



Performance Evaluation of Addendum IV

Regulatory Measures in 2015

Atlantic Striped Bass Management Board

October 24, 2016

Overview



- Addendum IV Background
- Addendum IV Performance
 - Results
 - Discussion

Addendum IV Background



- The 2013 benchmark stock assessment for Atlantic Striped Bass showed:
 - Stock was not overfished and overfishing was not occurring
 - Fishing mortality (F) above the F target
 - Spawning stock biomass (SSB) below the SSB target
 - Management action triggered

Addendum IV Background



- Addendum IV was approved in October 2014 with the goal of bringing F back down to the target level in 2016
- Required states to implement measures that achieve at least a:
 - 25% reduction in harvest from 2013 levels for ocean fisheries
 - 20.5% reduction in harvest from 2012 levels for the Chesapeake Bay fisheries

Addendum IV Background



- Addendum IV regulatory changes were implemented prior to the 2015 season
- Commercial fishery changes:
 - Amendment 6 quota allocations were reduced by 25% for the ocean fisheries
 - Chesapeake Bay commercial quota was set at 20.5% less than that harvested from the Bay in 2012

Addendum IV Background



- Addendum IV regulatory changes were implemented prior to the 2015 season
- Recreational fishery changes:
 - Ocean fisheries implemented a one fish bag limit and a 28” minimum size limit for the recreational fishery
 - Chesapeake Bay recreational fisheries implemented a suite of management measures that were projected to achieve the F target
 - States could implement alternative measures through the conservation equivalency process

Addendum IV Background



- A preliminary analysis on the performance of Addendum IV regulatory measures was conducted by Plan Review Team (PRT) in August 2015 by comparing 2015 harvest to the appropriate reference period

Region	Estimated Change in Harvest	Actual Change in Harvest
Ocean	-29.7%	-41.0%
Chesapeake Bay	-22.1%	+53.4%
Total	-25.8%	-22.4%

Addendum IV Background



- Board directed TC to investigate further and consider the impacts of several variables that could be contributing to the discrepancies between predicted and observed harvest
- TC looked at several factors:
 - Changes in size and age structure of available fish
 - Changes in effort
 - Changes in proportion of fish released alive vs. total catch

Addendum IV Performance - Results



Changes in Harvest Patterns - Commercial

Ocean (Commercial – Pounds of fish)		
Estimated Reduction from 2013 Quota	Actual Reduction from 2013 Quota	Actual Reduction from 2013 Harvest
-25.0%	-50.0%	-24.9%

Chesapeake Bay (Commercial – Pounds of fish)	
Estimated Reduction from 2012 Harvest	Actual Reduction from 2012 Harvest
-20.5%	-25.1%

Addendum IV Performance - Results



Changes in Harvest Patterns - Recreational

Recreational Fisheries (Numbers of fish)		
Region	Estimated Change in Removals	Actual Change in Removals
Ocean	-29.6%	-47.0%
Chesapeake Bay	-22.1%	+58.4%

