NOAA FISHERIES

SEFSC

Atlantic Blacktip Shark Benchmark Stock Assessment

Indices

SEDAR 65 (Review Workshop)

October 29, 2020

Indices submitted to the Indices Working Group

1. Marine Recreational Information Program Data (1981 – 1999, SEDAR65-DW16)

2a. SEFSC Shark Bottom Longline Fishery (1994 – 2007, SEDAR65-DW17)

2b. SEFSC Shark Bottom Longline Research Fishery (2008 – 2018)

3a. VIMS Bottom Longline original Series (1974 – 2018, SEDAR65-DW05)

3b. VIMS Bottom Longline catch Series (1974 – 2018, excluded years with zero catches)

3c. VIMS Bottom Longline Robust Series (1990 – 2018)

4. SEFSC-Mississippi Laboratory Bottom Longline Survey (NA, SEDAR65-DW15)

5. NEFSC Bottom Longline (1996 – 2018, SEDAR65-DW09)

6. SCDNR SEAMAP Bottom Longline Survey (2007 – 2018, SEDAR65-DW11)

7. SCDNR Red Drum Bottom Longline Survey (1996 – 2006, SEDAR65-DW11)

8. SCDNR Drumline Survey (2013 – 2018, SEDAR65-DW13)

9. GADNR SEAMAP Longline Survey (2007 – 2018, SEDAR65-DW12)

10a. COASTSPAN Bottom Longline All-ages (2005 – 2018, SEDAR65-DW08)

10b. COASTSPAN Bottom Longline age-0 (2005 – 2018)

11a. COASTSPAN Gillnet Long Net All-ages (2001 – 2018, SEDAR65-DW07)

11b. COASTSPAN Gillnet Long Net age-0 (2001 – 2018)

12. COASTSPAN Gillnet Short Net Age-0 (2006 – 2018, SEDAR65-DW10)

Flowchart developed by ICCAT and used as a method to evaluate indices of abundance as an input to the stock assessment model

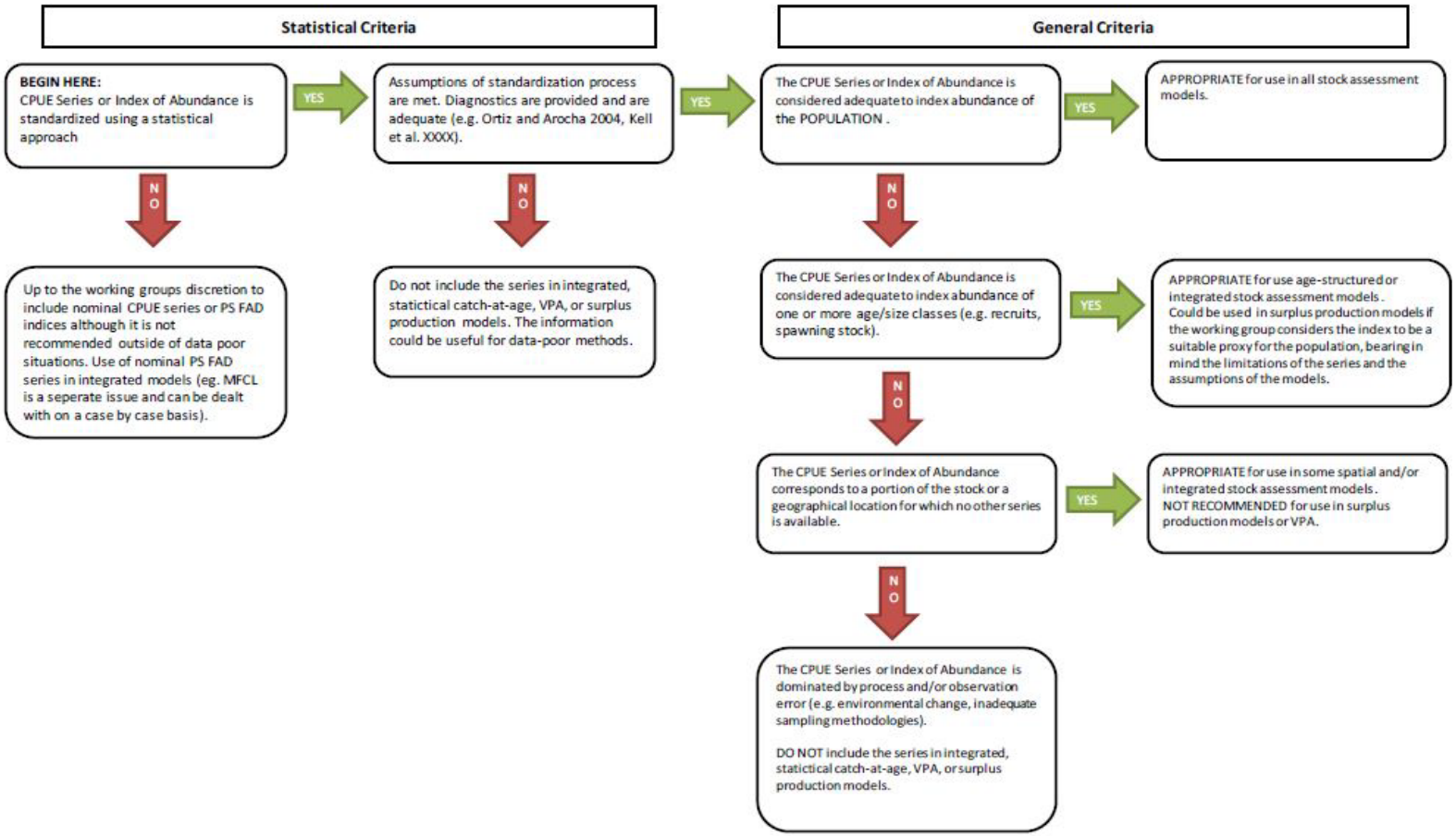
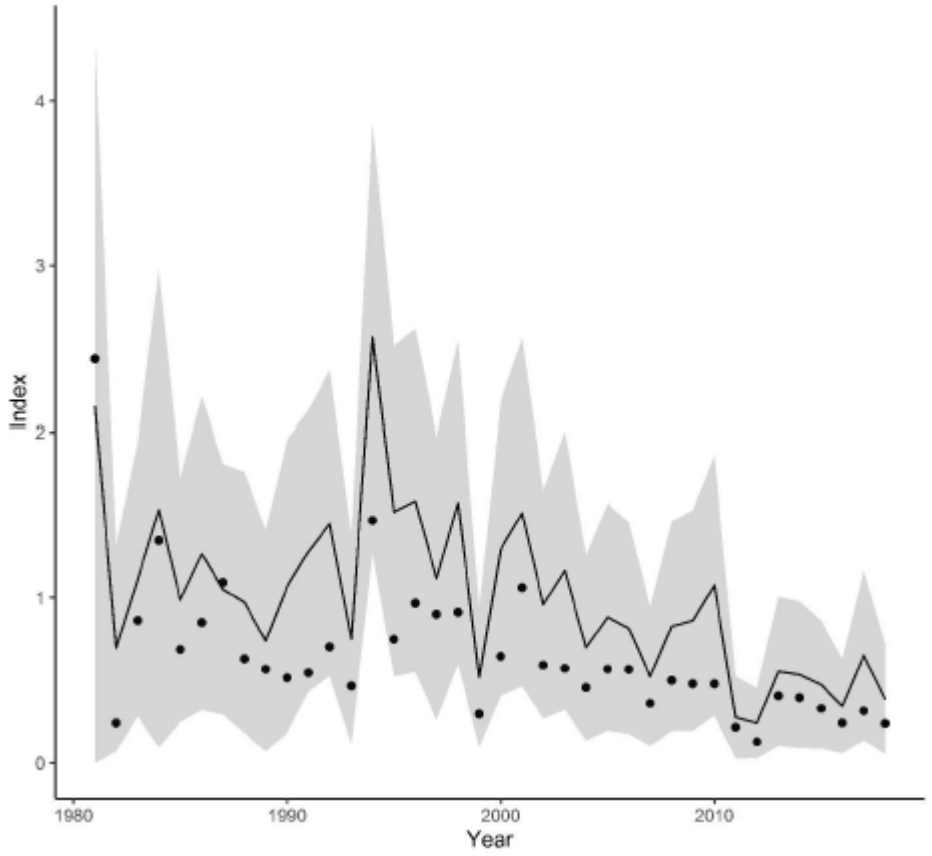


Figure 1. A flowchart to facilitate the appropriate application of CPUE series to stock assessment models used by ICCAT.

