Atlantic States Marine Fisheries Commission

Atlantic Menhaden Management Board

November 3, 2015
3:15 – 5:45 p.m.
St. Augustine, Florida

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 (*R. Boyles Jr.*)	3:15 p.m.
2.	Board Consent • Approval of Agenda • Approval of Proceedings from August 2015	3:15 p.m.
3.	Public Comment	3:20 p.m.
4.	Update on Draft Amendment 3 Development • Revisiting Fishery Allocation (*M. Waine*) • Ecosystem Management Objectives Workshop (*S. Madsen*)	3:30 p.m.
5.	Biological Ecological Reference Point Working Group Report (*M. Cieri*) **Action** • Recommendations for Models Based on Ecosystem Management Objectives • Timeframes for Ecological Based Reference Points	4:00 p.m.
6.	Discuss Draft Amendment 3 Timeline and Direction (*M. Waine*)	4:30 p.m.
7.	Discuss Allowance of Cast Nets under the Bycatch Provision of Amendment 2 (*R. Boyles Jr.*) **Possible Action**	5:15 p.m.
8.	Other Business/Adjourn	5:45 p.m.

The meeting will be held at the World Golf Village Renaissance; 500 S. Legacy Trail; St. Augustine, FL; 904-940-8000

MEETING OVERVIEW

Atlantic Menhaden Management Board Meeting
November 3, 2015
3:15 – 5:45 p.m.
St. Augustine, Florida

Chair: Robert Boyles Jr. (SC) Assumed Chairmanship: 8/13	Technical Committee Chair: Jason McNamee (RI)	Law Enforcement Committee Representative: Kersey
Vice Chair: Robert Ballou (RI)	Advisory Panel Chair: Jeff Kaelin (NJ)	Previous Board Meeting: August 5, 2015
Voting Members: ME, NH, MA, RI, CT, NY, NJ, DE, MD, PRFC, VA, NC, SC, GA, FL, NMFS, USFWS (17 votes)		

2. Board Consent

- Approval of Agenda
- Approval of Proceedings from August 2015

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. Update on Draft Amendment 3 Development (3:30 – 4:00 p.m.)

Background: Revisiting Fishery Allocation

- At its May 2015 meeting, the Board initiated Draft Amendment 3 which will consider changes to the management program including ecological reference points and revisiting allocation.
- The Board established a Board Working Group (WG) to aid in the development of issues to be addressed in Draft Amendment 3.
- The WG met several times via conference call between the August and November Board meetings to continue discussing potential allocation options for inclusion in the Draft Amendment 3 development process (**Briefing Materials**).
- The Committee for Economic and Social Sciences (CESS) is working on a request for proposal to evaluate the current socioeconomic importance of the Atlantic menhaden fishery. It is expected that the socioeconomic analysis will help the board evaluate the trade offs of different allocation scenarios. The timeline for completing the socioeconomic work is 12-18 months.

Background: Ecosystem Management Objectives Workshop

- A facilitated workshop with participation from managers, industry, and technical advisers was held to develop ecosystem management objectives for the Atlantic menhaden fishery (**Briefing Materials**).
- Staff will provide a progress report on the development of Draft Amendment 3 as it relates to revisiting allocation, and exploring ecosystem management objectives

Presentations

- Revisiting Fishery Allocation by M. Waine
- Ecosystem Management Objectives Workshop by S. Madsen

5. Biological Ecological Reference Point Working Group Report (4:00 – 4:30 p.m.) Action

Background

- The BERP WG has identified potential modeling approaching to develop ecosystem based reference points that address ecosystem based management objectives identified by the facilitated workshop conducted in August (**Supplemental Materials**).
- The BERP WG estimates that with the recommended modeling approaches the ecological reference point (ERP) development timeframe is estimated at 3-4 years.

Presentations

- Model Recommendations and Timeframes for ERP Development by M. Cieri

Board actions for consideration at this meeting

- Task BERP WG with ERP development

6. Discuss Draft Amendment 3 Timeline and Direction (4:30 – 5:15 p.m.)

Background

- The CESS is working on a request for proposal to evaluate the current socioeconomic importance of the Atlantic menhaden fishery. It is expected that the socioeconomic analysis will help the board evaluate the tradeoffs of different allocation scenarios. The timeline for completing the socioeconomic work is 12-18 months.
- The BERP WG estimates that with the recommended modeling approaches the ERP development timeframe is estimated at 3-4 years.
- The Board will discuss a timeline and provide direction for moving forward with Draft Amendment 3 given the pending work schedules of the CESS as it applies to revisiting allocations and the BERP WG as it applies to developing ecosystem based reference points.

7. Discuss Allowance of Cast Nets under the Bycatch Provision of Amendment 2 (5:15 – 5:45 p.m.) Action

Background

- At its February 2014 meeting, the Board approved a motion to manage cast net fisheries for menhaden under the bycatch allowance for 2014 and 2015, with the states bearing responsibility for reporting.
- From 2013-2014, cast nets landed an average of 750,823 pounds accounting for approximately 0.2% of the total landings (preliminary data, subject to change).

Presentations

- Background on Performance of Atlantic Menhaden Cast Net Fisheries by M. Waine

Board actions for consideration at this meeting

- Consider the expiring provision that manages cast net fisheries under the bycatch allowance.

8. Other Business/Adjourn

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

ATLANTIC MENHADEN MANAGEMENT BOARD

The Westin Alexandria
Alexandria, Virginia
August 5, 2015

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

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ATTENDANCE

Board Members

Terry Stockwell, ME, proxy for P. Keliher (AA)
Rep. Walter Kumiega, ME, proxy for B. Langley (LA)
Doug Grout, NH (AA)
G. Ritchie White, NH (GA)
Dennis Abbott, NH, proxy for D. Watters (LA)
Jocelyn Cary, MA, proxy for S. Peake (LA)
David Pierce, MA (AA)
Bill Adler, MA (GA)
Eric Reid, RI, proxy for Sen. Sosnowski (LA)
Robert Ballou, RI (AA)
David Simpson, CT (AA)
James Gilmore, NY (AA)
Emerson Hasbrouck, NY (GA)
Katherine Heinlein, NY, proxy for P. Boyle (LA)
Tom Fote, NJ (GA)
Russ Allen, NJ, proxy for D. Chanda (AA)
Adam Nowalsky, NJ, proxy for R. Andrzejczak (LA)
Loren Lustig, PA, (GA)
Tom Moore, proxy for M. Vereb (LA)
John Clark, DE, proxy for D. Saveikis (AA)
Roy Miller, DE (GA)
Craig Pugh, DE, proxy for W. Carson (LA)
Lynn Fegley, MD, proxy for D. Goshorn (AA)
Bill Goldsborough, MD (GA)
Dave Sikorski, MD, Proxy for D. Stein (LA)
Rob O'Reilly, VA, proxy for J. Bull (AA)
Kyle Schick, VA, proxy for R. Stuart (LA)
Catherine Davenport, VA (GA)
Louis Daniel, NC (AA)
Bob Steinburg, NC (LA)
Robert Boyles, Jr., SC (AA)
Ross Self, SC, proxy for R. Cromer (LA)
Tom Fote, GA (GA)
Patrick Geer, GA, proxy for Rep. Burns (LA)
Jim Estes, FL, proxy for J. McCawley (AA)
Thad Altman, FL (LA)
Martin Gary, PRFC
Derek Orner, NMFS
Wilson Laney, USFWS

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

Ex-Officio Members
Lloyd Ingerson, Law Enforcement Representative
Jason McNamee, Technical Committee Chair
Jeff Kaelin, Advisory Panel Chair

Staff
Shanna Madsen
Bob Beal
Toni Kerns
Mike Waine

The Atlantic Menhaden Management Board of the Atlantic States Marine Fisheries Commission convened in the Edison Ballroom of The Westin Alexandria, Alexandria, Virginia, August 5, 2015, and was called to order at 2:55 o'clock p.m. by Chairman Robert H. Boyles, Jr.

CALL TO ORDER

CHAIRMAN ROBERT H. BOYLES, JR.: Good afternoon, everybody. My name is Robert Boyles. I have the privilege as serving as the Chair of the Atlantic Menhaden Board. We'd like to call the Menhaden Board Meeting to order.

APPROVAL OF AGENDA

CHAIRMAN ROBERT H. BOYLES, JR.: The first item on the agenda I'm seeking is your consent for the approval of the agenda, which was submitted to as part of the briefing package. Are there any additions to the agenda; any changes to the agenda? I see none, so the agenda will stand adopted as presented.

APPROVAL OF PROCEEDINGS

CHAIRMAN ROBERT H. BOYLES, JR.: The next item is the approval of proceedings from our last meeting in May of 2015. Again, those proceedings were included in the briefing package. Any additions or edits to those proceedings? Seeing none, I'm seeking consent to approve those proceedings as presented. Those proceedings are approved as submitted.

PUBLIC COMMENT

CHAIRMAN ROBERT H. BOYLES, JR.: Next on the agenda is time for public comment. This is the time for members of the public who may wish to address the board for items that are not on the agenda. I've got no one who has requested time to make comments to the Menhaden Board; but I'll ask one more time just to make sure. I see no requests for public comments; so we will roll on right to the Update on Draft Amendment 3 and turn it over to Mike Waine.

UPDATE ON DRAFT AMENDMENT 3 DEVELOPMENT

MR. MIKE WAINE: I'm going to take a few moments here and walk everybody through sort of where we're at with Amendment 3 to the Fishery Management Plan for Atlantic Menhaden. A quick overview; in May – this was our last meeting – the board initiated Amendment 3. In this presentation I'll review the development and timeline.

That will include two major issues that have initially been scoped in this amendment, which are ecosystem-based reference points and a revisiting of allocation. I'll talk about a socioeconomic analysis. I will also talk about the process that is involved in the completion of Amendment 3. Starting with ecosystem reference points, the process that is currently occurring is the initial phase of scoping to draft the amendment.

As I talked about earlier at the Tautog Board, we've got two different rounds of public input that happens during an amendment process. The first is a public information document and the second is the actual amendment. All of the things that I'm about to talk to are things that are happening prior to us actually drafting the PID.

I'll get into that a little bit later, but I'm starting with ecosystem reference points. This is really the first step. We're going to establish a range of management objectives; and to do that the board the board established a working group, which has got representation from the management board, representation from the advisory panel and representation from our technical folks, including the Ecological Reference Point Working Group that has been essentially working on ecosystem reference points for quite some time.

UPDATE ON ECOSYSTEM MANAGEMENT OBJECTIVES WORKSHOP

MR. MIKE WAINE: We've got this multi-representative panel that's going to have a work shop at the end of this month for two days. That workshop is going to be facilitated by Dr. Mike Jones. He was the SEDAR 40 Peer Review Chair that we just had for the benchmark stock assessment in 2015. Ultimately the intent of this workshop is to refine a consensus list of objectives for the board to review during their annual meeting.

What I mean when I say that is we anticipate that this panel of multiple different representatives will come up with up with a list of potential ecosystem management objectives that the full board can review in November. The workshop process is the step that we're going through to create that list. Ultimately from that the board would then task the development of ERPs that are based on that final list of potential objectives.

What ultimately we expect to happen is there is going to be a quantitative component to this as well; so matching up with whatever the management objectives end up being, there will be quantitative modeling that goes along with producing ERPs. There is some work that will need to be done after the board sort of reviews that initial cut of what potential management objectives there could be. That is essentially the process. It is slightly new for the commission so I spent a little more time on it.

Prior to that workshop we're going to have a webinar for this panel. On that webinar we're going to review the topics to be covered, expectations and anticipated outcomes of this workshop. Mike Jones, the facilitator, will be going through a case study that will be applicable to sort where we're at with menhaden management.

He is going to pull from the Great Lakes Region to give that panel some idea of how the workshop will occur and what we're looking to be the products coming out from that. Also this webinar that is going to occur in a couple of weeks will also allow that larger workgroup to provide feedback and ask questions on the process.

REVIEW OF FISHERY ALLOCATION DEVELOPMENT

MR. MIKE WAINE: The next big topic that is being scoped through Amendment 3 is the revisiting of allocation. I just wanted to take a moment to remind the board of where we're at with this and how we got to this point. In Amendment 2, which is currently the amendment the fishery is operating under, there is a provision in there that the board will revisit allocation in 2016.

That was three years after the implementation date of Amendment 2, which was January 1, 2013. Right now we have a total allowable catch – for the coast it is allocated by states, and that allocation is based on the average landings from the years 2009 through 2011. State-by-state allocation; currently we have this revisit provision that has included this allocation topic to be scoped in Amendment 3.

Where are we at with this process? This same board sub-group that I mentioned for the Ecosystem Management Objective Workshop is also working on this revisiting allocation. Initially they're exploring a full range of allocation options. They're considering old and new concepts; so concepts that we had initially scoped through Amendment 2, when we first were considering allocation in this fishery.

Really, their intent here was to start broad and then focus on the specifics. This board sub-group came up with the draft goal of fair and equitable distribution of the coast-wide total

allowable catch among states and jurisdictions, regions and fishery interests. Over the next couple of slide I'm going to walk through basically a comprehensive list that this board's working group put together.
It represents basically where we're at in the process of them developing the initial ideas about what revisiting allocation would look like. The allocation options to be considered in this – and this is essentially the list that came out of some working meetings from this group – are coast-wide quota, regional quotas, state-by-state quotas which we currently use, seasonal quotas, separate quotas for bait and reduction fisheries – those are the end users – the disposition of the catch, separate quotas for different fleets or small, medium and large-scale fisheries within the larger menhaden fishery.

That is a gear type/harvest capacity allocation idea. There is a couple of others that were a little bit different, which had more of the set-aside small capacity and allocation that would be used by a very small-capacity fleet; so that fluctuations in the fisheries can be monitored. Ultimately these are just ideas that this working group was putting in front of the board to give them a sense for what they were thinking about with allocation.

Another one that made the list was minimum fixed-quota levels. That is something that we've also seen in the eel plan. Some of the potential factors that coincided with that initial brainstorm of potential allocation options were on the list that you see here. Ultimately what I'm running through is the summary that we provided on the board materials; and so if you don't catch all of this, it is in that document as well.

Some of the potential factors were historical catch or landings; so considering the time frame and the data availability. As you remember, some of the discussions we've had from the performance on Amendment 2 is the data availability over the time frame that we allocated and also making sure that the landings are up to date and which time frame to use; obviously a big factor to consider for allocation.

What the commercial capacity and interests are; so not just the harvester side of things but also the processing. We've heard some of that input along the way from our advisory panel as well. Availability and distribution of the resource; remember menhaden is not ubiquitous across it is range and so movement patterns and availability through time.

Biological and ecological principles; needs and interests of small-scale, fixed gear versus large-scale mobile gear; and, of course, the bycatch allowance topic that we've talking about through the review of the performance of Amendment 2; and also the transfer of quotas. Moving on to some other continued factors; we're talking about credit for biological monitoring that guides against local depletion.

The example that came up here was the biological monitoring program that the state of Rhode Island uses in Narragansett Bay. There was also credit for data collection programs and improved water quality, incentives for sound ecological and biological use of the resource, incentives for reduced discard mortality, management and operational efficiencies, consideration of a research set-aside and ongoing provisions for revisiting allocation.
This is basically supposed to put in front of the board an initial check-in on how the working group is proceeding on this topic. Remember the working group is not making any decisions on this. They're simply creating and brainstorming a list and then we'll start working on individual allocation scenarios to give more understanding and perspective for what those would look like for the menhaden fishery.

A couple of things to note before we move on from this topic; there is concern about the

incomplete landings' data. I have mentioned that. Of course, we want to encourage states to identify data gaps to staff. I have been working with the states to pull together the most up-to-date landings' history records by state for the menhaden fishery; and so ensuring that I fully characterize any data gaps within that spreadsheet will be important moving forward so that we can include those caveats for anything that gets developed.

Then the Board Working Group will bring things back for November once they have an opportunity to work through the specifics of some of these options. Ultimately the full board will review where we're at with that at the November meeting. Moving into the socioeconomic analysis, basically through the amendment process we're looking to do a social and economic analysis. The goal of this is to analyze the Atlantic Menhaden Fishery socially and economically.

Some work has been done previously. Jim Kirkley, a professor from VIMS, had done some work on the reduction fishery. There also is some data gaps on exactly characterizing these components of the fishery and what it means across the coast. We have this Committee for Social and Economic Sciences that is going to define specific project objective and a request for proposal in which ultimately the way this would work is researchers would submit proposals to this and the CESS would act as the review panel for selecting a researcher to tackle this task.

A potential example of objectives that would come out of this would be identify and describe the participants, develop the importance of Atlantic menhaden to fishing communities and really get into the economic value of bait and reduction fisheries. The intent in doing this is to evaluate the tradeoff of basically the allocation scenarios that we've just talked about, which we're scoping through Amendment 3.

I did want to note that the analysis time frame for this will likely be through 2016; so noting that it will take some time to get this RFP out, get some people interested in going after this work and selecting somebody that can produce deliverable results on that time frame. At this point in the presentation, I'm going to move into how does all of this sort of fit into our development of Amendment 3.

REVIEW OF DRAFT AMENDMENT 3 TIMELINE

MR. MIKE WAINE: As I mentioned when we started, the amendment process has two rounds of public input. The first round is a public information document which will end up scoping the management issues. The examples that I laid out are the ecological reference points and the allocation, but this document is not limited to those two topics.

It just happens to be the ones we're currently focusing on in this precursor stage to the development of the public information document. The second part of that process will be actually drafting the amendment; so putting in specific options for management and developing what this plan will look like; in essence, the compliance and implementation of whatever measures come out of the process. I'm going to walk through basically the quickest timeline that this amendment could take from this point.

Pending review of the topics that we just reviewed at the November meeting, the board could task the development of options in the PID. The plan development team would then work between the November and the February meeting to develop a public information document that further scopes and prepares these issues and topics for public input.

Hypothetically bringing that back to board consideration in February, this board would decide whether to send that PID out for public comment. If that was the case, hearings would be held in the spring, and we would bring back

public input on that public information document for the May 2016 board meeting.

After the board reviewed that level of input, they would then task the plan development team to develop specific options that came out of that scoping process into what will be Draft Amendment 3. Picking up from that May meeting, the PDT would then develop the specific options over the summer, bring back a document and draft amendment for board consideration at the August meeting. There the board would consider approving that document for public comment.

We would hold a second round of public hearings on this amendment and bring back the input there at the October meeting – that would be the annual meeting next year – where the board would ultimately select final options and compliance criteria for Amendment 3. With that timeline, the intent would be for implementation to occur for the 2017 fishing season if the board felt comfortable basically implementing the document on that timeline given that it would at our annual meeting next year before they finalized something.

Now, I wanted to take a moment to just talk about a few of the Amendment 3 timeline considerations that I've basically discussed through my presentation. I wanted to summarize a few things. Remember that we're working on developing ecological reference points; and that process is involving this Ecosystem Management Workshop.

It is involving the board essentially deciding on management objectives that incorporate the ecosystem; and then it also relies on technical analysis and modeling to produce ERPs that could be included in the amendment. I just wanted to mention that is going to take some time; and it would be important to consider the timeline in which those get developed and when you think about at what point is the board going to be able to include some of this information into, for example, the public information document versus the actual draft amendment.

The other thing that I talked about pretty extensively today was the social and economic analysis. Because of that process and the way we're working with the CESS as more of a review panel than them actually doing the work and the amount of time that it will take to conduct that, that will likely occur through 2016; and so the board should consider at what point that would be available for inclusion into a document that actually makes it out to comment for the public. There is the possibility that the Amendment 3 timeline that I just walked everybody through would need to be adjusted if the board wants to include these components at the various stages of the development of this document. I just have this caveat in there that if the timeline gets adjusted, implementation is more likely suited for 2018 than it is for 2017. With that, Mr. Chairman, I'll take some questions and definitely some topics to consider moving forward.

CHAIRMAN BOYLES: Mike, thank you for that very comprehensive and thorough review. Before we ask for questions, I'd like to beg your indulgence. Clearly, there is a lot of interest around the table; clearly, there is a lot of interest in this fishery and in this resource; and, clearly, there are a lot of us, both at the table as well as in the room, who are very, very interested and want to participate in these deliberations.

A number of you I know are disappointed that you're not a formal member of the working group; but I think what you see in terms of what Mike has just presented in terms of what came up just from the allocation deliberations so far; these were things that came from six individuals who we've asked to be kind of spearheading this on behalf of the board.

