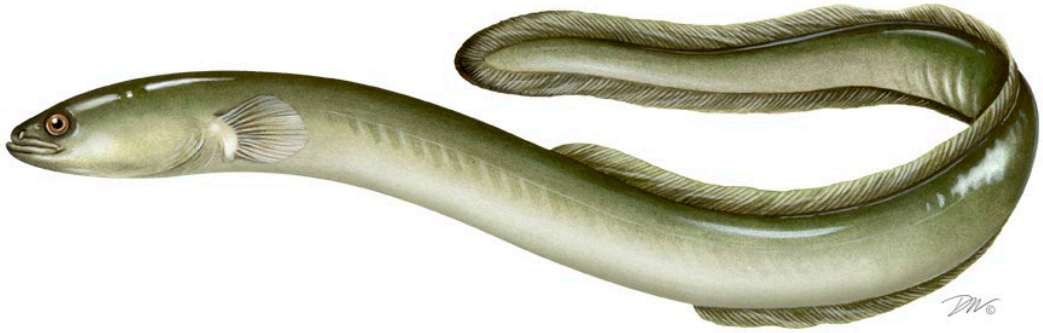
2022 American Eel Benchmark Stock Assessment



American Eel Board Meeting
February 1, 2023

Outline

- Background
- Life History
- Habitat Analysis
- Landings
- Fishery-Independent Indices
- Analyses and Models
- Management Tool
- Stock Status
- Recommendations
- Conclusions

Background: Challenges

- Navigate through and reside in range of habitats
  - Sargasso Sea, coastal estuaries, inland FW systems
- Distribution from Brazil to Canada
- Several management authorities
  - International, federal, state, ASMFC, inland, Gulf of Mexico
- Life history characteristics vary
- Other potential population Impacts:
  - Habitat fragmentation due to dams
  - Climate change
  - Swim bladder parasite
- Inability to model and produce reference points

Previous Assessments

- 2005: Not accepted for management
  - Sufficient shortcomings
- 2012: Benchmark stock assessment
  - Analyses indicated stock decline
  - Depleted status
  - Several modeling approaches and trend analyses
  - Reference points from model not accepted
- 2017: Stock assessment update
  - Extended time series, trend analyses
  - Depleted status

Current Assessment

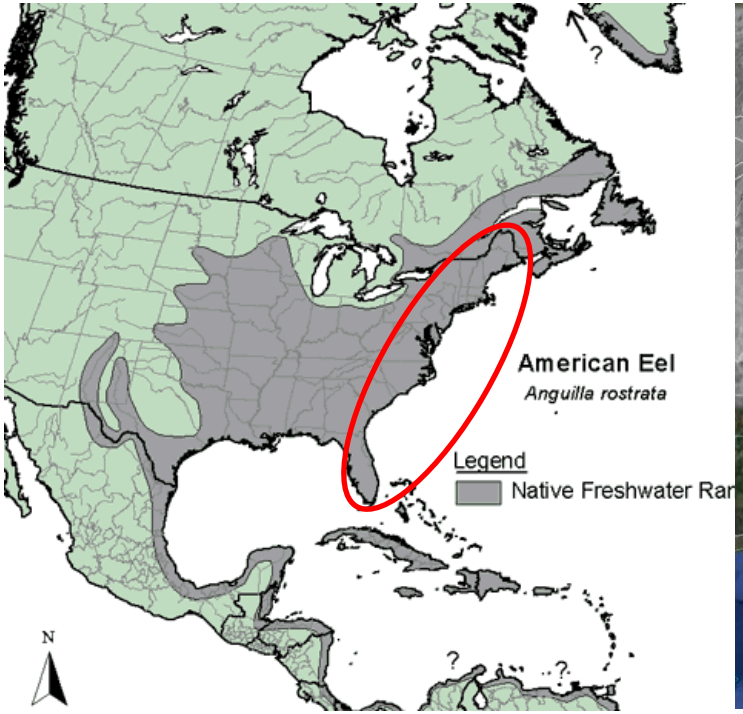
- Issues not resolved
- Attempted models and approaches recommended from previous peer review
  - Delay-difference model, reference points
  - Further explore surplus production model, TLA
- Other approaches
  - USGS GIS-based habitat analysis
  - Revised indices, trend analyses
  - Data-poor methods from NEFSC to give management advice

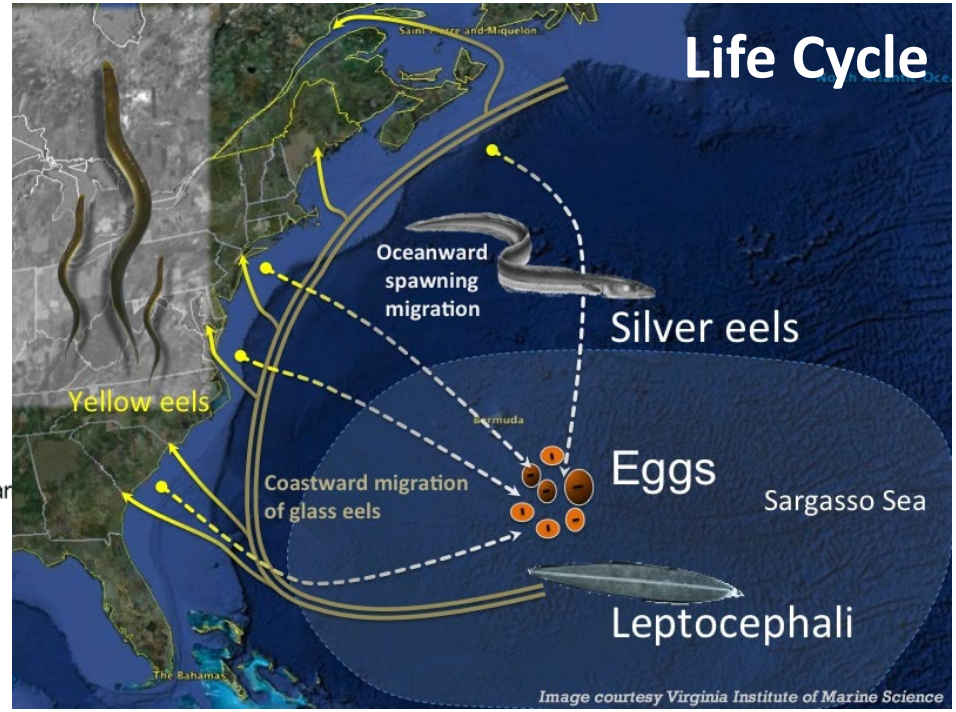
Other Eel Assessments

- NZ recently abandoned an analytical stock assessment and suggest proceeding with a habitat-oriented assessment
- European eel assessed by ICES Workgroup
  - Outlines several of same challenges
  - Relies on recruitment indices
- Canadian eel assessed by DFO
  - Also could not develop model, reference points

Life History

- Stock Definition
  - Single panmictic stock with one spawning population
  - Only US Atlantic coast considered in this assessment