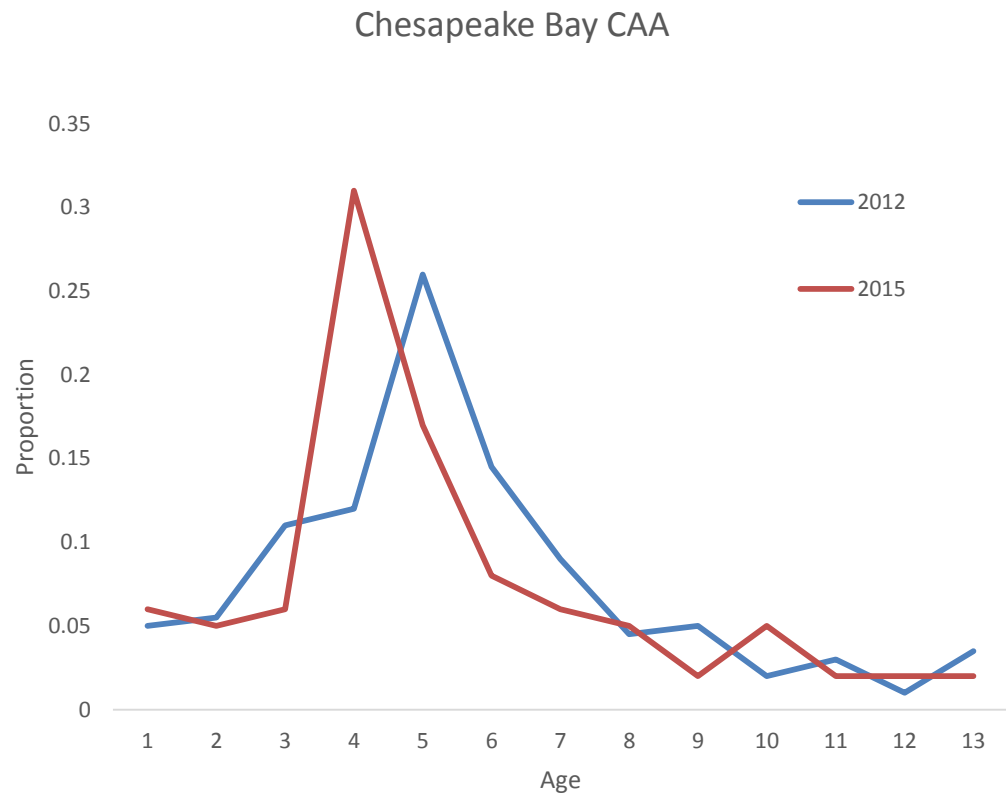
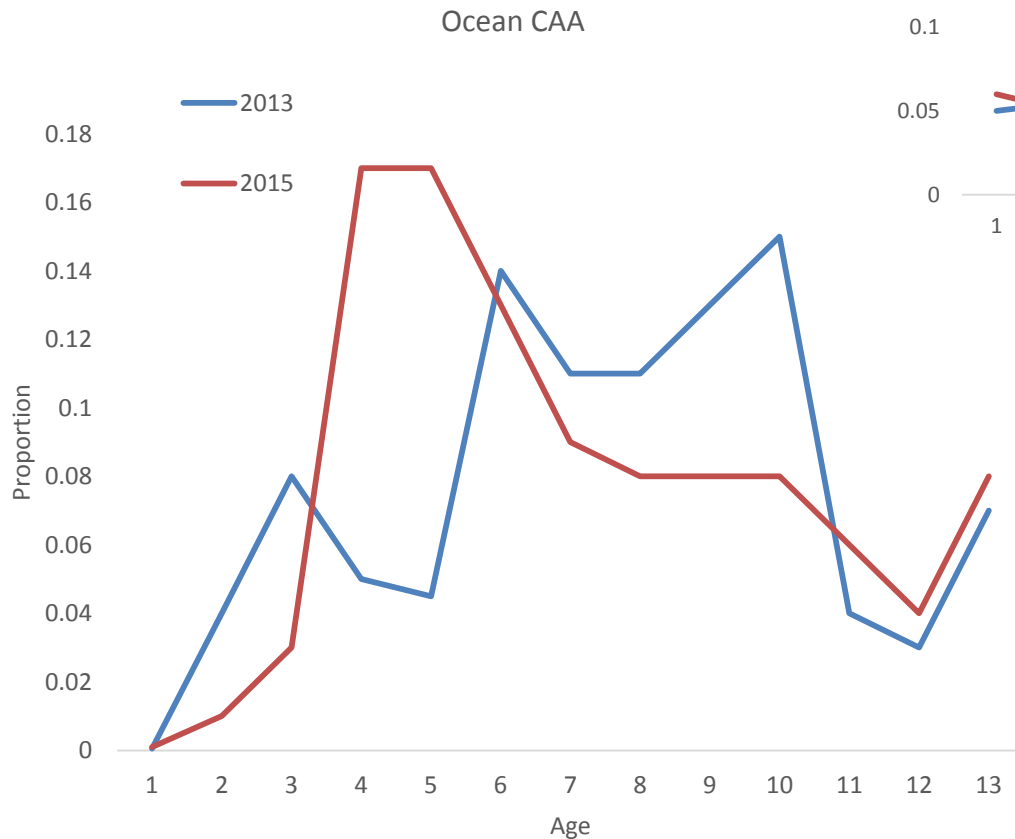
Addendum IV Performance - Results



Changes in Harvest Patterns – Harvested vs. Dead Releases

Region	Sector	Change in Removals
Ocean	Recreational Harvest (A+B1)	-55%
	Recreational Release Mortality (9% B2)	-24%
Chesapeake Bay	Recreational Harvest (A+B1)	+51%
	Recreational Release Mortality (9% B2)	+69%