Elements used to evaluate the adequacy and retention of CPUE series as an input to the stock assessment model

ELEMENT	DESCRIPTION	ACTIONS AND REASONING
1	Diagnostics	Apply defendable model validations (i.e., Q-Q plots, residuals, etc.) and consider overdispersion
2	Appropriateness of data exclusions and classifications (e.g., to identify targeted trips).	How were trips identified and was this a shark directed survey
3	Geographical coverage	How does the series compare with the range of the stock (i.e. Miami , FL to Long Island, NY)
4	Catch fraction	Change to mean proportion positives through time series
5	Length of time series relative to the history of exploitation.	The length of catch series for assessment is 1981-2018. For inclusion, survey must be established for minimum of 10 years but consideration will be given to shorter time series if they satisfy other important criteria
6	Are other indices available for the same time period?	Evaluate and pick best survey or combine them at the data level (if methods are similar)
7	Does the index standardization account for known factors that influence catchability/selectivity?	Is there an attempt to account for catchability and are the appropriate factors being considered
8	Are there conflicts between the catch history and the CPUE response?	Does the trend follow the expected performance based on management
9	Is the interannual variability outside biologically plausible bounds	Look at interannual variability: Is the trend of increase biologically plausible?
10	Are biologically implausible interannual deviations severe?	Covariates appropriate or accurate, change in design or stations appropriate
11	Assessment of data quality and adequacy of data for standardization purposes (e.g., sampling design, sample size, factors considered)	Are the covariates appropriate that were used in standardizing the data?
12	Is this CPUE time series continuous?	If not continuous, were there big changes in survey?
13	Characterization of Index uncertainty	Method of characterization (e.g., bootstrap, delta method), magnitude of uncertainty (e.g., CV)

1. Marine Recreational Information Program Data (1981-1999, SEDAR65-DW16)

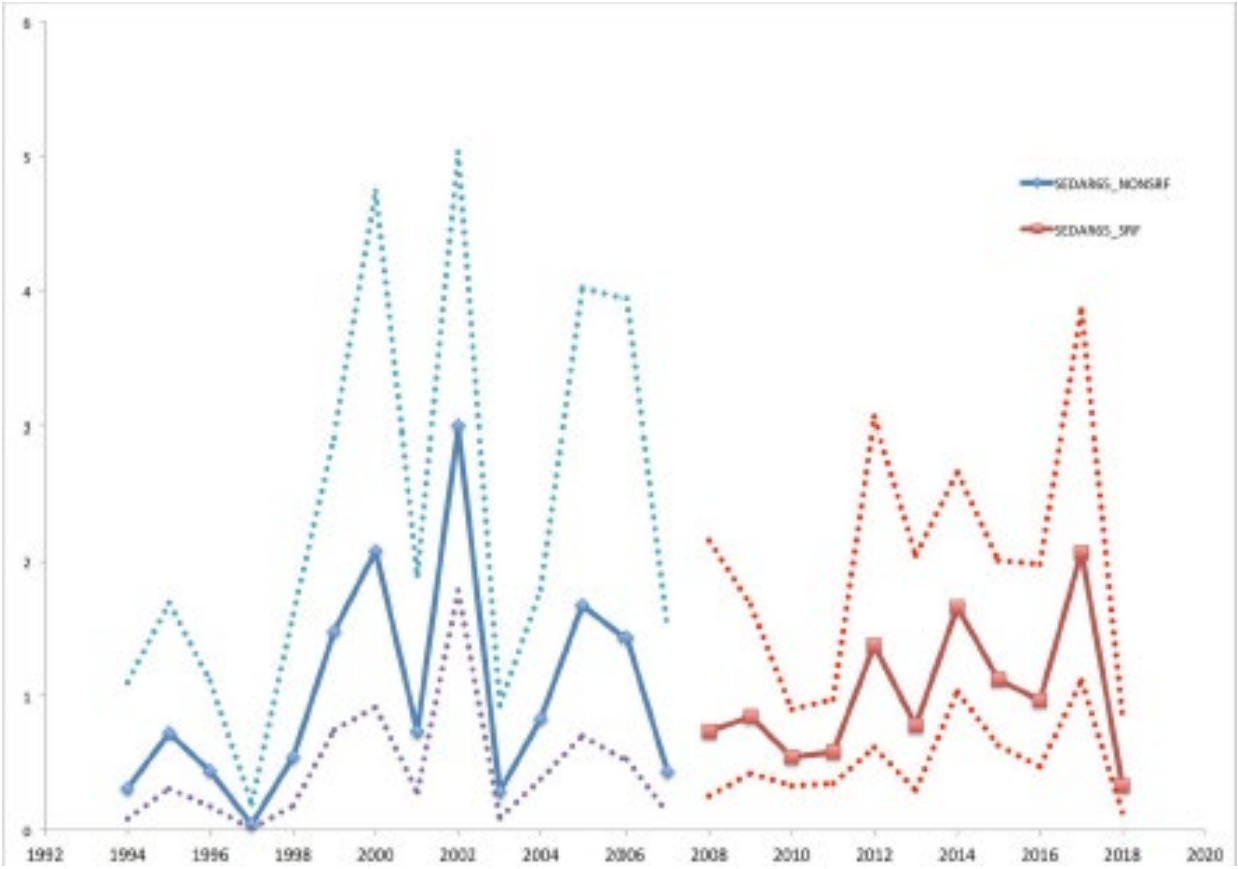


AP decisions for indices at the DW

the catch of carcharhinid sharks identified to species in the MRIP data has declined over the last 30 years, as more sharks have been released alive rather than landed. While this is a success from a management perspective, the trip interceptor cannot identify the species. Thus, this index is likely to be biased.

Decision: This index is likely to be biased. The group thus recommended that not be utilized.

SEFSC Shark Bottom Longline
2a. Fishery (1994 – 2007, SEDAR65-DW17)
2.b. Research Fishery (2008 – 2018)



AP decisions for indices at the DW

Two indices of abundance were created from this data series; 1994-2007 for all vessels and 2008-2018 for vessels in the research fishery. While observations of vessels outside the research fishery were made from 2008-2018, the low sample size in some years precluded including those data, as the model would have difficulty converging. The time series covers a broad area (North Carolina to Florida) over a long temporal period (1993-2018).

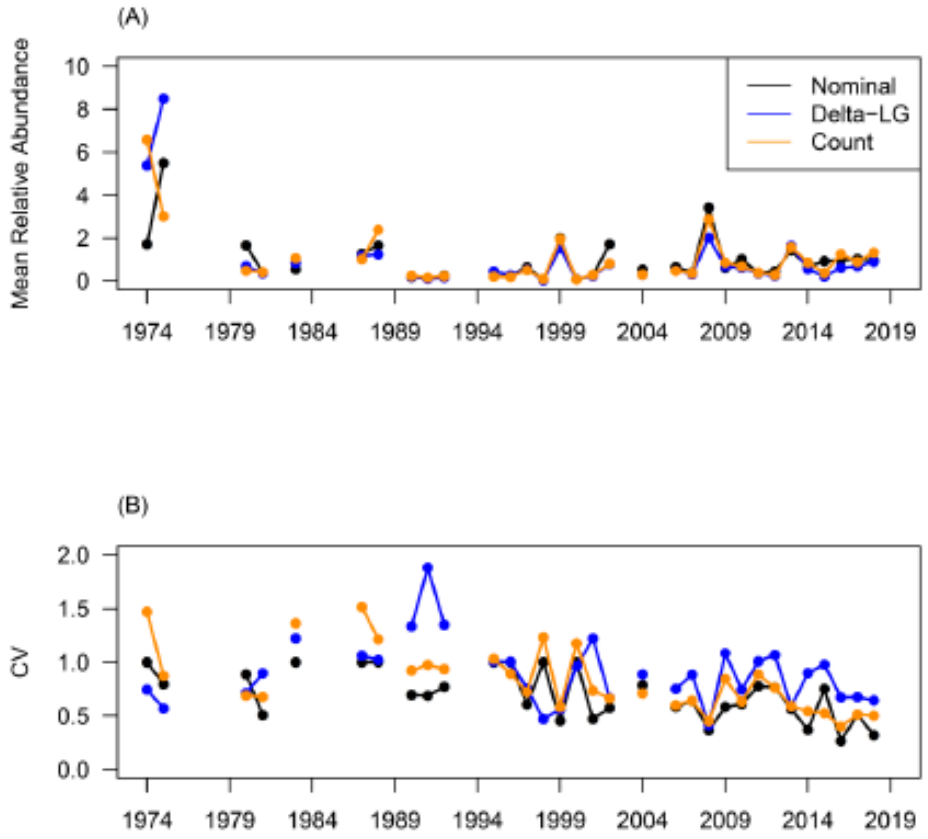
Decision: The Group determined that despite the series being noisy due to observational error, the series should be retained for use in the stock assessment.

