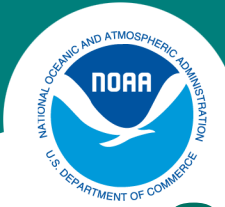
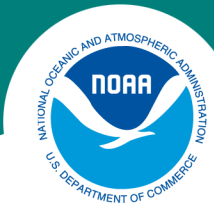


**NOAA  
FISHERIES  
SERVICE**



# **SEDAR 77 HMS Hammerhead Sharks Review Workshop Aug 28, 2023**

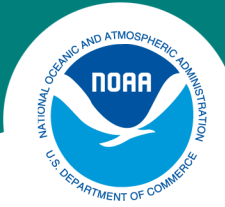
## **Final Recommended Indices**



# Procedure for evaluation

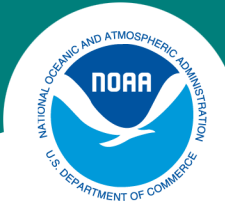
- -Proportion positive
- -Area covered
- -Life stage
- -Analysis used
- Delta lognormal/Negative binomial
- Diagnostics
- CV





# Working group evaluation of indices

- RECOMMENDATION
- -Data require any revised analysis
- -Make recommendation
- -Use in base case (life stage/area)
- -Use in sensitivity (life stage/area)
- -Do not use

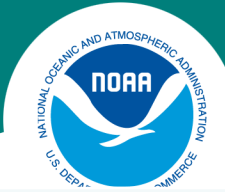


## **Recommendation**

**Indices available for potential combination**

**Bayesian hierarchical method (Conn 2010)**

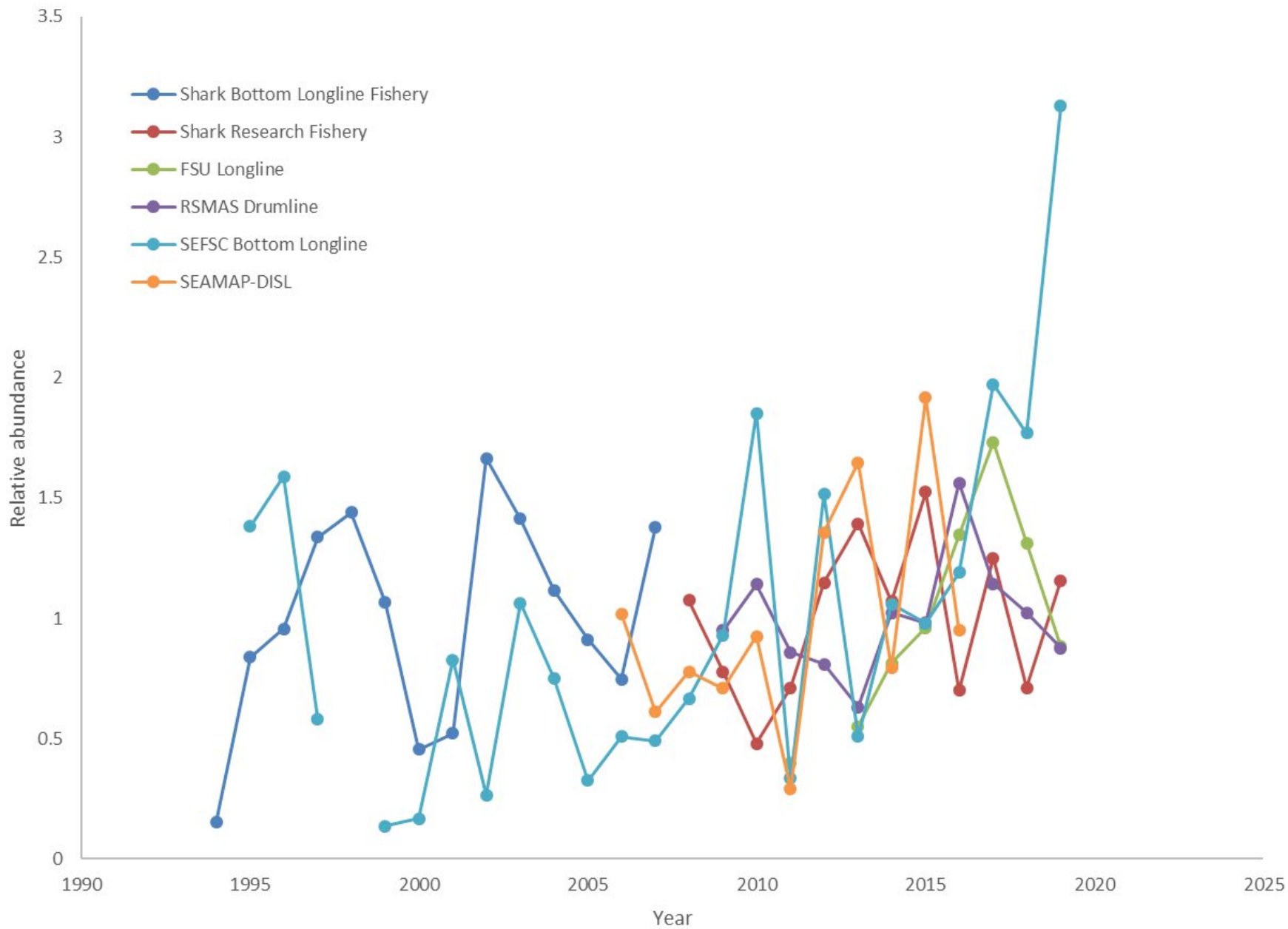
**Dynamic factor analysis (DFA) (Peterson et al. 2017)**

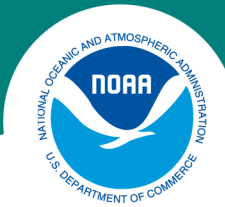


# Great hammerhead

Paper	Recommendation	Notes					
SEDAR 77 - DW12: Standardized abundance indices from scalloped and great hammerhead from the Shark Bottom Longline Observer Program, 1994-2019	Base	Stock wide, long time series, used in many previous shark assessments'					
SEDAR 77 - DW14: Standardized Abundance Indices for Great and Scalloped Hammerhead from the Florida State University Longline Survey	Base	post-analysis to be conducted on subset of data based to reduce true zeros from areas where hammerheads are not available					
SEDAR 77 - DW15: Standardized Abundance Index for Great Hammerhead from the Rosenstiel School of Marine and Atmospheric Science Drumline Survey	Base	base or sensitivity depending on available indices; Discuss spatial resolution, large CVs					
SEDAR 77 - DW24: Scalloped and Great Hammerheads Abundance Indices from NMFS Bottom Longline Surveys in the Northern Gulf of Mexico and Western North Atlantic	Base	long term, used in previous SEDARs, stock wide					
SEDAR 77 - DW25: Standardized Catch Rates Of Great Hammerheads (Sphyrna Mokarran) Collected During Bottom Longline Surveys In Coastal Waters Of The Northern Gulf Of Mexico, 2006-2019	Base	Good spatial coverage (TX-AL); Few GreatHH indices in western GOM					