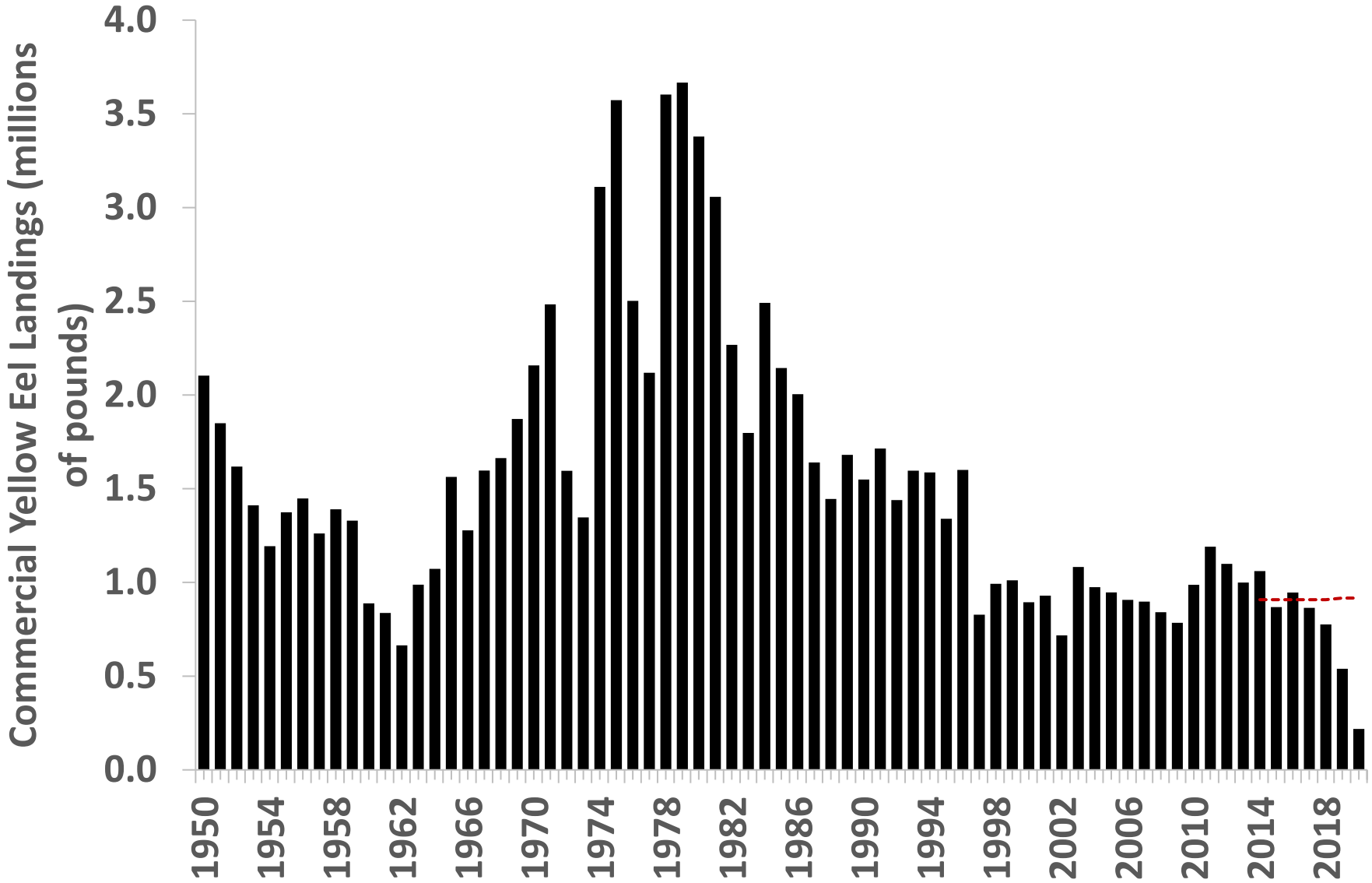




USGS Habitat Analysis

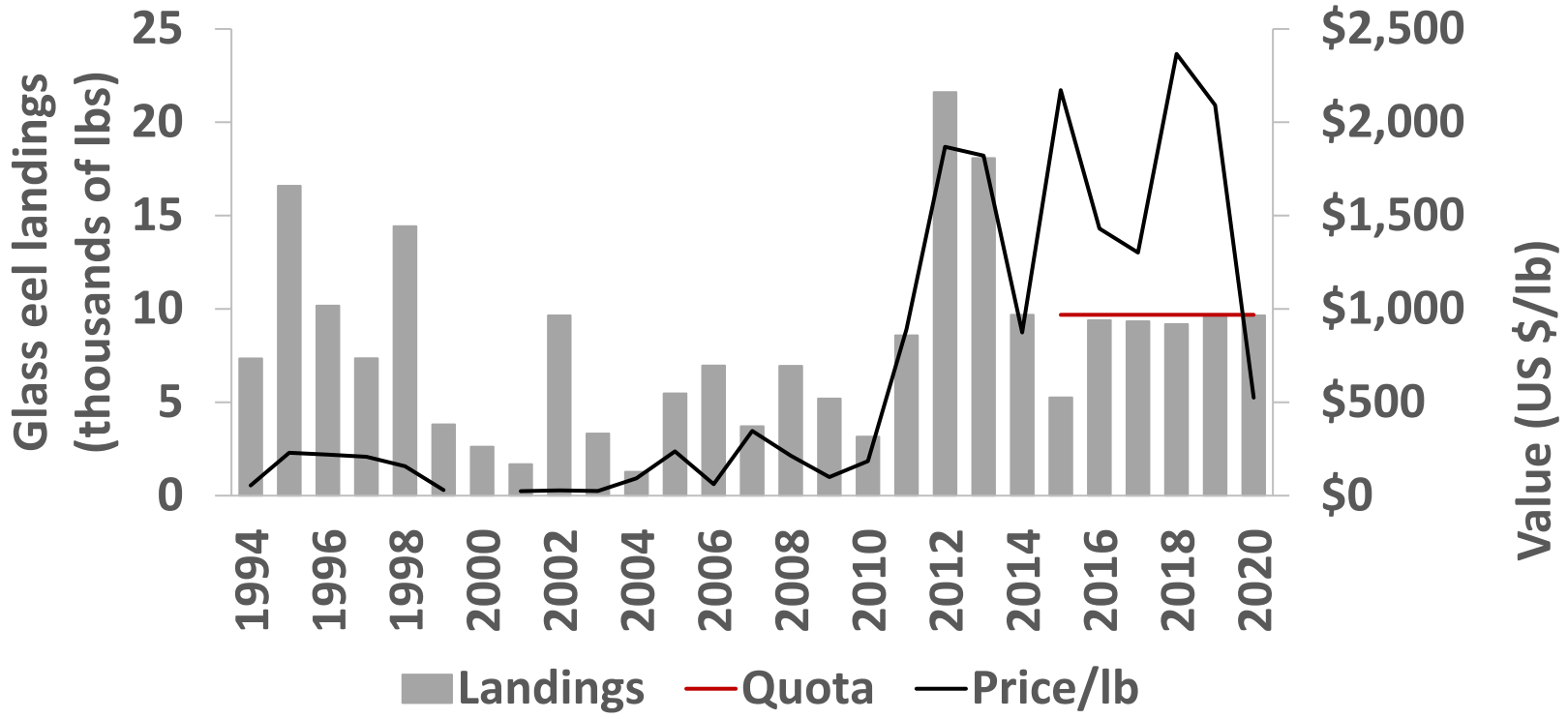
- ASMFC & USGS collaboration during assessment
- Pilot habitat-based model to assess eel stock
  - Initial assessment focused on data-rich Chesapeake and Delaware Bay watersheds
  - Compared eel occurrence/abundance to GIS based predictors
  - Spatial models for eel occurrence can be constructed with existing data (1995-2019)
  - Habitat fragmentation from dams – major factor
  - Modelling Limitations
    - Lack of historical data to understand impact of habitat restrictions from dams on population
    - Lack of current eel collections in other geographic regions

Yellow Eel Landings



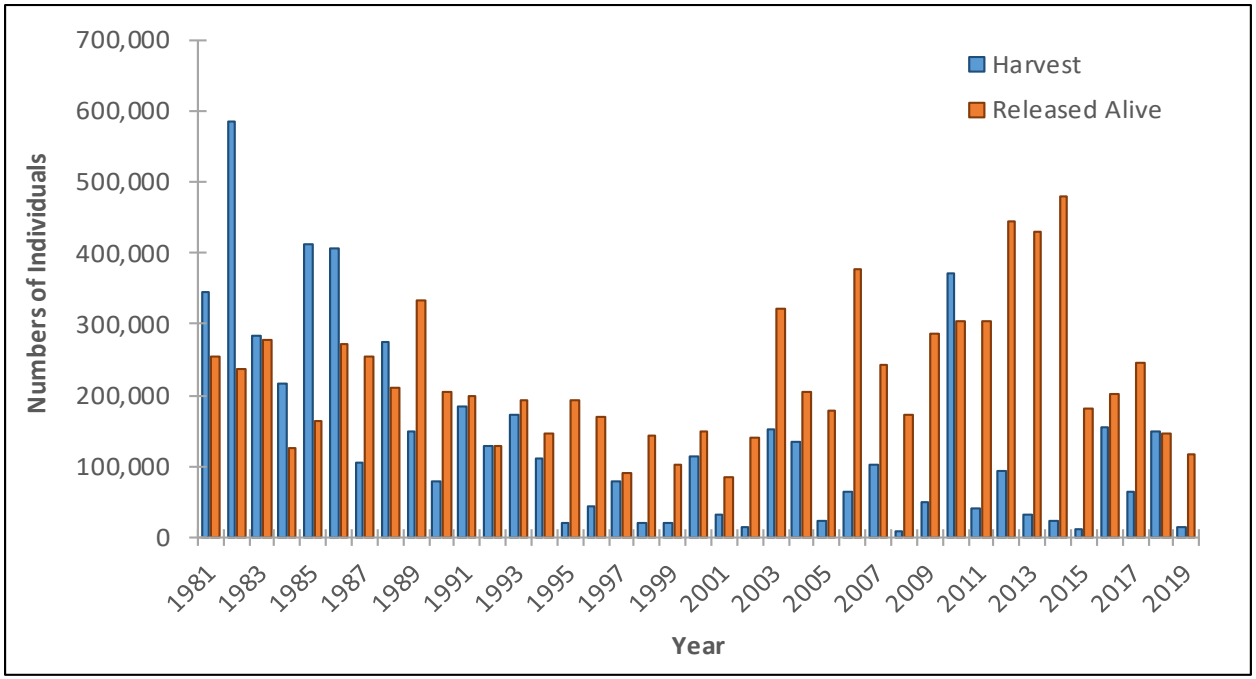
Glass Eel Landings

- Prohibited in all states but Maine and SC
- Addendum IV (2014): Maine quota of 9,688 lbs
- SC landings confidential, <750 lbs since 2015