VIMS Bottom Longline

3a. Original Series (1974 – 2018, SEDAR65-DW05)

3b. Catch Series(1974 – 2018, excluded zero catches)

3c. Robust Series (1990 – 2018)



AP decisions for indices at the DW

The Virginia Shark Monitoring and Assessment Program (VASMAP), which is based out of the Virginia Institute of Marine Science (VIMS), has been sampling shark populations in the coastal waters of Virginia since 1974 using standardized fisheries-independent longline gear.

Decision: The Group thus recommended three alternate time series for this data be developed and potentially utilized in the stock assessment: 1) including the entire time series regardless of sample size (1974-2018), 2) truncated to match the year when the catch series begins (1981-2018), and 3) the time series which would be considered to be the most robust in regards to sampling (1990-2018).

4. Southeast Fisheries Science Center-Mississippi Laboratory Bottom Longline Survey (NA, SEDAR65-DW15)

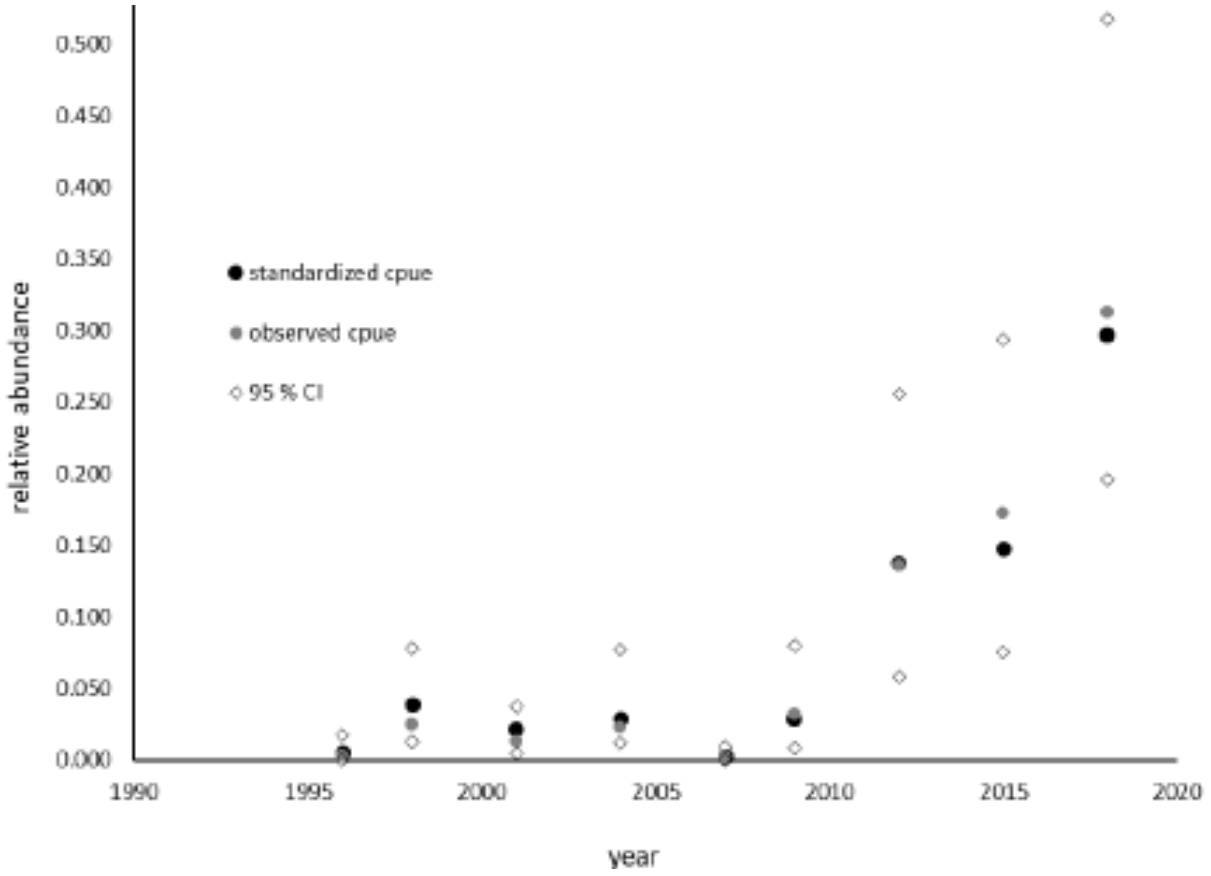
NO PLOT

AP decisions for indices at the DW

There were not sufficient numbers of blacktip sharks caught in the survey to produce a reliable index of relative abundance (n=45). This was largely due to the timing of the survey, which occurs when most blacktip sharks are either in areas further north or in shallow waters inaccessible by the NOAA vessel.

Decision: The Group did not recommend this series for use in the assessment.

5. NEFSC Bottom Longline (1996 – 2018, SEDAR65-DW09)

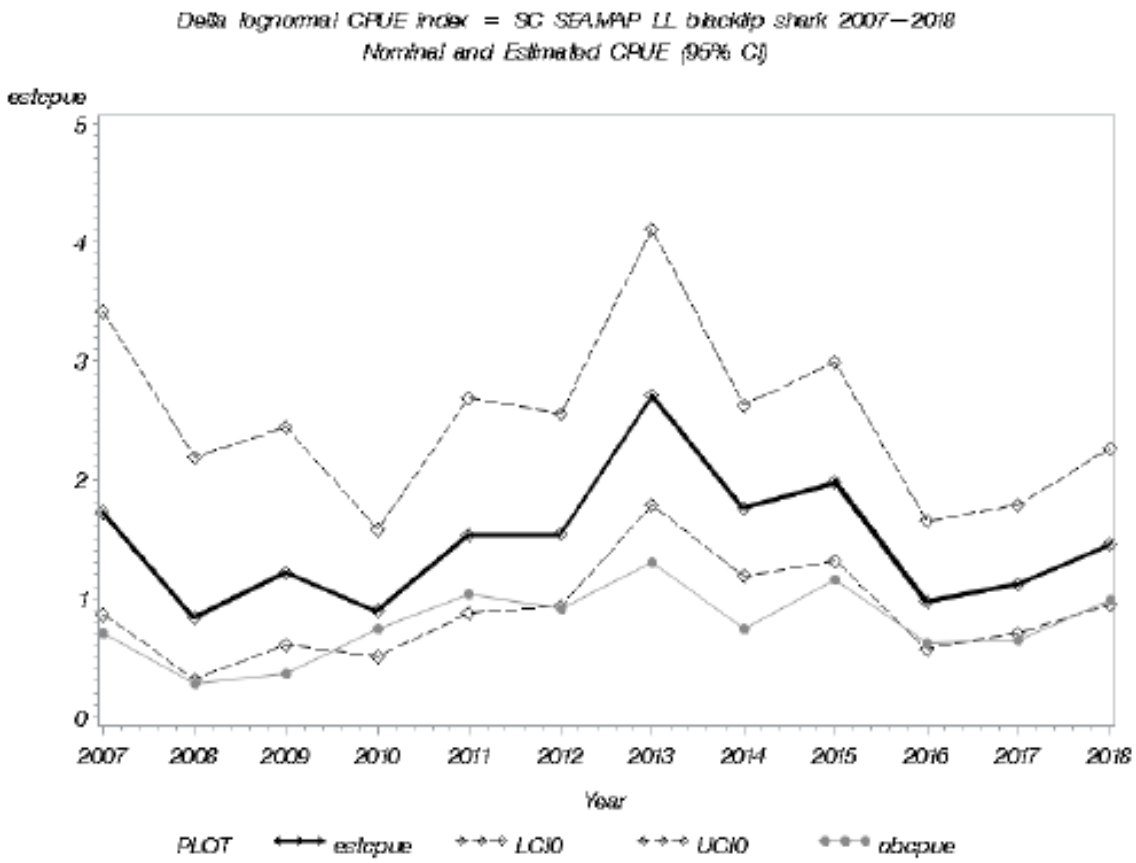


AP decisions for indices at the DW

The Northeast Fisheries Science Center (NEFSC) coastal shark bottom longline survey is conducted by the Apex Predators Program. The standardized CPUE results from the NEFSC longline survey show an increasing trend in blacktip shark relative abundance across survey years from 1996 to 2018.

Decision: The Group noted that although CVs might be biased low, it was recommended this series be retained for use in the assessment.

