in harvest. Amendment 4 relaxed the measures, and as states reopened fisheries, NMFS closed federal waters of the EEZ to ensure effectiveness of state

[1] "Reauthorization of the Atlantic Striped Bass Conservation Act", U.S. House of Representatives Report, 106-698.

[2] The Atlantic Coastal Fishery Cooperative Management Act (1993) generally mirrors the Striped Bass Act in giving the Secretary of Commerce the authority to impose moratoria in State waters, albeit for other Atlantic fisheries managed under ASMFC-approved fishery management plans.1988 Amendments and the Federal Moratorium.

measures (ASMFC, 1989). Although reopening of the EEZ has been periodically evaluated, including under Amendment 6 in 2003, both managers and stakeholders have consistently supported its continued closure, citing the predominance of mature, spawning-capable females offshore and the risk of increased fishing mortality if federal waters of the EEZ were reopened (ASMFC, 2003).

2.3.2 Executive Order 13449

In 2007, Executive Order 13449 affirmed federal policy to conserve striped bass and red drum, while clarifying that aquaculture production of these species was not restricted (Bush, 2007). The order declared that it is "the policy of the U.S. to conserve striped bass and red drum for the recreational, economic, and environmental benefit of the present and future generations of Americans" (Bush, 2007). The E.O. notes, importantly, that the order must be implemented in a manner consistent with applicable law. The E.O. essentially directed NOAA to promulgate regulations that restrict the sale of EEZ striped bass if it could do so consistent with the law. NOAA already had regulations on the books (i.e., closure of federal waters of the EEZ) that achieved the policies of the E.O.

2.3.3 Federal Jurisdiction and Regulations (Current Legal Constraints)

Management authority for Atlantic striped bass within state waters resides with the coastal states, coordinated through the ASMFC's Striped Bass FMP (ASMFC, 2022a). Federal authority in the EEZ is derived from the Magnuson Stevens Act, which predates the Atlantic Striped Bass Conservation Act and which requires NMFS to ensure that any regulations implemented for striped bass in the EEZ: (1) are consistent with the national standards under Section 301 of the MSA (16 U.S.C. §1851 et seq.); (2) are compatible with the ASMFC Striped Bass FMP and any federal moratoria authorized by statute; (3) ensure the effectiveness of state regulations within coastal waters; and (4) achieve long-term conservation and management objectives for the Atlantic striped bass resource (U.S. Congress, 1984; NMFS, 2020). In other words, NMFS or the Councils could develop a federal FMP for striped bass under the MSA if it so chooses. Alternatively, NMFS may implement regulations for striped bass under the ACA instead, which is the scheme we have today.

Federal regulations in the EEZ can be developed to complement ASMFC's Striped Bass FMP. Currently, federal regulations prohibit fishing for, harvesting, possessing, or retaining Atlantic striped bass in the EEZ (50 C.F.R. §697.7). Limited exceptions exist in Block Island Sound, where possession is permitted during continuous transit provided no fishing occurs in EEZ waters (NMFS, 1990).

In 1995, following ASMFC's declaration that striped bass stocks were rebuilt, NMFS considered lifting the EEZ ban or revising it to align with state size limits, as recommended by the Commission (ASMFC, 1997). After reviewing public comment and updated mortality estimates indicating fishing pressure was higher than previously believed, NMFS elected to maintain the EEZ moratorium (NMFS, 1995). Further, Amendment 6 included a recommendation to NMFS to consider reopening the EEZ (ASMFC, 2003). Following public review and consideration of updated stock assessments, NMFS concluded in 2006 that reopening the EEZ posed unacceptable risks because effort levels and associated fishing mortality could not be reliably controlled (NMFS, 2006).

Currently, implementing regulations (50 CFR 697.7(b)) state that it is unlawful for any person to do any of the following:

(1) Fish for Atlantic striped bass in the EEZ.

(2) Harvest any Atlantic striped bass from the EEZ.

(3) Possess any Atlantic striped bass in or from the EEZ, except in the following area: The EEZ within Block Island Sound, north of a line connecting Montauk Light, Montauk Point, NY, and Block Island Southeast Light, Block Island, RI; and west of a line connecting Point Judith Light, Point Judith, RI, and Block Island Southeast Light, Block Island, RI. Within this area, possession of Atlantic striped bass is permitted, provided no fishing takes place from the vessel while in the EEZ and the vessel is in continuous transit.

(4) Retain any Atlantic striped bass taken in or from the EEZ.

2.4 Solutions and Recommendations

A regulatory pathway that allows for offshore aquaculture of striped bass in the U.S. EEZ could be achieved without undermining the conservation achievements of the Striped Bass Conservation Act or ASMFC's management program. The following solutions are recommended:

2.4.1 Regulatory Carve-Out for Aquaculture

NMFS could lead an effort to amend existing regulations to explicitly recognize aquaculture operations as an exception to the EEZ moratorium. Permitting criteria may be established specific to aquaculture while reaffirming the prohibition on wild harvest in the EEZ. The language would have to be specific about who, when, and where the exemption would apply. This amendment would be subject to public comment and could include commentary by the ASMFC. While straightforward textually, NMFS intent is to work with the ASMFC to address any possible concerns before such action is considered.

2.4.2 Enforcement and Monitoring Framework

Federal and state enforcement agencies may adopt a robust compliance and monitoring program for aquaculture operations. This may include reporting requirements, periodic inspections, and integration of vessel monitoring systems or remote electronic monitoring to ensure no illegal harvest of wild striped bass occurs under the guise of aquaculture.

2.4.3 Traceability and Supply Chain Integrity

A comprehensive traceability system ("farm-to-market") is essential to differentiate cultured striped bass from wild-caught products. Tools could include genetic certification, tagging, or electronic product tracking. Such measures would prevent substitution of illegally harvested wild fish into aquaculture supply chains, thereby preserving confidence among regulators, markets, and consumers. Importantly, this approach would align with existing wild striped bass tagging programs used by coastal states, creating a seamless framework for distinguishing wild and farmed fish in commerce.

2.4.4 Alignment with Fisheries Management Measures

Complimentary aquaculture regulations could be developed by the States in consideration of existing striped bass fisheries management tools such as bag limits, size limits, and possession limits. While these limits may not apply directly to aquaculture, aligning aquaculture rules with conservation objectives will minimize regulatory conflicts and reinforce stock protection.

2.4.5 Certification of Pure-Strain Cultured Striped Bass

To ensure that aquaculture production supports conservation, cultured fish could be certified as pure-strain and non-interbreeding with wild stocks. Hatchery protocols, broodstock management, and genetic testing would safeguard against introgression and maintain the integrity of wild striped bass populations. Non-interbreeding status can be achieved through strict physical containment measures, siting farms away from migratory stocks, or by applying genetic control approaches such as triploidy, sterility induction, or technologies to prevent successful interbreeding with wild fish.

2.4.6 Preventing Market Leakage of Wild Harvest

Clear rules, coupled with enforcement and traceability, must ensure that wild-caught striped bass do not enter markets under the label of cultured product. This will protect both the conservation gains achieved under ASMFC management and the credibility of aquaculture enterprises. Such safeguards are not new; they already exist within the current hybrid striped bass and pond-farmed striped bass industries, where farmed product is clearly distinguished from wild harvest through tagging, documentation, and distribution controls. Building on this established framework, similar approaches can be extended to offshore aquaculture operations to provide regulators, markets, and consumers with confidence that aquaculture production remains separate from wild harvest.

3 Striped Bass Aquaculture in the EEZ: Jurisdiction, Enforcement, and ASMFC's Potential Role

The governance landscape for striped bass in federal waters remains shaped by moratoria and ASMFC oversight, yet opportunities exist to adapt these frameworks for aquaculture without undermining wild stock protections. Traceability systems, tagging protocols, and strong enforcement provisions can close loopholes that otherwise risk illegal harvest. With proactive engagement, ASMFC and federal agencies can ensure that aquaculture complements conservation rather than conflicts with it.

3.1 Jurisdictional Context

As outlined in Section 2.3, harvest within the U.S. East Coast EEZ is prohibited. This section explores how the ASMFC could consider adapting existing authorities for oversight of striped bass aquaculture. These restrictions do not apply in the Gulf of America, where applications are actively being explored to farm Atlantic striped bass, not hybrid varieties, and commercial activity is already occurring, for the purpose of human consumption. Pond-based farms are operating in North Carolina, South Carolina, and Texas. North Carolina and Ohio are pursuing commercial-scale recirculating aquaculture following successful research trials. To have a meaningful role in the development of this industry, the ASMFC could consider using existing authority to establish monitoring and enforcement programs for striped bass aquaculture as the market expands and interest grows for production in the Atlantic.

Permitting for most aquaculture operations in the U.S. EEZ currently falls under the authority of federal agencies, specifically the Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (ACE). Under the Magnuson-Stevens Act, the Regional Fishery Management Councils (RFMC) are consulted by NMFS in relation to impacts to Essential Fish Habitat (EFH) regarding the regulatory actions taken by either the EPA or the ACE. The ASMFC has representation on some regional fisheries management councils, but does not currently have a direct regulatory or enforcement role in EEZ aquaculture.

To clearly outline the current situation: permitting within the EEZ primarily falls under the jurisdiction of the EPA and the ACE. The RFMCs are typically not involved beyond Essential Fish Habitat (EFH) consultations, or to the extent a Council has taken actions on policies concerning aquaculture.

A complicating exception to the general rule above is that the management of Atlantic striped bass in state waters is primarily the responsibility of the coastal states, and is promulgated through the ASMFC's Striped Bass FMP. The management unit includes all coastal migratory striped bass stocks on the East Coast of the U.S., excluding the EEZ, which is managed separately by NMFS. Under the Atlantic Striped Bass Act, Section 5158 requires NMFS to ensure that any regulations implemented in the EEZ for striped bass:

1) Are consistent with the national standards in Section 301 of the MSA (16 U.S.C. 1801 et seq.).
2) Are compatible with the Striped Bass FMP and each federal moratorium in effect, as authorized by statute.
3) Ensure the effectiveness of State regulations within the coastal waters of a state.
4) Achieve long term conservation and management goals for the Atlantic striped bass resource. Federal regulations in the EEZ can be developed to complement ASMFC's Striped Bass FMP.

In November 1990, NMFS implemented a moratorium on the harvest and possession of striped bass in the EEZ under the Striped Bass Act to support the ASMFC Striped Bass Plan, provide additional protection for striped bass, and ensure the effectiveness of state regulations. This moratorium remains in effect today and current federal regulations ban the fishing, harvesting, possession and retention of Atlantic striped bass in the EEZ. As interest grows in the commercial culture of pure-strain striped bass in federal waters both in the Gulf of America and along the Atlantic, it is essential to recognize the regulatory gap that exists and the opportunity for ASMFC to step into a more proactive and protective role.

If the ASMFC wishes to have a meaningful role in this process, it could implement enforcement provisions specific to striped bass aquaculture, an authority that it currently possesses. It is also important to note that the ASMFC may be compelled to act regardless, given the potential expansion of pure-strain striped bass aquaculture in the Gulf of America and the potential of that product entering markets along the Atlantic.

This represents a timely opportunity for the ASMFC to actively engage with its stakeholders and ensure its voice is heard in shaping policy.

3.2 Scenarios for ASMFC Involvement

The expansion of pure-strain striped bass aquaculture presents both economic opportunity and ecological risk. The ASMFC is uniquely positioned to provide oversight of this industry, in conjunction with their protection of the wild striped bass stock. While it does not control permitting in the EEZ, the Commission establishes fishery management provisions and compliance standards that apply to its member jurisdictions, and thus influence the actions taken by Federal agencies working in the EEZ. If the ASMFC wishes to ensure that aquaculture development walks in parallel with decades of conservation work, it can consider exercising its authority to define and enforce compliance expectations related to striped bass aquaculture. The emergence of pure-strain production in regions like the Gulf of America underscores the urgency of this engagement.

Core Enforcement and Compliance Issues

Ultimately, fishery managers need strong, enforceable assurances that the development of an aquaculture market for pure-strain striped bass will not create incentives for illegal harvest, not undermine the commercial fishery or cause negative impacts on wild stocks. The primary enforcement concern appears to be illegal harvest, direct illegal sales of striped bass to consumers and restaurants. Strategies such as product differentiation and proper enforcement mitigate these challenges by improving accountability on the water and enabling law enforcement to track fish back to their origin. Effective regulation may include:

1. **Traceability and Product Differentiation**

Consistent labeling protocols across the supply chain, from production through market, are critical to preventing product misrepresentation. Effective approaches include physical identifiers, documentation procedures, and standardized processing requirements. Regulatory frameworks vary by jurisdiction, with some states tagging fish at the point of landing and others at the point of sale. The ASMFC has considered mandating dockside landing tags for all states, citing concerns that point-of-sale systems create greater opportunities for illegal harvest. A uniform dockside landing requirement could strengthen enforcement by reducing the risk of unrecorded landings, particularly in states with individual quotas where incentives for illegal sales are high. By ensuring traceability from the time fish are landed, tagging provides enforcement agencies with a critical tool to safeguard quota integrity and deter unlawful market activity.

Harvest of aquaculture striped bass from large offshore farms presents unique challenges for product tagging. Unlike small-scale operations, tagging at the point of capture, during loading to a well boat, or aboard a harvest vessel is impractical when tens of thousands of fish may be collected in a single event. Although gill- or tail-tagging systems can process up to approximately 200 fish per minute, they require individual handling, may adversely affect product quality, and can raise animal welfare concerns.

Dockside tagging reduces the risk of illegal mislabeling between aquaculture and wild-caught fish and is generally supported by enforcement agencies as a means of enhancing oversight, reducing opportunities for unlawful practices, and strengthening accountability across the seafood supply chain. Implementation considerations include enforcement logistics, operational safety, and consistency across fisheries with differing management structures. In particular, fisheries operating under individual quota systems are especially vulnerable to quota evasion, making rigorous dockside tagging a critical tool for compliance and traceability.

2. Monitoring and Market Controls

Reporting and tracking mechanisms must be adopted to monitor volumes of production, sales, and distribution of cultured striped bass. Rules concerning possession limits, vessel traffic, and size regulations may be considered, where appropriate, to ensure that aquaculture harvests are not masking illegal wild harvests.

