Atlantic Sturgeon Benchmark Stock Assessment

October 24, 2017

Atlantic Sturgeon SASC & TC

SASC

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- Bill Post, SC DNR
- Eric Schneider, RI DEM
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TC

- Ian Park, DE DFW (TC Chair)
- Lisa Bonacci, NH DEC
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- Wilson Laney, USFWS
- Christine Lipsky, NMFS
- Luke Lyon, DCFM
- Elizabeth Miller, SC DNR
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- Marta Nammack, NMFS
- Ray Rhodes, CoC
- Brian Richardson, MD DNR
- Tom Savoy, CT DEEP
- Chuck Stence, MD DNR
- Gail Wippelhauser, ME DMR

Overview

- Background
- Data and models used
- Results
- Stock status
- Conclusions

Life History

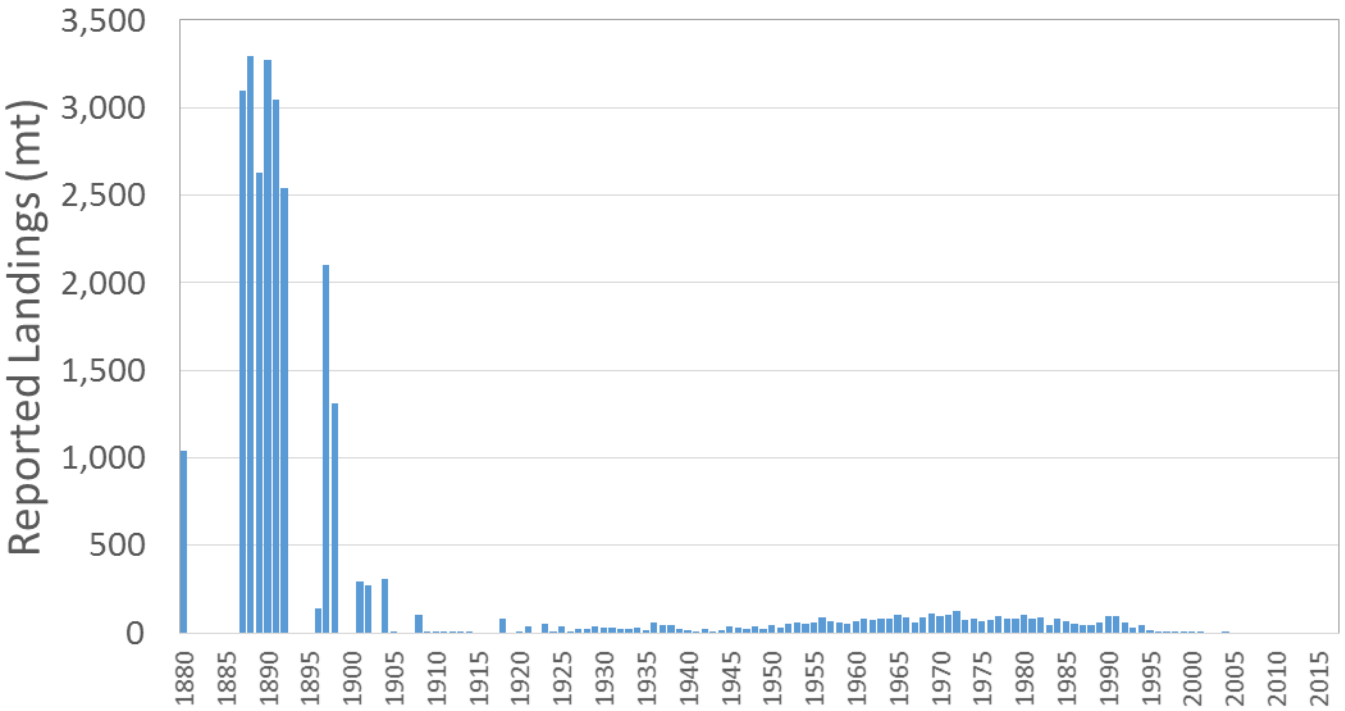
- Anadromous, spawning on hard bottom in tidal freshwater and river reaches
- Spend the first few years of their lives in natal rivers before moving offfshore to estuarine and coastal marine (1-12 miles) waters
- Fish tagged in mid-Atlantic waters were detected from Cape Canaveral to the Gulf of St. Lawrence

Life History

- Long-lived, slow to mature
- Maximum recorded age is 60 years (1964)
- Maximum length
  - 14-18 feet historically
  - 10-12 feet today

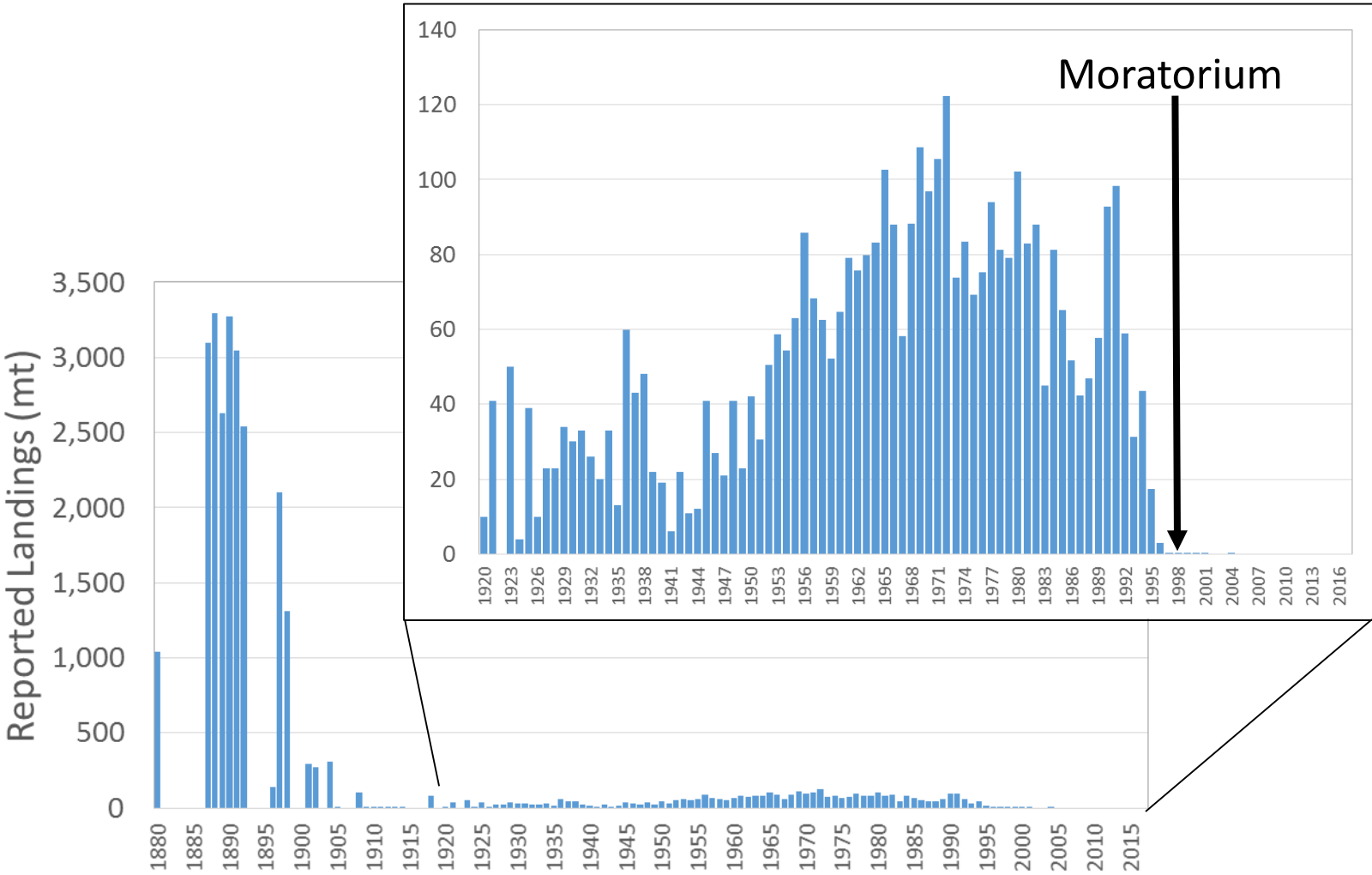
Management History

- One of the largest fisheries by weight on the Atlantic coast in the late 1800s/early 1900s
- Landings declined steadily since the beginning of the time-series



Management History

- Slight increase in the 1950s-1990s



Management History

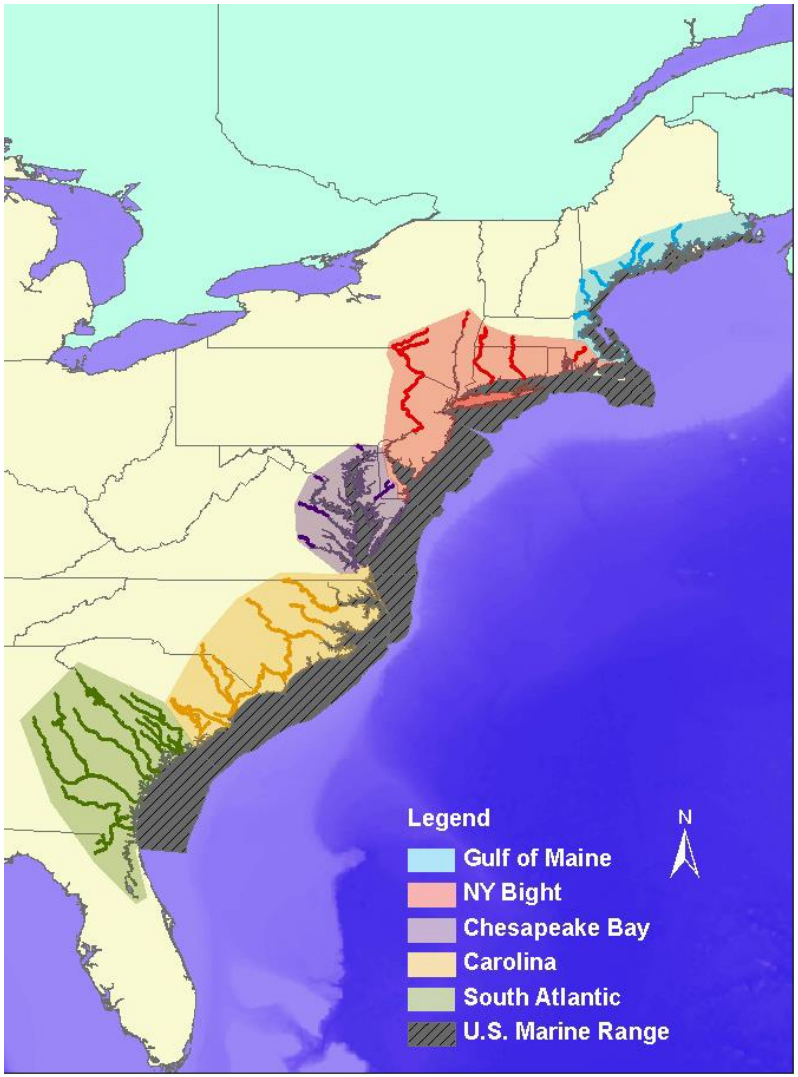
In 2012, NOAA listed Atlantic sturgeon under the ESA

Gulf of Maine DPS

- Threatened

New York Bight, Chesapeake Bay, Carolina, South Atlantic DPSs

- Endangered



Assessment History

- Last benchmark assessment completed 1998
- NOAA Stock Status Reviews: 1998, 2007
- 2017: ASMFC Benchmark Assessment
  - Coast-wide and DPS-level analyses
  - Still data-poor species
  - More quantitative analysis than previous assessments
  - Peer reviewed through ASMFC External Peer Review process Aug. 14-17

Data Used

- Biological/life history data
- Landings data (1880 – 1998)
- Bycatch observer data (2000 – 2015)
- Fishery independent surveys
- Acoustic tagging data

Analysis & Models

- SASC explored a number of different analyses and models
  - Trend analysis of abundance indices
    - Mann-Kendall Test, Power Analysis, Cluster Analysis, Conn method, Dynamic Factor Analysis, Population Viability Analysis, ARIMA
  - Data poor stock reduction models to look at productivity of the stock
  - Genetic effective population size
  - Tagging model to estimate total mortality
  - Eggs-per-recruit model to develop mortality benchmarks

Analysis & Models

- Stock status determination based on:
  - ARIMA
  - Tagging model
  - EPR model

Bycatch Data

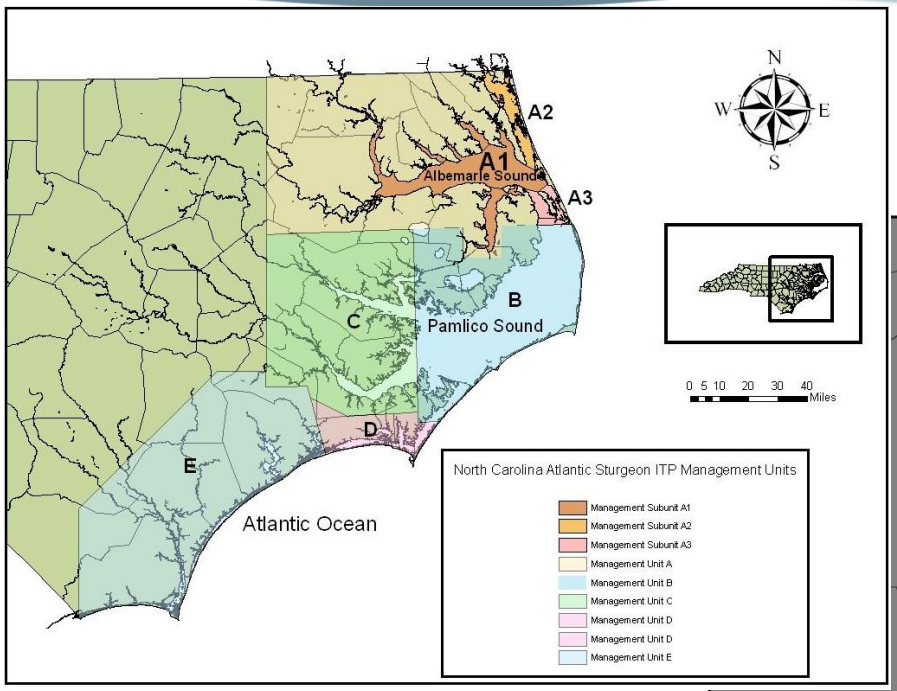
- Moratorium stopped directed harvest, but bycatch occurs in other fisheries

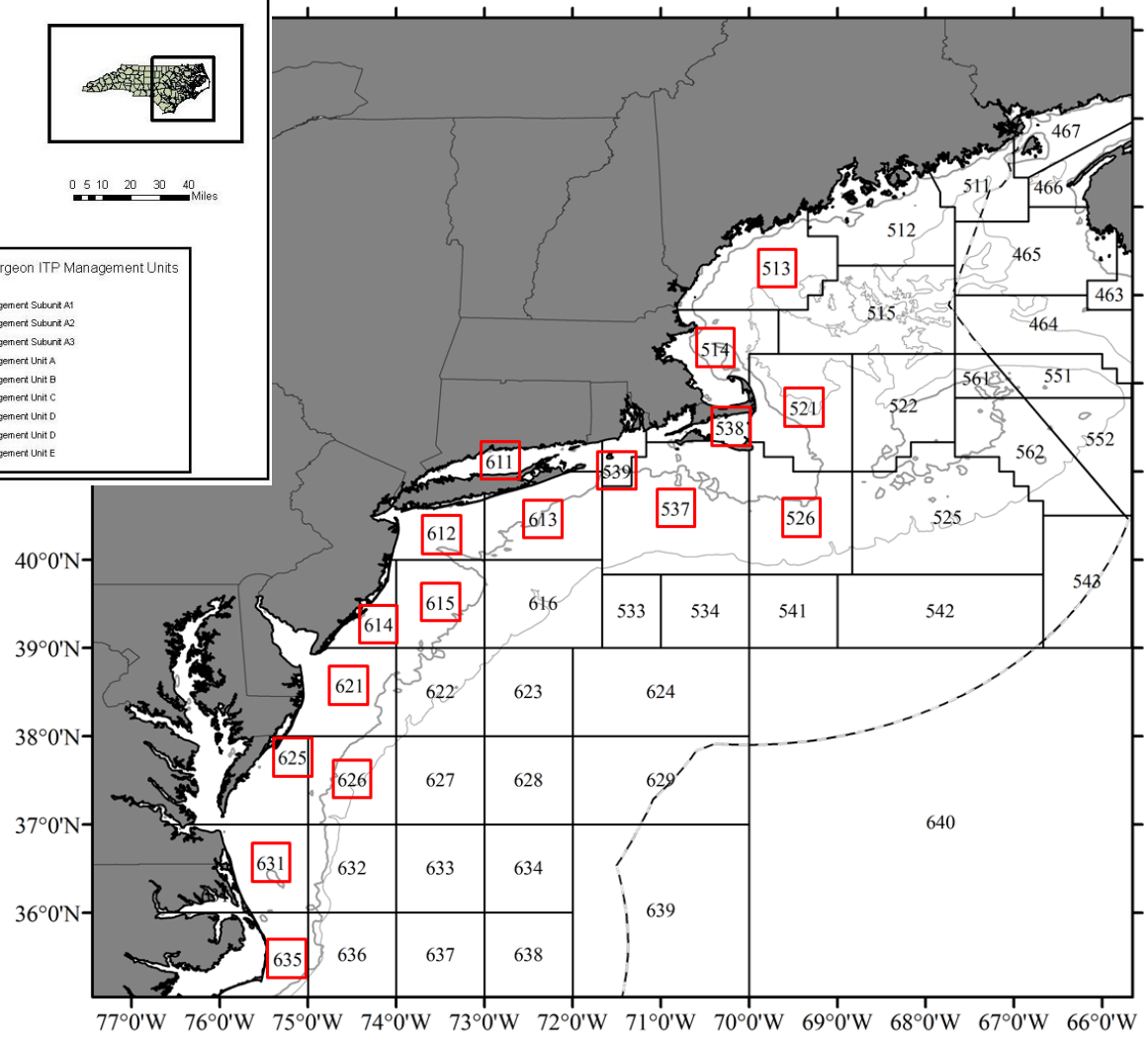
- Information on bycatch is limited
  - NOAA observer program on federally permitted vessels from ME – NC
  - NC estuarine gillnet observer coverage