I'll again ask your indulgence and bear with us as we work through these complicated and multi-

variate issues. The other thing that I'd like to say to the members of the working group; there is a lot of work yet to be done. Mike has presented to you what is the best possible time frame and any hiccup in our deliberations, any hiccups in our discussions, any additional analyses or things that we need to think about will certainly add to that.

We'd ask Mike to just make sure that we're all on the same page with respect to potential timing. There is a lot to consider. I certainly appreciate the support and the interest that we receive not only from the board but from the members of the public, from our advisors, from our technical advisors, et cetera. This is a set of big issues and I appreciate your forbearance with us. Mike, thank you for the excellent summary of where we are right now. With that, are there questions for Mike on what he has presented? Wilson.

DR. WILSON LANEY: Mike, with regard to the allocation options to be considered – it may be the question I'm going to ask is being considered more under the ecological reference points; but I know that other prey-based fisheries or fisheries that are promulgated on species that are mostly serving a prey function include allocations for species other than those that are targeted by commercial or recreational fisheries like marine mammals and certainly a lot of different bird species in this case for menhaden.

Is that something that the workgroup is thinking about? Does that fall under the ecological reference point's discussion or is that something that should be included under the allocation options, which I guess in other fisheries has been called a forage allocation for lack of a better term?

MR.WAINE: Yes; it is a good question, Wilson. I anticipate that is going to be addressed in the more ecosystem component of this work. The board subgroup that is working on the allocation scenarios is specifically focusing on the fishery. In terms of allocation to the ecosystem, that process is basically going to be addressed in the Ecosystem Management Workshop and then whatever ERPs are developed from that process.

Remember that involves technical committee input, the modeling, the datasets that we've been working with, the ERP Report that was included in the 2015 benchmark assessment that broke all the different models that the BERP Working Group considered when trying to think about how many different approaches could be used for the ERPs; and then the next step of that being defining specific objectives so we can start matching up what the objectives are with the modeling approaches that will get us ERPs from that process.

DR. WILSON: I'll follow up on the socioeconomic aspects of it. It seems to me that given that ASMFC is managing the menhaden stock in a healthy and sustainable manner and given that it is such an important prey item for a lot of other species that are targeted by ecotourism in particular – I'm thinking pelagic sea birding trips here and whale watching trips.

It seems to me that somehow ASMFC's management ought to get some consideration for the socioeconomic benefits of those other types of activities that are not directly related to menhaden but are certainly indirectly subsidized by ASMFC's management, if you will. Maybe that is something we could as the CESS about and see if they could at least put that in their thinking for some consideration for some kind of assessment.

MR. WAINE: Wilson, it is a great suggestion. It is something that came up on our CESS call when we had this discussion about essentially what could we do the funding that is allocated for this process and within the timeline that we're operating on. In its simples form we thought about this as two separate steps; the first being understanding the social and economic analysis

of the fishery; and then the second step being understanding how that relates the ecosystem and the importance of menhaden's role as a forage.

It is something that definitely got considered, but at this stage it would be extremely challenging to accomplish both if those within the scope of the budget and the time that we have, but it was brought up by the CESS.

MR. DAVID SIMPSON: Pretty comprehensive list all around. One that occurred to me especially over the last couple of years, since quota management, that may be on there but I didn't see it on the list is some consideration in the allocation and even ecological reference point development is the change in spatial distribution of menhaden with the changes broadening of the age structure.

It has been apparent to me in the last two years that I have just not in my life seen as many large menhaden or menhaden, period, up our way since quota management. It is kind of an interesting thing. It has come up for other species and so I think it is worth thinking about here.

The other under economic evaluation would be to make sure that we think about alternatives for the bait versus reduction fishery alternative species sort of source raw material that is out there and has important economic implications. Those are my two thoughts of the long list.

MS. LYNN FEGLEY: Mr. Chairman, I was wondering if we could get some clarity on the timeline for the results of the Ecosystem Workgroup. It looked, Mike, like what you said was that this workgroup is going to meet and come up with objectives and then was it at the fall meeting the full board will decide on a list of objectives and task the BERP Group to develop reference points at the fall meeting. I guess my question is when does that pairing of ecosystem objectives and model development actually occur? Are we going at that as early as November; is that what we're aiming for?

MR. WAINE: The short answer would be yes. The long answer involves a laundry list of models and management objectives that we haven't developed yet or the board has to sign on. I think that ideally the hypothetical situation would be that the full board reviews management objectives that come out of the workshop at the annual meeting.

If the board can decide on some objectives that make sense to move forward with; they would be paired up with the ERPs that would basically be a part of that objective. Then that would bring us into the technical phase of that process. At the same time I think we would start developing the public information document.

To be completely honest with the board, I'm thinking out loud right now. We would develop some of those objectives to be included into a public information document. They may not have ERPs at that point. The board may want to try to wait for some ERPs. I think that is my best shot at giving you where I think this is headed and that obviously has some unknowns.

MS. FEGLEY: Thank you for that clarification. I think that is fair enough and that was really my ultimate question was whether it was the intent ultimately to have that pairing of objectives and associated ERPs in the PID. It sounds that's what we want to aim for, but it we would have to take it as it comes.

MR. WAINE: Yes, correct, but remember that it will take quite a bit of work. If we go that route, yes, it is going to take quite a bit of work to get to that point to have ERPs match with objectives all in a PID ready to go in February. I would be impressed if we were at that point; but like I said, there are some unknowns here because we're so early in the process.

MR. WILLIAM J. GOLDSBOROUGH: Mr. Chairman, just an observation to piggyback on Dave Simpson's first comment, which essentially noted that we've had range constriction in this stock and that at least in Southern New England by observations they're starting to see some relief there; and that is certainly good news.

Noting that from some colleagues further north, maybe we're not there yet; that we still have a lack of menhaden farther northern parts of its former range; and so we have a ways to go yet to regrow the stock to fill out that range perhaps even before we are able afford to provide them to the ecosystem. That's worth keeping in mind.

MR. ROB O'REILLY: Mr. Chairman, this isn't exactly a question about the information or what has occurred so far; but I don't mind saying that on the first working group conference call I had reservations that I expressed that we have to be very cautious that the management board itself approves of the type of direction that the working group takes up. I still feel that way and I think that our second call there was more of a direction towards something that the board would approve moving forward.

Mike Waine has presented some of that outcome. I do have sort of a perplexed thought about this process going forward, because I know I think it was 2011 the board was determined that really what should happen – when MSP was the biological reference points, what the board wanted to know was, well, how about these ecological referent points or ecosystem-based reference points; how long would that take to develop? I think Dr. Latour at the time as chair of the technical committee said, well, it may be about three years.

We've surpassed that so we know it is a pretty difficult challenge; but I keep thinking that if one of the big situations we're facing is forage; that it just seems incongruous to work on allocation as more than a guideline of template for what happens in the future once we know what is available forage, what is available for fisheries.

I that is something I tried to express on the first call, and several others did as well; that, if anything, we should have something that can be enacted once we know more and once we have these reference points. I don't think there is any harm in moving forward with the working group and refining the elements that we're ready to bring to the board; but is certainly going to take the board's input because Amendment 2 was a process that was very detailed and discussed to the enth degree it ended up in an allocation system.

You have to ask what has really changed in the minds of the board since no one has said clearly what that is since 2012 as to what this revisiting is all about. It is in Amendment 2 to revisit; but I just want to make sure that the working group gets enough feedback to know what other states have in mind in terms of allocation. I guess it is early in the process based on the timeline that Mike Waine proposed; and so I think there will be an opportunity for the board to provide that guidance to the working group; but I thought it was important to stress that today.

DR. LOUIS B. DANIEL, III: To go back a little further in history, when we did Amendment 2 we had a stock assessment that said we were in a scrape. Then we got a stock assessment that said we weren't; and now we're going to be moving forward with a pretty massive effort in Amendment 3 and our assessment is going to be how old?

The uncertainty that still weighs over this whole process and the quick action that we took to go ahead and harvest more fish at the last meeting has me very concerned. I think you're going to run into numerous problems with the ecological reference points. I think that it is going to delay it further than '18 personally because I don't

think you're going to come up with a suitable management approach using that.

The thing that confounds me about the whole issue is that we're looking at a stock that we're right now managing at about 60 percent SPR, which is right in line with the various Lenfest Reports for forage fish; but yet we're going to go through all these gyrations and try to come up with something better than 60 percent. That seems like a monumental waste of our efforts with the uncertainty associated with that.

I want to bring that up as a point. I'm not on the workgroup; but I'm very concerned about the product that we will end with. I think if you look at your timeline you indicate that 2016 would be definitely included in the CESS analysis. That automatically makes a 2017 implementation date impossible or at least right after the annual meeting.

I think we've got to have that socioeconomic information incorporated into this amendment; and so I think we need to go ahead and set our sights on '18; but I think that would only be if the ecological reference points are toned down significantly from the direction that I think we're headed.

CHAIRMAN BOYLES: Further comments from the board? Seeing none; the board has heard where we are and where we intend to go. We have a lot of work to do. To reiterate both what Louis has just said in terms of the complexity as well as Rob's admonition that we stay closely engaged with this; the Allocation Workgroup is six board members. The board members who are members of the Ecological Reference Points are the same six.

Clearly, there are a lot more than six ideas and six interests represented around this table; so please, please, please stay engaged through this process. We will report back to you we hope with a lot of fruit at the annual meeting and certainly look forward to seeing a number of you at the end of the month in Baltimore. We will move on from that. The next item on the agenda is to discuss quota rollover provisions of Amendment 2. I think Mike is going to set this up.

BOARD DISCUSSION OF QUOTA ROLLOVER PROVISION OF AMENDMENT 2

MR. WAINE: A little bit of background to remind the board about the provision in Amendment 2 on quota rollovers; it specifies that the board may annually define a percent of unused quota to be rolled over for use in the subsequent fishing year if the stock status is not overfished and overfishing is not occurring.

Up to this point because we were operating with the stock status from the 2012 assessment, we did not have quota rollovers in this fishery. Based on the new stock status that came out of the 2015 benchmark assessment, the menhaden resource is not overfished and overfishing is not occurring; and so the board at this point can consider through board action quota rollovers for unused quota.

Note that would not be for the 2014 fishing year, but it would be for the current fishing year that we're in, which is 2015, and so any decision made by this board on this topic would apply to any unused quota at the end of this calendar year. I also just threw in this slide that shows what the states' total 2014 quota was, what their 2014 landings were and the underage.

If you see a minus sign, that is an underage; and the positive numbers indicate an overage. I didn't include the transfers that occurred in 2014. I just wanted to throw up this table to give the board a sense for the magnitude of underages that occurred in 2014 even though any quota rollover decisions would not be for this data that you're seeing. It would be for '15. Just to summarize, the board has the ability to

consider quota rollovers through board action at this point. Thank you, Mr. Chairman.

CHAIRMAN BOYLES: Mike, thanks. John.

MR. JOHN CLARK: Mr. Chairman, I just had a question. Mike, this is just what was reported as landings; this doesn't include bycatch? How would bycatch play into the quota rollover; because I know just in our state we had quite a bit of – considering how low our quota was, we did have quite a bit of bycatch also.

MR. WAINE: Yes; because of the way we're treating bycatch landings in Amendment 2, those are not counting towards the quota as specified in Amendment 2. At this point the table that is shown on the screen does not include the bycatch landings because they're not being considered part of the quota. I will say that at the time – you know, this is something that the board could consider during this discussion, but that's currently how the bycatch landings are being treated in Amendment 2.

MR. ROY MILLER: Mike, if I may, I think it would be good to show the bycatch landings along with the quota and the landings. It gives us a better perspective on the actual picture. Thank you.

CHAIRMAN BOYLES: Roy, we can tell you; we can't show you. It is a technological issue we've got. Hang on a minute. We will see if we can get that information for you. Further questions on rollover? Bob.

MR. ROBERT BALLOU: So if I'm no mistaken, Mike, what you're teeing up here is a teaser, indeed, but the rubber really wouldn't hit the road until after the calendar year changes and we're into 2016 at which time we could look back on our 2015 landings and our 2015 bycatch and potentially at our – I'm just throwing out a suggestion – at our winter meeting make a decision as to whether or not the board wanted to consider enacting the rollover provision for 2016. There would no way of doing anything earlier; am I correct in that characterization?

MR. WAINE: If I heard you correctly, we wouldn't get a vision of what 2015 landings are until after '15 ends. At our annual meeting – I think that's the one you were referencing, the next meeting or the fall?

MR. BALLOU: Winter.

MR. WAINE: February, yes, so at the February meeting – usually we do FMP review at the April meeting – excuse me, at the May meeting because compliance reports are due in April. At that point you would have the 2016 FMP Review which detailed the performance in 2015 and would show you what the overages and underages were for the '15 fishing year. It wouldn't be until May that you would actually see those numbers and they would be preliminary at that point. I can try to pull '14 right now so that you can see the performance of '14 for this topic; but, yes, you'd have to wait until May of '16 to see performance in '15.

DR. DAVID PIERCE: I haven't got it in front of me, but I suspect that our discussion and then our decision about what to roll over in terms of a percentage might be impacted by where we are right now relative to the degree to which we are not overfished and the degree to which we are not overfishing. I can't recall where we stand. I

s there a figure that could show how close we are to being overfished and overfishing; because if we're close to that boundary, then that would argue for a very small amount of percent rollover? If it is different, if there is a big gap between where we are and where we thought we need to be, then maybe a higher percentage could be considered.

MS. FEGLEY: Mike, while you're looking, I have a question. A rollover mechanically; I'm just curious how do we think something like that would work? Would it be a state that didn't

achieve its quota would get a rollover for that state or would it be the coast as a whole doesn't achieve the quota so the coast gets a rollover that is allocated? Do we know how that would work?

MR. WAINE: Ultimately it would be up to the board to decide that. I believe, though, that the language as written in Amendment 2 it is state-specific because we had state-specific allocation. I can double-check the wording, but I believe it is rollover of unused quota within a state to the subsequent fishing year; but let me just double-check that, Lynn.

MR. GOLDSBOROUGH: Mr. Chairman, one comment. I think we need to keep in mind when considering rollovers at this time and for the near future when we are still lacking ecological reference points and we're considering these underages in a scenario where we are dealing with single-species references and have yet to actually figure out how we're going to account for ecosystem needs.

Under that scenario I think we have to keep in mind the flipside and not just this current year but what the year receiving a rollover would look like; and that would be perhaps a significant increase in the total catch at a time when we're attempting to come to grips with dealing with multiple management objectives, allocating to both the fishery and to the ecosystem.

We don't know yet how much the ecosystem needs. We do know that both sectors have needs now. We know the ecosystem is suffering as well as, of course, the fishery could always use more catch. But at time like that when we don't yet have guidelines for much we want to allocate to the ecosystem, it seems to me to be unwise to be thinking about a rollover and what implications that might have.

CHAIRMAN BOYLES: Further comments or discussion? Let's see if we can get some information to help better inform the deliberations.

MR. WAINE: I think what the board is looking for is a table that totals both directed and bycatch landings together. I don't have that readily available. We could try to match up the underage from the table that I've showed with the bycatch landings that are currently being shown here.

I think the point that was being made is that even though some states are underperforming on their quotas, they are harvesting fish under the bycatch allowance, which is making up that difference basically. We just weren't including it in that table because Amendment 2 doesn't treat it as part of the quota. I will put together a table that we're looking for, but I don't have it readily available.

CHAIRMAN BOYLES: Okay, what is the pleasure of the board? I think the question of where we are is the amendment allows for the conditions to allow for a quota rollover appear to be having been met. We're not overfished and overfishing is not occurring. However, we don't have, of course, complete landings for 2015; and so deliberating what to do with unused quota at the end of this fishing year, the board could choose to do nothing. The board I suppose could revisit this at a later meeting once we've got more complete information.

MR. DENNIS ABBOTT: If we could go back to the graph that shows the catch and underages, I'll start off by saying I think everyone saw that New Hampshire had a quota of 113 pounds, which we didn't utilize. My comments are a bit tongue in cheek but also very serious. We didn't catch our 113 pounds; was it because we didn't have enough capacity in the state? Was there no market? Was it a lack of fish or was it weather-related?

I'm very much concerned about rolling over because the more likely thing in the state of New Hampshire was actually the fact that we don't see any menhaden. They're just not extending into the range. I think that throughout the range everybody has had opportunities to catch the fish. If you looked at Virginia, they were 409,000 pounds under; but I think in my quick math, that is like 0.001 percent of their quota, so it is a very significant number.

My final comment is I don't think we should do anything because it was just stated the bycatch is probably a greater number than the addition of all the underages that we see at this point in time. Thank you, Mr. Chairman.

REPRESENTATIVE CRAIG A. MINER: Mr. Chairman, if we scroll that up, at the bottom is there a total on the underage? No, okay. I think to Representative Abbott's point, just a quick math, it just seems to me that this number, when you add up all the negatives, will be eclipsed by the other numbers quite easily.

CHAIRMAN BOYLES: I think where we are is the amendment allows for this; and I just wanted to make sure the board was aware that we had a discussion about this. Given the fact that we don't have complete information on 2015, this is certainly something that a member can bring back up at the annual meeting. Mike, let me ask you could it be brought forward as late as the spring meeting after compliance for 2015 or is this a decision that has to be made before the end of the calendar year?

MR. WAINE: In Amendment 2 it doesn't specify a specific time that the board has to make this decision. I also checked on Lynn's question about whether it specifies by state; and that is not specific in the rollover provision in the plan. I almost feel like it might be a good idea – well, if the board chose to address this at another meeting, I could be more prepared for the discussion, but it is up to them.

REPRESENTATIVE WALTER KUMIEGA, III: Mr. Chair, this isn't the only species that we do a rollover for. How is it handled? Would we be rolling 2014 overage into 2016 or trying to roll it over into 2015?

MR. WAINE: It is really up to the board, because once again it is not explicit in the plan about how this supposed to occur. Because we've already completed the 2014 fishing year and we already did an FMP review of that fishing year back in May, it was staff's interpretation that this quota rollover provision would apply to 2015 if the board decided to move forward with it.

That is also backed by the fact that the 2015 benchmark assessment is what allowed us to meet the conditions of the plan which requires that we have not overfished and overfishing is not occurring stock status. That came out of the '15 assessment, which was approved for management use in February of '15.

Based on those things, my interpretation was that any board decision would be for 2015 unused quota that is on the table at the end of the 2015 season. That leaves meetings up until the annual meeting to review this topic again if the board would like to. Like I said, the plan doesn't specify that you have to do it this year. You could do it next year and have it apply to 2015, because we'll still have satisfied that stock status.

CHAIRMAN BOYLES: Let me suggest this to the board because I sense there is a lot of confusion; and, Mike, check me on this. Compliance reports are due April 1st the following year; so our 2015 compliance reports will be due April 1, 2016.

May I suggest that if there is interest in the board on allowing a quota rollover on a state-by-state basis; that this be brought to the board for their consideration by May 2016, at the time that we complete the 2015 FMP review. In other words, we will have more complete information at the

spring 2016 meeting on any underages and the board can have a discussion at that time on how to deal with them, if at all. Is that reasonable? Toni.

MS. TONI KERNS: Bob and I were just talking and what if a state were to make a request to utilize their underage in their compliance reports. They're turning in their compliance report; they are telling us what their landings are; and then that way they can let the board know their indication of that.

One of the measures or options that the board to decide on within Amendment 2 is the percentage of the quota that can be rolled over; and it is zero to a hundred percent. That may be something that the board would want to decide prior to the compliance reports being turned in, so sometime between and the February meeting, so that then states could make that request.

CHAIRMAN BOYLES: That makes sense to me. Dr. Pierce had a question.

DR. PIERCE: I wanted to make a point; and that point is that I'm not prepared to take any action right now, especially since the 2014 data are misleading for Massachusetts. At the end of July we actually had to announce to the industry that we were reducing our trip limit down to 25,000 pounds.

We took 75 percent of our overall allocation. I have every reason to believe that by the time we're through we'll have very little overage, in part underage, because of the nature in which we are managing and regulating this fishery. It is rather tightly controlled with stepwise reductions in the limit. I'm not prepared today to take any action.

DR. DANIEL: Correct me if I'm wrong and stop me quick if I am; but Amendment 2, when we had passed Amendment 2 the concept of this was very foreign to this board. We thought we were in a deep hole; and now we find ourselves in a rollover situation, which none of us expected or anticipated.