Addendum IV Performance - Results

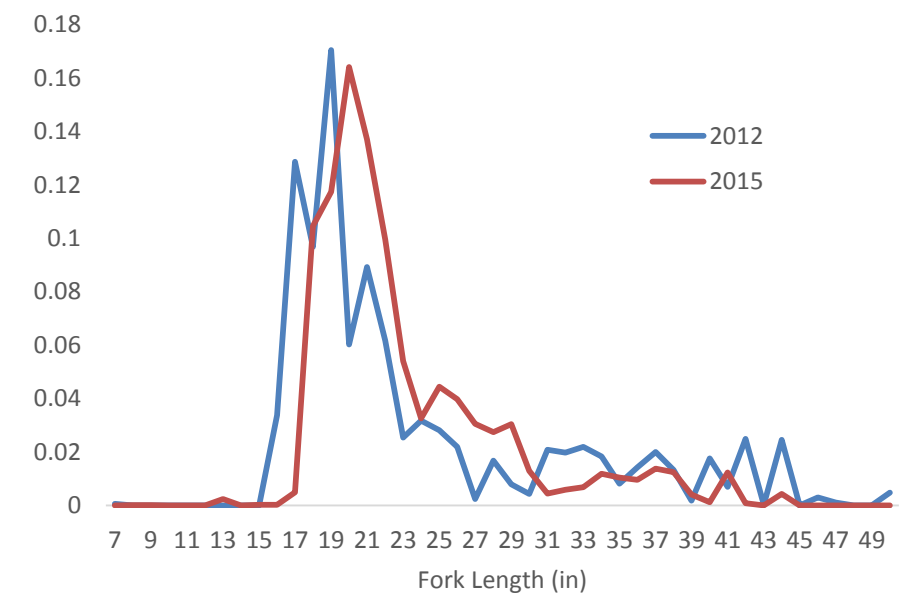
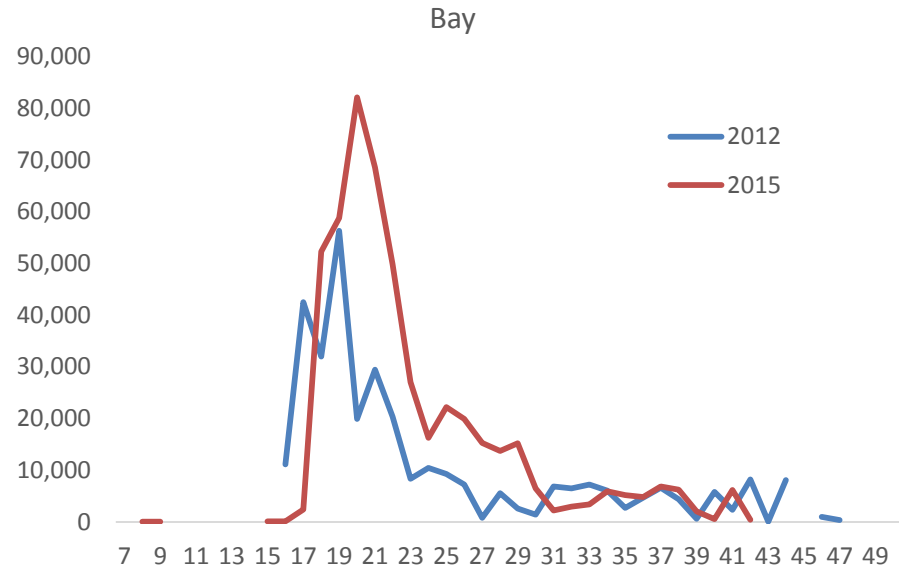
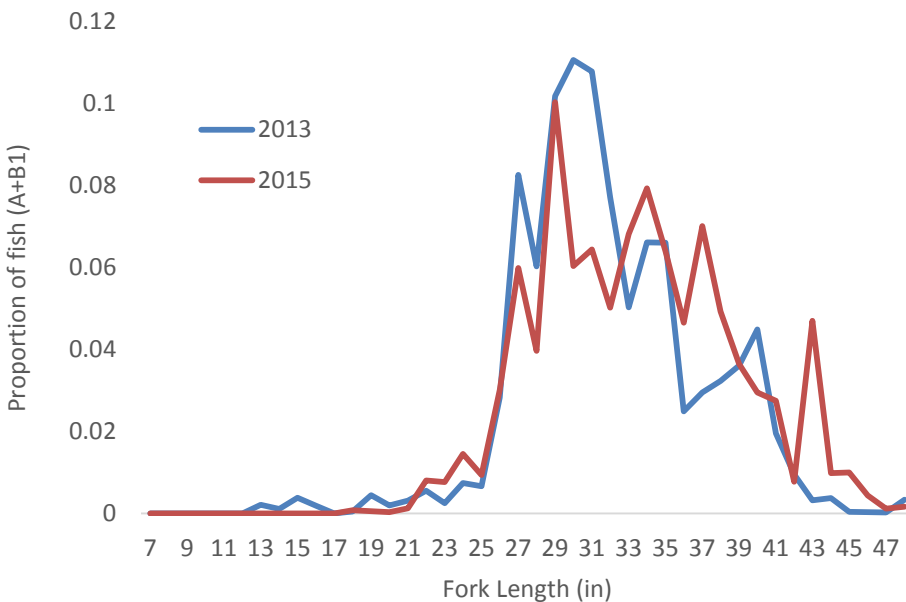
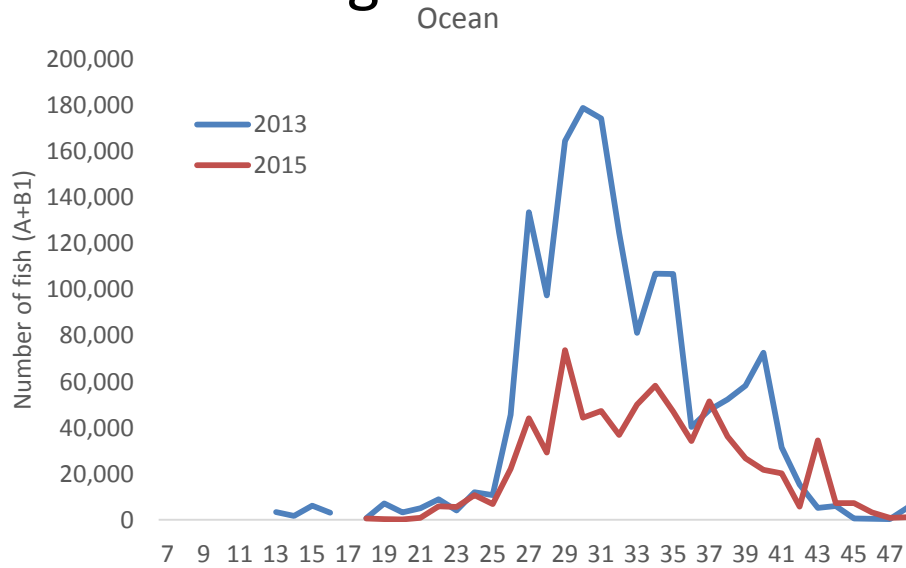


