Black Sea Bass Commercial Management

Presented to ASMFC Summer Flounder, Scup and Black Sea Bass Board

August 7, 2019

Presentation Outline

1. Background
2. Review of Potential Management Strategies
   - TMGC Approach
   - Trigger Approach
   - Hybrid Approaches
   - **NEW:** Connecticut Proposed Options
3. Draft Goal Statement
4. Next Steps
5. Questions

Background

- ASMFC Board established Commercial Black Sea Bass WG in August 2018
  - Purpose: identify issues and management strategies for the commercial fishery related to changes in black sea bass abundance and distribution

Background

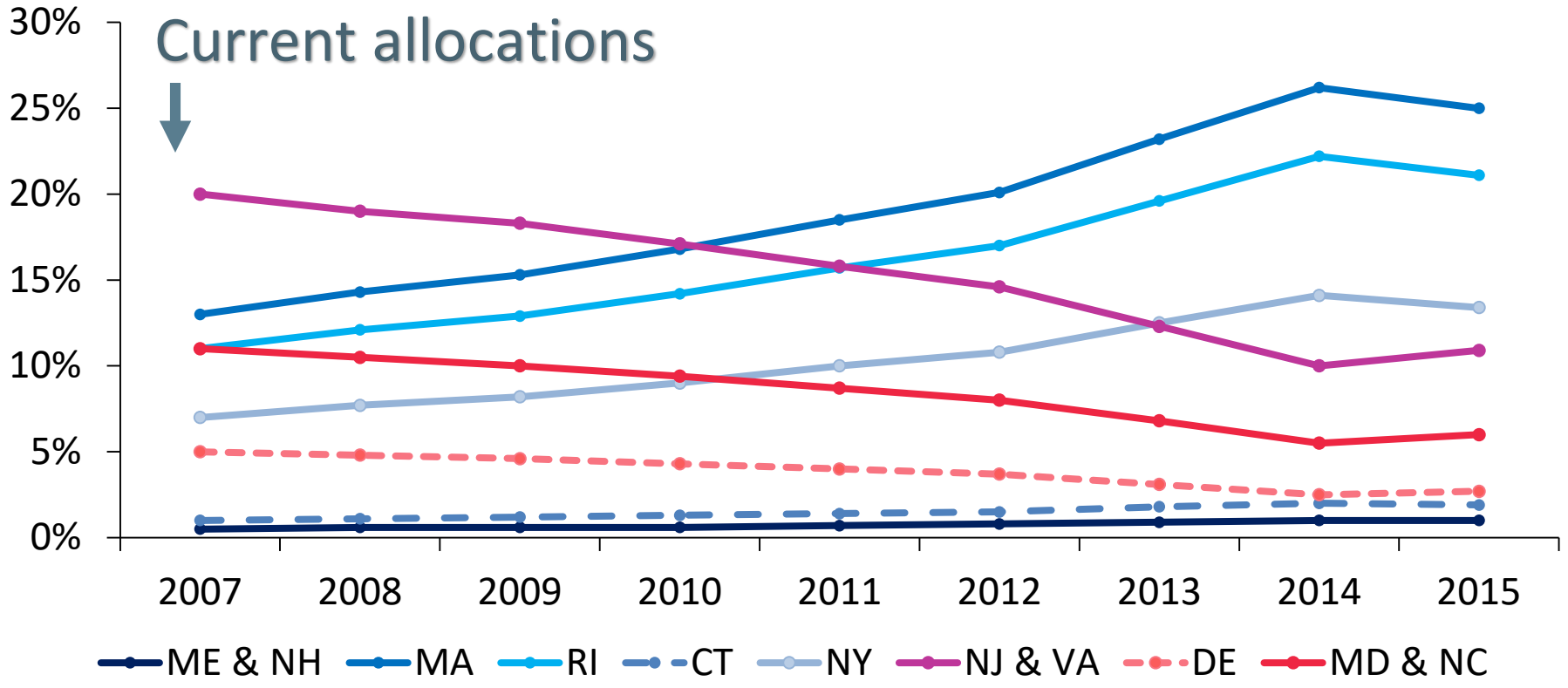
Date	Activity/Action
February 2019	Board Reviewed Commercial WG Report; formed PDT
March 2019	Joint Board and Council Meeting: reviewed Board work on commercial black sea bass. Council initiated amendment for commercial issues.
March-April 2019	PDT development and analysis of management strategies
May 2019	Board review of PDT and AP Reports
August 2019	**Board Review of Proposed Options and Goal Statement**

"TMGC" Approach

- Formula for gradually transitioning the basis for allocations from resource utilization (allocations, landings) to resource distribution (regional biomass, abundance)
- Various "dials" that can be adjusted
- Dynamic, multidirectional allocation changes
- Control rule can be used to limit annual allocation changes

"TMGC" Example

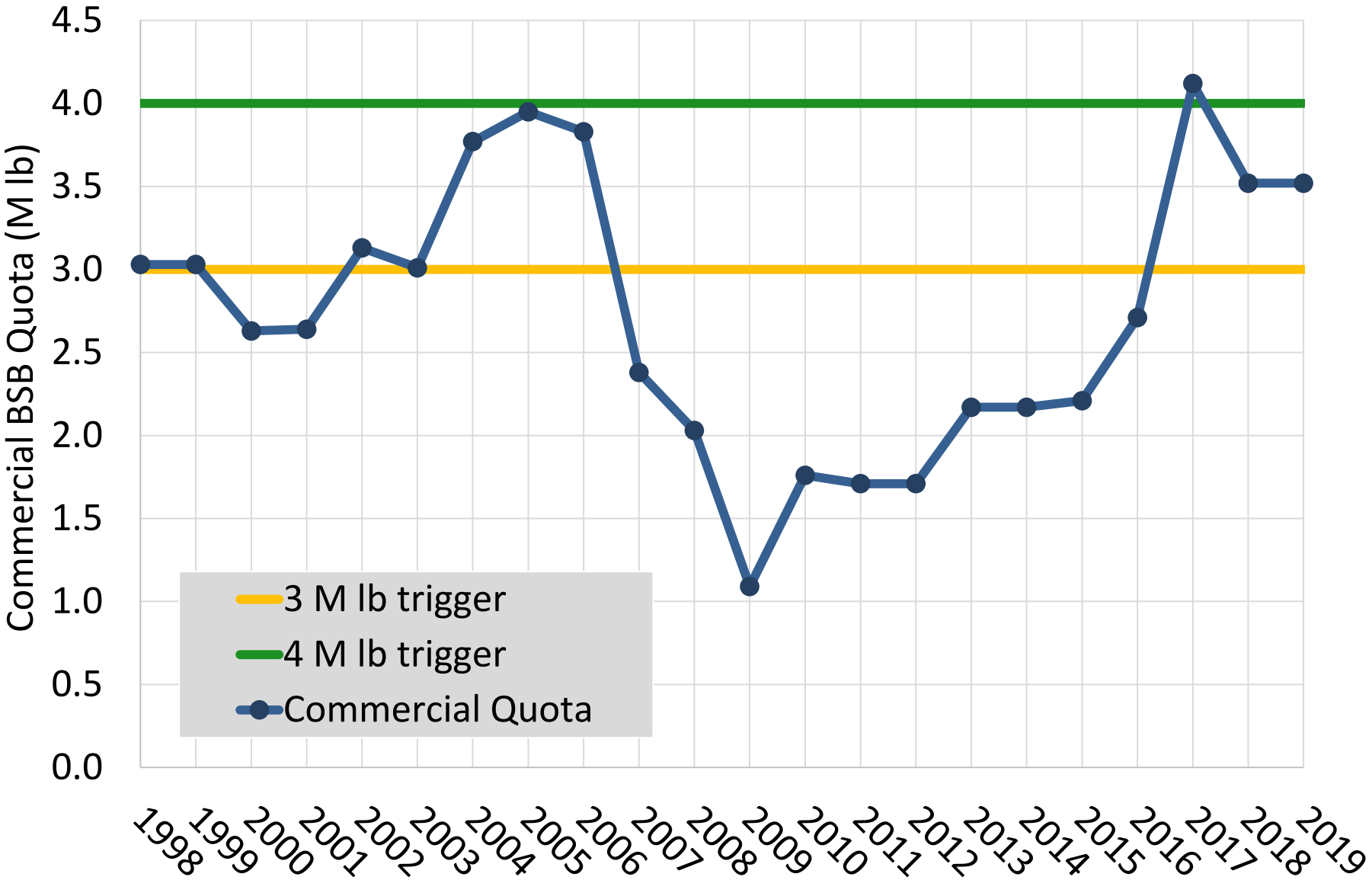
- Retrospective example of TMGC (2008-2015)
- Resource distribution information from last assessment
- Transition from 90:10 to 10:90 weights for utilization:distribution
- 3% control rule



Trigger-based Allocation Approach

- Establishes a coastwide quota value that would "trigger" reallocation of quota
  - 3 million pounds (average quota 2003-2018)
  - 4 million pounds (based on highest coastwide quota)
- Quota up to the trigger value would be distributed using current state allocations
- Quota exceeding the trigger value would be distributed evenly to the states (*or use a different method*)

Triggers Versus Recent Quotas



Trigger Approach Sub-Options

Step 1: Quota up to the trigger value distributed using current state allocations

Step 2: Quota above the trigger distributed…

- Evenly to MA-NC (ME and NH get smaller %)

  OR

- Based on regional biomass from assessment

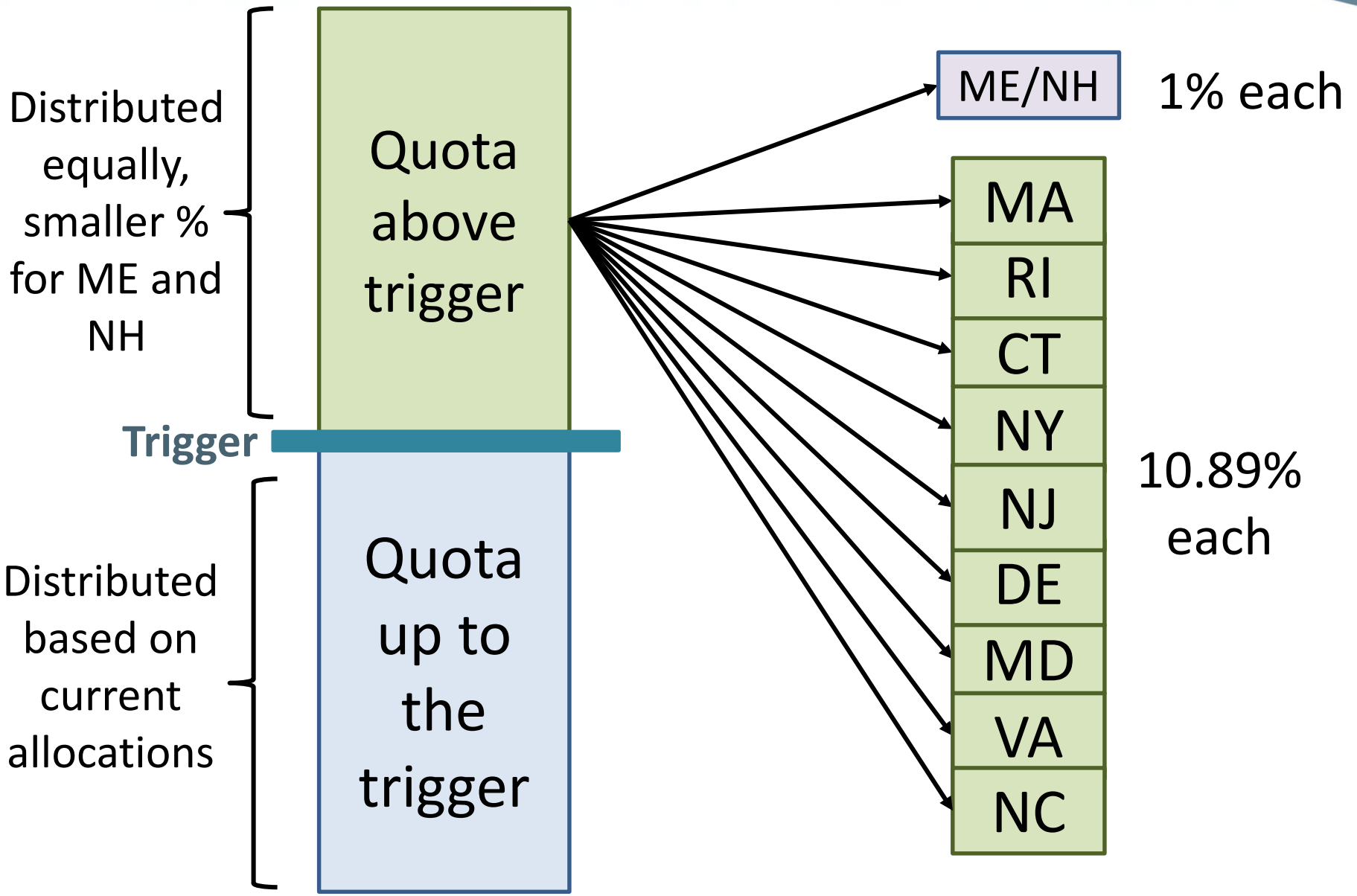
  STEP 3: Regional quota distributed to states

  - Equally

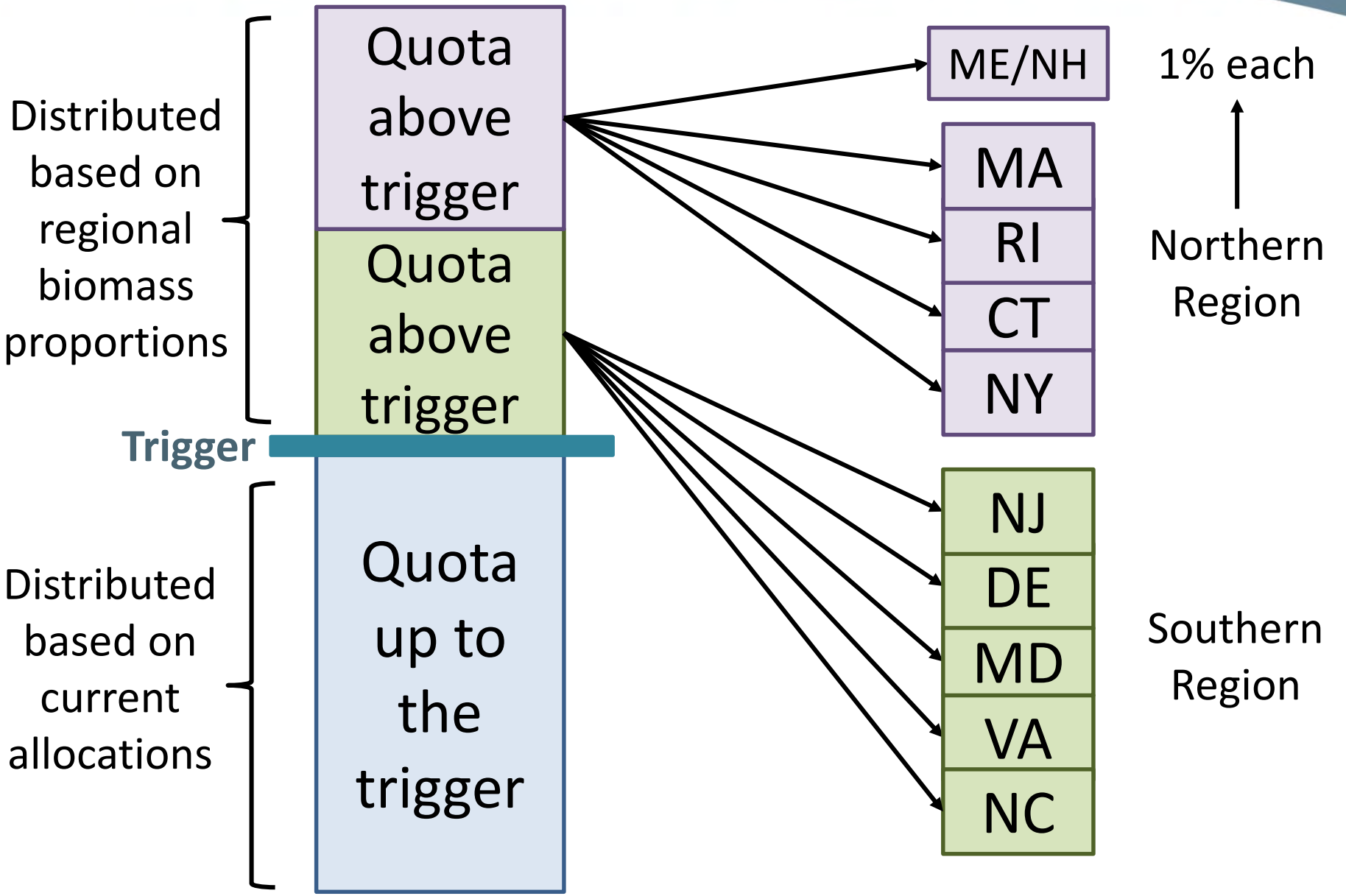
    OR

  - Based on historic allocations

Trigger Approach – Equal Allocation



Trigger Approach – Regional Biomass



Hybrid Approaches

- Two or more methods could be combined
- Example: 50% of quota allocated using status quo allocations, 50% using TMGC or Trigger
- Important to weigh flexibility vs increased complexity and potential confusion

New Proposed Options: 1

Option 1: Increase CT allocation to 5%

- Hold NY and DE allocations constant
- Move 1/2 of ME and NH allocations to CT (+0.5%)
- Move some allocation from MA, RI, NJ, MD, VA, and NC allocation to CT, proportional to each state's current percent allocation (+3.5%)

Table 1. Proposed changes in base allocations			
State	Current % Allocation	% Change in Allocation	New % Allocation
ME	0.5%	-0.2500%	0.2500%
NH	0.5%	-0.2500%	0.2500%
MA	13.0%	-0.5291%	12.4709%
RI	11.0%	-0.4477%	10.5523%
CT	1.0%	4.0000%	5.0000%
NY	7.0%	0.0000%	7.0000%
NJ	20.0%	-0.8140%	19.1860%
DE	5.0%	0.0000%	5.0000%
MD	11.0%	-0.4477%	10.5523%
VA	20.0%	-0.8140%	19.1860%
NC	11.0%	-0.4477%	10.5523%

New Proposed Options: 2

Option 2: Trigger option with adjustment of "base" allocations on an annual basis

- If coastwide quota is ≤ 3 million pounds:
  - Allocate quota using the previous year's state allocation percentages.
- If coastwide quota is > 3 million pounds:
  - Allocate 3 million pounds of quota or "base" quota using the previous year's state allocation percentages.
  - Allocate quota above 3 million pounds as follows:
    - Distribute regionally according to proportion of available biomass in each region (ME-NY = north region; NJ-NC = south region)
    - Distribute quota within each region according to existing intra-regional proportional allocation.