6. SCDNR SEAMAP Bottom Longline Survey (2007 – 2018, SEDAR65-DW11)

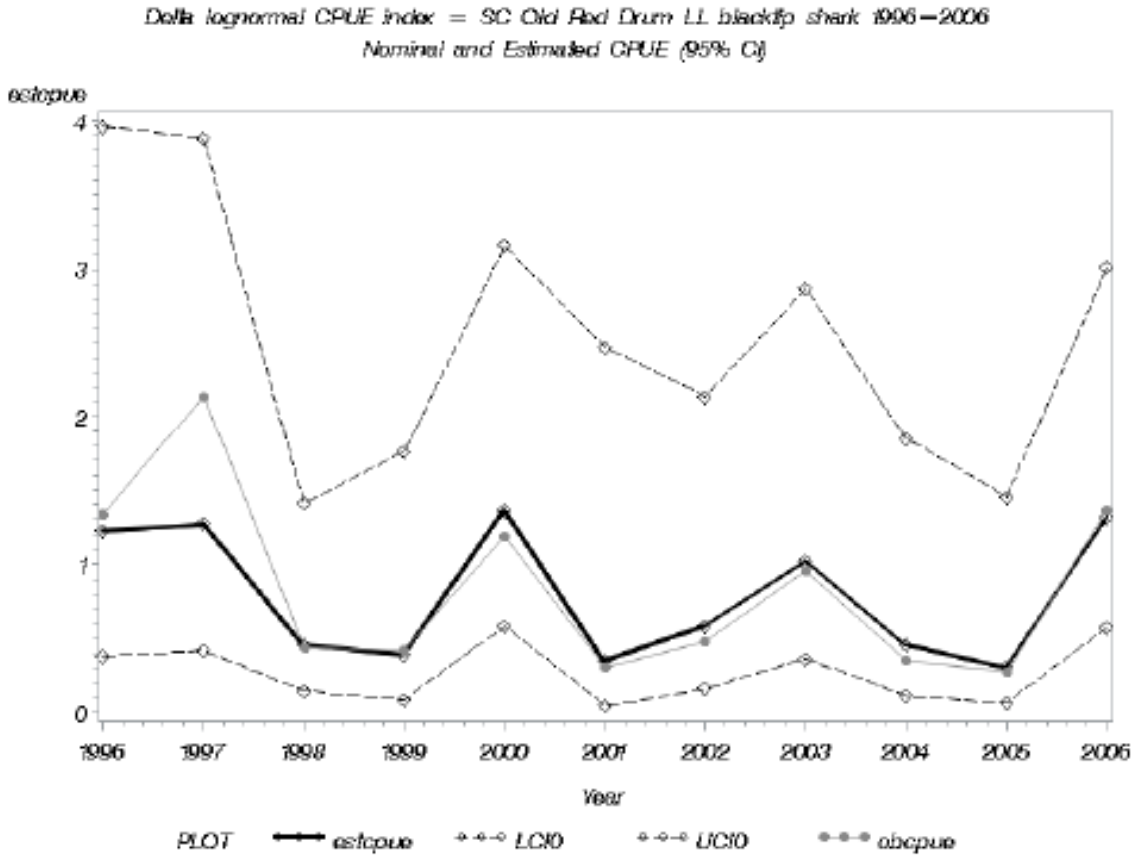


AP decisions for indices at the DW

The South Carolina Department of Natural Resources (SCDNR) Southeast Area Monitoring and Assessment Program (SEAMAP) multispecies survey started in 2007 as a replacement for the prior SCDNR red drum longline survey. The Group noted that the survey suffers from limited spatial coverage but has good temporal coverage. The survey is also based on a stratified random design located within the core of the species range.

Decision: The Group recommended that this series be retained for use in the assessment.

7. SCDNR Red Drum Bottom Longline Survey (1996 – 2006, SEDAR65-DW11)



AP decisions for indices at the DW

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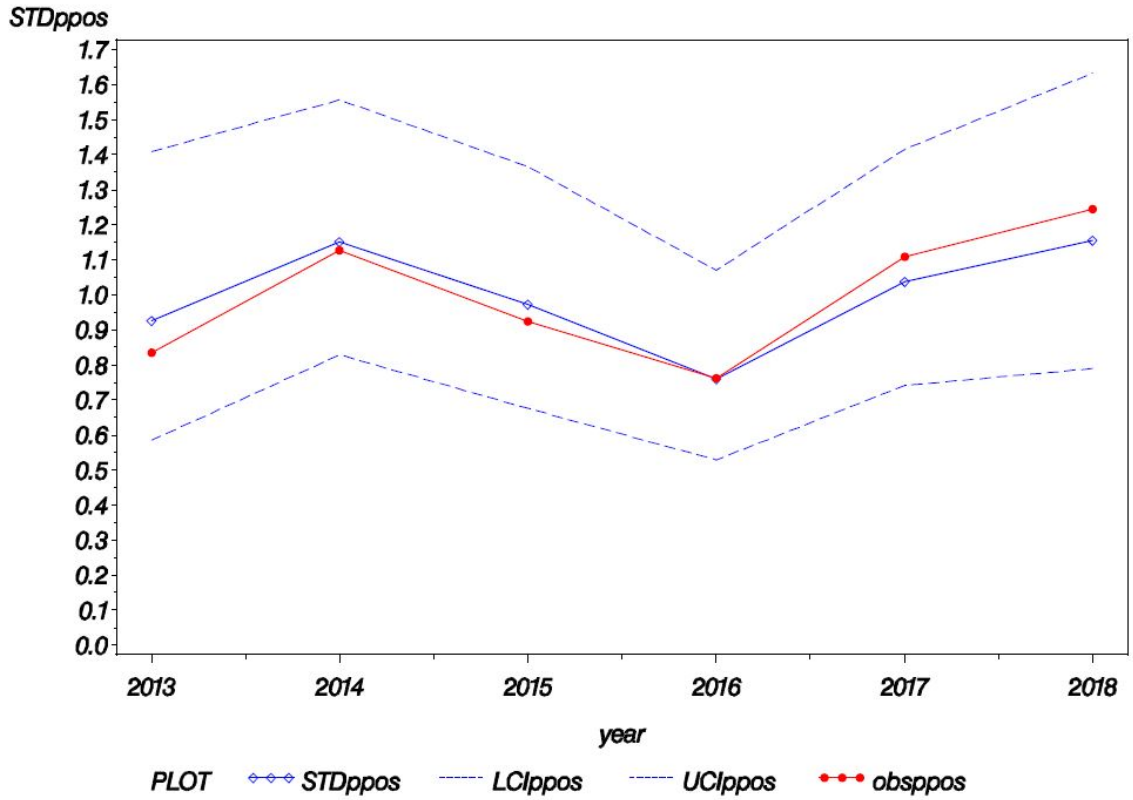
Decision: The Group recommended that this series be retained for use in the assessment.