Recreational Fisheries

- Limited number of American eels in MRIP
  - Over 3 million trips, <0.5% encountered eel
  - Does not include areas or gears relevant to eel
- Low precision associated with the time series
  - Most PSEs >50%



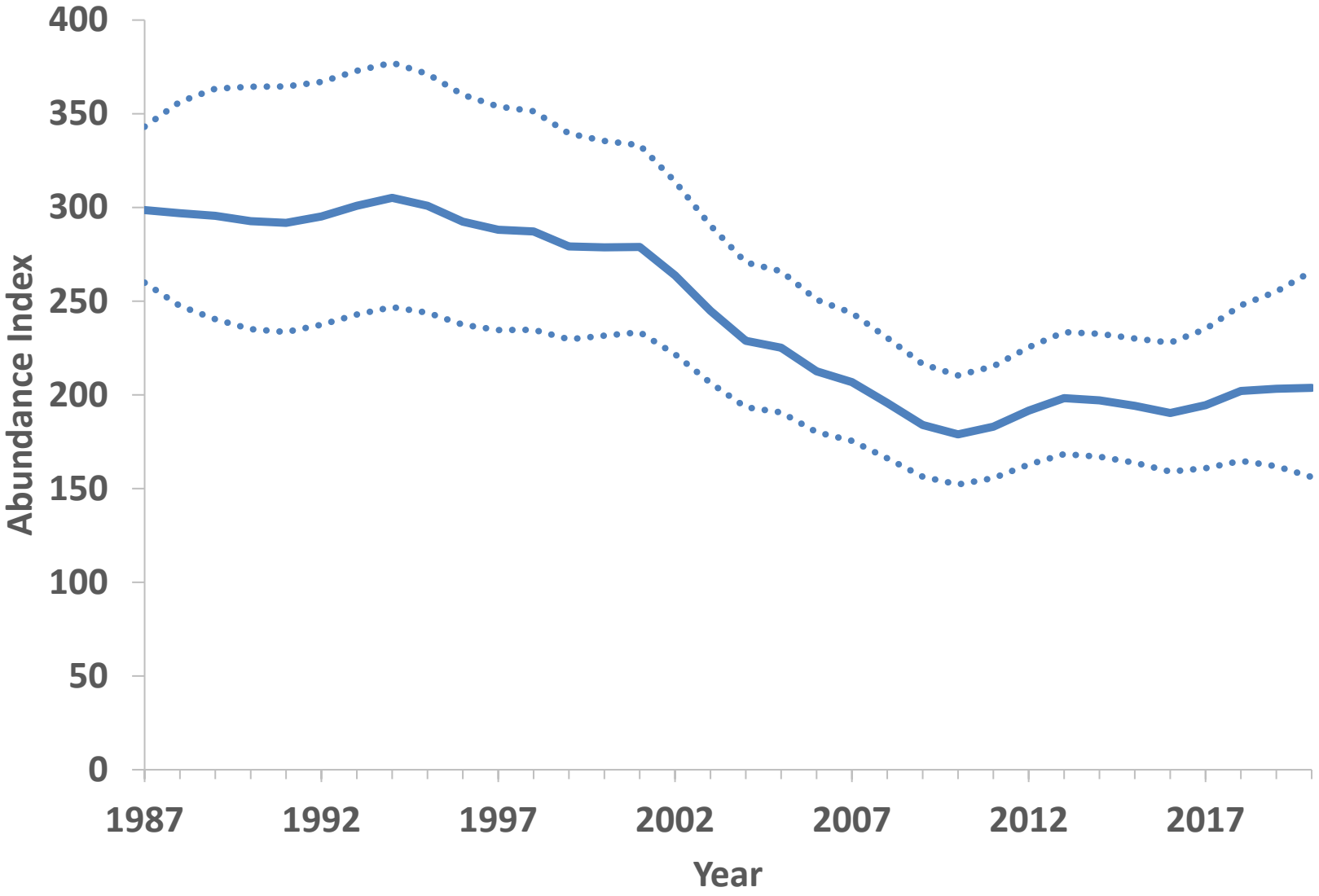
Fishery-Independent Indices

- Over 80 datasets evaluated
- Criteria for Retention
  - Time Series: at least 10 years long
  - Survey Design: statistical design preferred
  - Gear Type: capable of catching eel
  - Timing & Location: time/place where eel are available
  - Methods: consistent or changes standardized
- Datasets Retained
  - 25 YOY
  - 10 Elver
  - 14 Yellow Eel

YOY Indices

State	Site	Gear	Start Year	End Year	Trend
ME	West Harbor Pond	Irish Elver Ramp	2001	2019	↑
NH	Lamprey River	Irish Elver Ramp	2001	2020	NS
MA	Jones River	Sheldon Trap	2001	2019	↓
MA	Wankinco River	Ramp	2009	2019	NS
RI	Gilbert Stuart Dam	Irish Elver Ramp	2000	2019	NS
RI	Hamilton Fish Ladder	Irish Elver Ramp	2004	2019	NS
CT	Ingham Hill	Irish Elver Ramp	2007	2019	NS
NY	HRE Monitoring	Fyke Net	1974	2017	NS
NY	Carmans River	Epibenthic sled & tucker trawl	2000	2019	NS
NY	Hudson River	Fyke Net	2008	2020	↑
NJ	Little Egg Inlet	Plankton net	1992	2015	↓
NJ	Patcong Creek	Fyke Net	1999	2020	NS
DE	Delaware River - Millsboro	Fyke Net	2000	2020	NS
MD	Turville Creek	Irish Elver Ramp	2000	2019	NS
PRFC	Clark's Millpond	Irish Elver Ramp	2000	2013	NS
PRFC	Gardy's Millpond	Irish Elver Ramp	2000	2019	NS
VA	Wormley Creek	Irish Elver Ramp	2001	2019	↓
VA	Bracken's Pond	Irish Elver Ramp	2000	2015	NS
VA	Kamp's Millpond	Irish Elver Ramp	2000	2019	NS
VA	Wareham's Pond	Irish Elver Ramp	2003	2019	NS
NC	Beaufort (BBISP)	Neuston plankton net	1987	2019	NS
SC	Goose Creek	Fyke Net	2000	2015	↓
GA	Altamaha Canal	Fyke Net	2001	2013	NS
GA	Hudson Creek	Fyke Net	2003	2013	NS
FL	Guana	Dip Net	2001	2020	↓