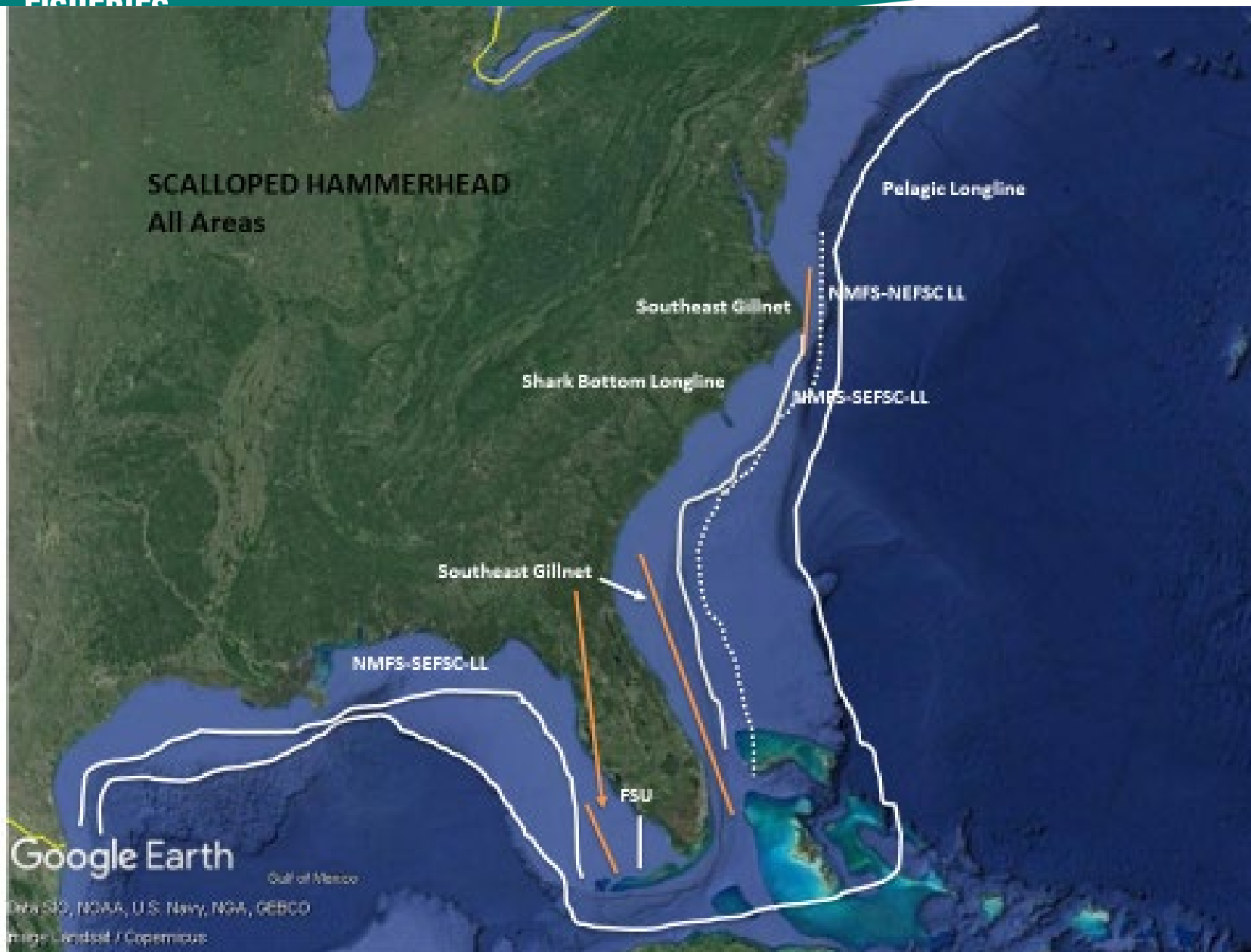


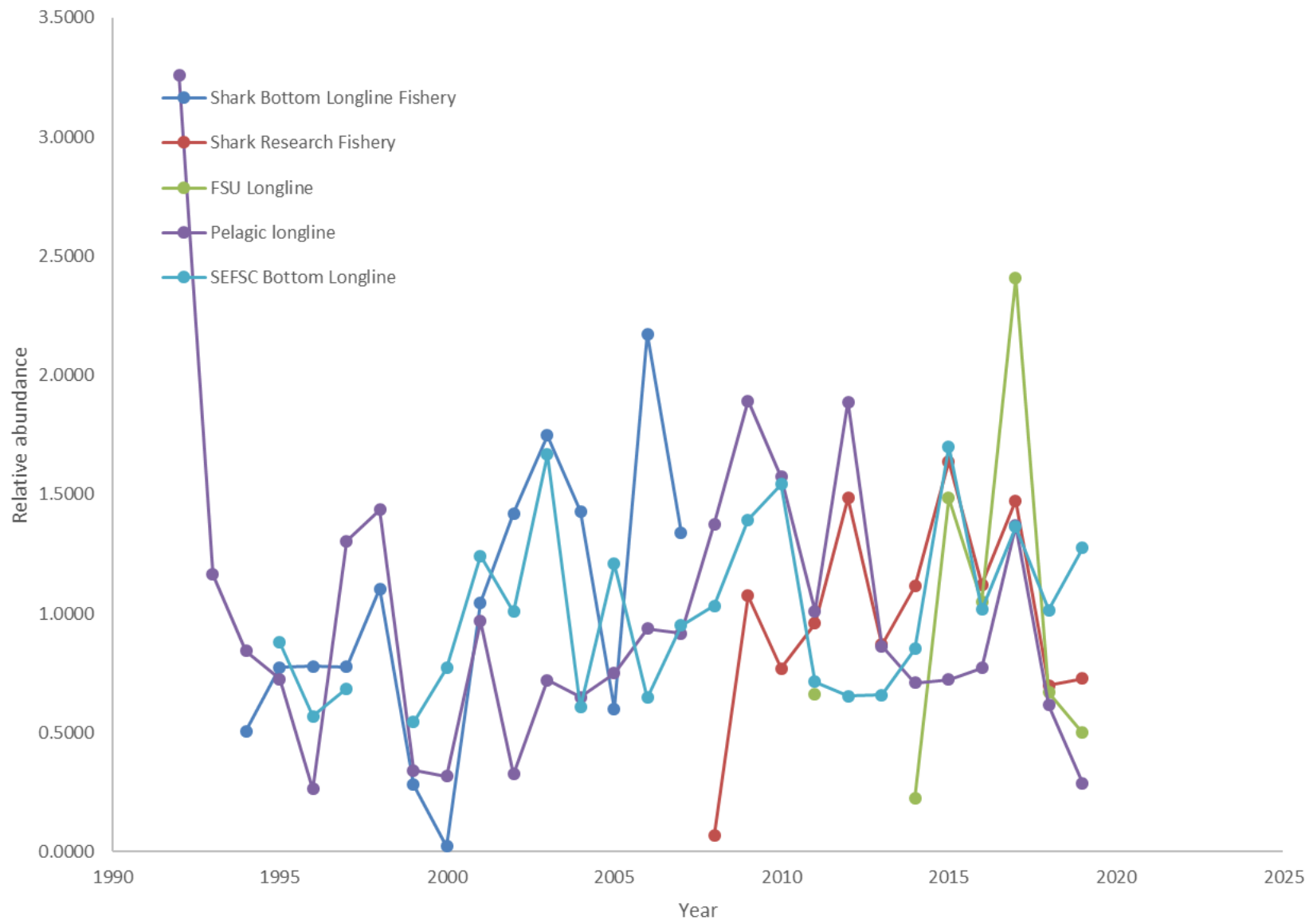


## Age 1+ Scalloped hammerhead-All Areas

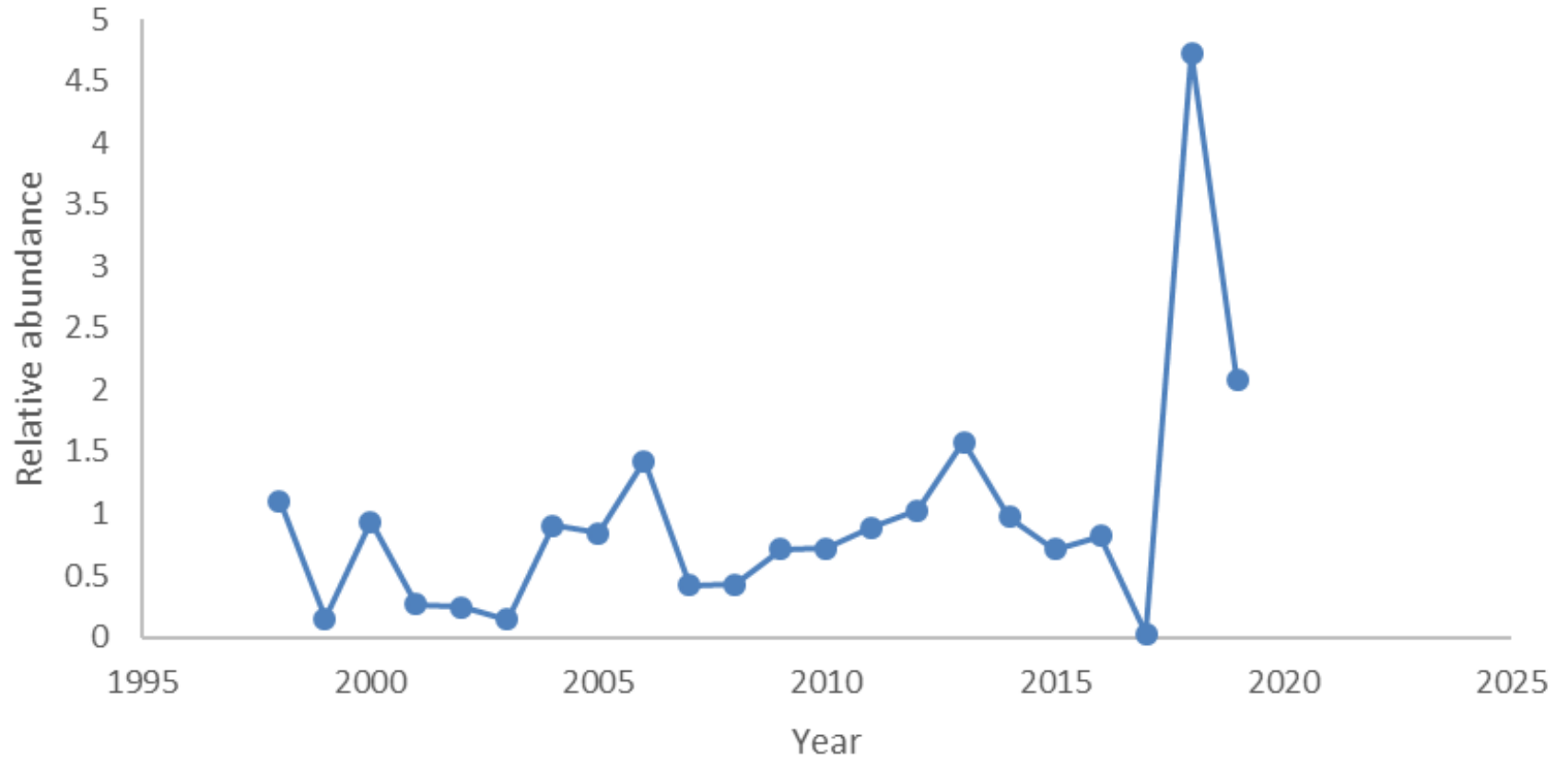
Paper	Recommendation	Notes
SEDAR 77 - DW14: Standardized Abundance Indices for Great and Scalloped Hammerhead from the Florida State University Longline Survey	Base	post-analysis to be conducted on subset of data based to reduce true zeros from areas where hammerheads are not available
SEDAR 77 - DW12: Standardized abundance indices from scalloped and great hammerhead from the Shark Bottom Longline Observer Program, 1994-2019	Base	
SEDAR 77 - DW13: Standardized Abundance Indices for Scalloped Hammerhead from the Southeast Coastal Gillnet Fishery	Sensitivity-All Areas	base or sensitivity depending on available indices; Discuss spatial resolution, large CVs
SEDAR 77 - DW24: Scalloped and Great Hammerheads Abundance Indices from NMFS Bottom Longline Surveys in the Northern Gulf of Mexico and Western North Atlantic	Base	long term, used in previous SEDARs, stock wide
SEDAR 77 - DW12: Standardized abundance indices from scalloped and great hammerhead from the Shark Bottom Longline Observer Program, 1994-2019	Base	
SEDAR 77 - DW08: Standardized abundance indices for scalloped hammerhead shark from the Pelagic Longline Observer Program, 1992-2019.	Base	Stock wide, long time series