- Size and Age Structure of catch:

Addendum IV Performance - Results



- Size and Age Structure of catch:



Addendum IV Performance - Results



- Changes in Harvest Patterns – Recreational by wave and mode:
 - No consistent pattern in harvest by wave and mode for each state
 - Some states saw increases and some saw decreases in some waves/modes

Addendum IV Performance - Results



Changes in Effort

Region	Change in Total Trips	Change in Directed Trips*
Ocean	-13%	-27%
Chesapeake Bay	-13%	+50%

*trips where striped bass was the primary or secondary target

- All states in Ocean fishery had a reduced number of directed trips with the exception of New Jersey who saw an increase of 2%
- There was no consistent pattern in effort by wave and mode for each state

Addendum IV Performance - Results



Changes in Harvest Patterns –Released Alive vs. Total Catch

Percent of Total Catch Released Alive		
Region	Reference Year	2015
Ocean	79%	86%
Chesapeake Bay	87%	89%

→ Regulations are working, anglers are releasing more fish alive

Addendum IV Performance - Results



Changes in Harvest Patterns – Percentage of Released vs. Total Catch

- Every state in the Ocean and Chesapeake Bay experienced an increase in the percentage of striped bass released alive vs. total catch in 2015 compared to the reference year with the exception of Maryland who had a small decrease of 1%

Addendum IV Performance - Results



Changes in Harvest Patterns – Percentage of Released vs. Total Catch

- ME, MA, CT, NJ and NC in the ocean experienced a change of less than 10%
- For the remaining states, the percentage of total catch harvested, decreased more than the percentage released, indicating anglers were releasing more fish alive



- Goal: Identify variables contributing to the differences seen in 2015 removals compared to those estimated by the TC
 - The Ocean recreational fishery saw a larger reduction than that estimated by the TC
 - The Chesapeake Bay recreational fishery saw an increase in harvest when a decrease was expected

Addendum IV Performance - Discussion



- Size and bag limit analyses assume effort, angler behavior, catch-per-unit-effort, and the size composition and distribution of fish available to anglers will be the same in the future
- Changes in these variables can lead to reductions different than those originally estimated

Addendum IV Performance - Discussion



The most significant variables contributing to differences in realized harvest vs. estimated were:

- Effort
 - Striped bass targeted trips decreased 27% in the Ocean fishery.
 - In the Bay however, targeted trips increased
- Availability of the 2011 year class
 - The 2011 year class was nearly fully recruited to the Bay fishery in 2015
 - The length of 2011 year class fish coincided with the Bay's legal size limits

Addendum IV Performance - Discussion



- Overall, Addendum IV measures are working, and harvest in the coastal fishery was reduced by the necessary amount
- Although harvest in the Bay increased, given the availability of the 2011 year class and increased striped bass targeting, the management measures likely reduced harvest from what could have been taken under the previous regulations

Addendum IV Performance



Questions???