Coastwide YOY Index



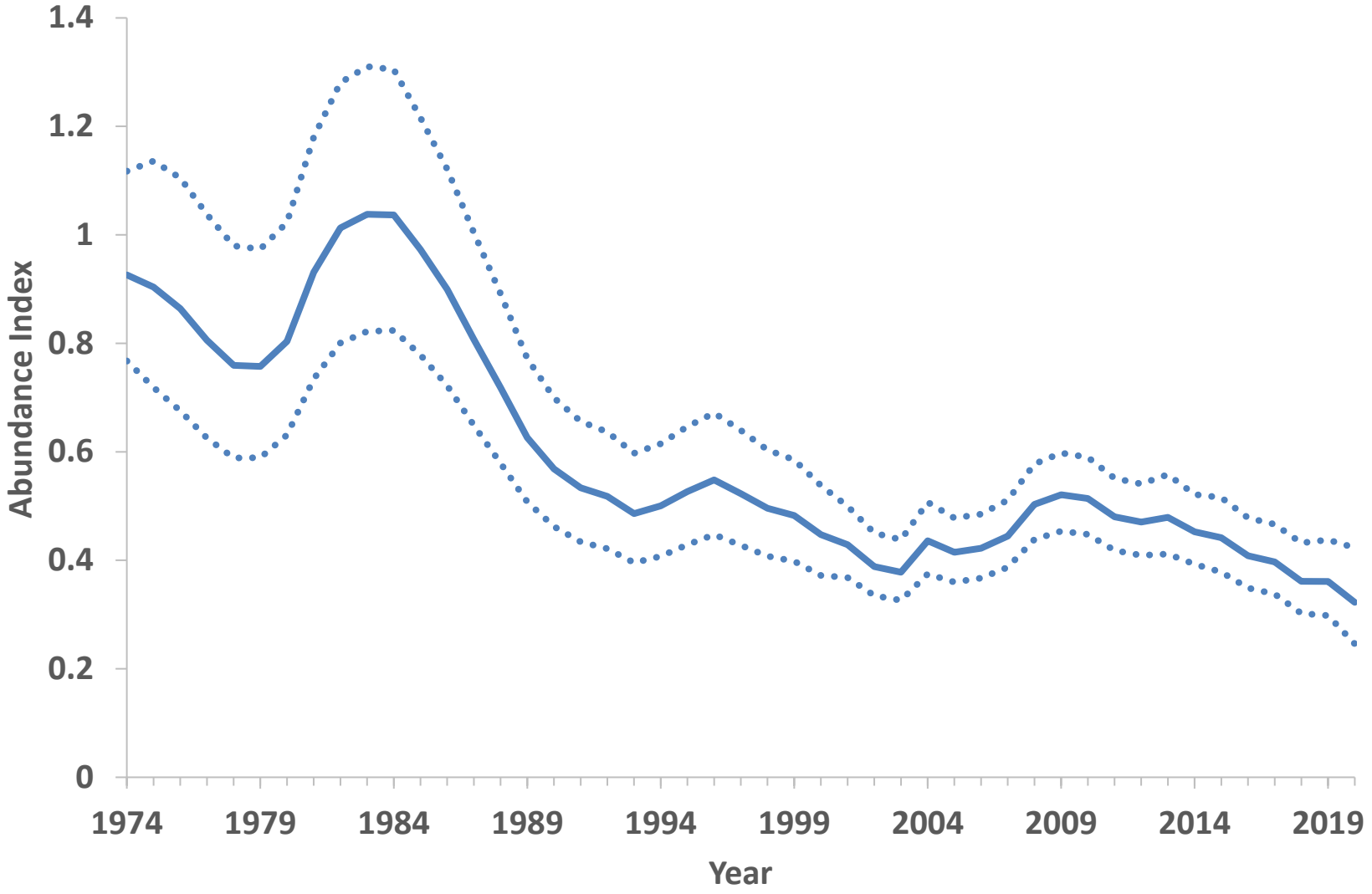
YOY Analysis & Recommendation

- State-mandated YOY surveys conducted 20+ years
- Evaluation of Data
  - No patterns in pigment stage, weights over time
  - No clear pattern in recruitment over time
  - Increase in length with increasing latitude
- SAS and TC recommend that the biological sampling requirement for YOY surveys be made optional
  - Many states indicated they will continue to collect this data voluntarily
- States still required to implement YOY survey

Yellow Eel Indices

State	Site	Gear	Start Year	End Year	Trend
NH	Rainbow Smelt Fyke Net Survey	Fyke Net	2008	2020	NS
MA	Rainbow Smelt Fyke Net Survey	Fyke Net	2004	2019	NS
CT	Farmhill River	Electrofishing	2001	2014	NS
CT	Eightmile River	Electrofishing	2001	2020	NS
NY	HRE Monitoring	Epibenthic sled & tucker trawl	1974	2017	↓
NY	Hudson Juvenile Alosine	Beach Seine	1985	2019	↓
NY	Hudson Juv Striped Bass	Beach Seine	1980	2019	↓
NJ	Delaware River Seine	Seine	1998	2019	NS
DE	Delaware Juvenile Trawl	Trawl	1980	2019	NS
PA	Delaware River Area 6	Electrofishing	2005	2020	↓
MD	Sassafras River	Pot	2006	2019	↑
VA	VIMS Trawl Survey	Trawl	1955	2019	NS
VA	VIMS Seine Survey	Seine	1967	2019	↑
SC	Rediversion canal	Aluminum ladder	2003	2020	NS