New Proposed Options: 2

Option 2 benefits:

- 3 million pound trigger ensures there will not be immediate substantial decrease to southern state allocations
- Incorporates data on distribution of the resource (from the stock assessments, or fishery-independent survey data)
- Allows state-by-state allocations to shift over time with regional resource availability shifts (either direction). Rate of allocation shift is accelerated during periods of high resource availability and effectively "pauses" during periods of low resource availability.
- Moderate annual changes in allocations by only "shifting" quota above 3 million pounds

Next Steps for Board

- Consider draft goal statement
- Consider initiation of a management action
  - Specify which management strategies should be considered
  - Consider potential timeline for document development

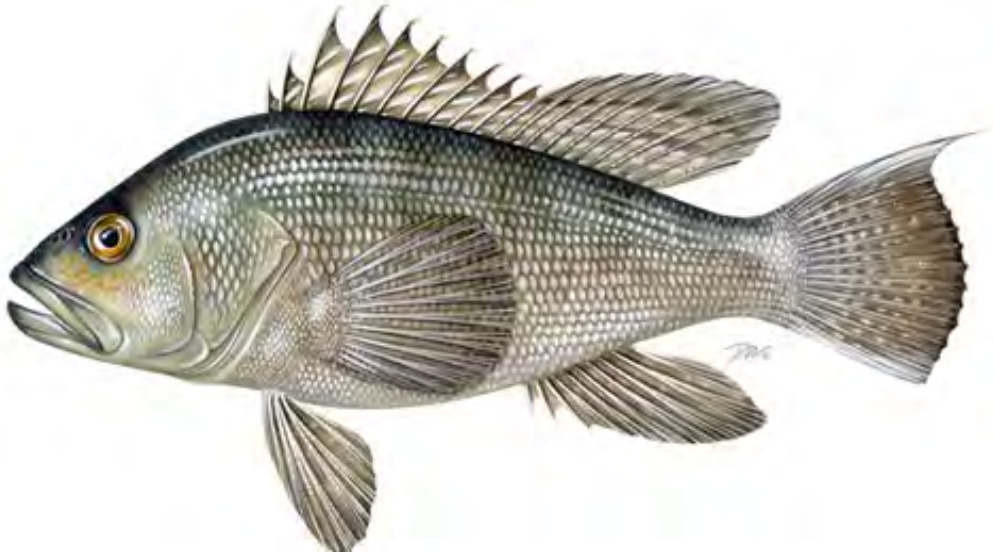
Potential Timeline

Date	Activity/Action
August 2019	Initiate addendum to address commercial black sea bass state allocations
October 2019	Review operational assessment; Review draft management options
December 2019	Consider draft addendum for public comment
Jan-Feb 2020	State public hearings on draft addendum
May 2020	Consider addendum for final approval; potential implementation 2021

Draft Goal Statement

"Consider changes in commercial black sea bass allocation to provide fair and equitable access to the resource by better aligning allocations with updated scientific information on resource distribution and abundance while affording due consideration to the socio-economic needs and interests of coastal communities."

Questions?

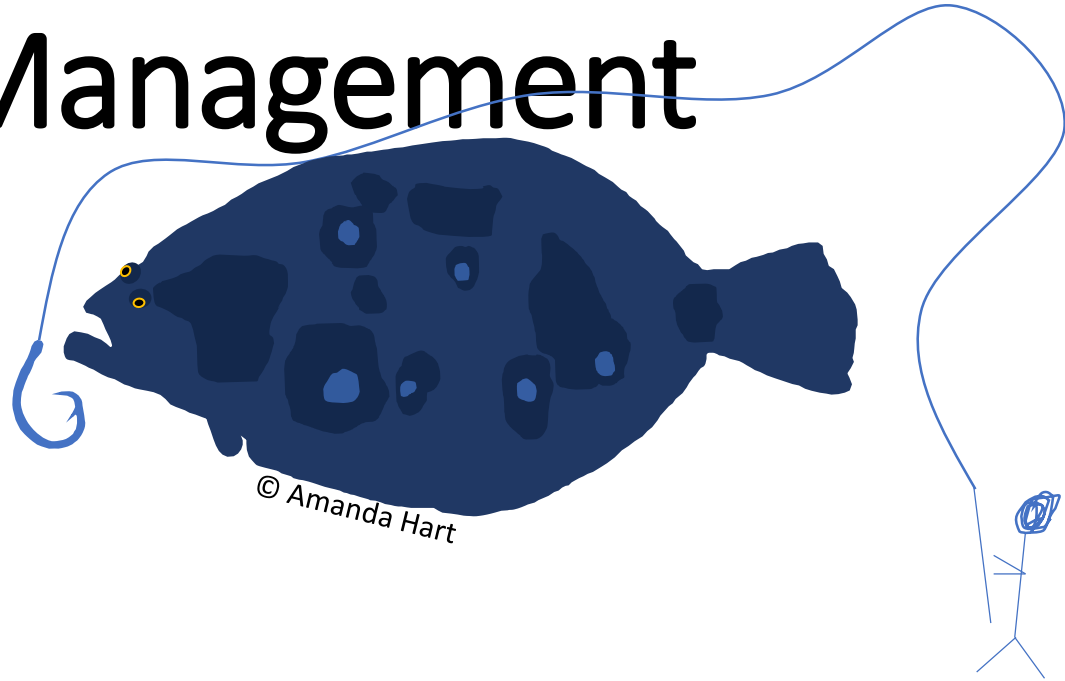


Draft Goal Statement

Revised goal statement:

"Consider adjusting current commercial black sea bass allocation using current distribution and abundance of black sea bass as one of several adjustment factors to achieve more balanced access to the resource. These adjustment factors will be identified as the development process moves forward."

Evaluation of F-Based Management for the Recreational Summer Flounder Fishery



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Objectives

- Test the performance of management approaches for the recreational summer flounder fishery
- Show the relative value of both current and potential management actions for satisfying management objectives
- Provide decision support tools to assist in application to the specification setting process for summer flounder

Project components

- Extend previous work funded by the Council to characterize catch response to changes in recreational fishing management regulations for summer flounder
- MSE using an operating model for summer flounder that includes recreational fishery dynamics, to compare alternative management approaches
- Develop tools (MSE product & interactive web application) to assist Monitoring Committee and stakeholders to explore likely consequences of management alternatives

Approach

- Use Management Strategy Evaluation (MSE) to test performance of current and potential alternative recreational management approaches for summer flounder fishery

- Intent: show relative value of current and alternative management actions for satisfying management objectives
  - Stability (in availability of opportunities & regulations)
  - Yield
  - Prevent overfishing

Management Alternatives to be tested

- Status quo
- Risk-based status quo
- F-based management
- Risk-based F-based management
- Spatial management scale, from coast-wide to state specific

- These alternatives will be compared and contrasted across different management units
- Alternatives will include set of options for making changes in regulations (season length, bag limit, minimum size)

MSE: Operating model & Observation models

- Conditioned an age-structured operating model (OM) to reflect life history and dynamics of summer flounder
  - Parameter values and initial conditions are taken from estimates from the most recent stock assessment

- OM projects numbers-at-age, subject to recruitment variability, given removals from commercial & recreational fishing
- An observation model generates data from OM to represent result from a summer flounder stock assessment (biomass & F relative to targets), and an estimate of recreational catch (e.g. as obtained through MRIP)
- Observations are used by one of the alternative management procedures providing a new catch level (with implementation error), updating dynamics of OM.

Recreational Fishery Fleet Dynamics Model

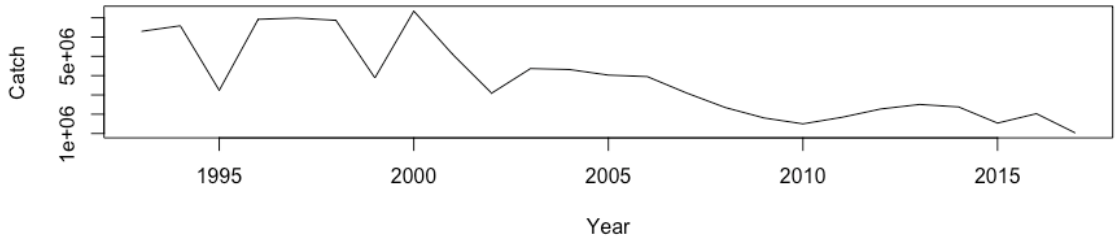
- Aim is to emulate response to regulation changes
  (how does total catch at size change given adjustments to management measures)
- We use available data (MRIP) to estimate responses of recreational fishers to summer flounder management measures to construct a set of plausible alternatives for these fleet dynamics and their associated uncertainty
- Extending previous work[1] we investigate historical effects of management measures on catch at various levels of refinement (e.g. state, wave, region) to quantify appropriate levels of effect and uncertainty associated with management choices made in the analysis

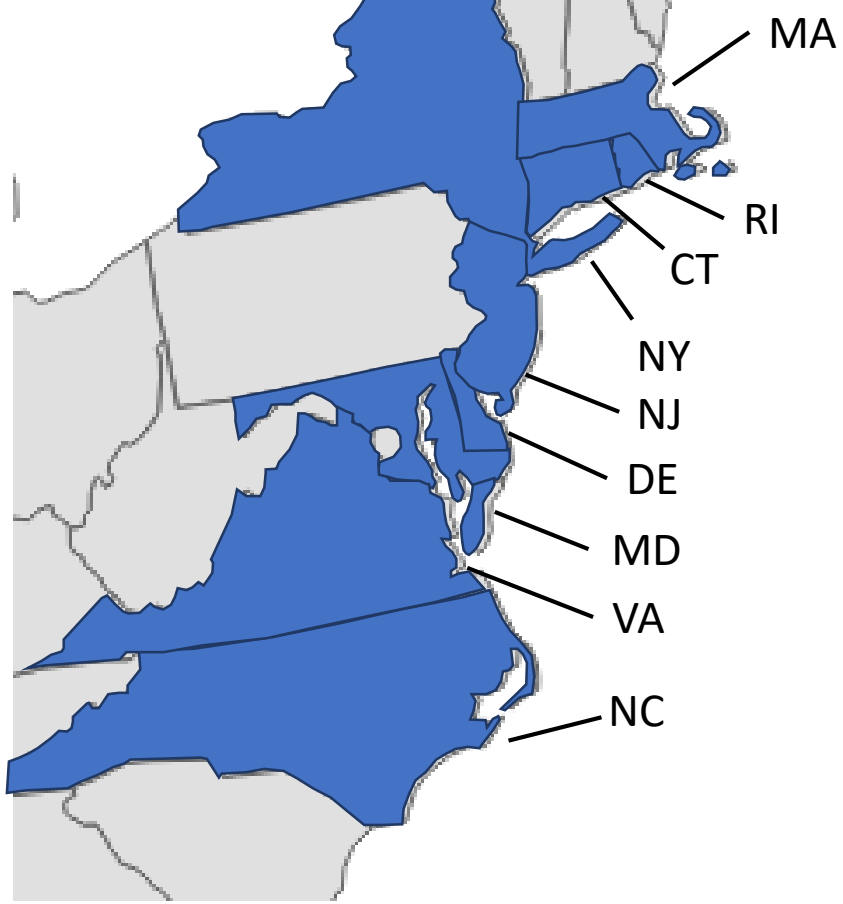
[1]: Ward, J. 2015. Recreational Summer Flounder Fishery Assessment. Report to the Mid-Atlantic Fishery Management Council, as presented June 16, 2015. 196p.

Wiedenmann, J., Wilberg, M., Bochenek, E., Boreman, J., Freeman, B., Morson, J., Powell, E., Rothschild, B. and P. Sullivan. 2013. Evaluation of Management and Regulatory Options for the Summer Flounder Recreational Fishery. Report to the Mid-Atlantic Fishery Management Council. 96p.

Fishery Response:

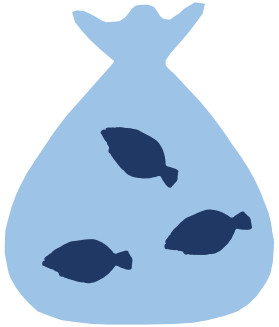
Catch (# at length)



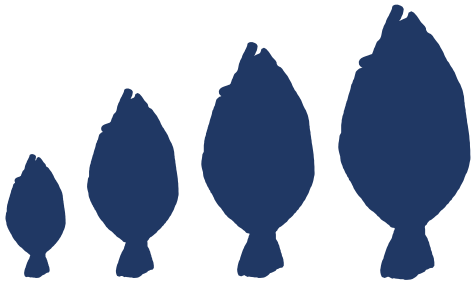


Management Settings:

Bag size (# fish)



Minimum size (in.)



Season length (days)

Calendar						
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

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Model

- Created recreational fishery fleet dynamics model using GAMs

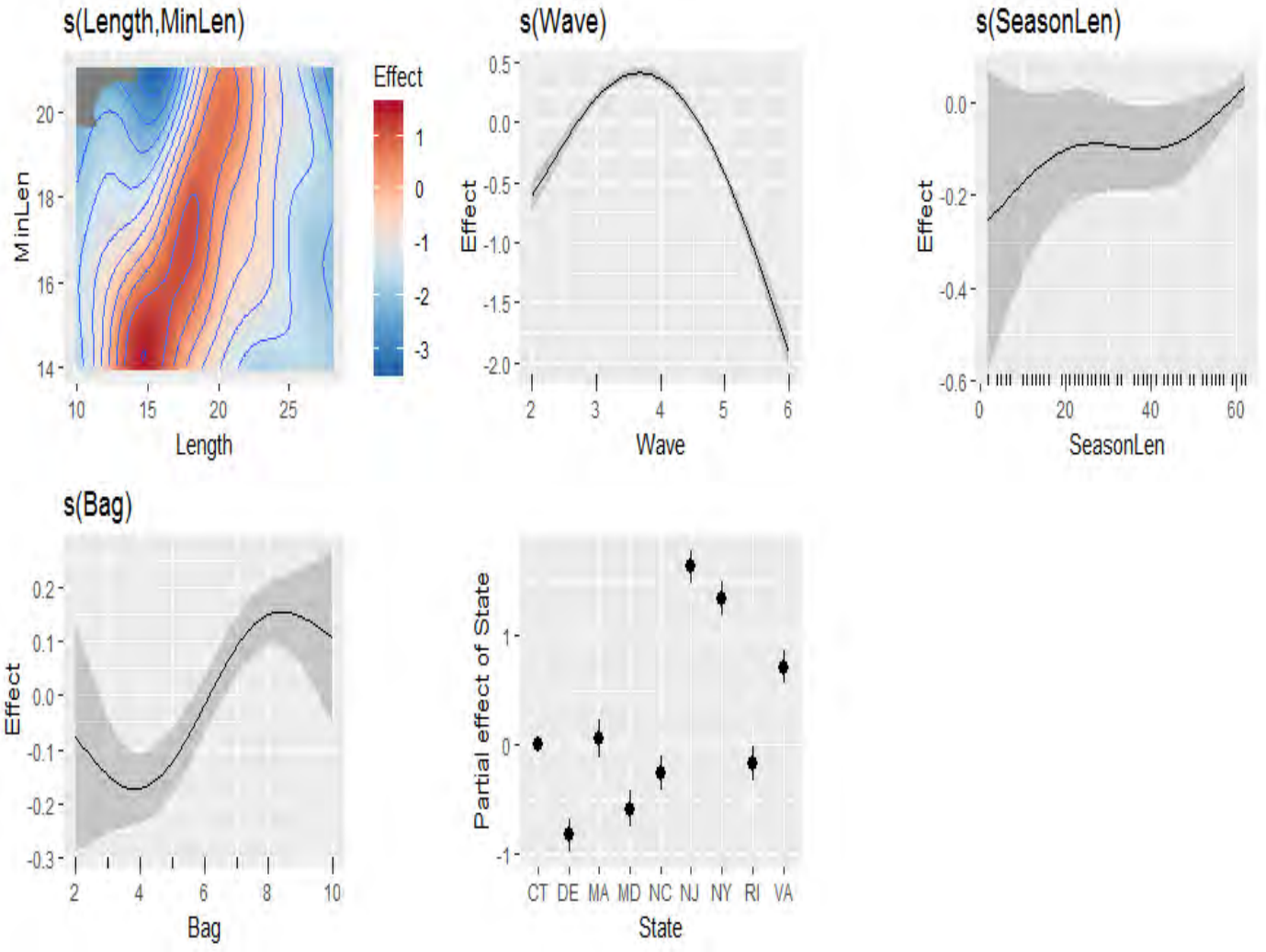
e.g.

$$\textit{Harvest or Discards} = s(Length, MinLength) + State + s(Wave) + s(Season) + s(Bag)$$

- Use of the GAM allows for the inclusion of non-linear effects, which is certainly the case for the interaction between minimum size and length of catch, wave, season, and bag limit

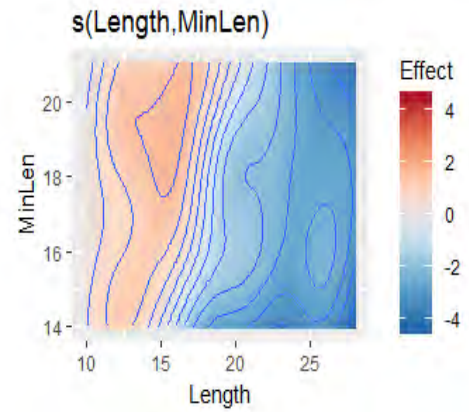
Output – Recreational Fleet Dynamics Model

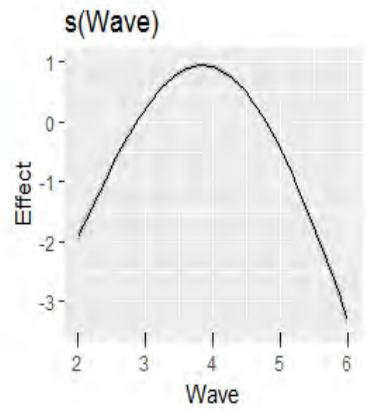
- **Harvest** with states going in to the model as a factor
- Increasing effect on harvest with regard to bag limit
- Season length increases to a point, then flattens out
- Min size and harv at length increases, peaks btwn 14” to 18”, and drops again
  - Incr min size pushes peak to larger fish

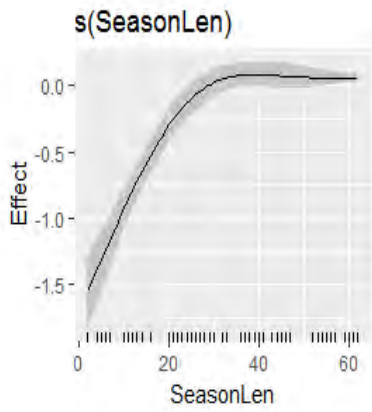


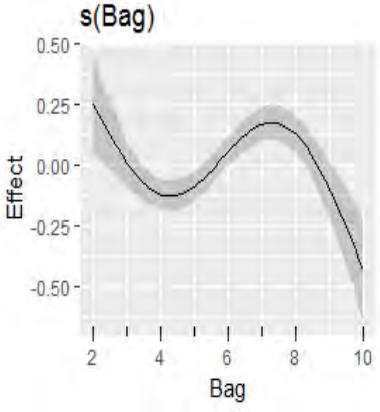
Output – Recreational Fleet Dynamics Model

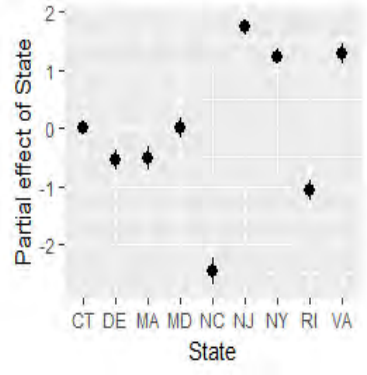
- **Discards** with same model structure
- Decreasing effect on discards with regard to bag limit
- Season increases discards like harvest, but flattens out more than harvest
- Min size and discards increases, peaks btwn 12” to 14”, and drops again
  - Incr min size pushes peak to larger fish, slightly
- Wave has a parabolic effect, incr through warmer months and then drops (same for harvest)







