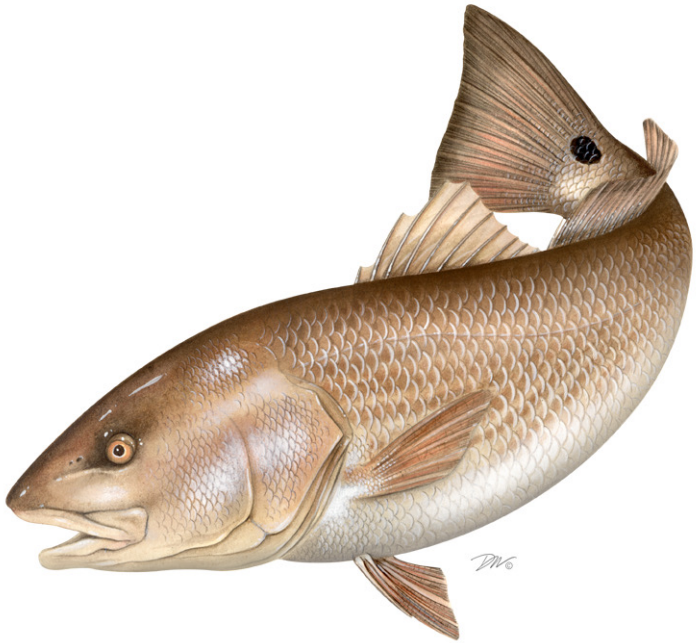
Red Drum Assessment History



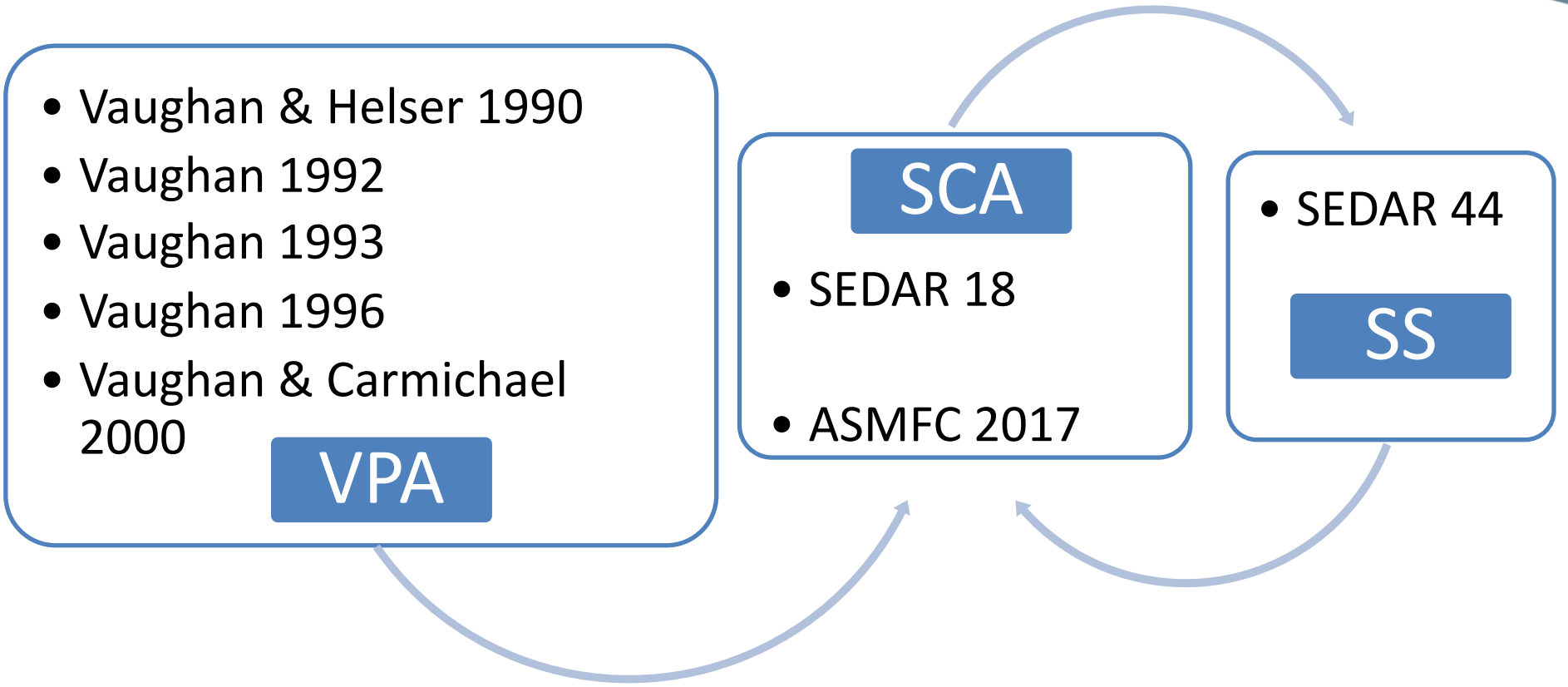
Jeff Kipp
8/13/2024

Outline

- Regional Assessments
- State Assessments
- Simulation Assessment