It just seems to me that we need to move carefully based on this drastic change in the stock assessment. I'm not saying it is not overfished and overfishing is not occurring; but I'd like to feel a little more comfortable. After the increased the quota at the last meeting and we're moving along here and we're talking about adding fish on the next year's catch and we don't know what the percentage is, there are so many inconsistencies in how we handle this as a commission.

With 10 percent of dogfish; why not a hundred percent of dogfish? They probably eat menhaden if you go into the ecosystem approach. There is such an inconsistency there; I would just suggest that we defer taking any action on this issue and deal with it and clarify these points in Amendment 3.

CHAIRMAN BOYLES: Louis, is that motion?

DR. DANIEL: Yes.

CHAIRMAN BOYLES: **Motion to defer action on quota rollover and consider it as part of Amendment 3 by Dr. Daniel; second by Jim Gilmore.** Discussion on the motion? Dr. Pierce.

DR. PIERCE: Just a question of timing; does this mean therefore if we incorporate into the amendment; that there would not be any potential for a rollover until 2018 or so? It is not going to be next year or the year after; it could be way down the road. It is not that I'm against the rollover or in favor of the rollover. I also suggested a cautionary approach on this. It is just that by including it in the amendment it seems to push quite deep into the future, especially since your suggestions or your words of caution, Mr. Chairman – or maybe it was Mike – that this could take a lot longer than we think.

CHAIRMAN BOYLES: Dr. Pierce, what I heard in the motion was defer action until Amendment 3; so that was until time certain. The way I interpret that – and I'll look to Dr. Daniel and Mr. Gilmore for affirmation – is that this would in essence put the rollover provision to bed until we adopt Amendment 3. Louis, is that how you –

DR. DANIEL: That was my intent. That way my belief would be with the development of Amendment 3 we would know what ecosystems' approaches we're going to take. We're going to know what the absolute quota amounts are; and we're not going to find ourselves in a situation where we're rolling over fish and causing harm to the stock while we're trying to come up with a long-term management strategy. Waiting until then, recognizing then we can set the percentages and then everybody will know; and so if you're tracking your quota appropriately and you know you've got a rollover provision, then you can utilize that like we do with other fisheries.

MR. WILLIAM A. ADLER: Until Amendment 3; until Amendment 3 is proposed or finished or what? I don't think I want until 2018 or whatever before we say, oh, maybe we could have rolled over. I'm okay with not taking action on it now; but I want to leave the door open here that if things settle out by next year, even, that we could do a rollover. Does this motion kill that idea?

CHAIRMAN BOYLES: As the way the maker of the motion just explained it; yes, it does.

MR. ADLER: It does kill it until Amendment 3?

CHAIRMAN BOYLES: Until the adoption of Amendment 3.

MR. ADLER: Adoption of Amendment 3; I can't support this.

MR. THOMAS FOTE: I'm trying to think of what species we allow rollovers. Dogfish might be the only one if it is true on dogfish; and I am not sure it is true. Over the years when we had great striped bass stocks and way over, when we tried to do rollovers, we got creamed from left and right to not do rollovers.

It has been the policy over the years not to do rollovers. I'm just asking what species we do rollovers with – besides if we do it on dogfish, which I'm not sure, what species do we actually do rollovers with right now according to a commission plan. We haven't done them on all the species I know.

MS. KERNS: The other species that we do rollovers is spiny dogfish and it is up to 5 percent.

MR. ERIC REID: There is a rollover in the scallop fishery as well, but that's a whole 'nother thing. If I did the math right, I think if you add bycatch, we're over by 2 million pounds, a thousand tons. I think there is a tremendous amount of work ahead of this group to worry about rollover. I could believe at our May meeting we said we're going to set specifications for two years, which means at our May meeting in 2017 we're going to have to relook at specifications; is that correct?

If this motion would say we would revisit this issue at our spring meeting in 2017, it would be a little shorter timeline than this, and I think that would be a better time to address this; but right now I think we're wasting a lot of energy for nothing.

CHAIRMAN BOYLES: Further discussion? Okay, seeing none, let me remind us where we are. Amendment 2 allows for, when certain conditions are met, when overfishing is not occurring and the stock is not overfished, the board may consider quota rollover. If I remember the timing, this board did not formally

adopt the stock assessment until the May meeting, just this past meeting.

This is the first time these conditions have presented themselves; and so the discussion for the board has been is this something that we want to consider; certainly dealing with imperfect information on the basis of where we are in 2015. I hear some concern about we don't have good information. We've got some concerns about bycatch. We've got some concerns about the net total on where we stand.

Now we have a motion on the floor that we defer the rollover until the adoption of Amendment 3. Now, Louis and Jim, maybe I have misunderstood and maybe I have misinterpreted. From my seat I see what that means is the motion intends that we don't deal with this given the uncertainty, given the amount of work that we have got to do; and so it is why I responded to Mr. Adler that what I interpret this to be is the board won't discuss this beyond today if this motion carries, until we adopt Amendment 3. Dr. Daniel.

DR. DANIEL: I'm sorry if that was the confusion. I was saying that we deal with it in Amendment 3; so we would address these issues of percentages and rollover so that by the time we adopt Amendment 3 we'll have the provisions for rollover or no rollover in adopting that with Amendment 3.

Tom is right; in terms of the quota rollovers, we've talked about this many, many times for striped bass, for flounder, for species where sometimes we'll say, well, if the stock is not overfished and overfishing is not occurring, we're going to allow some rollovers or we're going to wait until we're no longer overfished or fishing and then we'll allow rollovers; and we never do. That is what I intended to interpret as far as having that inconsistency there; but my hope was to have the rollover issue in Amendment 3 and address it there.

CHAIRMAN BOYLES: Thank you, Louis; I apologize for my misinterpretation. Mr. Adler, you've got my misunderstanding. This would be dealt with in Amendment 3. I'll remind the board this is not a final action and won't require a two-thirds vote to reverse should a state wish to deal with quota rollover at some point in the future. The question on the floor then is to defer rollover until the adoption of Amendment 3.

That motion is by Dr. Daniel and seconded by Mr. Gilmore. Is there a need to caucus? All those in favor of the motion signify by raising your right hand; all those opposed please raise your right hand; abstentions; null votes. That motion carries by a vote of seventeen in favor, zero opposed; no nulls and no abstentions. Thank you for correcting me and your forbearance with me in my understanding of this.

ADJOURNMENT

CHAIRMAN BOYLES: At this time is there any other business to come before the Menhaden Board? Seeing none; we will stand adjourned.

(Whereupon, the meeting was adjourned at 4:10 o'clock p.m., August 5, 2015.)

Atlantic States Marine Fisheries Commission

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October 21, 2015

To: **Atlantic Menhaden Management Board**

From: **Atlantic Menhaden Board Working Group**

RE: **Potential Allocation Options for Draft Amendment 3 Development**

At the May 2015 meeting of the Atlantic Menhaden Management Board, the Board established a Working Group (WG) to initiate the process of revisiting quota allocation as required by Amendment 2 to the Fishery Management Plan for Atlantic Menhaden (and to initiate the process of considering the development of ecological reference points, addressed in Memo 15-85). The members of the WG are Robert Boyles (SC, Chair), Bob Ballou (RI, Vice Chair), Jim Gilmore (NY), Russ Allen (NJ), Lynn Fegley (MD) and Rob O'Reilly (VA).

The WG met via conference call on several occasions during June and July, and provided an initial report to the Board at its August 2015 meeting. Thereafter, the WG continued to meet, via six conference calls from late August through early October, to continue their discussion on the allocation options and issues previously outlined and reviewed by the Board at its August 2015 meeting. All of the meetings were publicly noticed; and those members of the public who were on the calls were afforded the opportunity to comment on the WG's discussion at the end of every call. This memo serves as a follow-up report from the WG to the Board detailing its discussion on allocation options.

The WG discussions on allocation are part of the preliminary steps in the Amendment 3 process. Potential allocation options developed by the working group are intended for review by the full Board prior to inclusion in a Public Information Document, which will serve as the scoping phase of Draft Amendment 3. There will be two separate rounds of public comment during the Amendment process -- a Public Information Document (PID) that will scope the management issues being considered, and then a Draft Amendment which will further develop specific management options.

The WG started by creating a broad characterization of the full range of allocation options that could potentially be considered by the Board for inclusion in Amendment 3. They suggested that some options would be the same as ones previously considered in Amendment 2, and others would be completely new concepts. Generally, the intent of the WG was to start broad with a complete list of allocation options and then, as time allowed, focus in on the specifics of each potential option to discuss its applicability and usefulness to Atlantic menhaden management. The WG proposed the following goal statement, list of potential allocation options, range of potential allocation timeframes, and identification of issues to be further considered as the PID process ensues.

Draft Goal:
Fair and equitable distribution of coastwide total allowable catch among states/jurisdictions, regions, and fishery interests.

Allocation Options:
When discussing allocation options, the WG considered landings history, the performance of state fisheries, and the challenges associated with the current management program. Those challenges include: minimizing discard mortality; accommodating small-capacity fisheries; accommodating true bycatch fisheries, small-scale targeted fisheries, and fixed-gear fisheries; aligning harvest opportunities with the distribution and size composition of the resource; ensuring equitable access to quota among gear types and management units; and striking a fair and equitable balance between current needs/interests/capacity and future growth opportunities. Below is a summary of the allocation options considered by the WG that address the listed challenges to varying degrees.

A. Coastwide Quota

One coastwide quota for the entire Atlantic menhaden fishery.

B. State by State Quotas

Quota is allocated to each state/jurisdiction in the management unit. This is the status quo option from Amendment 2.

C. Regional Quotas

Quota is allocated to designated regions. Specific regional options discussed were:

1. Two region split: (1) North (2) South matching regions used for stock assessment purposes in the 2015 Benchmark Stock assessment. Machipongo Inlet, VA is the dividing line

2. Two region split: (1) Chesapeake Bay (2) Coastwide

3. Three region split: (1) New England (2) Mid-Atlantic (3) Chesapeake Bay South

4. Four region split: (1) New England (2) Mid-Atlantic (3) Chesapeake Bay (4) South Atlantic

Notes: The WG included option 1 because it matches the assessment regions used in the 2015 Benchmark Stock Assessment. There was no specific justification for including options 2-4 other than the WG thought these options represented possible geographic delineations intended to capture the spatial dynamics of the fishery.

D. Disposition Quotas

Quota is allocated to bait and reduction fisheries separately.

Notes: The WG included allocation by disposition because of the different dynamics that exist between the bait and reduction fisheries.

E. Fleet Capacity Quotas

Quota is allocated to gear type or harvest capacity fleets.

Notes: The WG spent a majority of time discussing the fleet capacity allocation option. The WG reviewed gear specific landings history (Appendix 1) and evaluated state specific information on how gear types were permitted and managed within a state. After reviewing this information, the WG developed examples of a three fleet and two fleet capacity allocation shown below.

1. Three Fleet Capacity Allocation

Small-Capacity Fleet:

- Types of gears include, but not limited to, cast net, trawl, trap/pot, haul seine, fyke net, hook and line, other.
- Total coastwide landings for these small capacity gears are approximately 3.14 million pounds annually or 0.7% of coastwide total allowable catch (TAC) from 2009-2012.
- Given the small capacity of these gear types, this fleet would be managed with a soft quota (e.g., 1% of coastwide TAC, or 3.5 – 5.0 million pounds).

Medium-Capacity Fleet:

- Types of gears include, but not limited to, pound nets, gill nets
- Total coastwide landings are approximately 18.92 million pounds annually or approximately 5% of the coastwide TAC.
- Given the medium capacity of these gear types, this fleet would be managed with a soft or hard quota (e.g., 6-8% of the coastwide TAC).
- Note: the Board may wish to consider further allocation (e.g., regional, state by state) of the capacity-specific quotas to provide equitable access to the quota.

Large-Capacity Fleet:

- Types of gears include, but not limited to, purse seines and pair trawls
- Total coastwide landings are approximately 408.7 million pounds annually or approximately 95% of the coastwide TAC.
- Given the large capacity of these gear types, this fleet would be managed with a hard quota (e.g., 93-96% of the coastwide TAC).
- Note: the Board may wish to consider further allocation (e.g., regional, state by state) of the capacity-specific quotas to provide equitable access to the quota.

2. Two Fleet Capacity Allocation

Small Capacity Fleets:

- Types of gears include, but not limited to, cast net, trawl, trap/pot, haul seine, fyke net, hook and line, pound nets and gill nets.

- Small capacity fleet could be defined by a trip limit. Must have a daily vessel limit of less than X to fish in small capacity fleet – otherwise move to large capacity. Alternatively, trip limits could be implemented if small capacity harvest fires established triggers (see below).
- Total coastwide landings for these small capacity gears are approximately 22 million pounds annually or 6% of coastwide landings from 2009-2012.
- Given the small capacity of these gear types, this fleet would be managed with a soft quota (e.g., 6% of coastwide TAC), but this harvest would be allowed to fluctuate above the quota in year when fish are available (Figure 1).
- Annual review of small scale catches relative to coastal catch – these fisheries operate in aggregate on a small portion of the coastal TAC.
- Set triggers if small scale fleet harvest grows to an unacceptable level.(e.g. implement trip limits, return to state by state quotas for small scale fleets).
- States could implement management to prevent substantial growth in their small scale fisheries

Notes: The majority of non-purse seine menhaden harvest is taken by fixed, multi-species gears. Harvest from these gear fluctuates with the availability of fish in the area. These gears cannot move to find schools of menhaden. These are also multi-species gears so discards become an issue in managing menhaden.

Large-Capacity Fleet:

- Types of gears include, but not limited to, purse seines and pair trawls
- Total coastwide landings are approximately 408.7 million pounds annually or approximately 95% of the coastwide TAC.
- Given the large capacity of these gear types, this fleet would be managed with a hard quota (e.g., 93-96% of the coastwide TAC).
- Note: the Board may wish to consider further allocation (e.g., regional, state by state) of the capacity-specific quotas to provide equitable access to the quota.

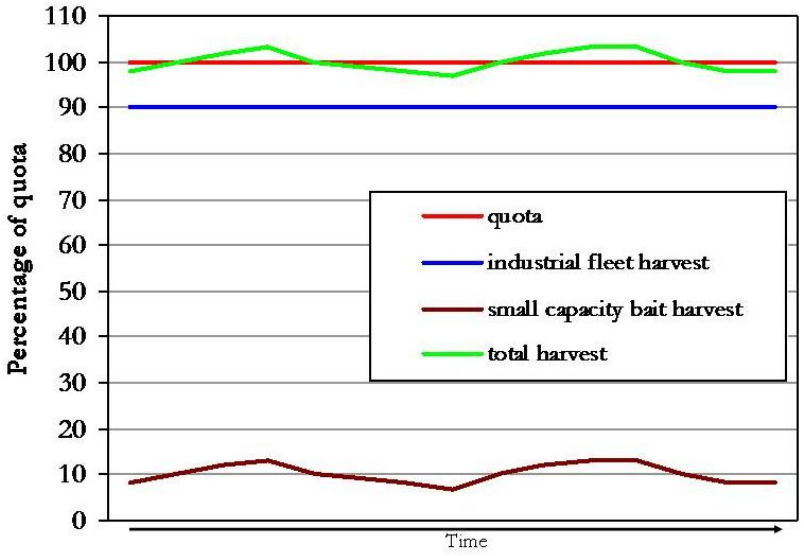

Figure 1. A graphical representation of the two fleet capacity allocation showing the fluctuating small capacity bait harvest and its impact on total harvest relative to the quota.

F. Minimum Fixed Quotas

Each state would receive a minimum fixed percent quota (e.g., 1% of the coastwide TAC). If a state's quota was not used it could be transferred.

Notes: The WG discussed having a minimum fixed quota allocation because it provides growth opportunity for states that have small quotas and has been used in other ASMFC management plans (e.g., American eel).

G. Seasonal Quotas

Quotas would be divided into designated seasons.

Notes: The WG discussed that seasonal quotas would be a better management option implemented under a regional or state by state quota allocation.

Potential Allocation Timeframes

Several of the allocation options discussed above require a landings history timeframe to base allocation and therefore the WG discussed the following potential timeframes.

1. 2009-2011: Status quo, timeframe used for state by state allocation in Amendment 2

2. 2009-2012: Similar timeframe to Amendment 2, but includes 2012 which was the last year prior to the implementation of Amendment 2 in 2013.

3. Weighted allocation with half weight for a long period, and half weight for more recent short period.

Example: half weight for 2009-2012, and half weight for 2013-2015

Issues for further consideration

As stated, the allocation options explored above address the challenges to varying degrees and more work would be needed to provide workable allocation options that more fully consider the WG's list of challenges associated with allocation in the Atlantic menhaden fishery.

Additionally, the WG notes that the *bycatch allowance* and *episodic events set aside* provisions need to be considered by the full Board when moving forward with allocation option development for Amendment 3. The WG views these management provisions as conditional upon the specifics of any chosen allocation program, but emphasize that the dynamics currently captured by these two provisions are an important part of the current management program for Atlantic menhaden. Appendix 2 is a summary of bycatch allowance landings in 2014.

Additional issues that the WG recommend for further consideration include: quota rollovers; quota paybacks; transfers; location of harvest; accommodation for ecosystem-based management programs that establish harvest controls at local/regional levels.

Appendix 1

Table 1. Atlantic menhaden coastwide landing averages by gear type for 2009-2012 and 2013-2014. Bycatch allowance landings are included in 2013-2014 average. Data are preliminary and subject to change.

Landings in Pounds	2009-2012 Average	% by Gear	2013-2014 Average	% by Gear
Purse Seine	436,211,312	95.188%	353,766,645	94.207%
Pound Net	16,129,566	3.520%	13,990,507	3.726%
Trawl	2,639,414	0.576%	1,444,210	0.385%
Gill Net	2,784,530	0.608%	5,052,734	1.346%
Cast Net	213,494	0.047%	750,823	0.200%
Trap/Pots	104,775	0.023%	156,790	0.042%
Fyke Net	51,994	0.011%	3,865	0.001%
Haul Seine	64,215	0.014%	118,651	0.032%
Other	65,608	0.014%	237,735	0.063%
Total	458,264,908	100%	375,521,959	100%

Appendix 2

Bycatch landings in 2014, harvested under the 6,000 pound bycatch allowance, totaled 3,102 mt (~6.84 million pounds) which represents a 60% increase from 2013 bycatch landings. For reference, bycatch landings accounted for approximately 1.8% of the coastwide landings, but do not count towards the coastwide TAC. The Chesapeake Bay jurisdictions of Maryland (33%), Virginia (30%), and PRFC (16%) comprised 79% of the total bycatch with the states of New Jersey, New York, Delaware, Florida, and Rhode Island accounting for the remaining 21% (Table 2). The predominant gears used were pound nets (58%) and gill nets (33%), which accounted for over 90% of the landings and were used by New York, New Jersey, Delaware, Maryland, PRFC, and Virginia. Cast nets (6%), otter trawls (3%), and fish traps (0.2%) were used for the remaining landings.

Table 2. Bycatch landings summary by state in 2014. Data are preliminary and subject to change.

State	Bycatch (lbs)	% of Bycatch total	Gears
RI	9,723	0.1%	fish trap
NY	366,999	5.4%	cast net, gill net
NJ	723,517	10.6%	gill net, pound net, otter trawl
DE	111,944	1.6%	gill net
MD	2,239,937	32.8%	pound net, gill net
PRFC	1,112,343	16.3%	pound net
VA	2,054,898	30.0%	gill net, pound net
FL	219,000	3.2%	cast net, fish trap
Total	**6,838,361**		

A total of 5,442 trips landed bycatch of Atlantic menhaden in 2014. A majority of the bycatch trips (72%) landed less than 1,000 pounds (Table 3). However, Maryland reported occurrences of pound net bycatch trips that were over the 6,000 pound limit because some license holders were using two vessels to legally land more than 6,000 pounds a day.

Table 3. Bycatch trip summary by thousand pound bins for 2014. Data are preliminary and subject to change.