3. Enforcement and Penalties

Penalty structures can deter violations, including fraudulent substitution between wild-caught and aquaculture products. Penalties should be calibrated to serve as effective deterrents and implemented through a clearly articulated enforcement framework that coordinates federal, state, and interstate authorities. Enforcement records show persistent convictions for the illegal possession or sale of fish by recreational fishers, underscoring the need for robust accountability measures (ASMFC, 2025). While the direct risk of recreational fish being misrepresented as aquaculture products may be relatively low, traceability systems and tagging requirements strengthen oversight and help address illicit market activity. There may also be value in exploring tagging protocols for recreational harvest, which could support traceability efforts and help deter unauthorized sales. In addition, consideration could be given to consistent size restrictions across recreational and commercial sectors.

4. Enforcement Burden and Legal Authorizations

The ASMFC and NOAA (specifically NMFS Office of Law Enforcement, OLE) collaborate extensively on fisheries enforcement. Their partnership blends federal oversight with regional/state-level enforcement, sharing burdens via multi-agency agreements and funding mechanisms tied to the Magnuson-Stevens Act and the Atlantic Coastal Fisheries Cooperative Management Act.

Under the Atlantic Coastal Fisheries Cooperative Management Act, NOAA provides funding to the states, in part, to support law enforcement capacity, including for Joint Enforcement Agreements (JEAs). NOAA's OLE maintains formal agreements with a wide list of states (e.g., MD, MA, FL, GA, etc.) to ensure nationwide coverage. ASMFC's Law Enforcement Committee (LEC) includes representatives from each member state plus NOAA, U.S. Coast Guard (USCG), and U.S. Fish and Wildlife Service (USFWS). Its tasks include reviewing enforcement plans, coordinating cross-jurisdictional efforts, and advising on regulation enforceability.

5. Law Enforcement Considerations

When reviewing investigation and criminal provisions, the following may be considered by the Law Enforcement Committee of the Atlantic States Marine Fisheries Commission:

- Consider a uniform regional traceability system for all seafood products harvested or produced for commercial sale, clearly distinguishing aquaculture from wild-caught sources.
- Standardize labels by year, type (aquaculture vs. wild-caught), color, and inscriptions for easy identification and traceability.
- Issue time-limited tags or labels (valid for a single calendar or fishing year) to ensure currency and prevent reuse or fraud.
- Include essential information on each tag, such as year, state or facility of origin, source type (aquaculture/wild), size limits (if applicable), and a unique identifier.
- Use tamper-evident and traceable tags that cannot be transferred between fish or altered without detection.
- Consider immediate tagging at the point of harvest or harvest-equivalent (e.g., at aquaculture facility dispatch or wild harvest landing).
- Require aquaculture operations to report production volumes and verify tag use based on certified harvest quantities.
- Enforce annual or seasonal return of all unused tags or labels, and prohibit federal permit renewal for non-compliance.
- Integrate tag tracking into dealer reports or electronic trip tickets, including identification of whether the product is farmed or wild-caught.
- Apply meaningful penalties, including license suspension or revocation, for mislabeling, misuse of tags, or other violations at the state or federal level.
- Ensure real-time, centralized access to tag issuance and use data for authorized enforcement personnel to facilitate on-the-ground inspections and audits.

Existing Models and Precedents

States have already taken action to regulate striped bass aquaculture in ways that promote transparency and accountability. Some states require a tagging program for commercially harvested striped bass. It is unlawful to sell or purchase commercially caught striped bass without a commercial tag. The intent is to prevent the sale or purchase of untagged striped bass in a state or jurisdiction where there is currently no commercial fishery program. Notably, Virginia had previously administered a detailed regulatory framework for culture of pure-strain striped bass. These efforts provide a valuable foundation for broader regional and federal collaboration.

A strong regulatory framework with effective enforcement and monitoring is essential to maintaining the integrity of the seafood supply chain. Clear differentiation between aquaculture-raised striped bass and wild-caught striped bass is critical to ensure consumer transparency and market fairness. To address these concerns, several Atlantic coastal states, including Massachusetts, Maine, New Hampshire, and Virginia (prior to repeal) have taken steps to regulate the labeling, handling, and marketing of aquaculture-raised hybrid striped bass. These state efforts promote transparency and accountability and provide a valuable foundation for broader regional and federal collaboration.

1. Maine and New Hampshire

Maine and New Hampshire have adopted similar regulatory frameworks to ensure that aquaculture-raised striped bass are accurately labeled and traceable throughout the supply chain. This alignment reflects a broader regional effort to promote consistency in labeling and enforcement standards across jurisdictions.

The sale of wild striped bass caught for personal use or by commercial fisheries in other states or jurisdictions is prohibited in the State of Maine. Striped bass sold in Maine markets and restaurants is therefore a cultured product and is primarily hybrid striped bass. In Maine, regulations under 13 DMR § 188-42-02 require containers of aquaculture-raised hybrid striped bass, whether whole or filleted, to be labeled as “Hybrid Striped Bass” and include the state of origin; the names, permit numbers, and addresses of shipping and receiving dealers; the date of shipment; and the net weight of the container. Fillets must retain their skin, and like in Massachusetts, the use of the term “striped bass” for marketing hybrid products is prohibited. Possession exemptions already exist in Maine; chiefly the exemption applies to aquaculture products that do not meet the legal size or season requirements for wild-caught marine organisms of the same species.

New Hampshire enforces nearly identical standards through N.H Admin. Code § Fis 807.14. The regulation cites the potential for hybrid striped bass markets to be used as outlets for undersized striped bass and emphasizes the importance of regulatory consistency across states. Like Maine and Massachusetts, New Hampshire mandates clear product labeling, skin-on requirements for fillets, and restricts the use of the term “striped bass” in marketing or sales for hybrid striped bass.

2. Virginia

Regulations for the commercial striped bass fishery in Virginia include minimum sizes, possession limits, gear restrictions, seasons, and quotas. Virginia previously administered a detailed regulatory framework for the lawful propagation, sale, and transport of aquaculture-raised striped bass and hybrid striped bass under 4VAC20-252.

Under this system, anyone seeking to operate an aquaculture facility to raise striped bass or hybrid striped bass in Virginia was required to obtain a permit from the Virginia Marine Resources Commission. The permit authorized and defined the limits for the purchase, possession, sale, transfer, and transport of striped bass and hybrid striped bass for aquaculture purposes. Permits were issued annually on a non-transferable basis, and were automatically renewed by the Commission provided the facility had been adequately maintained and remained structurally unchanged and in compliance with all permit conditions.

Permitted facilities were only allowed to acquire eggs, fry, and fingerlings from state-permitted, disease-free dealers. Each acquisition required documentation with receipts detailing the species, quantity, date, source, and destination. Harvesting striped bass from Virginia's tidal waters for the purpose of artificial spawning in aquaculture facilities remained subject to applicable state fishing laws, such as size limits and seasonal closures. Under the previous section, 4VAC20-252-210(C), striped bass or hybrid striped bass produced at a permitted aquaculture facility in another state may be imported for sale in Virginia, provided that all standards outlined in the regulation are met. Section 252-210 was repealed in April 2024 as an attempt to streamline regulations by the Commonwealth.

All market-ready fish had to be labeled with the name, address, and permit number of the producing facility. In addition, all sales and resales needed to be accompanied by a receipt documenting the species, seller, purchaser, date of sale, and production facility information. Copies of receipts were required to be kept by both parties and made available to enforcement authorities upon request. Permitted facilities were also required to maintain a chronological file of transactions for inspection by the Department of Wildlife Resources or agents of the Marine Resources Commission.

3. Massachusetts

Though Massachusetts does not have a legal framework addressing the aquaculture of pure strain striped bass, it does have an analogous legal framework for product differentiation of aquaculture vs wild caught product. Massachusetts enforces robust standards under 322 CMR 14.00 for the sale, transport, and distribution of aquaculture-raised finfish, with specific provisions for aquaculture-raised hybrid striped bass. Under Section 14.01, the state requires that all containers of aquaculture-raised striped bass, whether whole or filleted, are clearly labeled as "Hybrid Striped Bass". The labels must also include information on the state of origin, the names, and addresses of shipping and receiving dealers, the permit numbers of the shipping and receiving dealers, the date of shipment, and the net container weight. Aquaculture-raised hybrid striped bass fillets are also required to have the skin attached. Additionally, 322 CMR 14.01(5) makes it unlawful to promote, market, sell, or advertise hybrid striped bass products as "striped bass". Massachusetts extends these labeling requirements to all aquacultured finfish species that are wild caught and landed in the state. It also prohibits any sale, promotion, or transport of aquaculture-raised finfish unless they are properly labeled and clearly identified as being an aquaculture product.

4. North Carolina

Finally, while not directed toward aquaculture, an analogous legal framework for product differentiation exists in North Carolina. The state governs the possession and sale of wild-caught striped bass through a permitting and tagging system under 15A NCAC 030. 0503. Fish dealers must obtain a Striped Bass Dealer Permit for a specific harvest area- the Atlantic Ocean, the Albemarle Sound Management Area, or the Joint and Coastal Fishing Waters of the Central/Southern Management Area. Sale, purchase, or possession of striped bass without a validated dealer permit is unlawful. Striped bass taken from open harvest proclamation areas must have a tag attached to the mouth and gill cover. Tags are issued by the North Carolina Division of Marine Fisheries and must not be bought, sold, or transferred. These regulations support accountability and traceability and are designed to separate legally harvested wild-caught fish from illegal or misrepresented products in the market. Farmed striped bass in North Carolina are not subject to tagging requirements for transport or retail sale but must be accompanied by documentation identifying their cultured origin throughout shipment and distribution. The production of farmed striped bass requires appropriate permits or licenses from the North Carolina Department of Agriculture and Consumer Services, with additional regulatory oversight by the North Carolina Division of Marine Fisheries.

Without clear and consistent standards for traceability, aquaculture markets could unintentionally become an outlet for illegally harvested or undersized wild-caught striped bass. This not only undermines fishery management goals, but also erodes consumer confidence. Together, these state-level regulations demonstrate a coordinated approach to strengthen transparency, traceability, and compliance in the seafood supply chain. Additionally, they provide a valuable foundation for coordinated regional strategies or future federal policies aimed at ensuring product integrity and building consumer trust in the growing domestic aquaculture sector.

4 Marine Spatial Planning and Siting

The identification of suitable areas for aquaculture development, coupled with careful site selection and management, is fundamental to ensuring the success and long-term sustainability of offshore aquaculture. Forecasting environmental interactions represents a critical first step, providing the foundation for coastal and ocean-use planning while helping to equitably address points of resistance to aquaculture expansion.

This section highlights the challenges associated with unplanned or poorly coordinated aquaculture development and emphasizes the benefits of structured marine spatial planning (MSP) approaches. Spatial planning tools ranging from geographic information systems (GIS) and remote sensing to coupled biophysical and socioeconomic models offer science-based frameworks to guide aquaculture expansion in both coastal and offshore environments (Froehlich et al., 2017; Lester et al., 2018). Integrated approaches, such as the ecosystem approach to aquaculture (EAA), explicitly account for ecological carrying capacity, stakeholder interests, and governance structures (Morris et al., 2025; Theuerkauf et al., 2019). Increasingly, these tools are being adopted by regulatory agencies and decision-makers to address environmental, economic, social, and governance considerations, including biosecurity, climate change, and competition among ocean users.

Recent advances in MSP have yielded a suite of decision-support tools that foster coordinated, participatory, and integrated approaches to aquaculture management (Kapetsky et al., 2013; Gentry et al., 2017). Such tools not only help protect natural resources but also provide mechanisms to balance multiple, and often conflicting, uses of marine space. Drawing on case studies, this section identifies both successful examples of MSP implementation and common pitfalls or barriers that may hinder practical application.

Planning for aquaculture operations in U.S. federal waters requires a particularly high level of spatial analysis, given the diversity of existing ocean uses and the complex siting criteria required for offshore fish farms. Suitable sites must balance biophysical parameters (e.g., water depth, current speed, wave exposure, distance to port) with regulatory requirements, ecological sustainability, and social acceptance. Effective planning also necessitates consideration of cumulative impacts across time and space, as well as harmonization of aquaculture siting with broader sustainability goals and regulatory frameworks.

Recent planning and permitting efforts in the Gulf of America and Southern California highlight the necessity of multi-agency collaboration in evaluating candidate farm areas (Riley et al., 2021; Morris et al., 2021; Wickliffe et al., 2024). These processes incorporated assessments of navigation corridors, military operations, industrial activities, commercial and recreational fisheries, protected species, and sensitive habitats to minimize conflicts across ocean sectors. In both cases, spatial analysis tools proved essential at different stages of decision-making. For example, automatic identification system (AIS) vessel-tracking data, which record ship position, course, and speed, were used to evaluate potential navigational conflicts during planning. These analyses highlighted when specific data layers (e.g., vessel traffic, habitat mapping, socioeconomic information) were most informative—some being critical during the early planning phase to guide siting alternatives, and others later in permitting phases to refine project footprints and mitigate conflicts.

Together, the Gulf of America and Southern California case studies represent the most significant federal step yet to support offshore aquaculture development and underscore the importance of structured spatial planning in advancing offshore aquaculture for species such as striped bass along the U.S. coastline. By integrating ecological, economic, and social dimensions, MSP provides a transparent and adaptive framework capable of facilitating industry growth while safeguarding ecosystem health and compatibility among multiple oceanic uses.

As part of NOAA's National Ocean Service, the National Centers for Coastal Ocean Science (NCCOS) plays a central role in advancing MSP by developing science-based inclusive decision tools to inform precision siting for aquaculture and other sectors of the ocean economy. NCCOS integrates GIS technologies with ecological and ocean-use data to support planning, scoping, authorizing, and mitigating activities. These robust quantitative tools are paired with community and stakeholder engagement methods to bring in social-cultural considerations into the analysis. This approach provides strategies for siting aquaculture operations that account for regulatory and management priorities as well as stakeholder concerns. By reducing user conflicts and enabling coordination among regulators, operators, and stakeholders, spatial planning supports responsible aquaculture development in U.S. federal waters.

4.1 Siting Considerations for Atlantic Striped Bass

NOAA's NCCOS conducted a preliminary spatial analysis to identify thermally suitable areas for striped bass aquaculture along the U.S. Atlantic coast. The analysis evaluated both state and federal waters from Maine through Florida by quantifying how often water temperatures fell within defined biological production thresholds.