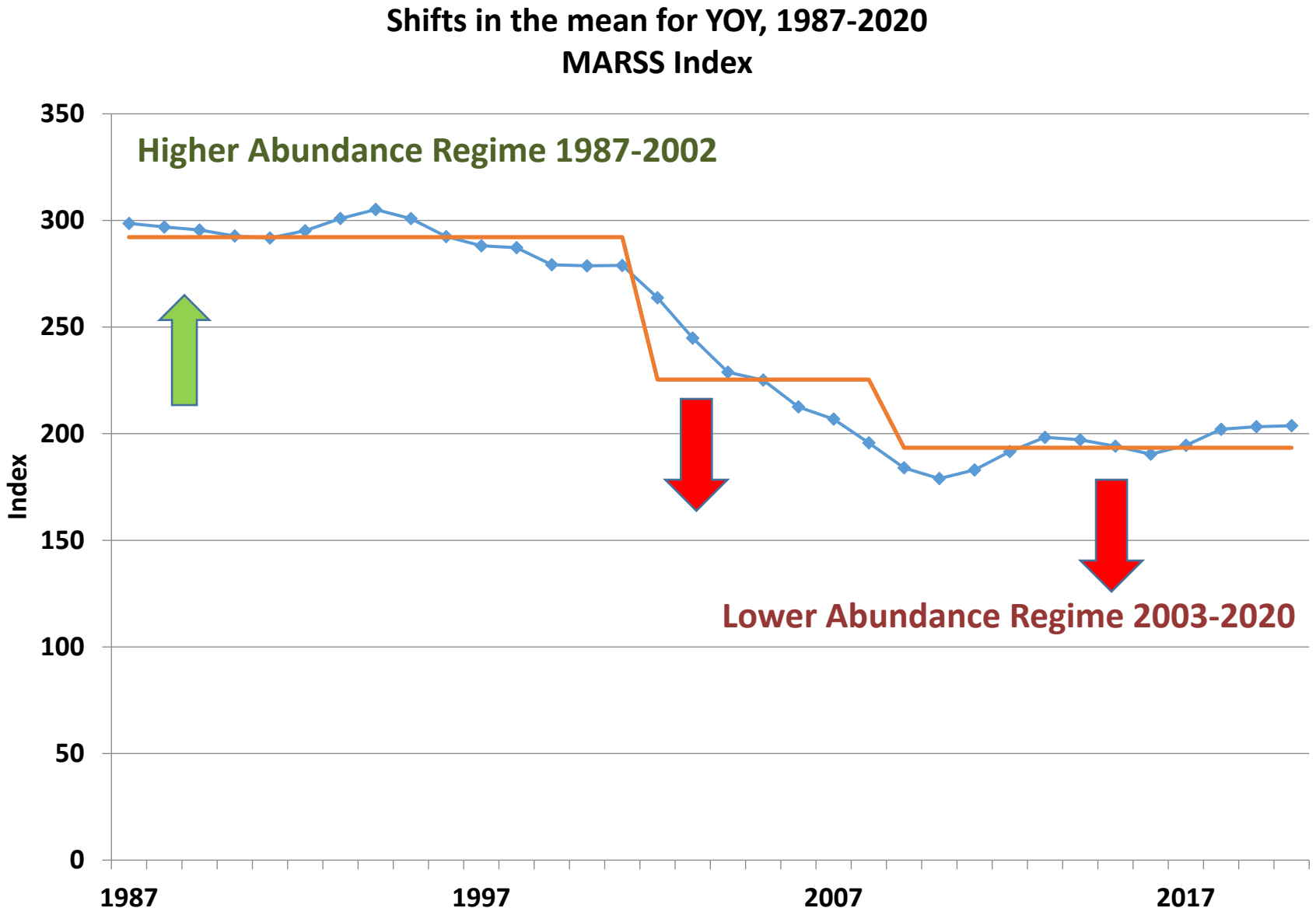
Coastwide Yellow Eel Index



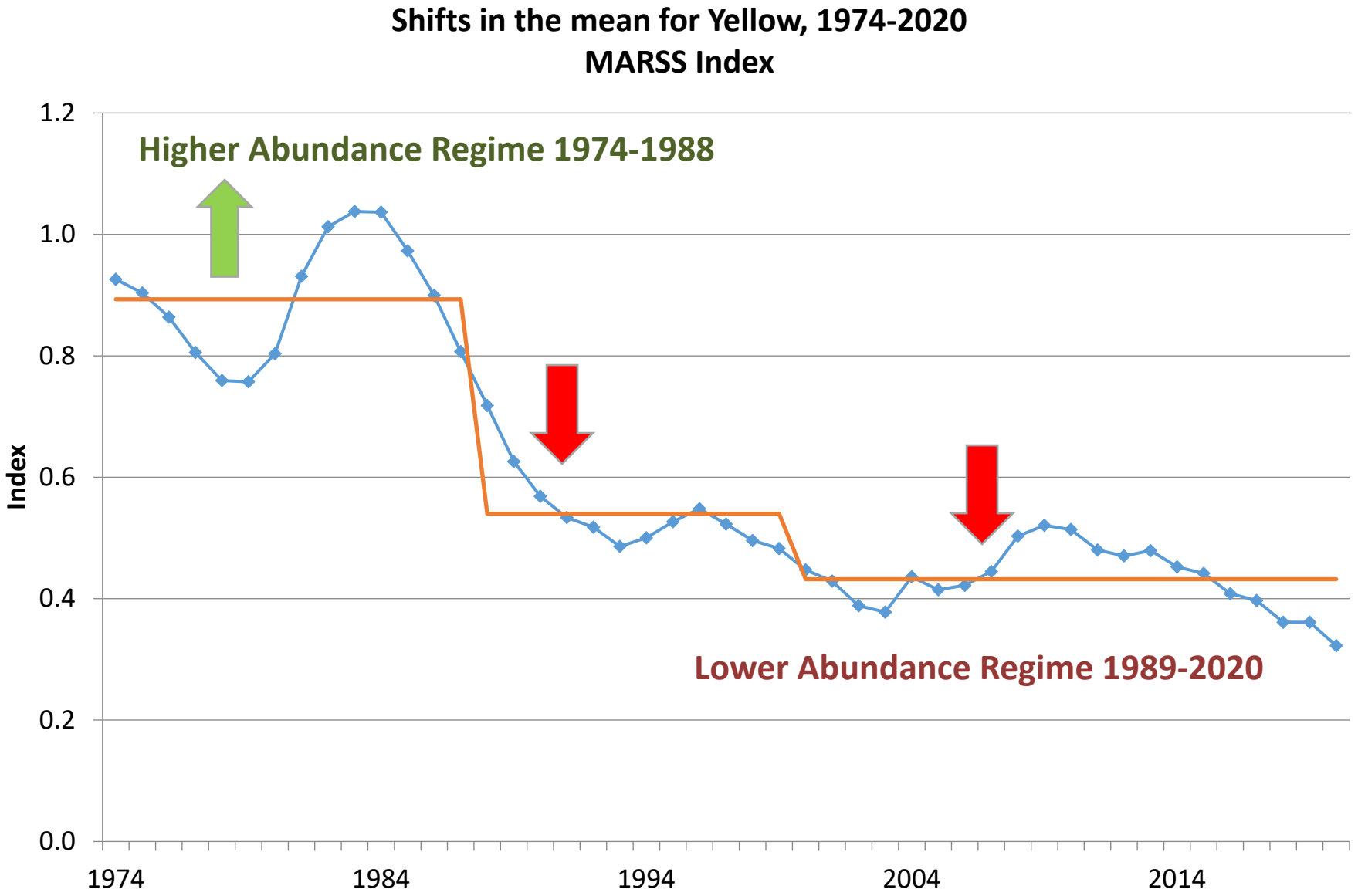
Assessment Methods Considered

- Multivariate Auto-Regressive State-Space (MARSS) Modeling
- *Conn Approach*
- Mann-Kendall Test
- *Power Analysis*
- Regime Shift Analysis
- *Traffic Light Analysis*
- *Surplus Production Models*
- *Egg-Per-Recruit (EPR) Modeling*
- Delay-Difference Model
- Index-Based Methods (NEFSC 2020)

Regime Shift: YOY



Regime Shift: Yellow Eel



Delay-Difference Model

- Biomass of age-structured populations predicted directly from previous years' biomass and parameters for survival, growth, and recruitment
- SAS developed the model, several sensitivity runs, and associated reference points but did not recommend its use for management
- Limitations of developed model
  - Model developed for an "average eel" (Ches. Bay)
  - Model developed for combined sexes
  - Problematic parameterization of growth and length-at-maturity

Index Based Methods (IBM)

- IBM is a Plan B approach
  - Used to assess stocks that are data poor and traditional stock assessment methods cannot be used to set catch limits
- Methods have been simulation tested
  - Based on NEFSC 2020 Research Track report as well as Carruthers et al. (2015)
- SAS Evaluated several IBM methods
  - Focused on I_{TARGET}
    - Requires only catch and abundance information
    - Allowed for specification of reference period

IBM: Configuration

- Used yellow eel landing and the MARSS index
- Compares an average index value of the past 3 years to a reference period
- I_{TARGET} = Reference Period Index Average * Multiplier ($I_{TARG\ MULT}$)
  - Reference Period: 1974-1988 (higher regime)
  - Multiplier ($I_{TARG\ MULT}$) to set biomass target from reference period:
    - 1.0 (maintain abundance of that of reference period)
    - 1.25 and 1.5 (increase abundance from reference period)
    - *For eels, stock was already exploited in reference period*

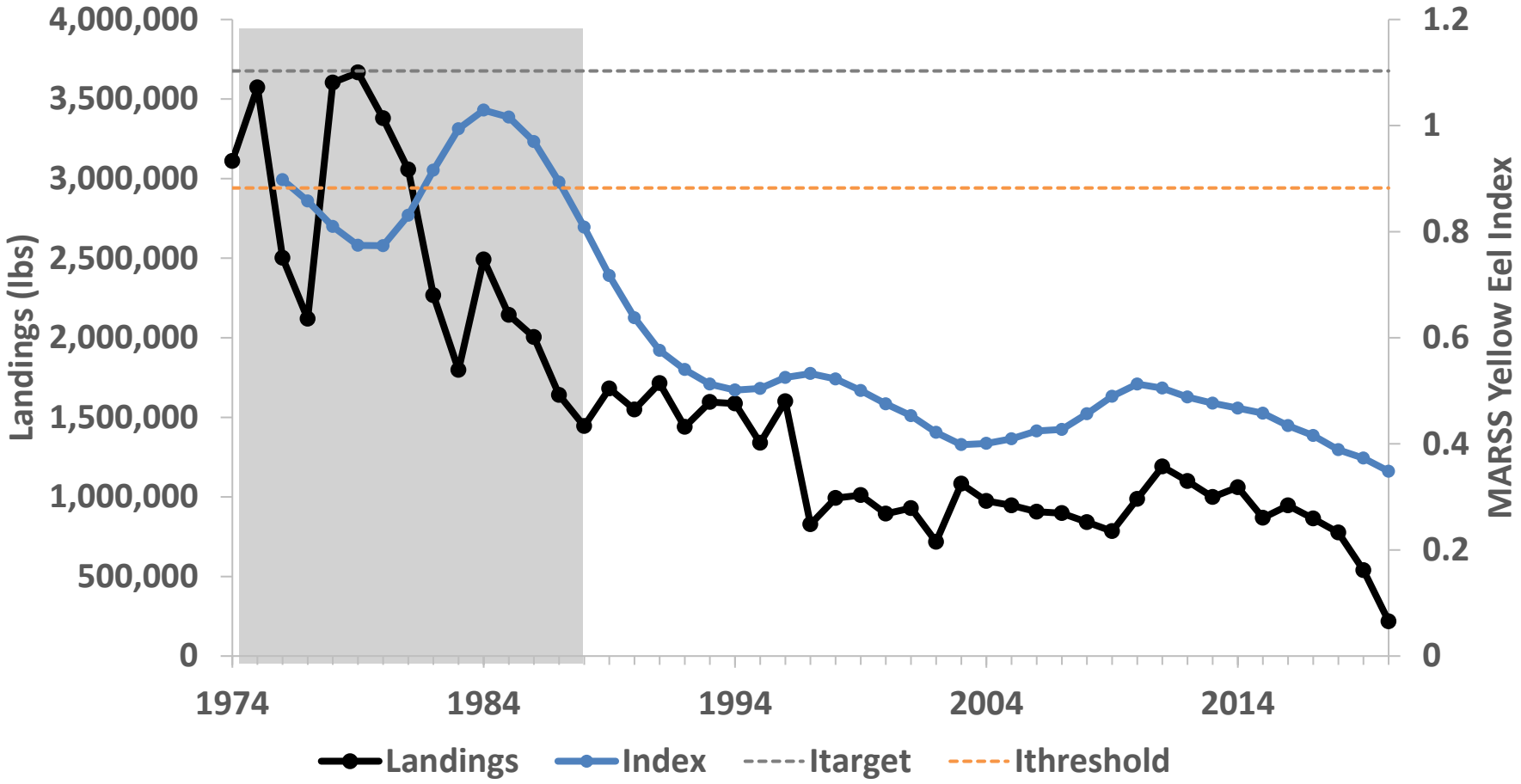
IBM: Configuration (Cont.)