Regional Assessments

Regional Assessments

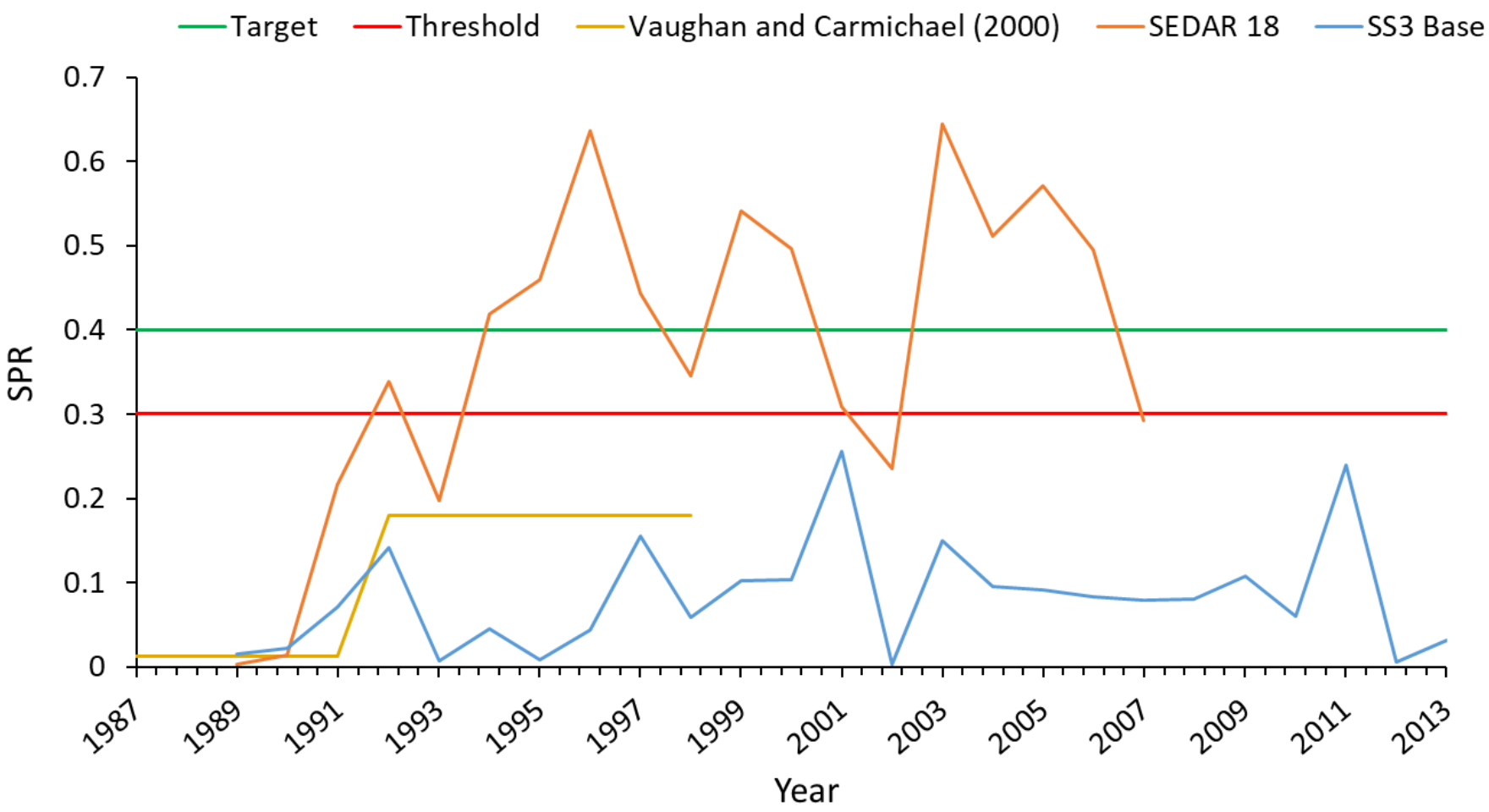


- Atlantic red drum considered one stock in first assessments, two stocks with a break at the NC/SC border since Vaughan (1996)