8. SCDNR Drumline Survey (2013 – 2018, SEDAR65-DW13)

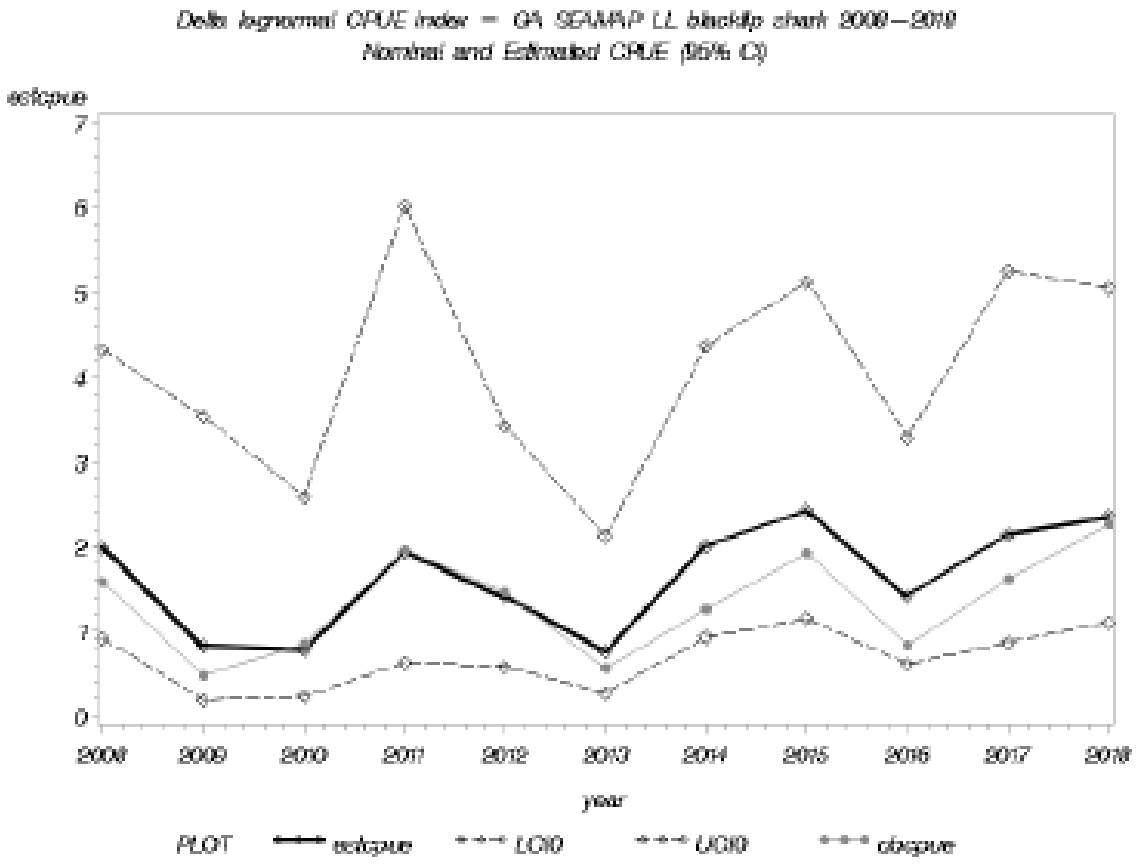


AP decisions for indices at the DW

This time series is not very long temporally. However, the survey samples mostly large juveniles and adults with a high proportion positive of catches.

Decision: As there are few series that sample this portion of the population exclusively, the Group recommended the series be retained.

9. Georgia Department of Natural Resources SEAMAP Longline Survey (2007-2018, SEDAR65-DW12)

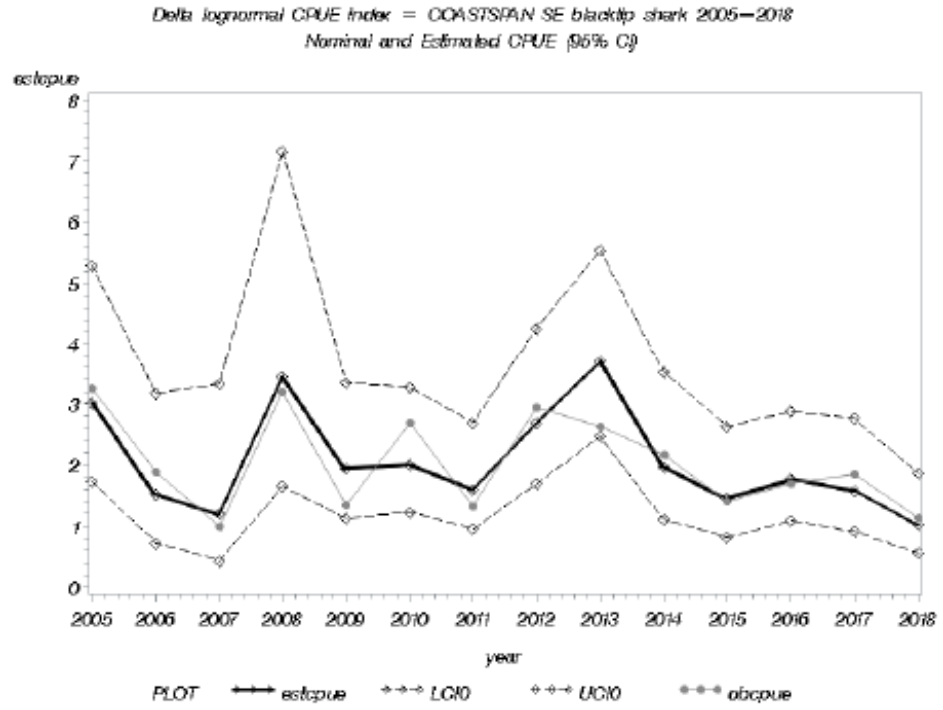


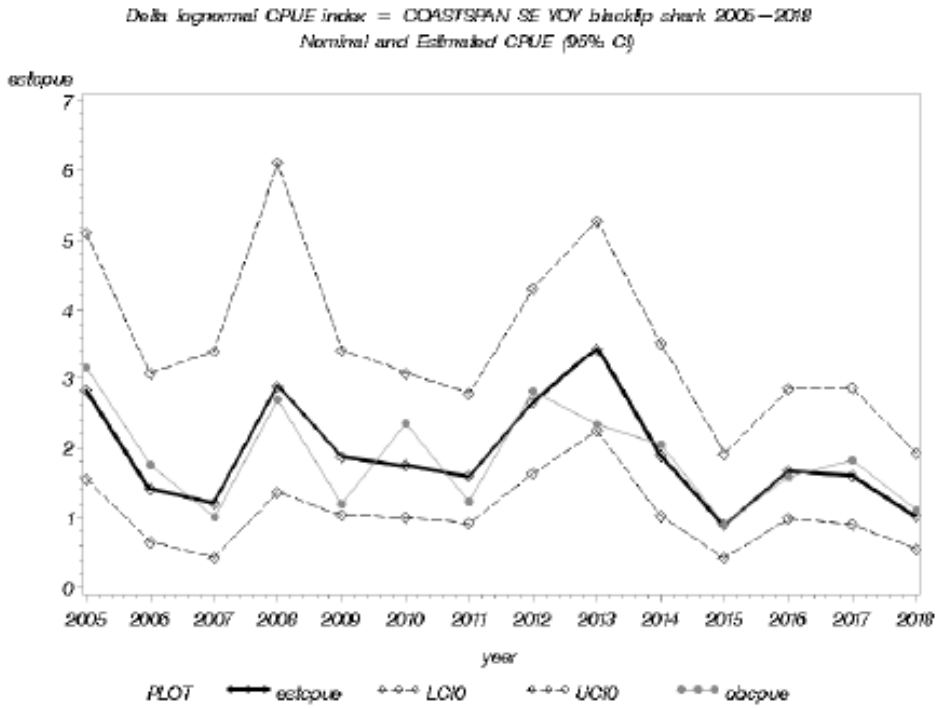
AP decisions for indices at the DW

Differences in bait and hook type were found to have a significant effect on blacktip shark catches, but could not be accounted for in the model since the differences did not overlap within years.

Decision: Because of the variability in methods and their influence on the abundance trend, the Group recommended this series not be retained for use in the stock assessment.

COASTSPAN Bottom Longline
10a. All-ages (2005 – 2018, SEDAR65-DW08)
10b. age-0 (2005 – 2018, SEDAR65-DW08)