Bins (LBS)	# of trips	% of total trips
1-1000	3,930	72%
1001-2000	470	9%
2001-3000	299	5%
3001-4000	185	3%
4001-5000	193	4%
5001-6000	251	5%
6000+	103	2%
Unknown	11	0%
Total	**5,442**	

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MEMORANDUM

October 20th 2015

To: Atlantic Menhaden Management Board

From: Shanna Madsen and Mike Waine, Staff ASMFC

RE: Ecosystem Management Objectives Workshop Report

Background: The Atlantic States Marine Fisheries Commission's Biological Ecological Reference Points Workgroup (BERP WG) has been tasked to develop ecological reference points (ERPs) that incorporate the predatory demands on Atlantic menhaden. In the *Ecological Reference Points for Atlantic Menhaden* report, the BERP WG presented suite of preliminary ERP models and ecosystem monitoring approaches for feedback as part of the 2015 Benchmark Stock Assessment for Atlantic Menhaden (Appendix E, SEDAR 40 Stock Assessment Report). In this report, the BERP WG recommended the use of facilitated workshops to develop specific ecosystem and fisheries objectives to drive further development of ERPs for Atlantic menhaden.

In May 2015, the Atlantic Menhaden Management Board initiated Draft Amendment 3 to the Fishery Management Plan. Draft Amendment 3 will consider changes to the management program including the development of ecological reference points that reflect Atlantic menhaden's role as a forage species. To aid in the development of these reference points, the Commission established the recommended multi-disciplinary working group to identify potential ecosystem goals and objectives for Board review and consideration. This Ecosystem Management Objectives Workgroup (EMOW) contained a broad range of representation including Commissioners, stakeholder representatives, and technical representatives to provide various perspectives on Atlantic menhaden management (*Appendix 1*).

Introduction: The intent of this report is to describe the process and products of the Ecosystem Management Objectives Workshop held on August 31st - September 1st, 2015. Prior to the Workshop, the EMOW met via webinar on August 14th, 2015 to review topics to be covered, expectations, and workshop goals, as well as provide participants an opportunity to ask questions and make suggestions to the workshop process. The webinar also featured a case-study from the Great Lakes region to provide an example structured decision-making framework. Agendas from both the webinar and workshop can be found in *Appendix 2*.

In the structured decision-making process, the EMOW defined management objectives and associated measures of performance. Workshop participants identified two types of objectives: fundamental and means. Fundamental objectives are the final product a group would like to achieve and serve as statements about what a group values. Means objectives define steps necessary to achieve fundamental objectives and can therefore be considered the "means to the ends" defined by the fundamental objectives. A comprehensive list of fundamental and means

objectives were constructed by the Workgroup (*Appendix 3 and 4*). Both lists were then distilled and refined by Workgroup members into a more concise set of objectives that best represented the extensive list. Once a refined list of fundamental objectives was identified, participants specified performance metrics that, if measured, would enable a determination of whether the fundamental objectives were met. BERP WG representatives provided a summary review of the ERP and ecosystem monitoring approaches presented in the *Ecological Reference Points for*

Atlantic Menhaden report (Appendix E, SEDAR 40 Stock Assessment Report). The EMOW then identified the intersection between objective performance measures and available modeling approaches.

The refined fundamental objectives list is presented here, with no order of importance. These objectives were ones that the EMOW identified as essential to Atlantic menhaden management. This list was the result of EMOW deliberation and discussion. To provide context, the original brainstormed list can be found in *Appendix 3*.

Refined Fundamental Objectives

- **Achieve broad public support for management**
- **Sustain menhaden to provide:**
    - **For fisheries**
    - **For predators**
    - **Historical and cultural values**
    - **Other ecosystem services**
    - ***→All to provide both social and economic benefits***
- **Minimize risks to sustainability due to a changing environment**
- **Provide stability for all types of fisheries (for both menhaden and species that depend on menhaden)**
- **Sustain ecosystem resiliency or stability**

Condensed means objectives are also presented here, again with no implied order of importance. This list of refined means objectives is linked to the refined fundamental objectives, but a particular means objective may contribute to multiple fundamental objectives. The EMOW approved the refined lists of fundamental and means objectives, but for background the complete list of means objectives identified at the workshop is found in *Appendix 4*.

Refined Means Objectives

- **Science**
    - **Increase knowledge base**
    - **Better communication of science**
    - **Account for variation**
- **Management**
    - **Define clear objectives**
    - **Provide timely advice**
- **Ecosystem**
    - **Ensure adequate supply of menhaden for:**
        - **individual predator groups**
        - **food web as a whole**

- **Account for spatial/temporal variation when managing trade-offs**
- **Minimize the risks of collapse for:**
    - **Menhaden**
    - **Fishery**
    - **Irreversible ecosystem change**

The EMOW brainstormed performance measures based on the refined list of fundamental objectives. Performance measures associated with fundamental objectives are presented below.

The EMOW discussed the definition or metric of collapse for the Atlantic menhaden population, fishery, and ecosystem. For the Atlantic menhaden population, the metric of collapse would be associated with some level of biomass or fecundity relative to unfished spawning stock biomass or fecundity. Collapse in the fishery would be dependent on the type of fishery and would mean it is no longer economically viable to fish. Irreversible ecosystem damage would mean the food web would be altered in a manner that would not recover to a previous state with the relaxation of fishing pressure.

Performance Measures for Refined Fundamental Objectives

- **Achieve broad public support for management**
    - **Unanimous vote of the Atlantic Menhaden Management Board**
    - **Positive press releases from all stakeholders**
    - **"Informed consent" or acknowledgement that the decisions made were "fair and reasonable"**
    - **Participation in the fishery benefits**
    - **Absence of legal action**
    - **Strong compliance with management measures**
- **Sustain menhaden to provide for fisheries**
    - **Meeting or exceeding (positively) reference points**
    - **Non-truncated age distribution**
    - **Historical distribution maintained**
    - **Avoid unintended economic consequences of management**
    - **Employment in fishery**
    - **Achieving yield objectives for all fisheries**
    - **Achieving abundances that exceed "depleted" status**
    - **Reduce regulatory discards**
- **Sustain menhaden to provide for predators**
    - **Same as for fishery, assuming reference points are ecological reference points**
    - **Predators in a healthy nutritional state**
    - **Distribution of menhaden related to predator requirements (prey availability)**
- **Sustain menhaden to provide for historical and cultural values**
    - **Maintaining "historical" (meaning existing and recent past infrastructure rather than distant past) patterns of employment (spatial, demographic, gear use etc.)**
- **Sustain menhaden to provide for ecosystem services**
    - **Same as above; represented in the other menhaden "services"**

- **Minimize risk to sustainability due to changing environment**
    - **Analysis would explicitly consider uncertainty about future environmental conditions**
- **Provide stability for all types of fisheries (both direct and indirect)**
    - **Variability in employment and yield**
    - **Frequency of substantive management action**
- **Sustain ecosystem resiliency or stability**
    - **Covered by metrics above; if successful in providing for a viable fishery and other food web components that are related to menhaden**

A preliminary pairing of performance measures related to fundamental objectives to BERP WG-suggested modeling approaches are listed below. It is important to note that performance metrics should not only be measurable, but predictable. That is, models should be able to predict the effects of management action (e.g., a harvest control rule) on the performance measure in order to determine whether management action will achieve a desired objective. The full BERP WG will meet to review this preliminary pairing in October and provide the Board with the intersection between fundamental objectives and ecosystem models in November during the Commission's annual meeting.

Performance Metrics and Model Matches

- **Abundance/biomass of menhaden (meets reference points, "non-depleted" abundance/biomass)**
    - **Single species model (time invariant)**
        - **does not account for predator dynamics explicitly**
        - **accounts for predators as an average**
    - **Single species model with dynamic parameters (e.g. time-varying r or M)**
    - **Multispecies models**
        - **Steele-Henderson**
        - **Multispecies virtual population analysis (MSVPA)**
        - **Multispecies statistical catch-at-age (MSSCAA)**
        - **Ecopath with Ecosim (EwE)**
- **Age composition**
    - **Catch-at-age models (SCA, VPA)**
        - **Single and multi –species models**
- **Historical distribution**
    - **Age-composition may serve as a surrogate**
- **Variability in yield**
    - **Single and multi-species models**
- **Employment: levels of and variability in employment, "historical" patterns of employment (related to sustaining existing and recent past infrastructure rather than returning to the distant past)**
    - **Ecological models do not directly address this**
        - **Addressing measures like abundance/biomass, yield, and age composition could be a proxy for economic and employment effects**
    - **Other socioeconomic analysis may contribute**
- **Yield objectives (for species dependent on menhaden)**

    - **Analysis must be informative of influence of menhaden on other predator species**
    - **Multispecies models**
        - **Steele-Henderson (but only with adjustments)**
        - **MSSCAA**
- **Regulatory discards (pound nets, gill nets, multispecies gears)**
    - **Ecological models cannot predict levels of regulatory discards associated with harvest control rules**
- **Frequency of substantial management action**
    - **Not addressed by ecological models**
- **Measures of public support**
    - **Not addressed by ecological models**

Workshop Outcomes: The EMOW established potential goals and objectives for ecosystem management that the Atlantic Menhaden Management Board will consider through the development of Draft Amendment 3.

The BERP WG will meet in October to assess the ability of each ERP model to address EMOW-identified management objectives and performance measures as well as revisit the timelines for ERP model development. The recommendations and outcomes from this BERP WG meeting will be presented to the Board during the Commission's 2015 Annual Meeting.

Appendix 1: Ecosystem Management Objectives Workgroup

Menhaden Management Board Subgroup
Robert Boyles (SC, Menhaden Board Chair)
Bob Ballou (RI, Menhaden Board Vice-Chair)
Jim Gilmore (NY)
Russ Allen (NJ)
Lynn Fegley (MD)
Rob O'Reilly (VA)

Advisory Panel Subgroup
David Sikorski (recreational sector)
Ken Hinman (ecosystem sector)
Ron Lukens (reduction fishery)
Jeff Kaelin (bait fishery, AP Chair)

Technical Representatives
Amy Schueller (NMFS, SAS Chair)
Jason McNamee (RI, TC Chair)
Matt Cieri (ME, BERP Chair)

Facilitator
Michael Jones (SEDAR 40 Review Panel Chair)

ASMFC Staff
Mike Waine (Atlantic Menhaden FMP Coordinator)
Katie Drew (BERP WG Assessment Scientist)
Shanna Madsen (BERP WG Coordinator)

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Appendix 2: Ecosystem Management Objectives Workgroup Webinar

August 14th 2015
9:00 am-12:00 pm

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 and introductions *(M. Jones)* 9:00 am
2. Approval of agenda

3. Workshop relevance to technical process *(S. Madsen)*
4. Workshop relevance to management process and timeline *(M. Waine)*
5. Structured decision-making process case-study with salmon/alewife *(M. Jones)*
    a. Discuss expectations for setting management objectives
    b. Review example management objectives
6. Review draft EMO Workshop agenda
    a. Provide feedback

7. Public comment
8. Adjourn 12:00 pm

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Appendix 2: Ecosystem Management Objectives Workshop for Atlantic Menhaden

August 31st 2015 8:30 am-5:00 pm
September 1st 8:30 am-4:00 pm
Hanover, Maryland

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.

Monday, August 31st

1. Welcome and introductions *(M. Jones)* 8:30 am
2. Approval of agenda

3. Overview of process and workshop goals *(M. Jones)*
4. Management objectives generation and discussion
    a. Brainstorm range of management objectives
    b. Discuss nuances of each objective in regards to areas or species influenced

5. Public comment
6. Adjourn 5:00 pm

Tuesday, September 1st

7. Biological Ecological Reference Points Presentation *(J. McNamee)* 8:30 am
    a. Comprehensive review of BERP WG models developed in the Ecological Reference Points Report
    b. SEDAR 40 Peer Review Recommendations
8. Identify intersection between management objectives and available BERP WG models
    a. Pair analytical tools to address management objectives
    b. Discuss model development timeframe
9. Refine consensus management objectives list which will be:
    a. Considered by the Atlantic Menhaden Management Board
    b. Focus of ongoing technical work by BERP WG

10. Public comment
11. Adjourn 4:00 pm

Appendix 3: Comprehensive Fundamental Objectives

- Serve broad public interest:
    - Fisheries dependent on menhaden, indirectly
    - Desire for healthy and stable ecosystems
- Contribute to economic benefits for commercial and recreational fisheries dependent on menhaden
- Maximize "utilization" of menhaden by fisheries and predators
- "Menhaden for the system, the public, and tomorrow"
- Provide ecosystem services as important food source across spatial and temporal scales
- Recognize the historical and cultural importance of menhaden
- Facilitate broad support from menhaden management and ensure confidence in management
- Recognize "non-fishery" economic aspects of menhaden in the ecosystem (e.g. whale watching, fish kills)
- "Take what we can take, leave what we need to leave"
- Note importance of social as well as economic benefits of menhaden
- Maintain the resource in a way that minimizes risks to long-term menhaden sustainability/resiliency in the face of environmental change
- Maintain stability for both the ecosystem and the fishery

Appendix 4: Comprehensive Means Objectives

- Translate technical analysis into forms effective for communication to stakeholders (and gain a realistic appreciation of the limits of science)
- Better fishery independent surveys to inform the status of menhaden
- Articulate a clear set of management objectives for menhaden
- Maintain an adequate supply of biomass and abundance menhaden for: striped bass, bluefish, weakfish, seabirds, marine mammals, sharks OR the food web more generally
- Better understanding of recruitment and environmental factors driving it
- Better understanding of the trade-offs among ecosystem services
- Articulate broader ecosystem objectives to inform menhaden analysis
- Better understanding of the socioeconomic value of menhaden across various ecosystem services as well as the fishery
- Understand foraging requirements of predators on menhaden (diet data)
- Manage harvest spatially and temporally across age structure to reduce conflicts with other ecosystem services
- Provide useful management advice in the short term (~2-5 years) and long term
- Determine the role of other forage species relative to menhaden
- Avoid a collapse of menhaden population
- Avoid a collapse of menhaden fishery
- Avoid irreversible changes in the ecosystem due to menhaden decline
- Account for likely future environmental conditions (including both the climate oscillations and the change) in trade-off analyses
- Acknowledge the importance/role of variation and its effect of perceptions of “baselines”
- Maintain water quality at levels that do not imperil the menhaden ecosystem

Public comment

From: William Bartlett [mailto:wbartlett@md.metrocast.net]
Sent: Tuesday, September 01, 2015 9:09 AM
To: Comments <comments@asmfc.org>
Subject: Re: Menhaden

Menhaden

All living things need nutrients to grow and thrive. For many animals it is grass and only grass; a green plant produced by photosynthesis. There is always plenty of grass as long as conditions are right; more than the grass eaters can eat. Nature abhors a vacuum and will grow grass. Many animals get all the nutrients they need from eating these animals that eat grass. Mother nature in her "infinite wisdom" provides many of the animals that are needed to feed the carnivores. They are prolific animals like rabbits, mice, deer, wildebeests, etc. And it is the same in the waters that surround us all.

With available nutrients, we have plants in the water called phytoplankton; plants just like grass that require the sun to produce photosynthesis. And we have the animals that eat the phytoplankton. They are called zooplankton (copepods, dinoflagellates). The phytoplankton and zooplankton are microscopic, but it is what makes the water cloudy in places around the world like the Chesapeake Bay where it finds the most nutrients (nitrogen and phosphorous washed off the land).

There are fish that eat the tiny plants and animals. They can filter out the planktons. These fish provide the same niche as the grass eaters on land. They are called forage fish. Without them we would have no fish that we like to eat.

Because so many forage fish are needed to provide food for many other fish, birds and mammals Mother nature has provided several species of very prolific fish. One of the most well known in our area is the menhaden. We need them in great abundance, but what is happening is that one company is taking over 300 million pounds of them every year from the mid-Atlantic area to be used as feed for some farm animals and farm raised fish. There was a time when the water in this area was a lot clearer. We do not need 300 million pounds of this fish to be removed from this area. We need even more to eat the planktons and clear the water.

Mother nature provided this fish in great numbers because they are needed in great numbers. The removal of so many menhaden upsets the balance of nature and should be stopped completely immediately.

The Chesapeake Bay will not return to any resemblance of its former self until the menhaden are brought back in sufficient numbers as nature intended.

William Bartlett
19124 Lake Drive
Leonardtown, MD 20650
wbartlett@md.metrocast.net
301 994 0671

Mr Waine,

This is the letter I sent to the Virginian Pilot

Beth Ricks

-----Original Message-----
From: Gary Ricks <grricks@aol.com>
To: letters <letters@pilotonline.com>
Cc: Lee.Toliver <Lee.Toliver@pilotonline.com>
Sent: Sun, Oct 4, 2015 11:48 am
Subject: Stop menhaden fishing in the bay

My letter is in response to the recent discontent of local charter boat captain's, concerning the harvesting of menhaden off the coast of Virginia Beach.

I feel compelled to express my view's on the menhaden fishing within the Chesapeake Bay.

I have deep roots and many years spent on the Eastern Shore. During the late 60's my family acquired property on the Chesapeake Bay. The location is almost directly across from where boats operate daily out of Reedville, Virginia.

There was a time when my father could catch "spot" off the beach. He would clean them and my mom would cook them for breakfast. I recall when "the blues are running" echoed up and down the beach. People came rushing, rods in hand to join in the fun. My husband and son spent many a summer day casting off from the beach.

Over the past several years my family has witnessed a steady decline in fishing. We have watched the menhaden boats operate 24/7 to harvest these fish. Whether they be for bait or Omega Protein matters not, this bay has been robbed of a necessary and vital element to an extremely delicate eco-system.

I am aware this is not the only contributing factor, but a major one. Along with the many restrictions placed upon the farmers, individuals being more conscientious, we can all do our part to save this bay.

The time has come for the State of Virginia to recognize the true value of this bay, an estuary unlike anything else in our country. I implore all voters to call or e-mail their state representative and demand they end menhaden fishing within the boundaries of the Chesapeake Bay in Virginia. In order to restore this natural treasure, we must all share the responsibility, from our General Assembly, to all those who enjoy the recreational advantages the bay has to offer.

My own vested interest is to have the joy of seeing my twin grandsons plant their feet firmly in the sand, cast a rod, and know the excitement of catching a fish just as their great-grandfather once did.

I have had the pleasure of speaking with many people who graciously gave me their time and input. I am but one voice hoping to become many. I realize this shall be an uphill battle, yet history shows all things are possible.

Elizabeth Ricks

Dear Mr. Waine

I am quite upset about the continued complaints by so many with regards to the menhaden fishing in the Chesapeake Bay. I would sincerely appreciate your confirming something of great importance to me. Below is a list I compiled, in hoping to have a better understanding.

(1) Omega Protein has an annual yield of 315,000,000 lbs. from I presume the entire Atlantic Coast.

(2) 85% of the above is 267,750,000 lbs. which comes from the Virginia waters.

(3) 25% of the above is derived from the Chesapeake Bay, totaling 66,937,500.

I have recently read where contributions from Omega Protein have gone to Virginia campaigns, and their $88 Million contribution to the economy of Virginia was highly praised by our governor. Unless someone in our state legislature starts to listen to the people and begins a process by which this reckless handling of the bay is changed, then the continued demise will never end..

I understand the ASMFC calls the shots on the amount of menhaden allowed to be caught, and this figure is based on scientific studies. My question to you as, the coordinator, is how this figure is comprised? Do the studies cover an overall catch or each state's individual percentage. It certainly wouldn't take a rocket scientist to realize our state is taking the bigger piece of the pie, leaving little doubt to a novice person as to why this bay can't recover. We have heard for years of clean-up attempts in the bay. I can clean my home and yet, if I don't put food in the fridge, who's gonna live here?

I do realize the ASMFC has little interest or involvement in our politics. Yet, all of you involved in making these decisions, which inadvertently affect a natural treasure, must surely feel it is wrong. Someone needs to take a stand and maybe the place to start, is looking at the state of Virginia alone.

I truly don't get why Omega Protein and any other menhaden industry cannot take their quotas from 3 miles offshore of the coast. I guess the Chesapeake Bay provides all their needs on a daily basis. If the ASMFC has the authority to establish yearly quotas, then you should have the same authority in stating where, as well as how much. I hope you will share this message with your board and they will begin to make the necessary changes.

I look forward to hearing from you and please, know I appreciate your time. I shall be sending the enclosed to our senator,
as well as the one for the Eastern Shore.