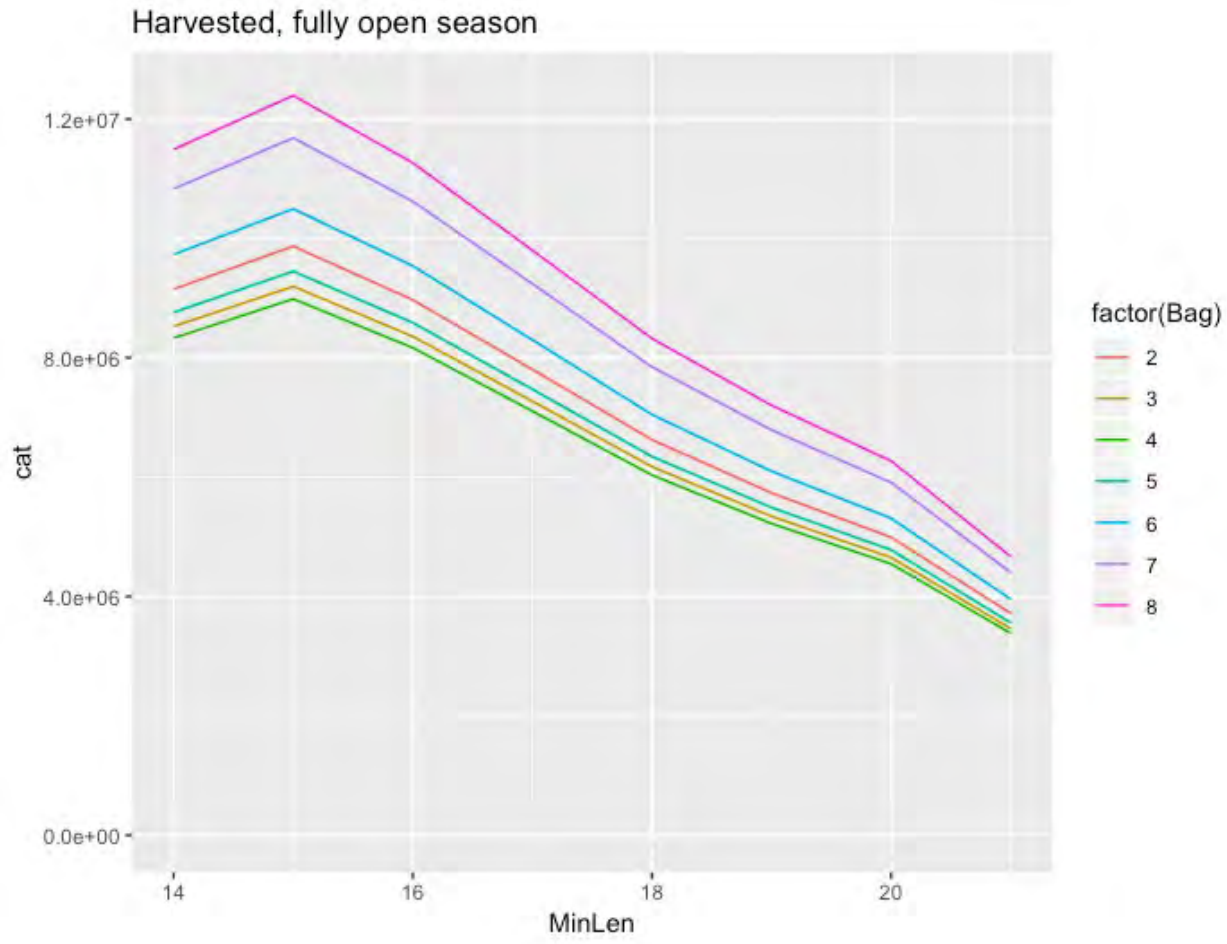




Output – Recreational Fleet Dynamics Model

- Recalling some of the discussions with John Ward, a look at the effect on harvest and discards is presented

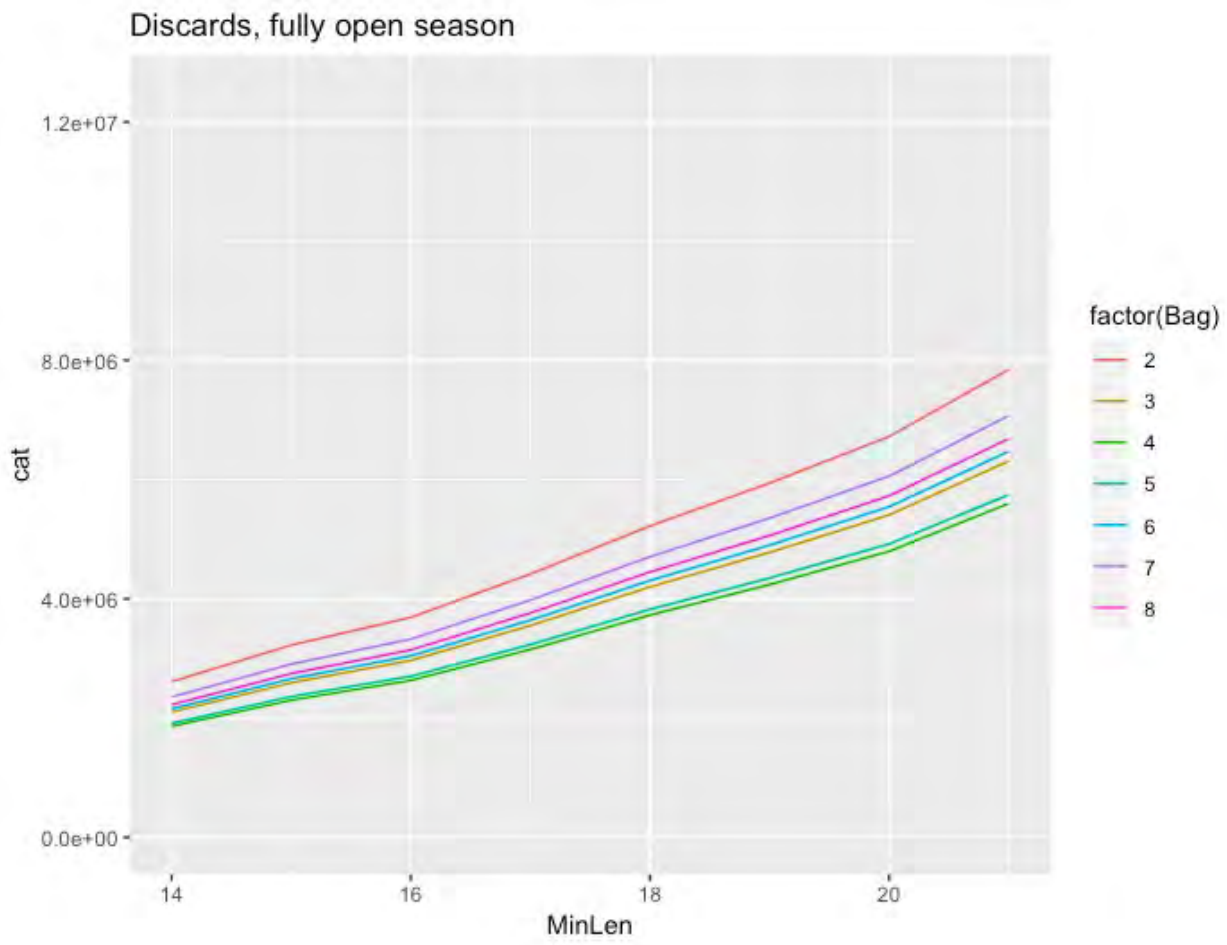
- Here there is a logical effect of:
  - Increase in harvest with increasing bag, though not dramatically
  - A decrease in harvest as Min size is increased



Output – Recreational Fleet Dynamics Model

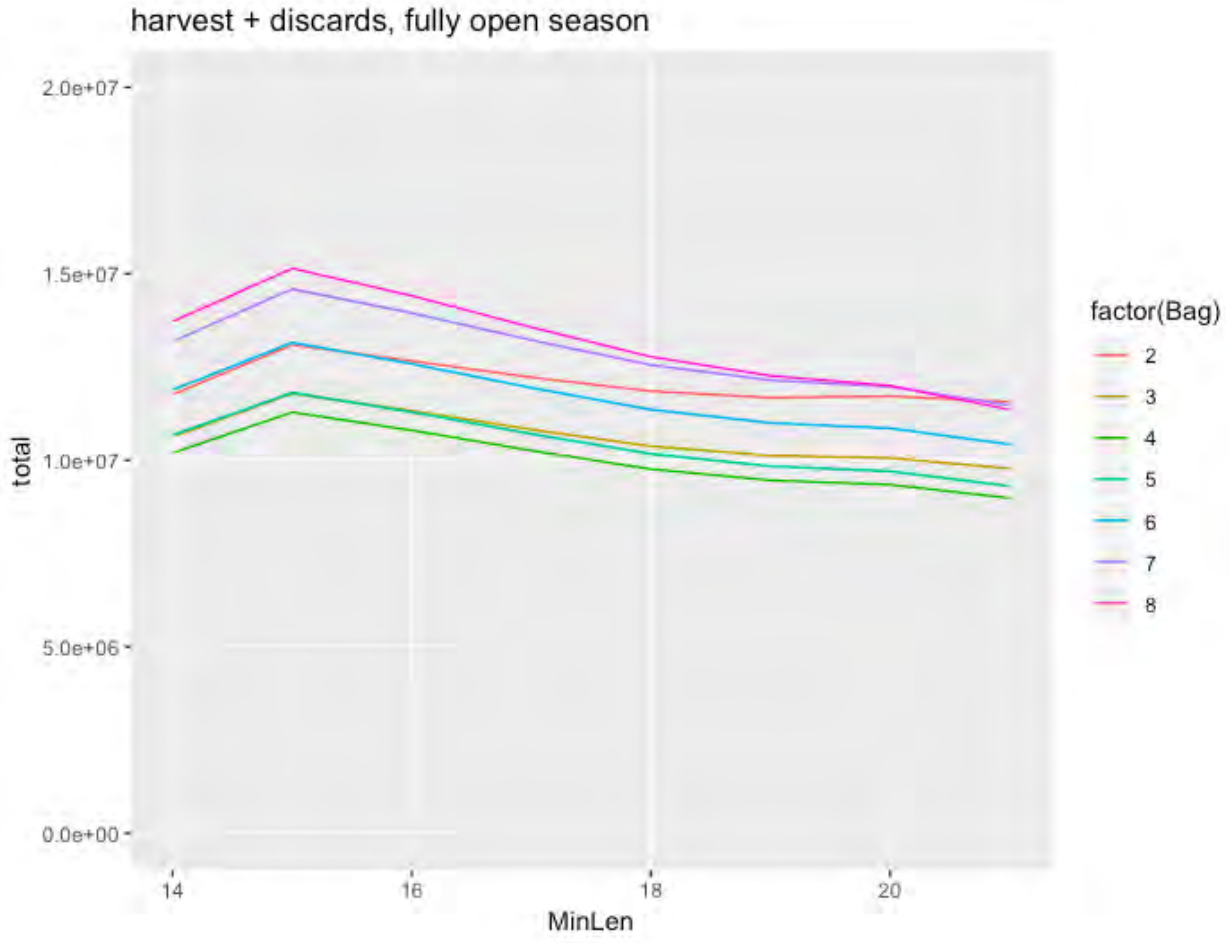
- Same plot for discards

- Here, again, there is a logical effect of:
  - Generally a decrease in discards with increasing bag, though not dramatically
  - An increase in discards as Min size is increased



Output – Recreational Fleet Dynamics Model

- When combining the two effects together, the discards negate much of the decreased harvest benefit of increasing Min size (though not entirely)
- An important factor for managers to consider

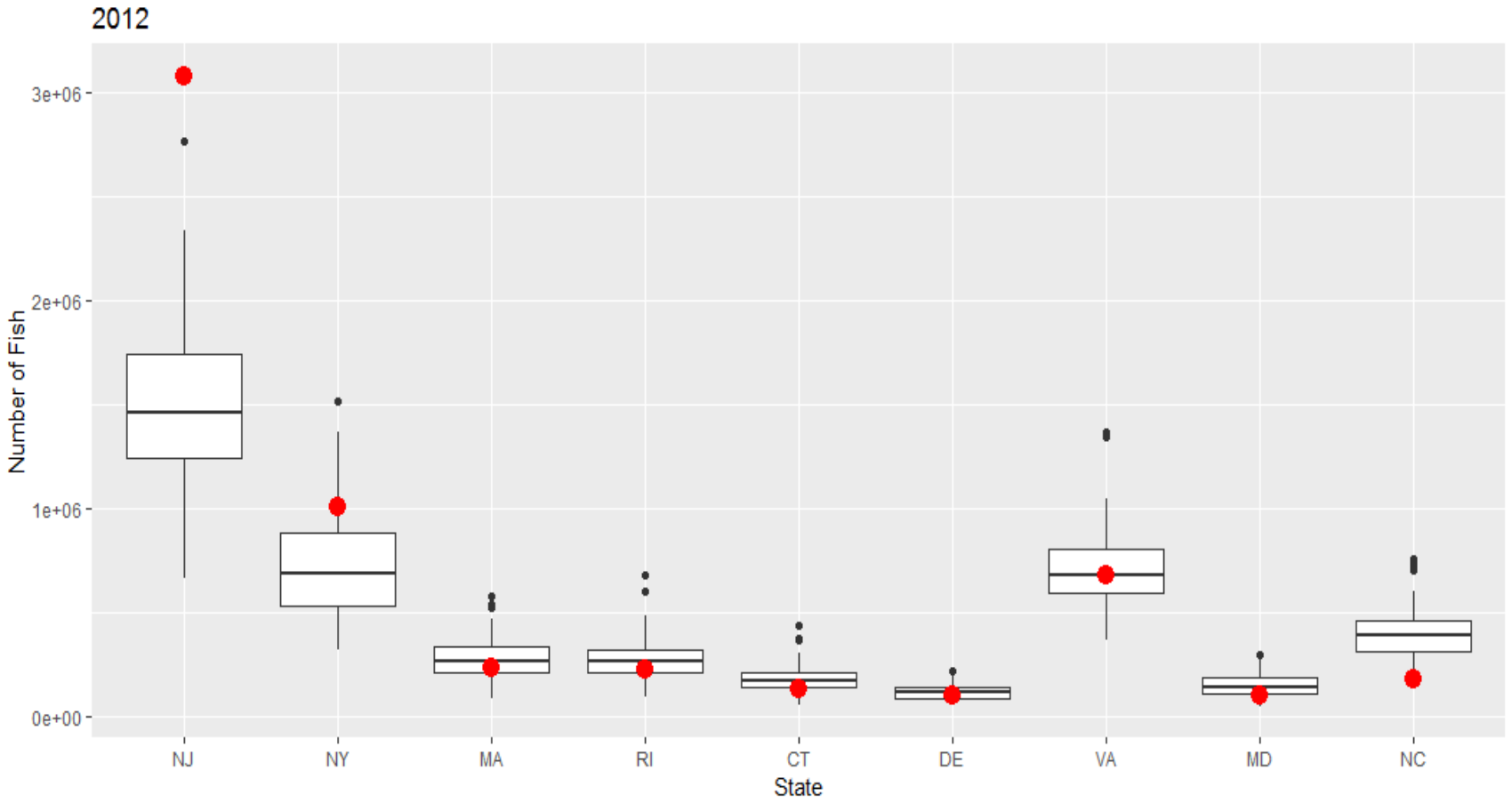


Output – Recreational Fleet Dynamics Model

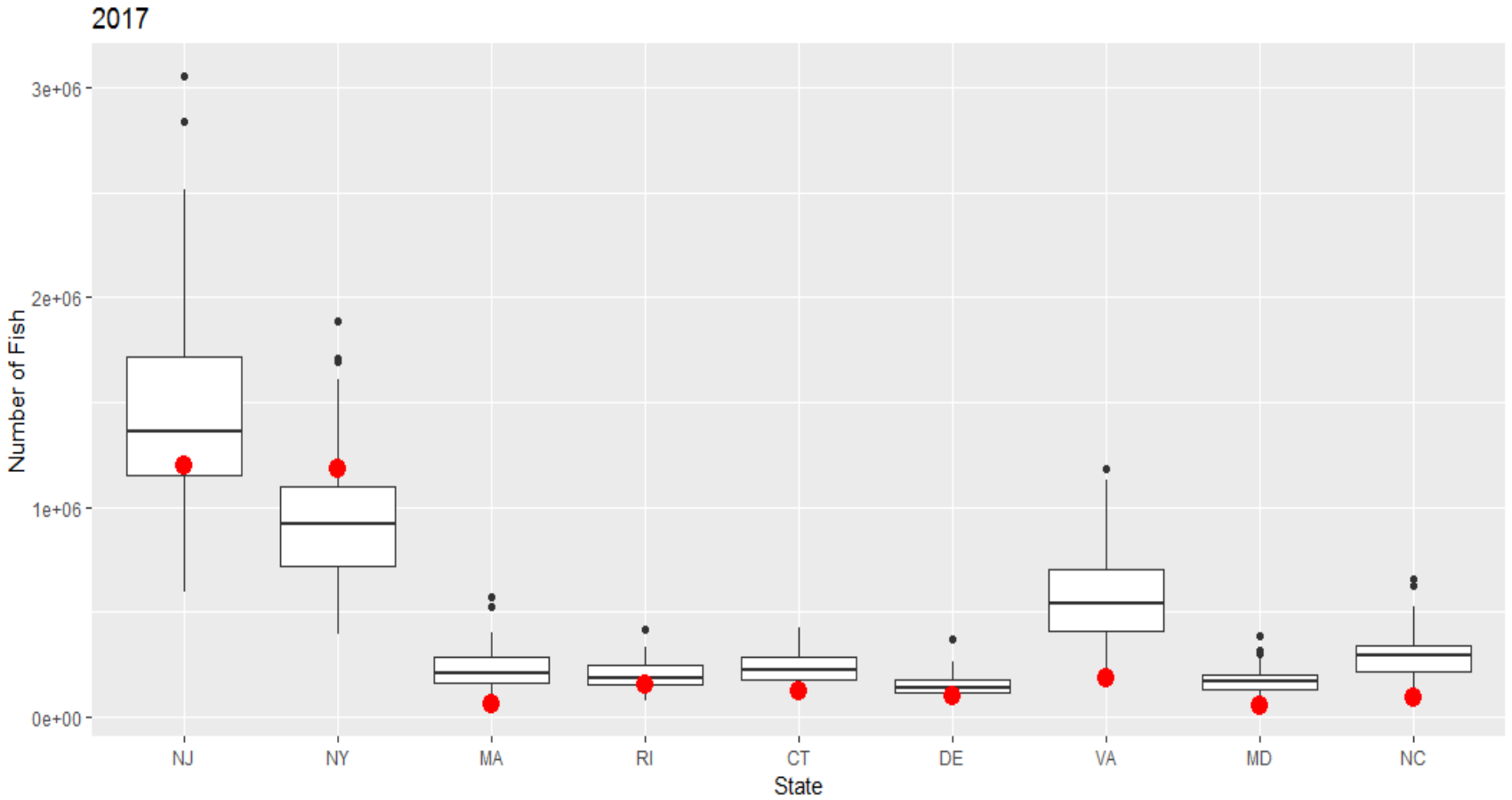
- Monitoring Committee had asked for a retrospective analysis for the GAM to see its performance relative to previous years

- The following slides show this analysis:
  - Only using the harvest model
  - Uses a sample of 100 draws from the posterior of the model, so the model estimates are represented by a box and whisker plot
  - Went back 6 years
  - MRIP estimates may be off a little as some lengths were dropped from the analysis, but should be pretty close

Output – Recreational Fleet Dynamics Model



Output – Recreational Fleet Dynamics Model



Output – Recreational Fleet Dynamics Model

- Generally performs well, with MRIP estimates falling within the range of the 100 estimates of the model
  - Seems to improve in the most recent period of time, and will continue to improve (maybe…) as more data is added to the model

- This feature of the recreational fleet dynamics model can be used in a control rule to account for the fact that there is uncertainty not only in the MRIP estimate, but in the effect of our management changes