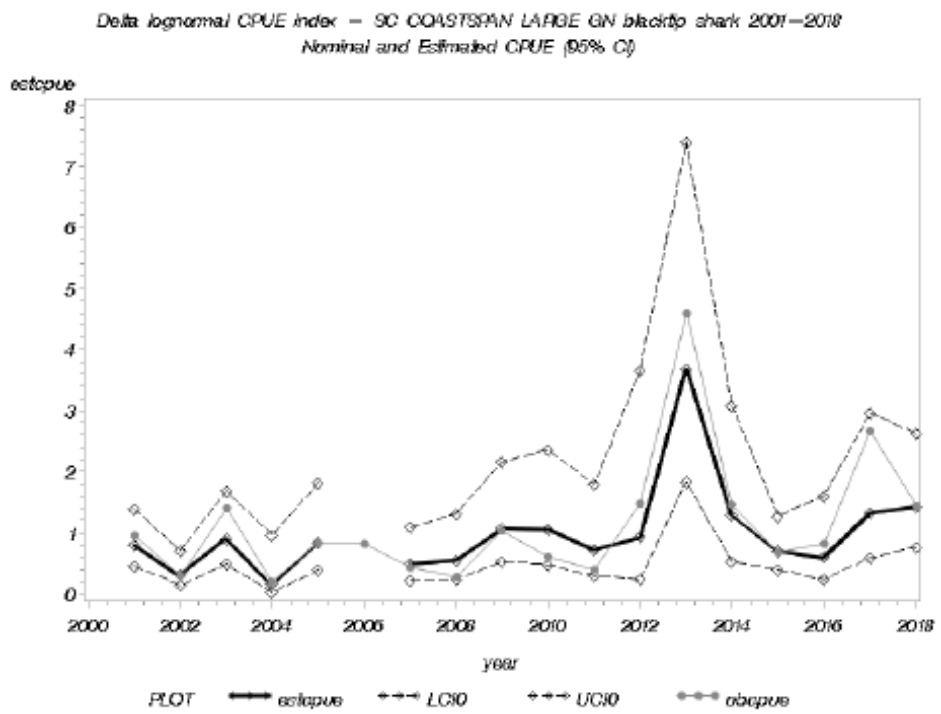


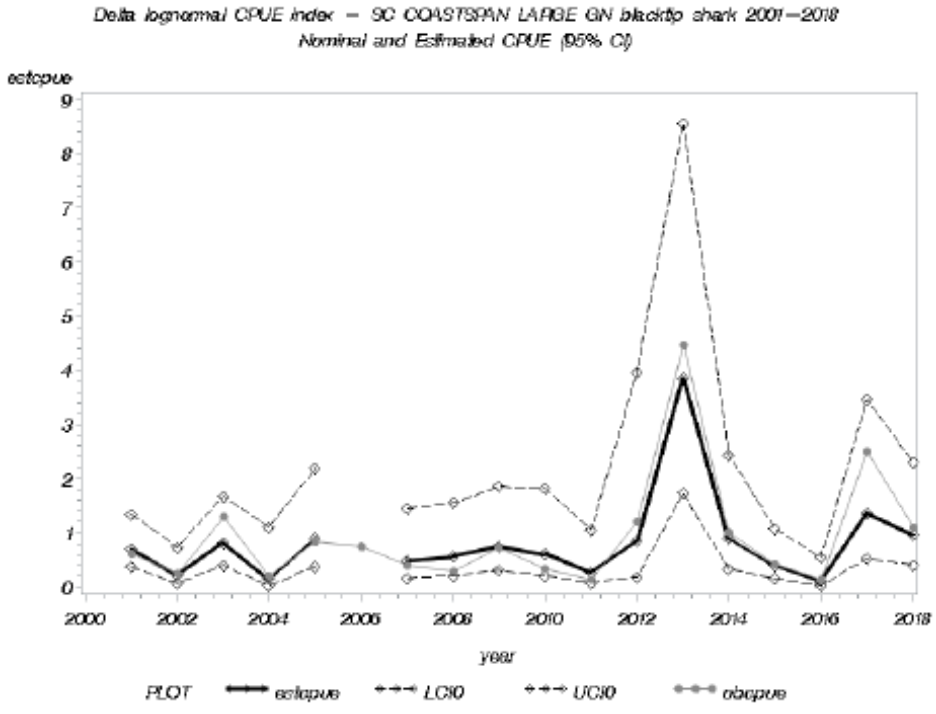
AP decisions for indices at the DW

Personnel from the SCDNR, GADNR, and UNF in collaboration with the NMFS Cooperative Atlantic States Shark Pupping and Nursery (COASTSPAN) survey began sampling for sharks using longline and/or gillnet methods in several of their state's estuaries and nearshore waters.

Decision: The Group evaluated the time series and, due to the temporal and spatial coverage, decided that it should be recommended for use. After consulting with the lead stock assessment analyst, the Group also recommended the series be split into Age 0 sharks only and all life stages combined. The Age 0 sharks time series will be used as a recruitment index for the stock assessment. The Group noted that both the Age 0 and juvenile time series should not be included in a model at the same time because they are based on the same data set.

COASTSPAN Gillnet Long Net
11a. All-ages (2001 – 2018, SEDAR65-DW07)
11b. age-0 (2001 – 2018, SEDAR65-DW07)





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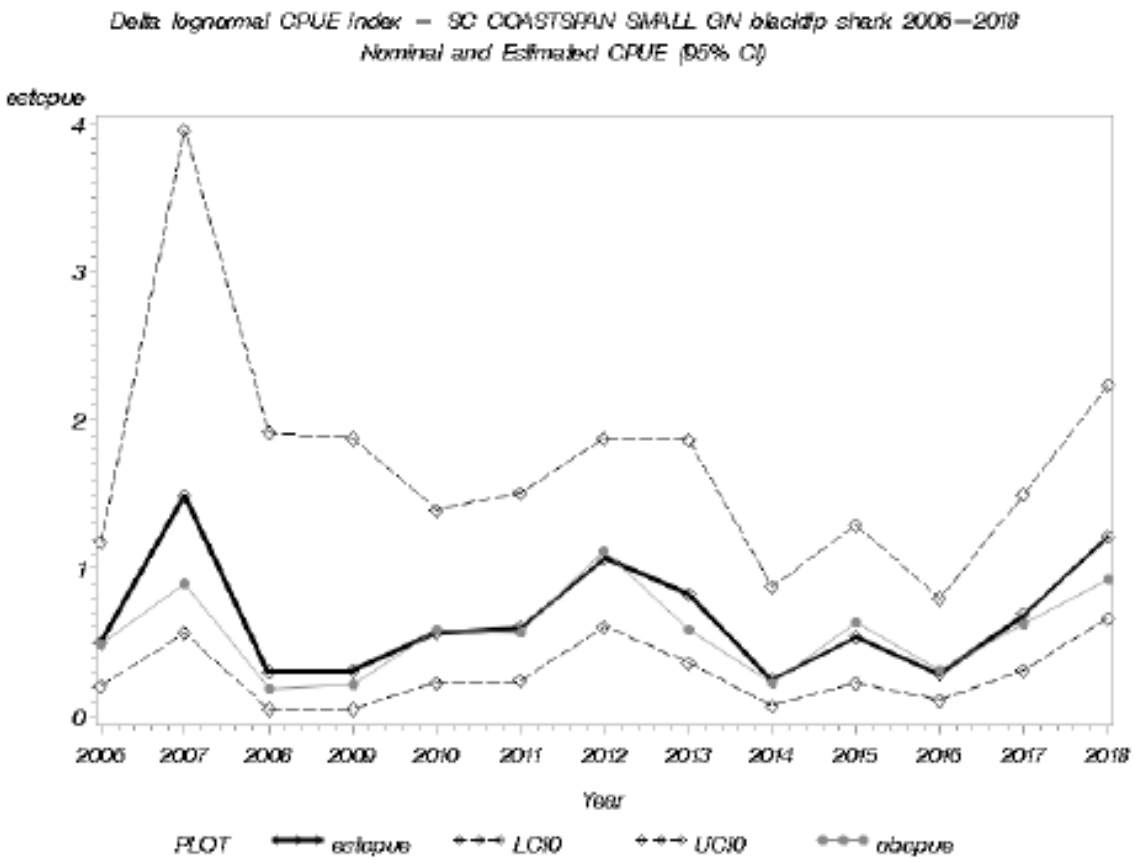
Decision: The Group recommended this series be retained for use in the assessment.

12. COASTSPAN Gillnet Short Net Age-0 (2006 – 2018, SEDAR65-DW10)



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Decision: The Group recommended this series be retained for use in the assessment.

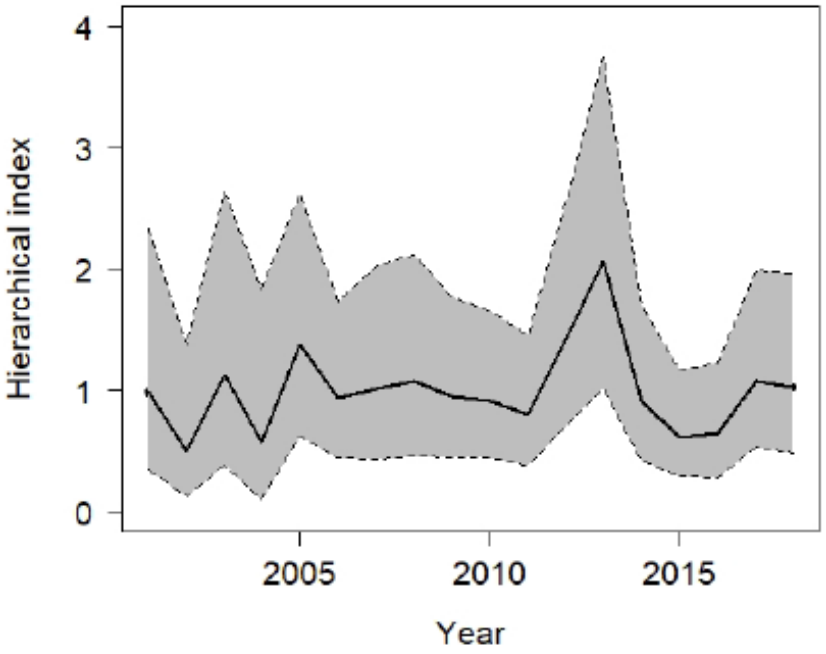
Indices recommended by the Indices Working Group