Bycatch Estimates

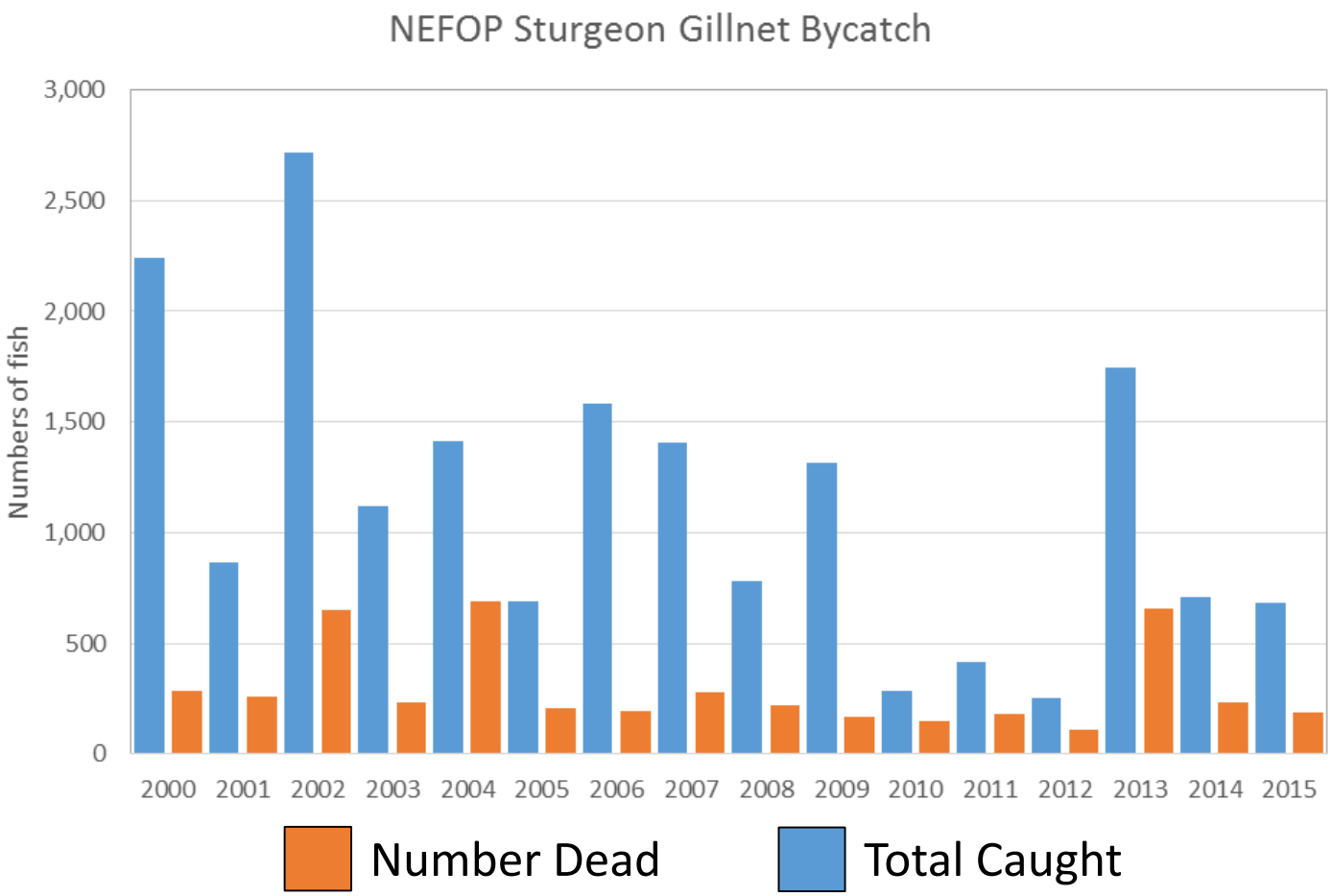
- NMFS: 2000 – 2015
- NC: 2004 - 2015
- Modification of the methods used as part of the initial listing process (Miller and Shepherd, 2011)
- GLM to predict number of Atlantic sturgeon caught based on species composition, year, and quarter, and other factors
- Separate models for otter trawls and gillnets

Bycatch Estimates



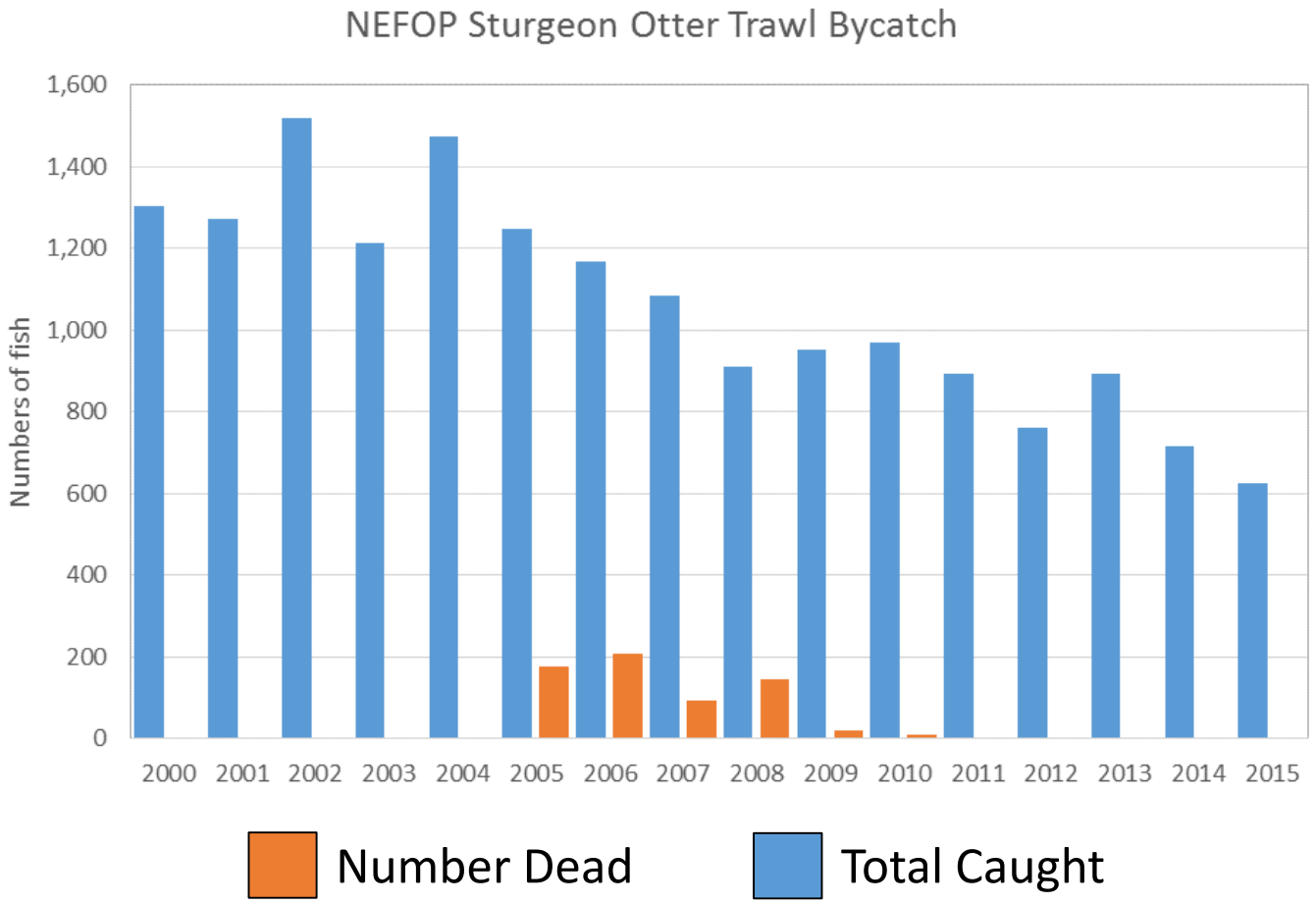


NEFOP/ASM



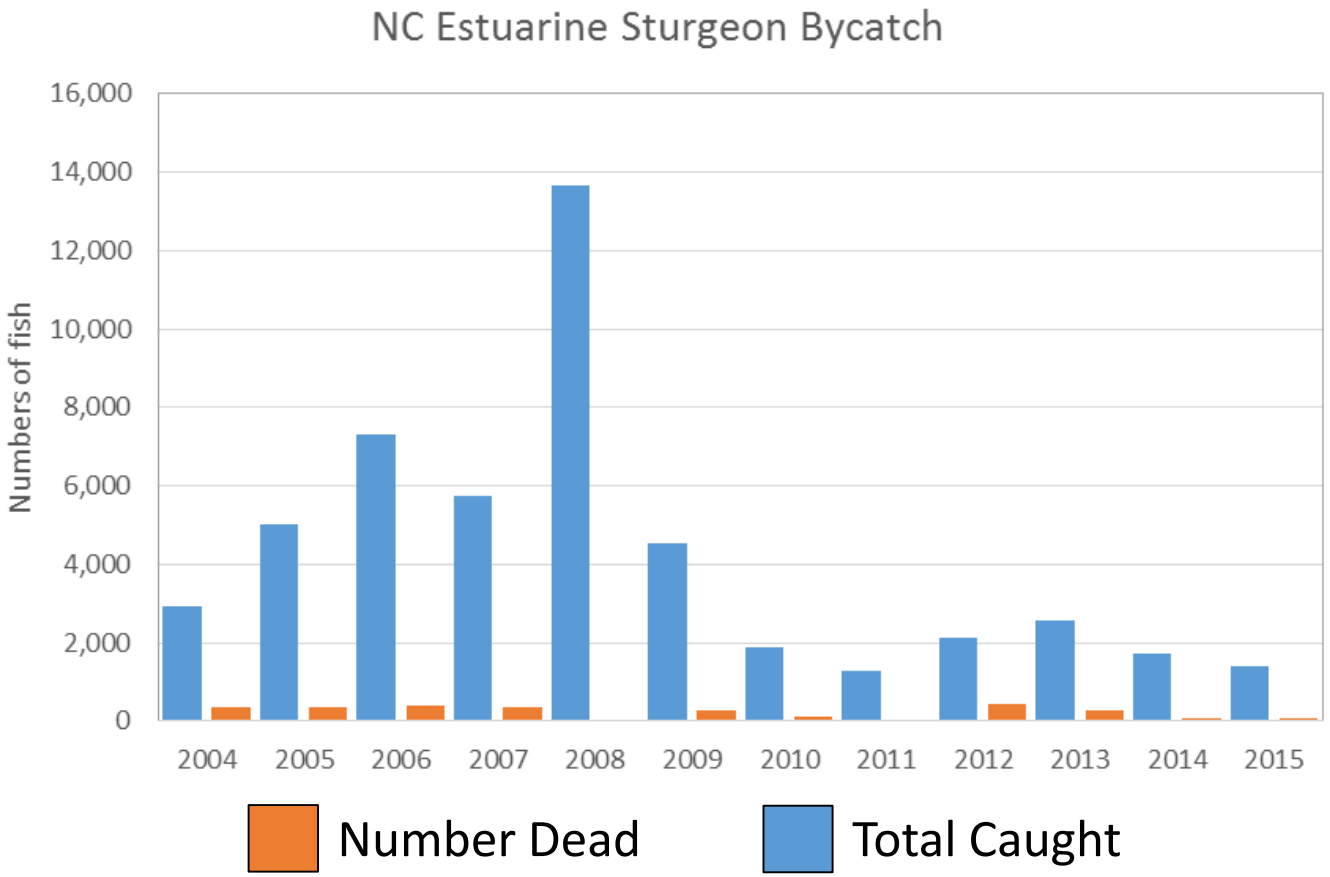
- Average total: 1,139 fish per year
- Average dead: 295 fish (25%) per year

NEFOP/ASM



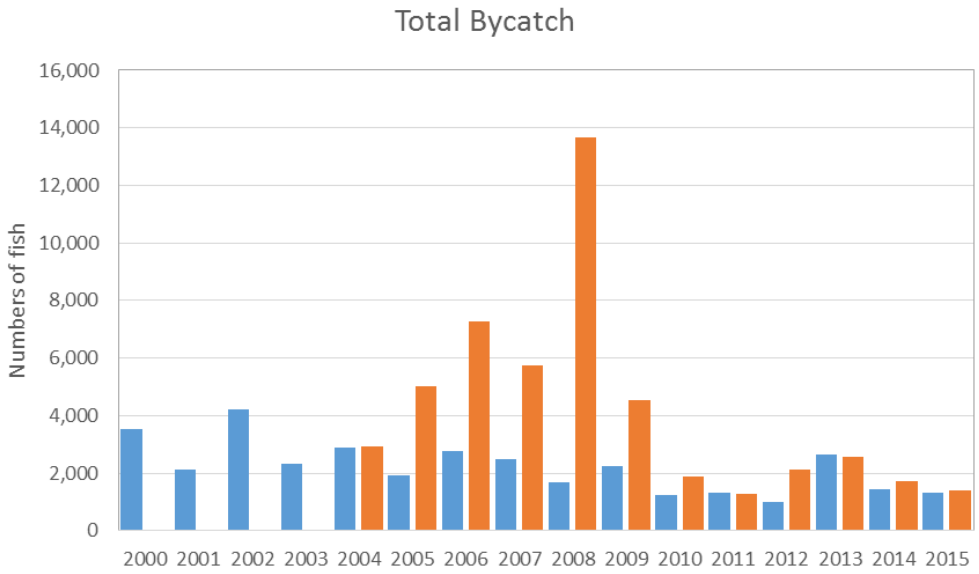
- Average total: 1,062 fish per year
- Average dead: 41 fish (4%) per year