Thanking you in advance,

Beth Ricks

cc

October 20, 2015

Robert Boyles
Chair
Menhaden Management Board
Atlantic States Marine Fisheries Commission

Dear Chairman Boyles:

We are writing to urge the Atlantic Menhaden Management Board to stay on track at your November meeting to develop and release a Public Information Document (PID) for Amendment 3 by February 2016 and include what we refer to as the "75% solution" among the options put forward. This approach is 1) well represented in the scientific literature as a means for setting ecological reference points for important forage species; 2) it best meets objectives for menhaden identified by the Ecosystem Management Objectives (EMO) Workshop; and 3) it is the only approach that can be immediately applied to the most recent menhaden stock assessment to develop catch limits for implementation by the 2017 fishing season.

The 75% solution, leaving three-quarters of unfished biomass in the ocean for ecosystem services, is a generic descriptor for the Lenfest[1] and numerous comparable approaches endorsed by literally dozens of well-regarded fishery scientists, from the U.S. and around the world, over years of researching ecosystem-based conservation of forage fish. For example, Lenfest's default recommendation of setting biomass targets at $0.75B_0$ and thresholds at $0.40B_0$ is remarkably consistent with recommendations made in scientific papers published since 2000 and adopted as policy by a number of

[1] Described as *Pikitch et al (2012)* in recent Biological Ecological Reference Point Working Group documents.

fishery management bodies. (For a summary of the emergent consensus around a 75% solution, see *Resource Sharing: The Berkeley Criterion.*[2])

There is very good reason to believe that this approach, accepted as best management practices globally, is appropriate for menhaden in the U.S. Atlantic. Dr. Ellen Pikitch and Dr. Edward Houde, the chair and vice chair of the Lenfest Forage Fish Task Force respectively, were invited by ASMFC to present their recommendations in a webinar held August 25, 2015. The audience included members of the Biological Ecological Reference Point Working Group, participants in the EMO Workshop held a week later, and the interested public. In the webinar, they explained that the Lenfest approach is applicable to menhaden; in fact, it was highlighted as a case study in the Forage Fish Task Force report[3]. (We've appended the presentation prepared by Drs. Pikitch and Houde for the webinar.)

The EMO Workshop, convened at the behest of the Board and held August 31-September 1, agreed that a fundamental menhaden management objective is to sustain an adequate supply for individual predators and the food web as a whole, while maintaining ecosystem resiliency and stability. The 75% solution is specifically designed to achieve this objective, accounting for all predators in the ecosystem with a precautionary balance of ecosystem and fishery needs.

As the BERP Working Group has affirmed, ecological reference points based on the 75% solution are the only type ready to be applied now, using the 2015 peer-reviewed BAM stock assessment. While other, more complex multi-species models are being developed - and we do not discourage this research at all - their usefulness for management purposes is unknown and in any case not likely for years into the future.

It is 15 years now that the Board has been considering changes to menhaden management to protect its role as forage in the ecosystem. Throughout this prolonged discussion, the ASMFC's scientific advisors have emphasized the need for clearly defined ecosystem objectives. Those objectives are not produced by models, no matter how sophisticated. They are instead policy decisions made by fishery managers with input from stakeholders on how best to allocate prey between fisheries and the ecosystem. What is perhaps most valuable about the 75% solution is that the objective – providing a specific forage set-aside for other species in the ecosystem - is inherent and includes a specific means to achieving that objective.

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[2] Hinman, K. (2015) *Resource Sharing: The Berkeley Criterion*. Wild Oceans. Waterford, VA. 34 pp.
[3] Pikitch, E. *et al.* (2012) *Little Fish, Big Impact: Managing a Crucial Link in Ocean Food Webs*. Lenfest Ocean Program. Washington, DC. 108 pp.

By including the 75% solution approach in the PID for Amendment 3, the Board will be ensuring that the public will have an opportunity to consider and comment on a comprehensive and ready path forward alongside alternative approaches. This is particularly important given the public's longstanding, overwhelming and unprecedented support for developing ERPs for menhaden in order to protect predators and the fisheries that depend on them.

Thank you for considering our request.

Sincerely,

Ken Hinman
President
Wild Oceans

Kim Coble
Vice President
Chesapeake Bay Foundation

Peter Baker
Director, U.S. Oceans, Northeast
The Pew Charitable Trusts

Applying the LFFTF Recommendations

A presentation to the ASMFC

Ellen Pikitch, Edward Houde and Laura Koehn

August 25, 2015

A REPORT FROM THE LENFEST FORAGE FISH TASK FORCE

little fish BIG IMPACT

Managing a crucial link in ocean food webs

Lenfest Forage Fish Task Force

***Objective**: Develop consensus recommendations on sustainable management of forage fish which accounts for their vital role in ocean ecosystems.*

- Dr. Ellen K. Pikitch, Chair
- Dr. P. Dee Boersma
- Dr. Ian L. Boyd
- Dr. David O. Conover
- Dr. Philippe Cury
- Dr. Tim Essington
- Dr. Selina S. Heppell
- Dr. Edward D. Houde
- Dr. Marc Mangel
- Dr. Daniel Pauly
- Dr. Éva Plagányi
- Dr. Keith Sainsbury
- Dr. Robert S. Steneck

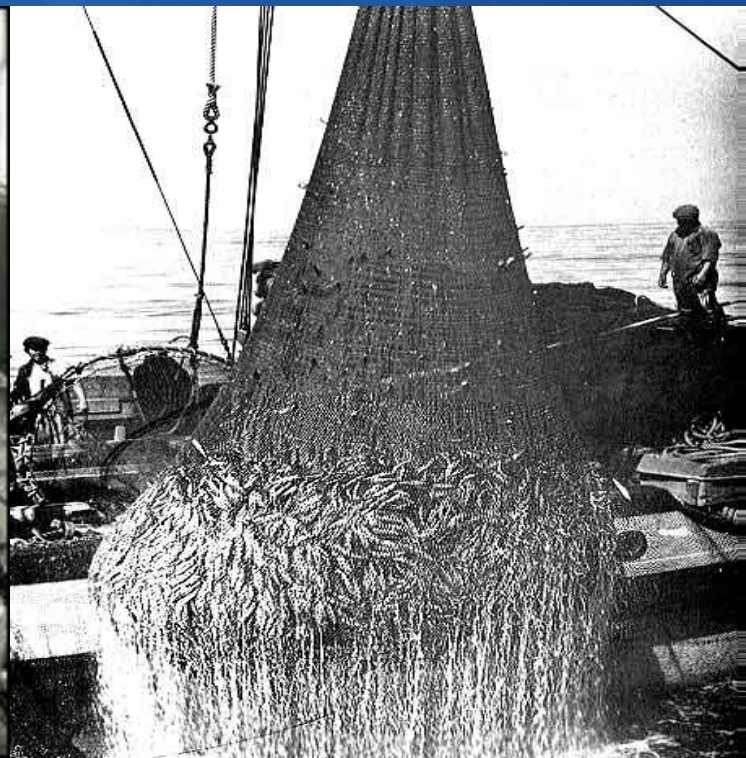
Forage fish collapses

California sardine- 1950s

Peruvian anchoveta- 1970s

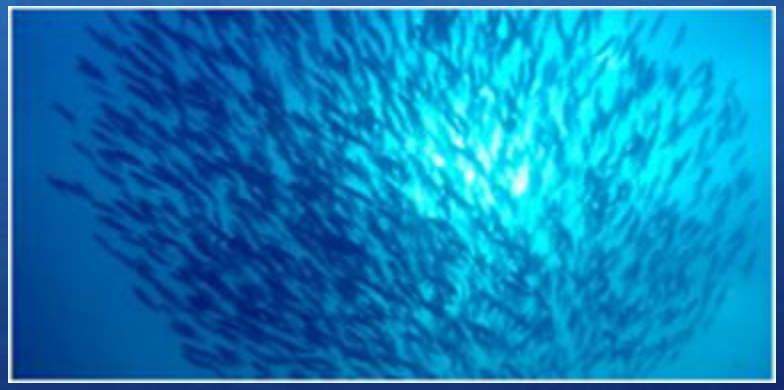
Namibian sardine-1970s

Japanese sardine- 1990s



Task Force Approach

- Workshops and site visits
- Review of theory and practice
- Case studies - ecosystems
- Data – forage fish and predators
- New science
  - Ecopath models
  - Ecosim models
  - Predator Response to Exploitation of Prey (PREP) equation



General Results

from "Little Fish, Big Impact"

Approximate locations of the 72 Ecopath models used in this analysis

Economic Value of Forage Fish

Direct value of commercial catch = $5.6 billion

Supportive commercial value = $11.3 billion

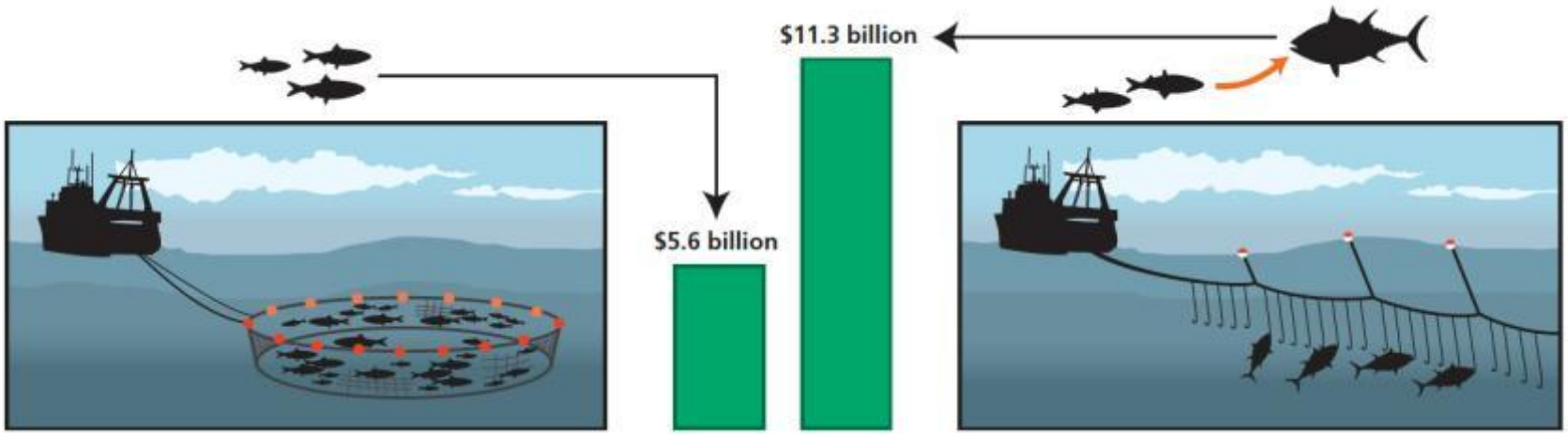
Total global commercial value = $16.9 billion

Value in 2006 dollars

First ever estimate of total value of forage fish to all fisheries

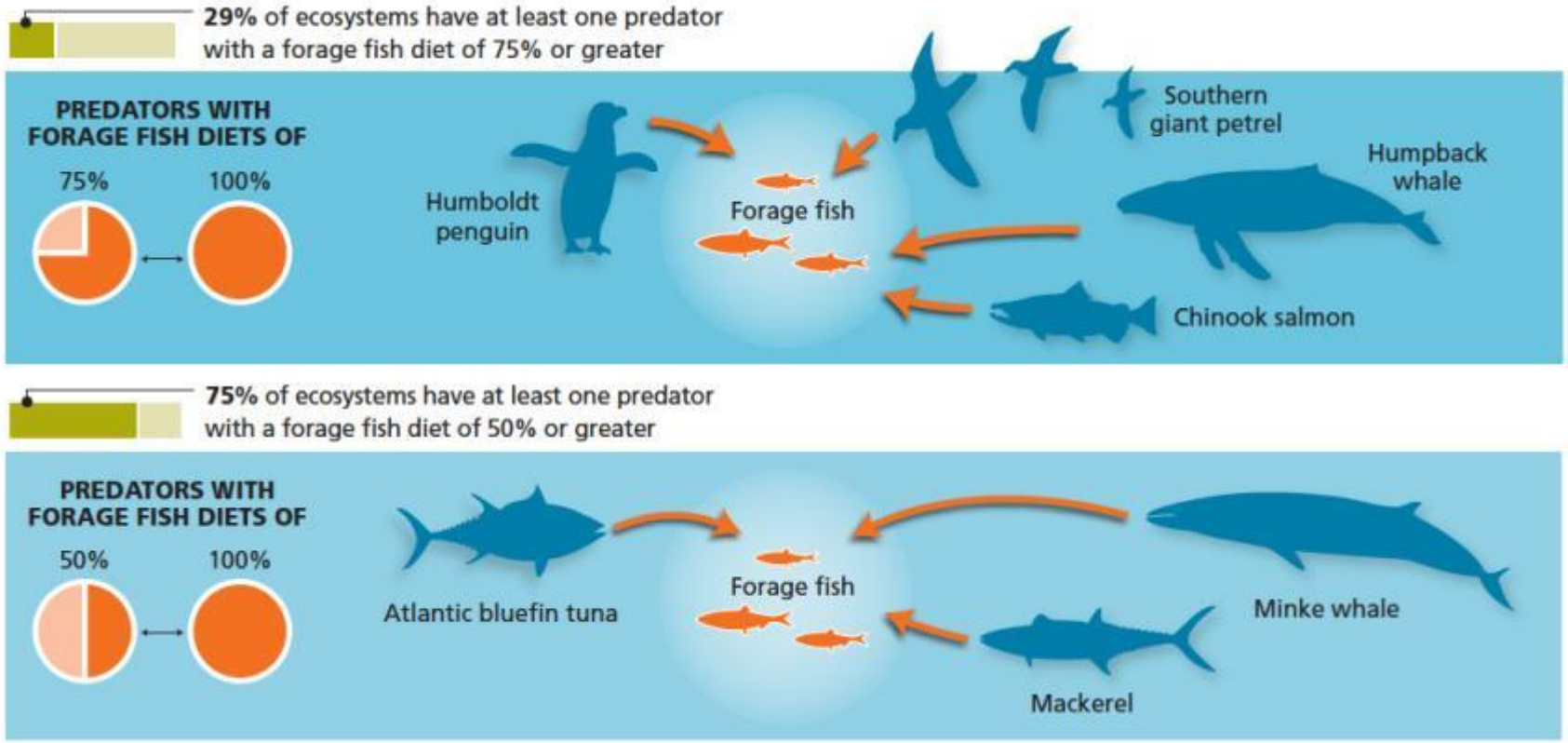
FORAGE FISH DIRECT VALUE

FORAGE FISH SUPPORTIVE VALUE



Ecological Importance of Forage Species

The Task Force found that 75% of the ecosystems studied have at least one highly or extremely dependent predator.



Applying the PREP Equation

from "Little Fish, Big Impact"

Ecosim modeling approach

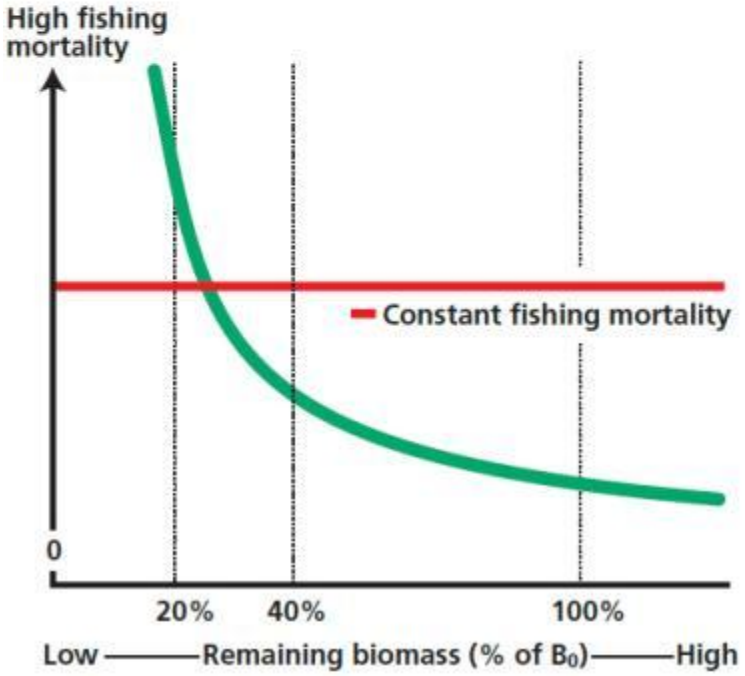
- Ecosystem Modeling Setup
  - Ecosim with MSE Batch Module: Allows for examination of implementation error and a wide variety of harvest strategies
- 10 Ecosystem models
  - 2 upwelling (N. Humboldt & Northern California)
  - 1 Semi Enclosed Sea (Baltic Sea)
  - 3 Non-Upwelling Coastal (Gulf of Mexico, North Sea, Western English Channel)
  - 3 Arctic-High Latitude (Aleutian Islands, GoA, Barents)
  - 1 Estuaries/ Bay (Chesapeake Bay)

Least sustainable strategies

Constant yield or constant fishing mortality rules

Constant yield: A constant tonnage of catch is taken each year, resulting in higher fishing mortality at lower population levels.

Constant fishing mortality: The same fraction of the population is harvested each year.