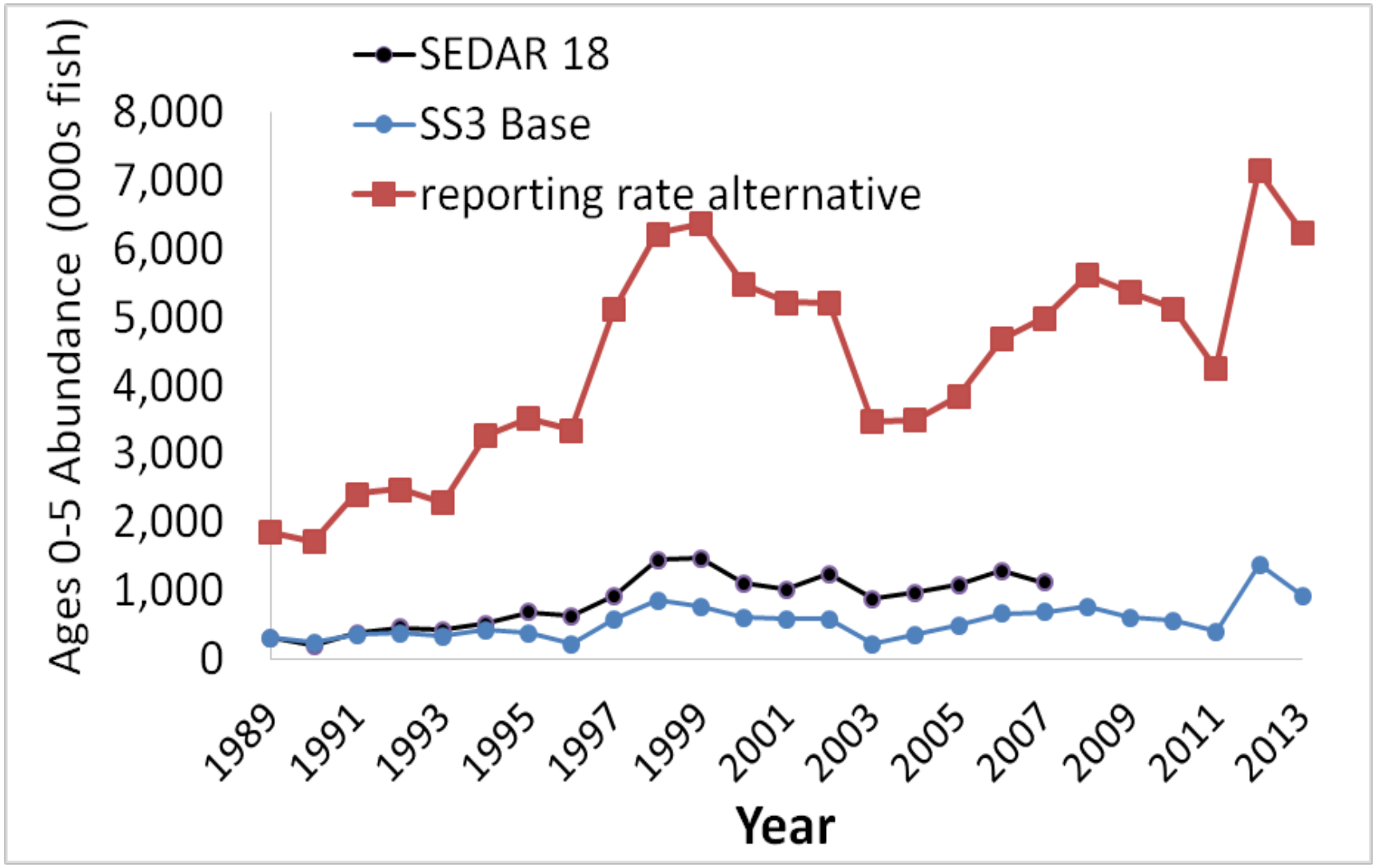
Regional Assessments

- Assessments generally configured to estimate spawning potential ratio (SPR) to determine stock status and management advice
- Early assessments estimated low SPR and overfishing from the 1980s through the early-mid 1990s
- Later assessments estimated increases in SPR in late 1990s/early 2000s (northern) or more stable SPR through time (southern), but conflicting overfishing statuses
- Most recent assessment (ASMFC 2017) estimates neither stock is experiencing overfishing, cannot determine SSB status