- $I_{THRESHOLD} = 0.8 * I_{TARGET}$
  - The threshold value is set at 80% of the target value
  - The threshold value is the recommend value by NEFSC

- Catch recommendations are based on where the current 3-year index value falls relative to the I_{TARGET} and $I_{THRESHOLD}$ values
  - Recommend catch will be further reduced when the three-year average index be below $I_{THRESHOLD}$

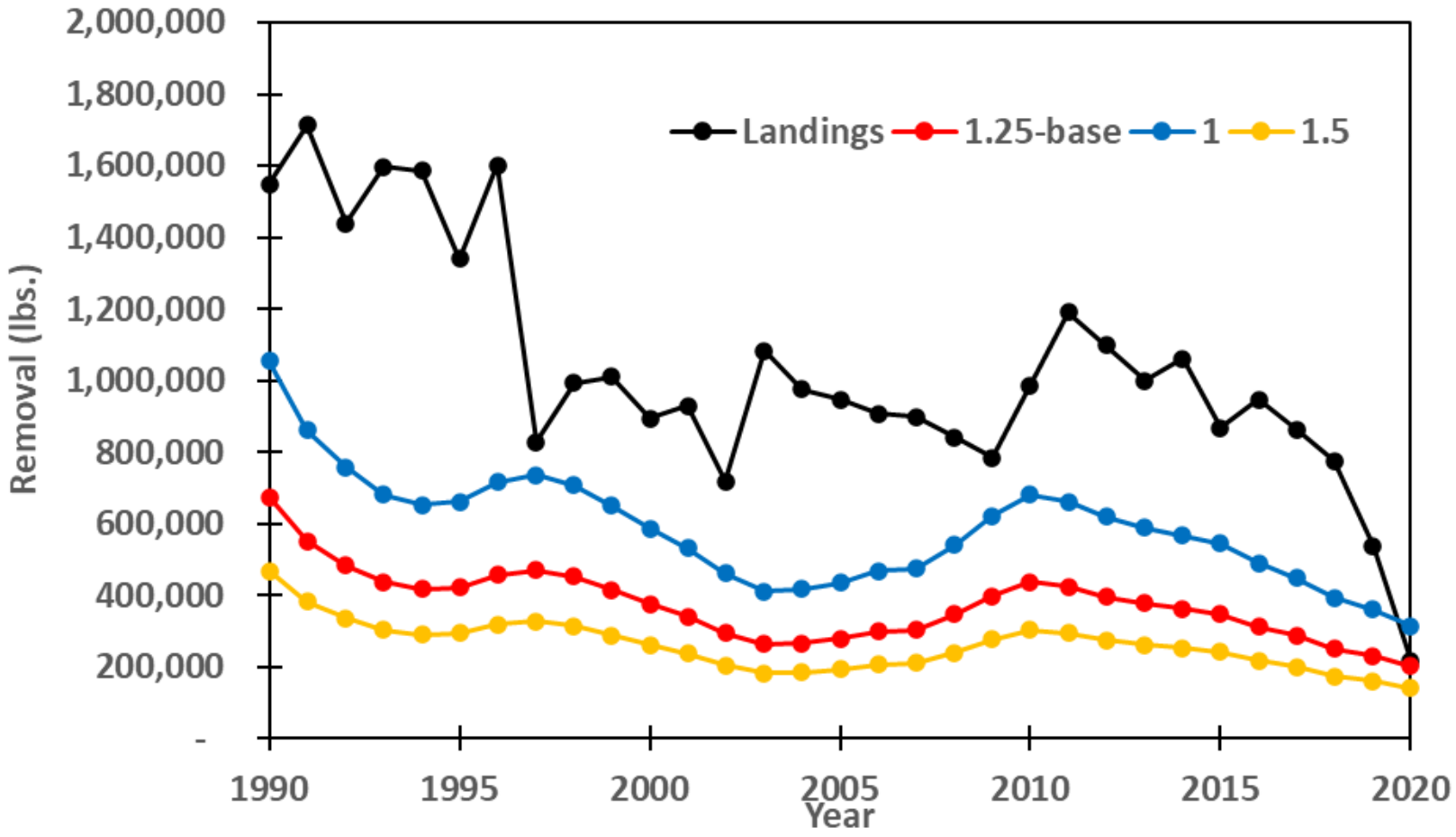
IBM: Inputs

The three-year running average of the MARSS index and coastwide landings. Grey box as reference period.



IBM: Results

Coastwide landings and recommended catch under three assumptions of $I_{TARG\ MULT}$



IBM Stock Status

- 3-yr average of the MARSS index in 2020 is below $I_{THRESHOLD}$
  - Stock is *overfished*
- I_{TARGET} not well suited to determine overfishing
  - Removals above the "recommended removals" by the method could be viewed as *overfishing occurring*
  - Overfishing status is unknown but likely

Stock Status: History

- In the 2012 and 2017 assessments status could not be defined
  - Lack of quantitative reference points
  - Limited information on abundance, status at all life stages, and habitat requirements.
- 2012/2017 assessments indicated that the stock was “depleted”
  - *Depleted: low levels of abundance but unclear if fishing mortality is primary cause of reduced stock size*
    - Stock at historical low levels
    - As a result of a combination of historical overfishing, habitat loss, food web alterations, predation, turbine mortality, environmental changes, toxins and contaminants, and disease

Stock Status: Current

1. I_{TARGET} indicates the stock is *overfished*
2. MARSS indicates the stock has been in decline for multiple decades
   - Stock at lowest abundance in the time series
3. Other Assessment Methods
   - Show decreasing or low population: Conn index, MARSS index, regime shift analysis, delay-difference model, Mann-Kendall Test
4. *Overfishing* could not be determined
   - ***Likely*** *overfishing occurring* given removals have exceeded recommended removals from the I_{TARGET} method for decades
5. Recommendation: Yellow eel removals should be reduced

Recommendations

- Stock assessment update considered in 5 years and a benchmark in 10 years
- Research recommendations
  - ASMFC 2012, 2017 remain important
  - 2022 assessment lists recommendations specific to what the SAS thinks could improve the next assessment

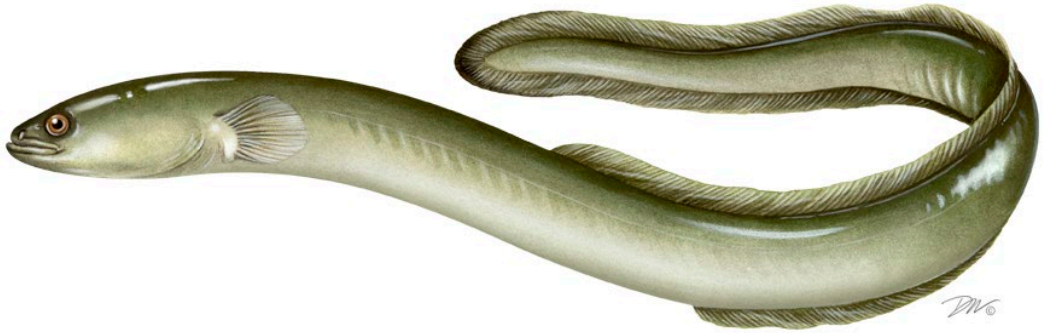
Conclusions

- Eels are difficult to assess
  - Do not conform to traditional assessment methods
  - Progress was made with the current assessment
- YOY monitoring
  - Lower abundance regime since 2003
  - Biological sampling not required for YOY surveys
- GIS-based habitat models
  - Provides an alternative assessment method
  - Difficult to assess habitat availability beyond the current habitat use due to limited historic data

Conclusions (Cont.)