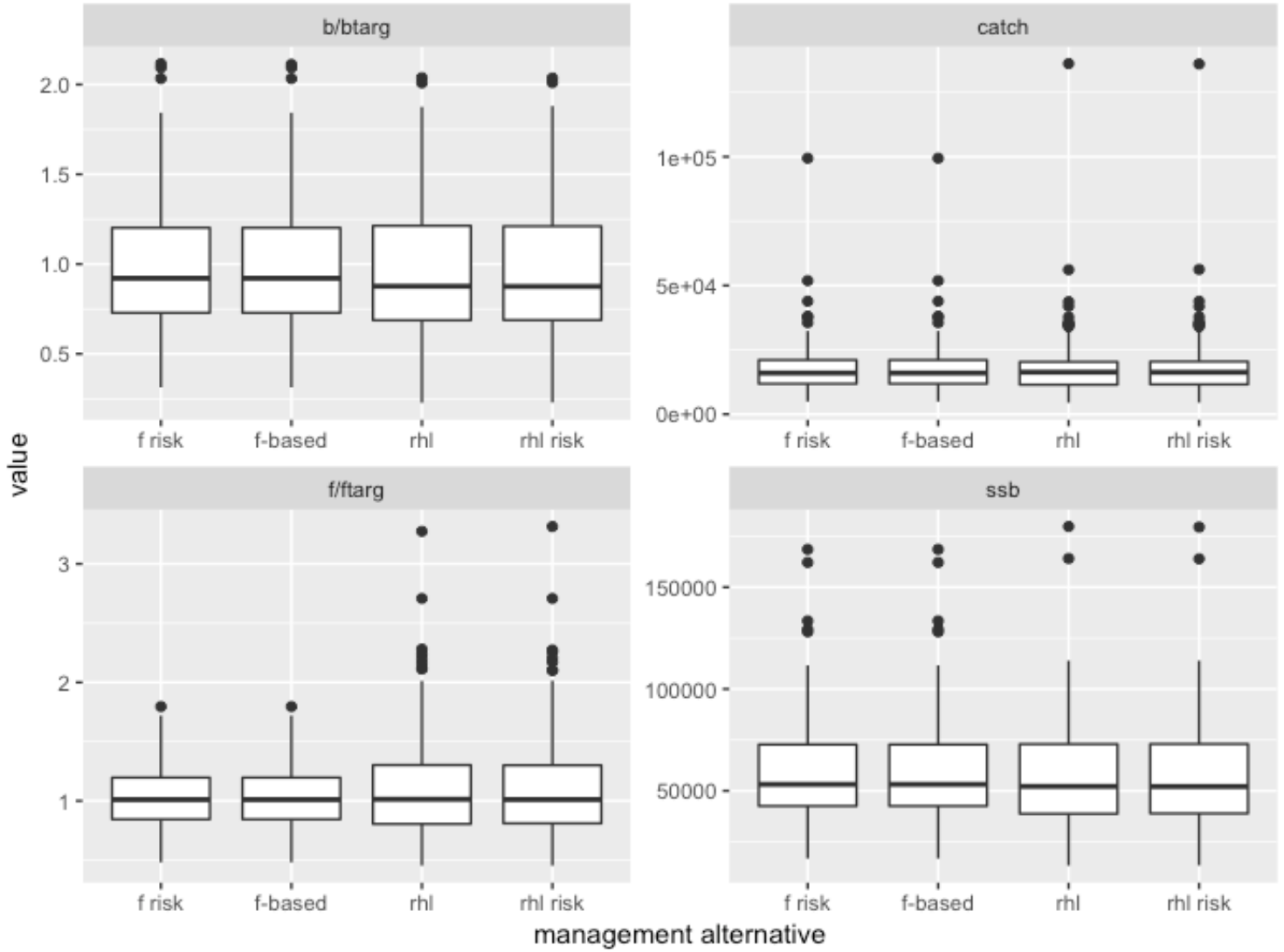
- As an example, the box plots could be used for comparison with the RHL, and if they overlap with the RHL, no change would be needed
  - More on this later

Comparing performance of alternatives

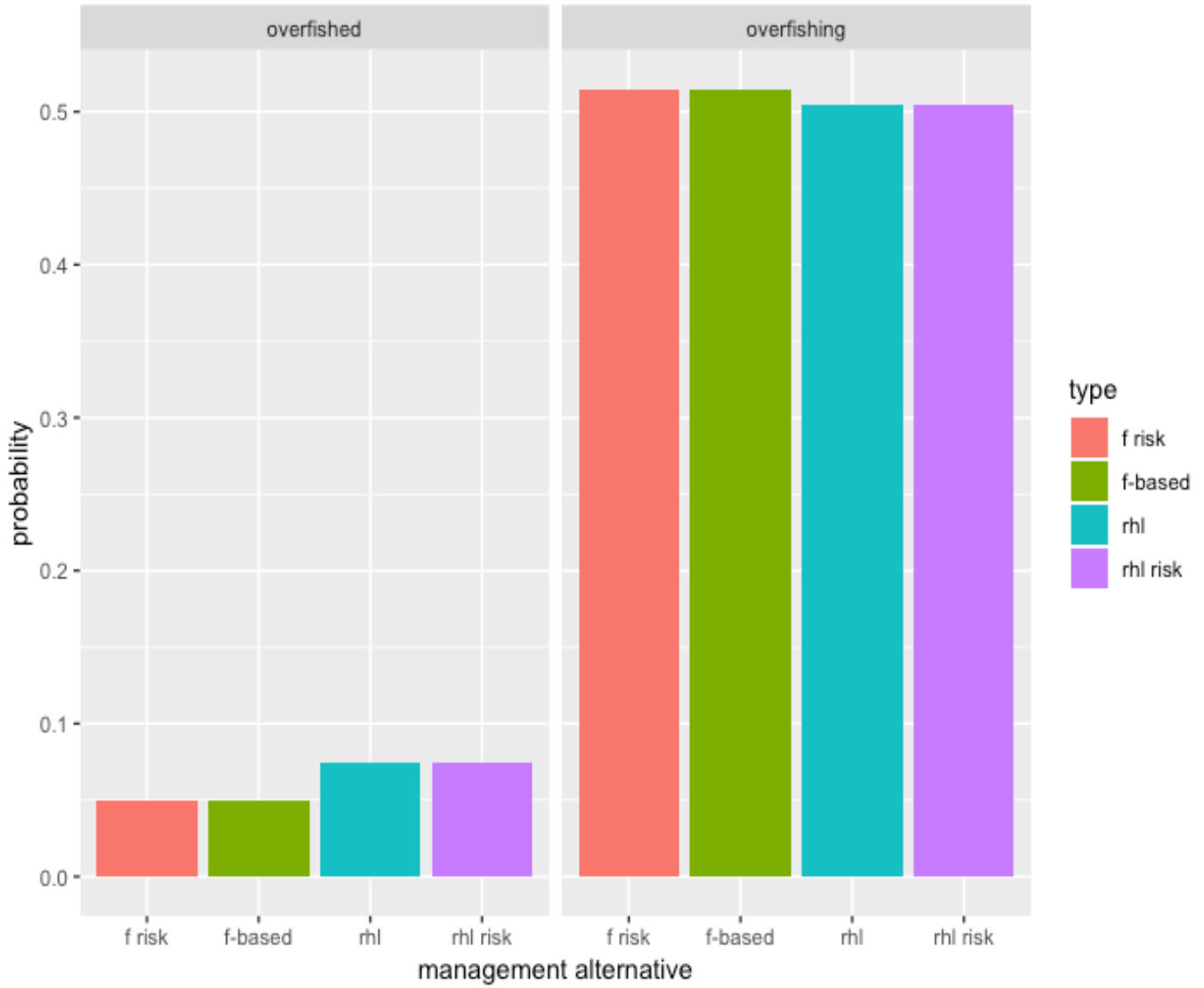
- Preliminary results
- Alternatives in MSE
  - MRIP-based adjustments to catch based on performance relative to RHL
  - Adjustments to recreational catch based on F relative to target F
  - Additionally have added in the “risk based” alternatives

  - Assumes that successfully able to adjust catch based on the estimate of what the manager thinks they need to achieve
  - Change currently based on full set of options (bag, min size, and season length)

Comparing performance of alternatives



Comparing performance of alternatives



Interactive web application

https://jasons-shiny-apps.shinyapps.io/HarvestPredictTool/

Next steps

- Recreational fishery fleet dynamics model appears to represent the reality of what occurs in the fishery pretty well, so we could entertain using this in parallel for setting specs next year
  - Would need to think about how to use the uncertainty, will have some ideas in the report, and will work through with MC
- Finish up report, testing different scopes (state by state, regional, coastwide)
  - Will also work on working in some feedback from MC on risk-based approaches
- Will present next week at the MAFMC meeting

Acknowledgements!

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Hab in the MAB: Characterizing Black Sea Bass Habitat in the Mid-Atlantic Bight

Bradley G. Stevens

University of Maryland Eastern Shore

with Cara Schweitzer, Andre Price, Rebecca Wenker, and Wilmelie Cruz

UNIVERSITY of MARYLAND EASTERN SHORE

NOAA LMRCSC

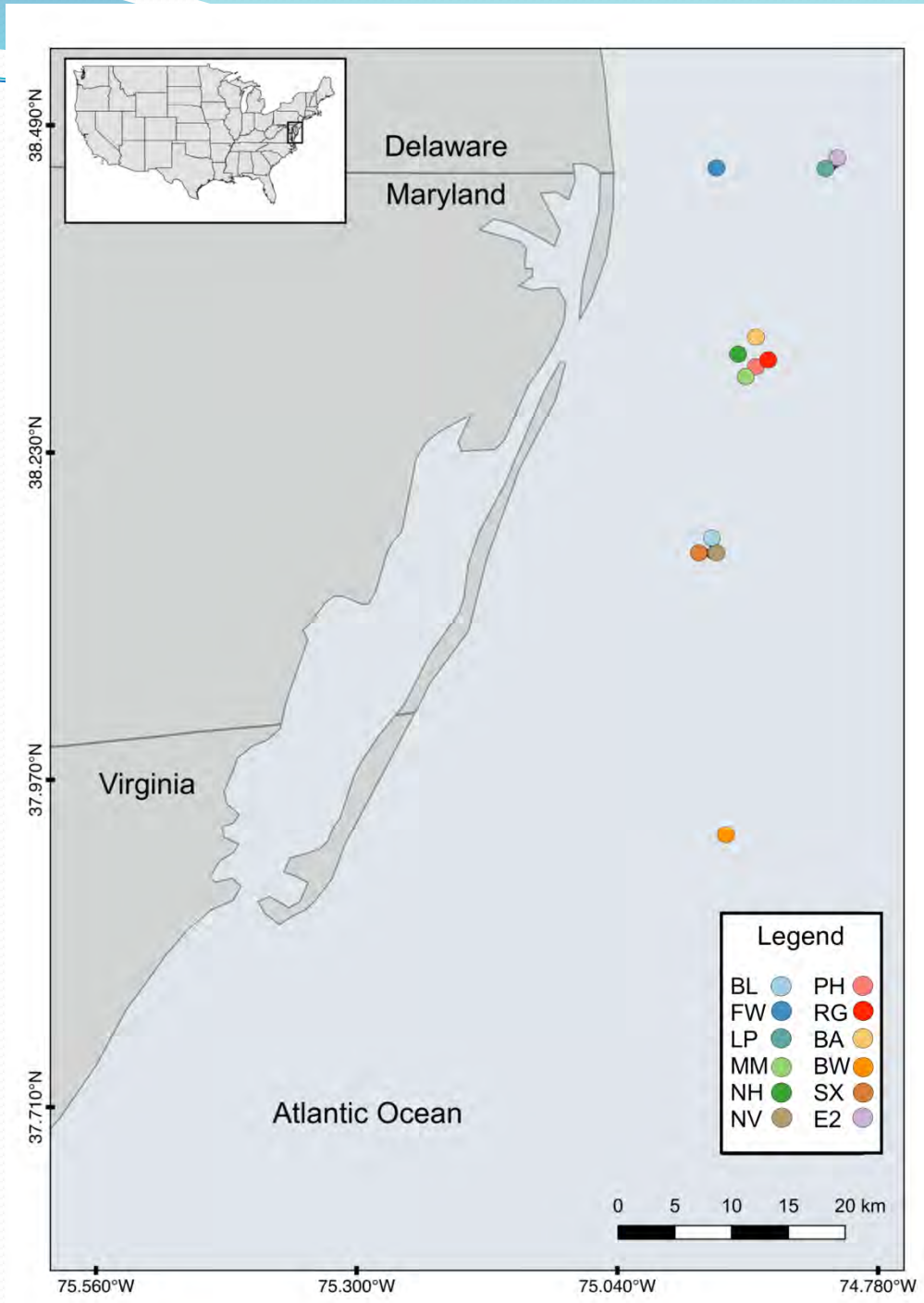
NOAA FISHERIES NATIONAL MARINE FISHERIES SERVICE

Study Goals

1. Relationship between fish abundance and benthic community structure;
2. Trophic ecology of black sea bass and its relationship to reef characteristics;
3. Effect of habitat connectivity, by experimental manipulation of artificial reef structure;
4. Sea whip age, growth, and damage

Natural reefs are scarce, deep (>120 ft), and hard to find.

We studied 12 artificial reef sites off the coast of the Delmarva peninsula.



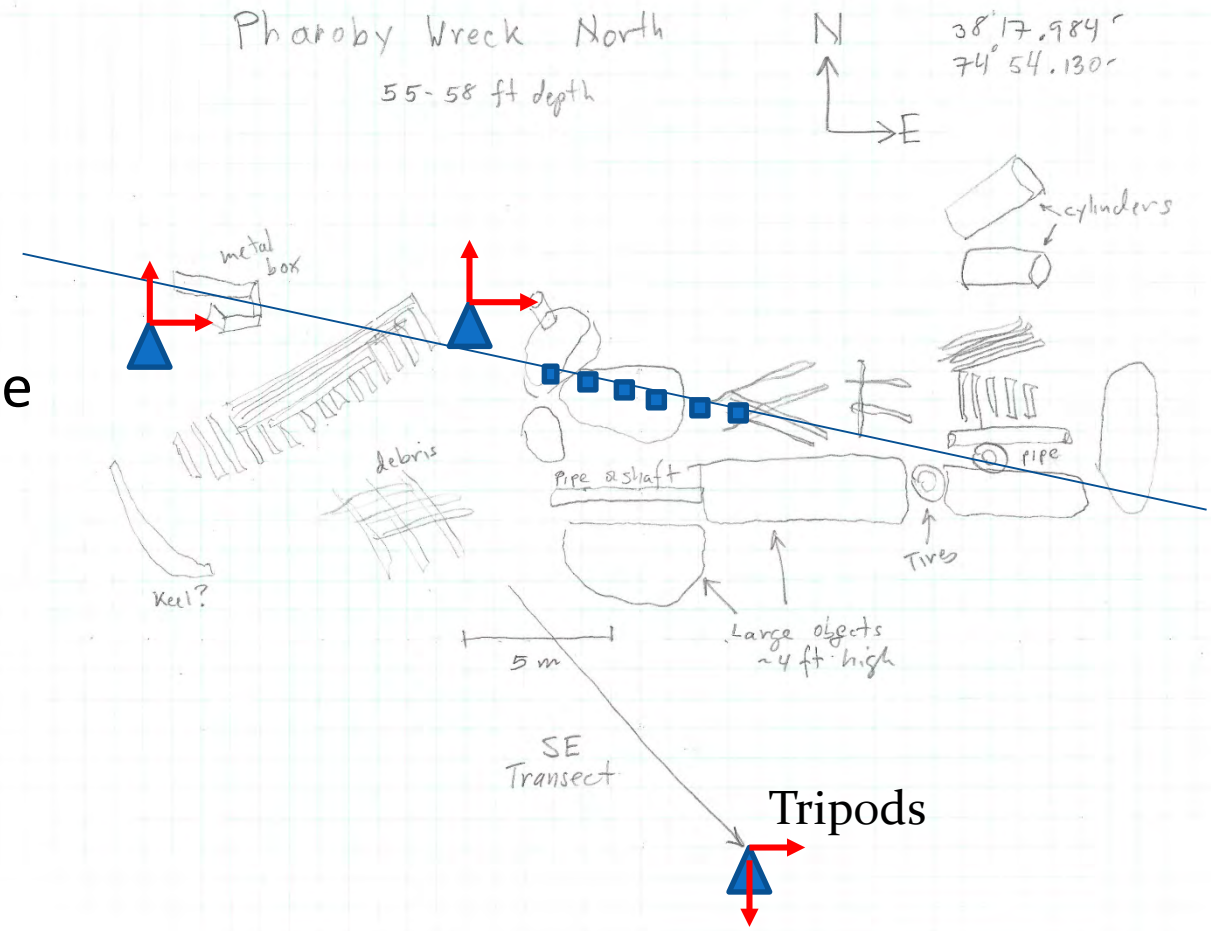
Fish Abundance

- Go-Pro cameras on tripods
- 30 minute “sets”
- Count fish in in 1 frame every 30 sec
- Average value = “MeanCount”

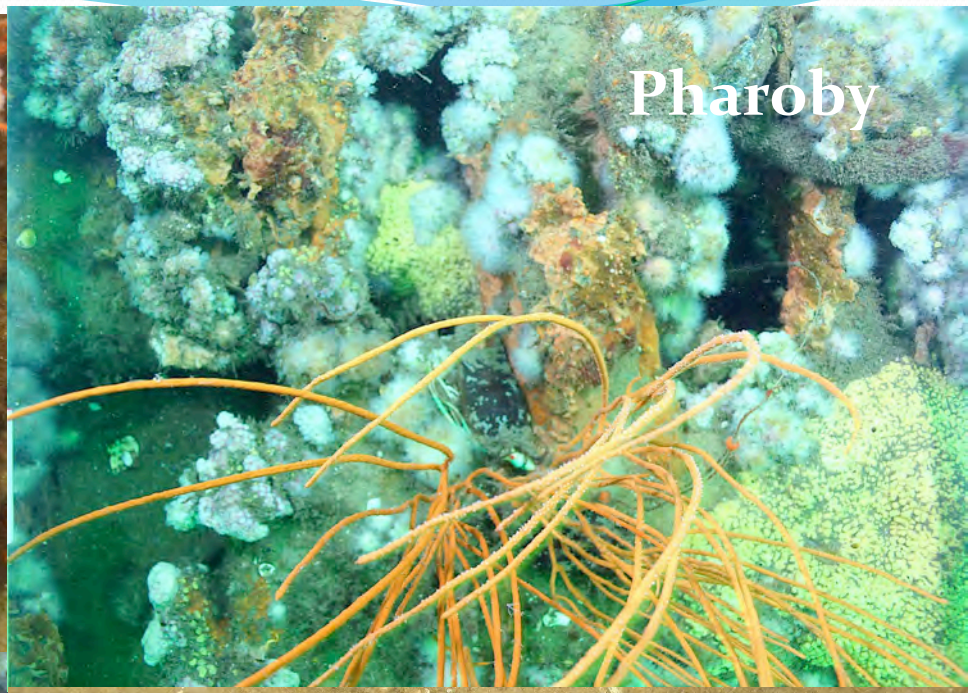
Video frame from 6/15/2016 at 0:01:30 mark. “Kathleen Riggins” shipwreck

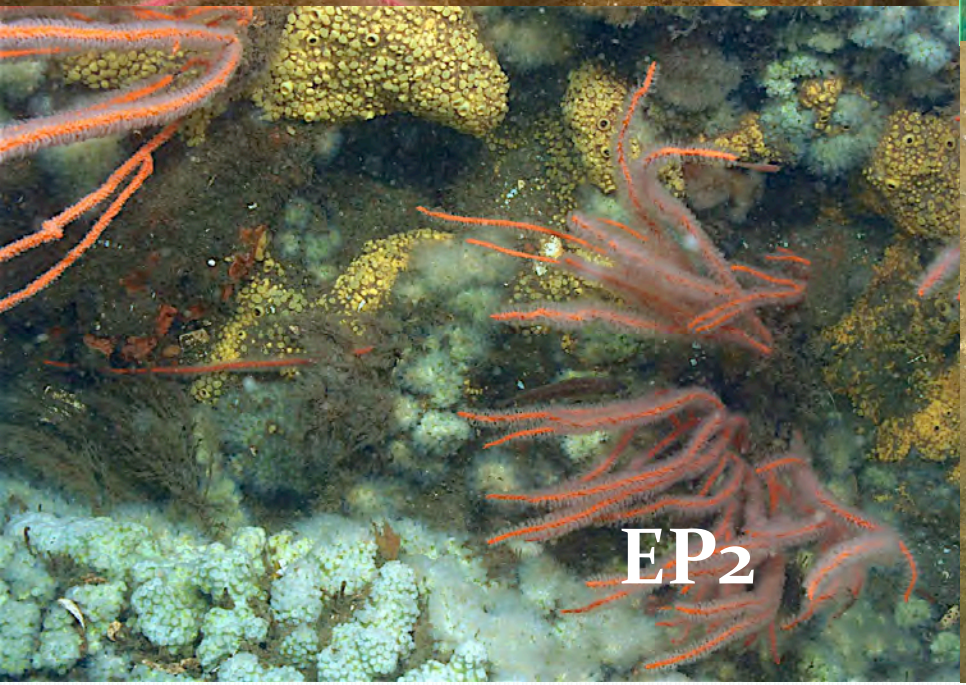
Benthic community Structure: Quadrat surveys