The suitable temperature range is defined as the range of water temperatures over which striped bass can maintain normal physiological function, survive, feed, and grow at commercially viable rates. Recent work conducted with industry partners indicates that temperatures from 15 to 30 °C support commercial production of striped bass from approximately 50 g to 2.5 kg (Andersen et al., 2021). Within this broader suitable range, the optimal temperature range represents the narrower thermal window that maximizes growth, feed conversion, and production efficiency. Laboratory studies of juvenile striped bass have identified optimal temperatures ranging from 24 to 28 °C (Cox & Coutant, 1981; Secor et al., 2000), while grow-out performance in production settings is generally reported optimal between 22 and 26 °C (R. Borski, North Carolina State University, pers. comm.). This framework aligns with bioenergetic growth models developed for striped bass, where the suitable thermal range represents conditions that sustain survival and growth (Hartman & Brandt, 1995), while the optimal range for aquaculture identifies the temperatures that maximize growth, production efficiency, and profitability (Klinger et al., 2017; Mengual et al., 2021).

Temperatures below 15 °C or above 30 °C are expected to reduce physiological performance, slow growth, and lower economic returns. Because striped bass in offshore systems are fully submerged, the assessment used modeled temperatures between 6-10 m depth to represent cage conditions. The siting analysis also limited candidate areas to water depths of 50 to 150 m to support cage infrastructure and to locations within 30 nautical miles of shore, since greater distances are likely to reduce economic viability.

The Naval Research Laboratory Global Ocean Forecasting System 3.1: 41-layer HYCOM + NCODA Global 1/12° Analysis dataset was used to estimate temperatures at depth as it provided the high spatial and temporal range and resolution needed for this analysis. The dataset provides modeled temperatures at 40 depth levels throughout the global ocean, at eight times throughout the day to inform daily temperature ranges. For each grid cell, minimum and maximum daily temperatures were extracted, and a location was considered to fall within the thermal range only if both values were within the defined threshold range. The number of qualifying days was then tallied across the study period. Cage culture constraints, as outlined previously, were applied to further isolate areas with appropriate thermal conditions, sufficient depth for viable cage deployment, and distances from shore that are economically realistic. Depth estimates were sourced from the NOAA National Centers for Environmental Information Earth Topography (ETOPO) Global Relief Model (NOAA NCEI, 2022). Data from 2020–2023 were used to calculate the mean number of days within suitable and optimal ranges per year.

Large areas of thermal suitability were identified throughout the mid-Atlantic and southern Atlantic regions, with many locations remaining within the suitable range for nearly an entire year (Figure 1). When cage culture siting criteria were applied (i.e., depth and distance to shore) the extent of available areas decreased substantially; however, regions off Florida and North Carolina continued to provide broad areas of suitable conditions. Optimal temperatures were less common than the broader suitable range, as expected, but conditions exceeding 100 days per year at optimal temperatures were observed along the mid-Atlantic and southern coast. Despite the prevalence of wild striped bass populations in the northeast, areas north of Cape Hatteras, North Carolina, frequently experienced temperatures below the suitable range, often for weeks at a time and more than 100–200 days annually. Elevated temperatures were less problematic, as the Gulf Stream remains offshore of the 30 nm distance from shore constraint that was applied.

During our study period, an average of 68.2 million ha of state and federal waters along the Atlantic coast met the suitable temperature range for striped bass aquaculture ≥ 250 days annually. Within this area, an average of 27.1 million ha was within the optimal temperature range for at least 150 days. When depth and distance from shore criteria were applied to the areas that experienced optimal temperatures on average ≥ 180 days the area decreased to 429,000 ha, located off the coasts of North Carolina and Florida.

Although the physiological performance, growth, and bioenergetics of striped bass is comparatively well studied (e.g., Anweiler et al., 2019; Penny & Pavey, 2021; 2023), important uncertainties remain regarding the thermal tolerances of different populations and life history stages. Laboratory studies are required to clarify how thermal thresholds vary across developmental stages and genetics, thereby informing more precise bioenergetic modeling. Additional physiological thresholds should also be quantified and integrated into future analyses to better characterize the species' aquaculture potential.

Expanding this analysis to other regions of the U.S. EEZ would provide a broader perspective on feasibility. Moreover, as ocean conditions continue to shift, evaluating bioenergetic thresholds under forecasted climate and thermal regimes will be essential to assessing the opportunity and longevity of aquaculture potential. Such analyses should also consider the adaptive capacity of both the industry and the species itself when estimating long-term temperature changes. Finally, extending this framework to other candidate species would help identify opportunities for advancing offshore aquaculture in U.S. waters.

Climate Change and Ocean Warming

Projected warming of the northwest Atlantic is expected to alter thermal suitability for striped bass. Offshore sites in North Carolina and Florida already approach the upper tolerance threshold of 30°C during summer months, potentially increasing risks of thermal stress (Friedland et al., 2025). Conversely, northern sites may become more viable under warming scenarios.

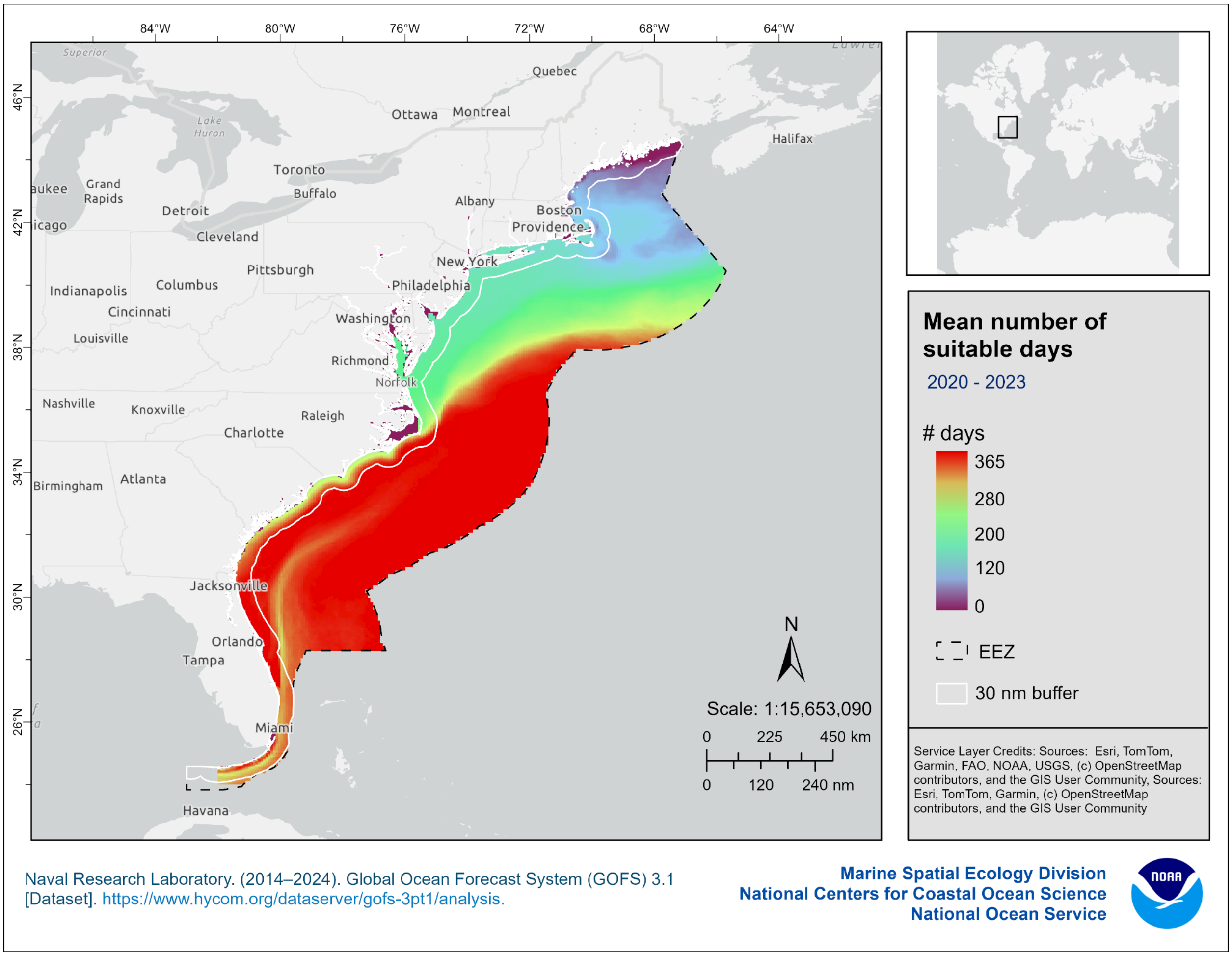

Figure 1. Number of days at suitable temperatures (15–30 °C) for striped bass, *Morone saxatilis*, in 2023. Water temperatures are presented for coastal and offshore waters through the extent of the Atlantic Coast U.S. EEZ (200 nm).

5 Consumer Awareness and Markets

Market conditions strongly favor the development of a domestic pure strain striped bass aquaculture sector (Andersen et al., 2021). Demand for sustainable, locally produced seafood is high, while wild harvests remain limited and imports of striped bass dominate supply. Pure-strain striped bass is well positioned to fill this gap, offering a recognizable and desirable product with strong consumer appeal and broad market potential.

When assessing the economic viability and sustainability of any new aquaculture industry, understanding market conditions, including supply and demand dynamics, is fundamental. These data inform pricing strategies, consumer behavior, and resource planning, while also guiding regulators and legislators on how to maximize economic benefits and minimize conflicts with existing enterprises.

Commercial hybrid striped bass aquaculture has been established in the U.S. since the late 1980s, complementing centuries of commercial capture fisheries. Despite these markets, interest from both producers and buyers is growing for pure-strain striped bass to meet rising demand for white-fleshed marine fish. Recent research and stakeholder engagement have also identified striped bass as a top candidate species for marine aquaculture expansion in the U.S. (Rexroad et al., 2021; Andersen et al., 2021; StriperHub, https://ncseagrant.ncsu.edu/striperhub/). These developments underscore the importance of evaluating the species' economic characteristics as commercialization advances.

5.1 Supply

A critical component of any economic analysis is the characterization of current market supply. For domestic aquaculture, evaluating the supply of wild-caught and imported alternatives provides insight into existing demand for a species and reveals trends in market strength over time. A comprehensive supply analysis for striped bass and other marine finfish species was previously conducted by Engle, van Senten, and Schwarz (2023); a similar methodology will be applied here using updated statistics to reflect current market conditions. This analysis will also incorporate the supply of farmed hybrid striped bass, given its relevance and similarity to the striped bass market.

According to the FAO (2025a), the only two regions where pure strain striped bass has been farmed since 1950 are Mexico and the Palestinian Territories. In 2023, Mexico had not reported any production (1,406 metric tons; 2022) and the Palestinian Territories had produced only 4 metric tons (FAO 2025a). Seven countries have produced farmed hybrid striped bass since 1950, however only four (Denmark, Israel, Italy, and the U.S.) reported production in 2024. The U.S. produced nearly 80% of the total supply of farmed hybrid striped bass in 2023 reaching 2,404 metric tons (FAO 2025a). Although the 2023 USDA Census of Aquaculture did not individually report statistics on food fish striped bass farms, 51 operations were identified as producing pure striped bass for "conservation, recreation, enhancement, or restoration purposes" in 2023 (USDA-NASS 2024).

Several states along the Atlantic coast allow for variable scales of commercial striped bass harvest, including Massachusetts, Rhode Island, New York, Delaware, Maryland, Virginia, and North Carolina. Commercial landings of striped bass reached 1,788 metric tons in 2023 while recreational landings were more than six times that (10,961 metric tons) in the same period (NOAA 2025b). While commercial landings remained relatively flat from the prior year, recreational landings fell by 33% in 2023 compared to 2022 (NOAA 2025b). Overall, the current supply of striped bass products in the U.S. is limited, fragmented, and unable to keep pace with demand. Wild harvests are strictly regulated and hybrid aquaculture production, though established, has not scaled to meet broader seafood market needs. These constraints on supply highlight the opportunity for pure-strain striped bass aquaculture to expand domestic availability. With this supply gap established, the following section considers consumer demand and market drivers that make striped bass a compelling candidate for offshore aquaculture development.

5.2 Demand

The U.S. per capita consumption of seafood has remained relatively stable for the last 20 years, reaching 22.1 kg of consumption in 2022 similar to other “high-income countries” (FAO 2024). However, demand for imported seafood in the U.S. still remains the highest in the world, purchasing $26.6 billion in 2024 which was $4 billion more than the next country, China (FAO 2025b). In fact, 70-90% of the total seafood that is consumed in the U.S. is imported, with more than half of that volume coming from farmed sources (NMFS 2024). In recent years, the American consumer has shown an affinity for farmed products and is willing to pay more for locally produced seafood (Fonner & Sylvia 2015; Brayden et al., 2018; Quagrainie 2019; Bouchard et al., 2021; Asche et al., 2022; Athnos et al., 2023). A domestic farmed striped bass industry has the potential to tap into these markets and take advantage of these US demand characteristics.

The primary market for striped bass extends across much of the U.S. eastern seaboard and Gulf States, where the species is well recognized and valued due to its long-standing fisheries. Additional, though smaller, markets exist in inland states. Wild-caught striped bass are harvested commercially under strict state-specific seasonal quotas and size limits and are typically landed at larger sizes (greater than 8–10 lbs.), making them well suited for fillet markets and high-end restaurants. In contrast, hybrid striped bass supply a different niche, commonly marketed at smaller sizes (1.5–2.0 lb.) and sold whole or live, particularly to urban ethnic markets. Farmed striped bass could enter channels similar to those of wild-caught fish while offering the advantage of year-round availability. As a highly recognizable product with versatile applications (e.g., whole fish, fillets, sushi), farmed striped bass would be positioned to complement, rather than replace, existing market segments.

Consumer preferences for several aquaculture species highlighted in the southeastern U.S. have been evaluated to better understand consumption habits (Agyeman et al. 2025; Rexroad et al. 2021). Respondents who rated the “source” of their striped bass as an important attribute, consumed it seasonally, and preferred to purchase it in restaurants or grocery stores were more likely to express strong demand (Agyeman et al. 2025). These findings suggest that future producers could successfully market striped bass through restaurants and grocery stores to seasonal consumers already familiar with the product.

Interestingly, price was not a statistically significant factor influencing the likelihood of purchase (Agyeman et al. 2025). Further work on consumer perceptions specific to striped bass is currently being conducted by StriperHub.