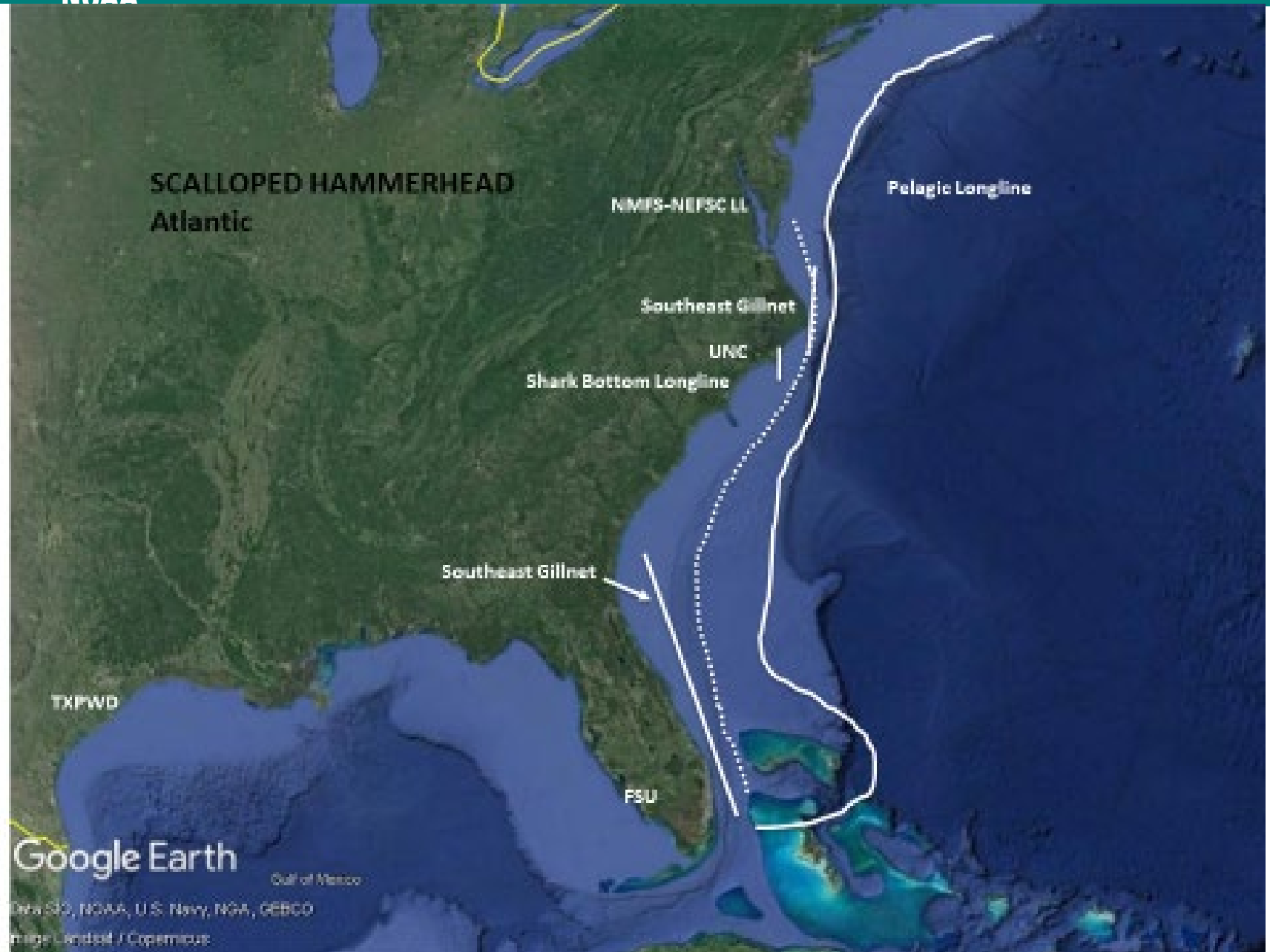
# SE Gillnet

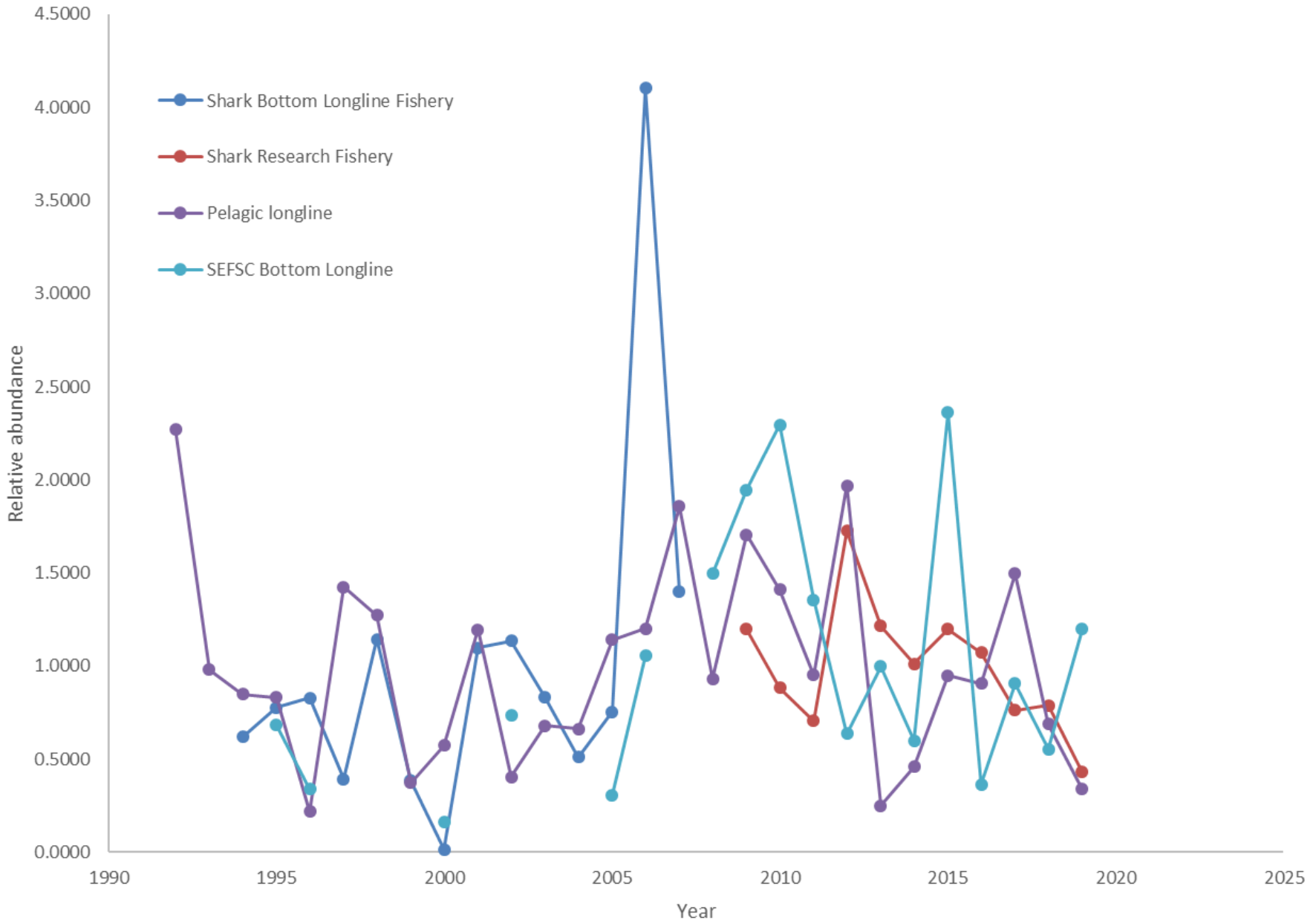


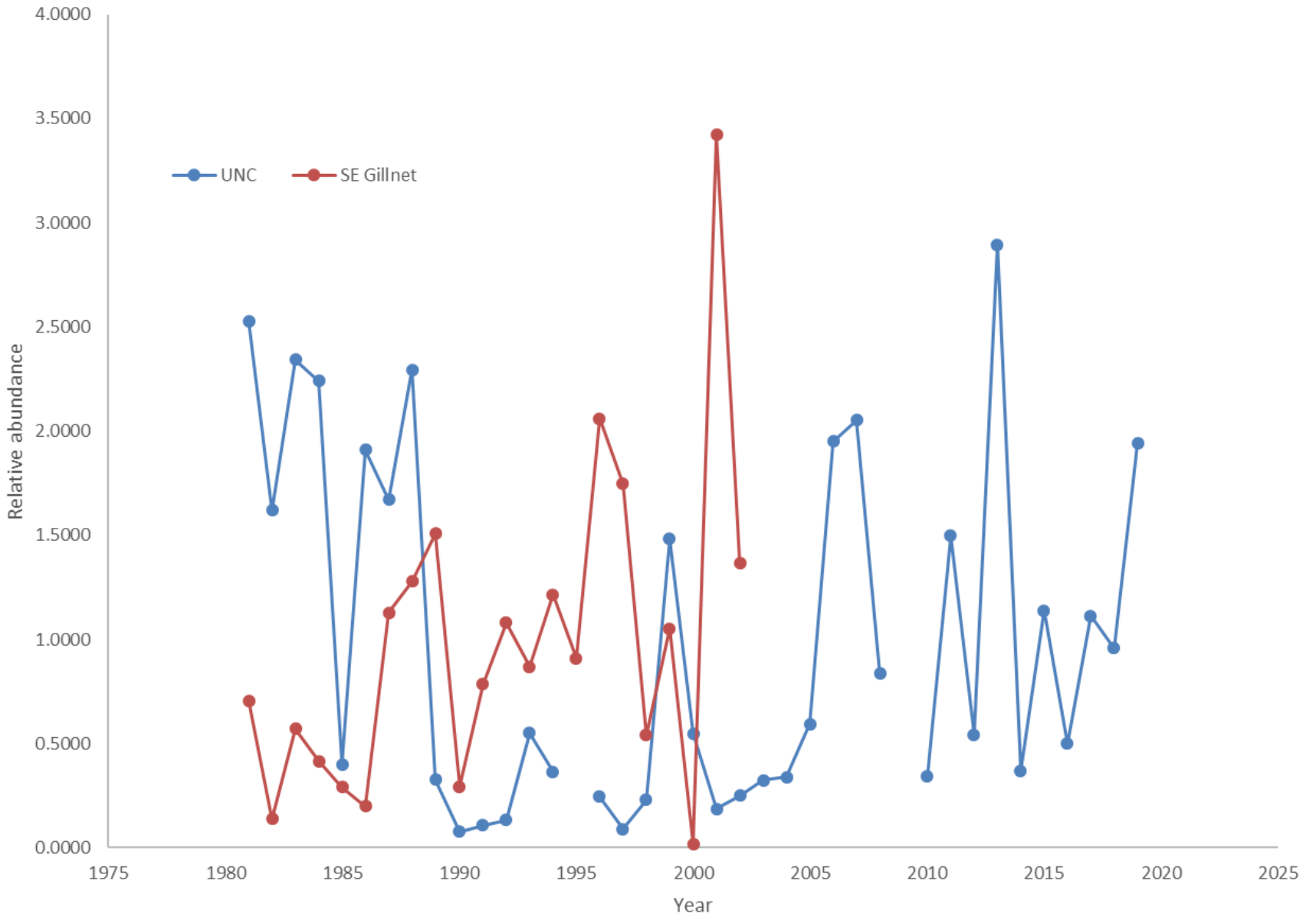


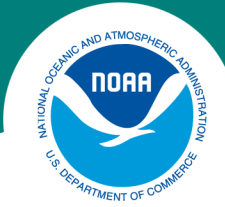
# Age 1+ Scalloped hammerhead-Atlantic

Paper	Recommendation	Notes
SEDAR 77 - DW12: Standardized abundance indices from scalloped and great hammerhead from the Shark Bottom Longline Observer Program, 1994-2019	Base	
SEDAR77-DW29 (SCSEAMAPLL). Standardized indices of abundance for scalloped hammerhead sharks from the South Carolina Department of Natural Resources red drum and Southeast Area Monitoring and Assessment Program longline surveys	Not recommended	Low catches
SEDAR 77 - DW13: Standardized Abundance Indices for Scalloped Hammerhead from the Southeast Coastal Gillnet Fishery	Sensitivity-ATL	
SEDAR77-DW28. Standardized index of abundance for scalloped hammerhead sharks from the NOAA Northeast Fisheries Science Center coastal shark bottom longline survey	Re-examine by spatially splitting the series	bi/triannual survey (1996, 1998, 2001, 2004, 2007, 2009, 2012, 2015, 2018). Trend in abundance does not match species life history, potential range shift
SEDAR77-DW29 (RedDrumLL). Standardized indices of abundance for scalloped hammerhead sharks from the South Carolina Department of Natural Resources red drum and Southeast Area Monitoring and Assessment Program longline surveys	Not recommended	Limited spatial converge, model did not fit the data well
SEDAR 77 - DW24: Scalloped and Great Hammerheads Abundance Indices from NMFS Bottom Longline Surveys in the Northern Gulf of Mexico and Western North Atlantic	Base	
SEDAR 77 - DW12: Standardized abundance indices from scalloped and great hammerhead from the Shark Bottom Longline Observer Program, 1994-2019	Base	
SEDAR77-DW33. Standardized index of abundance for scalloped hammerhead sharks from the University of North Carolina shark longline survey	Sensitivity	long time series but very limited spatially
SEDAR 77 - DW08: Standardized abundance indices for scalloped hammerhead shark from the Pelagic Longline Observer Program, 1992-2019.	Base	