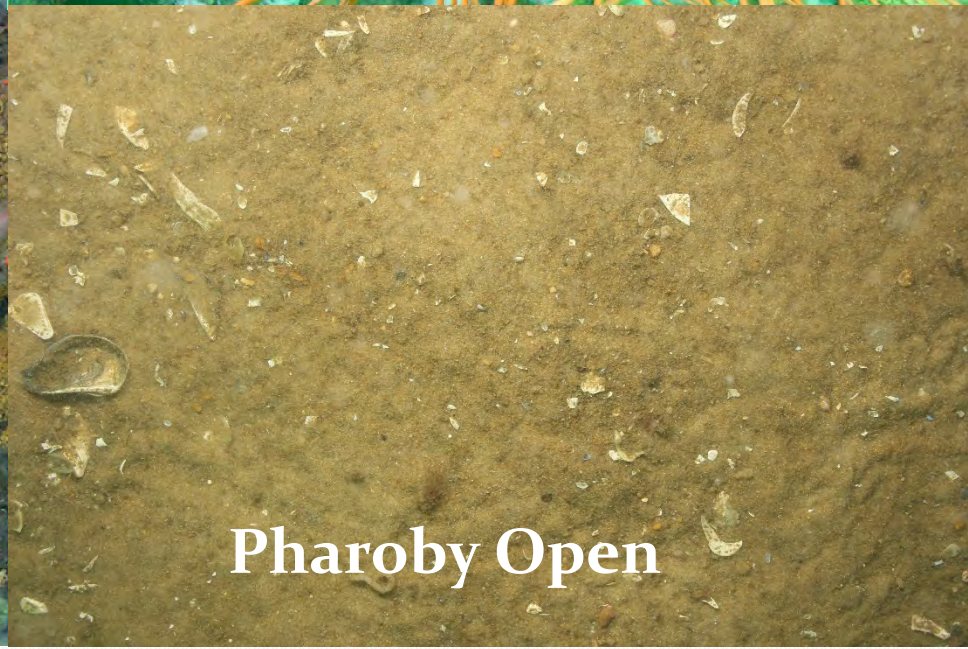
- 35 mm DSLR
- 0.25 m^2 quadrat frame
- 1 m intervals on structure and open bottom
- Proportional area of common species



Quadrat assessment of epifauna coverage

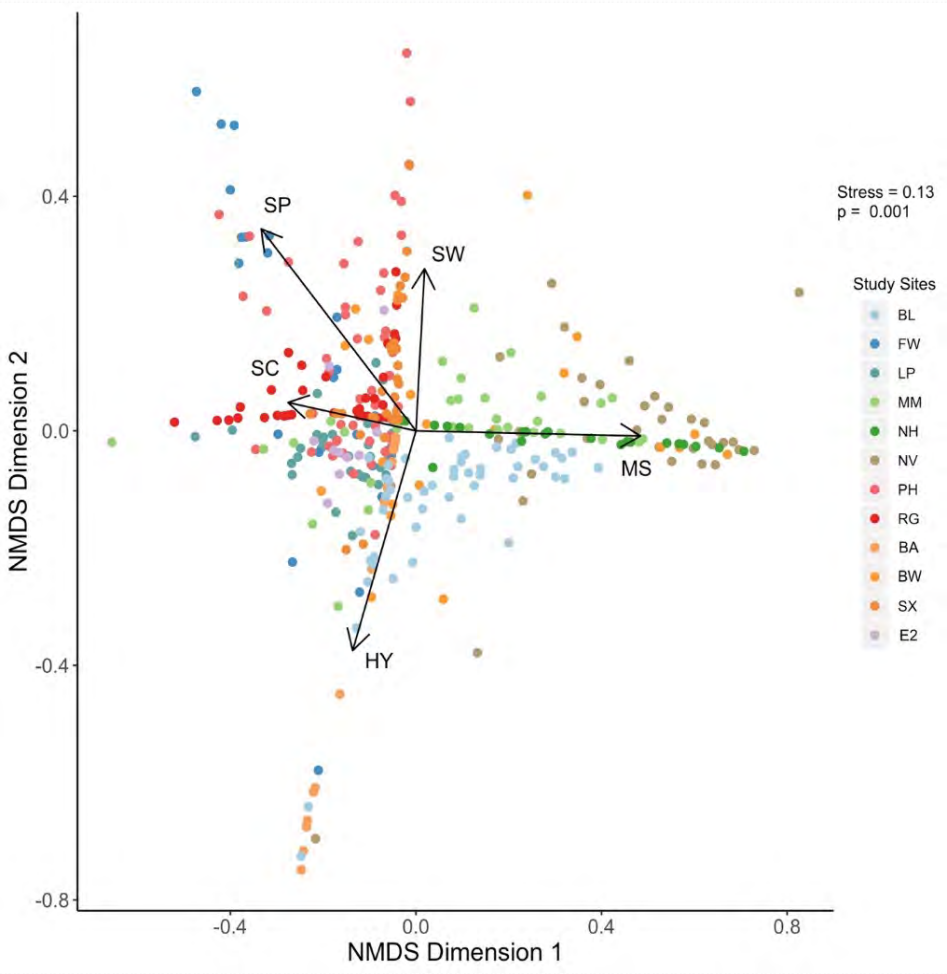






Community Composition

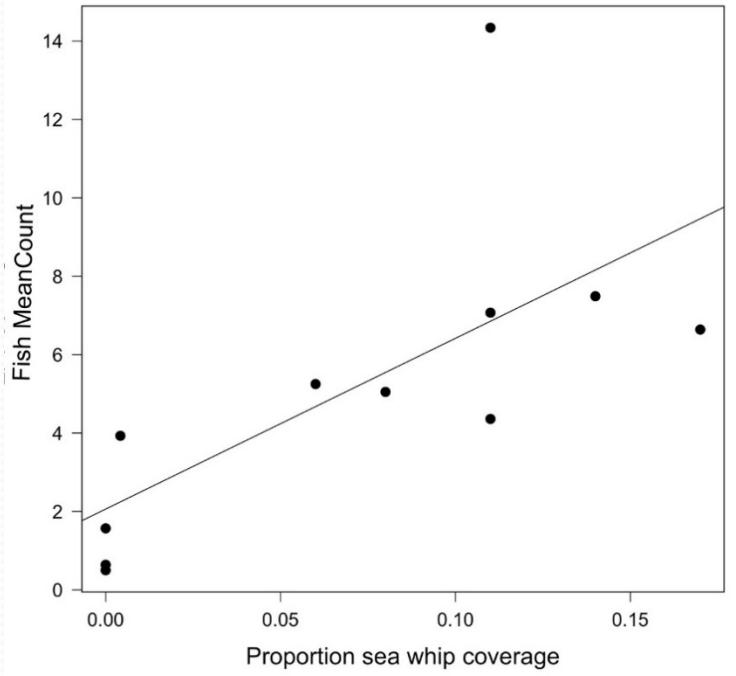
- nMDS : Non-Metric Multidimensional Scaling
- Different sites associated with particular species
- Sea whips and hydroids negatively correlated
- Suggests chronological succession
- Hydroids → Mussels → Gorgonians



Fish Abundance & Community Structure

- No fish observed on open sand (away from structure)
- Fish abundance on reefs NOT related to total % cover of biogenic structure.
- Fish WERE significantly related to % cover of sea whip corals
- $R^2 = 0.48$, $P=0.03$

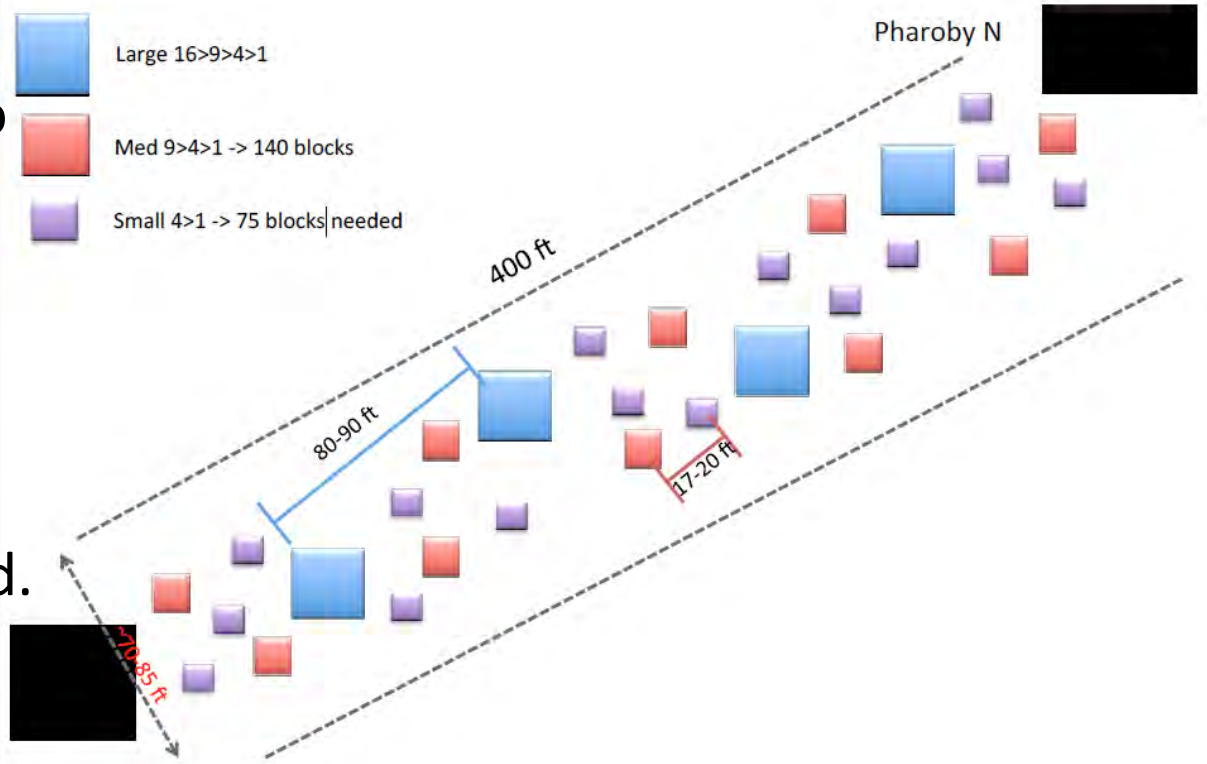
Variable	P value
Sea whips	**0.028 ***
Stone Coral	0.173
Sponge	0.904
Blue mussel	0.365
Hydroids	0.288



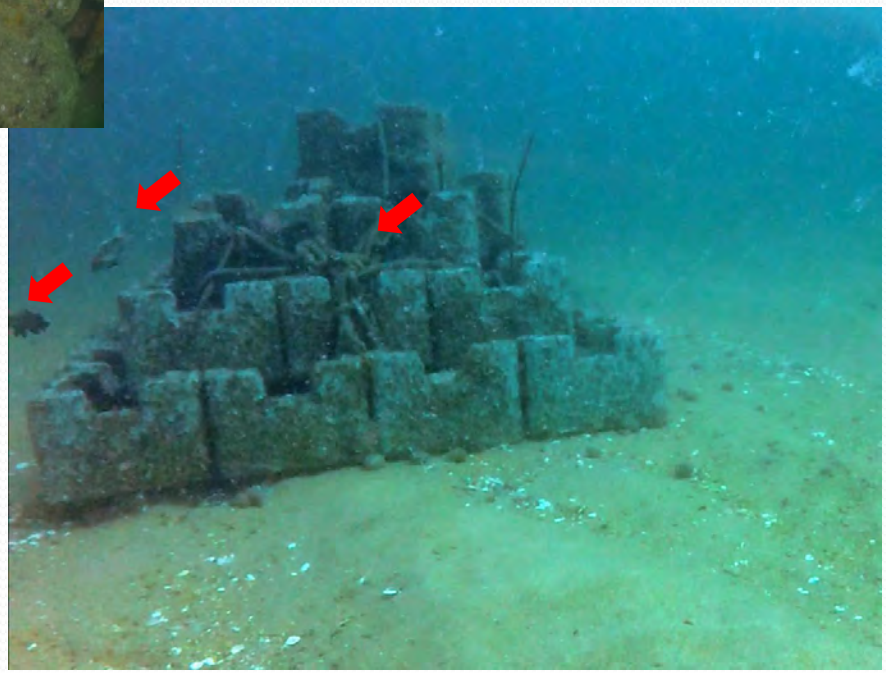
Schweitzer, C. C., and B. G. Stevens. 2019. The relationship between fish abundance and benthic community structure on artificial reefs in the Mid-Atlantic Bight, and the importance of sea whip corals *Leptogorgia virgulata*. *PeerJ.*:e7277. doi.org/10.7717/peerj.7277

Habitat Connectivity

- If we build it (an artificial reef), will they come?
- Will fish be “extracted” from nearby reefs?
- “Oyster Castles” used to create reef pyramids between two parts of shipwreck at “Impact” site.
- Control site not changed.

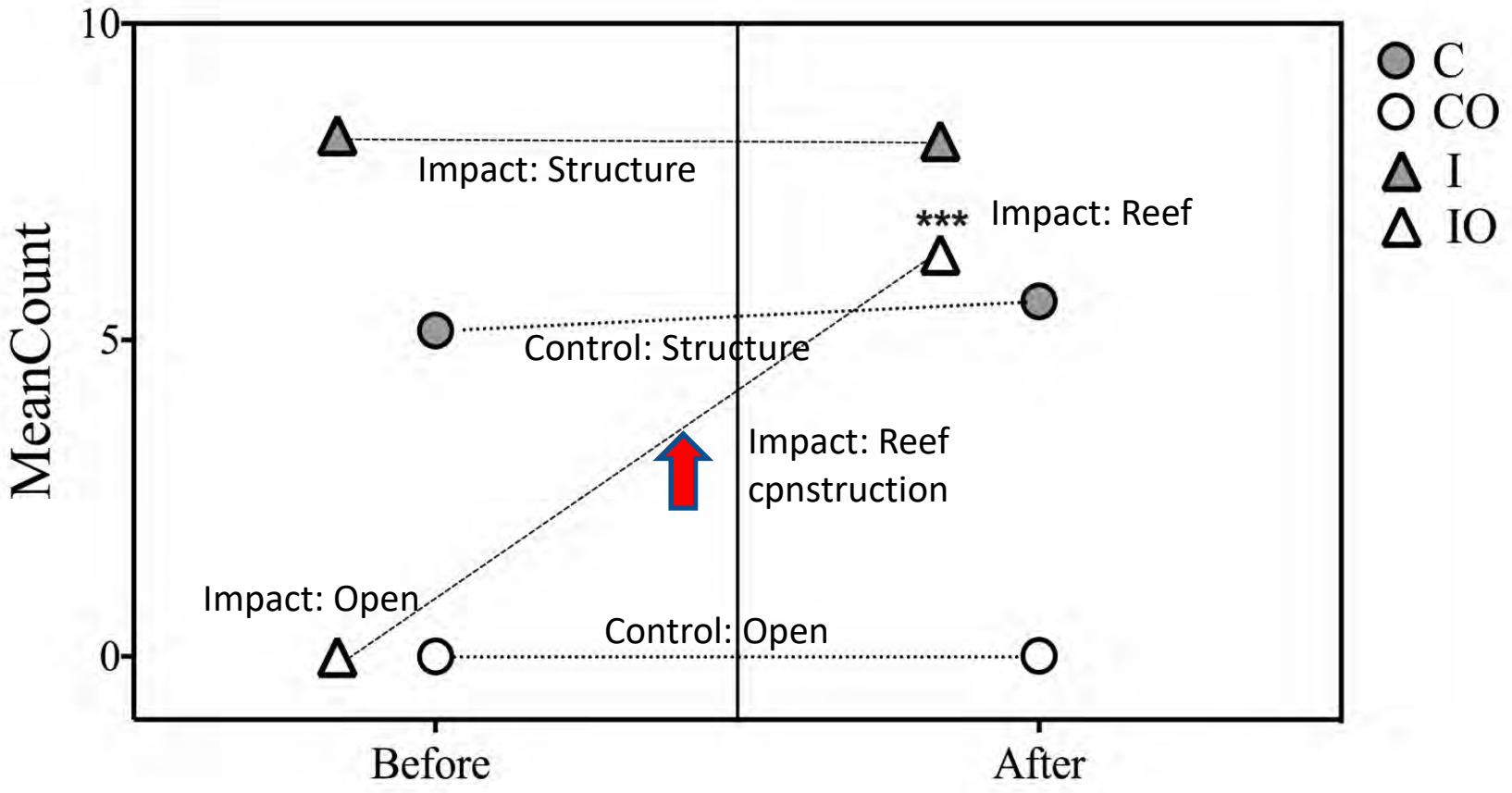


- Cameras set on wreck structure at Control and Impact sites (C & I)
- On open sand bottom between wreck sections (CO & IO)



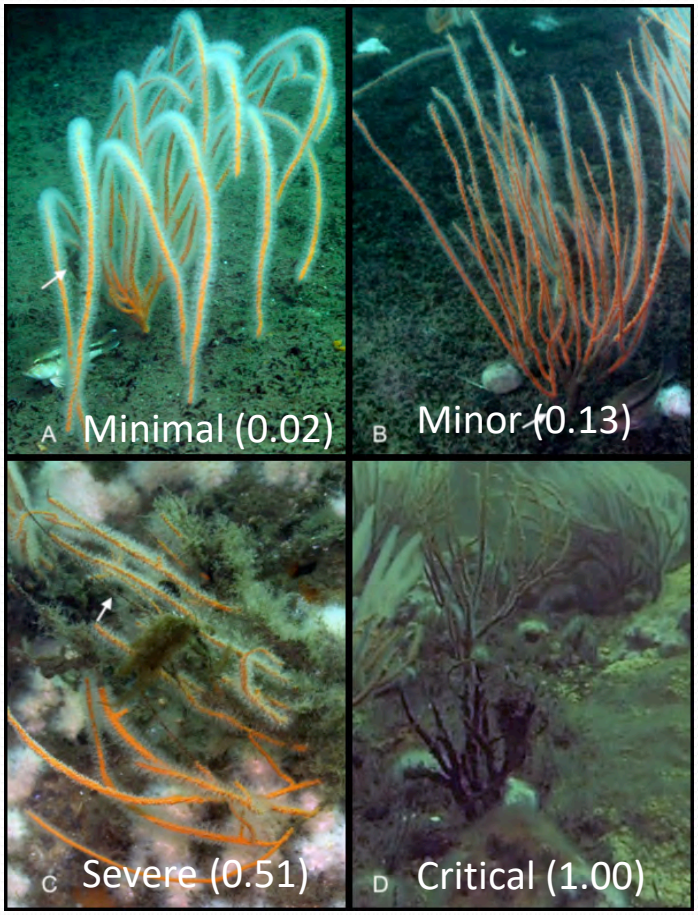
- Before: 2017
- Reef constructed Nov 2017
- After: 2018
- Repeated June, July, Aug

Before-After, Control Impact Study Design



- Structured Sites:
  - Impact higher than control at all times
  - No change over time
- Control:open – No change
- Impact:open - abundance increased after reef construction