The extent to which farmed striped bass will substitute for imported or wild-caught striped bass in domestic markets remains uncertain and will require further study once production facilities are established. Market impacts will depend on factors such as relative price and availability of alternatives, product quality, production volumes, and the specific market channels targeted. Importantly, the introduction of a farmed product could also stimulate overall demand by increasing consumer exposure to striped bass in different seasons and product forms not traditionally available.

5.3 Harvest, Transport, and Processing

Hybrid striped bass are typically harvested at a size of 1.5-2.5 lbs., which is attained after 16-20 months of growout depending on the culture practices and environmental conditions. Fish are harvested using seines, lift nets, or pumping systems, and are either immediately placed in ice slurries to maintain product quality or live-hauled to urban ethnic markets which often provide the highest prices. Regardless of the sales channel, hybrid striped bass are sold almost exclusively as whole fish, with limited processing into fillets or other value-added products. At typical harvest sizes, hybrid striped bass yield only 30–35% fillet recovery, which is comparatively low and provides little incentive for processors to pursue fillet production.

Pure striped bass are produced in much smaller volumes, largely for regional markets. In the U.S., their proposed market size is 3–7 lbs., which can be attained in 24–36 months under favorable culture conditions. Unlike hybrids, pure striped bass are envisioned for harvest and processing into fillets and other value-added products, following a model more typical of marine finfish such as salmon. At these larger harvest sizes (≥3 lbs.), striped bass can achieve fillet yields closer to 40%, producing thicker cuts that resemble their wild-caught counterparts, a characteristic that enhances consumer familiarity and market appeal.

Efficient harvest and processing logistics are critical to resource use in offshore striped bass aquaculture. Variables such as harvest frequency, size uniformity, and stocking density directly influence costs and product quality (Engle et al., 2024). Uniform fish size simplifies grading and increases processing efficiency, though variability at scale can complicate operations. Optimizing stocking densities and harvest timing improves yields and reduces waste (Andersen et al., 2021).

Cold-chain management is important for striped bass, a high-value product requiring rapid chilling and continuous refrigeration to maintain freshness. Offshore distance complicates logistics, often necessitating insulated containers or onboard chilling systems (Srikanth et al., 2018). Efficient harvest and processing capacity will be critical for maintaining product quality, securing consistent supply, and enabling striped bass to penetrate broader domestic seafood markets.

5.4 Production Costs and Economic Contribution

Although no published studies have directly measured the cost of production for striped bass aquaculture in the U.S., several analyses have drawn on data from related species and production systems. Engle et al. (2024) estimated production costs for striped bass under three scenarios in the southern U.S.: coastal ponds modeled after red drum farms, offshore net pens modeled after greater amberjack (*Seriola dumerili*) and salmon farms, and recirculating aquaculture systems (RAS) modeled after salmon and rainbow trout facilities. Capital investments, production costs, and equipment requirements were adapted from these established industries, while biological performance assumptions for striped bass were derived from scientific literature and expert consultation. The analysis indicated that striped bass aquaculture was only profitable in offshore net pens, with breakeven prices comparable to those of commercially farmed red drum. Breakeven yields were similar to those of black drum, but higher than those required for species such as spotted seatrout and Florida pompano. Additional commercial research is needed to refine these estimates, and profitability in pond or RAS culture may be achievable with further technological and management improvements.

Economic contribution analyses provide broader insight into the linkages between aquaculture and other sectors of local, state, and national economies. A recent study by Kumar et al. (2024) found that U.S. aquaculture contributed $3.8 billion to the national economy and supported more than 22,000 jobs. Foodfish farms exhibited an economic multiplier of 1.79, while marine aquaculture had a multiplier of 1.78, meaning that each dollar spent generated an additional $0.79 and $0.78, respectively, in related economic activity. The development of a robust striped bass aquaculture industry has the potential to generate similar spillover benefits, particularly for coastal communities. Such growth could stimulate investment in marine infrastructure and logistics networks, creating shared benefits across multiple industries.

5.5 Conclusion

While the true economic and marketing characteristics of striped bass aquaculture cannot be fully assessed until a commercial industry is established in the U.S., potential can be estimated from current science, existing literature, and comparable industry sectors. Hybrid striped bass has been cultured successfully at commercial scale since the 1980s.

There is momentum and a growing shift toward pure-strain striped bass culture, with several farms in North Carolina, Florida, and Texas already pursuing this transition. In contrast, the supply of wild striped bass in the U.S. remains limited relative to other fisheries, and the long-term sustainability of both commercial and recreational harvest is increasingly uncertain.

Demand for seafood in the U.S. remains strong with the majority of products being imported. While commercial-scale striped bass aquaculture is still in the early stages, economic indicators suggest the species has viable market potential, particularly in the context of growing consumer demand for domestic, sustainably produced seafood. Demand-side conditions are favorable, yet production cost challenges and regulatory inconsistencies—especially in states with gamefish designations—must be addressed. Interstate transport and sale of pure-strain farmed striped bass could present barriers for market development that will require synergies between state and federal regulations to avoid enforcement challenges and ensure transparency.

6 Striped Bass Aquaculture History

The history of striped bass aquaculture has been detailed extensively in the literature, with Andersen et al. (2021) offering the most current account. The culture of striped bass was first described in the late nineteenth century by managers with an interest in stock enhancement to improve production of fish for enhancing commercial and recreational fisheries for tributaries of Albemarle Sound, Chesapeake Bay, Delaware Bay, and New York Bay (Worth 1884a; Bowers 1900). The first published report of a successful hatch of striped bass eggs under artificial conditions was made in 1874 by Spencer Baird, the first commissioner of the U.S. Commission of Fish and Fisheries (Baird, 1874). In 1879, the U.S. Fish and Wildlife Service (USFWS) hatched striped bass fry at a site located along the Abermarle Sound in North Carolina that had been used as an American shad (*Alosa sapidissima*) hatchery (USFWS, 1882). The U.S. Fish Commission established the first dedicated hatchery for the propagation of striped bass in Weldon, NC (Worth 1884b). The Edenton National Fish Hatchery was then established in North Carolina in 1898 by the USFWS with a similar purpose to Weldon (Woodroffe, 2012).

In the early twentieth century, the USFWS published technical manuals detailing procedures for spawning, hatching, and fry release of various cultured fishes, including striped bass (Piper, 1982). By 1910, the foundational methods for striped bass propagation were already established; however, the U.S. Bureau of Fisheries, formerly U.S. Fish Commission, abandoned plans for marine stock enhancement (Worth, 1910). Interest in hatchery-based programs was revived in the 1950s, following the discovery of a naturally reproducing striped bass population in the Santee–Cooper Reservoir system of South Carolina (Scruggs Jr., 1957). This development stimulated a large-scale augmentation program aimed at creating self-sustaining populations in freshwater rivers and reservoirs across the southeastern U.S., including Kentucky, Alabama, Georgia, and South Carolina (Geiger & Parker, 1985; Kinman, 1988; Stevens, 1975). By the 1980s, striped bass had been successfully stocked into hundreds of reservoirs across at least 36 states (Stevens, 1984; Kinman, 1988). Despite much success advancing culture and stocking practices, striped bass remained a challenging species.

A range of biological and operational constraints historically limited the development of striped bass culture. Key challenges included: (1) high sensitivity to handling and confinement stress; (2) inconsistent spawning success and unreliable hatchery production; (3) cannibalism during larval and juvenile stages, particularly under high stocking densities; (4) susceptibility to bacterial, parasitic, and viral diseases; and (5) elevated mortality during harvest, grading, and transport. Collectively, these constraints hindered large-scale adoption of striped bass aquaculture and shifted industry emphasis toward the culture of hybrid striped bass, which demonstrate improved tolerance to handling and environmental variability, more consistent performance on formulated feeds, and greater overall resilience to health management challenges. While history shows technical challenges, the hybrid industry demonstrates scalable solutions that inform pure-strain development.

6.1 Striped Bass Aquaculture: Lessons from the Hybrid Industry and Pathways for Expansion

Beginning in the 1960s, hybrid crosses between striped bass and other Moronids were produced because preliminary findings indicated that hybrids exhibited greater tolerance to extremes in temperature and dissolved oxygen than either parental species so were better suited in many aquaculture systems (Logan 1968). The most common cross made was between striped bass males and white bass (*M. chrysops*) females (i.e., sunshine bass) because many producers found that spawning smaller white bass females required less expertise than spawning striped bass females (Smith 1988). It was not until emergency fishing moratoriums were imposed (Maryland 1985–90; Virginia 1989–90) following the collapse of the striped bass fishery in the 1980s that the path for commercial hybrid striped bass aquaculture as a means of supplying a valuable seafood product emerged (Hodson & Hayes, 1990).

Today, the hybrid striped bass industry is fourth in value among finfish species in the U.S., behind only channel catfish, Atlantic salmon, and rainbow trout. Hybrid striped bass are currently cultured in about 19 different states, particularly in the South and Midwest, in constructed, inland freshwater ponds. The fish are usually grown for about 16 months, and are marketed whole at approximately 680 g (1.5 lbs.; D'Abramo et al., 2002). In coastal states, consumers are accustomed to, and often prefer, pure-strain wild striped bass harvested from marine environments. Pure strain striped bass, rather than hybrids, are also highly preferred in lucrative ethnic markets, seafood restaurants and sushi bars, and unlike hybrids, these pure strain striped bass can be grown in “open” systems (e.g., coastal areas) with reduced risk of genetic contamination of wild stocks. Marine striped bass culture was even initiated to meet this demand, and for these purposes, fish are generally grown to larger sizes (2.2 kg) for whole, gutted, or filleted market forms.

Although hybrids have successfully established their niche in the US aquaculture landscape, they have struggled to penetrate mainstream markets where pure striped bass have an advantage. Nonetheless, they offer a close industry comparable in terms of production planning discussions and have helped lay the foundational research for pure striped bass aquaculture. The remaining sections of this chapter will provide an overview of the current understanding of production planning and intensive culture systems for striped bass by drawing upon strategies from the closely related and established U.S. hybrid industry.

6.2 Hatchery and Nursery Systems

Hatcheries typically maintain broodstock, which are induced to spawn using temperature and photoperiod manipulation, behavioral cues, and hormone induction when necessary (Hodson and Sullivan 1993; Clark et al., 2005; Andersen et al., 2021). Once spawned, fertilized eggs are incubated in McDonald-type hatching jars or tanks until they hatch, usually within 2-3 days at water temperatures of 18-22°C. After hatching, the larvae are either transferred directly into fertilized ponds or maintained in indoor nursery tanks where they are fed a diet of live zooplankton such as rotifers and brine shrimp nauplii (i.e., *Artemia*). As the larvae grow, they are weaned onto commercially prepared diets.

Once juvenile striped bass reach a size of approximately 1–2 g, they are typically transferred to outdoor nursery ponds or larger tanks for further grow-out. Earthen ponds, ranging from 0.1 to 1.0 ha, are fertilized to enhance natural productivity and supplemented with commercial feeds. Juveniles are commonly stocked at densities of 50,000–100,000 fish per hectare and grown to 10–50 g over a period of 3–4 months.

Indoor RAS systems represent an alternative nursery method, particularly in regions where temperatures are unsuitable for pond culture (e.g., colder latitudes). RAS facilities produce juveniles for transfer to larger land-based farms. Outdoor ponds and climate-controlled RAS present viable opportunities to produce large numbers of fingerlings required for offshore aquaculture operations. A parallel model exists in the Atlantic salmon industry in Norway, where smolt are reared in freshwater hatcheries and nursery systems before transfer to coastal and offshore marine cages. Over the past decade, conventional flow-through hatcheries have increasingly been replaced by RAS, which offer advantages in water use efficiency, environmental control, and siting flexibility (Brown et al., 2025).

6.3 Transport and Stocking

When juvenile striped bass reach the target size, they are harvested from nursery systems and transferred to grow-out facilities. Harvesting is commonly conducted using seines or by draining ponds, after which fish are loaded into transport tanks equipped with aeration or oxygenation systems to maintain water quality during transit. Upon arrival, fish are acclimated to the receiving water before being stocked into production units.

Stocking densities in grow-out systems vary with production intensity and facility design, typically ranging from 10 to 50 kg/m³. In pond or net-pen systems, densities are generally maintained at the lower end of this range due to limited environmental control, whereas RAS can support higher densities under carefully managed conditions with systems for management of water quality, dissolved gases, and disinfection. In these open-water and pond environments, densities are also moderated by the larger volume of production systems and the space afforded allowing individuals to swim more freely.

6.4 Growout Systems

Although most U.S. production of hybrid and pure striped bass occurs in ponds, tanks, and raceways, there is increasing interest in offshore culture systems to meet growing demand for marine foodfish. Offshore aquaculture involves rearing fish in marine cages or net pens located in coastal or offshore waters. These systems offer potential advantages over land-based production, including reduced land use, lower energy requirements, and in some cases, improved economic feasibility. At the same time, offshore operations face unique challenges such as exposure to severe weather, predation, and logistical constraints associated with remote locations.

Net pens used for culture are commonly constructed of high-density polyethylene (HDPE) or steel and range in volume from 100 to 1,000 m³. Stocking densities typically range from 10 to 25 kg/m³, with fish fed commercial diets through automated feeding systems. Offshore environments are generally characterized by high water exchange, stable temperatures, and elevated dissolved oxygen, conditions that support favorable growth. However, the open nature of these systems increases risks of escapement and disease transmission to wild stocks compared with land-based facilities.

Land-based indoor systems (i.e., RAS technology) provide an alternative grow-out strategy, offering controlled culture conditions, robust biosecurity and disease management, flexible siting to enhance market access, and reduced risks to marine ecosystems (Brown et al., 2025). Despite these advantages, widespread adoption of RAS for striped bass and other marine finfish has been limited by high capital and operating costs and the challenges of maintaining stable production. Continued research is needed to address economic feasibility, product quality, feed formulation, and control of early maturation in culture systems.

7 Offshore Aquaculture Technology

Technological innovation has made it increasingly feasible to culture marine finfish in coastal and open-ocean environments, including the U.S. EEZ. Offshore aquaculture is generally defined as taking place in open ocean waters, in highly exposed environments subject to strong currents, waves, and storm events, requiring more robust and complex infrastructure than inshore or nearshore systems (Price & Morris, 2013; Drumm, 2010; Kapetsky et al., 2013). While offshore aquaculture represents only a small fraction of U.S. production today, demonstration projects and deployments in deep water have demonstrated that innovation in gear, materials, and monitoring systems can unlock substantial potential for growth (Froehlich et al., 2017; Buck et al., 2025). This sector currently consists of an offshore fish farm in Hawaii state waters and a small number of open ocean shellfish and seaweed farms around the nation.