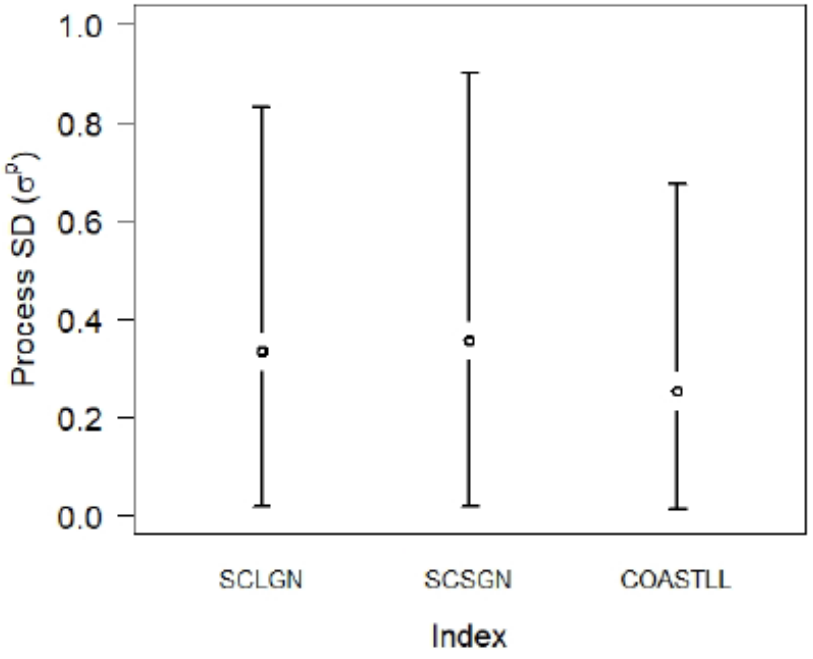
S1 (Shark-BLL-Obs) = Shark Bottom Longline Fishery (1994 – 2007)
S2 (Shark-BLL-Res) = Shark Bottom Longline Research Fishery (2008 – 2018)
S3 (VIMS-BLL-Robust) = VIMS Bottom Longline Robust Series (1990 – 2018)
S4 (NEFSC-BLL) = NMFS-NEFSC Bottom Longline (1996 – 2018)
S5 (SCDNR-SEAMAP-BLL) = SCDNR SEAMAP Bottom Longline Survey (2007 – 2018)
S6 (SCDNR-Red-Drum-BLL) = SCDNR Red Drum Bottom Longline Survey (1996 – 2006)
S7 (SCDNR-DL) = SCDNR Drumline Survey (2013 – 2018)
S8 (COASTSPAN-BLL-All-ages) = COASTSPAN Bottom Longline All-age (2005 – 2018)
R1 (COASTSPAN-BLL-age-0)
S9 (COASTSPAN-GNL-All-ages) = COASTSPAN Gillnet Long Net All-age (2001 – 2018)
R2 (COASTSPAN-GNL-age-0)
S10 (or R3)(COASTSPAN-GNS-age-0) = SCDNR Gillnet Short Net Age-0 (2006 – 2018)

Approximate linear coverage of specific abundance indices for Atlantic blacktip shark

Additional indices explored during the AP

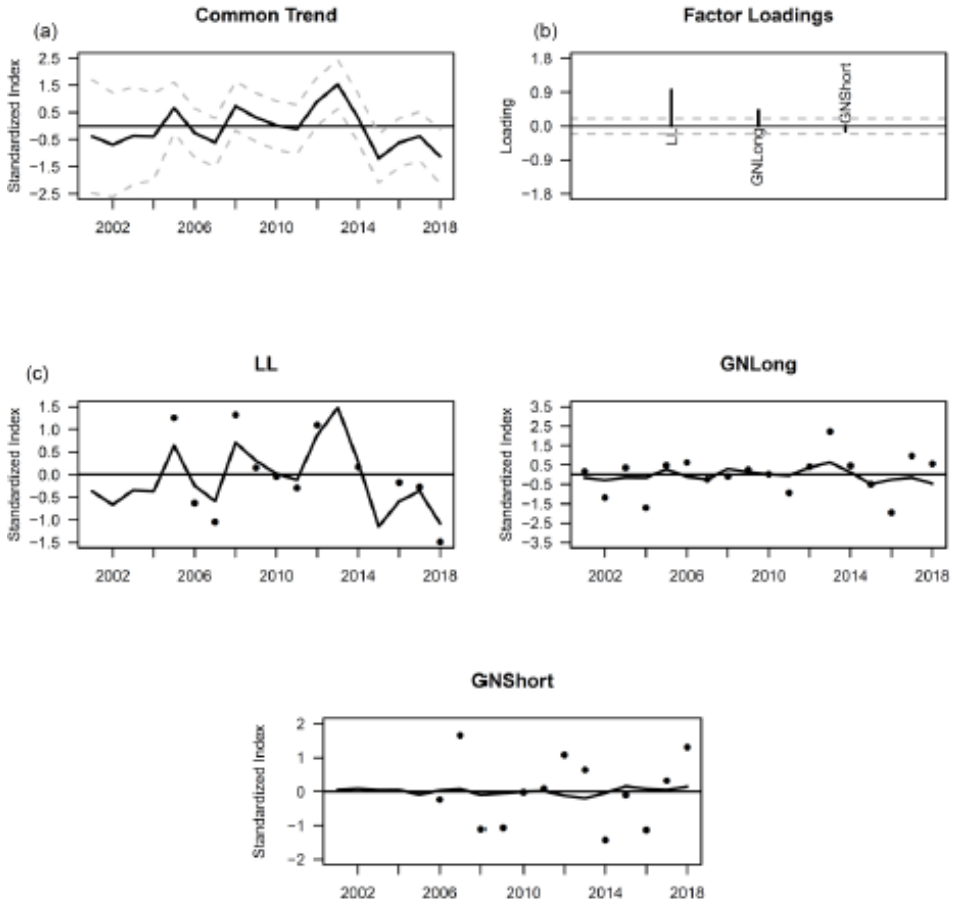
Hierarchical index for Atlantic blacktip shark recruitment indices (2001-2018, SEDAR65-AW01)