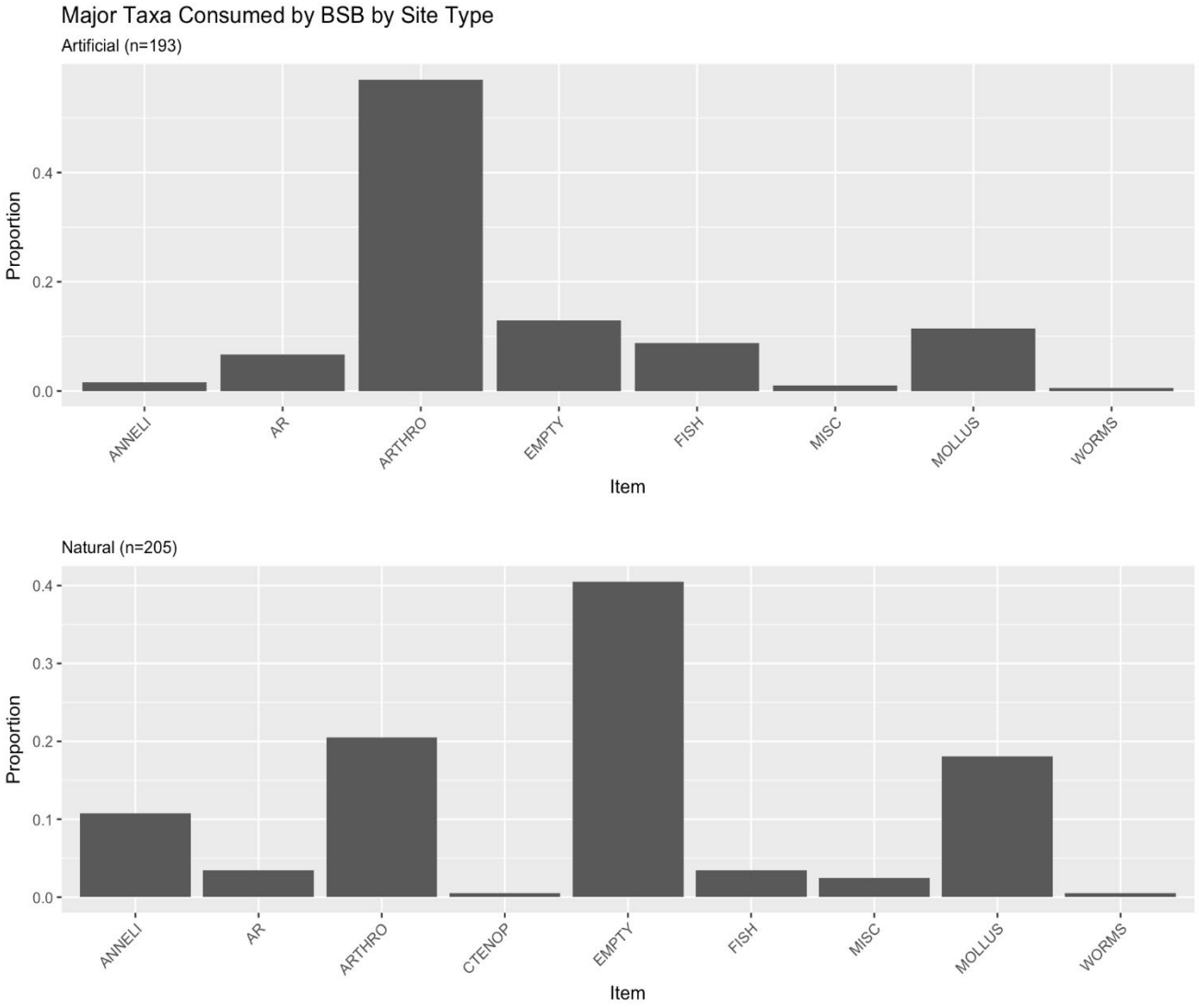
Sea Whip Damage Index (DI)



Images by Cara Schweitzer

- Study sites used by recreational fishers, not commercially
- Evidence of entanglement with monofilament, sinkers, and rope
- DI not sig diff between sites: mean 0.15 (range 0.02-0.26)

Feeding Ecology of Black Sea Bass at Natural and Artificial Reef Sites



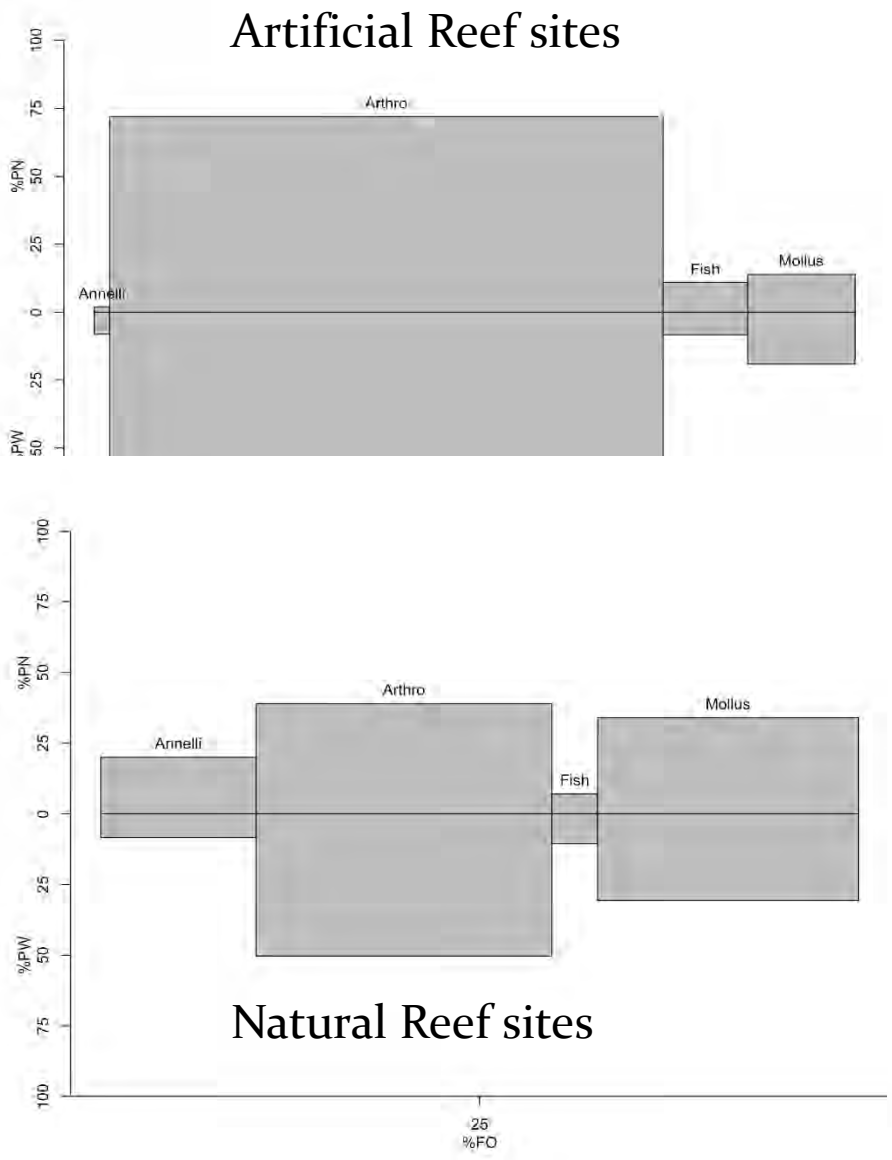
PSIRI: Prey-Specific Index of Relative Importance

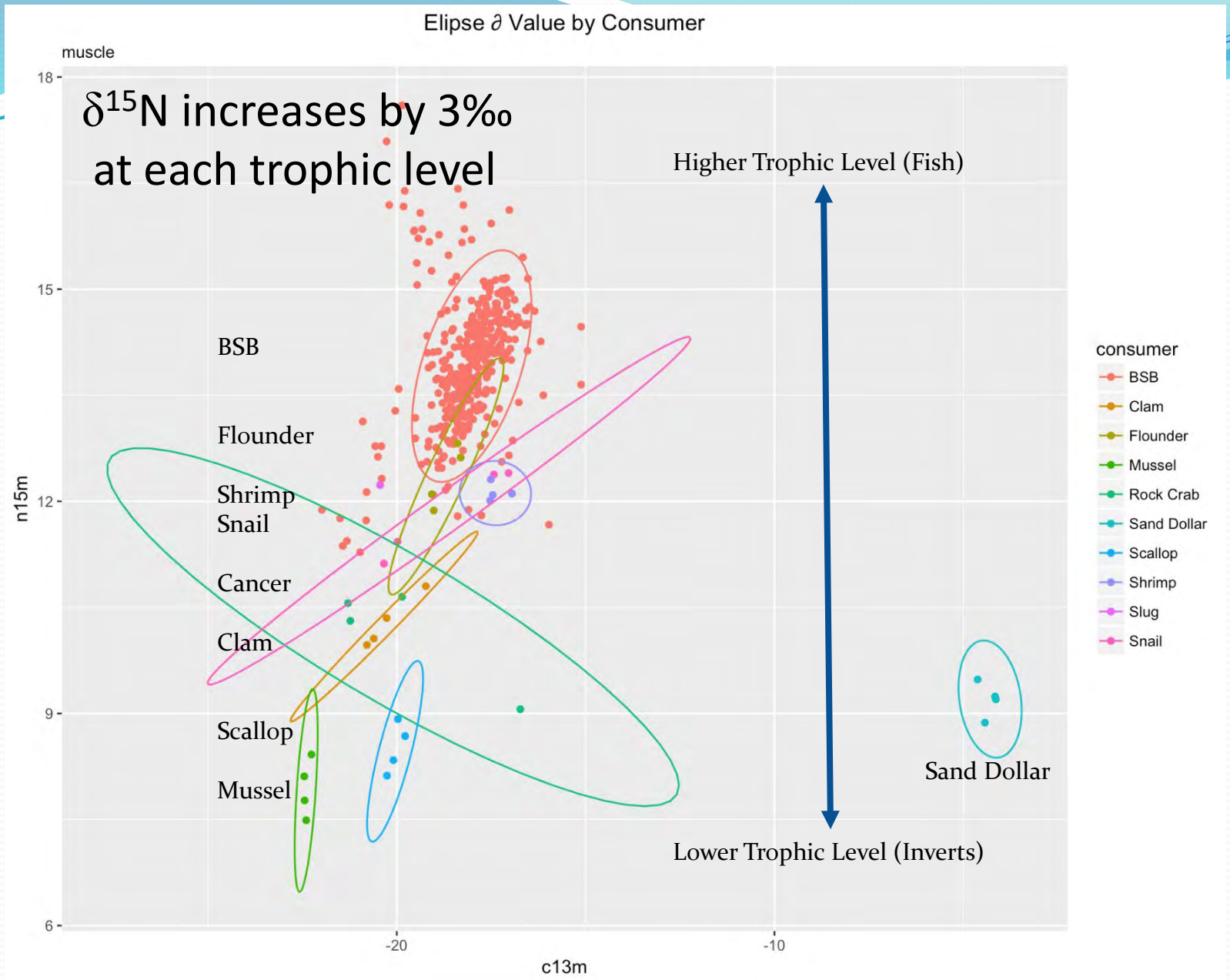
Artificial Sites: Crustaceans, some molluscs & fish

Natural Sites: fewer crustaceans, more molluscs, annellids

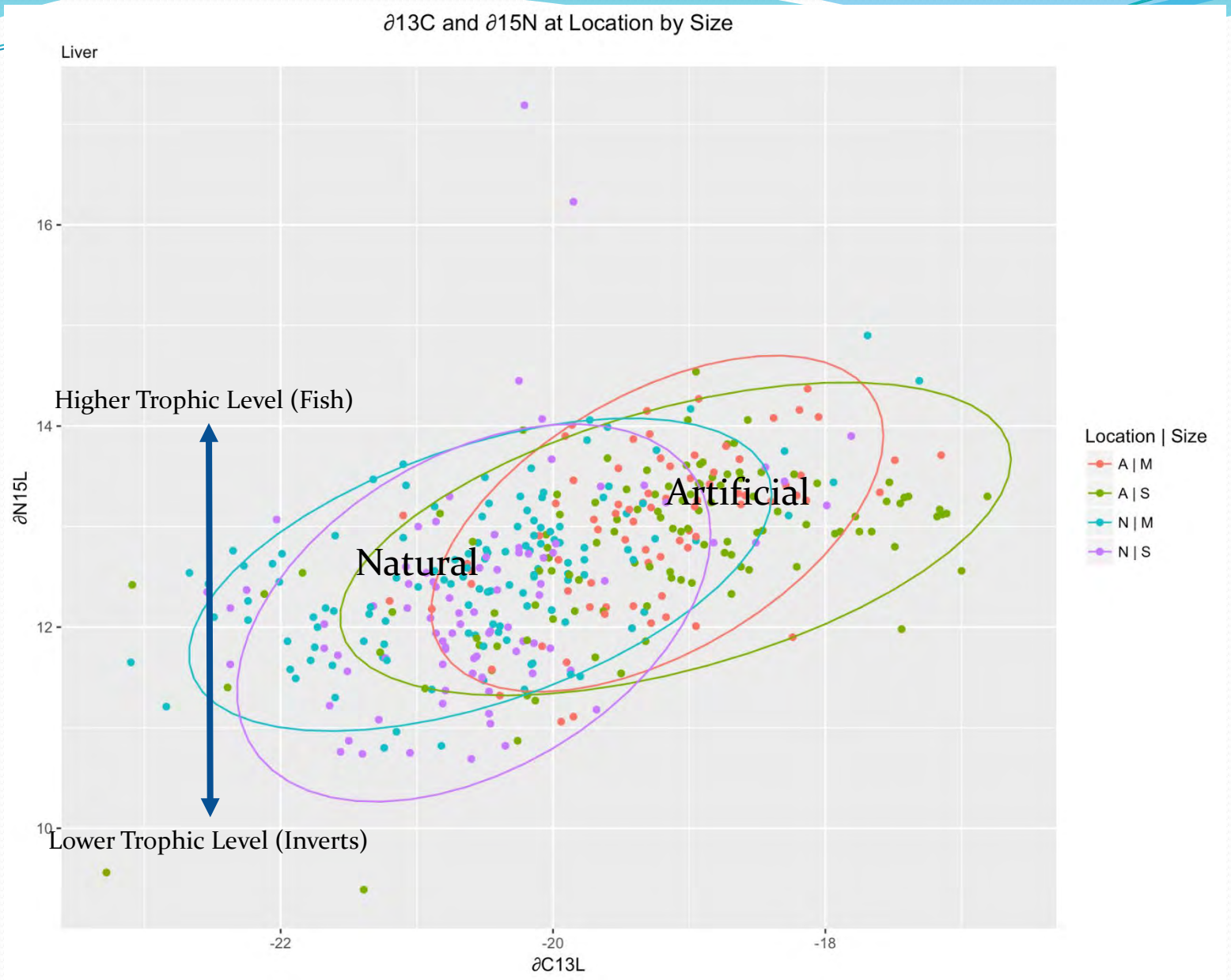
Most prey derived from sandy habitats, not reef structures

Habitat selection may not be related to food





Terrestrial/Pelagic prey ⟷ Marine/benthic prey

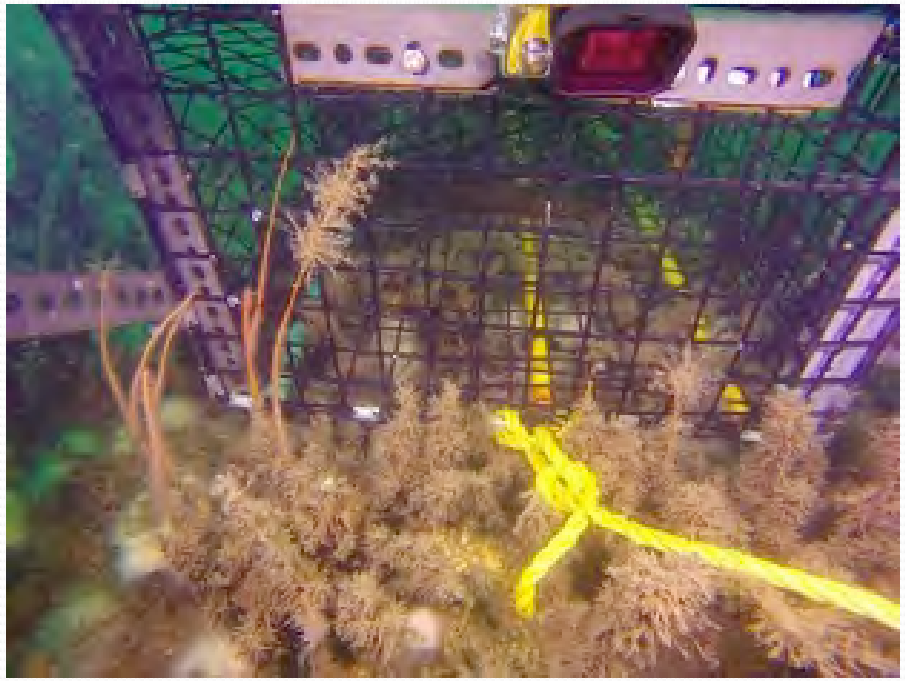

∂13C and ∂15N at Location by Size
Liver
16
14
12
10
∂N15L
-22
-20
-18
∂C13L
Higher Trophic Level (Fish)
Lower Trophic Level (Inverts)
Natural
Artificial
Location | Size
A | M
A | S
N | M
N | S
Terrestrial/Pelagic prey
Marine/benthic prey

Related Studies

- Impacts of BSB traps on benthic habitat esp emergent epifauna
  - NOAA Bycatch Program 2016-2017
- Age and growth of gorgonians, *Leptogorgia virgulata*
  - NOAA Bycatch Program 2017-2018
- Video surveys of the MD Wind Power Area
  - MD DNR funding 2012-2015.

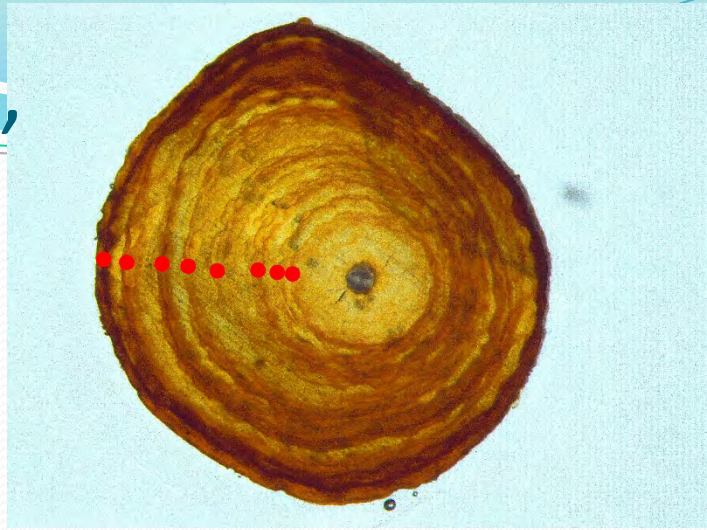
Impacts of Trap Fishing on Habitat

- Fish traps rarely land on biological structure (5%)
- Traps drag across seafloor when retrieved
- Drag time increases from ~10 sec (first) to 60 sec (last)
- Dragging increases encounters with biota to 50%
- Traps may crush, damage, or break corals and sea whips



- Schweitzer, C. C., R. N. Lipcius, and B. G. Stevens. 2018. Impacts of a multi-trap line on benthic habitat containing emergent epifauna within the Mid-Atlantic Bight. ICES Journal of Marine Science:fsy109-fsy109. doi.org/10.1093/icesjms/fsy109

Age and Growth of sea whips, *Leptogorgia virgulata*



- Rebecca Wenker MS Thesis
- Age 3 to 19 years, differ between sites
- Recruitment is episodic
- Recovery could take decades

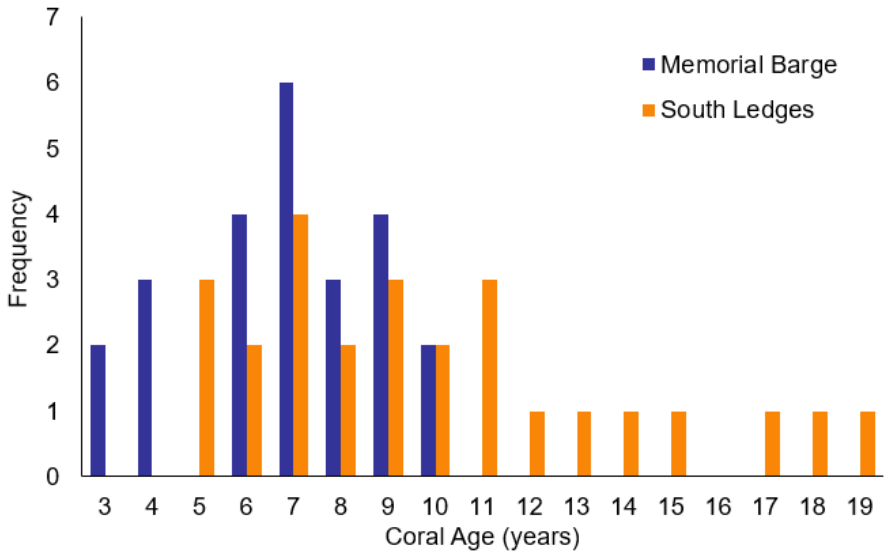
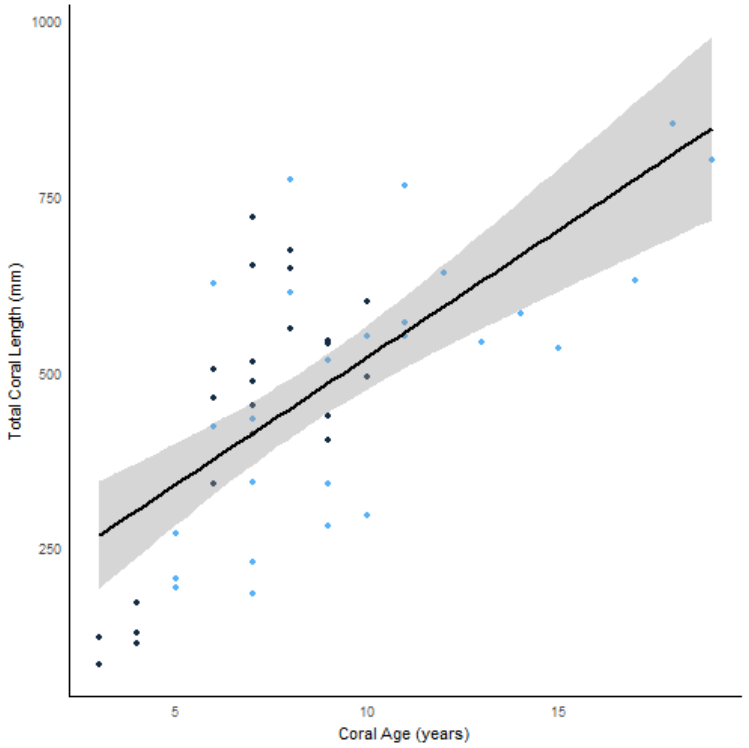


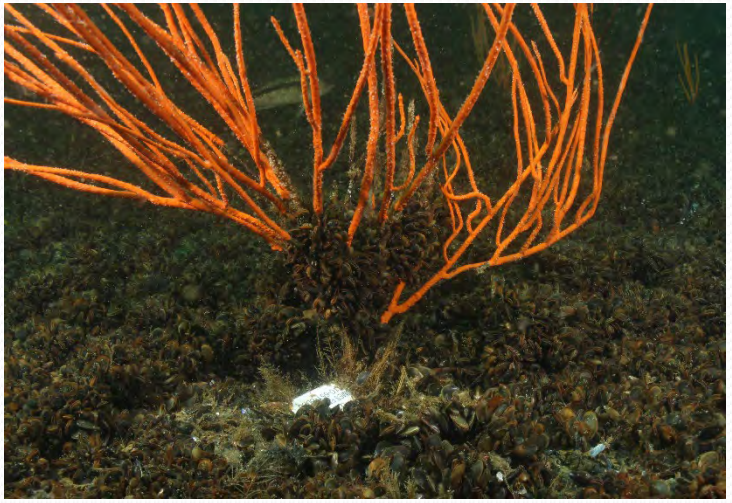
Figure 1. Frequency of *Leptogorgia virgulata* colonies by age (years), collected from the Memorial Barge (blue) and South Ledges (orange) sites in the Mid-Atlantic Bight during 2017. Age was significantly different between sites, (KS test; P=0.002). For Memorial Barge, *N*=24, while for South Ledges, *N*=26.