7.1 NOAA’s Role in Offshore Aquaculture Development

As one of the federal agencies responsible for stewardship of the nation’s marine resources, NOAA is fostering the growth of a robust domestic aquaculture industry while ensuring that offshore development remains consistent with its environmental stewardship mandates. These efforts include developing tools to evaluate the ecological benefits and risks of marine aquaculture, implementing science-based regulations to safeguard ecosystems, and advancing production designs and operational practices that are compatible with sustainable fisheries and ocean use (Nicolls et al., 2020; NOAA OCM, 2023; BEA, 2021). Multi-agency work groups are also developing regionally tailored permitting frameworks to improve the efficiency and transparency of decision-making while maintaining compliance with environmental law. In support of these initiatives, Feldman et al. (2025) published a *Technical Guide to Marine Aquaculture Gear*, providing detailed guidance on cage and net-pen systems, mooring and anchoring technologies, and other essential components required for offshore aquaculture. These roles ensure that technological innovation is paired with regulatory oversight to support sustainable striped bass farming.

7.2 Marine Cages and Net-Pen Systems

Marine cage and net-pen aquaculture require large, durable enclosures designed to withstand offshore wave energy and the strong swimming behavior of cultured species. Striped bass, in particular, require high water flow for oxygenation, ample space to support growth, and robust containment systems to prevent escapes or structural damage. Successful offshore operations also depend on high-quality formulated feeds, continuous monitoring of fish health, and strict biosecurity measures to minimize the risk of disease. Site selection is critical to avoid harmful algal blooms, ensure dispersal of organic waste, and maintain thermal regimes within the species' tolerance limits.

For striped bass, offshore production would likely use large-volume submersible or semi-submersible cages engineered for high-energy environments. Submersible cages can be lowered below the wave zone during storm events, while semi-submersible pens and large circular HDPE cages provide surface stability with reduced wave exposure (Langan & Horton, 2003; Price et al., 2017). Cage volumes on the scale of tens of thousands of cubic meters afford fish the ability to swim freely, which not only supports welfare but also reduces effective stocking densities allowing for optimal growth and production of striped bass.

7.3 Nets and Predator Exclusion

Net design is central to containment and welfare. Offshore nets are typically constructed from abrasion-resistant, high-strength materials such as knotless nylon or high-density polyethylene (HDPE), designed to withstand constant pressure from fish and environmental forces. Mesh sizes are selected to retain the smallest stocked fish while minimizing drag and maximizing water exchange. Predator exclusion is achieved through reinforced predator nets or double-net systems that deter sharks, seals, and other large marine animals. These barriers are tensioned with spacers or standoff frames to prevent collapse into stock nets, reducing the risk of escapes or entanglement. Overhead bird nets or canopy structures are commonly installed to prevent depredation by seabirds, reducing stock stress and feed loss. Routine inspection and net cleaning are essential to maintain mesh integrity, prevent fouling that diminishes water exchange, and ensure both containment and predator deterrence. Increasingly, copper-alloy mesh is being adopted despite its higher cost, as it provides superior resistance to biofouling, reduces the frequency of net cleaning, and offers enhanced durability and predator protection relative to traditional synthetic materials.

7.4 Innovation and Future Directions

Technological advances are rapidly enhancing the sustainability and profitability of offshore aquaculture. Innovations include co-location with existing offshore infrastructure, autonomous feeding barges, ship-based aquaculture, real-time environmental monitoring platforms, and novel antifouling materials. In the U.S., there is competition for nearshore space and expansion into federal waters provides opportunities for larger sites with fewer user conflicts and greater social acceptance among commercial and recreational fishing communities (Kapetsky et al., 2013; Buck et al., 2025). With one of the largest EEZs in the world, the U.S. has significant potential to expand striped bass production offshore, provided that engineering, logistical, and environmental stewardship challenges are addressed through continued research, innovation, and regulatory collaboration.

8 Environmental and Ecosystems

Evidence from modern offshore systems shows that environmental impacts of net pen aquaculture can be limited and manageable when best practices are applied (Price & Morris, 2013). Strong currents, deeper waters, and advanced feeds reduce risks of nutrient buildup and habitat degradation, and with appropriate siting and monitoring, offshore striped bass farming can align with ecological sustainability goals while avoiding significant long-term ecosystem harm.

Despite these opportunities, public perception and regulatory concern remain among the largest barriers to starting new offshore aquaculture ventures in the U.S., particularly given the large ocean areas that could support development and the potential number of farms. The environmental effects of marine aquaculture vary widely depending on species selection, production methods, siting, and scale of operations (Belle & Nash, 2008; Price & Morris, 2013). Modern production technologies, standardized operating procedures, and best management practices (BMPs) reduce risks to water quality, benthic habitats, and marine life. Offshore farming, in particular, provides opportunities to minimize impacts due to deeper waters, stronger currents, and greater dilution potential compared to nearshore settings (Buck et al., 2025). At the same time, offshore development requires careful evaluation of ecological interactions, cumulative effects, and regulatory safeguards to ensure sustainable growth.

In the context of striped bass aquaculture, potential environmental effects can be grouped into several categories: (1) water quality, (2) benthic and sedimentary processes, (3) interactions with marine life and habitats, (4) cumulative and landscape-scale effects, and (5) mitigation strategies, including novel approaches such as integrated multi-trophic aquaculture (IMTA). This section synthesizes current knowledge, with a focus on offshore relevance, and highlights management and monitoring frameworks that can safeguard essential fish habitats (EFH) while supporting the expansion of a domestic striped bass aquaculture industry.

8.1 Water Quality and Nutrient Enrichment

Discharges such as solid wastes, nutrients, ammonia, fish waste, feed waste, pharmaceuticals, and chemicals from aquaculture operations are primarily governed by the implementing regulations of the Clean Water Act (CWA) Sections 402 and 403 (EPA, 2021). Section 402 requires that a National Pollution Discharge Elimination System (NPDES) permit for discharge into federal waters be issued in compliance with the U.S. Environmental Protection Agency's (EPA) ocean discharge criteria under Section 403, which aim to prevent unreasonable degradation of receiving waters (NOAA, 2022; EPA, 2025). In preparation of an NPDES permit, EPA generally applies water quality models to characterize interactions between effluent and the receiving environment. These models can address effluent dispersion within the water column and particulate deposition in near- and far-field zones, thereby informing monitoring plans to ensure environmental compliance and performance (Cromey et al., 2002; Stucchi et al., 2005).

Three-dimensional (3D) modeling tools have been developed to refine these assessments by predicting the transport and fate of aquaculture-derived wastes under site-specific conditions. By incorporating hydrodynamics, bathymetry, stocking densities, and feed inputs, these models simulate the dispersion of dissolved nutrients and the deposition of solid wastes, enabling forecasts of benthic organic enrichment, nutrient concentrations, and dissolved oxygen dynamics (Cromey et al., 2002; OSPAR, 2005; Newell & Richardson, 2014). Their predictive capability provides a science-based framework to evaluate farm-scale and cumulative impacts, guide siting decisions, establish thresholds for sustainable production, and reduce ecological risks. When integrated into regulatory processes, such modeling approaches strengthen the environmental safeguards of aquaculture permitting while supporting industry growth in a precautionary and adaptive management framework.

Organic Loading

The primary water quality concerns from finfish cage culture are nutrient enrichment (nitrogen and phosphorus), suspended particulates, lipids, and fluctuations in dissolved oxygen (Belle & Nash, 2008; Holmer, 2010). Waste from feed and fish excretion contributes organic matter and nutrients to surrounding waters. In offshore environments, strong currents and high flushing rates typically enhance dispersal, reducing localized benthic accumulation compared to nearshore systems (Chamberlain & Stucchi, 2007). Nonetheless, large-scale striped bass production could elevate nitrogen and phosphorus inputs, particularly if stocking densities are not matched with site-specific hydrodynamics.

Studies across the U.S. and Europe indicate that when farms are sited in deep, well-circulated waters, measurable nutrient effects are typically limited to within 30 m of cages, and persistent long-term impacts are rare (Price & Morris, 2013). Improvements in feed formulation, feeding efficiency, and digestibility have also substantially reduced nutrient loading compared to historical operations (Naylor et al., 2009). Nutrient spikes and transient oxygen declines may occur during feeding events but generally recover quickly in offshore sites with strong flushing (Troell et al., 2009).

In contrast, farms located in shallow or semi-enclosed nearshore systems are at higher risk of causing localized eutrophication. Here, aquaculture impacts may be difficult to distinguish from terrestrial nutrient inputs or municipal discharges (Shumway, 2011). For striped bass offshore culture, siting in high-energy environments such as off the continental shelf of North Carolina or Florida may reduce these risks. Maintaining high water exchange rates and adopting BMPs such as optimized feeding regimes, precision monitoring of feed delivery, and selection of formulated diets are critical for protecting water quality.

Dissolved Oxygen Dynamics

Respiration of fish and decomposition of organic waste can reduce dissolved oxygen (DO) levels, potentially affecting both cultured stocks and wild organisms. Offshore siting criteria, particularly depth (>50 m) and current speed (>5 cm s^{-1}), help mitigate these risks by ensuring sufficient oxygen replenishment. Seasonal stratification along the Atlantic coast, particularly in the mid- and south-Atlantic Bight, may constrain vertical mixing and should be carefully considered in site selection and hydrodynamic models (Friedland et al., 2025).

Hydrodynamics and Waste Dispersal

Modeling current velocities, flushing rates, and vertical mixing is central to evaluating carrying capacity. Offshore aquaculture has an advantage of greater dispersion compared to coastal farms, but cumulative impacts across multiple farms could overwhelm assimilative capacity if not spatially managed. Advanced models such as coupled hydrodynamic-biogeochemical frameworks (e.g., FVCOM, HYCOM, ROMS) can predict dispersal of nutrients and organic matter.

8.2 Benthic Habitats

Sedimentation Impacts

Deposition of waste feed and fecal matter can alter benthic community structure beneath cages. In coastal salmon farms, shifts toward opportunistic polychaetes and hypoxia-sensitive taxa have been observed (Hargrave, 2010). The extent of benthic impact offshore is expected to be more diffuse due to deeper water and higher energy conditions, though localized organic enrichment remains possible. For example, at well-managed offshore farms, these effects are typically confined to within 100 m of cages and benthic recovery between harvest and re-stocking is often rapid (Keeley et al., 2014). Anaerobic conditions may develop under heavily impacted sites, particularly in depositional environments with limited flushing or soft sediments (Kutti et al., 2007). To minimize risk, site selection should prioritize erosional seafloors, adequate depth, and high current velocity to disperse organic matter (Belle & Nash, 2008).

Emerging monitoring tools, including stable isotope tracers, acoustic imaging, and automated image analysis, provide cost-effective methods for assessing benthic impacts and far-field dispersal (Callier et al., 2018). Regulatory protocols often require sediment monitoring of indicator parameters such as redox potential, total organic carbon, and sulfide concentrations. Adaptive management frameworks, wherein farm management practices are modified in response to monitoring outcomes, represent a best practice for ensuring benthic protection.

Essential Fish Habitat

Offshore aquaculture operations may occur within or adjacent to designated Essential Fish Habitat (EFH). To the extent practicable, siting should minimize interactions with sensitive benthic features, including deep-water corals and hard-bottom reef systems. Along the Atlantic coast, these habitats are frequently associated with shelf breaks and submarine canyon systems (NOAA, 2021). Early consultation with relevant management agencies, combined with baseline environmental surveys, can inform site selection and help reduce the risk of habitat disturbance or degradation.

In the South Atlantic region, proposed offshore aquaculture sites may also overlap with habitats that support diadromous fish species, coral reef systems, and estuarine waters that are hydrologically connected to EFH (SAFMC, 2014). Mandatory consultation processes and site-specific environmental review can help identify these sensitivities and guide placement decisions. While poorly sited operations have the potential to affect benthic communities and water quality, locating facilities in deeper, well-flushed offshore waters is generally associated with a lower likelihood of significant environmental impacts.

The NOAA NCCOS has ongoing collaborations with the EPA to provide depositional and water quality modeling products (see Figure 2) and science advice to support agency permitting and associated environmental reviews and consultations for finfish aquaculture projects proposed for U.S. federal waters.