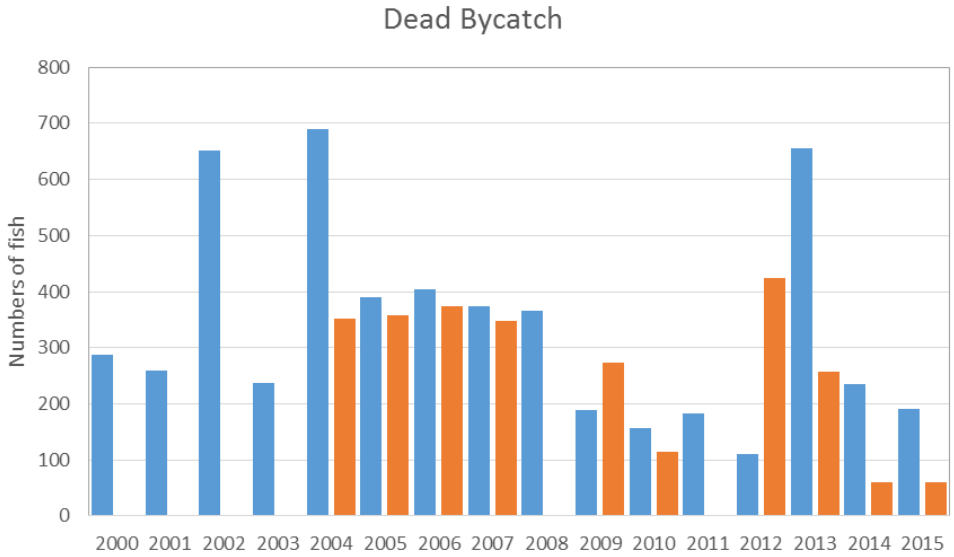
NC Observer Program



- Average caught: 4,179 fish per year
- Average dead: 218 (5%) fish per year

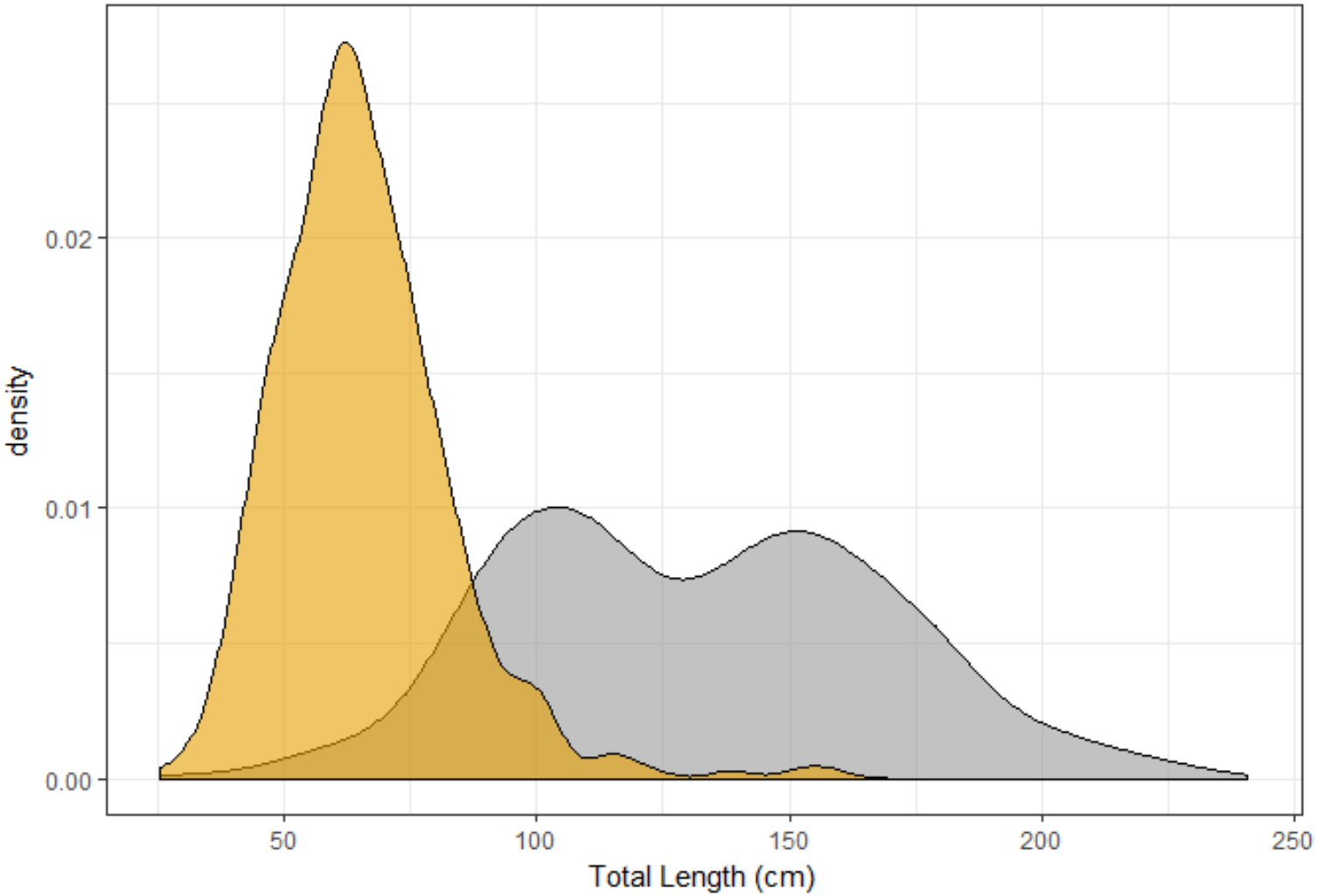
Comparison of Results





- Estimates of total bycatch were higher from NC program than from the federal program
- Estimates of dead bycatch were similar in magnitude

Comparison of Results

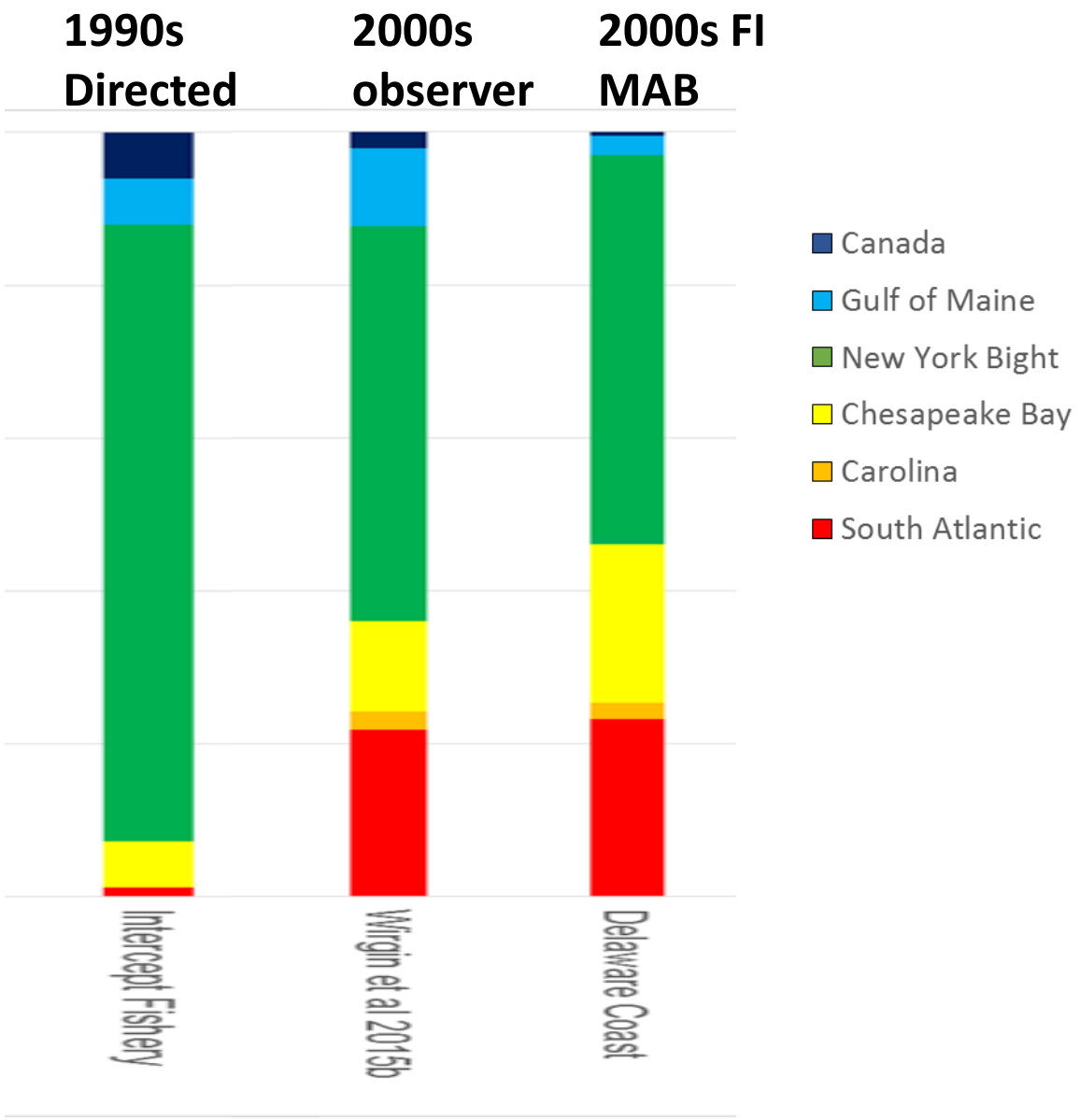


Bycatch Data

- Observer coverage on the Atlantic coast is not sufficient to fully characterize sturgeon bycatch
  - No coverage south of NC
  - No estuarine coverage outside of NC
  - Low percentage of trips covered

DPS-Level Harvest

Ocean intercept fisheries (directed & bycatch) harvest fish from all DPSs

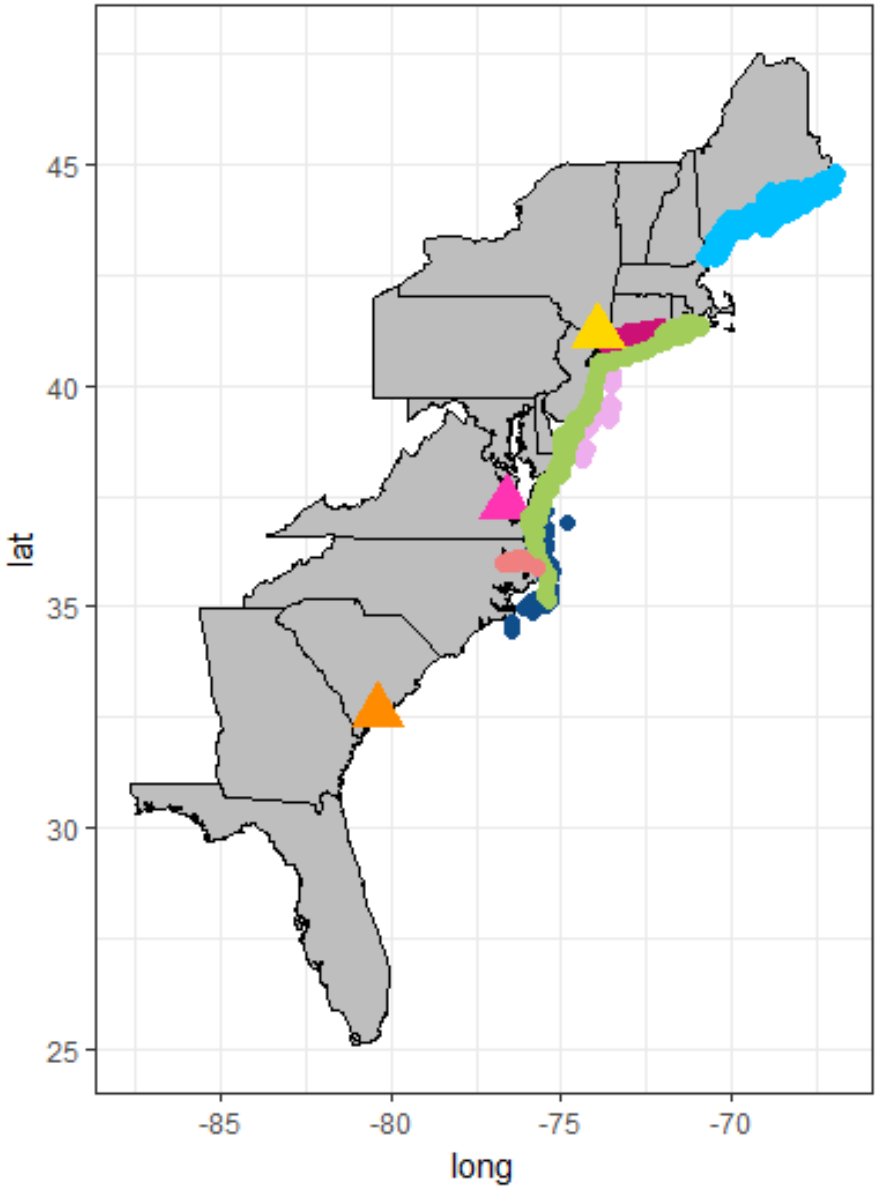


Fishery Independent Surveys

- Atlantic sturgeon are rarely encountered in multi-species surveys

- 50 surveys from state, federal, and academic researchers were evaluated by the SAS and 41 were ruled out for not encountering Atlantic sturgeon frequently enough, having inconsistent methods, or incomplete time-series

Fishery Independent Surveys



Survey

- ME-NH Inshore Trawl
- CT LISTS
- NEAMAP
- NY JASAMP
- NJ Ocean Trawl
- VIMS Shad Monitoring
- USFWS Copperative Tagging Cruise
- NC P135
- SC Edisto

Location

- Ocean/Estuary
- River

Fishery Independent Surveys

- Surveys caught primarily juveniles and small adults (most fish were 500 mm – 1500 mm)

- Very low rates encounters with sturgeon; only 1-3% of tows/hauls had Atlantic sturgeon

  → Panel recommended that indices with low numbers of Atlantic sturgeon should use presence/absence instead of CPUE as the index

ARIMA

- Auto-Regressive Integrated Moving Average: smooths out the effects of autocorrelation and observation error/noise in a time series

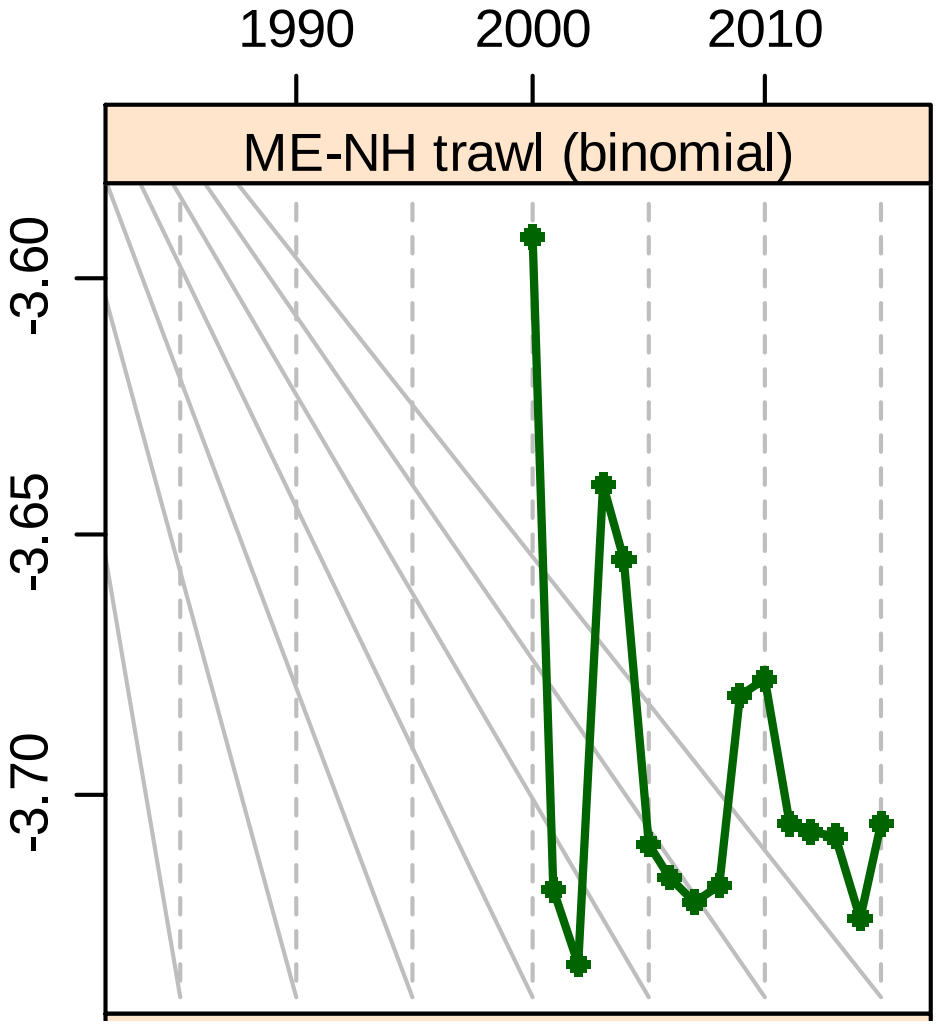
- Calculates the probability that an index value is above or below a reference value in the time series

ARIMA

- SASC looked at two reference values:
  - 25th percentile of the index
  - the index value in 1998 (the start of the moratorium)

→ Is the index in 2015 (or the last year of the time series) higher than the 25th percentile of the entire time series? Is it higher than it was in 1998?