- Abundance indices more robust and better defined
  - MARSS trends indicate low abundance in recent years
- Many analyses in this benchmark assessment indicate decreasing or low population levels
  - Conn index, MARSS index, regime shift analysis, delay-difference model, Mann-Kendall test
- The population continues to be depleted from historic levels
- Stock status based on I_{TARGET} is *overfished* and likely *experiencing overfishing*

Questions?



American Eel Stock Assessment Review Panel Report

American Eel Fishery Management Board

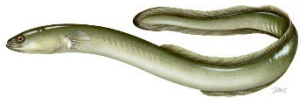
February 1, 2023

Stock Assessment Peer Review Process

- American Eel Stock Assessment Subcommittee and Technical Committee developed new stock assessment
- ASMFC Peer Review Workshop, December 2022
- Scientific review focused on data inputs, model results, and overall quality of assessment

Products

- ASMFC Stock Assessment and Review Report
- http://www.asmfc.org/species/American-eel



Stock Assessment Review Process

Scientific Peer Review Panel

- Chair + 2 additional Technical Reviewers, with expertise in
  - Eel Biology and Population Dynamics
  - Stock Assessment Modeling
  - Survey Index Standardization

Dr. Jared Flowers (Chair), Georgia DNR, Coastal Resources Division

Dr. Hilaire Drouineau, National Research Institute, Bordeaux, France

Dr. Robert Leaf, University of Southern Mississippi, Gulf Coast Research Lab

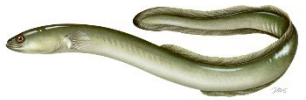
Review Panel Overall Findings

1. The RP endorses and supports the I_{target} approach for the formulation of reference points for the fishery; additional work is needed to establish sound reference points; recommend a formal robustness test of the index-method using a simulation approach

2. It is more appropriate to consider the American eel stock to be in a "depleted" rather than "overfished" state. The RP is uncomfortable with the overfished terminology because of uncertainty in the assessment methods and does not believe a reliable status determination can be made at this time

3. Future assessments should focus on methods directly resulting in catch recommendations; specifically, index-based methods, including I_{target}, and stage-based delay-difference models as most promising for management advice

4. Habitat modeling for eel shows promise for understanding changes in carrying capacity and other spatial dynamics of the stock and has delivered promising results for other eel species internationally; preliminary habitat work during this assessment should be further explored



Review Findings

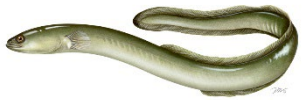
✓ **ToR 1:** *Evaluate the definition of stock structure*

Panel Conclusions

- Agree with assessing American eel at a coastwide scale because it is a panmictic species; the species' distribution extends beyond the United States Atlantic Coast; ideally, conduct stock assessments at larger scale
- The majority of data originate from coastal areas where most of the commercial fishery takes place, however, the species occupies many other areas and habitats

Recommendation 1: Continue to expand data collection and analysis to Canadian, Gulf of Mexico, and Caribbean regions, recognizing jurisdictional responsibilities for managing American eel; the SAS utilized data on commercial fisheries in some of those regions, although landings are not comprehensive

Recommendation 2: Encourage future data collection and analysis of American eel in freshwater habitats, including habitat modeling



Review Findings

✓ **ToR 2:** *Evaluate thoroughness and treatment of data used in assessment*

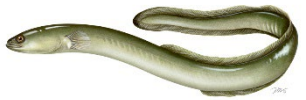
Panel Conclusions

- The data sets used are comprehensive and appropriate for the stock assessment; all potential data sources were requested and used where appropriate

- The broad distribution of eel makes it difficult to collect representative relative abundance data

Recommendation 1: Take steps to account for autocorrelation in index standardization efforts; results are unlikely to drastically change and recommendation is partially addressed by the inclusion of Julian day as explanatory variable

Recommendation 2: Add more information about data standardization, including tables and figures, to improve the understanding and visualization of the standardization framework and results

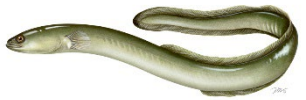


Review Findings

✓ **ToR 3:** *Evaluate methods and models used to estimate population parameters and reference points*

Panel Conclusions

- The SAS carried out a comprehensive review of biological parameters for American eel used in the analysis; the SAS used the best scientific knowledge available for the assessment
- The SAS tested several stock assessment methods, both updating formerly used tools and testing new approaches; these efforts were thorough and well executed
- The aggregated indices per life stage using MARSS method are currently the best available coast-wide indices and can be used to indicate stock abundance variations over time
- The index-based methods and stage-based delay-difference modeling were demonstrated to have the most potential for management advice



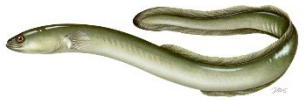
Review Findings

✓ **ToR 4:** *Evaluate the methods used to characterize uncertainty*

Panel Conclusions

- Multiple models evaluated by the SAS to determine fishery and stock reference points: surplus production, egg-per-recruit, and delay-difference models; each approach, for reasons of poor or lack of fit, was unable to provide reliable or useful results
- The RP and SAS agreed the surplus production model was not suitable for use
- Egg-per-recruit model can derive reference points of value on local scales where yellow and glass eel fisheries co-exist, the RP considers the EPR approach theoretical, and caution should be used when interpreting results

Recommendation: The delay-difference model is the only non-index based model with potential; more model development is needed to account for variability and uncertainty in eel life history characteristics across its range



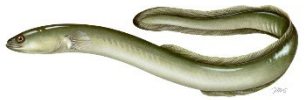
Review Findings

✓ **ToR 5:** *Evaluate the diagnostic analyses performed*

Panel Conclusions

- The SAS performed some useful diagnostic analyses, the RP concludes diagnostics are insufficient to produce reliable reference points
- The SAS systematically varied the I_{target} 'mult' parameter, representing the relationship of the reference period to the biomass target, from 1.0, 1.25, and 1.5
- The SAS bootstrapped predicted confidence intervals of the MARSS time series and used the resulting time series within the I_{target} method; the bootstrapping approach is not ideal, as it ignores autocorrelation in the data

Recommendation: The RP recommends the development of an MSE simulation to test the robustness of the assessment method (index method, assessment frequency) and harvest control rules (setting of catch limits based on assessment results)



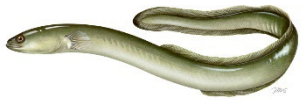
Review Findings

✓ **ToR 6:** *Evaluate stock status determination and reference points used by the assessment*

Panel Conclusions

- The term 'depleted' is appropriate to describe stock biomass for yellow eel; note depleted is used only as a descriptor, not a status determination, and is based on the SAS' suite of modeling approaches, derived from coastwide index of abundance
- The I_{target} approach does not allow the determination of stock or fishery status with respect to traditional MSY-based biological reference points; given the catch advice from I_{target}, an evaluation should be performed to understand if following the catch advice will result in stock biomass increases

Recommendation: Further evaluate the robustness of catch advice developed from I_{target}, in recognition of: process error associated with eel's complex life history, a significant portion of the stock is outside of the assessed area, anthropogenic impacts other than fishing affect the stock, the focus on yellow eel in the I_{target} approach, the exclusion of other life stages, and the error associated with landings data



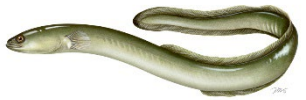
Review Findings

✓ **ToR 7:** *Evaluate the incorporation of new information or attempts at novel approaches to assess the stock*

Panel Conclusions

- The SAS is commended for incorporating new information and approaches in the assessment
- The SAS has done an excellent job developing and updating the indices, and documenting changes in individual surveys over time
- The MARSS, delay-difference, and index-based methods incorporated new or updated assessment approaches

Recommendation: Continue updating and refining the assessment approaches; continue to improve the favored approaches identified by the SAS and RP

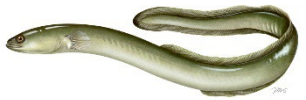


Review Findings

✓ **ToR 8:** *Review research recommendations*

Panel Conclusions

- The surplus production model and TLA assessment approaches should be discontinued; future effort should focus on the index-based methods and stage-based delay-difference models
- Habitat modeling should be explored in future assessments, to understand changes in carrying capacity, other spatial dynamics of the stock, and to promote international collaborations
- The Panel agrees with the SAS and TC recommendation to make optional the biological sampling requirement for YOY surveys
- Observed climate-induced changes in environmental conditions in the North Atlantic may influence population productivity and abundance, as evidenced by the regime-shift analysis, and should be considered in future assessments



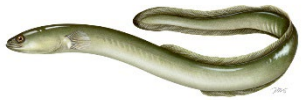
Review Findings

✓ **ToR 9:** *Recommend timing of next benchmark assessment*

Panel Conclusions

- Conduct next benchmark stock assessment after additional data are collected and progress is achieved in addressing the Panel's analytical recommendations, at a minimum of 5 years, consistent with eel's long generation time (3-5 years in the south, 10-20 years in the north)

- Pursue international assessments, including Canadian, Caribbean, and Gulf of Mexico input; the Review Panel applauds inclusion of select Canadian and GOM data in current assessment; future assessments would benefit from participation from other areas




Questions?