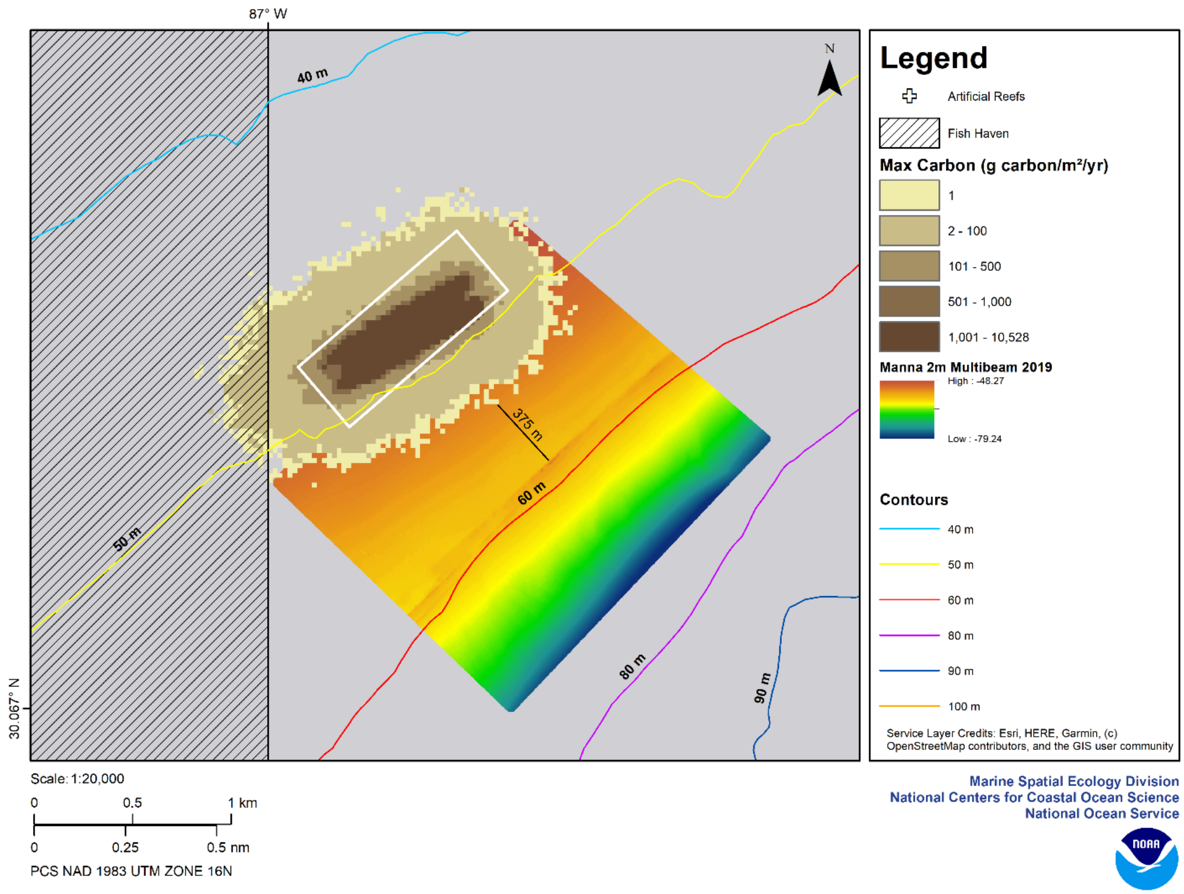

Figure 2. NOAA's National Centers for Coastal Ocean Science applied high-resolution depositional modeling to estimate maximum carbon deposition from a commercial-scale offshore finfish farm in the Gulf of America. Bathymetric data were collected during the baseline environmental survey and are represented at 2-m spatial resolution. The depositional model was run over a five-year period under maximum biomass conditions for an 18-cage configuration. Hydrodynamic forcing was derived from 2018 current fields produced by the Gulf of America HYCOM model. Model results demonstrate the importance of precision siting in identifying locations where solid waste and carbon deposition are sufficiently dispersed, thereby minimizing localized accumulation and supporting environmentally appropriate farm placement.

8.3 Protected Species and Habitat Interactions

The introduction of offshore aquaculture structures into Atlantic waters requires careful evaluation of potential interactions with protected resources, including marine mammals governed by the Marine Mammal Protection Act (MMPA) and species and habitats protected under the Endangered Species Act (ESA) (NOAA Fisheries, 2023a; NOAA

Fisheries, 2023b). Interactions between aquaculture gear and marine mammals, sea turtles, and seabirds remain an active concern but have been well documented both globally and domestically (Price & Morris 2013; NMFS 2015; Price et al. 2016; NMFS 2019; Bath et al. 2023). Recently, the NOAA Technical Guide to Offshore Aquaculture Gear and Protected Species Interactions indicates that entanglement risk is generally low for most offshore cage designs but not negligible, particularly for large whale species and protected turtles (Feldman et al., 2025). Gear modifications such as tensioned mooring lines, weak links, minimized slack, and the use of stiff or coated materials are essential to reduce entanglement hazards. In addition, strategic siting that avoids migratory corridors and ecologically sensitive habitats further lowers the likelihood of interactions.

Adequate risk assessment requires a baseline understanding of offshore aquaculture system design, mooring and net-pen configurations, feed inputs, and operational practices proposed for striped bass culture (Price & Morris, 2013). Potential pathways of interaction include entanglement with nets or mooring lines, attraction of predators such as seals and dolphins to farm sites, displacement or alteration of migratory routes, and changes in prey availability for ESA-listed fish, sea turtles, and marine mammals (Nelson et al., 2021; Read, 2008). The proximity of farms to designated critical habitats requires precautionary siting to avoid overlap (NOAA Fisheries, 2016; NMFS, 2021a; 2021b).

Emerging best management practices and technological innovations provide pathways to further reduce risks. These include predator-resistant and tensioned netting, siting analyses that explicitly exclude sensitive habitats and migratory routes, and adaptive monitoring programs that integrate acoustic, visual, and satellite data (Rust et al., 2014). Taken together, these measures highlight the importance of coupling aquaculture science with regulatory frameworks to ensure that striped bass offshore aquaculture develops in a manner consistent with the long-term protection and recovery goals of the MMPA and ESA.

NOAA's NCCOS is advancing a physics-based 3-D entanglement simulator in collaboration with partners (Bureau of Ocean Energy Management and BelleQuant Engineering) to support risk assessments for marine mammal entanglements with new and existing ocean industries including aquaculture. The simulator combines digital models of large whales and other protected species and underwater structures (moorings, rope, chain, and other structures) to mathematically and physically characterize the interactions between animal and gear. Potential entanglement scenarios, gear re-design can be tested to better understand risk and likelihood of adverse interactions between the gear and animal. This tool supports science-based risk assessments for regulators and industry, helping to inform engineering design, siting decisions, and mitigation strategies, thereby reducing one of the principal environmental concerns associated with offshore aquaculture expansion and facilitating efficient permitting and consultations for commercial-scale farms. By enabling proactive evaluation of entanglement risk and alternative design solutions, the entanglement simulator is intended to lower ecological impact uncertainty around offshore farm operations, support environmental compliance, and ultimately de-risk farm deployment in federal waters as part of broader marine spatial planning and protected species interaction research.

8.4 Ecosystem-Level Considerations

Food Web Dynamics

Offshore striped bass aquaculture introduces an artificial biomass of piscivores into marine ecosystems. While contained, the farms may act as fish aggregating devices, altering local species distributions. Evidence from salmon and tuna net pens suggests farms attract pelagic species, including forage fish, invertebrates, and predators (Dempster et al., 2002). Such aggregations may increase predation pressure or alter trophic pathways, though they can also enhance foraging opportunities for wild species (Callier et al., 2018).

Harmful Algal Blooms

Naturally occurring harmful algal blooms (HABs) pose a direct risk to striped bass aquaculture through mechanisms including gill irritation and damage, toxin exposure, hypoxia, and acute mortality events. As a result, understanding whether offshore cage culture contributes to HAB dynamics is a critical consideration for siting and management in the EEZ. Synthesis of the global literature indicates that marine net pen aquaculture does not exhibit a consistent or causal relationship with HABs when farms are appropriately sited and managed (Price & Morris, 2013). While dissolved nutrient releases from cage culture can produce localized and transient increases in phytoplankton biomass, particularly within tens to hundreds of meters of net pens, these responses have not been linked to the initiation or persistence of toxic or nuisance algal blooms (Price et al., 2015). In offshore and well-flushed environments characteristic of the EEZ, hydrodynamic dispersion and biological assimilation rapidly dilute dissolved nutrients, rendering aquaculture-derived inputs minor relative to background nutrient variability and watershed-driven sources. Evidence suggests that HAB risk is primarily governed by site-specific factors such as flushing, stratification, and existing nutrient loads rather than cage culture itself. Consequently, precision siting in dispersive offshore waters, combined with modern feed formulations and efficient feeding practices, is expected to minimize eutrophication risk and decouple offshore striped bass aquaculture from HAB dynamics in the EEZ.

9 Escapement Risks and Genetic Considerations for Offshore Striped Bass Aquaculture

Escape events pose real risks for genetic introgression, but decades of selective breeding, coupled with new genomic tools, provide safeguards to manage those risks. Domesticated strains, sterility technologies, and rigorous monitoring can ensure that aquaculture operations do not compromise wild population integrity. When paired with robust containment systems, striped bass aquaculture can proceed without undermining the genetic resilience of wild stocks.

For offshore operations, it is useful to distinguish between chronic, low-level seepage of escapees and rare, high magnitude catastrophic releases, because these pathways differ in detectability, dispersal potential, and the timing of exposure that drives genetic risk. Seepage most often results from small holes, net abrasion, predator related tearing, and routine activities such as handling and lifting, creating a persistent trickle of escapees that can be difficult to detect directly yet still sustain contact with wild conspecifics (Jensen et al., 2010; Holmen et al., 2021). Catastrophic events are more commonly linked to structural failure or mooring failure, collisions, and extreme weather, and they can release large numbers of fish over short periods, overwhelming recapture capacity and increasing the likelihood that mature escapees enter migratory corridors or spawning habitats during sensitive windows (Jackson et al., 2015; Thorvaldsen et al., 2015).

Escape events are among the most widely recognized ecological risks associated with marine finfish aquaculture, with outcomes shaped by species behavior, farm design and durability, siting and hydrodynamic conditions, operational practices, and interactions with predators such as sharks, marine mammals, and seabirds. Ecological consequences have been well documented across freshwater, estuarine, and marine systems, including competition with wild conspecifics, habitat displacement, disease and parasite transmission, and genetic introgression (Naylor et al., 2005; Hutchings & Fraser, 2008). Although domesticated fish often show reduced individual fitness and survival compared to wild stocks (Glover et al., 2017), even limited interbreeding can erode local adaptation, homogenize genetic structure, and reduce the long-term resilience of wild populations (Bourret et al., 2011).

For offshore aquaculture of native striped bass, these risks warrant particular attention. Striped bass are highly mobile and migratory, with populations ranging from the Gulf of St. Lawrence (Canada) to the St. John’s River (Florida) (Waldman et al., 2012). Resident populations occur in southern systems such as Albemarle Sound, North Carolina, while northern populations migrate extensively along the Atlantic coast (Boreman & Lewis, 1987; Overton et al., 2008). Escaped individuals could therefore disperse widely, interact with multiple genetically distinct subpopulations, and introduce risks of maladaptation or loss of genetic structure. Given the cultural, recreational, and commercial importance of striped bass, and their complex genetic composition, safeguarding wild populations is a priority for both fisheries and aquaculture management (ASMFC, 2019).

9.1 Historical Stocking and Genetic Legacy

The striped bass has a long history of hatchery propagation and stock enhancement. Beginning in 1884, striped bass from the Roanoke River were widely distributed for research and restoration purposes (Geddings, 1971). By the mid-20th century, federal and state hatcheries were producing and transporting striped bass throughout the U.S. and abroad. These efforts expanded during the 1970s and 1980s, when more than 20 hatcheries collectively released millions of fish annually to support restoration following severe population declines caused by overfishing, habitat degradation, and recruitment failure (Boreman & Austin, 1985; Rulifson & Laney, 1999). Although stocking programs contributed to recovery, widespread “cross-stocking” introduced non-native genetic material into multiple watersheds, altering natural genetic structure and raising long-term conservation concerns (Waldman et al., 2012). For example, while remnant native Gulf populations persist in the Apalachicola–Chattahoochee–Flint (ACF) river system in Florida, genetic analyses reveal substantial introgression (52%) from Atlantic stocks used in enhancement programs across the Gulf (Wirgin et al., 1997; Wirgin et al., 2010; GSMFC, 2006). The legacy of these programs underscores the importance of preventing further anthropogenic genetic alteration through aquaculture escapes.

9.2 Advances in Genomic Tools

Modern genomic approaches now allow high-resolution monitoring of striped bass population structure. Methods such as RADseq and genome-wide SNP genotyping enable the detection of fine-scale differentiation, even among weakly structured marine populations (Vendrami et al., 2017; Drinan et al., 2018; Jenkins et al., 2019). Analytical advances, including identification of outlier loci, provide insights into adaptive divergence and improve assignment accuracy in mixed-stock analyses (Gagnaire et al., 2015). These tools have been applied to striped bass, where they have clarified stock composition and informed management (LeBlanc et al., 2020; Wojtusik et al., 2023, 2025). Applications extend to monitoring genetic introgression, detecting illegal harvest, and assessing risks associated with aquaculture escapes (Ackerman et al., 2011; Martinsohn & Ogden, 2009).

9.3 Domesticated Strains and Aquaculture Applications

In parallel with restoration programs, a domesticated striped bass broodstock line has been developed through more than 30 years of selective breeding for aquaculture performance. The National Program for Genetic Improvement and Selective Breeding, based at North Carolina State University’s Pamlico Aquaculture Field Laboratory, created this line from multiple founder strains including the Roanoke River, Chesapeake Bay, Santee-Cooper Reservoir, Florida–Gulf of America, Canadian, and Pacific populations (Harrell et al., 1990; Kenter et al., 2018; 2023). Selection has emphasized growth, stress tolerance, and disease resistance, resulting in a strain phenotypically and genetically divergent from wild populations. This divergence may reduce the likelihood that escapees would survive or reproduce successfully in the wild, potentially lowering ecological risk compared to more recently domesticated or wild-derived stocks. However, if interbreeding occurs, maladaptive traits from the cultured line could still introgress into wild populations, compromising local adaptation and resilience (Ignatz et al., 2024; San Roman et al., 2025).

9.4 Risk Assessment and Mitigation

Effective escape risk management for offshore striped bass aquaculture requires a precautionary, multi-layered approach. Risk assessments incorporated into siting and permitting typically evaluate both the probability of escape and the ecological consequences of farm–wild interactions. Engineering strategies including robust mooring systems, regular inspection of nets and cages, predator deterrence, and contingency planning are critical for preventing escapes (Jackson et al., 2015). Genetic management measures such as broodstock traceability, use of sterile lines, and long-term genomic monitoring of both farmed and wild populations provide complementary safeguards (Glover et al., 2017; Karlsson et al., 2011).

Life-history traits of striped bass further inform risk analysis. For example, escaped males should reach maturity earlier and thus are more likely to contribute to wild spawning than females, which typically require two additional years to mature (Waldman et al., 2012). This suggests a moderate but non-negligible risk of introgression.

9.5 Reproductive Control and Genetic Containment

A practical operational safeguard is mandatory harvest before maturation, implemented through production schedules and, where appropriate, permit conditions that require complete cohort removal before fish are capable of spawning. This approach is widely treated in the aquaculture escape literature as a risk reduction measure because it limits the chance that escapees can contribute to reproduction, including scenarios where spawning can occur in or near net pens, or where mature escapees reach spawning habitats following an escape (Baskett et al., 2013).

One of the most effective strategies to minimize ecological and genetic risks from aquaculture escape events is the use of reproductively sterile fish. By eliminating or reducing the potential for interbreeding with wild populations, reproductive control technologies provide a biological safeguard that complements physical containment measures. Several approaches are currently available or under development in finfish aquaculture and could be applied to striped bass (Xu et al., 2023).