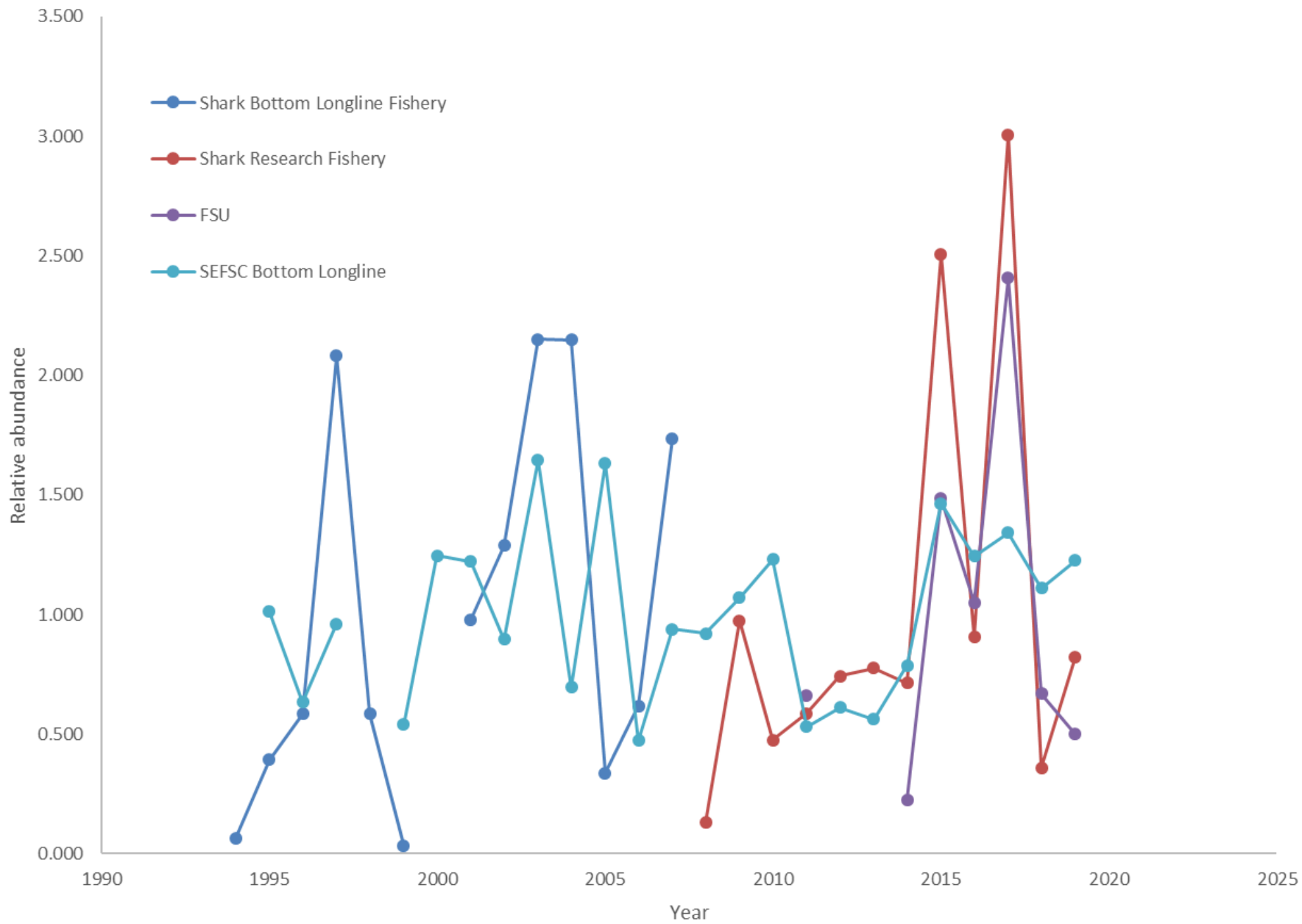


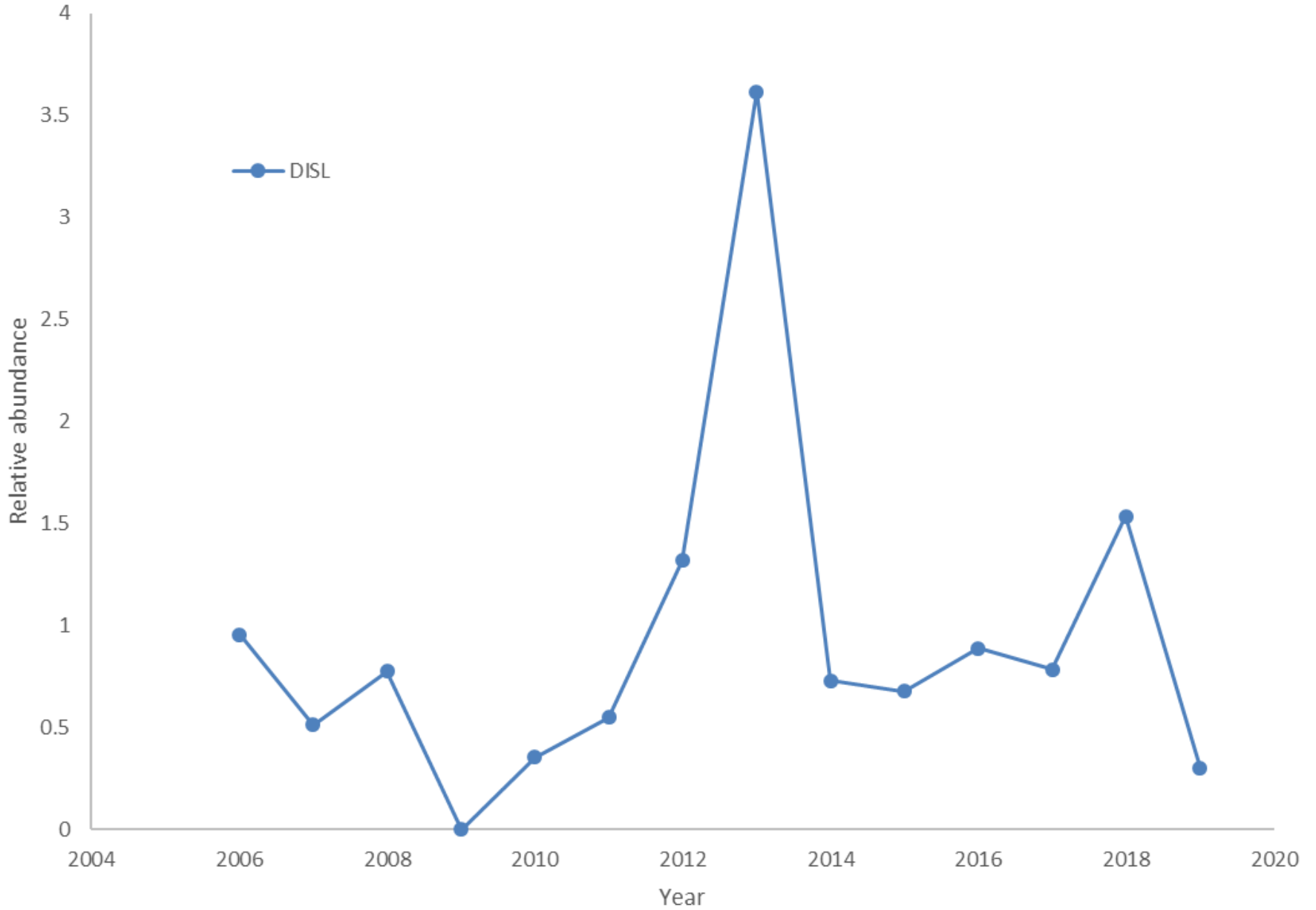
## Age 1+ Scalloped Gulf of Mexico

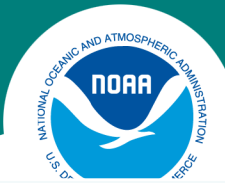
Paper	Recommendation	Notes
SEDAR 77 - DW12: Standardized abundance indices from scalloped and great hammerhead from the Shark Bottom Longline Observer Program, 1994-2019	Base	
SEDAR 77 - DW06: Size distribution and trends in relative abundance of scalloped hammerheads ( <i>Sphyrna lewini</i> ) in the northern Gulf of Mexico, 2006-2021	Sensitivity-GOM	Relatively long-term fishery-independent data series (~15 years), but geographically limited to nearshore/offshore Alabama. Bottom longline gear is standardized to NMFS MS labs, with stratified, random station selection. Use as base or sensitivity depending on available indices
SEDAR 77 - DW24: Scalloped and Great Hammerheads Abundance Indices from NMFS Bottom Longline Surveys in the Northern Gulf of Mexico and Western North Atlantic	Base	