2016 Stock Assessment Update for Atlantic Striped Bass

Catch Data

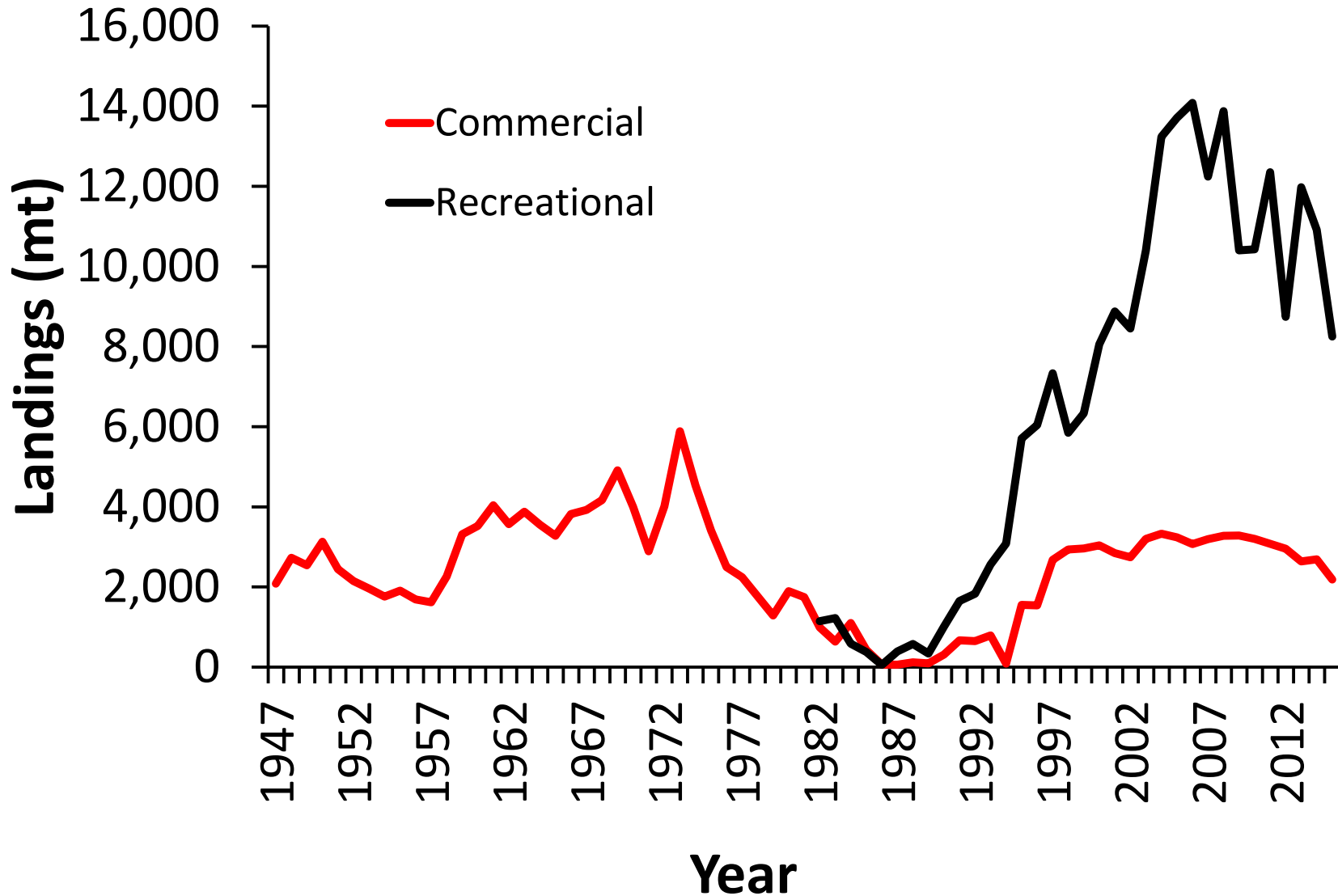


- MRIP estimates of harvest and dead releases for ME, NH, MA, RI, CT, NY, NJ, DE, MD, VA (wave 1 externally estimated), and NC (ocean only)
- Reported commercial harvest for MA, RI, NY, DE, MD, PRFC, VA and NC (ocean only)
- Commercial dead discards estimated from tag and MRIP data

Missing Catch Data

- Catch from major rivers (e.g., Hudson River, Delaware River, etc.)
- Unreported catch (e.g., poaching, underreporting)