NOAA has developed the Offshore Mariculture Escape Genetic Assessment (OMEGA) model to evaluate genetic and ecological risks associated with aquaculture escape events. OMEGA simulates the probability of fish escaping from offshore farm systems, their survival and dispersal in the marine environment, and the likelihood of encountering and interacting with wild conspecifics. The model is intended to support risk-based assessments of offshore aquaculture operations and to inform the development of management and engineering strategies that reduce the potential adverse effects of escape events on wild populations (Purcell et al., 2025).

Triploidy

Induction of triploidy, producing fish with three sets of chromosomes, has been successfully applied in numerous aquaculture species, including salmonids, carp, and catfish, to create sterile or functionally sterile individuals (Piferrer et al., 2009; Benfey, 2016). While triploid performance varies by species, triploid striped bass have been produced experimentally and show promise for use in commercial systems (Okomoda et al., 2020). Incorporation of triploid technology into offshore striped bass culture could provide a near-term strategy for genetic containment, though further research is required to ensure consistent induction rates, animal welfare, and commercial performance.

Genetic Knockdown Approaches

Emerging biotechnologies offer more targeted methods of inducing sterility through gene knockdown or knockout of key reproductive pathways (Houston & Macqueen, 2019; Gutasi et al., 2023; Xu et al., 2023). For example, suppression of genes involved in germ cell development or meiosis can yield sterile phenotypes without altering somatic growth. While these methods are not yet commercially applied in striped bass, they are commercially available technologies for other marine fish species and the technology represents a potential long-term avenue for highly reliable reproductive control.

Monosex or Sex-ratio Control

Manipulation of sex ratios, such as producing all-male or all-female populations, can reduce reproductive capacity if only one sex is cultured. For striped bass, male fish reach sexual maturity earlier and could present a higher risk of genetic introgression following escapes, whereas all-female populations may reduce this risk (Waldman et al., 2012). Sex control has been applied in other aquaculture species through hormonal or genetic methods (Beardmore et al., 2001; Luckenbach et al., 2017; Berlinsky et al., 2020), but further research is needed to assess its feasibility in striped bass.

Research and Development

Development of sterility induction methods for striped bass aquaculture remains a critical research need. While the domesticated broodstock line developed at North Carolina State University provides a stable genetic foundation for offshore farming, it has not yet been systematically adapted for sterility. Developing robust and commercially viable sterility methods, whether through triploidy, gene knockdown, or sex-ratio control, would likely require 4–5 years of focused research to optimize protocols compatible with domesticated strains and evaluate fish performance in a commercial setting. Investment in this research would provide regulators and producers with a powerful tool to minimize ecological risk and ensure the sustainability of offshore striped bass aquaculture.

10 Aquatic Animal Health Considerations for Offshore Aquaculture

Disease is a primary operational risk for striped bass aquaculture and a recurring constraint on economic performance. Offshore net pens can support healthy production, but only when farms prevent pathogen introduction, detect problems early, and respond quickly under a regulated framework (Rhodes et al., 2023).

Open water pens continuously exchange water with surrounding ecosystems. That exchange improves flushing, but it also allows microbes and parasites to move between cultured fish and wild fish. Stocking densities needed for commercial production can amplify outbreaks and increase losses if farms do not maintain strong health controls (Rhodes et al., 2023).

Offshore striped bass aquaculture can maintain high animal health standards when farms treat disease as an operational risk that must be managed continuously. The priority is prevention, early detection, and targeted response. Site selection, biosecurity, surveillance, and compliance with therapeutic regulations together reduce disease incidence and limit potential effects on nearby wild fish populations (Rhodes et al., 2023).

10.1 Main pathways for disease and parasite pressure

Several conditions elevate risk in offshore culture, and each point to a specific management response.

1. **Proximity to wild fish**
   Pens located near migratory or resident striped bass can support two-way

movement of pathogens, which raises concerns for both farmed and wild fish (Rhodes et al., 2023).

2. **High connectivity through water exchange**
   Pathogens and parasites can disperse beyond farm boundaries, so surveillance and response planning must account for the broader site area, not only the cage footprint (Rhodes et al., 2023).

3. **Stress and suppressed immune function**
   Handling, fluctuating environmental conditions, and periods of suboptimal water quality can increase susceptibility to infection (Virginia Cooperative Extension, 2023).

4. **Biofouling and infrastructure condition**
   Fouling can reduce water circulation and degrade local water quality inside and around cages. Farms can reduce this risk through routine cleaning and appropriate materials, including copper alloy mesh where feasible (Rhodes et al., 2023).

Once aquatic pathogens establish in natural systems, eradication becomes difficult. Experience and modeling show that farms can increase pathogen abundance in surrounding waters if controls fail, which can affect farm productivity and nearby wild populations (Rhodes et al., 2023).

10.2 Striped bass pathogens and treatment considerations

Striped bass culture faces a recognizable set of bacterial and parasitic hazards, with risk shaped by environment, husbandry, and baseline pathogen presence.

In the Chesapeake Bay, mycobacteriosis caused by *Mycobacterium shottsii* and *M. pseudoshottsii* is endemic among juvenile wild striped bass, particularly in nutrient enriched estuaries. Mycobacteria also occur in cultured striped bass and hybrid striped bass, most often in recirculating systems, broodstock settings, or facilities experiencing chronic stress and poor water quality. Relative to other bacterial diseases, mycobacteriosis is not typically a leading driver of commercial losses. Columnaris disease, caused by *Flavobacterium covae*, remains a concern for net pen production. Additional pathogens and parasites documented for striped bass include the following (Paperna and Zwerner, 1976; Rhodes et al., 2023; MD DNR, 2024).

- *Ichthyophthirius multifiliis*, a protozoan that causes ich, or white spot disease, in freshwater fish (Rhodes et al., 2023).

- *Edwardsiella tarda*, which can cause systemic infection and mortality (Lee Herman and Bullock, 1986).

- *Streptococcus iniae*, documented in hybrid striped bass with systemic impacts (Evans et al., 2006).

Parasites can cause meaningful health impacts when infestation intensity is high, increasing stress and weakening fish condition (Rhodes et al., 2023).

10.3 Prevention focused management

For striped bass aquaculture, prevention carries the most weight. Farms typically rely on vaccination where available, strict biosecurity, careful water quality management, and structured health monitoring to detect emerging problems before mortalities escalate (Evans et al., 2006).

Several actions consistently support better health outcomes:

Area of Focus	Key Practice/Goal
Optimal Water Quality	Maintaining stable, high-quality water conditions to reduce stress and disease susceptibility.
Nutrition	Proper nutrition is critical for supporting the immune system and overall health of cultured striped bass.
Robust Biosecurity	Preventing pathogen introduction through controlled stock movements, disinfection protocols, and equipment sanitation.
Appropriate Stocking Densities	Avoiding overcrowding to limit stress and disease transmission.
Regular Health Monitoring	Early detection of pathogens or parasites through systematic surveillance, diagnostics, and record keeping.
Strategic Site Selection	Well-sited net pens in areas with adequate current flow help disperse waste, excess nutrients, and potential pathogens. Good water exchange reduces the concentration of organic matter and microbial loads, limiting the accumulation of disease agents. Sites must also allow for practical access and regular monitoring.

10.4 Therapeutants, antibiotics, and U.S. regulatory oversight

Even well managed farms sometimes require therapeutic intervention to address mortalities, infestations, or infections (FDA, 2022). In U.S. marine aquaculture, the set of approved options remains limited compared to other animal production sectors (FDA, 2022). Therapeutant use is governed by a regulatory system designed to protect animal health, the environment, and food safety (FDA, 2020). Treatments, including extra label use where applicable, require veterinary supervision and must follow federal rules. Current constraints include the lack of therapeutants explicitly approved for offshore marine aquaculture systems in the United States, which increases the importance of prevention and careful case management (FDA, 2020).

FDA provides central oversight for aquaculture therapeutics, and this oversight helps limit ecological risk associated with medication use (Scott, 2004). Management approaches that reduce parasite pressure, such as adjusting stocking densities and timing stocking events, can reduce reliance on drugs. Antibiotic use has declined substantially in salmon aquaculture, including a reported drop of roughly 90 percent around the turn of the century with continued reductions thereafter (Tveterås 2002). In Maine, antimicrobial medicated feeds such as oxytetracycline were reported in 8 percent of salmon production cycles from 2003 to 2017, with no reported use from 2009 to 2017 (Love et al. 2020). Despite declining use, antibiotic persistence in sediments can range from days to years depending on light, oxygen, pH, temperature, and sediment characteristics (Adenaya et al. 2023; Coyne et al. 2001; Rigos and Troisi 2005). This persistence can contribute to selection for antibiotic resistant bacteria near aquaculture sites, so any use should remain limited and carefully controlled.

At present, no antibiotics are approved for striped bass and other marine aquatic species. Some broad-spectrum antibiotics and feed additives, including florfenicol and oxytetracycline, may be available under the National Investigational New Animal Drug Program as permitted by the U.S. Fish and Wildlife Service. Use should remain sparing, under veterinary oversight, and consistent with approved protocols to limit environmental accumulation and ecological disruption.

10.5 Vaccines and alternatives

Vaccines have been under development in aquaculture for more than 50 years and now represent a rapidly expanding disease prevention tool. Adoption varies because cultured species, production conditions, and delivery methods differ widely across aquaculture systems. Even so, vaccine development and use increasingly supports production practices that reduce antibiotic dependence while improving fish welfare.

11 Resource Use and Operational Efficiency in Offshore Striped Bass Aquaculture

Striped bass aquaculture is resource-intensive, but innovations in feed efficiency, automation, and renewable energy offer pathways to reduce costs and environmental impacts. Studies suggest offshore production can be profitable when efficiency is prioritized at scale. With continued improvements, striped bass farms could achieve both economic competitiveness and operational sustainability in U.S. waters.

11.1 Feeds and Feed Efficiency

Feed represents the single largest input cost in striped bass aquaculture and is the most significant driver of environmental performance. Research has focused on reducing reliance on fishmeal and fish oil while maintaining growth and health outcomes. Alternative ingredients such as soybean meal, corn gluten meal, and poultry by-product meal show promise, though digestibility and nutrient availability remain ongoing challenges (Fujita et al., 2023). Novel sources, including insect meals, bacterial biomass, fish silage, and single-cell proteins, are also being tested as viable replacements for traditional marine-derived proteins (Turchini et al., 2019; Glencross et al., 2007). Advances in formulation now allow diets to be tailored to species-specific needs, improving feed conversion ratios (FCR) and nutrient retention (Price & Beck-Stimpert, 2014; Hua et al., 2019).

Aquaculture has historically relied on forage fish (e.g., anchovy, sardine, menhaden) due to their high-quality protein and omega-3 fatty acids, with roughly 20 million metric tons (≈20% of the global marine harvest) processed annually for fishmeal and oil (FAO, 2018). However, supply has plateaued, and their proportional use in aquafeeds has declined for two decades (Naylor et al., 2021). Despite these trends, fishmeal and fish oil remain critical for some marine species requiring highly digestible proteins and long-chain polyunsaturated fatty acids (Hua et al., 2019). Studies have shown that alternative protein sources can replace much of the fishmeal in aquaculture diets without compromising performance (Rust et al., 2011; Gatlin et al., 2007). Plant proteins (soy, corn, algae, seaweed) and microbial or insect meals offer scalable solutions, with ongoing USDA and NOAA-supported research aimed at reducing environmental impacts and improving adoption (Rexroad et al., 2021).

Striped bass have demonstrated efficient feed conversion and can grow well on formulated diets with reduced reliance on fishmeal and fish oil (Rexroad et al., 2021; Andersen et al., 2021). This flexibility distinguishes them from other marine carnivorous species and helps limit pressure on forage fish resources. Continued refinement of striped bass-specific feeds will further strengthen the species' sustainability profile while supporting offshore aquaculture development.

11.2 Energy Use

Energy use is a major determinant of both cost and environmental footprint in offshore striped bass farming. Operations require energy for feeding, monitoring, cage maintenance, harvesting, and transport (Price & Beck-Stimpert, 2014). Lacking grid connectivity, farms rely on fossil fuels or renewable systems to power infrastructure (Fujita et al., 2023).

Harvesting is especially energy-intensive, with vessels consuming fuel for propulsion, refrigeration, and lifting equipment. Long-distance logistics amplify these demands, raising operational costs and carbon emissions (Sardar et al., 2025; Basurko et al. 2013). Optimizing vessel routing and adopting hybrid or alternative-fuel vessels can reduce energy use.

Renewable energy technologies such as floating solar, wave, and hybrid wind-solar systems are increasingly evaluated as alternatives for offshore aquaculture infrastructure (Rubino, 2008; Soto & Wurmann, 2019). Coupled with energy storage, these systems can provide reliable low-carbon power for feeding, sensors, and communications (Haider et al., 2024). Strategic siting also plays a role: proximity to shore reduces vessel fuel use and enables more efficient logistics (FAO, 2024).

As offshore aquaculture expands, energy management will become central to economic viability and environmental performance. Reducing fossil fuel dependence and integrating renewables will support both industry competitiveness and broader carbon-reduction goals. Integrating renewable energy and efficiency technologies can lower operating costs while reinforcing the sustainability profile of offshore striped bass aquaculture, strengthening its alignment with U.S. climate and seafood goals.

12 Historical Review of Research Initiatives and Commercial Projects

Past research and pilot projects in the U.S. and abroad show that striped bass aquaculture is biologically feasible but historically hampered by regulatory uncertainty, infrastructure challenges, and limited market development. Recent advances in genetics, production systems, and consumer demand now address many of these barriers. These lessons confirm that the current moment offers the strongest opportunity yet for offshore striped bass aquaculture to succeed.

12.1 Research Initiatives

StriperHub, a coordinated NOAA Sea Grant initiative led by North Carolina Sea Grant and North Carolina State University, is advancing striped bass aquaculture in the U.S. by integrating genetics, production research, and industry outreach. Long-term selective breeding programs at NC State's Pamlico Aquaculture Field Laboratory have produced domesticated lines with improved growth, feed efficiency, stress tolerance, and disease resistance, now capable of reaching 1.8 kg within 18 months. By coupling these advances with seed production, grow-out demonstrations, and market development, StriperHub is positioning pure-line striped bass to compete directly in both premium and commodity markets, creating new opportunities for expansion of U.S. aquaculture.