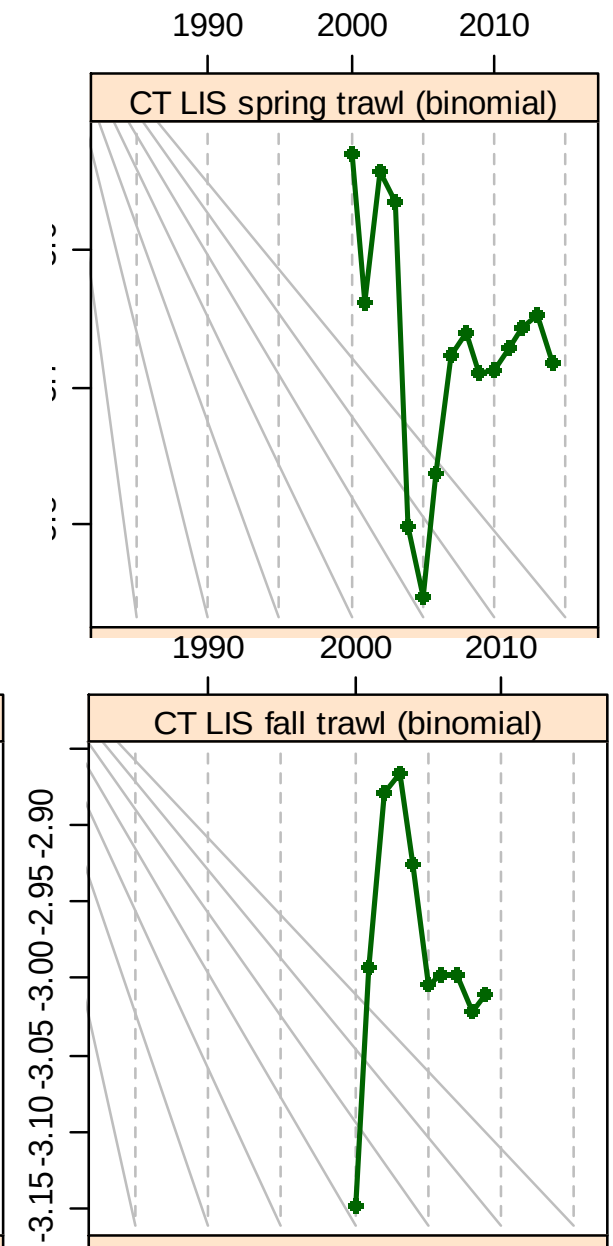
ARIMA: Gulf of Maine DPS



ME-NH Trawl

- 51% chance of being above the 1st year of the index
- 61% chance of being above the 25th percentile

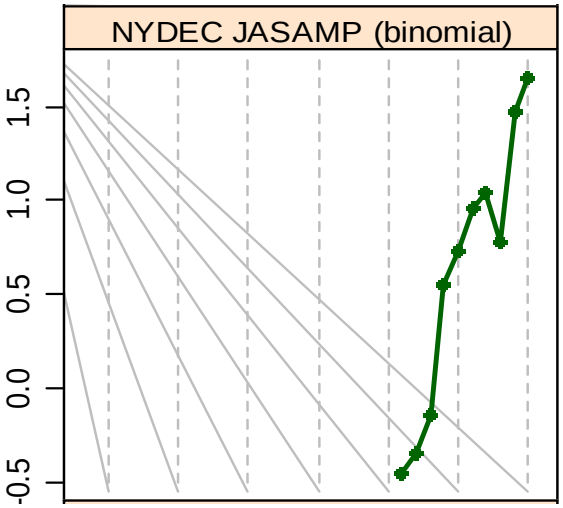
ARIMA: NY Bight DPS

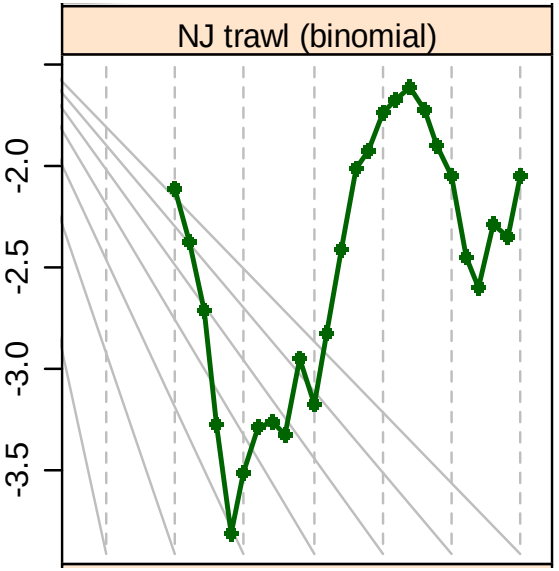


- **CT LIST (spring)**: 37% chance of being above the 1st year of the index, 58% chance of being above the 25th percentile

- **CT LIST (fall)**: 66% chance of being above the 1st year of the index, 65% chance of being above the 25th percentile

ARIMA: NY Bight DPS

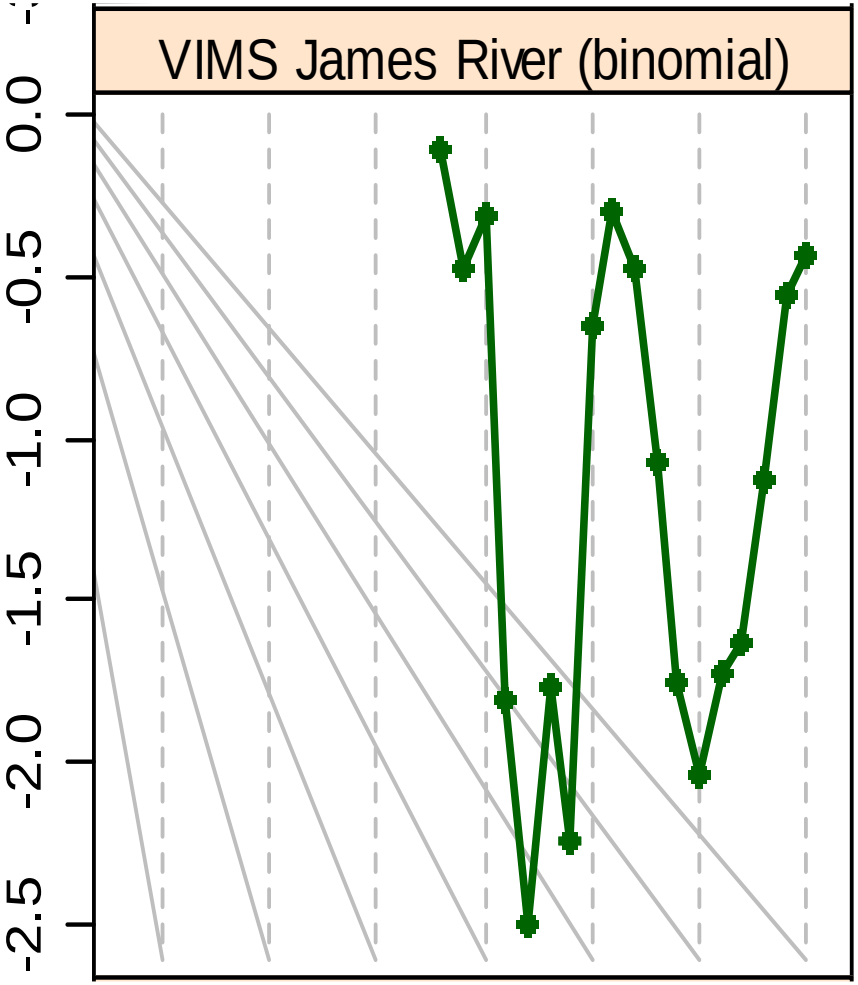




- **NY JASAMP**: 100% chance of being above the 1st year of the index, 100% chance of being above the 25th percentile, significant increasing trend

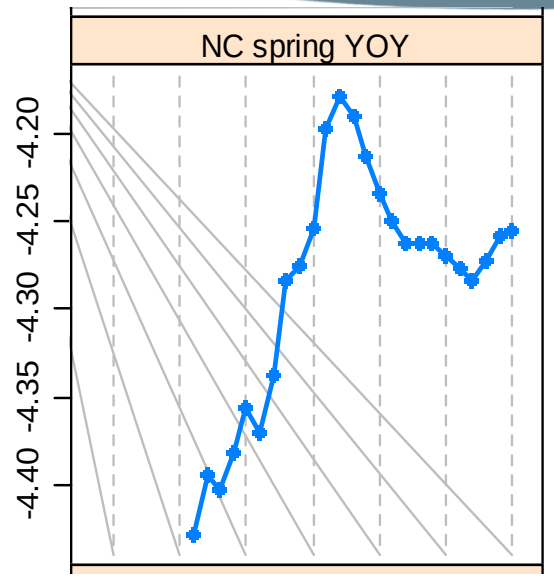
- **NJ Ocean Trawl**: 96% chance of being above the 1998 value of the index, 95% chance of being above the 25th percentile

ARIMA: Chesapeake Bay DPS

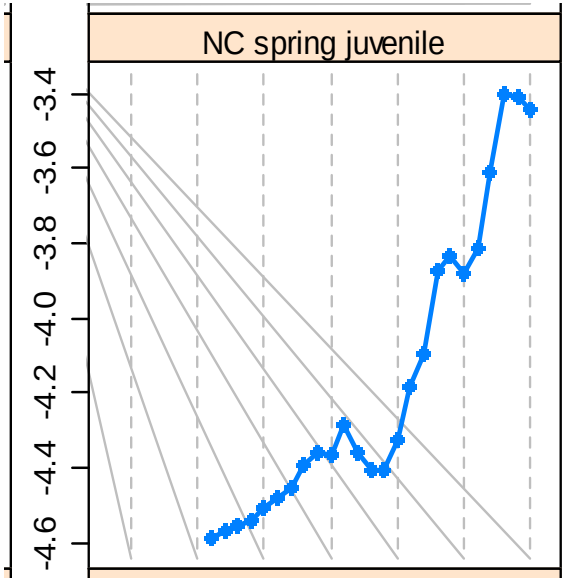


- **VIMS Seine Survey**: 36% chance of being above the 1998 value of the index, 96% chance of being above the 25th percentile

ARIMA: Carolina DPS

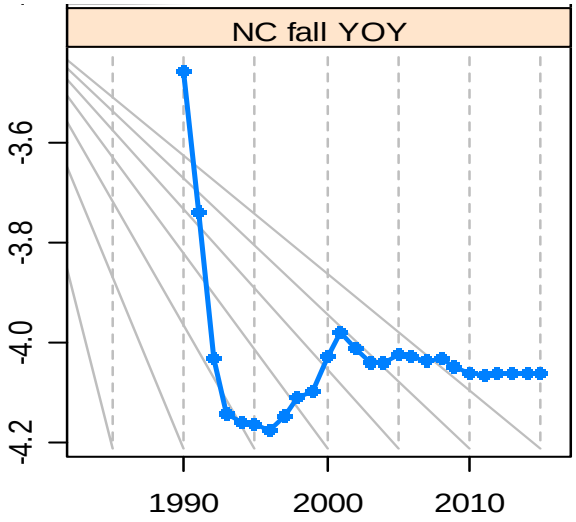


- **NC P135 (spring, YOY)**: 78% chance of being above the 1998 value of the index, 81% chance of being above the 25th percentile

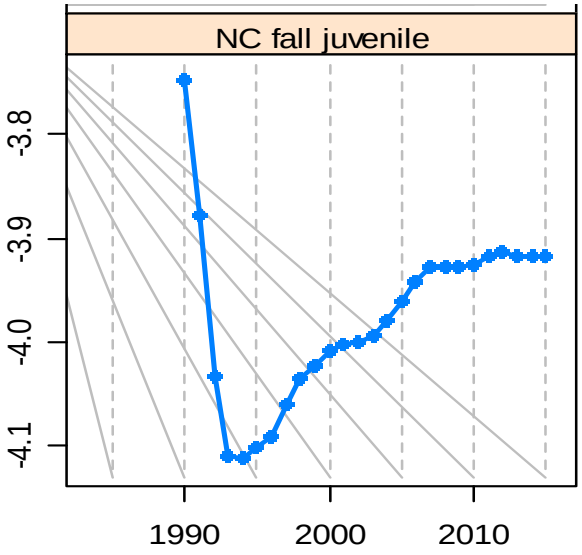


- **NC P135 (spring, juvenile)**: 100% chance of being above the 1998 value of the index, 100% chance of being above the 25th percentile, significant increasing trend

ARIMA: Carolina DPS

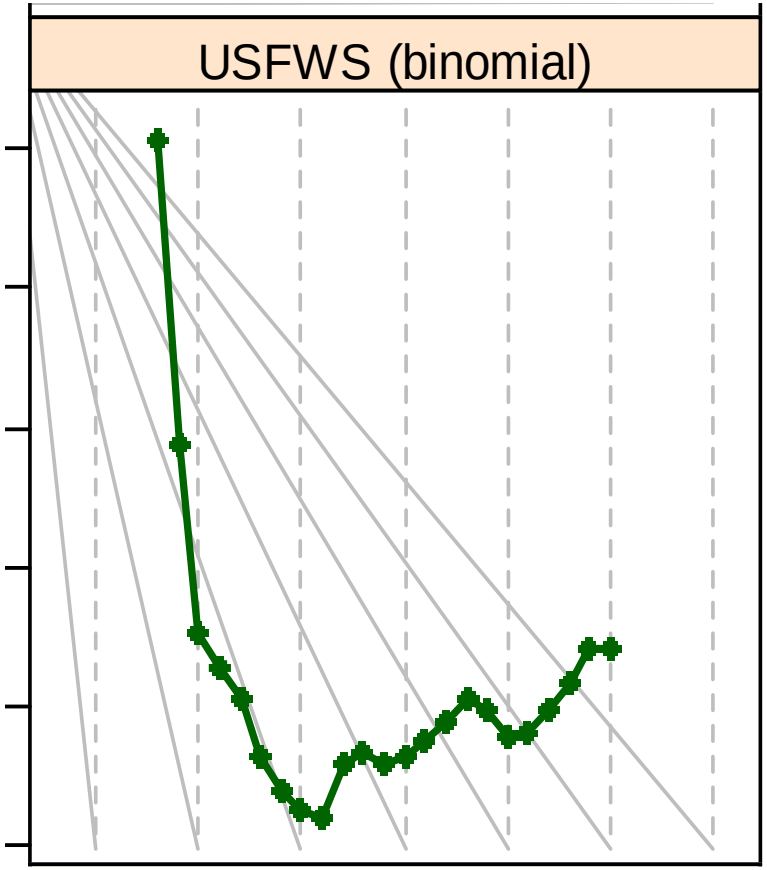


- **NC P135 (fall, YOY)**: 44% chance of being above the 1998 value of the index, 54% chance of being above the 25th percentile



- **NC P135 (fall, juvenile)**: 71% chance of being above the 1998 value of the index, 73% chance of being above the 25th percentile, significant increasing trend

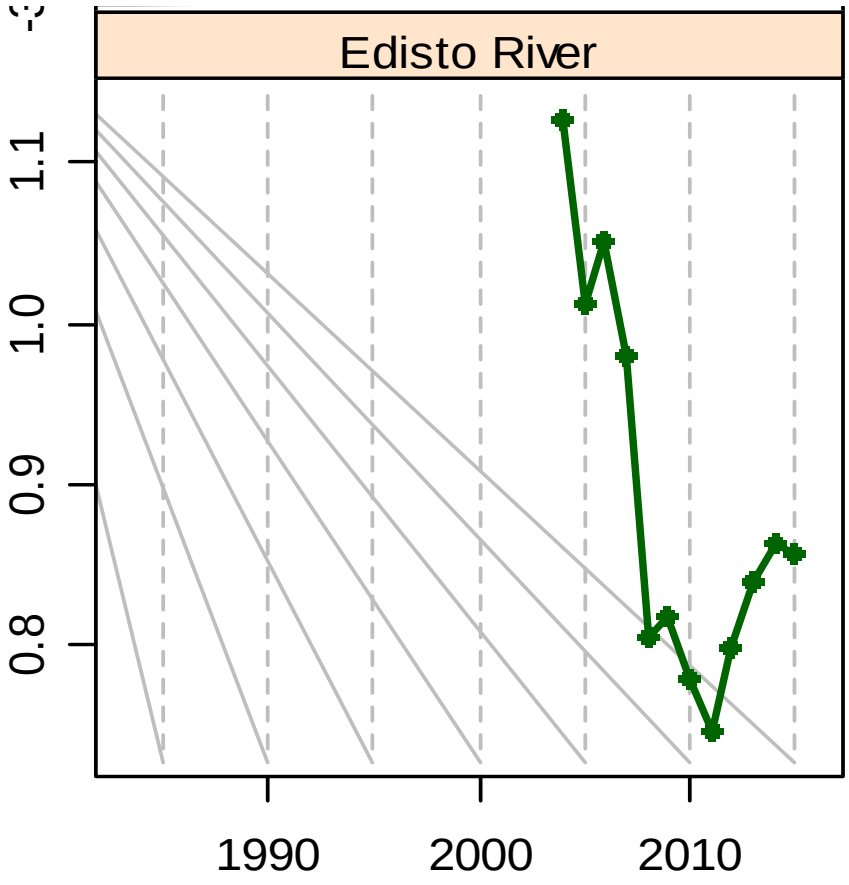
ARIMA: Carolina DPS



USFWS Cooperative Tagging Cruise:

- 43% chance of being above the 1998 value of the index
- 53% chance of being above the 25th percentile

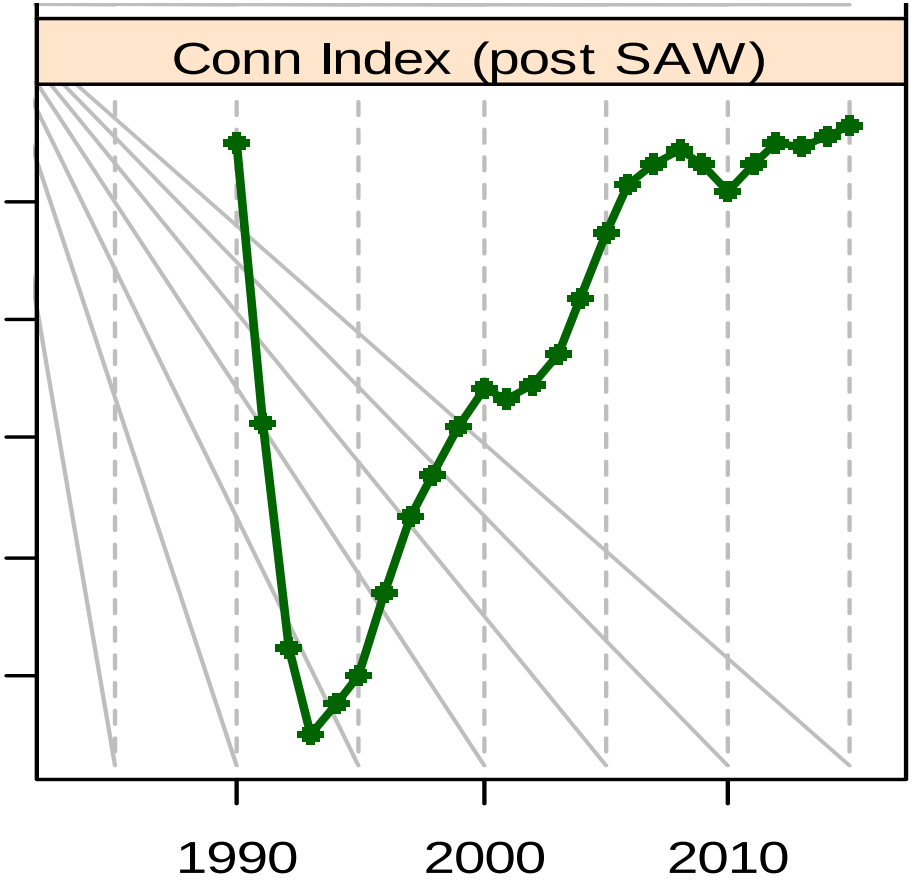
ARIMA: South Atlantic DPS



Edisto River Survey

- 28% chance of being above the 1st year of the index
- 51% chance of being above the 25th percentile

ARIMA: Coast-wide



Conn Index

- 95% chance of being above the 1998 index value
- 95% chance of being above the 25th percentile

ARIMA Summary

DPS	Number of surveys where last year of index > 25th percentile	Number of surveys where last year of index > 1998* value
Gulf of Maine	1 of 1	1 of 1
NY Bight	4 of 4	3 of 4
Chesapeake Bay	1 of 1	0 of 1
Carolina	5 of 5	3 of 5
Coast	1 of 1	1 of 1

*: If survey started after 1998, the first year of the survey is the reference year.