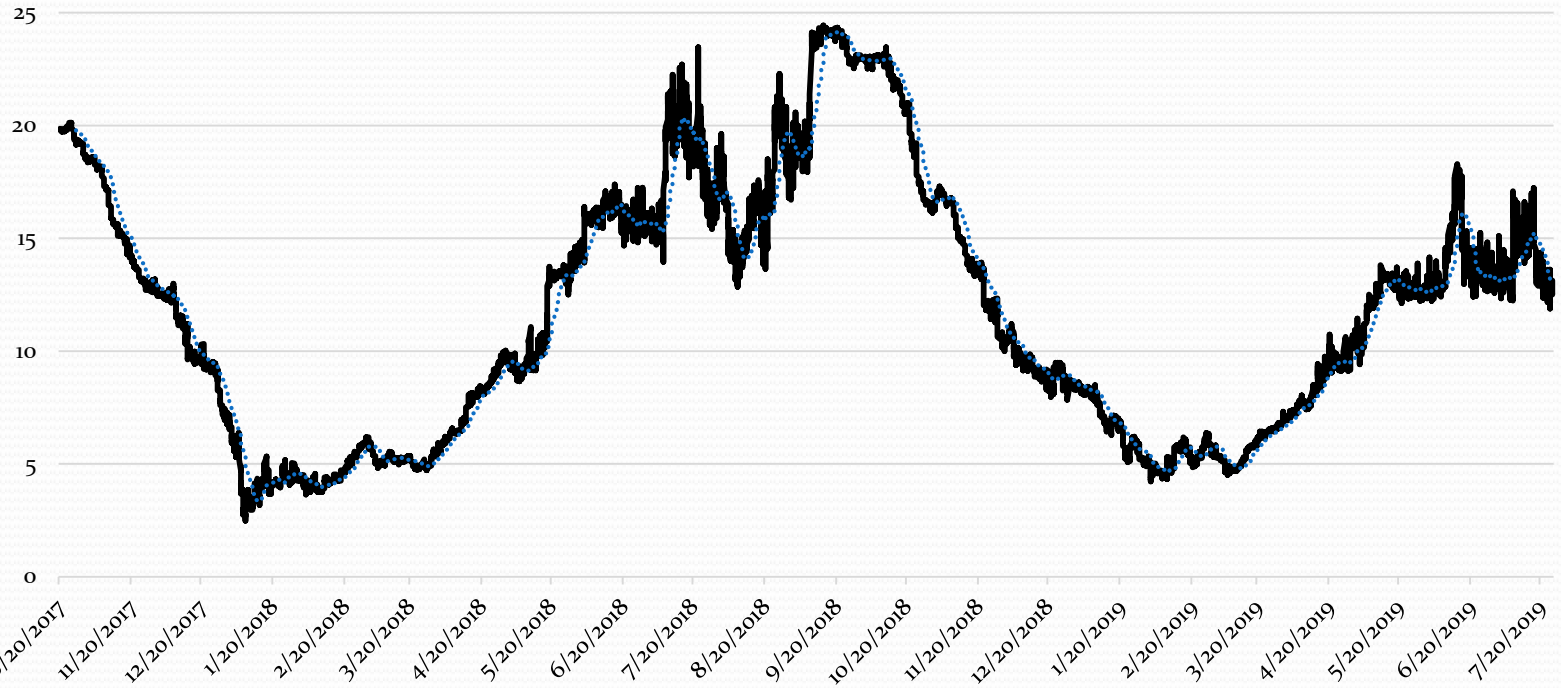


Tagging of sea whips (in-situ growth)

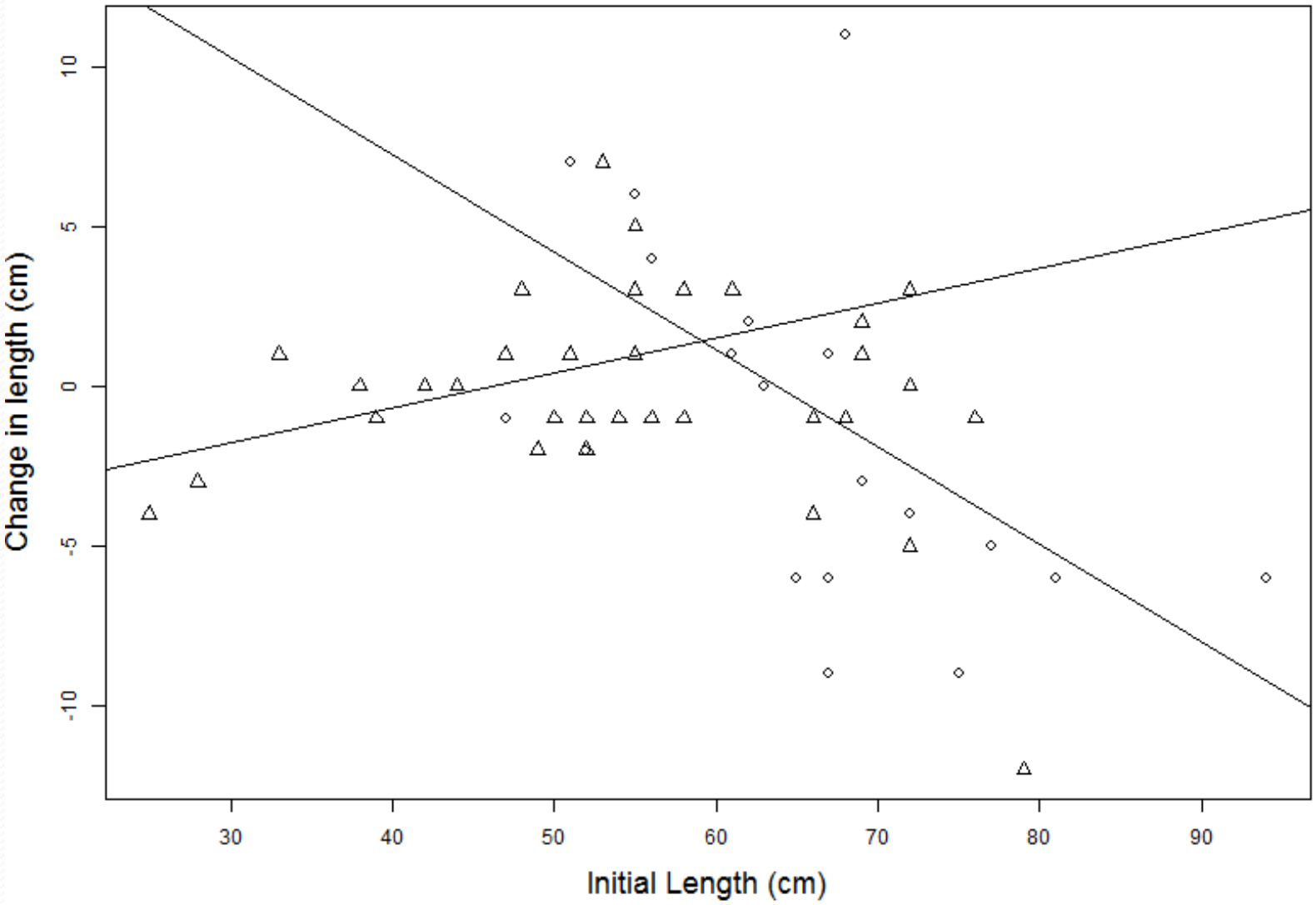
October 2017

July 2019





Gorgonian Growth (?) Rates



Digital Camera Sled Surveys 2012-2014

- 5 MD WEA blocks
- Low diversity
- Few large organisms
- No hard structure, few corals
- Turbines will probably not displace fish habitats

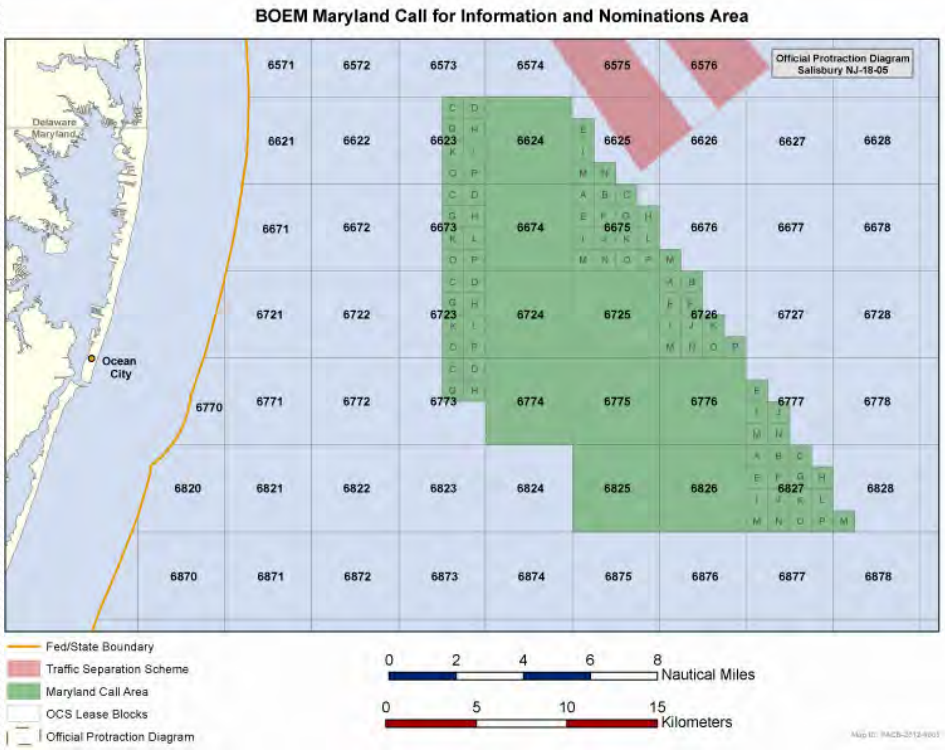
Cruz-Marrero, W., D. W. Cullen, N. R. Gay, and B. G. Stevens. 2019. Characterizing the benthic community in Maryland's offshore wind energy areas using a towed camera sled: developing a method to reduce the effort of image analysis and community description. PLoS ONE 14(5):e0215966.

Conclusions

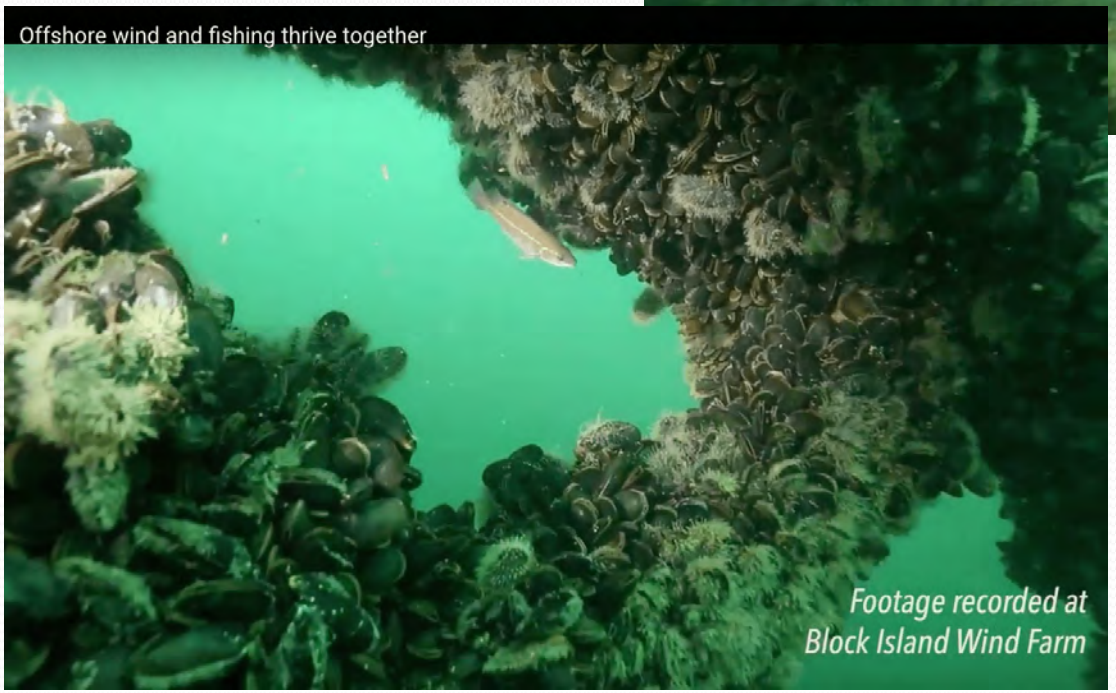
- BSB are tightly structure-oriented
  - associated with biological structure on hard bottom
- Reefs/wrecks vary in community composition
  - May be related to age and succession
- Sea whips comprise most of the vertical structure
  - Fish abundance related to sea whips ONLY
- Sea whips exhibit degradation
  - Causes unknown. Recovery could take decades
- More habitat → more fish
  - "Castle" pyramids not permanent
- BSB eat primarily crabs from non-reef habitats
  - Minor differences between Artificial and Natural reefs
- Preference for reefs probably due to shelter, not food

But What about…

How will offshore windpower development affect black sea bass and their habitats?



Turbine bases provide habitat for mussels and other organisms.



Turbines may significantly increase habitat available for black sea bass.


Cara Schweitzer
©2017 NickCaloyianis www.nickcaloyianis.com
Rebecca Wenl
Andre Price
Mr. Sea Bass
Brad

Summer Flounder, Scup and Black Sea Bass Discard Mortality

Presented to ASMFC Summer Flounder, Scup and Black Sea Bass Board

August 7, 2019

Presentation Outline

1. Background
2. Review of Discard Mortality Information
3. Discussion Questions
4. Questions

Background

- Strategic Plan for Reforming Recreational Black Sea Bass identified reducing discard mortality as an important issue
- In May 2019, the Board agreed to discuss this topic at the August 2019 meeting
- Focus on recreational black sea bass discard mortality rate, though the Board may wish to address other fisheries and/or areas

Background

- Species-specific discard mortality (summer flounder, scup, and/or black sea bass)
  - Sector-specific discard mortality
    - Recreational discard mortality
      - Recreational discards (quantity)
      - Discard mortality rate
    - Commercial discard mortality
      - Commercial discards (quantity)
      - Discard mortality rate
- Gear-specific discard mortality

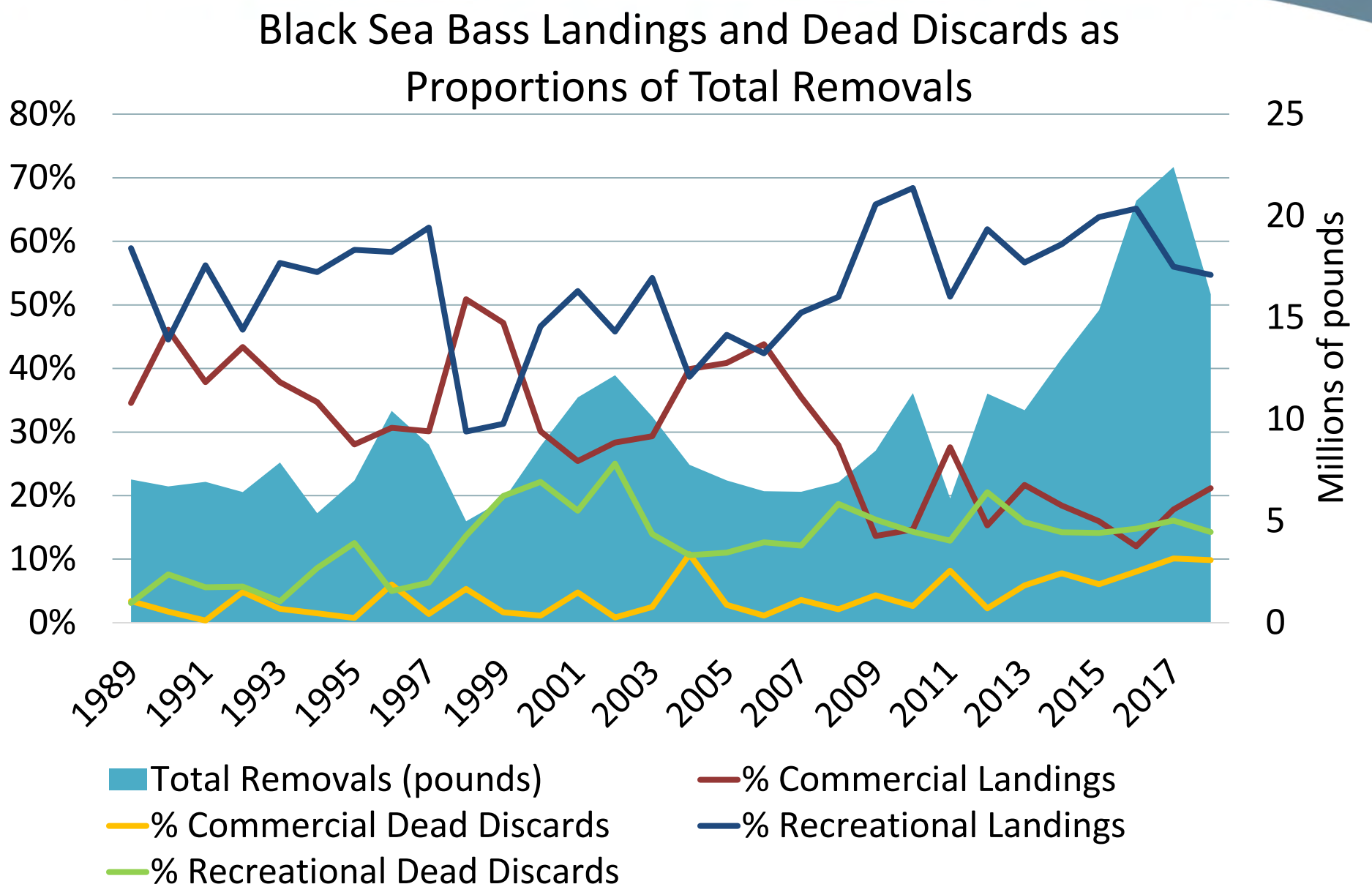
Discards & Mortality Rates

- Estimated dead discards = % mortality * estimated discards
- Assumed discard mortality rates based on scientific research
- Estimated recreational discards based on MRIP data
- Commercial discards estimated by gear based on bycatch reporting, observer data, VTR data