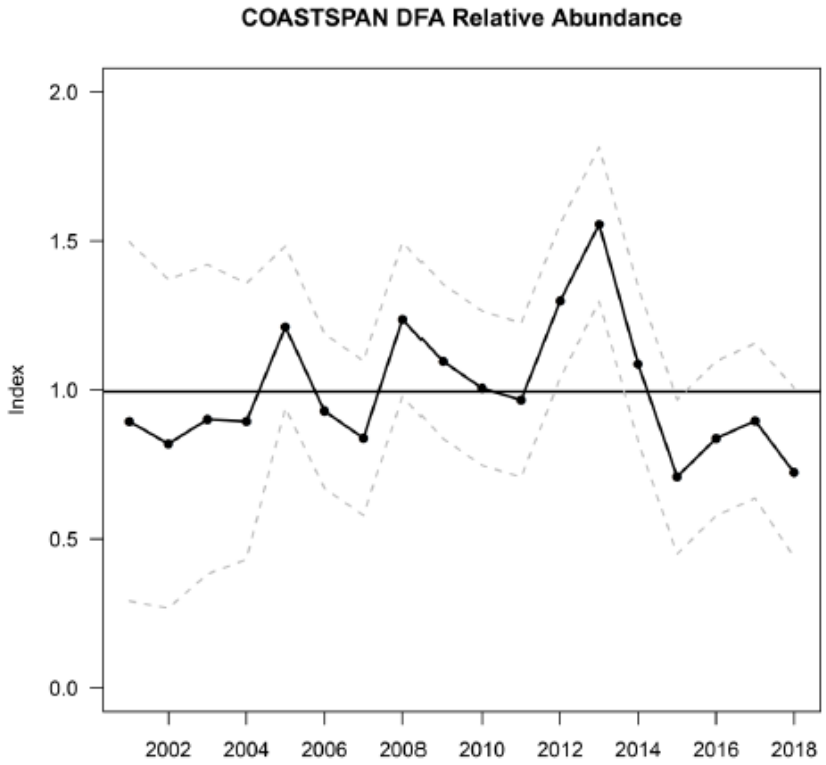




Additional indices explored during the AP

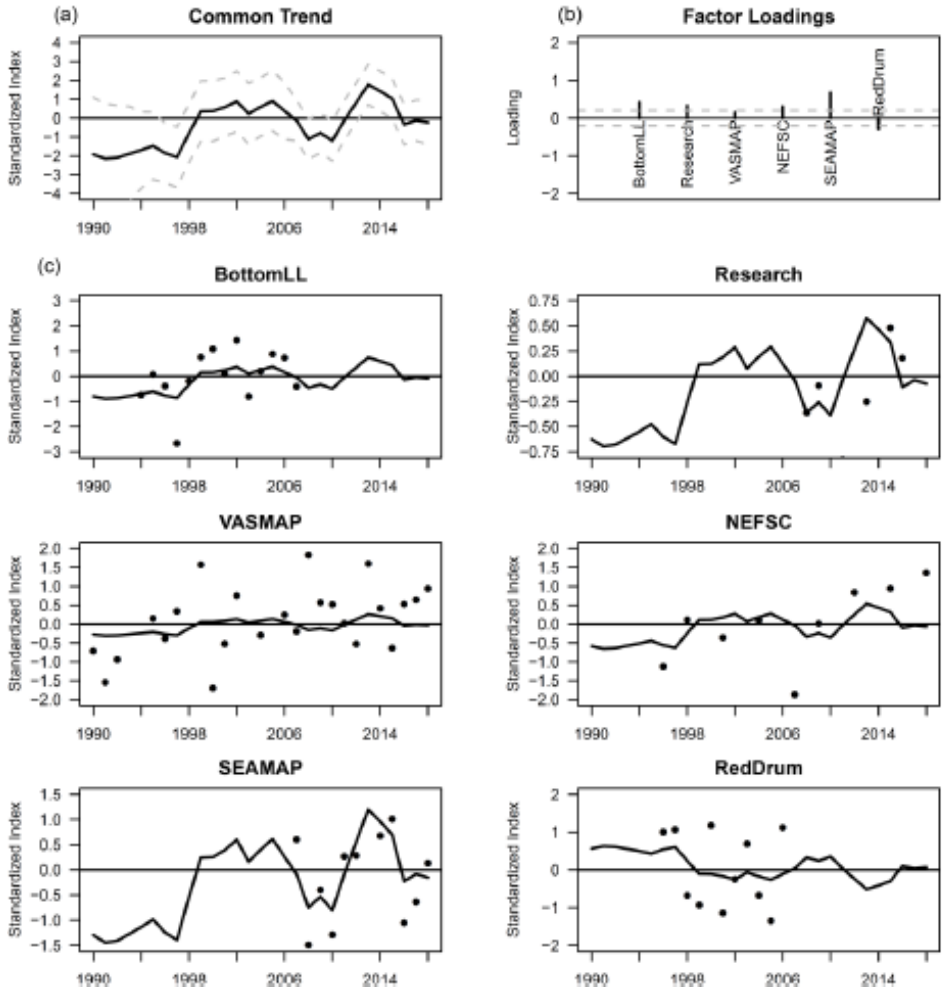
DFA index for Atlantic blacktip shark recruitment indices (2001-2018, SEDAR65-AW03)

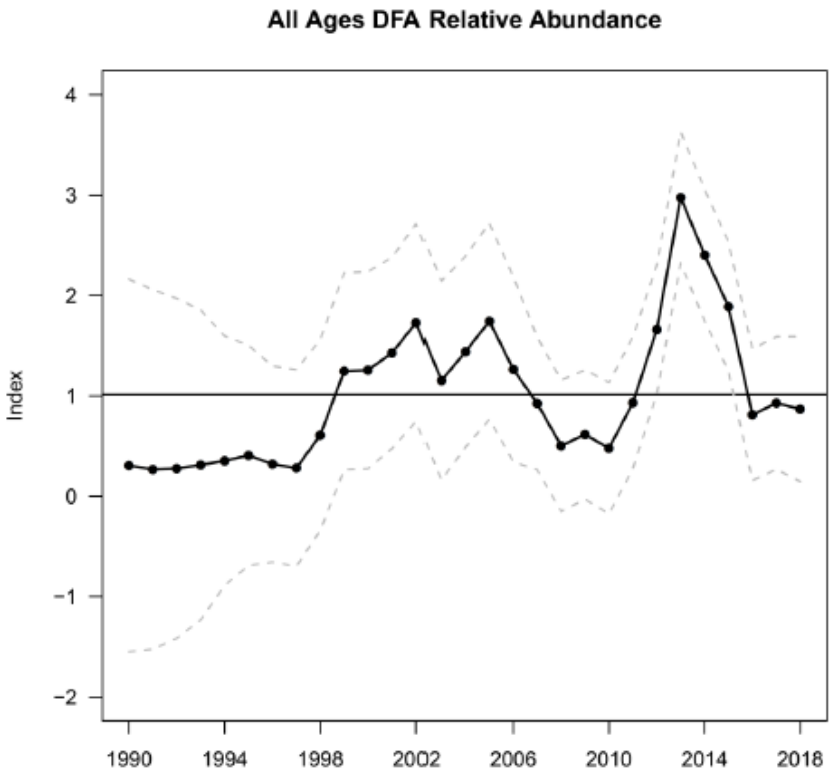




Additional indices explored at the AP

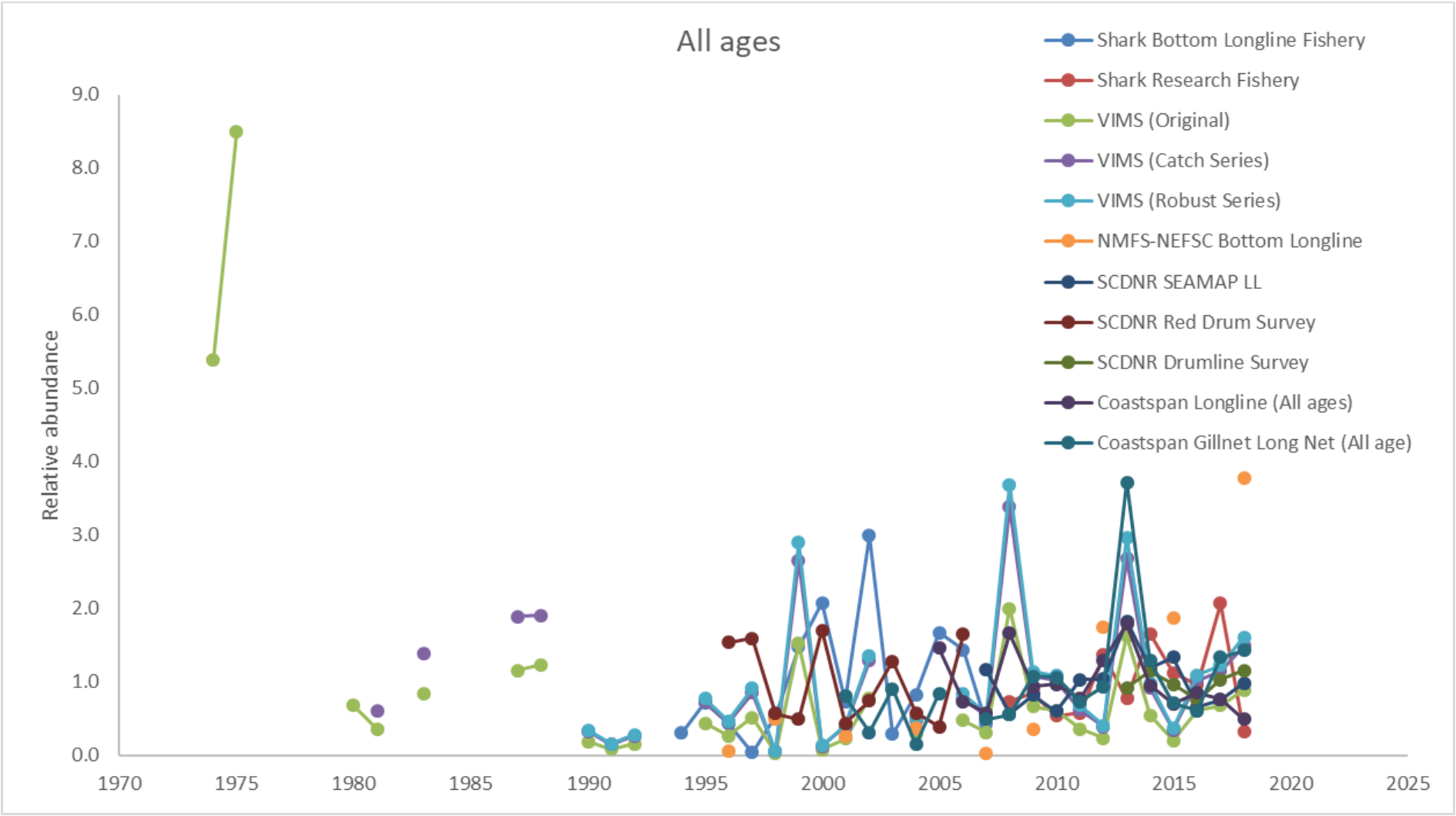
DFA index for Atlantic blacktip shark all-ages (1990-2018, SEDAR65-AW03)





Additional slides

Mean annual values of relative abundance for each time series recommended for all ages by the Indices Working Group (VIMS(Original) and VIMS (Catch Series) were NOT used in assessment)



AP decisions for indices at the DW