Acoustic Tagging Data

- 12 different researchers from academic and state agencies contributed data from 1,331 acoustically tagged Atlantic sturgeon

Acoustic Tagging Data

DPS	# of tags	# Adults	# Juv	# Months tags out
GM	153	127	26	104
NY	657	444	213	117
CH	275	161	114	57
CA	99	15	84	64
SA	147	119	28	70
total	1331	866	465	

- Fish assigned to DPS using genetics where possible

Acoustic Tagging Model

- Bayesian model estimated the survival rate of tagged fish
- Coast-wide and DPS-specific levels
- Larger sample size at the coast-wide level resulted in less uncertainty at the coast-wide level than at the DPS-specific level
- DPSs with higher sample size had more precise estimate of survival

Acoustic Tagging Model

- Estimates of total mortality (Z) were compared with Z benchmarks from the EPR analysis to determine if total mortality rates were too high

Stochastic EPR

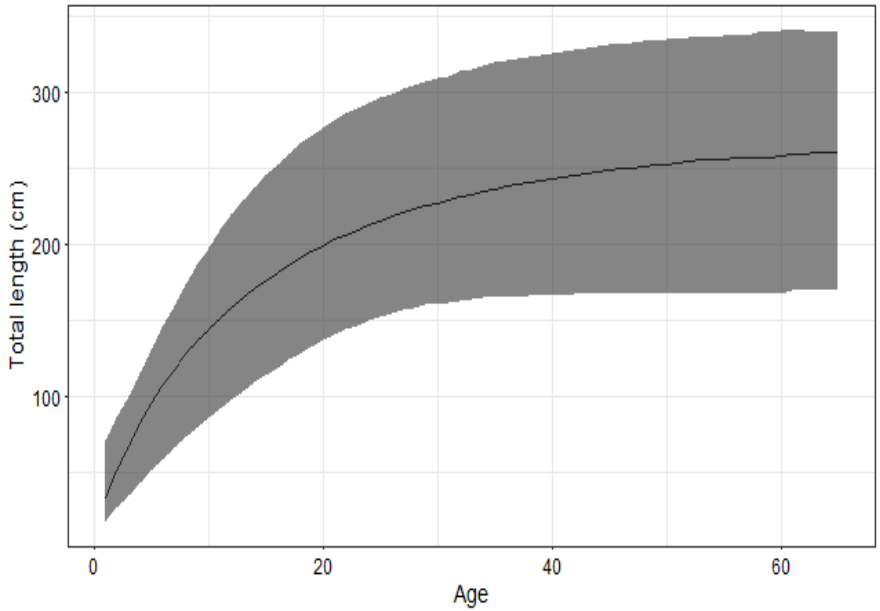
- Eggs-per-recruit model was used to estimate the level of total mortality (natural + anthropogenic) that produces 50% of the eggs-per-recruit that a virgin population produces

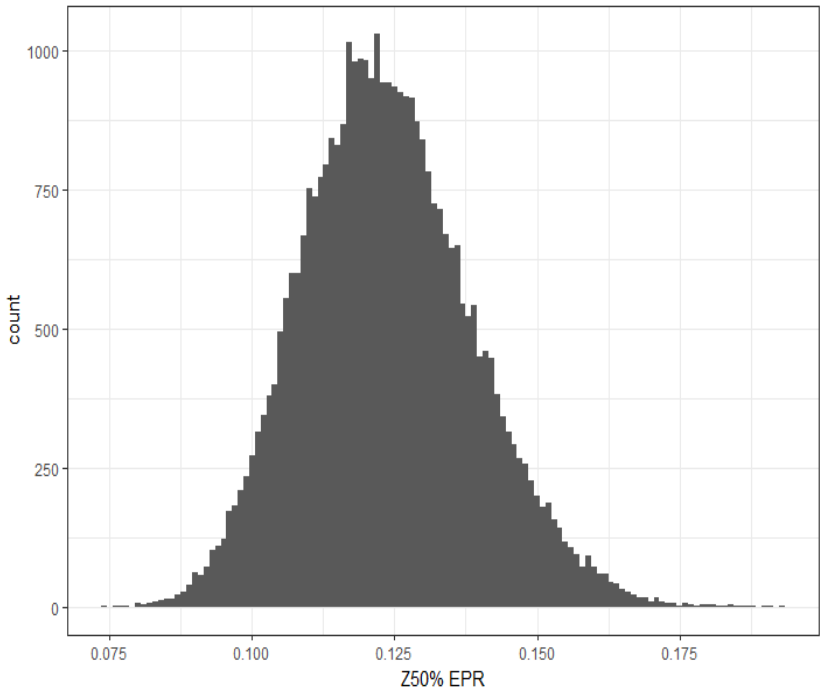
  →Total mortality threshold: $Z_{50\%EPR}$

- Similar to river herring $Z_{40\%SPR}$ reference points and menhaden fecundity reference points

Stochastic EPR

- Because the inputs to the EPR model are so uncertain, the Review Panel recommended drawing these values from distributions and creating a distribution of $Z_{50\%EPR}$ value instead of a single point estimate



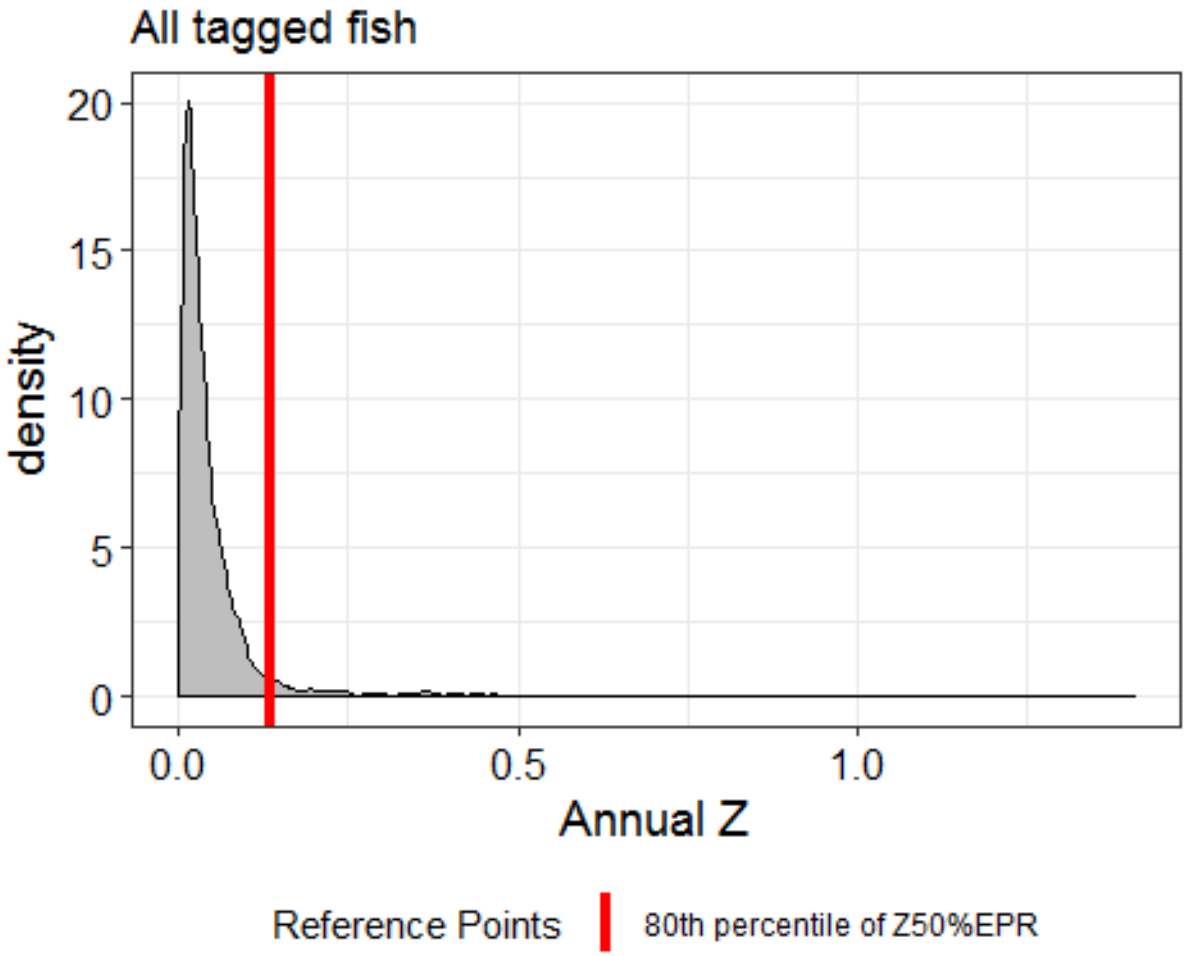


Stochastic EPR

$Z_{50\%EPR}$ (95% CIs)
0.12 (0.10 – 0.15)

→ Atlantic sturgeon cannot sustain high levels of additional mortality

Total Mortality



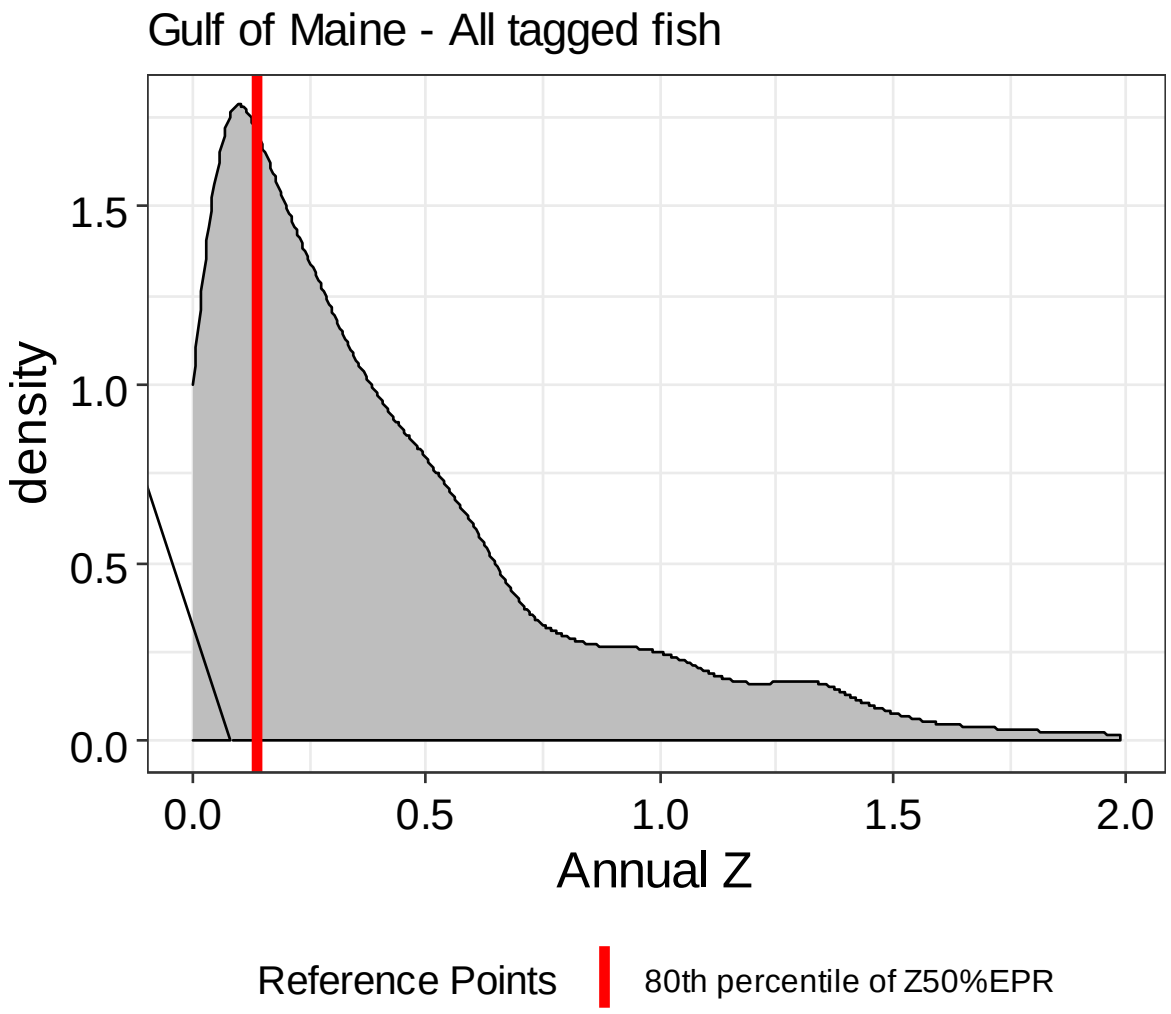
Coast

(all tagged fish)