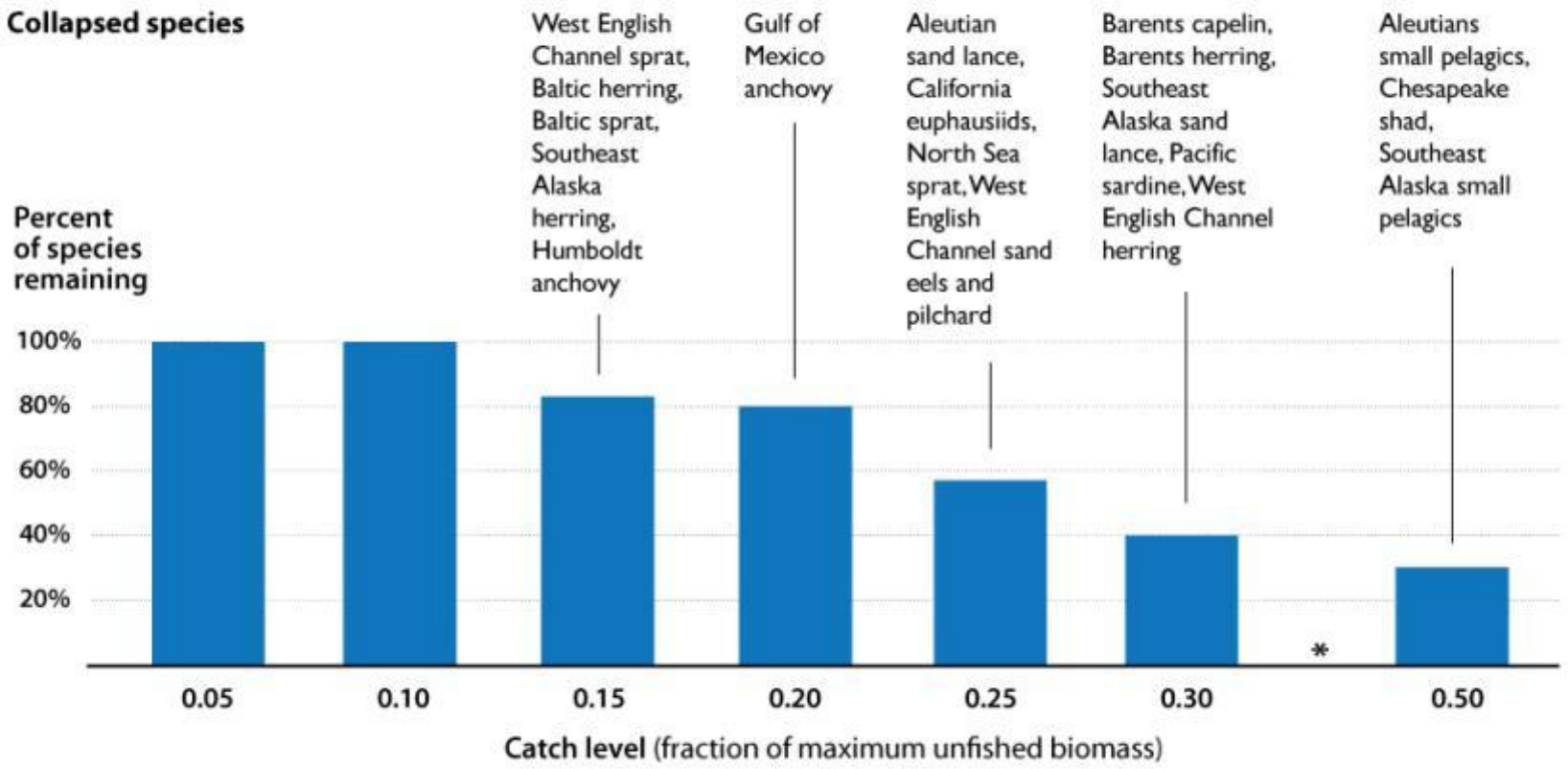


Comparison of harvest control rules

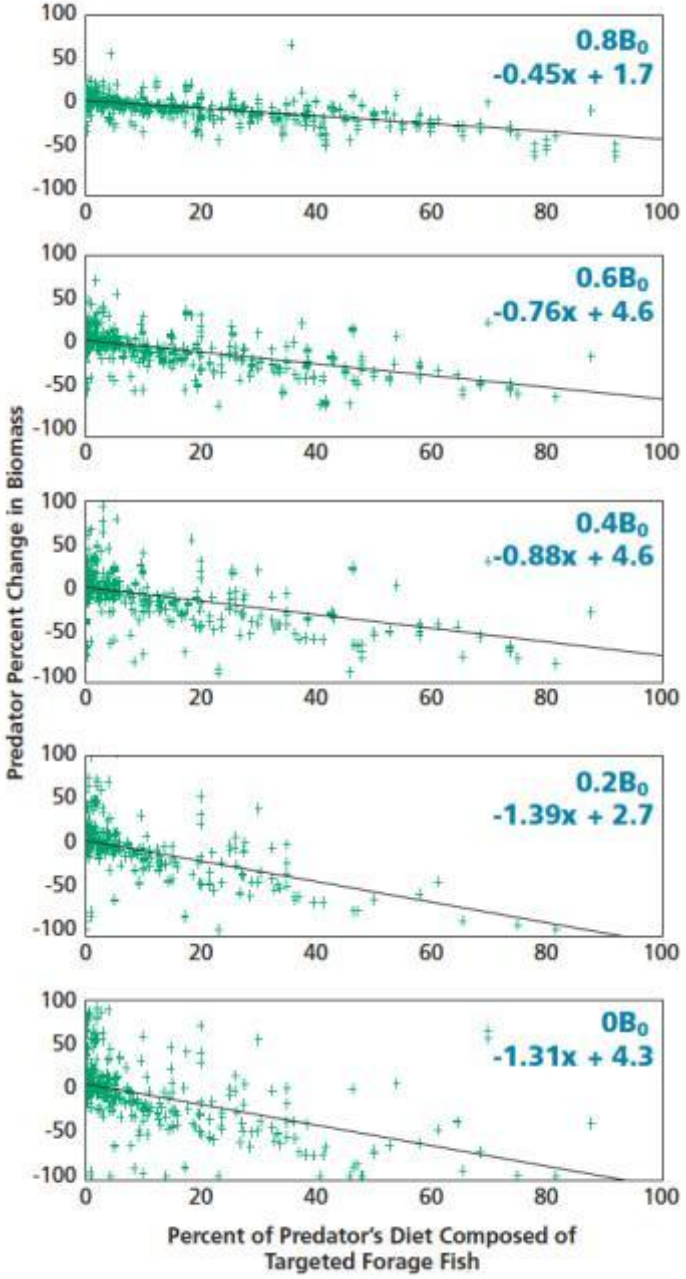
Constant yield and constant fishing (CF) mortality rules.

Forage species population collapses from constant yield strategies

Results of deterministic model simulations of the effect of a strategy of constant yield on the 30 forage fish species.



Note: Seven species did not collapse in any simulation. *Model simulations were not run for levels 0.35, 0.40 and 0.45.



Predator responses to forage fish depletions

Results from deterministic modeling of the constant fishing mortality rule. Each point represents a predator species within one of the models. Each panel represents a different level of forage fish depletion, noted in the upper right corner as a proportion of B_0. Fishing level increases as one moves downwards.

PREP Equation (Predator Response to Exploitation of Prey)

$$R = \rho D^{\alpha}\left(1 - \frac{B}{B_0}\right)^{\beta}$$

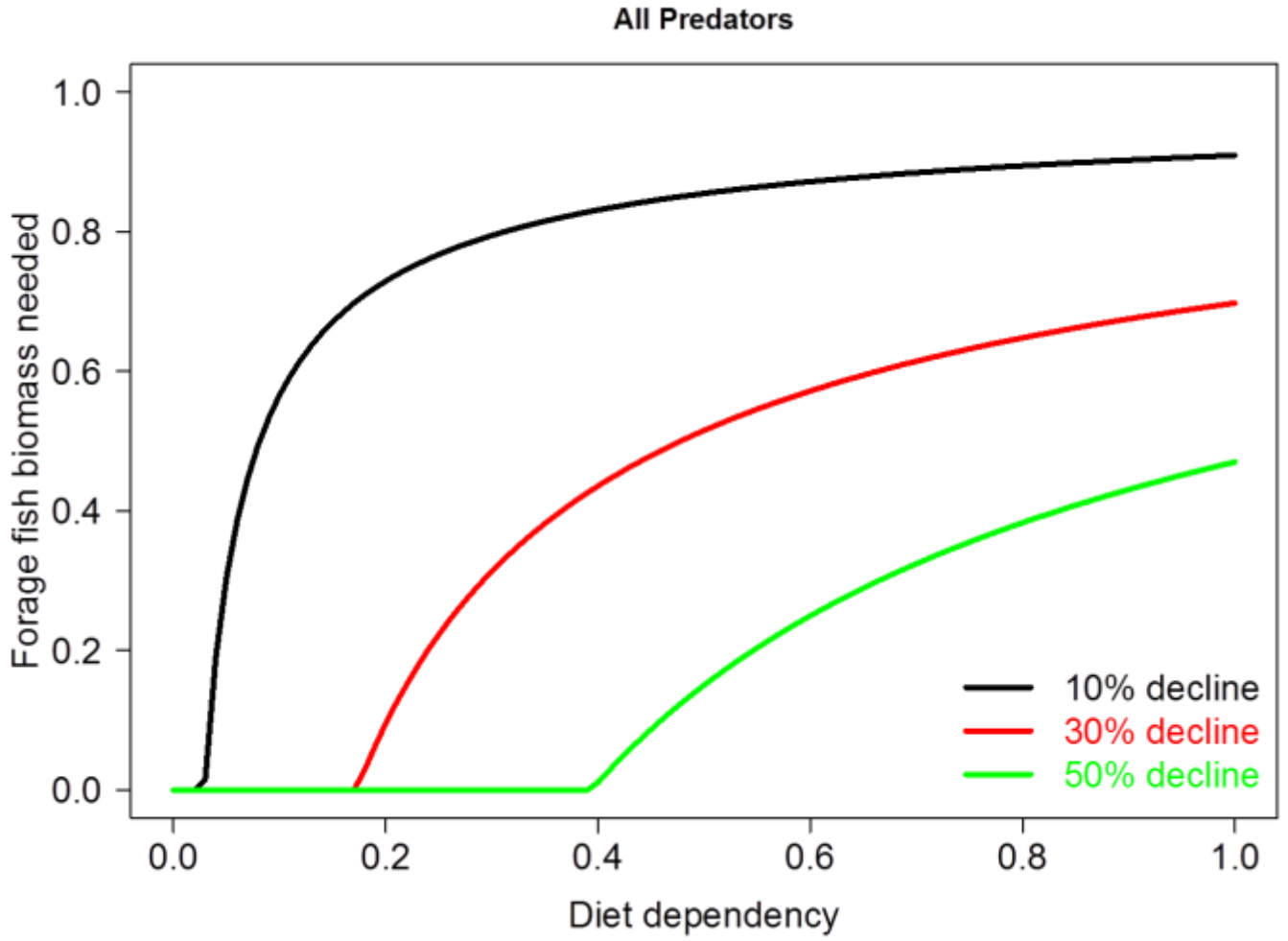
R = Predator Decline (as %)

D = Diet Dependency (as a fraction of the total diet)

B = Forage Fish Biomass

Parameters were fit to all predator data, and to data for all taxonomic groups

Forage biomass to prevent predator decline



Critical forage fish biomass levels

Critical forage fish biomasses needed (as percentages of B_0) to avoid a 50% decline in predators, from PREP equation.

Diet %	95% Confidence of success		75% Confidence of success	
	All groups	Seabirds	All groups	Seabirds
25%	0.79	0.74	0.42	0.45
50%	0.85	0.88	0.57	0.74
75%	0.88	0.90	0.66	0.78
Max	0.90	0.91	0.73	0.81

Applying the PREP Equation

Example from the California Current

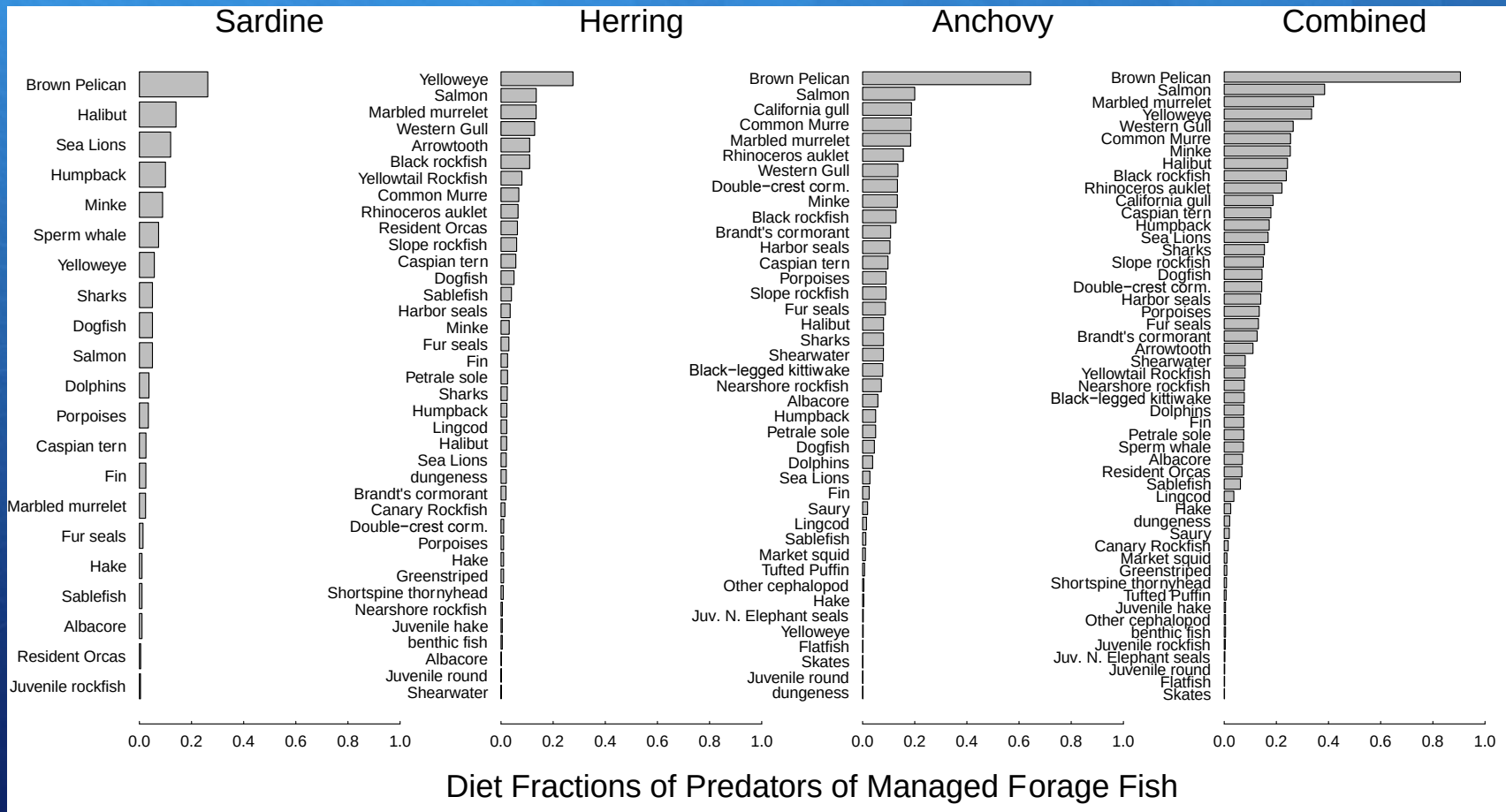
Analyzing Trade-offs in the California Current

Laura E. Koehn, Tim E. Essington, Isaac C. Kaplan, Kristin N. Marshall, William Sydeman, Amber Szoboszlai, and Julie Thayer

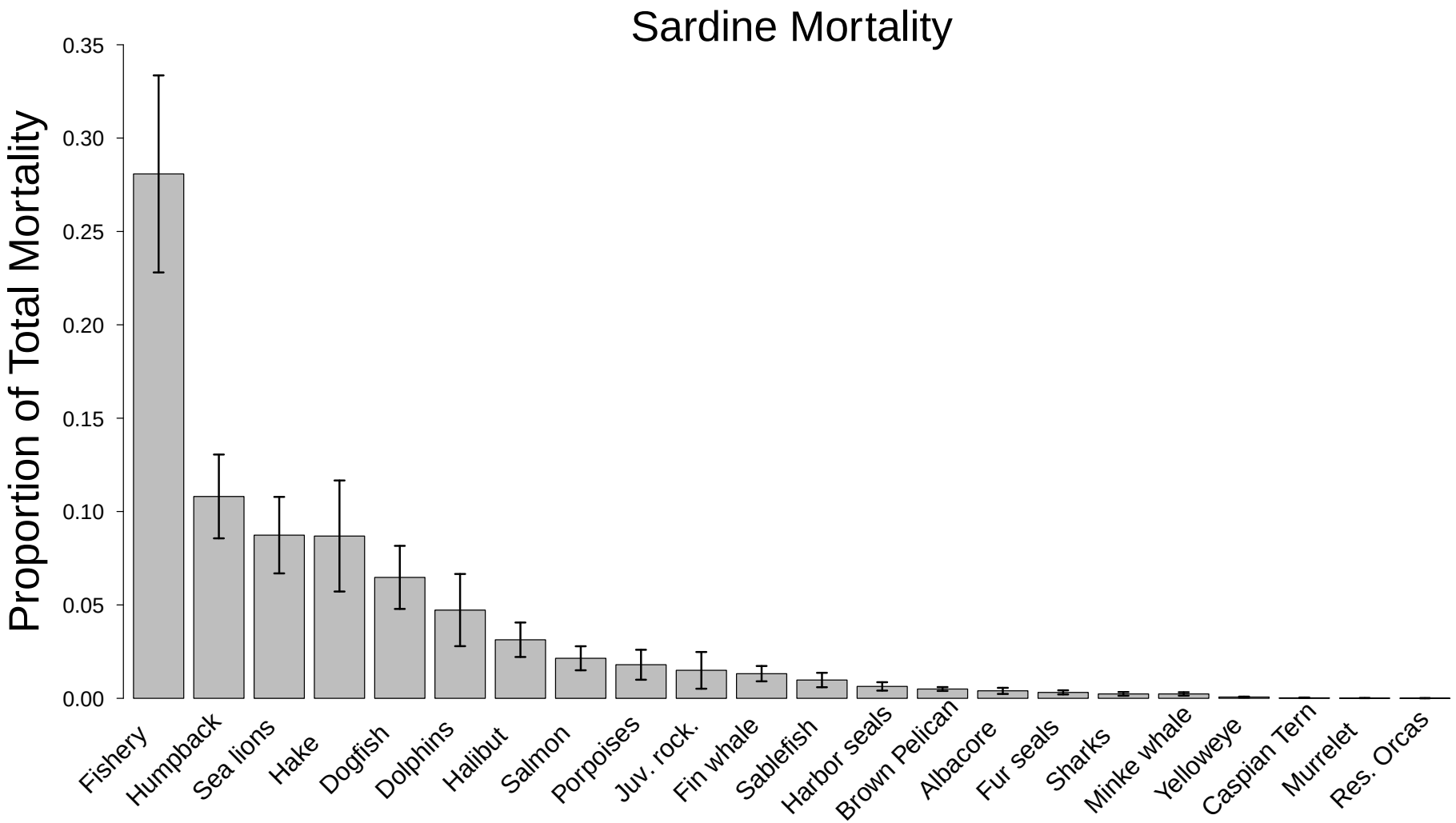
California Current Ecopath

- Ecopath
  - Determines energetic linkages between functional groups (biomass pool)
  - Not dynamic; no spatial component
- New Cal. Cur. Model
  - Forage fish centric model
  - High taxonomic resolution of forage fish and their predators (92 groups)
  - Forage: sardine, anchovy, herring, sandlance, whitebait smelt, other smelt, market squid
  - Designed to look at trade-offs between forage fish ecosystem services and fisheries

Forage Fish in Predator Diets (original Ecopath model)



Sardine Mortality Across Monte Carlo Draws (ave. mortality proportions ± SD)



What amount of predators do you lose with depleted forage fish?

- PREP equation (Predator Response to Exploitation of Prey)
  - Tells you what the average Ecosim result would be
  - Output is the expected decline in predators as forage fish are depleted by some level
  - Based on predator diet dependency (diet fraction) and predator type

PREP – Predators with >15% decline given 50% depletion in forage fish

Sardine
Brown Pelican

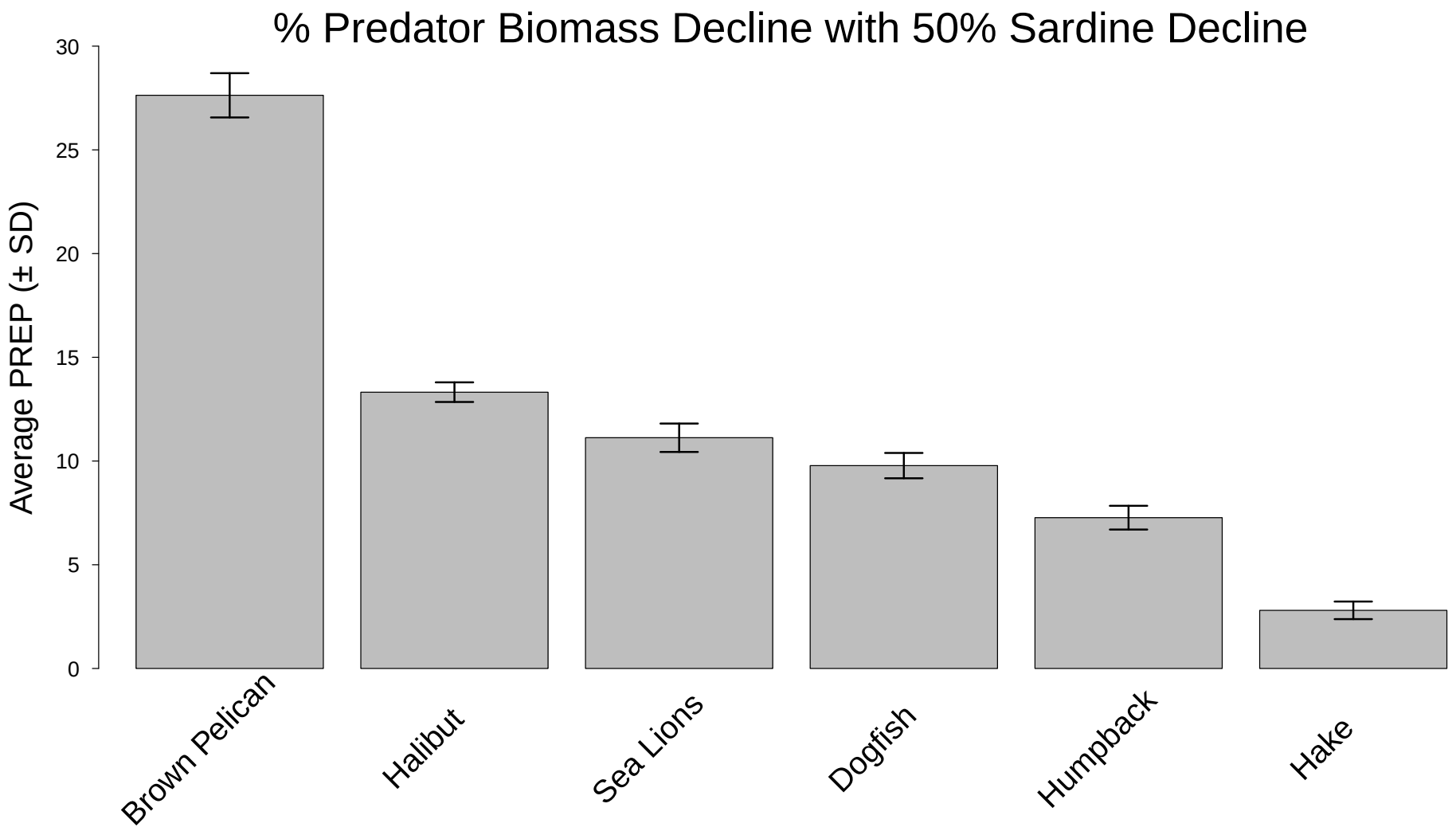
Anchovy
Brown Pelican
California Gull
Common Murre
Marbled Murrelet
Rhinoceros Auklet
Western Gull
Double-crested cormorant
Salmon
Sharks

Herring
Yelloweye Rockfish
Marbled Murrelet
Western Gull

Combined group
Brown Pelican
Marbled Murrlet
California Gull
Western Gull
Common Murre
Sharks
Rhino Auklet
Salmon
Yelloweye
Caspian tern
Minke
Halibut
Black rockfish
Double-crested
Brandt's corm.