The USDA has played a pivotal role in advancing striped bass and hybrid striped bass aquaculture through strategic research funding and breeding programs. Notably, USDA-supported initiatives, such as the National Research Support Project 8 (NRSP-8), NIFA projects, and Agricultural Research Service (ARS) collaborations, have fostered genetic improvement and selective breeding efforts, enabling enhanced growth, disease resistance, and performance in RAS and pond systems. These investments, combined with targeted SBIR grants focused on pedigree tracking, semen preservation, and broodstock development, have strengthened the industry's capacity for commercial diffusion of superior striped bass genetics

12.2 Marine Cage Culture

United States

Over the past five decades, several experimental and pilot-scale commercial attempts have been made to culture striped bass in marine net pens or cages, particularly in New York waters. These projects demonstrated the biological feasibility of cage culture but also underscored the environmental and operational challenges. The earliest documented trial occurred in 1974–1975, when researchers deployed floating cages in a seawater lagoon off Shelter Island, New York. Fingerlings stocked in the fall suffered from mortality events when water temperatures dropped to 1 °C, necessitating onshore overwintering. Restocked fish grew during the following summer, but survival and retention were poor due to escapes, and only 14% were harvestable by fall (Harrell et al., 1976). A second pilot project in 2011 stocked 15,000–20,000 striped bass into net pens in New York State waters (University of Vermont Sea Grant, 2022). This effort was short-lived after a vessel strike damaged infrastructure and Hurricane Sandy further disrupted operations, ultimately forcing removal of the pens. Finally, in 2012, a private venture launched in Gardiners Bay at the northern end of Long Island. Striped bass raised in net pens exhibited strong growth and survived the impacts of Hurricane Sandy. Fish were later transferred to an onshore facility and marketed through restaurants and seafood retailers in Long Island and Manhattan, demonstrating small-scale biological and commercial feasibility. However, broader challenges related to permitting, scalability, and storm resilience remain unresolved (Multi Aquaculture Systems, 2012).

Collectively, these U.S. case studies highlight both the opportunities and risks of striped bass aquaculture in marine cages. While growth performance can be strong, success depends heavily on site selection, infrastructure resilience, and regulatory clarity. Despite these challenges, multiple offshore aquaculture initiatives have identified striped bass as a promising candidate for the U.S. EEZ in recent years. These include Pacific Ocean AquaFarms, with proposed sites off San Diego and Long Beach, California, and Manna Fish Farms, with proposed sites off Pensacola, Florida, and Long Island, New York.

International

Pacifico Aquaculture, founded in 2010 in Ensenada, Baja California, was the first and only commercial-scale offshore striped bass farm in North America. Situated 8 miles offshore near Isla Todos Santos, the operation utilized marine net pens supported by a hatchery and nursery RAS at Playa Tres Emes, where juveniles were reared to approximately 80 g before transfer offshore. The company achieved four-star Best Aquaculture Practices (BAP) certification, encompassing hatchery, grow-out, processing, and feed, and was recognized by Monterey Bay Aquarium's Seafood Watch with a "Good Alternative" rating. At its peak, Pacifico consistently produced up to 3,200 metric tons annually, with ambitions to scale toward 20,000 metric tons per year. Their product was marketed to "conscientious consumers" and premium channels across North America. Its striped bass entered retail and foodservice markets through distribution partnerships with Whole Foods, Amazon Fresh, Fresh Direct, Earth Fare, and through Santa Monica Seafood in California and the U.S. Southwest. Nationwide distribution extended through wholesalers such as Profish, Seattle Fish Company's Chef's Fresh Fish, Samuels Seafood, and Wulf's Fish, while restaurant chains including Pacific Catch prominently featured the product. Pacifico was also a regular exhibitor at the Seafood Expo North America, where it promoted its brand and product lines to domestic and international buyers.

For more than a decade, Pacifico represented the sole commercial example of offshore striped bass aquaculture in the region. In June 2025, the company ceased operations, marking the closure of North America's only offshore striped bass producer and concluding a pioneering commercial effort (Fiorillo, 2025; Mayer, 2025).

Several co-authors of this report conducted site visits to the Pacifico operation during commercial development, peak production, hatchery construction, and following its closure, providing important lessons for future striped bass aquaculture development. Despite strong market demand, the operation experienced persistent production challenges, largely attributed to suboptimal siting relative to suitable thermal regimes. Temperature variability negatively affected growth rates and feed conversion efficiency, resulting in inconsistent production performance and difficulty in reliably supplying product to market. These observations underscore the critical importance of precision siting to ensure thermal suitability, production reliability, and long-term commercial viability for offshore striped bass aquaculture.

12.3 Recirculating Aquaculture Systems

Feasibility of land-based culture has been researched in depth for pure striped bass (Engle et al., 2024), but commercial scale comparables only exist for their hybrids in the U.S. and Asia. The U.S. companies included AquaFuture Inc., founded in 1990 (Turners Falls, Massachusetts) and Kent SeaTech founded in 1972 (Mecca, California). Both operations experienced years of technical successes with the species but economic challenges (e.g., feed cost, energy demand, stagnant fish prices) caused them to pivot to barramundi (*Lates calcarifer*) and biofuel respectively. Operations in China continue to demonstrate successful production in RAS for their domestic premium markets. Although the biological and technical potential exists to produce pure striped bass at scale in RAS, concerns about operating costs and market price remain when raising fish to marketable size.

12.4 Pond Aquaculture

Most commercial striped bass and hybrid striped bass production occurs in the southeastern and midwestern states (notably North Carolina, Arkansas, Mississippi, and Texas) where earthen ponds are used for fingerling and grow-out phases. Hybrid striped bass have historically been preferred due to superior hardiness and growth. The typical production system is a two-phase model: fry are first reared in hatcheries, then stocked into fertilized ponds to grow into fingerlings or market-size fish. Pond culture benefits from relatively low infrastructure costs and established feed-based management, though it requires substantial land, warm water, and aeration. The 2023 USDA Census of Aquaculture reports there were 57 farms producing hybrid striped bass in the U.S., with 32 of those marketing food-size fish.

13 Conclusions

Striped bass is among the most iconic and economically valuable fishes of the U.S. Atlantic coast. Decades of hatchery propagation, hybrid striped bass aquaculture development, and scientific advances have laid the foundation for farming pure striped bass in offshore environments. This report demonstrates that offshore striped bass aquaculture is biologically feasible, economically competitive, and aligned with national goals of expanding domestic seafood production. Yet, current federal rulemaking prohibits possession of striped bass in the EEZ, creating a de facto ban on offshore striped bass farming along the eastern Atlantic. To advance sustainable aquaculture, this prohibition could be reconsidered. Updating federal and state regulations to explicitly allow striped bass aquaculture in the EEZ would unlock opportunities for economic growth, seafood security, and coastal community development while safeguarding wild stocks through modern genetic, ecological, and regulatory safeguards.

The pathway forward requires targeted investment in science and deliberate policy reform. Offshore striped bass aquaculture should proceed within a precautionary, adaptive management framework that emphasizes ecological compatibility, environmental responsibility, and stakeholder trust. With appropriate research, policy innovation, and regulatory clarity, the U.S. can establish a robust offshore striped bass aquaculture sector that complements conservation of wild fisheries and strengthens the resilience of the seafood supply chain.

13.1 Priority Research Needs

- Offshore production trials: Conduct large-scale demonstration farms to test performance under high-energy offshore conditions.
- Broodstock improvement: Expand selective breeding programs to enhance growth, feed efficiency, and disease resistance in domesticated lines.
- Feeds and nutrition: Optimize sustainable diets using alternative proteins, oils, and functional ingredients tailored to striped bass.
- Genetic containment tools: Develop and validate methods to ensure reproductive sterility of farmed striped bass.
- Fish health management: Advance vaccines and biosecurity protocols for aquatic animal health management in offshore settings.
- Farm economics: Model the production costs and business feasibility of striped bass aquaculture to determine profitability timelines and financial risk.
- Market research: Assess consumer preferences, willingness to pay, and branding strategies for farmed pure-strain striped bass.

- Reproductive control for striped bass aquaculture remains a critical research need.

13.2 Policy and Management Needs

- Regulatory reform: Amend 50 C.F.R. §697.7 to permit aquaculture of striped bass in the EEZ, while maintaining the ban on wild harvest.
- Permitting frameworks: Develop clear, streamlined, and science-based offshore aquaculture permitting pathways that integrate NOAA, EPA, and USACE authority.
- Traceability and labeling: Establish traceability standards to distinguish cultured striped bass from wild harvest, ensuring market integrity.
- Compliance and enforcement: Implement monitoring systems to verify containment, environmental compliance, and genetic safeguards.
- Biosecurity regulations: Update aquatic animal health frameworks to address offshore net-pen systems, including rapid response protocols for disease events.
- Stakeholder engagement: Facilitate public and industry input into striped bass aquaculture planning to build social license and reduce conflict.
- Workforce development: Support training programs to transition maritime workers into skilled aquaculture careers.

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From:	Alex Balboa
To:	Emilie Franke
Subject:	[New] [External] fisheries
Date:	Friday, February 6, 2026 10:05:08 PM
Attachments:	New York State DEC Issues Urgent Warning For Hudson River.pdf A Maryland way to help the Bay Columns stardem.com.pdf Maryland Eyes August Rockfish Ban to Save Struggling Striped Bass - The Southern Maryland Chronicle.pdf Chesapeake Bay Foundation Encourages the Public to Support Maryland"s Striped Bass Fishing Season Adjustment • Chesapeake Bay Foundation.pdf Watershed Woes - NumbersUSA.pdf Third Year Of Poor Hudson River Striped Bass Reproduction Could Mean Fewer Fish Ahead DEC Ossining Daily Voice.pdf New plan aims to protect striped bass as Maryland seeks feedback.pdf Guest Opinion Save Omega Protein - Rappahannock Record.pdf Menhaden research receives federal funding, but advocates want action now Fisheries bayjournal.com.pdf

Friday 6 February 2026 2200 hours

To whom it may concern

I was reading the latest news media articles regarding the striped bass and menhaden fishery with great interest. Media reports continue to underscore alleged widespread destruction of the striped bass and menhaden fishery and habitat at all levels by commercial and recreational overharvesting in federal and state waters throughout the Chesapeake Bay and surrounding ocean ecosystem, despite strong documentation indicating such problems exist. This is also allegedly contributing to the significant precipitous decline in the health of striped bass as well. Please coordinate, collaborate and cooperate on Federal, State and/or local jurisdictional levels in addressing these concerns potentially impacting adversely the public's finances, policies, trust, confidence, and quality of life issues.

Thank you for your time in this matter and hope to hear from you soon.

Sincerely,
Alex Balboa
1996 Waverly Drive
Bel Air, MD 21015-1100
USA

From:	Scott Krista
To:	Comments
Subject:	[New] [External] Striper bass CT
Date:	Sunday, March 22, 2026 4:36:18 PM

Hello

I have been fishing striped bass for over 30 and while I understand control of bringing back the bass in full expectations you will decimate the economy of marinas, tackle shops, restaurants,charters and the boat market. I think you should not allow any taking of bass . Make it all catch and release for recreational and commercial. Please don’t kill one of the things I look forward to doing each season.

Scott
Tight Lines
Sent from my iPhone

From:	Comments
To:	Emilie Franke
Subject:	FW: [New] [External] Comments for upcoming Striped Bass Work Group
Date:	Monday, March 2, 2026 10:39:38 AM

From: Carl Tiska <carl.tiska@gmail.com>
Sent: Saturday, February 28, 2026 4:03 PM
To: Comments <comments@asmfc.org>
Subject: [New] [External] Comments for upcoming Striped Bass Work Group

Dear Members of the Striped Bass Work Group,

I am an avid recreational kayak angler based in Rhode Island. I am a harvester rather than a catch-and-release angler. Over the past few years, despite the local abundance of striped bass in the waters in which I fish, I have stopped targeting striped bass due to the overfished status of the stock and have shifted my effort to other species. I am supportive of the Work Group proposing the most conservative measures possible to rebuild the striped bass spawning stock biomass.

While the recent Massachusetts DMF study on post-release mortality concluded that mortality is below the currently accepted 9% figure, recreational post-release mortality will continue to comprise a significant percentage of total striped bass mortality. Clearly there are significant challenges with developing measures to reduce release mortality, as the recent Addendum III process demonstrated, but I believe that the Work Group should consider two measures so that the catch-and-release anglers can contribute to rebuilding the striped bass SSB: prohibiting striped bass tournaments while the stock remains overfished, and prohibiting treble hooks when fishing for striped bass.

Some organizations, like the Rhode Island Saltwater Anglers Association, no longer have a striped bass category in their annual fishing tournament. This is responsible and commendable, but unfortunately it is not universal. For instance, On the Water magazine runs a yearlong ‘Striper Cup’ which, in the kayak category, encourages anglers to catch the largest possible striped bass throughout the season, including the months when the water temperature is the warmest, which as is known, increases release mortality. I regularly fish in one of the more popular spots for many contestants in the kayak category of the ‘Striper Cup’ and once the time frame of the ‘Striper Cup’ ends in mid-September, striped bass fishing effort drops off markedly, even though there are still striped bass in abundance at that location. It is not speculative to state that the ‘Striper Cup’ increases effort and consequently results in more dead stripers than if the tournament were not held. Prohibiting striped bass tournaments will reduce release mortality.

Unlike the other possible management efforts, prohibiting striped bass tournaments would be easy to enforce and wouldn't risk significant economic impacts on guides, commercial fishermen or fishing businesses. Catch and release fishermen would still be able to fish; they just wouldn't be incentivized to overfish stripers to win prizes. Taking this measure would be 'low hanging fruit', like when the Board prohibited gaffing stripers a few years ago.

The recent Massachusetts DMF study observed a higher post-release mortality rate for striped bass caught with a treble hook than for fish caught with a single hook, providing scientific data of something that we all suspected. While enforcement would be challenging for a treble hook prohibition, it would be no more challenging than the current requirement to use a circle hook when fishing live bait for striped bass.

These two measures would enable catch-and-release fishermen to contribute to rebuilding the striped bass SSB and be much easier to enforce than no-targeting closures, and I hope that the Work Group will consider them. Thank you for the opportunity to provide feedback through your public comment process.

Sincerely,
Carl Tiska
24 Van Zandt Ave
Newport RI 02840
carl.tiska@gmail.com