Median Z=0.04

6.5% chance that $Z > Z_{threshold}$

Total Mortality

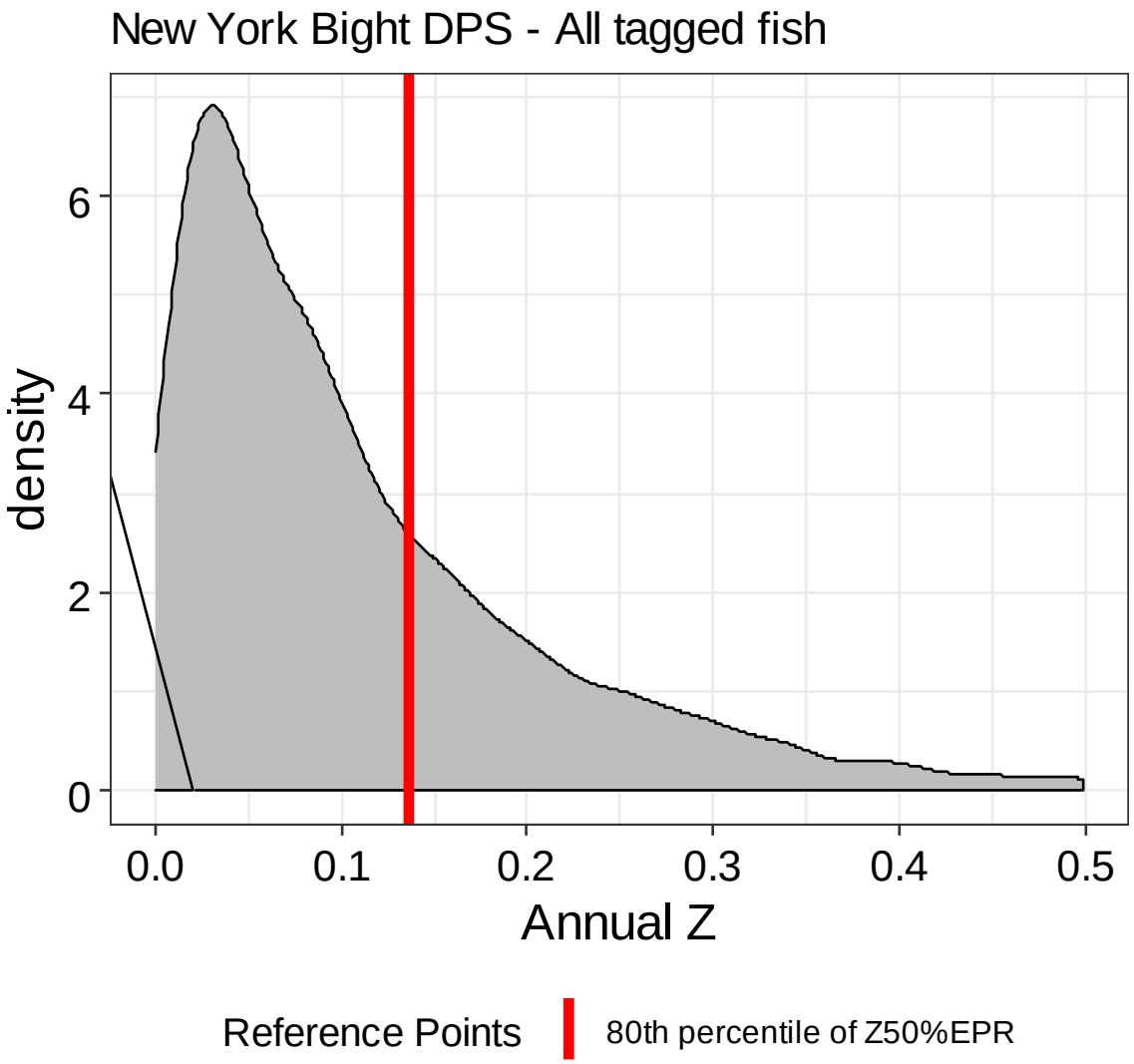


Gulf of Maine

Median Z=0.30

74% chance that $Z > Z_{threshold}$

Total Mortality

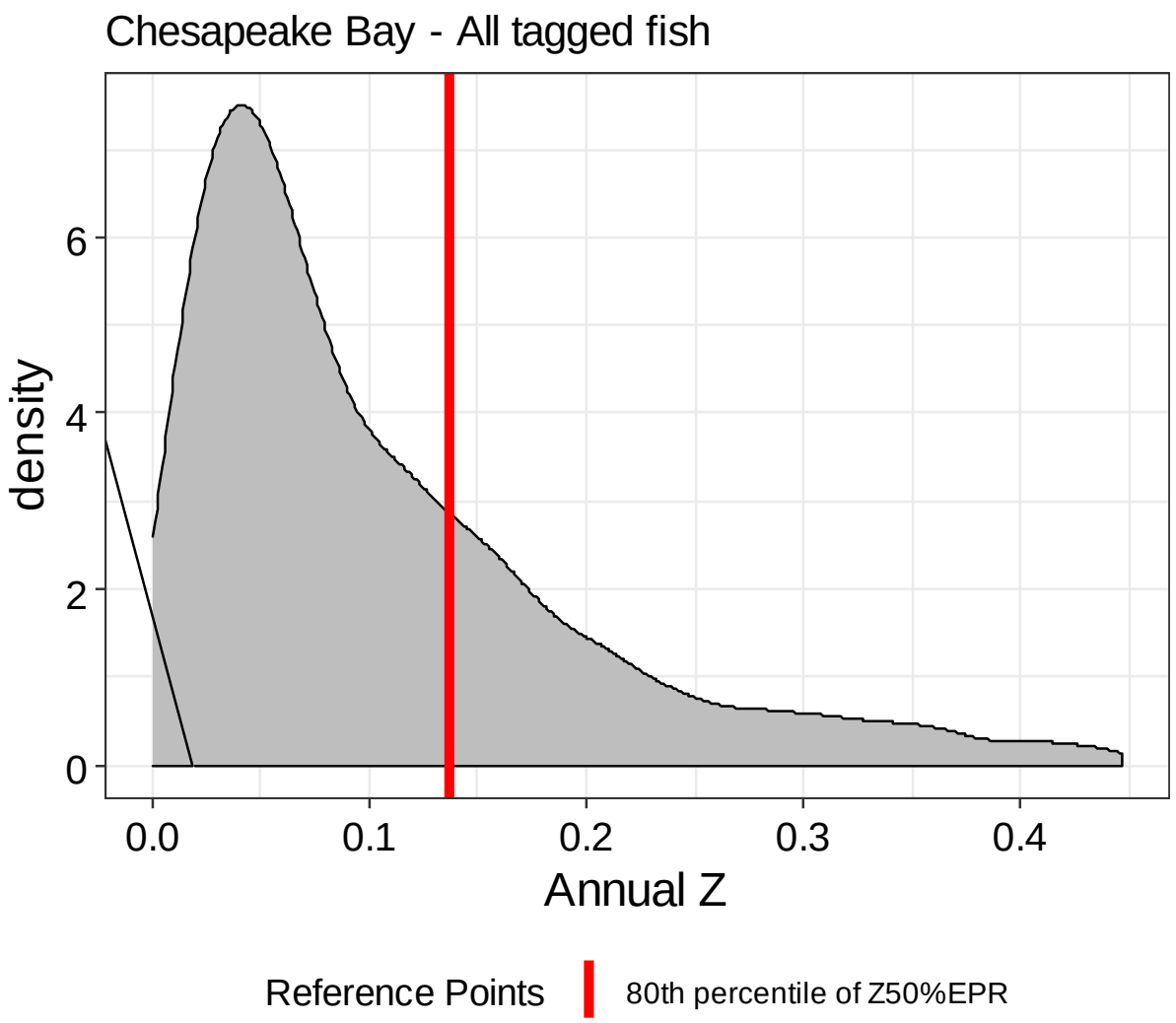


NY Bight DPS

Median Z=0.09

31% chance that $Z > Z_{threshold}$

Total Mortality

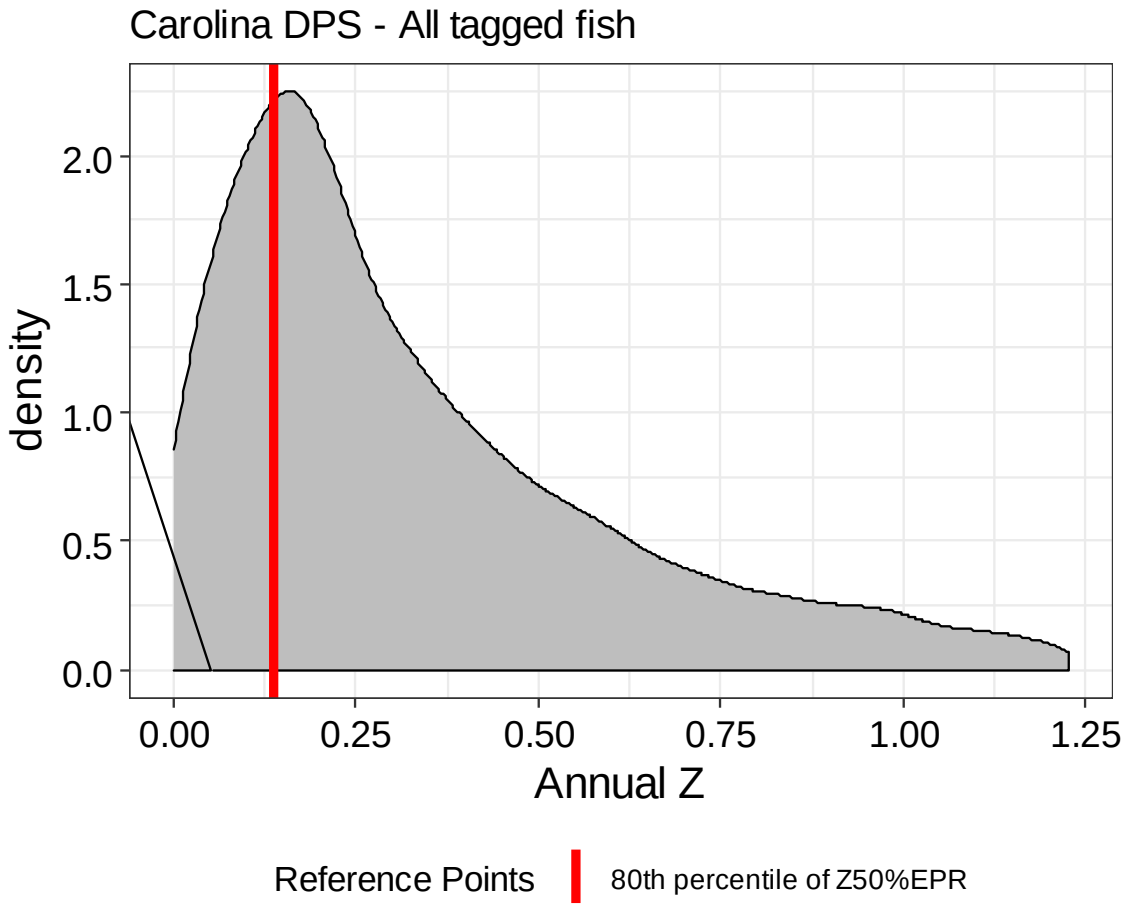


Chesapeake Bay DPS

Median Z=0.13

30% chance that $Z > Z_{threshold}$

Total Mortality

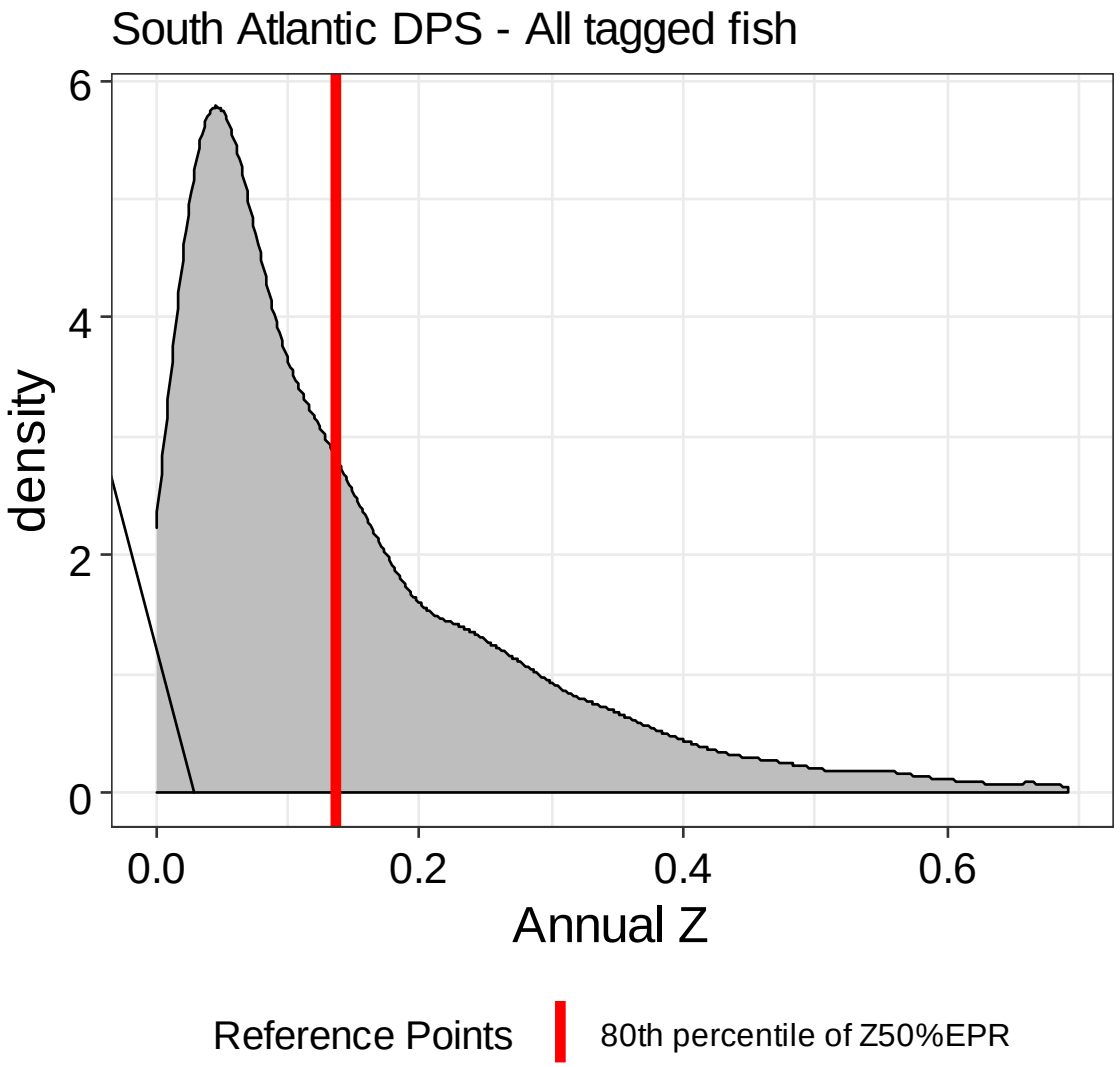


Carolina DPS

Median Z=0.25

75% chance that $Z > Z_{threshold}$

Total Mortality



South Atlantic DPS

Median Z=0.15

40% chance that $Z > Z_{threshold}$

Stock Status

- Reference points
  - Abundance: index value in 1998
  - Mortality: 80th percentile of the $Z_{50\%EPR}$ distribution

- Review Panel recommended that status be presented as the probability of being greater than the reference point, instead of just "above" or "below"

Stock Status

	Mortality Status	Biomass/Abundance Status	
Population	**P(Z) > $Z_{threshold}$**	**Relative to Historical Levels**	**Average probability that last year of indices > 1998 value**
Coast-wide	7%	Depleted	95%
Gulf of Maine	74%	Depleted	51%
New York Bight	31%	Depleted	75%
Chesapeake Bay	30%	Depleted	36%
Carolina	75%	Depleted	67%
South Atlantic	40%	Depleted	Unknown (no suitable indices)

Stock Status

	Mortality Status	Biomass/Abundance Status	
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Coast-wide	7%	Depleted	95%
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Conclusions

- At the coast-wide level, the population appears to be recovering slowly relative to where it was in 1998 and mortality is sustainable

- More uncertainty at the DPS-level, and not all DPSs show the same trends

- Juvenile indices show the strongest positive trends

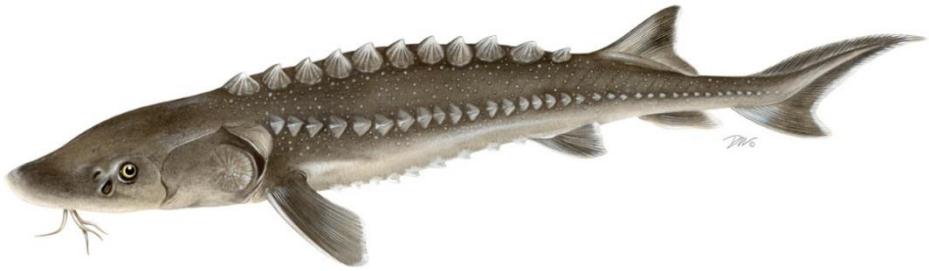
Conclusions

- Data poor species
  - Few dedicated Atlantic sturgeon surveys, none for SSB
  - Rarely encountered in existing multi-species surveys
  - Very limited biological data collected annually
- Tagging data provide important information on survival, and the time series should be maintained and sample size increased to better understand DPS-level dynamics

Conclusions

- TC recommends an update in 5 years and a benchmark assessment in 10 years if improvements in data have been made

Atlantic Sturgeon Stock Assessment Peer Review Report



Atlantic Sturgeon Fishery Management Board

October 18, 2017

Stock Assessment Peer Review Process

Atlantic Sturgeon Stock Assessment Subcommittee and TC

- Developed new coast-wide assessment

Scientific Peer Review Panel

- Chair + 3 additional Technical Reviewers, with expertise in
  - Sturgeon biology
  - Statistics and Population Dynamics
  - Stock Assessment Modeling

- Scientific review focusing on data inputs, model results and sensitivity, and overall assessment quality

Products

- Stock Assessment Report
- Review Panel Report

www.asmfc.org/species/atlantic-sturgeon

Stock Assessment Peer Review Process

Atlantic Sturgeon Stock Assessment Review Workshop

Raleigh, North Carolina

August 14-17, 2017

Review Panel:

Dr. Joseph Ballenger (Chair), Marine Resources Research Institute, South Carolina DNR

Dr. Rod Bradford, Population Ecology Division, Canada Department of Fisheries & Oceans

Fisheries and Oceans Canada

Dr. Selina Heppell, Oregon State University Department of Fisheries and Wildlife

Oregon State University

Dr. Robert Ahrens, University of Florida Fisheries and Aquatic Sciences Program

Peer Review Overall Findings

Suite of assessment analyses provides best available science

Paucity of data precluded the application of traditional assessment methods, except @ coast-wide level