* Ordered from greatest to least decline

Magnitude of PREP Predictions (sardine)



Effects of various harvest control rules on predators, target species, and catches

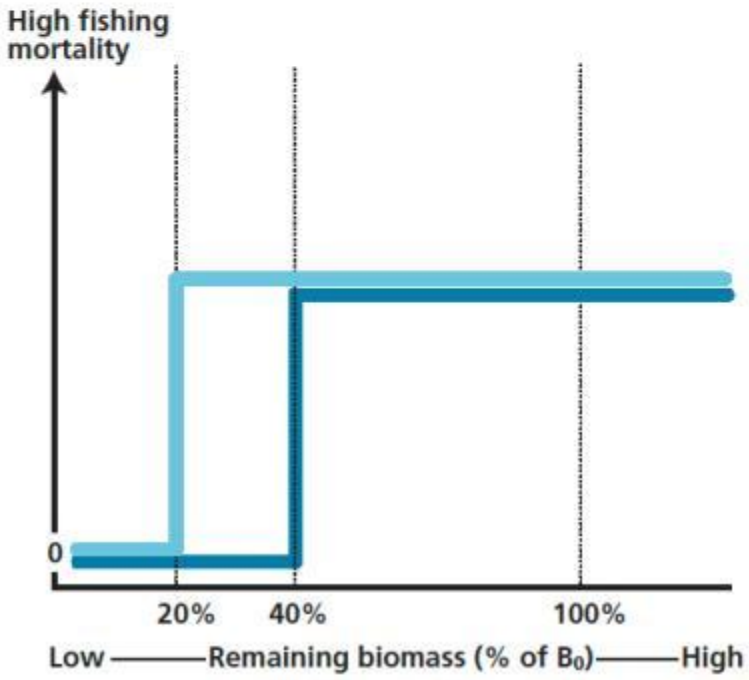
Based on 10 EwE models

More sustainable

Step function rule

The same as the constant fishing mortality rule, except that fishing ceases when the fish biomass decreases to a minimum threshold (biomass limit).

20% minimum biomass limit
40% minimum biomass limit



Comparison of harvest control rules

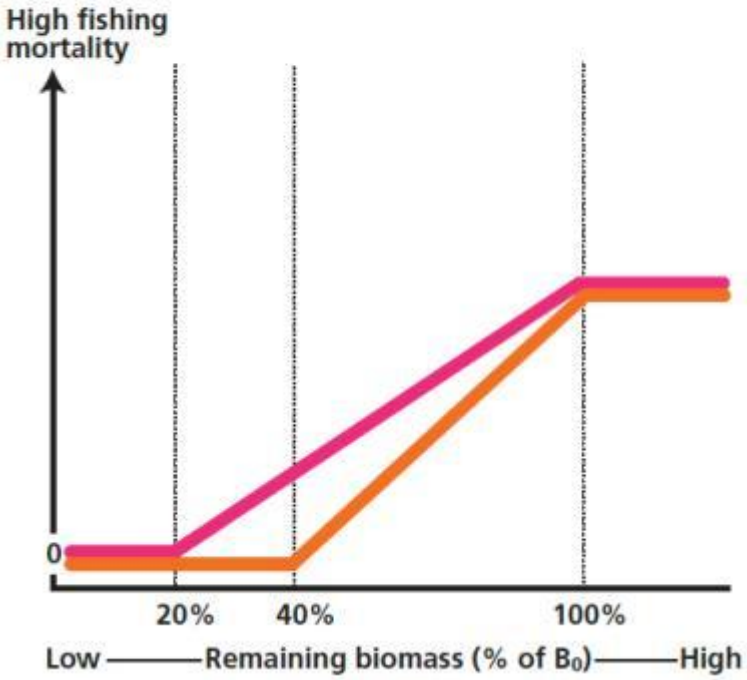
Biomass limit rules.

Best strategies

Hockey stick rule

The same minimum biomass limits as the step function rules apply, but fishing mortality is decreased gradually instead of all at once as fish biomass decreases.

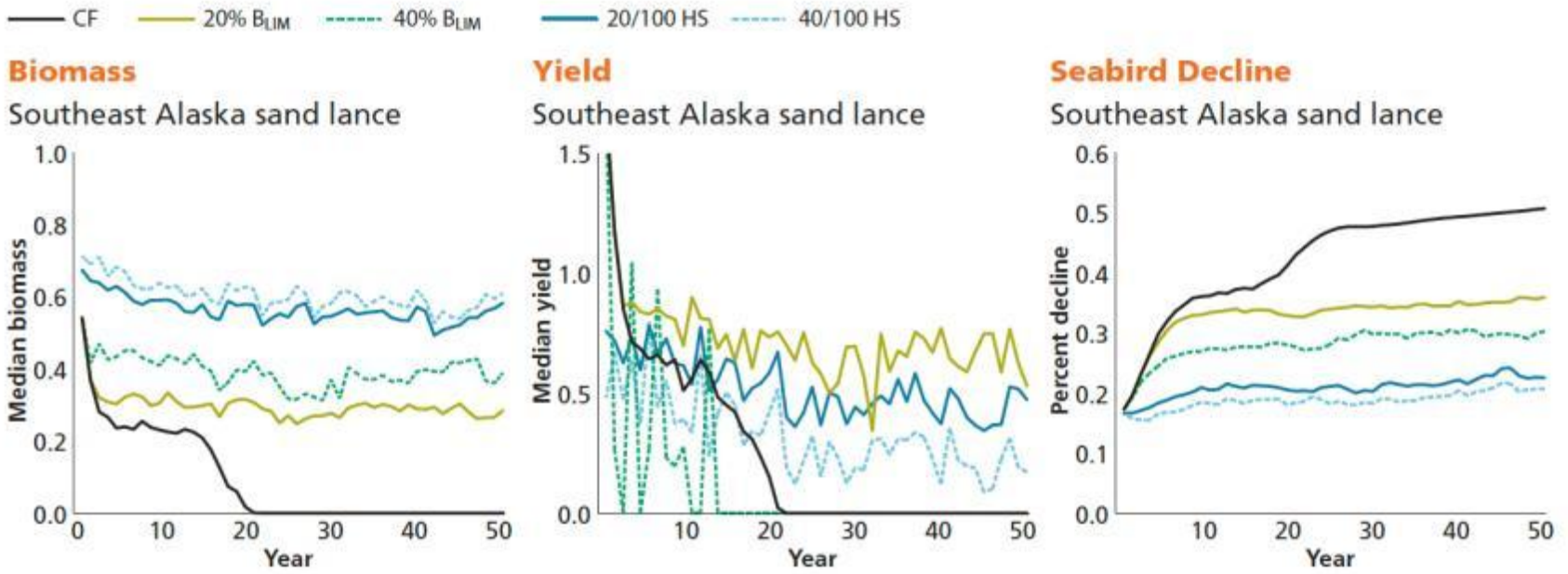
- **20%** minimum biomass limit to **100%**
- **40%** minimum biomass limit to **100%**



Comparison of harvest control rules

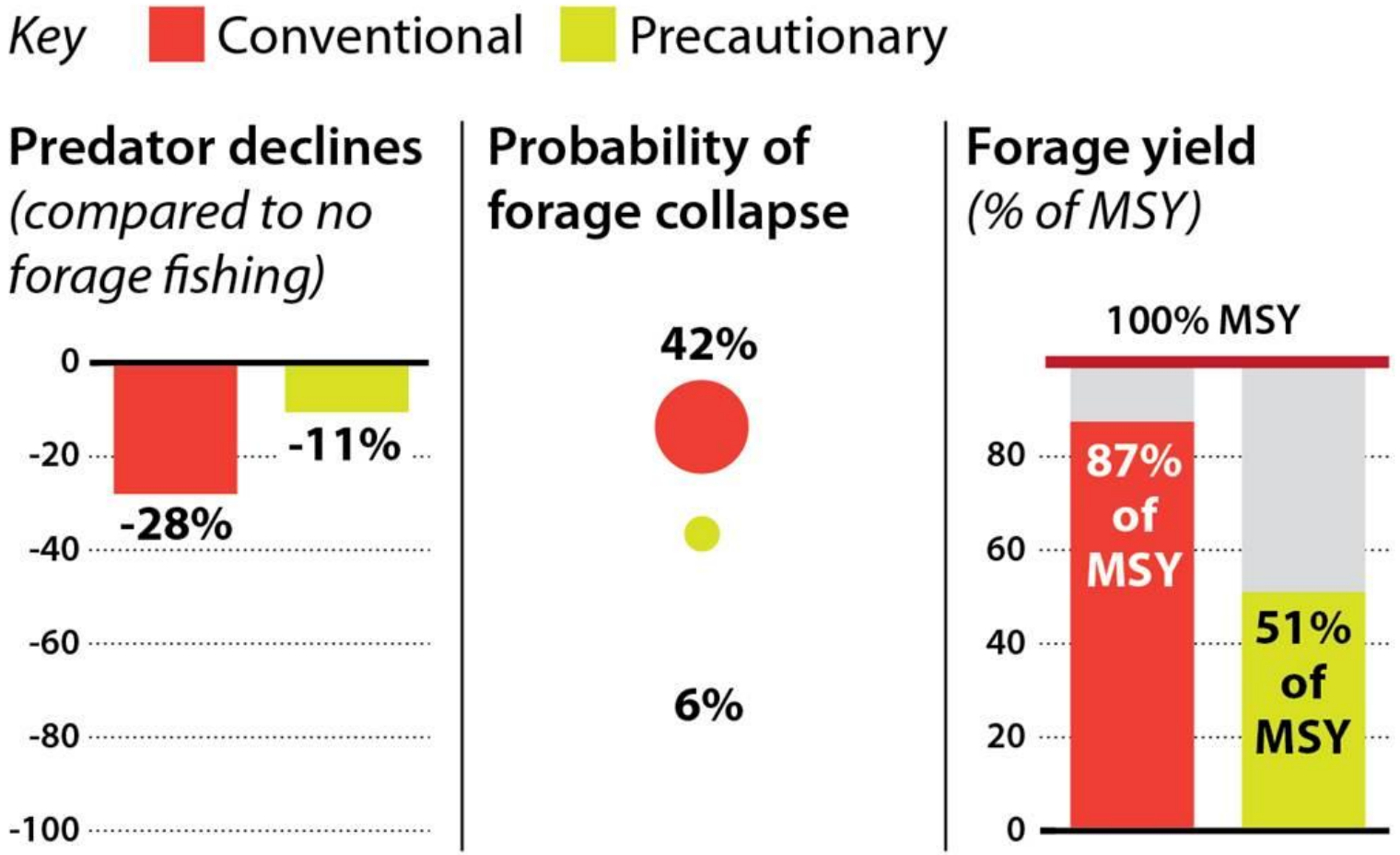
Hockey stick rules.

Stochastic model runs – southeast Alaska



Examples of stochastic model results to compare the impacts of the five stochastic harvest control rules. All lines represent the median responses (medians taken across 100 simulations) for the specified forage fish.

Only Precautionary Management Protects Predators and Fisheries



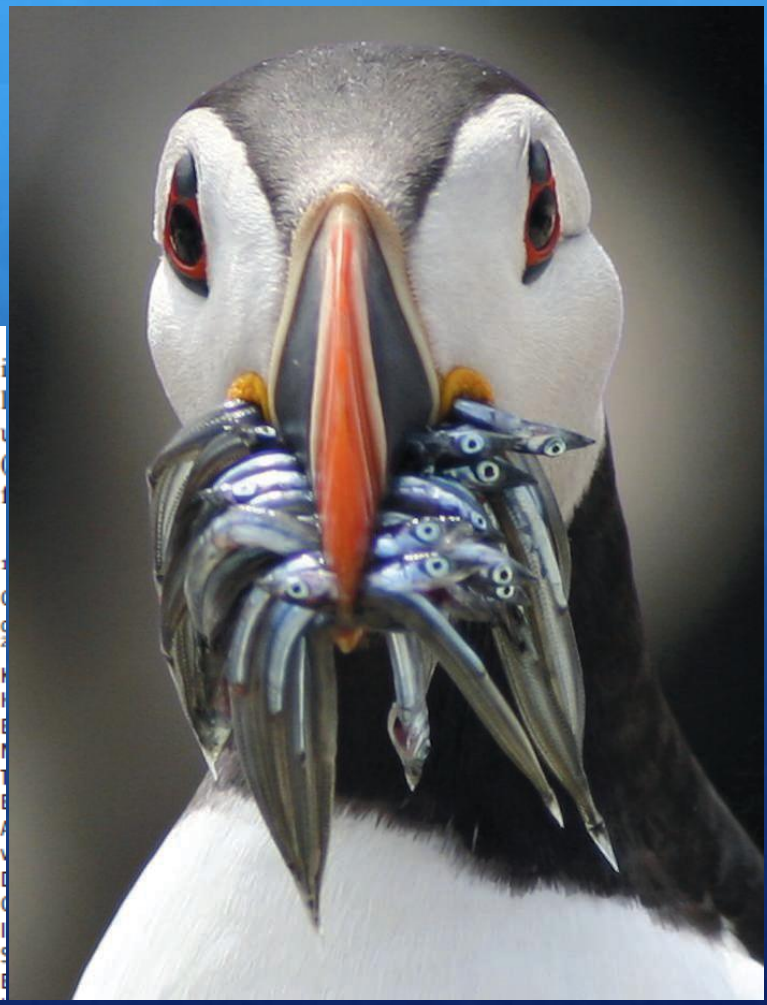
Empirical (model-independent) evidence

Example from Cury et al. 2011. Science.

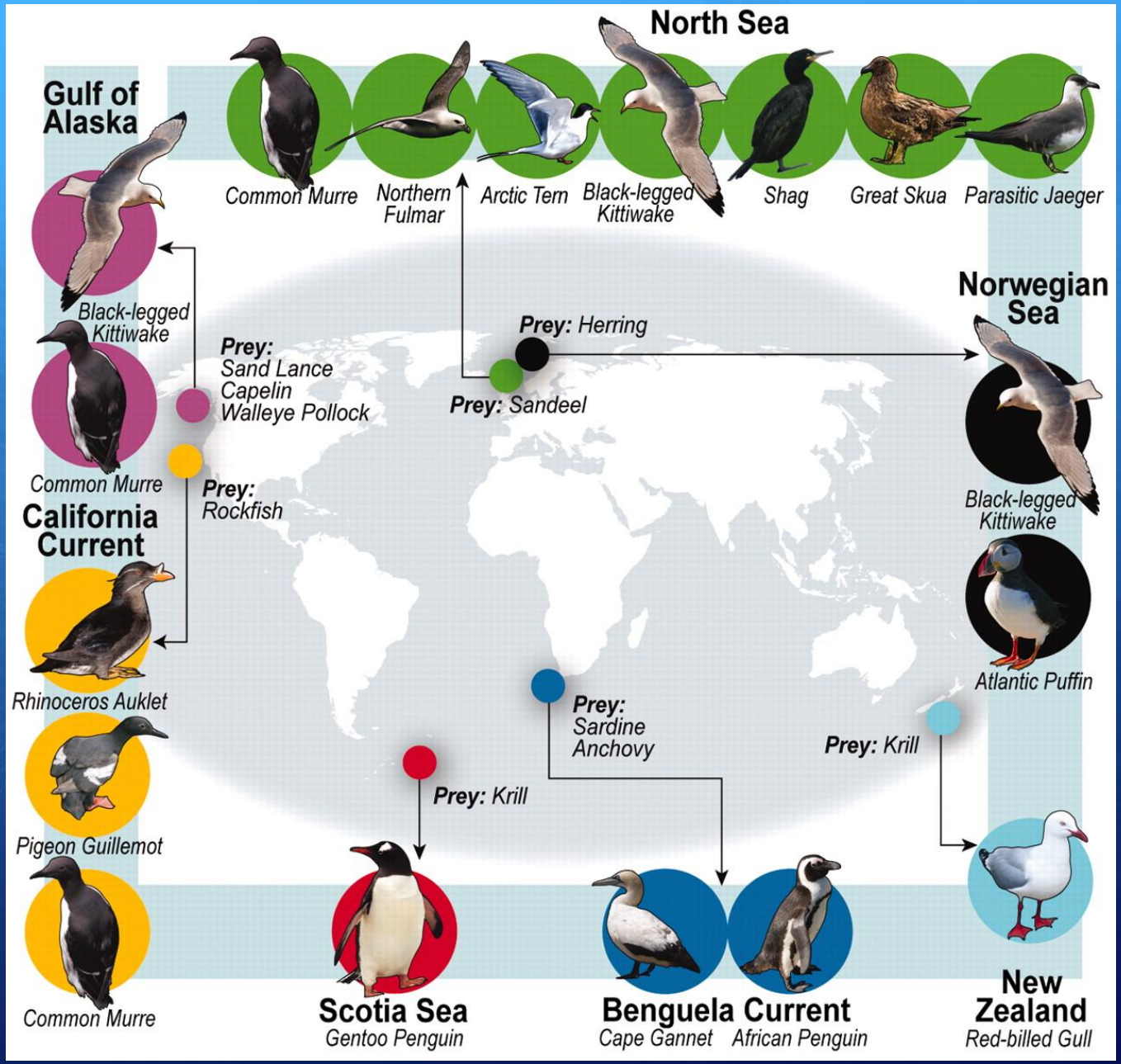
Global Seabird Response to Forage Fish Depletion—One-Third for the Birds

Philippe M. Cury,[1*] Ian L. Boyd,[2*] Sylvain Bonhommeau,[3] Tycho Anker-Nilssen,[4] Robert J. M. Crawford,[5] Robert W. Furness,[6] James A. Mills,[7] Eugene J. Murphy,[8] Henrik Österblom,[9] Michelle Paleczny,[10] John F. Piatt,[11] Jean-Paul Roux,[12,13] Lynne Shannon,[14] William J. Sydeman[15]

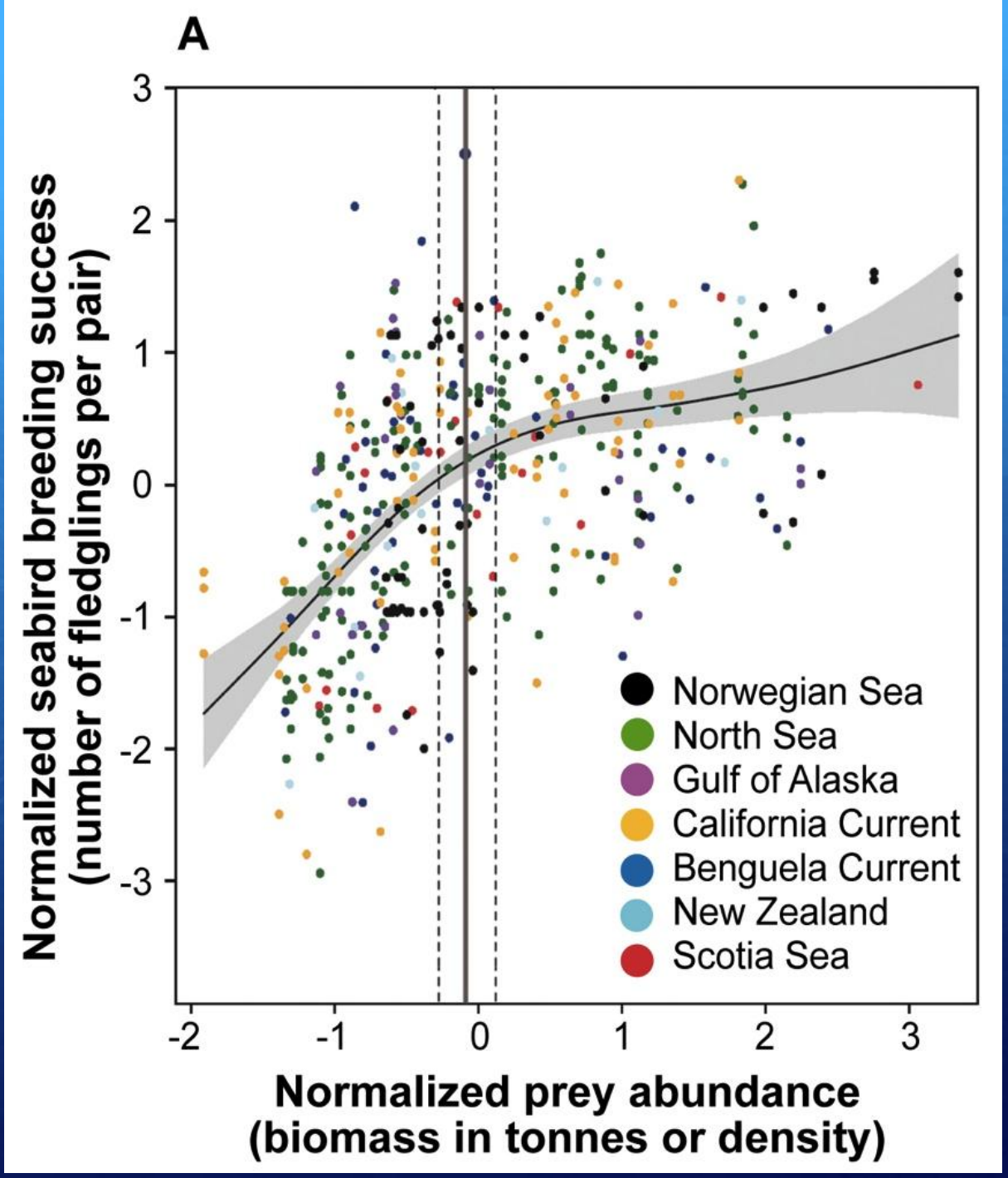
Determining the form of key predator-prey relationships is critical for understanding marine ecosystem dynamics. Using a comprehensive global database, we quantified the effect of fluctuations in food abundance on seabird breeding success. We identified a threshold in prey (fish and krill, termed "forage fish") abundance below which seabirds experience consistently reduced and more variable productivity. This response was common to all seven ecosystems and 14 bird species examined within the Atlantic, Pacific, and Southern Oceans. The threshold approximated one-third of the maximum prey biomass observed in long-term studies. This provides an indicator of the minimal forage fish biomass needed to sustain seabird productivity over the long term.