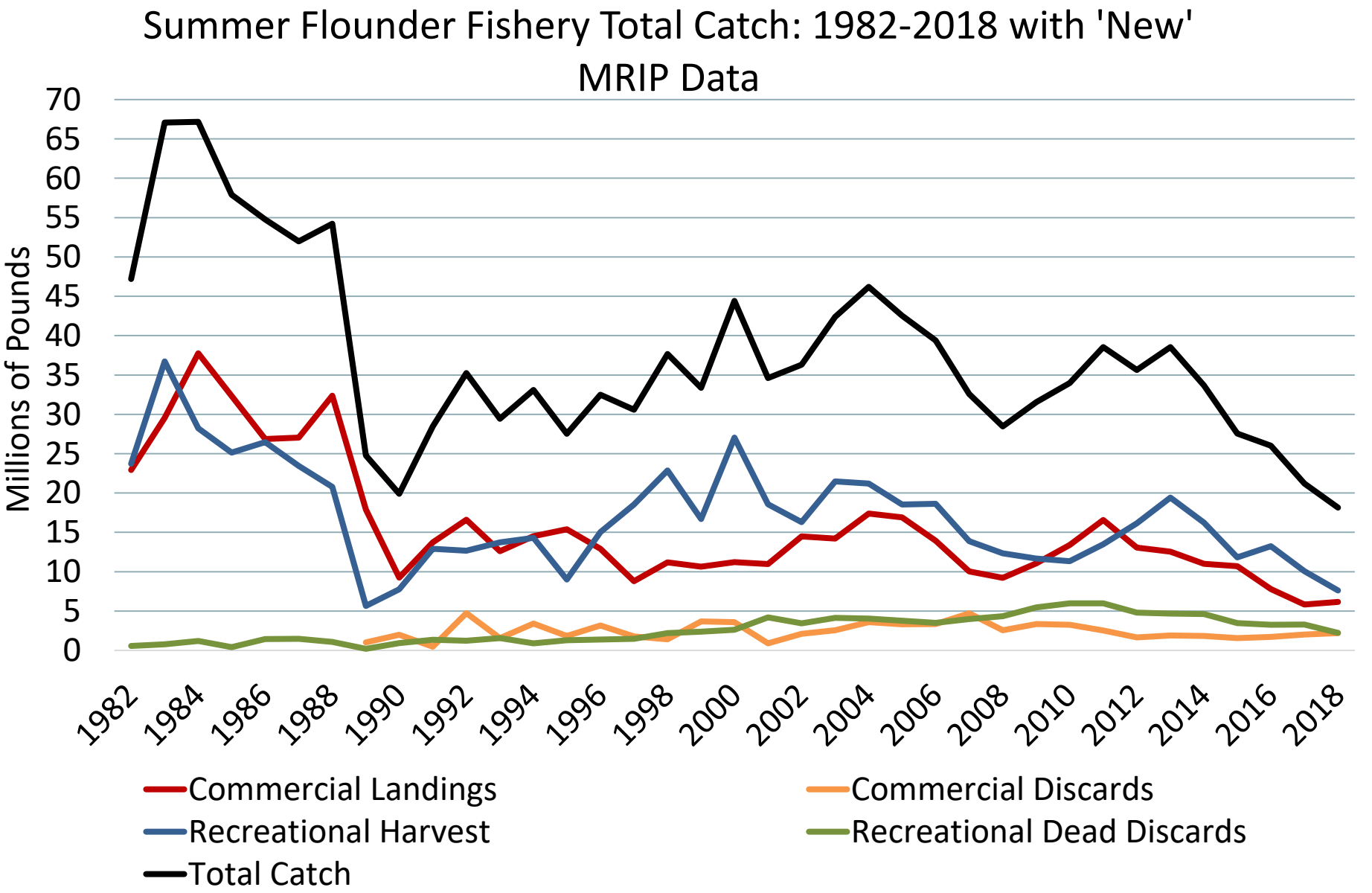
Discards & Mortality Rates

Species	Rec Discard Mortality Rate	Rec Dead Discards (% of Total Removals in Pounds, 2015-2017)	Commercial Discard Mortality Rate	Commercial Dead Discards (% of Total Removals in Pounds, 2015-2017)
Summer Flounder	10%	14%	80%	7%
Scup	15%	3%	100%	23%
Black Sea Bass	15%	15%	100% trawls/gillnets; 15% pots/ hand lines	8%

Discards vs Landings



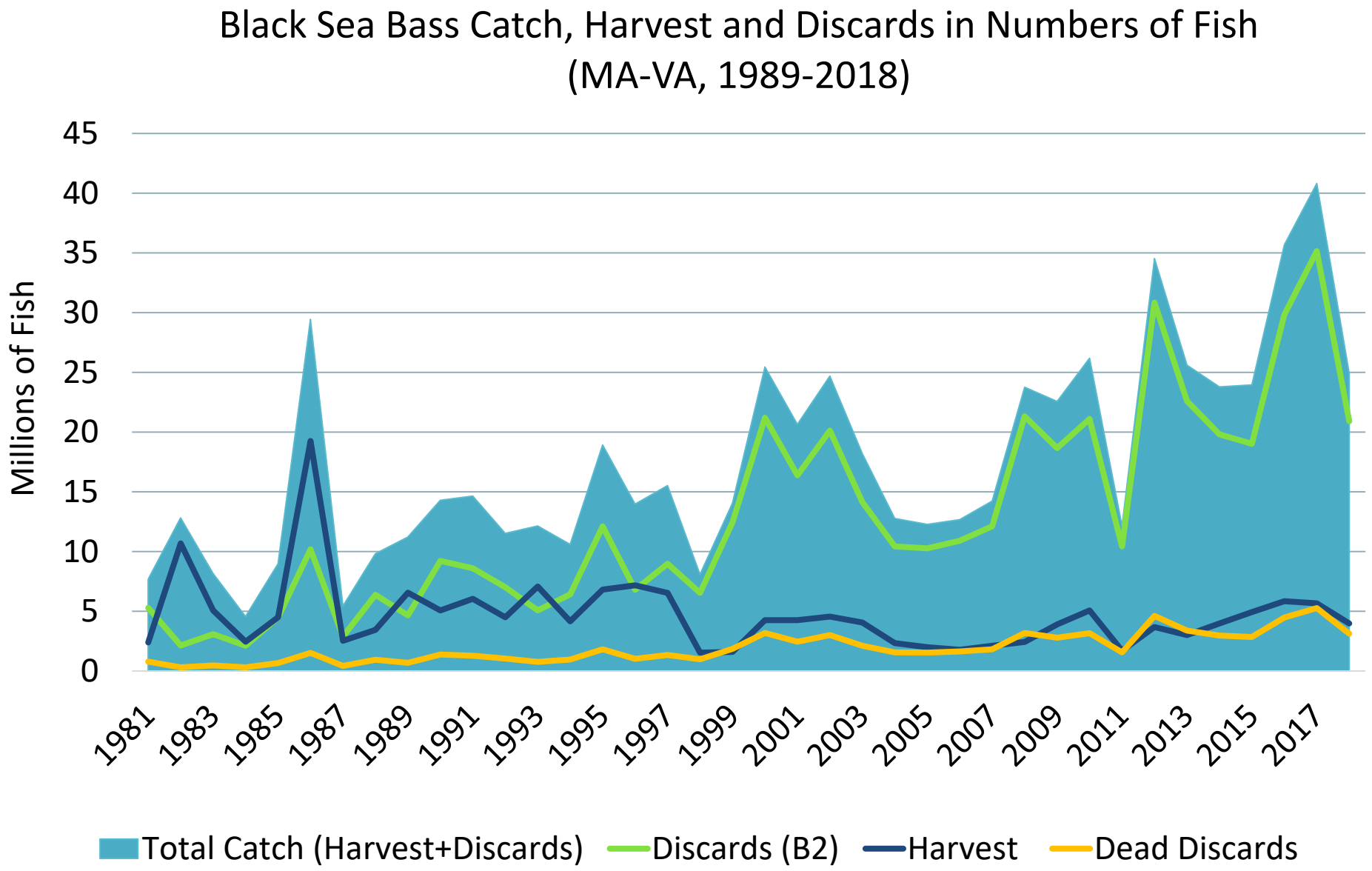
Discards vs Landings



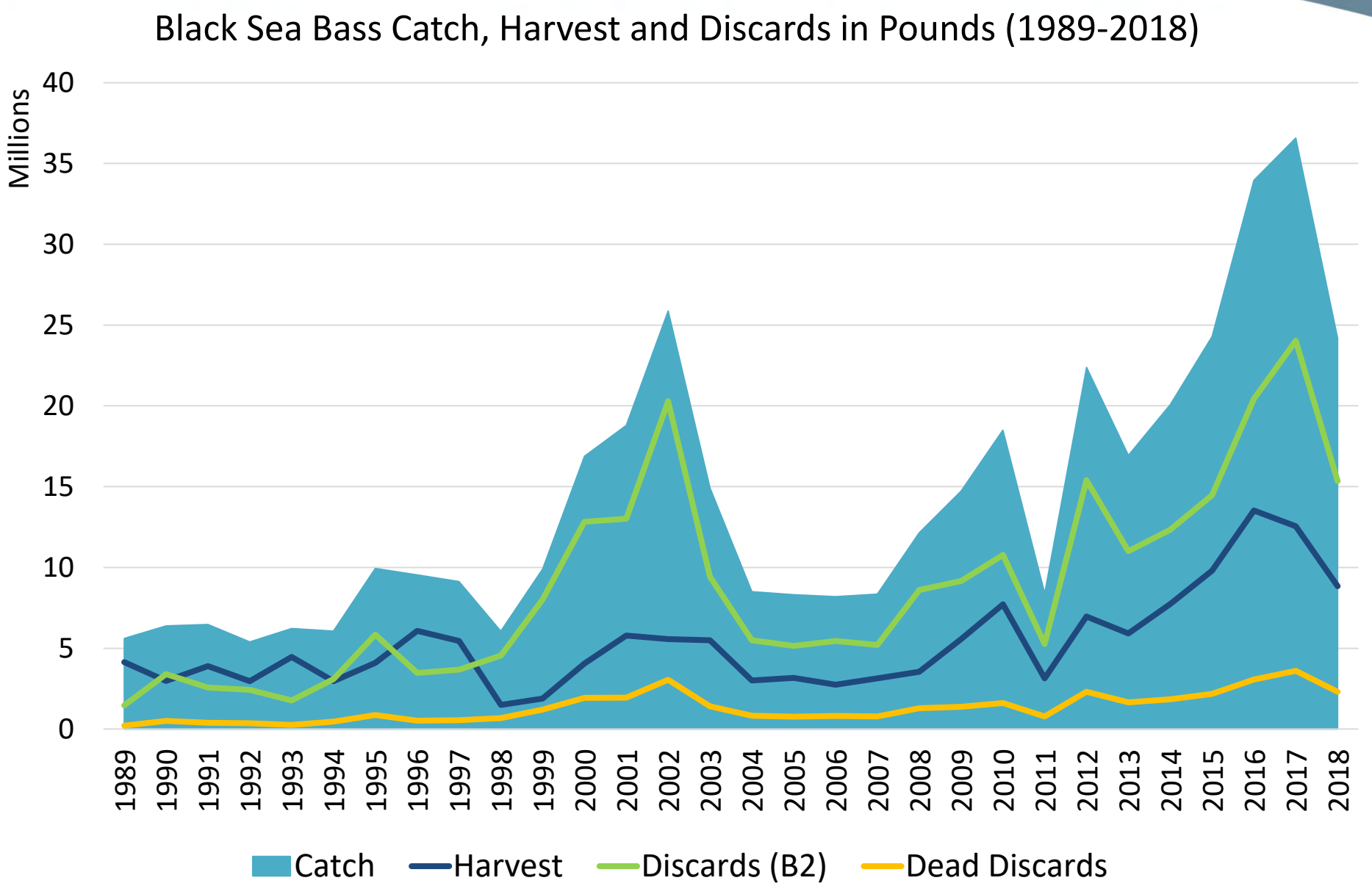
Black Sea Bass Recreational Discards

- Increasing number of recreational discards = increasing number of dead discards
- Dead discards might have negative impact on the stock
- Regulatory discards could be turned into harvest
- 15% mortality rate may not be accurate
  - Recent study at Rutgers found 21-52% mortality at 45 meter depths

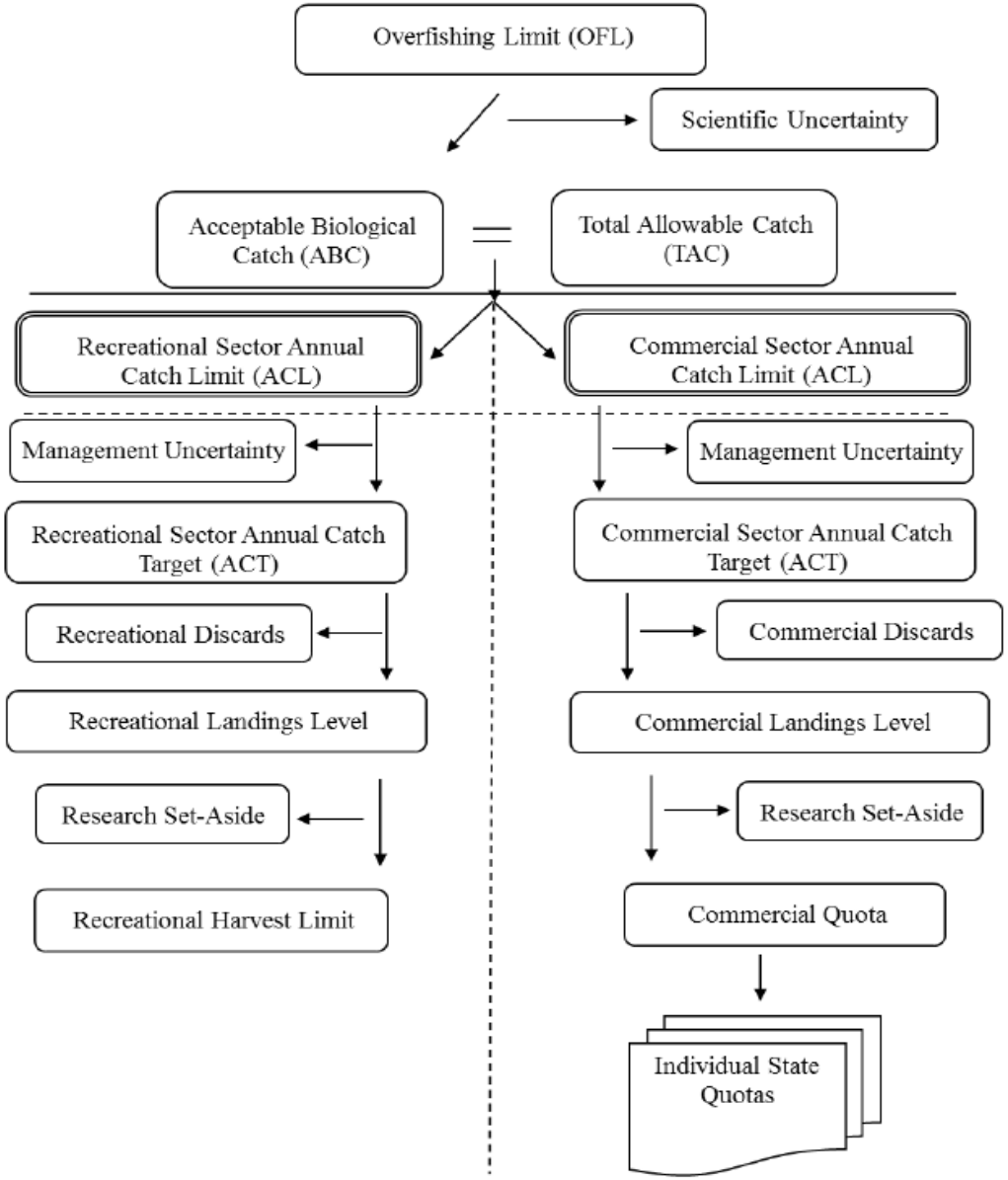
Black Sea Bass Recreational Discards



Black Sea Bass Recreational Discards



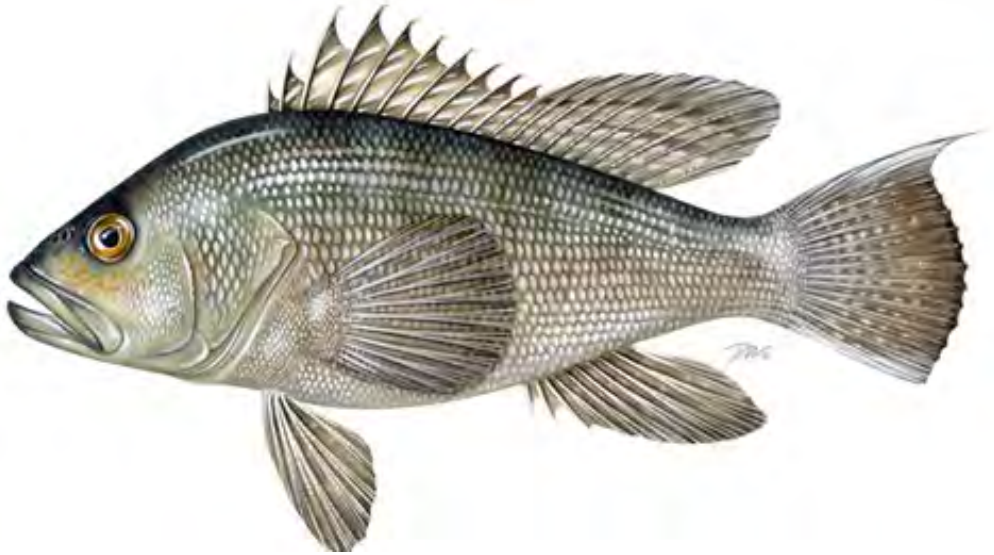
Discards and Fishery Specifications



Discussion Questions

- Is addressing discard mortality a priority for this Board in the next year?
  - If so, for which species, sectors, etc?
  - Which aspects (number of discards, assumed mortality rate, true discard mortality?)
  - What approaches would the Board want to pursue to address these areas?
    - Policy/regulatory changes
    - Education
    - Research

Questions?



Progress Update on the Recreational Management Reform Working Group

Presented to ASMFC Summer Flounder, Scup and Black Sea Bass Board

August 7, 2019

Presentation Outline

1. Background
2. Recreational Reform Focus
3. Work to Date
4. Next Steps
5. Questions

Background

Date	Activity
April 2018	Draft Strategic Plan on Black Sea Bass Recreational Reform presented to Board; Working Group formed
Dec 2018	Addenda XXXI and XXXII approved
March 2019	Board and Council agreed to form joint recreational reform working group & steering committee
March-August 2019	Steering Committee formed, met twice

Recreational Reform Focus

- Focus on increasing management stability and flexibility, while reducing the year-to-year workload required to evaluate and establish measures
- Flexibility – accounting for uncertainty in projected and estimated harvest
- Stability – multi-year specifications cycle
- Alignment with stock assessments

Work to Date

- Information gathering and concept development in these areas:
  - Identifying limitations of MSA
  - Identifying limitations of FMPs
  - Linking management to stock status
  - Incorporating MRIP uncertainty into management
  - Identifying other FD or FI information that can be used as ‘sign posts’ between assessments
  - Process and timeframe for implementing changes

Next Steps

- **Today:** Board review
- **Next Week:** Council review
- **August-October:** Steering Committee meetings to continue development of recreational reform strategies
- **October Joint Meeting:** Board and Council review and discuss strategies and process proposed by Steering Committee

Questions?