Stock status determinations

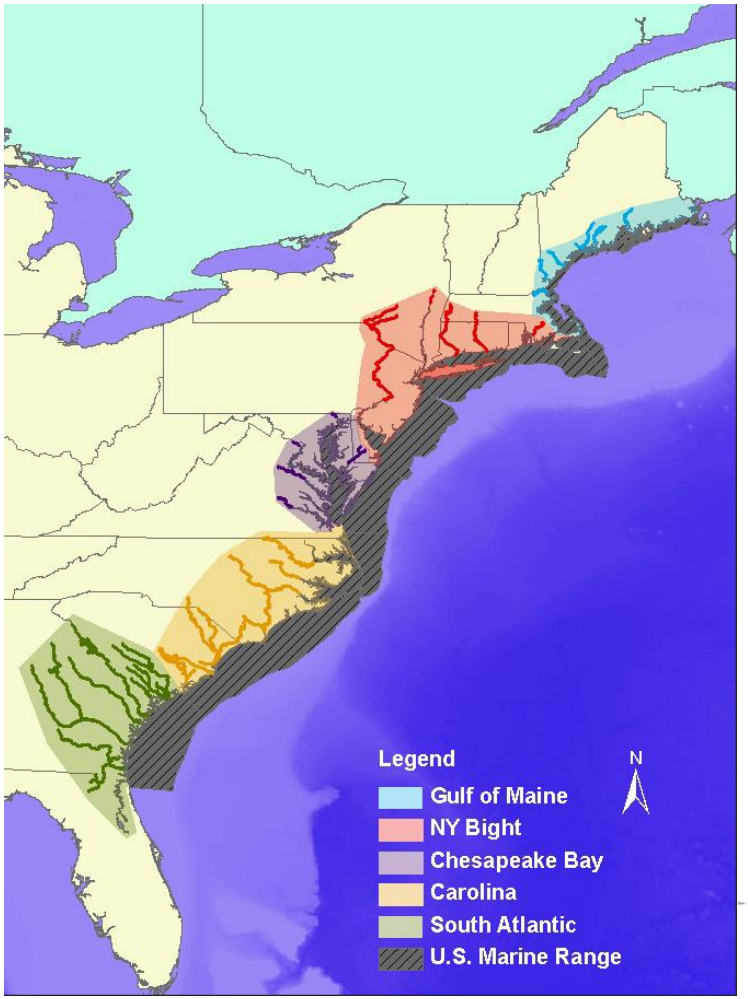
- Depleted relative to historical levels
  - Effective population size & stock-reduction analyses
- Total mortality is below threshold levels
  - Z estimates from tagging model relative to EPR Z threshold values
- Stable to increasing relative abundance
  - ARIMA models

Review Terms of Reference

ToR 1: *Evaluate appropriateness of population structure(s) defined in the assessment*

<u>Panel Conclusions</u>

- Evidence suggests a complex meta-population structure
  - Small, semi-discrete sub-populations connected through migration
- Genetic designations of DPSs are sound
  - Refinements necessary to better define spawning tributary membership within DPS units



Review Terms of Reference

ToR 1: *Evaluate appropriateness of population structure(s) defined in the assessment*

Panel Conclusions

- Challenges to assessment @ the DPS or river level
  - Insufficient life history information
  - Identification of new or more wide-spread spawning behaviors needs to be researched, including…
    - Potential high incidences of straying
    - Identification of fall spawning runs in some systems
  - Lack of coordination between U.S. and Canadian Atlantic Sturgeon assessment and research
  - Difficulty partitioning anthropogenic mortality (bycatch, ship strike, etc.) to individual DPSs

Review Terms of Reference

ToR 1: *Evaluate appropriateness of population structure(s) defined in the assessment*

<u>Panel Recommendation(s)</u>

- Focus on assessing trends and Z at a coast-wide level
- Support research that would…
  - Advance our ability to assess the population @ finer spatial resolutions
  - Refine the DPS construct to better define spawning tributary membership
    - Particularly in the Carolina and South Atlantic units

Review Terms of Reference

ToR 2: *Evaluate the adequacy, appropriateness, and application of data used, and justification for inclusion or elimination of data sources; evaluate the methods used to calculate indices and other statistics*

<u>Panel Conclusions:</u>

- Thorough collection and evaluation of available data
  - Data used emphasizes the data poor situation of Atlantic Sturgeon relative to many other U.S. managed marine and riverine resources
    - Lack of data for South Atlantic fish
    - Adult fish not adequately represented in most data sets
    - Age structure is not sufficiently documented for any DPS

Review Terms of Reference

ToR 2: *Evaluate the adequacy, appropriateness, and application of data used, and justification for inclusion or elimination of data sources; evaluate the methods used to calculate indices and other statistics*

<u>Panel Conclusions (Fishery Removals):</u>

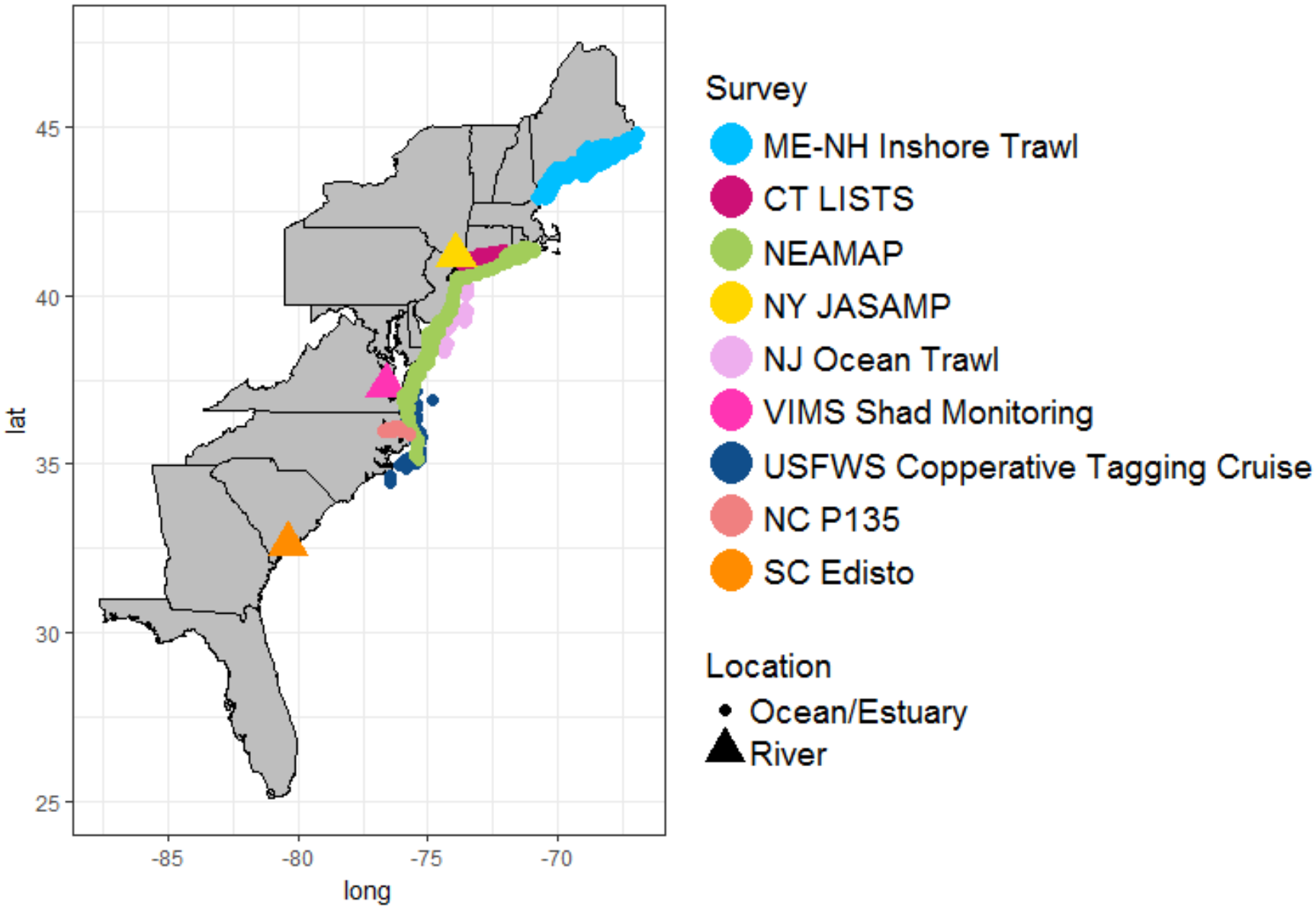
- Several potential sources of bias in historic landings data
  - Incomplete catch history
  - Annual landings influenced by under/over reporting or inappropriate survey methods
  - Lack of information on sizes harvested
- Removals time series hampered by an inability to separate the historical fishery removals by DPS

Review Terms of Reference

ToR 2: *Evaluate the adequacy, appropriateness, and application of data used, and justification for inclusion or elimination of data sources; evaluate the methods used to calculate indices and other statistics*

<u>Panel Conclusions (Indices of Relative Abundance):</u>

- Very few surveys specifically designed to catch Atlantic Sturgeon
- Some surveys appears DPS-specific given survey location and age range encountered, though it is unclear what proportion of DPSs are actually encountered in mixed DPS surveys
  - Address with concurrent genetic sampling


45
40
35
30
25
lat
-85
-80
-75
-70
long
Survey
ME-NH Inshore Trawl
CT LISTS
NEAMAP
NY JASAMP
NJ Ocean Trawl
VIMS Shad Monitoring
USFWS Copperative Tagging Cruise
NC P135
SC Edisto
Location
Ocean/Estuary
River

Review Terms of Reference

ToR 2: *Evaluate the adequacy, appropriateness, and application of data used, and justification for inclusion or elimination of data sources; evaluate the methods used to calculate indices and other statistics*

<u>Panel Conclusions (Indices of Relative Abundance):</u>

- Concern regarding the suitability of the Conn method to develop a coast-wide index
  - For now, represents the best estimate available for a coast-wide trend estimation

Review Terms of Reference

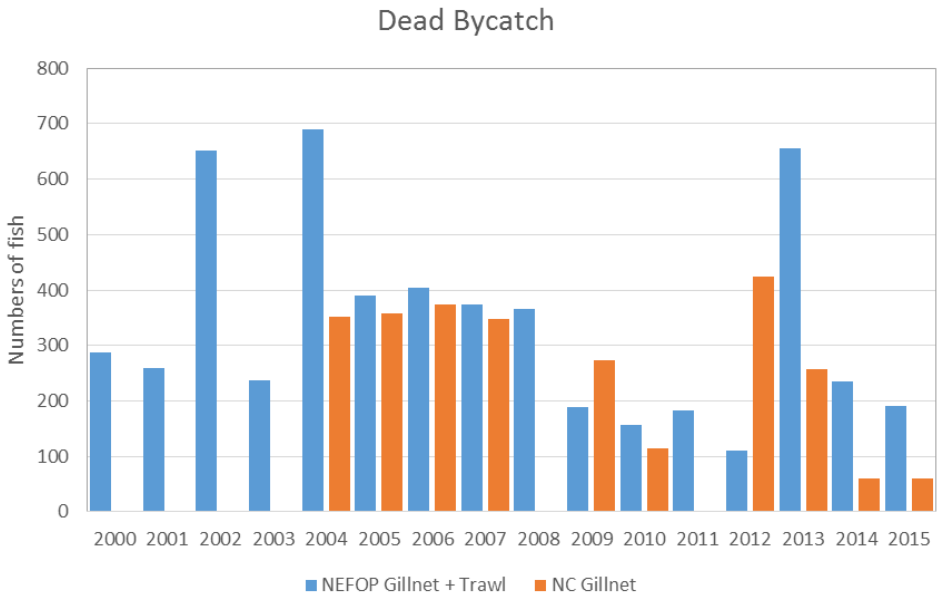
ToR 2: *Evaluate the adequacy, appropriateness, and application of data used, and justification for inclusion or elimination of data sources; evaluate the methods used to calculate indices and other statistics*

<u>Panel Recommendation(s) (Indices of Relative Abundance):</u>

- Include NY JASAMP, NEAMAP, SC Edisto surveys in trend analyses
  - Despite time series shorter than pre-determined 15 years
- Develop abundance indices using binomial error structure for surveys with low encounter rates and small catches when positive (ME-NH Trawl, CT LIST, NJ OT, NEAMAP, VIMS shad)
  - Use newly standardized indices in subsequent trend analyses and development of coast-wide Conn Index

Review Terms of Reference

ToR 3: *Evaluate the methods used to develop Atlantic sturgeon bycatch estimates*



<u>Panel Conclusions:</u>

- Bycatch series posited should not be used as a time series of relative abundance
  - Inconsistencies in sampling
  - Responses of industry to regulatory changes
  - Uncertainty about DPS composition of observed catches
- DPS composition of bycatch is needed if assessment/management @ the DPS level

Review Terms of Reference

ToR 3: *Evaluate the methods used to develop Atlantic sturgeon bycatch estimates*

Panel Conclusions:

- Bycatch mortality likely underestimated
  - Derived from subset of fisheries interacting w/ Atlantic Sturgeon
    - Limited observer coverage in oceanic fisheries, no information from many inshore/estuarine/riverine fisheries
  - Difficulty defining effective effort on unobserved trips
  - Do not account for delayed mortality
  - Affected by under-reporting or inappropriate survey methods
  - Time-series is incomplete
- ***Recommendation:*** Include additional fisheries in order to increase geographic scope
  - Particularly in the Gulf of Maine and in estuarine/riverine areas

Review Terms of Reference

ToR 4: *Evaluate the methods and models used to estimate population parameters (e.g., F, Z, biomass, relative abundance) and biological reference points*

Panel Conclusions:

- Suite of models available limited due to the inability to conduct age-based analyses
  - Age data available are insufficient
- Given limitations, panel agrees with decision to…
  - Evaluate Z estimates from the acoustic tagging model relative to EPR based reference points as a means to assess sustainability of current Z
  - Use ARIMA models to evaluate recent trends in abundance

Review Terms of Reference

ToR 4: *Evaluate the methods and models used to estimate population parameters (e.g., F, Z, biomass, relative abundance) and biological reference points*

Panel Conclusions:

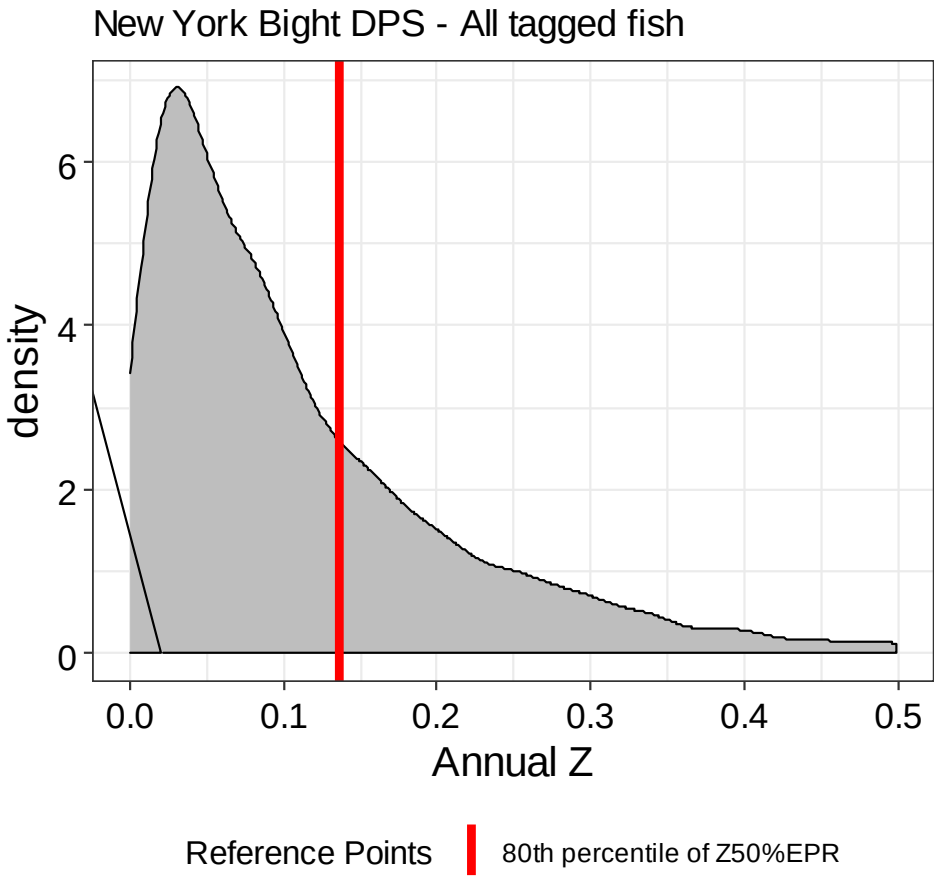
- Representativeness of life history parameter estimates, at the coast-wide or individual DPS level, is a significant source of uncertainty in the current assessment
- ***Recommendation:*** Collect contemporary life history information from all segments of the population