Post-PR SAS Discussion

- MSE/population simulation work may not be a productive exercise for eel
  - Data issues, inability to estimate life history parameters throughout range remains a challenge
  - I_{TARGET} is simulation tested and peer reviewed
  - Time/expertise might be better spent investigating other approaches
- SAS has already begun preliminary simulation work around the indices and I_{TARGET}

Potential Next Steps

- Option 1: No action **(*Not recommended*)**
  - Maintain depleted status and management under Addendum V
- Option 2: Additional work by SAS, possible Addendum to follow
  - Simulation work to explore yellow eel indices and sensitivity of I_{TARGET}
  - Timeline: this year
- Option 3: Peer Review Report MSE/simulation work
  - Timeline: next benchmark (2033) or before if requested by Board

ASMFC Guidance Document

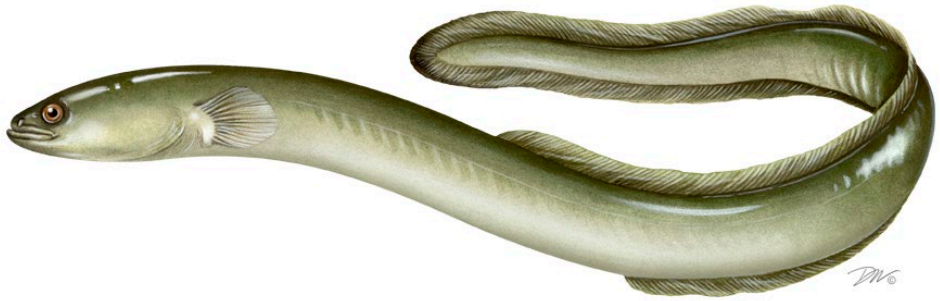
- When TC/SAS and Peer Review Panel cannot reach agreement:
  - Stock assessment and peer review report presented to Board
  - Board tasks the TC/SAS to provide justification for not incorporating the peer review advice and to provide alternative analyses
  - TC/SAS presents findings to the Board
  - Board makes the final determination on status of the stock and reference points

Board Action

- If the Board agrees with Option 2, staff recommends postponing accepting the assessment for management use until TC/SAS presents their findings to the Board

- Accepting assessment and peer review today would indicate agreement with peer review report and MSE/simulation work (Option 3)

American Eel FMP Review for the 2021 Fishing Year



American Eel Management Board

February 1, 2023

Outline

- Status of the FMP
- ~~Stock Status~~
- Status of the Fishery
  - Commercial
  - Recreational
- State Compliance with FMP
- PRT Recommendations

Status of the FMP

- Addendum V (2018): Coastwide Cap = 916,473 lbs
- Two Aquaculture proposals submitted & approved for the 2021 season
  - ME: 138.91 lbs of aquaculture quota harvested out of 200 lb allocation
- Any state that harvests over 750 lbs of glass eel a year must implement a fishery-independent life cycle survey (Addendum IV)
  - Maine survey implemented in 2016; location moved from Cobboseecontee Stream to West Harbor Pond in 2019.

Status of the Fishery

Commercial

- State-reported landings of yellow/silver eels were about 427,048 lbs in 2021
  - 64% increase from 2020
  - Maryland, Virginia, and New Jersey together accounted for 87% of harvest
- Maine Glass Eels: 9,106 lbs in 2021
  - SC landings are confidential

Recreational

- As of 2009, recreational data are no longer provided for American eel in CRs

Fishery Management Plan

Glass Eel Fishery Regulations

- All states must implement YOY survey (2000)
- All states must maintain regulations (2000)
- Max of 25 pigmented eels per one pound of glass eels. Use 1/8” mesh to grade eels (2014)
- Maine glass eel quota of 9,688 lbs with payback (2015)
- Maine implements swipe card monitoring program for daily reporting (2014/2015):
  - Harvester to dealer
  - Dealer to dealer
  - Export from state
- Maine is required to implement life cycle survey (2015)
- No change in regulations

Fishery Management Plan

Glass Eel Fishery Regulations

PRT Review:

- No noted issues on glass eel regulations from state compliance reports

Fishery Management Plan

Yellow Eel Fishery Regulations (both Com and Rec)

- Increase in minimum size to 9” (2014)
- ½” x ½” min mesh size for yellow eel pots
- Allowance of 4x4” escape panel of ½” x ½” mesh
- Recreational 25 fish bag limit per day per angler
- Crew and captain allowed 50 fish bag limit per day
- Coastwide harvest cap of 916,473 lbs (implemented in Jan 2019)
- 2 Year Management Trigger of 10% Overage (2019)
- No change in regulations

Fishery Management Plan

Yellow Eel Fishery Regulations (Commercial & Rec)

PRT Review:

- No noted issues on yellow eel regulations from state compliance reports

Fishery Management Plan

Silver Eel Fishery Regulations

- Seasonal closure from Sept 1 – Dec 31, no take except from baited pots/traps and spears (2015)
- One year exemption for weir fishery in Delaware River and its tributaries in NY (2014)
- NY weir fishery exemption continued, but restricted to 9 permits that may be transferred (2015)
- No change in regulations

Fishery Management Plan

Silver Eel Fishery Regulations

PRT Review:

- Florida does not have a regulation preventing harvest of eels from pound nets from September 1 through December 31, but the state is unaware of any active pound net fishery in the past 10-15 years

Fishery Management Plan

Other Management Measures

- Trip level reporting by both harvesters and dealers at least monthly
- Sustainable fishery management plans:
  - Fishing Mortality Plan
  - Transfer Plan quota from yellow to glass
  - Aquaculture Plan: 200 pounds of glass eels if can demonstrate watershed contributes minimally to spawning stock
  - All plans must scientifically demonstrate they will not increase overall fishing mortality
- No change in regulations

Fishery Management Plan

Other Management Measures

Aquaculture Plans:

- ME: submitted a continuation of Aquaculture Plan for 2022
  - Approved by the Board in August 2021

Fishery Management Plan

Other Management Measures

- Many states have been unable to provide information on the percent of commercial harvest sold as food versus bait; only Maine, New York, New Jersey, Delaware, and Florida provided this information for 2021.
- New York was unable to provide data on commercial CPUE for the 2021 fishing year.
- New Jersey was unable to complete the fishery independent monitoring requirements in 2021 due to continued COVID-19 restrictions.

De minimis

- Standard: for each life stage, for preceding 2 years, average commercial landings constitute less than 1% of the coastwide commercial landings for that life stage
- New Hampshire, Massachusetts, Pennsylvania, D.C., Georgia, and Florida requested *de minimis* status for their yellow eel fisheries
  - Florida does not qualify as the state landings in 2021 exceed 1% of the coastwide yellow eel landings
  - All other states met the 1% landings criteria

PRT Recommendations

- The Board consider state compliance notes
- Note the drop in recent years yellow eel harvest; likely to continue due to decreased market demand
- Reevaluate requirement that states provide estimates of the % harvest going to food vs bait; task CESS with market analysis
- States continue work w/law enforcement agencies to include information on illegal harvest
- PRT request NY work to separate yellow and silver eel landings
- States quantify upstream and downstream passage, and provide information to the TC for evaluation

Board Action for Consideration

Approve the American Eel FMP Review and state compliance reports for the 2021 Fishing year, and *de minimis* requests from New Hampshire, Massachusetts, Pennsylvania, District of Columbia, and Georgia for their yellow eel fisheries.

Questions?