Coast-wide Landings (mt)



Coast-wide Removals



2015

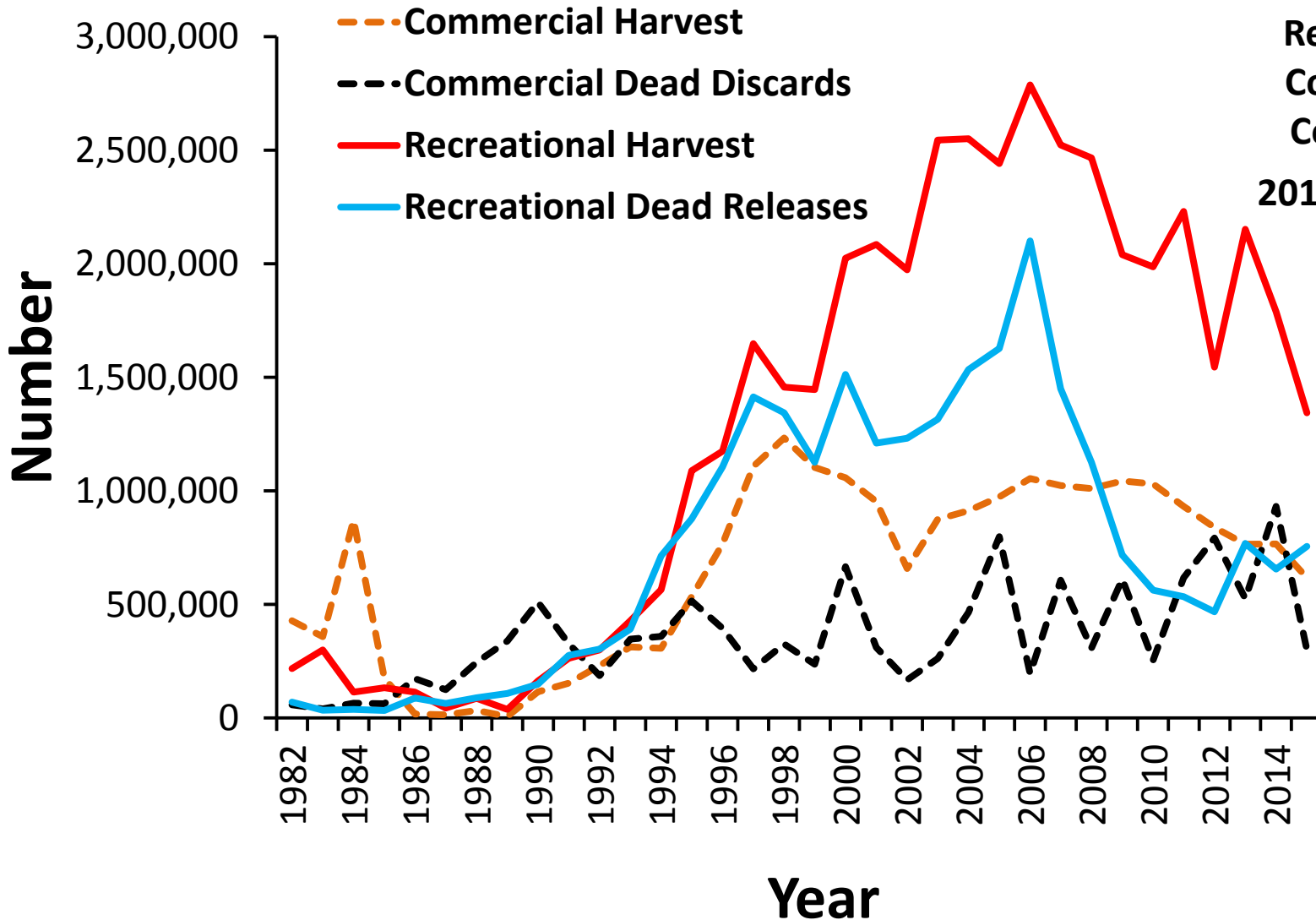
Rec Har: 44.6%