Cury, Boyd et al 2011, *Science*



Cury et al. Science 2011;334:1703-1706



Meta-analysis: one third for the birds

7 marine ecosystems

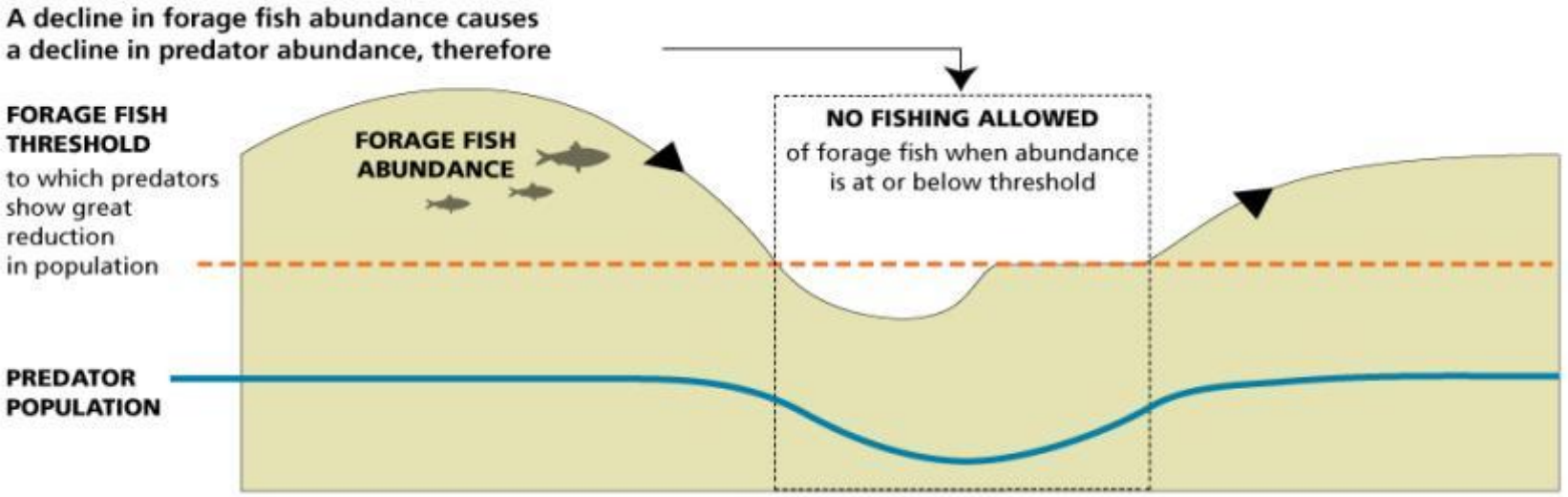
14 seabird species

438 years of observation

Recommendations

Based on model results AND empirical (model free) evidence

Minimum Biomass Threshold

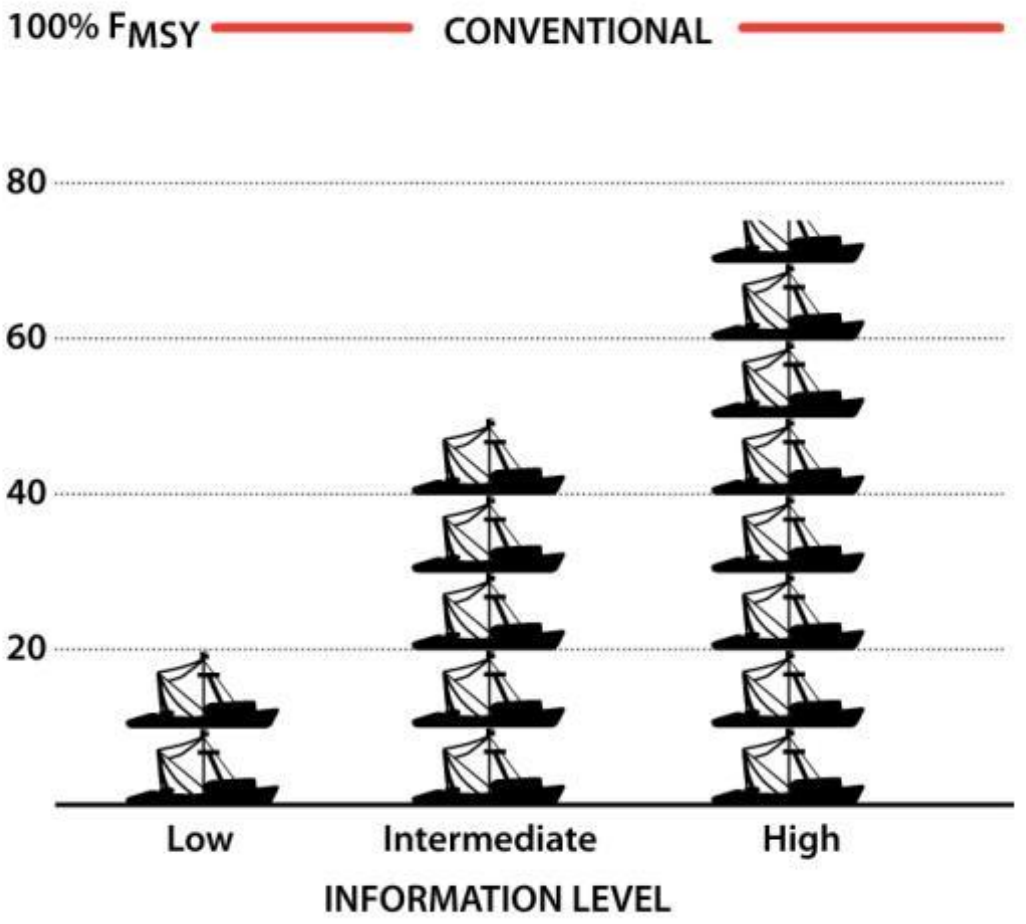


A three-tiered precautionary approach to the management of forage fish developed by the Lenfest Forage Fish Task Force

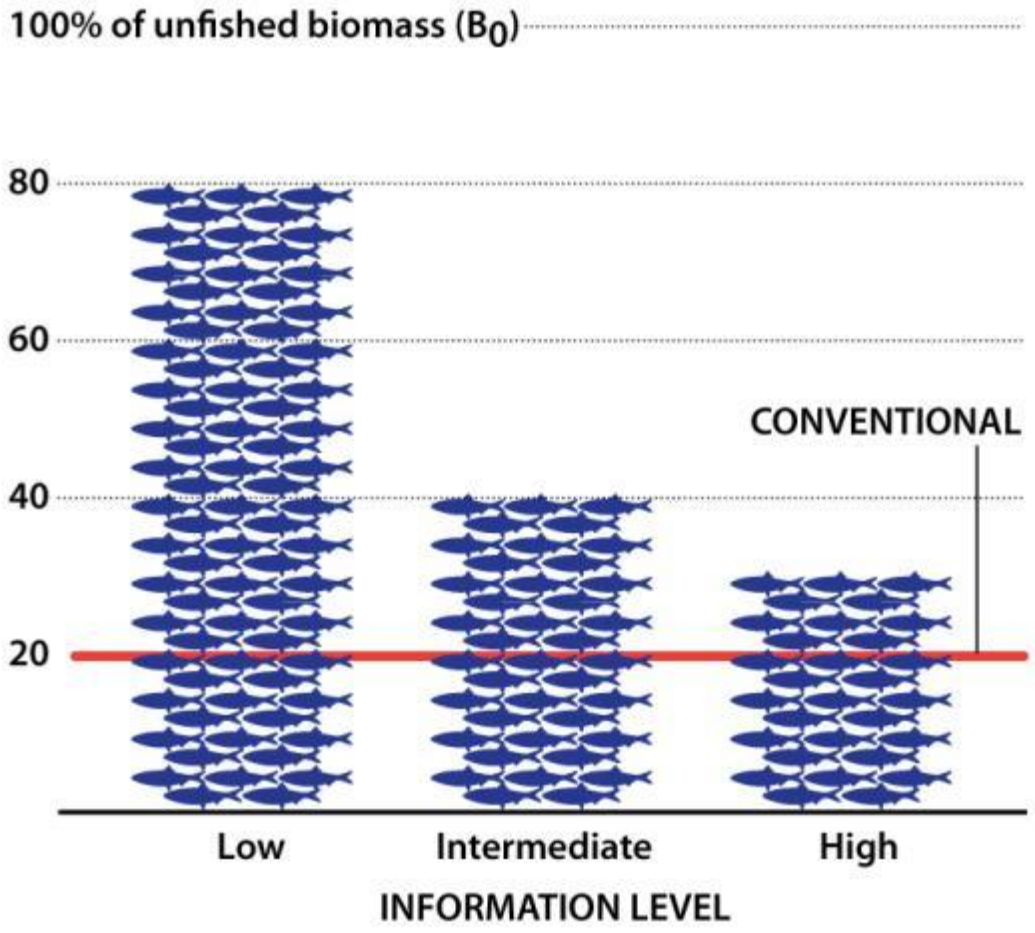
(See Chapters 6 and 7 in the report for additional details)

INFORMATION TIER *Based on information needed to project fisheries impacts on forage fish and on the predators that feed on them.*	KNOWLEDGE OF . . . Forage fish stock dynamics and fisheries *Population status, trends*	 *Environmental drivers*	 *Monitoring, enforcement*	KNOWLEDGE OF . . . Status, trends, dependencies of predators *Identification of dependent predators*	 *Status of predators*	 *Foraging patterns*	RECOMMENDED MANAGEMENT ACTION
LOW	 Limited information on abundance, status, and trends such that there is little certainty about stock status, in particular as to whether the stock is above minimum biomass levels.	 Environmental drivers have not been examined sufficiently to enable precise predictions of forage fish production dynamics.	 Fishery monitoring and enforcement is not sufficient to ascertain whether catches are within specified limits.	 Dependent predators have not been identified on the basis of empirical evidence from the relevant ecosystem.	 Insufficient evidence to judge the status and trends of predators either known or likely to be dependent upon forage fish.	 Spatial patterns of foraging are not known.	**RECOMMENDED MANAGEMENT ACTION** • No new fisheries should be allowed to operate. • Severely restrict existing forage fisheries so that depletion from fisheries is no more than 20% of unfished population (B_0). • Implement precautionary spatial closures to protect against localized depletion of forage fish, and to protect potential foraging areas of land-based predators. • Initiate data gathering to reach intermediate tier.
INTER-MEDIATE	 Population abundance, status, and trends are monitored, so that catch control rules are likely to result in population levels within specified biological limits.	 Putative environmental drivers of forage fish productivity are identified, providing some ability to predict production dynamics and account for them in the harvest control rule.	 There is some monitoring and enforcement of fisheries so that catches are likely to be within specified limits.	 Dependent predators have been identified so that effects of forage fish on their abundance can be predicted on the basis of food web models or the PREP equation.	 Population status and trends of dependent predators are monitored but with considerable uncertainty.	 Spatial patterns of foraging are known and sufficient to support predictions about the effects of localized depletion.	**RECOMMENDED MANAGEMENT ACTION** • Apply the "Predator Response to Exploitation of Prey" (PREP) equation, or use data or models specific to the ecosystem, to assess the impacts of forage fish depletion on dependent species (using 95% confidence interval). • Apply a "hockey stick" harvest control rule with minimum biomass (B_{LIM}) ≥ 40% B_0 and fishing (F) not to exceed 50% of the natural mortality rate or 50% of the level that achieves MSY (F_{MSY}). • Increase B_{LIM} and decrease F when the ecosystem contains highly dependent predators or when precision of diet dependencies is low. • Use spatial management to protect predators likely to be adversely affected by localized depletion.
HIGH	 Population abundance, status, and trends are known sufficiently precisely and with sufficient lead time to adjust fishing levels according to a harvest control rule, resulting in a high likelihood of achieving management goals.	 Environmental drivers of forage fish productivity are well known and are accounted for in the harvest control rule.	 High ability to monitor and enforce fisheries regulations at-sea and/or dockside so that catches are highly likely to be within specified limits.	The functional responses of dependent predators to forage fish abundance are well defined based on empirical evidence so that effects of fishing can be determined with a high degree of certainty. Models reflect what is known from the field and are tested and modified with new information.	 The population status and trends of dependent predators are measured with high certainty and at frequent intervals.	 Localized forage fish requirements of dependent predators can be estimated with high precision, so that effects of localized depletion on dependent predators are well described.	**RECOMMENDED MANAGEMENT ACTION** • The harvest strategy must include an upper limit to F and a lower limit below which targeted fishing ceases (B_{LIM}), and F should be reduced as B_{LIM} approached. • The harvest strategy must include precautionary buffers that account for limits on the ability to predict fisheries and food web dynamics. • The harvest strategy must—by independent, realistic, quantitative testing—be shown to achieve the Dependent Predator Performance Criterion, protect the forage fish stock from impaired reproduction, and allow it to recover through periods of natural fluctuation in productivity. • In any case, lower biomass limits should not be less than 30% B_0, and the maximum fishing rate should not exceed 75% F_{MSY} or 75% of natural mortality. • Apply spatial management to account for localized depletion effects on spatially constrained predators.

A Lower Ceiling on Forage Fishing



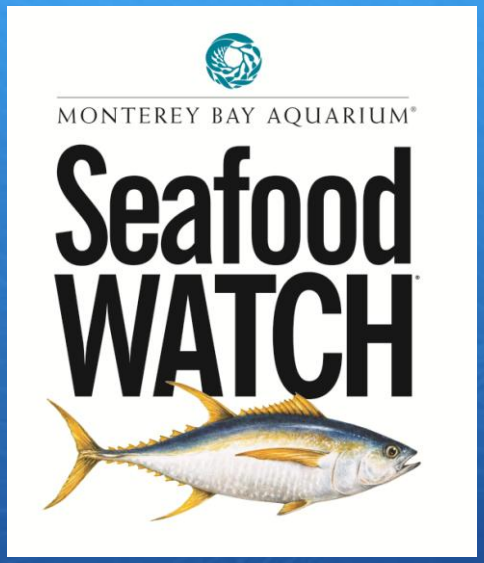
A Higher Floor on Forage Fish Biomass



Key Recommendations

- Focus on predators
- Consider spatial & temporal management
- For intermediate tier, use a hockey stick control rule with F target set to half of F_{MSY} , and B_{MIN} set at 0.4 B_0
- Tailor management to available information

Seafood Watch Proposal



- Seafood Watch is proposing to incorporate the LFFTF recommendations
- Forage fish would have to meet reference points recommended by the LFFTF
- Forage fish would be scored as "Moderate Concern" or higher if **abundance** is not above the LFFTF recommended reference points, even if it is above standard biomass reference points
- Forage fish will be scored as "High Concern" if **fishing mortality** is not below LFFTF recommended F, even if it is below FMSY.

Seafood Watch Proposal

- Criterion 1: Impacts on the Species Under Assessment
- Criterion 2: Impacts on Other Capture Species

Conservation Concern	Description of Abundance Criteria	Score
Very Low	One or more of these conditions must apply: 1. Recent Stock Assessment (<5 years) and biomass is above or fluctuating around a **target** reference point that is appropriate given the species ecological role 2. Stock is at or very near its historic high or virgin biomass 3. Species is non-native	**5**
Low	One or more of these conditions must apply: 1. Recent Stock Assessment (<10 years), and biomass is above a **limit** reference point that is appropriate given the species' ecological role; at least 75% of the **target** reference point; or above a **target** reference point but short of requirements for very low concern 2. Quantitative stock assessment is lacking, but the species is not highly vulnerable and there are at least two appropriate data-limited assessments that suggest a healthy stock	**3.67**
Moderate	One or more of these conditions must apply: 1. Species is above a **limit** reference point but below 75% of the **target** reference point 2. Species is not highly vulnerable AND either there is no evidence to suggest that stock is above or below reference points, or there is conflicting information about stock status 3. Species is highly vulnerable and there is no quantitative stock assessment, but there are data indicating status is not of concern	**2.33**
High	One or more of these conditions must apply: 1. Probable that stock is below the **limit** reference point, depleted/overfished, or determined by a state, national, or international scientific body to be of concern, vulnerable, endangered, or threatened 2. Species is highly vulnerable and no evidence suggests that the stock is either above or below reference points, or data-limited assessment methods have conflicting outcomes	**1**

Conservation Concern	Description of Fishing Mortality Criteria	Score
Low	One or more of these conditions must apply: 1. Probable (>50% chance) that fishing mortality from all sources is at or below a sustainable level that will allow population to maintain current level or rebuild if depleted and to fulfill its role in the ecosystem 2. Population trends are increasing in short and long term due to management 3. Species is non-native 4. For C2 species the fishery is not a substantial contributor to fishing mortality or its contribution to mortality is expected to be low enough to not adversely affect population	**5**
Moderate	One or more of these conditions must apply: 1. Fishing mortality is fluctuating around FMSY or for a species with an exceptional role in the ecosystem, a reference point that is appropriate given the species ecological role 2. Fishing mortality is Unknown 3. Fishing mortality is below the reference point but the reference point is less conservative than FMSY	**3**
High	One or more of these conditions must apply: 1. For Criteria 1 species, overfishing is occurring or fishing mortality is unknown but suspected or probably (>50% chance) that it is above a sustainable level or reference point that is appropriate given the species ecological role 2. For Criteria 2 species, cumulative fishing pressure may be too high to allow species to maintain abundance or recover and the individual fishery's contribution is unknown or the fishery is a substantial contributor	**1**