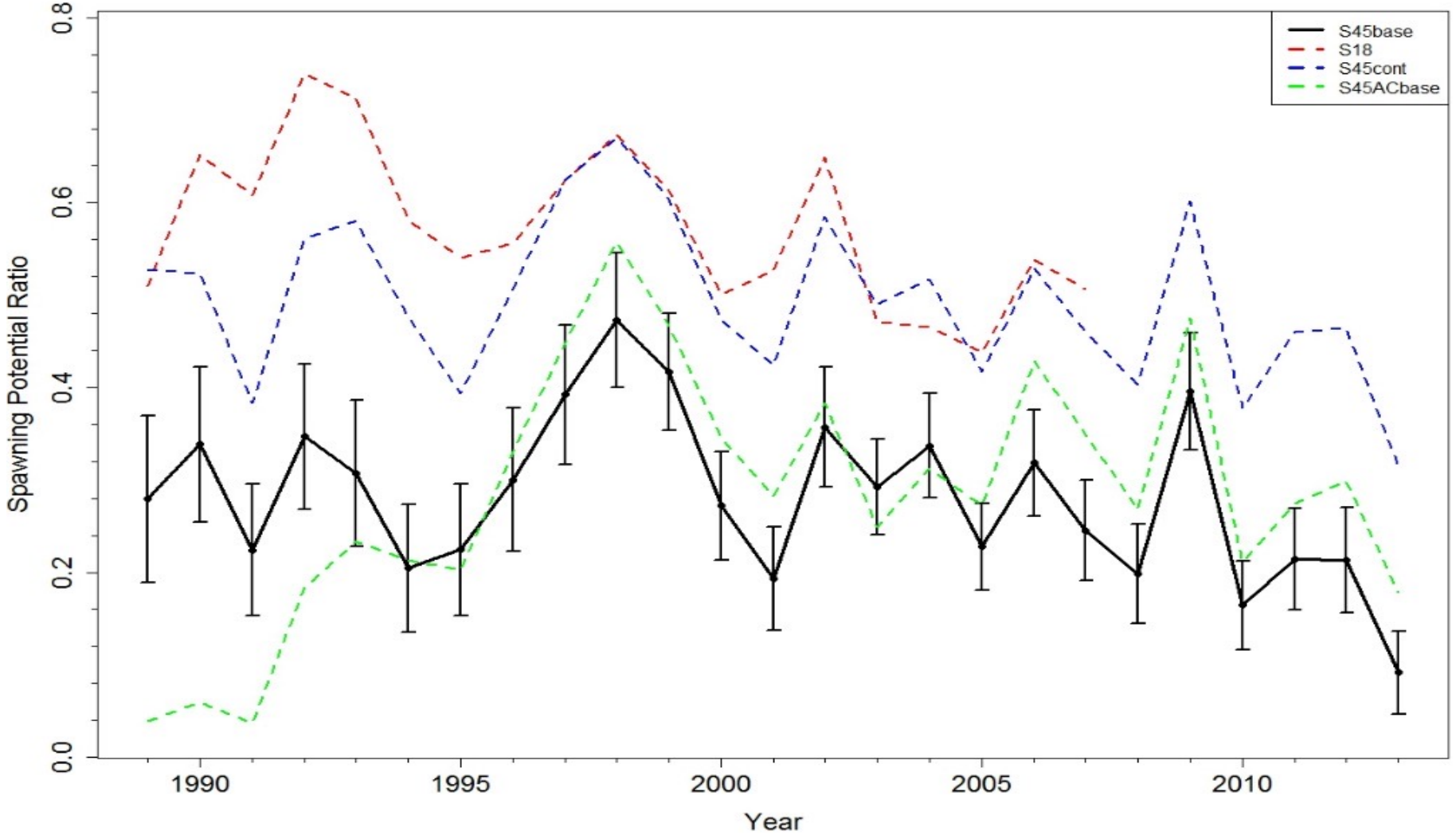
Northern Stock SPR



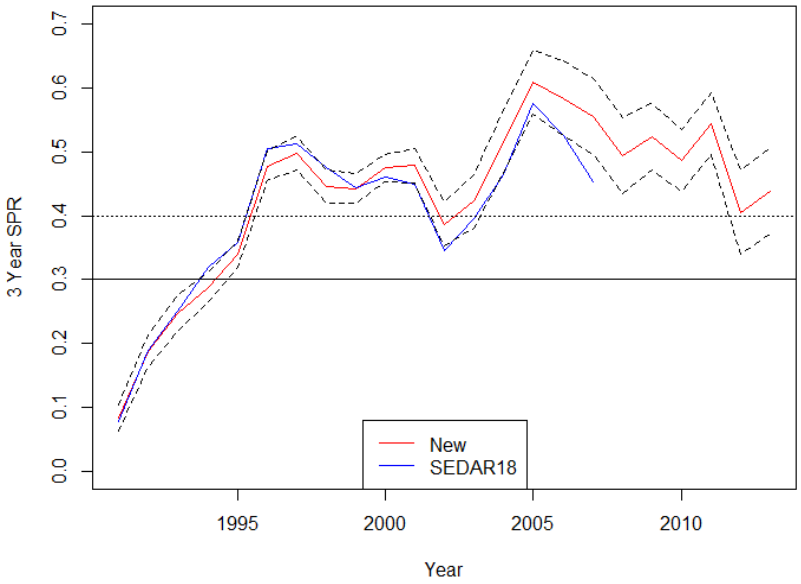
Northern Stock Abundance

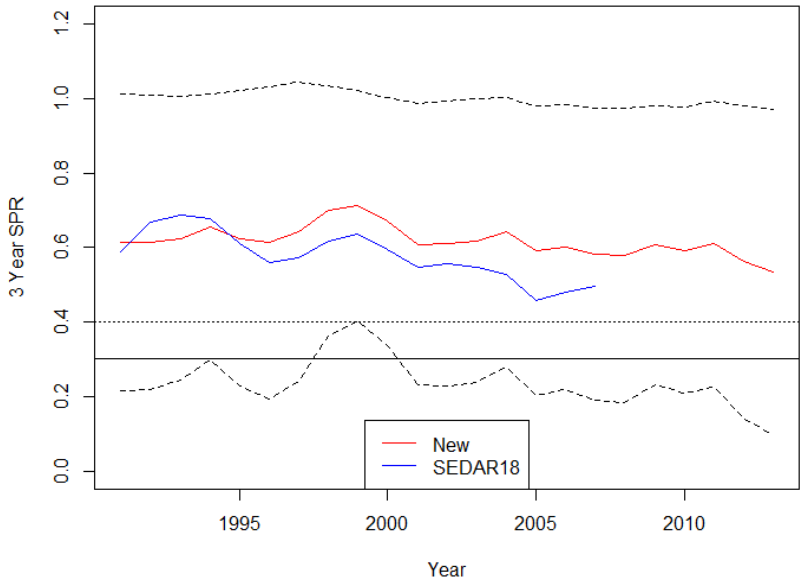


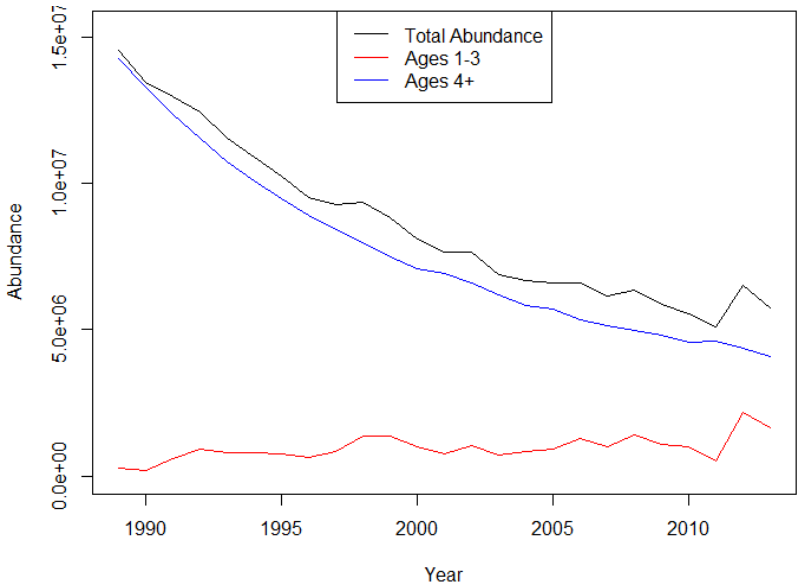
Southern Stock SPR

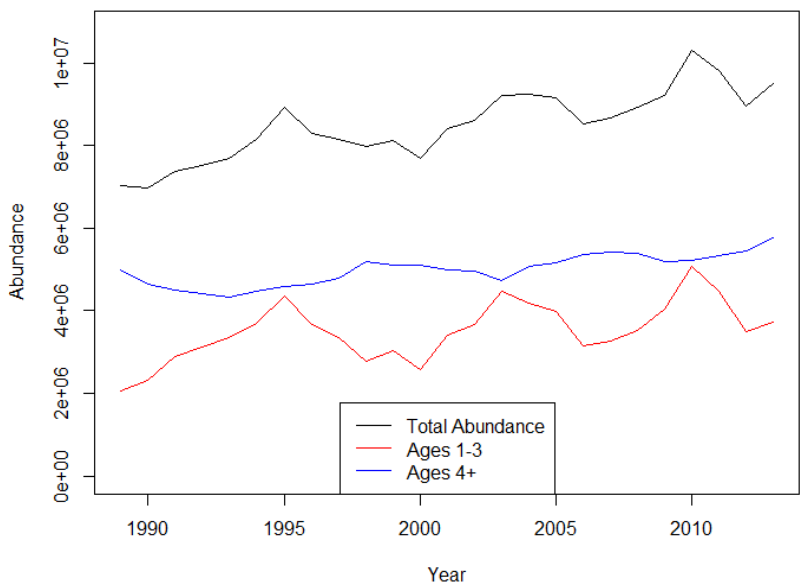


ASMFC 2017


3 Year SPR
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
1995
2000
2005
2010
Year
New
SEDAR18


3 Year SPR
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1995
2000
2005
2010
Year
New
SEDAR18


Abundance
0.0e+00
5.0e+06
1.0e+07
1.5e+07
1990
1995
2000
2005
2010
Year
Total Abundance
Ages 1-3
Ages 4+