Rec Dis: 25.0%

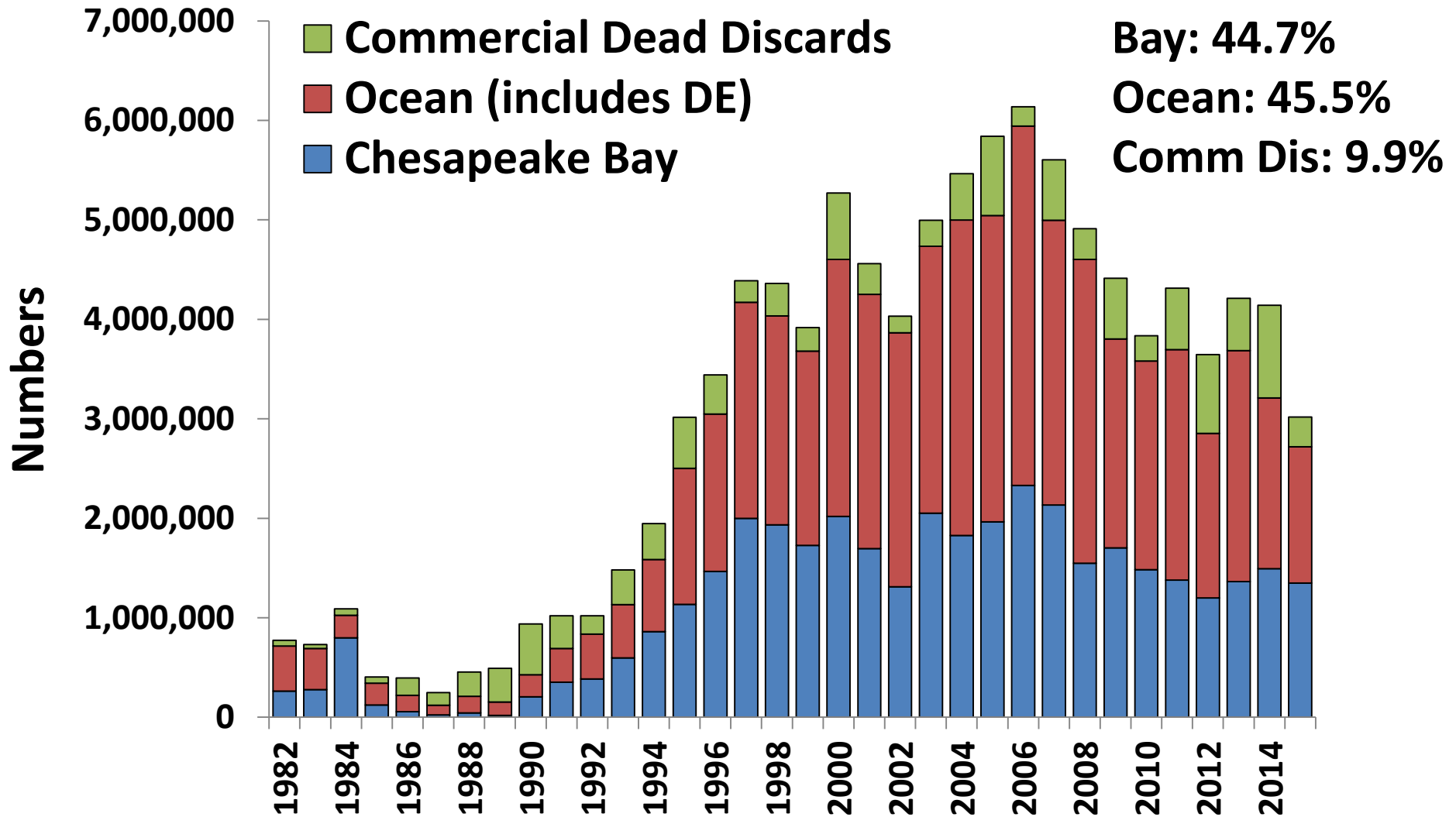
Com Har: 20.5%

Com Dis: 9.9%

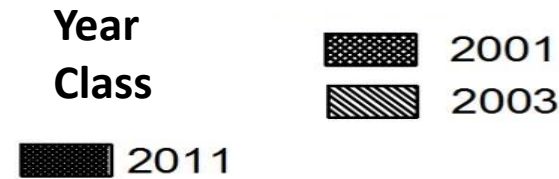