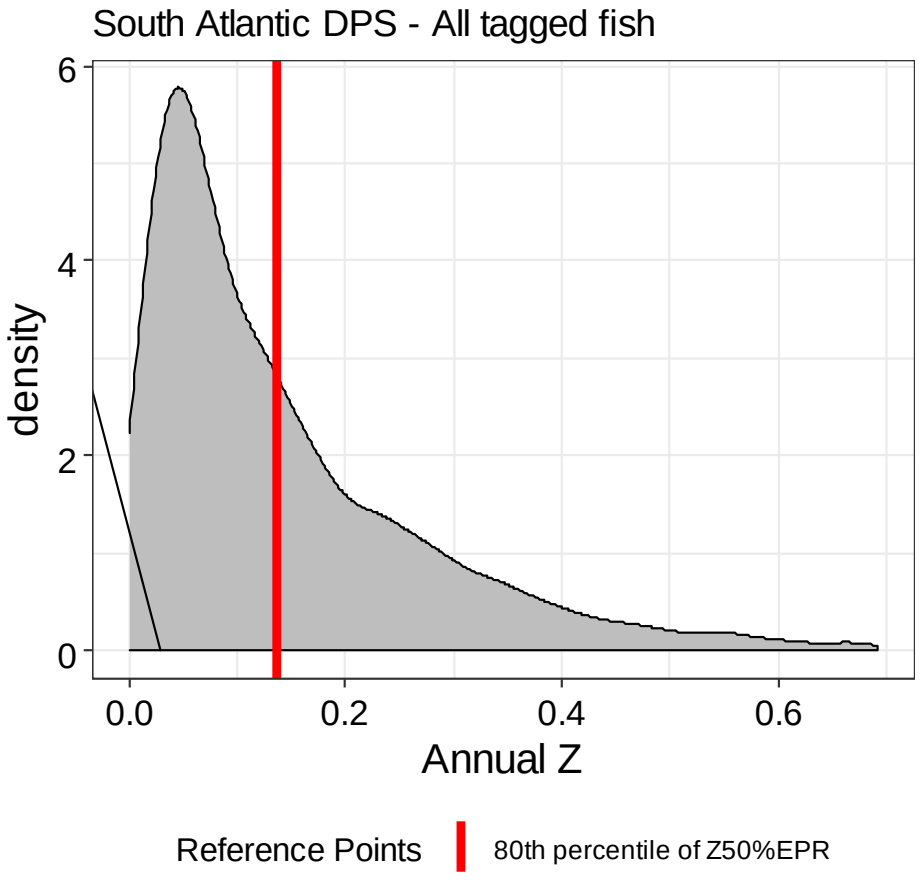
Review Terms of Reference

ToR 4: *Evaluate the methods and models used to estimate population parameters (e.g., F, Z, biomass, relative abundance) and biological reference points*

<u>Panel Conclusions (Acoustic Tagging Model):</u>

- Uncertainty in Z estimates will improve as sample size and length of time series increases
  - Coast-wide and at individual DPS level
  - For juveniles and adults
- ***Recommendation:*** Use median Z estimates from tagging model as point estimate for current Z


New York Bight DPS - All tagged fish
density
Annual Z
0.0
0.1
0.2
0.3
0.4
0.5
0
2
4
6
Reference Points
80th percentile of Z50%EPR


South Atlantic DPS - All tagged fish
density
Annual Z
0.0
0.2
0.4
0.6
0
2
4
6
Reference Points
80th percentile of Z50%EPR

Review Terms of Reference

ToR 4: *Evaluate the methods and models used to estimate population parameters (e.g., F, Z, biomass, relative abundance) and biological reference points*

Panel Conclusions (ARIMA Model):

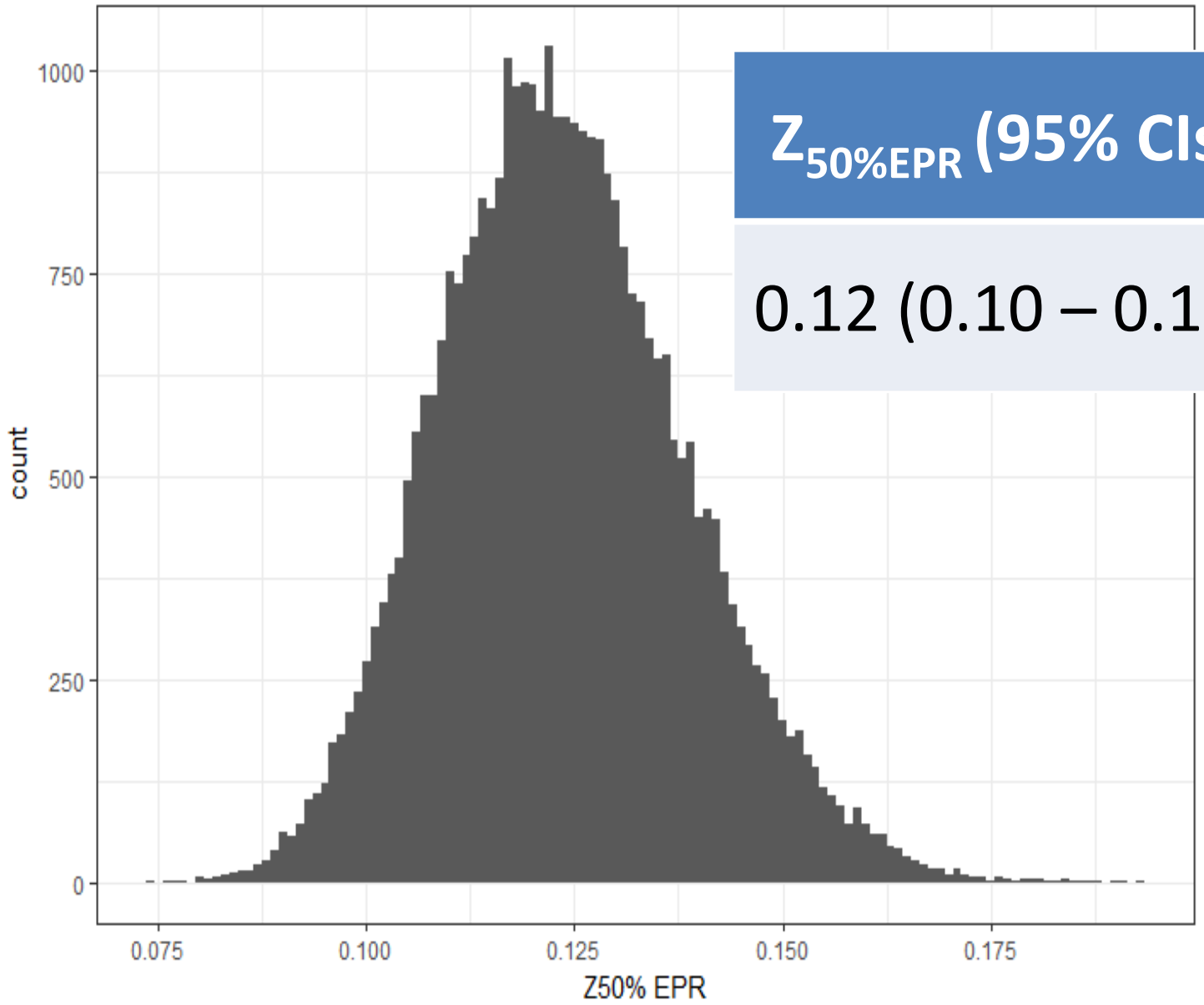
- Use of ARIMA model is most suitable for trend analysis because…
  - ARIMA account for autocorrelation
  - Provides mechanism for probabilistic determination of likelihood of population increase
- Power analysis useful to determine the utility of individual indices to detect population trends
- Mann-Kendall, when applied to results of the ARIMA analyses, allowed for probabilistic assessments of increases in relative abundance trends relative to reference levels

Review Terms of Reference

ToR 4: *Evaluate the methods and models used to estimate population parameters (e.g., F, Z, biomass, relative abundance) and biological reference points*

Panel Conclusions (EPR Analysis):

- Concern regarding robustness of EPR analyses and reliance of management on the point estimates of $Z_{50\%}$ due to two primary sources of uncertainty
  - Life history inputs – dated, uncertain life history information primarily derived from a single DPS (New York/Hudson)
  - Bycatch and ship strike selectivity
- Evaluation of different assumptions about age-at-maturity and/or bycatch selectivity suggested substantial uncertainty in the $Z_{50\%}$



$Z_{50\%EPR}$ (95% CIs)

0.12 (0.10 – 0.15)

Review Terms of Reference

ToR 4: *Evaluate the methods and models used to estimate population parameters (e.g., F, Z, biomass, relative abundance) and biological reference points*

<u>Panel Recommendation(s) (EPR Analysis):</u>

- Justification is needed for the choice of $Z_{50\%}$ as the threshold/target EPR level
  - Exploration of how sensitive the $Z_{xx\%}$ level is to different assumed threshold/target EPR levels is needed
  - Choice of most appropriate threshold/target will likely require additional research
- Use a probabilistic approach to defining EPR % levels
  - Better illustrate our understanding of stock status

Review Terms of Reference

ToR 5: *Evaluate the methods used to characterize uncertainty in the stock assessment*

<u>Panel Conclusions:</u>

- Mortality Status
  - Tagging model appropriately incorporates uncertainty into recent Z estimates by using a Bayesian framework
    - ***Recommendation:*** Include visual/summary of posterior distribution of Z
  - Z posterior and recommended uncertainty incorporation into EPR analysis allows for Z status determination to be assessed probabilistically
- Biomass/Abundance Status
  - ARIMA analysis probabilistic framework lends itself, once a risk tolerance is specified, to monitor population trends relative to an accepted reference point

Review Terms of Reference

ToR 6: *Evaluate recommended best estimates of stock biomass, abundance, mortality, and reference points for use in management*

Panel Conclusions:

- Monitoring Z using acoustic tagging models provides better measure of anthropogenic mortality impact on recover than directly monitoring sources of anthropogenic mortality
- Utility of tagging model Z estimates expected to increase as uncertainty in Z estimates is reduced
- Addressing previous concerns regarding EPR analysis will inform potential future mortality rate recover targets

Review Terms of Reference

ToR 6: *Evaluate recommended best estimates of stock biomass, abundance, mortality, and reference points for use in management*

<u>Panel Conclusions:</u>

- Uncertainty exists as to the most appropriate index based reference point to use as a measure of current stock status
  - Use of the 25th percentile and comparison relative to the index value at start of moratorium are reasonable starting points
- Should not use the results of the SRA analyses as a measure of biomass/abundance status
  - Review panel expressed no confidence in the greater increase in relative abundance predicted by these models than observed in relative abundance indices

Review Terms of Reference

ToR 6: *Evaluate recommended best estimates of stock biomass, abundance, mortality, and reference points for use in management*

<u>Panel Recommendation(s):</u>

- For estimation of Z from acoustic tagging models to be viable long term, must…
  - Maintain a sustained effort to tag additional fish coast-wide
  - Maintain/expand current acoustic receiver arrays
- Specification of risk tolerance by managers would inform choice of EPR reference point and mortality status determination
- Choice of appropriate index based reference points should be informed by management goals/recovery targets

Review Terms of Reference

ToR 7: *Evaluate stock status determinations, or recommend alternative methods/measures*

<u>Panel Conclusions:</u>

- Abundances are likely increasing slowly, Atlantic Sturgeon remain depleted relative to historical levels
  - Recognized difficulties posed by the paucity of information and lack of DPS-specific recovery targets for status determination
- ***Recommendation:*** Additional research to identify appropriate reference points for future status determinations and recovery targets
- ***Recommendation:*** Metrics used in status determination be presented as probabilities

Review Terms of Reference

ToR 8: *Review the research, data collection, and assessment methodology recommendations, make additional recommendations, and prioritize research activities*

<u>Panel Conclusions:</u>

- Severe data limitations currently restrict the type, scope, and usefulness of assessment methodologies that can be applied
  - Incomplete accounting of temporal and spatial variability in life-history parameters
  - Imperfect understanding of temporal/spatial organization of discrete spawning populations
  - Major uncertainties in the scope for direct harm arising from interaction with ongoing human activities

Review Terms of Reference

DPS	Life History			
	Length-Weight	Age-Length*	Maturation	Fecundity/Spawning Frequency
Gulf of Maine	✓	2015 (Canada)	---	---
New York Bight	✓	1998, 2000, 2005, 2016	1988	1998
Chesapeake	✓	2012	---	---
Carolinas	✓	2015	---	1982
South Atlantic	---	2015	---	---

Review Terms of Reference

DPS	Surveys/Monitoring (# of surveys ≥10 yrs)		
	Small Juveniles	Juvenile/Adult	Spawning Adults
Gulf of Maine	0	1	0
New York Bight	3	1	0
Chesapeake	2	0	0
Carolinas	7	1	0
South Atlantic	1	0	0

Review Terms of Reference

DPS	Local (DPS-level) bycatch monitoring	# of Acoustic Tags used in Z-estimation	Genetic Samples (N_e estimation, DPS ID)
Gulf of Maine	---	153	113
New York Bight	---	657	518
Chesapeake	---	275	482
Carolinas	✓	99	37
South Atlantic	✓	147	508

Peer Review Overall Findings

Suite of assessment analyses provides best available science

Stock is **depleted** relative to historic levels, though current total mortality is **below** threshold levels and coast-wide Atlantic Sturgeon population seems to be exhibiting **stable** to **increasing** relative abundance

Conduct an assessment update in 5 years (2022) and a benchmark assessment in 10 years (2027)

Peer Review Overall Findings

Questions?

NOAA FISHERIES

GARFO

Next Steps for Atlantic Sturgeon

5-Year Review and Recovery Planning

October 18, 2017

Lynn Lankshear, Atlantic Sturgeon Coordinator

Greater Atlantic Region Fisheries Office

5-Year Review

At least once every 5 years, the Secretary shall conduct a review of each listed species to determine whether it should be delisted or reclassified.

5-Year Review

We publish notice in the Federal Register that we are undertaking a 5-year review and ask the public to submit relevant information

Typically provide 90 days for the submission of the information. However, we will continue to accept new information at any time

5-Year Review

For species without recovery plans, we analyze the available information relative to the definitions of endangered and threatened and in the context of the five listing factors

5-Year Review

A 5-year review does not change the listing status of the species

A 5-year review ends with a determination of whether the species should be delisted or the listing status changed. A separate rulemaking is required to make any such change.

5-Year Review

For Atlantic Sturgeon DPSs, plan to:

- review information for and write the draft 5-year review internally
- use the stock assessment as one of the primary sources of new information
- request the ASMFC Sturgeon TC peer review the draft 5-year review
- complete one review document for all 5 DPSs.

5-Year Review

Results of the 5-year Review will be available on the Office of Protected Resources website

http://www.nmfs.noaa.gov/pr/listing/reviews.htm

As well as the GARFO and SERO websites for Atlantic sturgeon

5 Year Review

For further information about 5 Year reviews:

http://www.nmfs.noaa.gov/pr/listing/reviews.htm

Recovery Planning

Section 4(f) of the ESA requires the Secretary to develop and implement recovery plans for the conservation and survival of listed species

Recovery Planning

Beginning stages of recovery planning for the Atlantic sturgeon DPSs

Considering whether to do separate plans, one plan or some combination for the DPSs, and whether to include shortnose sturgeon

Recovery Planning

Expect to involve outside experts and form a Recovery Planning Team or teams

We make draft recovery plans available for public comment and consider all input before finalizing a recovery plan

Recovery Planning

For further information about Recovery Planning:

http://www.nmfs.noaa.gov/pr/recovery/

Update on Critical Habitat

The GIS data for the critical habitat units is available at:

http://www.nmfs.noaa.gov/pr/species/criticalhabitat.htm

Questions, contact:

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Status of ESA Section 10(a)(1)(B) Incidental Take Permits for Atlantic Sturgeon

Max Appelman
Atlantic States Marine Fisheries Commission
November 5, 2015

Background

2 ways of permitting the "take" of ESA-listed species:

- Section 7: Federally funded projects or actions
  - Incidental Take Statement (ITS)
- Section 10: non-Federal projects or actions
  - Incidental Take Permit (ITP)
  - Section 10(a)(1)(A): ITPs for research/monitoring
  - Section 10(a)(1)(B): ITPs for state-directed fisheries

Focuses on Section 10(a)(1)(B) ITPs for state-directed commercial fisheries

ITPs for Atlantic Sturgeon

- States were surveyed regarding the status of commercial ITPs for Atlantic sturgeon
  - Received/Pending/Developing?
  - What geartypes/fisheries?
  - If not developing, why?

- Responses were summarized

State	Status	Gear/Fishery
ME	N/A	N/A
NH	N/A	N/A
MA	N/A	N/A
RI	Developing	Trawl, Gill Net
CT	N/A	N/A
NY	Developing	Trawl, Gill Net
NJ	Developing	20+
PA	N/A	N/A
DE	Developing	Gill Net
MD	N/A	Gill Net, Pound Net, Fyke, Pots
DC	N/A	N/A
PRFC	N/A	N/A
VA	Pending	Gill Net
NC	Received	Gill Net
SC	Pending	Shad Fishery
GA	Received	Shad Fishery
FL	N/A	N/A

Summary

- ITPs are primarily sought for gill net, otter trawl, and/or commercial shad fisheries (VA, NC, SC, GA)
- Prolonged development due to:
  - Joint applications for multiple listed species (RI, VA)
  - Pursued for a lot of different gears/fisheries (NJ)
  - Development/expansion of data collection programs (NY, SC)
- Currently not pursuing the development of an application due to:
  - Few/zero interactions with sturgeon in state-water fisheries (ME, NH, MA, PA, DC, PRFC, FL)
  - Other regulations that minimize sturgeon encounters (CT)
  - Limited data or resources (MD)