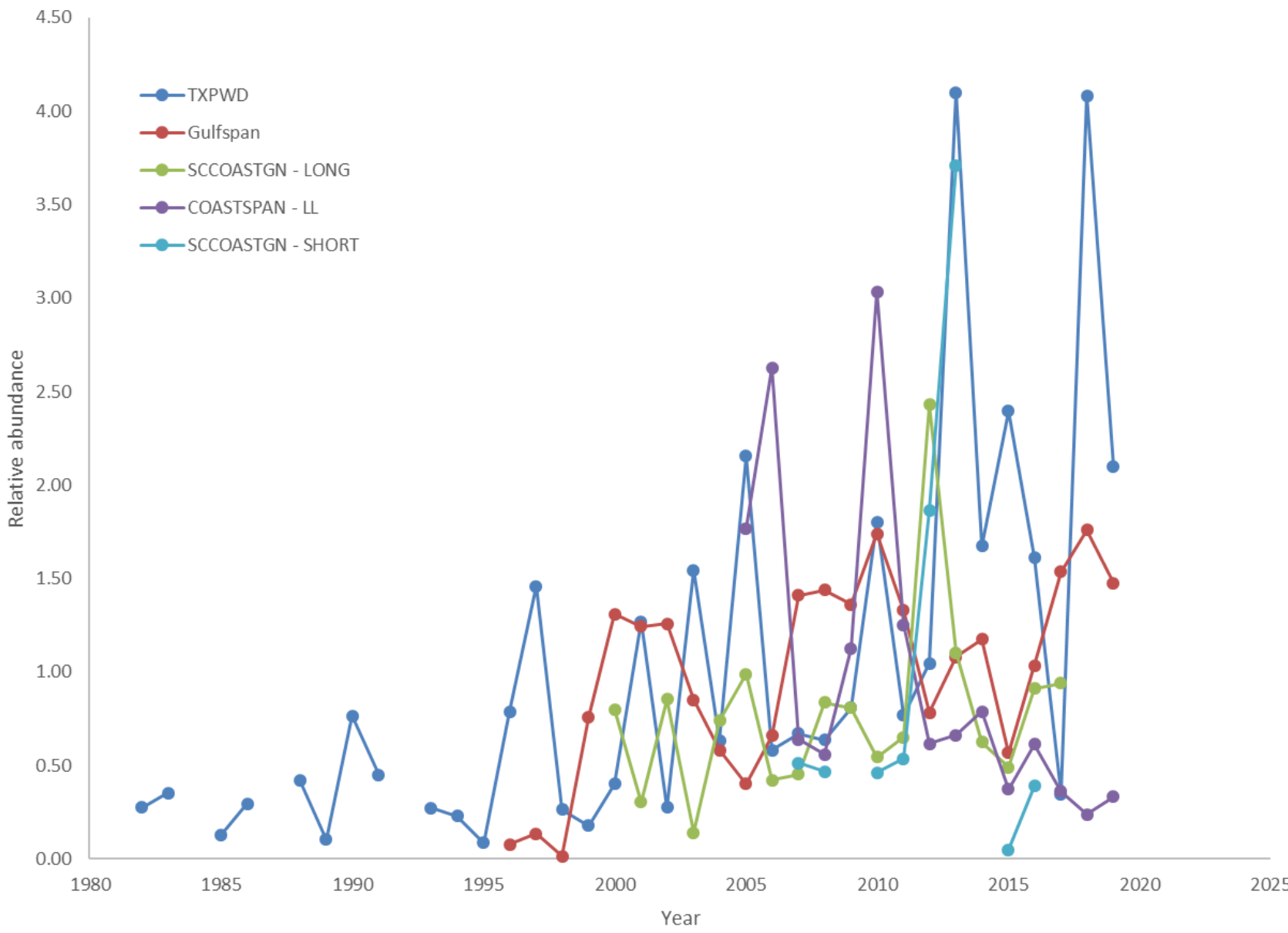


## Age 0 Scalloped Hammerhead

Paper	Area(s)	Recommendation	Notes
SEDAR77-DW32. Standardized index of abundance for scalloped hammerhead sharks from the South Carolina Department of Natural Resources, Cooperative Atlantic States Shark Pupping and Nursery SHORT-gillnet survey	ATL	Base	Limited spatially but used in previous assessment, scientific survey, utilize in DFA or heirarchical model with other YOY indices
SEDAR77-DW30. Standardized index of abundance for scalloped hammerhead sharks from the NOAA Cooperative Atlantic States Shark Pupping and Nursery longline survey	ATL	Base	Limited spatially but used in previous assessment, scientific survey, utilize in DFA or heirarchical model with other YOY indices
SEDAR77-DW31. Standardized index of abundance for scalloped hammerhead sharks from the South Carolina Department of Natural Resources, Cooperative Atlantic States Shark Pupping and Nursery LONG-gillnet survey	ATL	Base	Limited spatially but used in previous assessment, scientific survey, utilize in DFA or heirarchical model with other YOY indices
SEDAR 77 - DW17: Relative abundance index for young-of-the-year scalloped hammerhead shark from the northeastern Gulf of Mexico	GOM	Base	Potentially split and analyze in DFA during the assessment
SEDAR 77 - DW16: Relative abundance index for young-of-the-year scalloped hammerhead shark based on a fishery-independent gillnet survey off Texas, 1982-2019	GOM	Base	potentially combined in DFA