Abundance
0e+00
2e+06
4e+06
6e+06
8e+06
1e+07
1990
1995
2000
2005
2010
Year
Total Abundance
Ages 1-3
Ages 4+

Assessment Challenges

- Effect of maturity-driven emigration on descending age composition
  - Assess only the sub-adult component of the stock
  - Constraints on selectivity estimation
  - Assume selectivity

- Data-limited and growing live release fishery
  - Apply filters to harvest composition data
  - Use limited data
  - Use tag-recapture data
  - Assume selectivity

- Model sensitivity and uncertainty
  - Models sensitive to tag-recapture information
  - SCA wide confidence intervals
  - Management quantity sensitive to selectivity assumptions

State Assessments

State Assessments

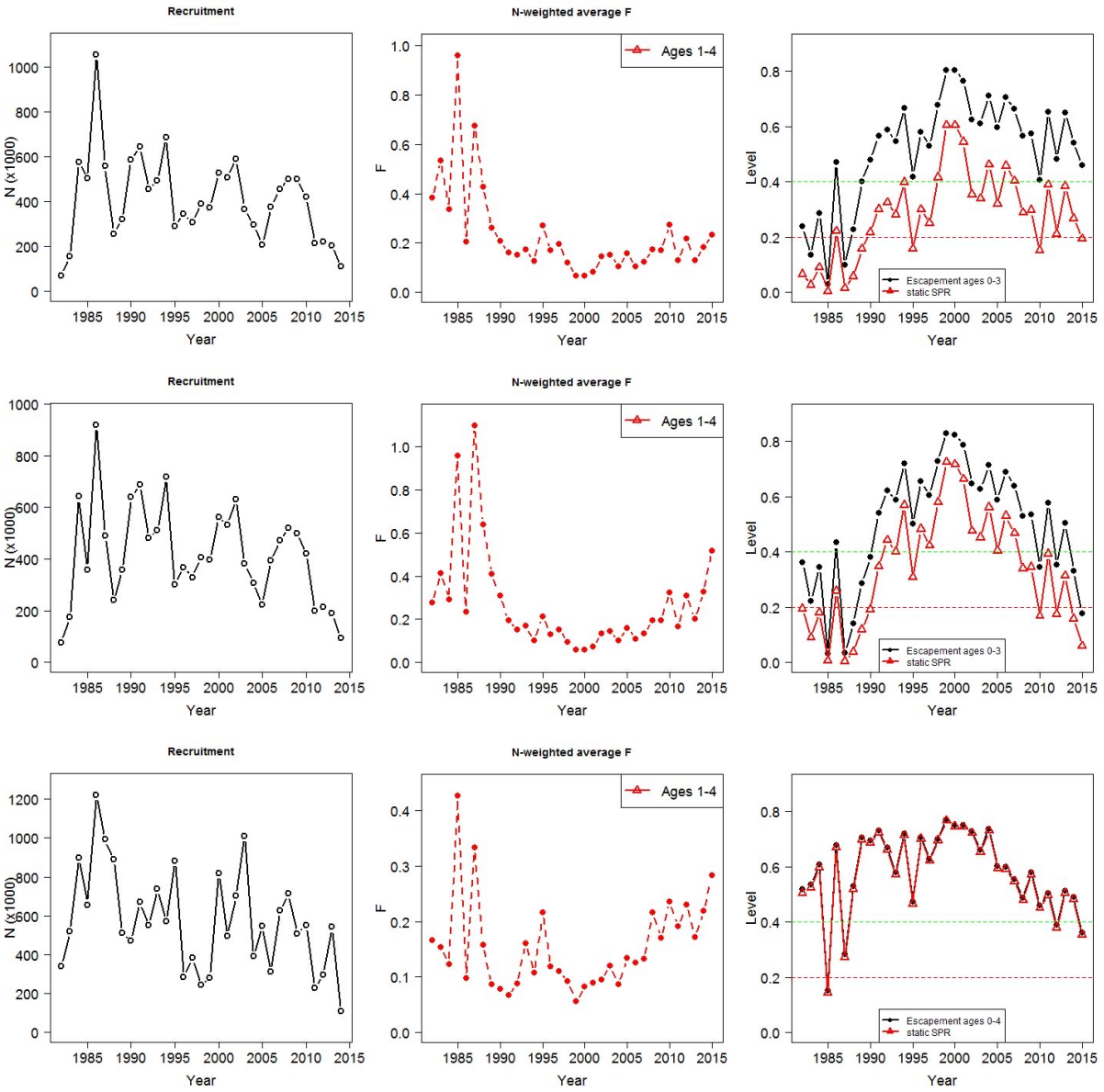
- North Carolina
- South Carolina
- Florida

North Carolina Assessment

- Updated Vaughan and Carmichael (2000)
- 1986-2005
- Terminal SPR varied between models, but indicated increased levels from Vaughan and Carmichael (2000) in the early 2000s to above the management threshold (not overfishing)

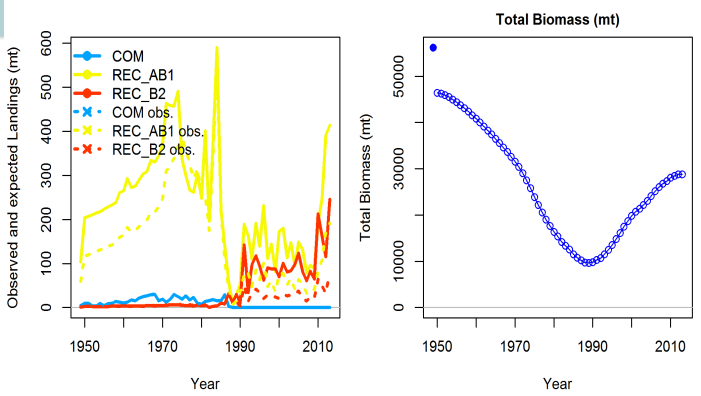
South Carolina Assessment

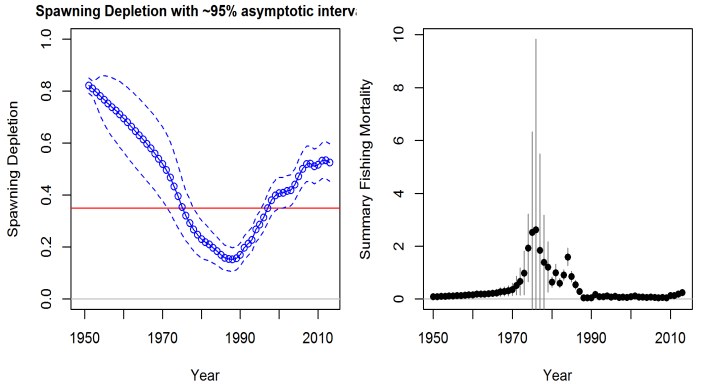
- Integrated SS and SCA models
- Results indicated overfishing
- Prompted reduced bag limit in 2018

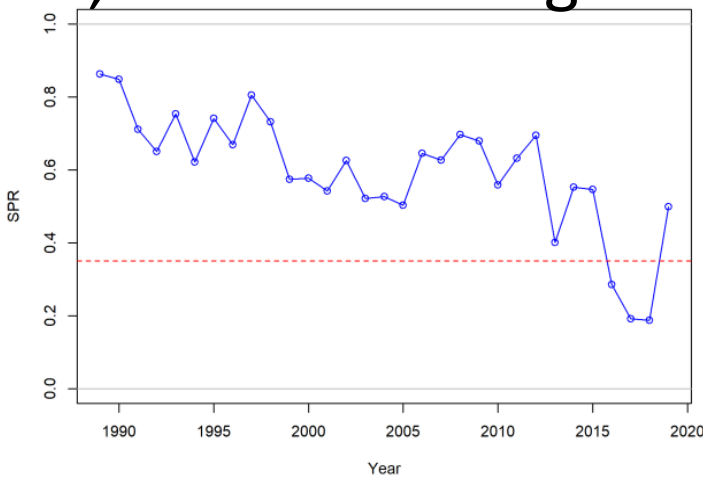


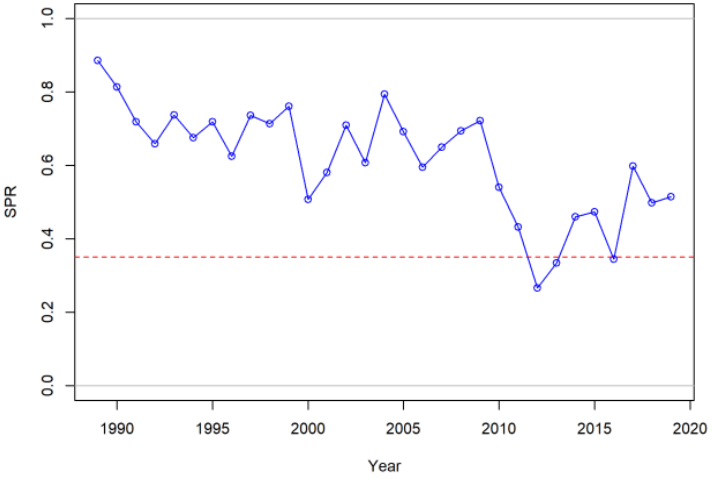
Florida Assessments

- Two assessments in recent years (2015 & 2020)
- Assessments divide Atlantic coast into regional management units (SE & NE)
- Integrated SS models
- Not overfished, not overfishing