# SCALLOPED HAMMERHEAD YOY-Age 0





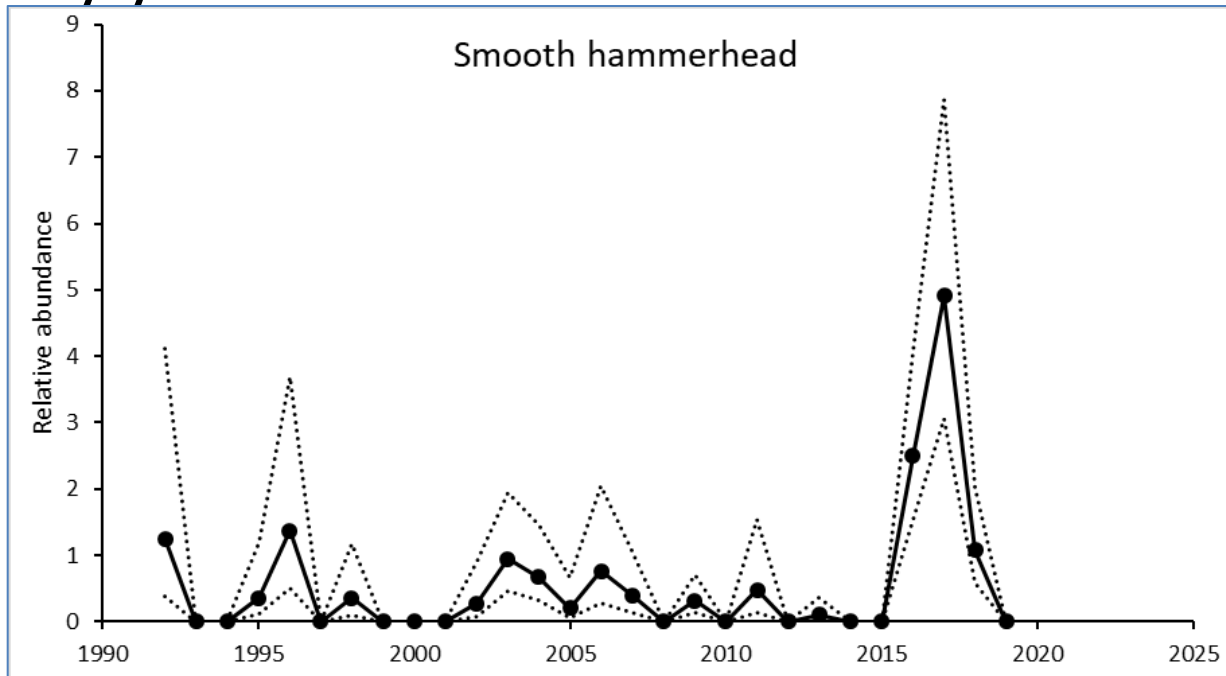
# Smooth hammerhead

- Two potential data sources
  - Pelagic Longline observer program
  - Mark Sampson Logbook



# Pelagic Observer Program

- Previously analyzed in Jiao et al. (2011)
  - Low proportion positive (<1%)
  - Many years with 0 catches





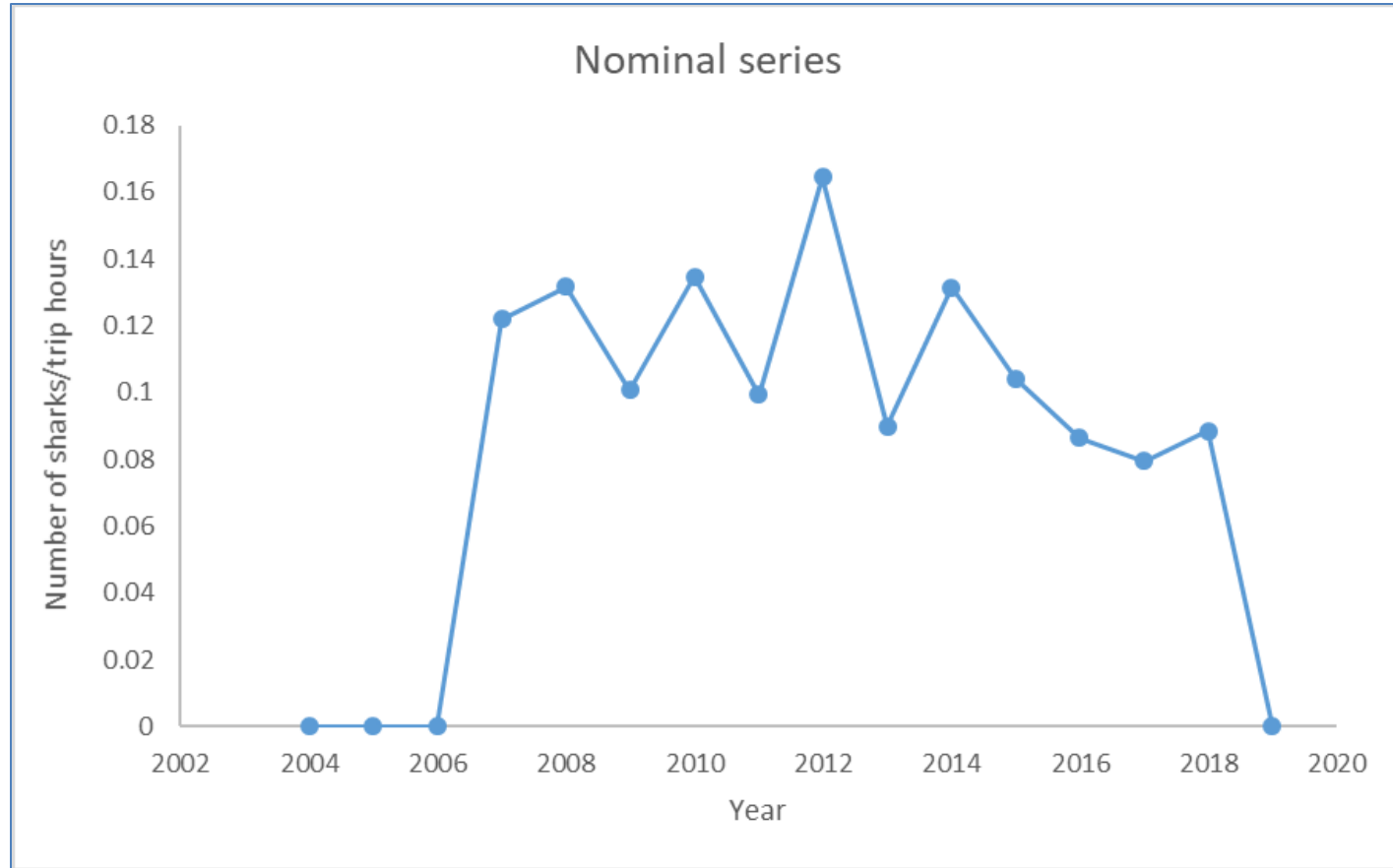
# Mark Sampson Logbook

- Data provided by MD DNR
  - Data series from 2004-2019 (not complete)
  - Covariates have multiply levels
    - Trip Type
      - >70 levels; e.g. AM Bluefish, PM shark, Spot Tagging
    - Boat
      - 3 levels; e.g. anchor, drift, trolling
    - Fishing Location
      - >70 levels; e.g. Bobby's Spot, Great Gull Buoy

Data series has great promise but will required much more time invested to understand the data. Thesis project

# Nominal index

Year	N
2004	99
2005	112
2006	117
2007	124
2008	112
2009	123
2010	113
2011	123
2012	117
2013	104
2014	110
2015	113
2016	107
2017	102
2018	104
2019	3



- Smooth hammerhead
  - No reliable index of abundance
  - Life history from the NE Atlantic
  - Logbook (mis-identifications)