Simulation Assessment

Assessment Road Map

- Assessment uncertainties prompted ASMFC Sciaenids Management Board tasking of Assessment Science Committee (ASC) with developing road map to future assessments

- ASC consulted with Red Drum Stock Assessment Subcommittee

Assessment Road Map

- Road map recommended evaluating three potential assessment frameworks
  - Model-free stock indicators
  - Juvenile population dynamics model
  - Complete stock population dynamics model
- Evaluation to be done through simulation modeling
- Results of simulation modeling used to guide subsequent benchmark assessment of *in situ* stocks

Simulation Assessment Process

- Operating models (OM) developed by tuning to observed data sets

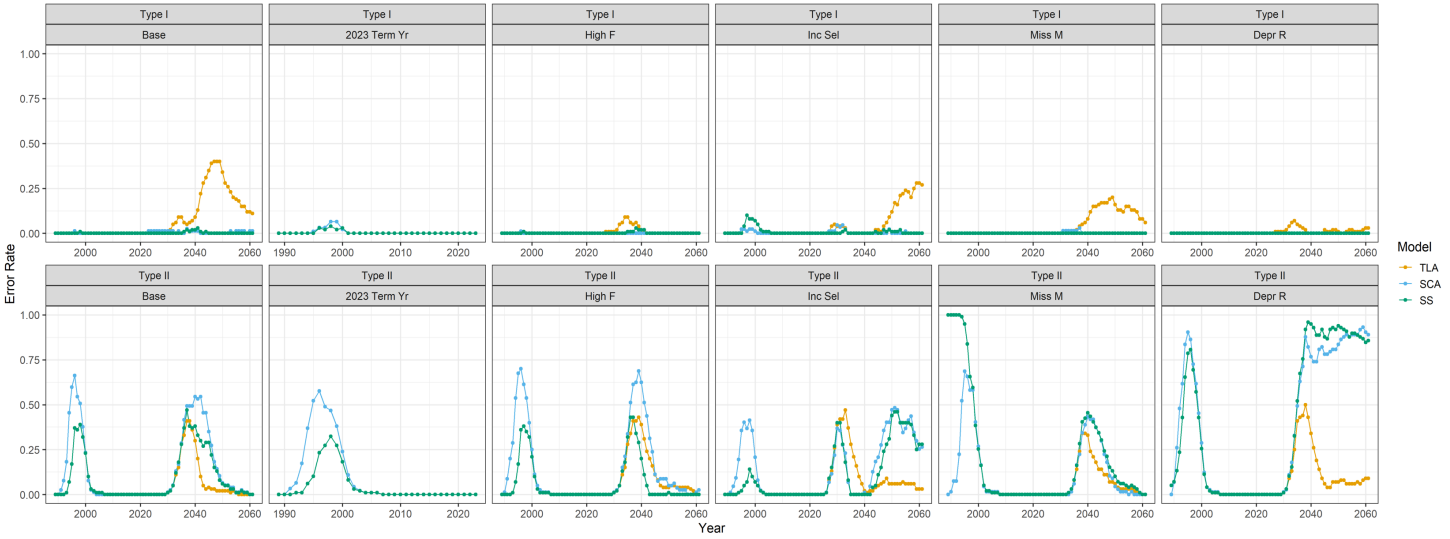
- Data sets sampled for three estimation models (EM):
  - Traffic Light Analysis (TLA)
  - SCA model used in past assessments
  - SS model with expanded age structure

- EM population parameters and status determinations compared to OM

- Several scenarios simulated to assess performance under different conditions

Performance Metrics

- Convergence rate
- Relative error to asses precision and bias of quantitative population parameter estimates
- Error rates for estimating stock status



Results

- Northern SCA relied heavily on tag-based estimates and was sensitive to data weighting
- Northern TLA performed well for recruitment condition and overfished status, poorer for fishing mortality status
- More consistency among methods for southern stock
- Southern SCA precision deteriorated in 2023 Term Yr scenario

Recommendations

- Northern SCA not recommended by SAS
- Peer review panel recommended against pursuing southern SCA in future assessments in favor of more flexible and supported SS platform
- Develop the TLA as a complementary analysis during the benchmark assessment
- Prioritize development of the SS models

Recommendations

- High priority peer review recommendations:
  - Show southern SS model can produce unbiased estimates using sample data without observation error
  - Apply gird search for identifying optimal TLA trigger criteria using on the “historical” period data

Model Year Definition

- Previous red drum assessments have modeled calendar years from January – December
- Transition to fishing year from September – August during this assessment
- Aligns data sets and modeled population dynamics with life history

Questions?