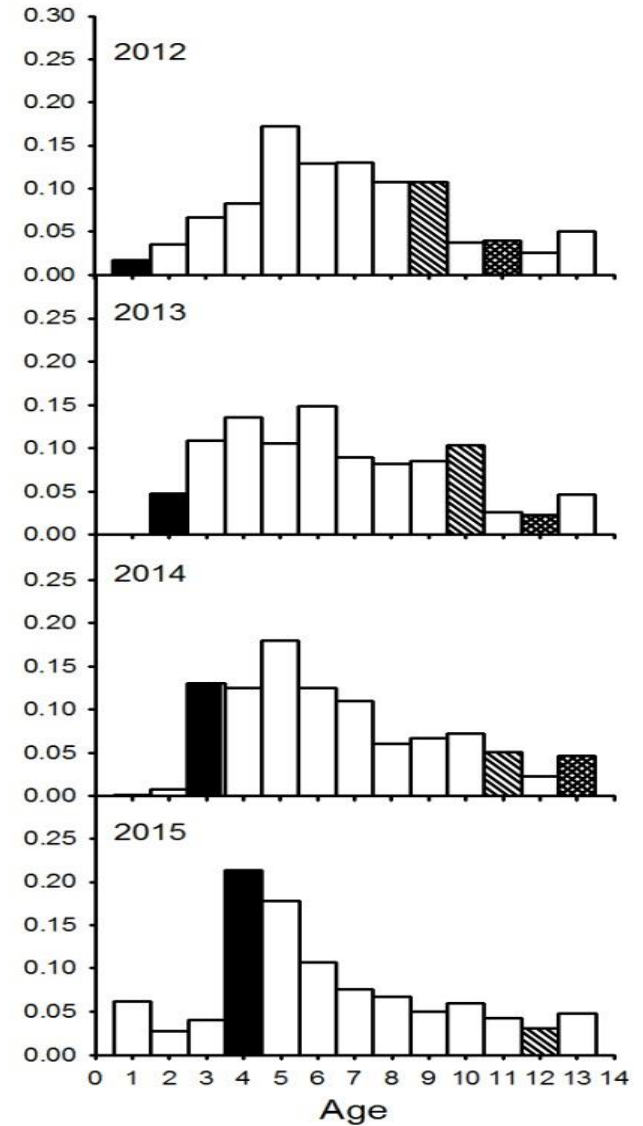
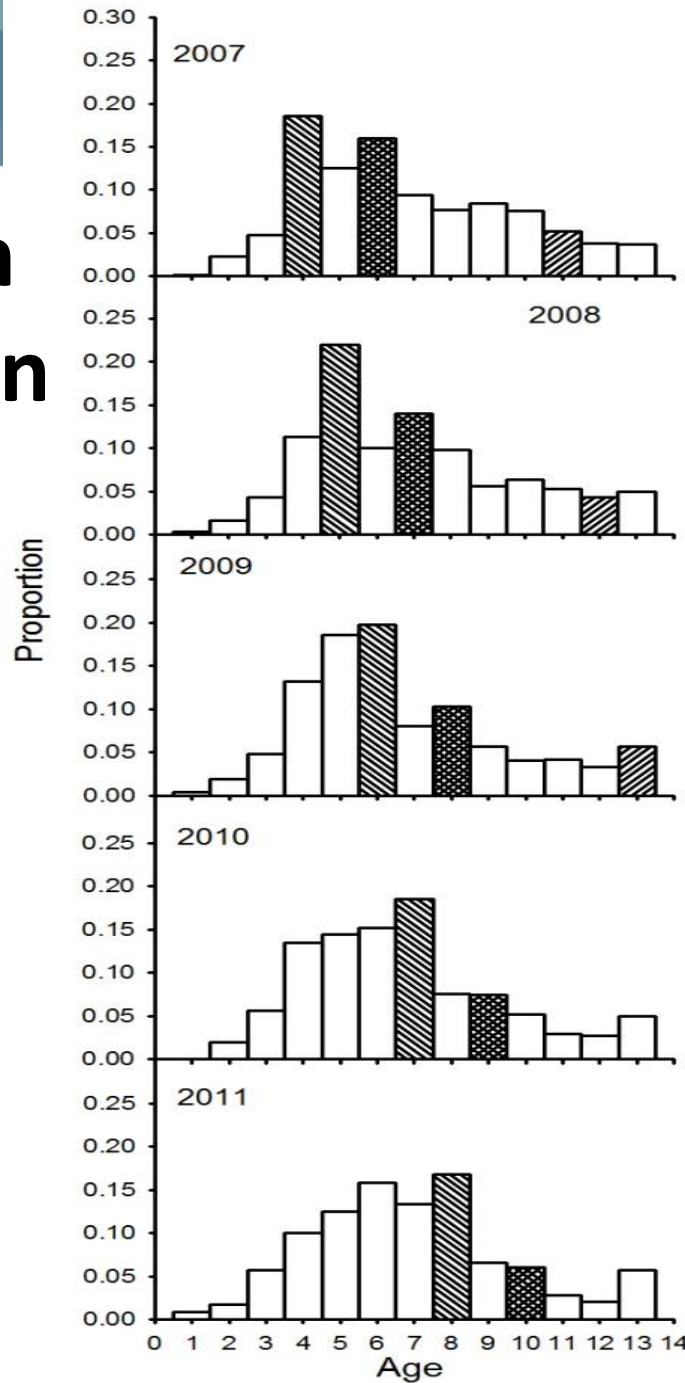
2015: 27% decline



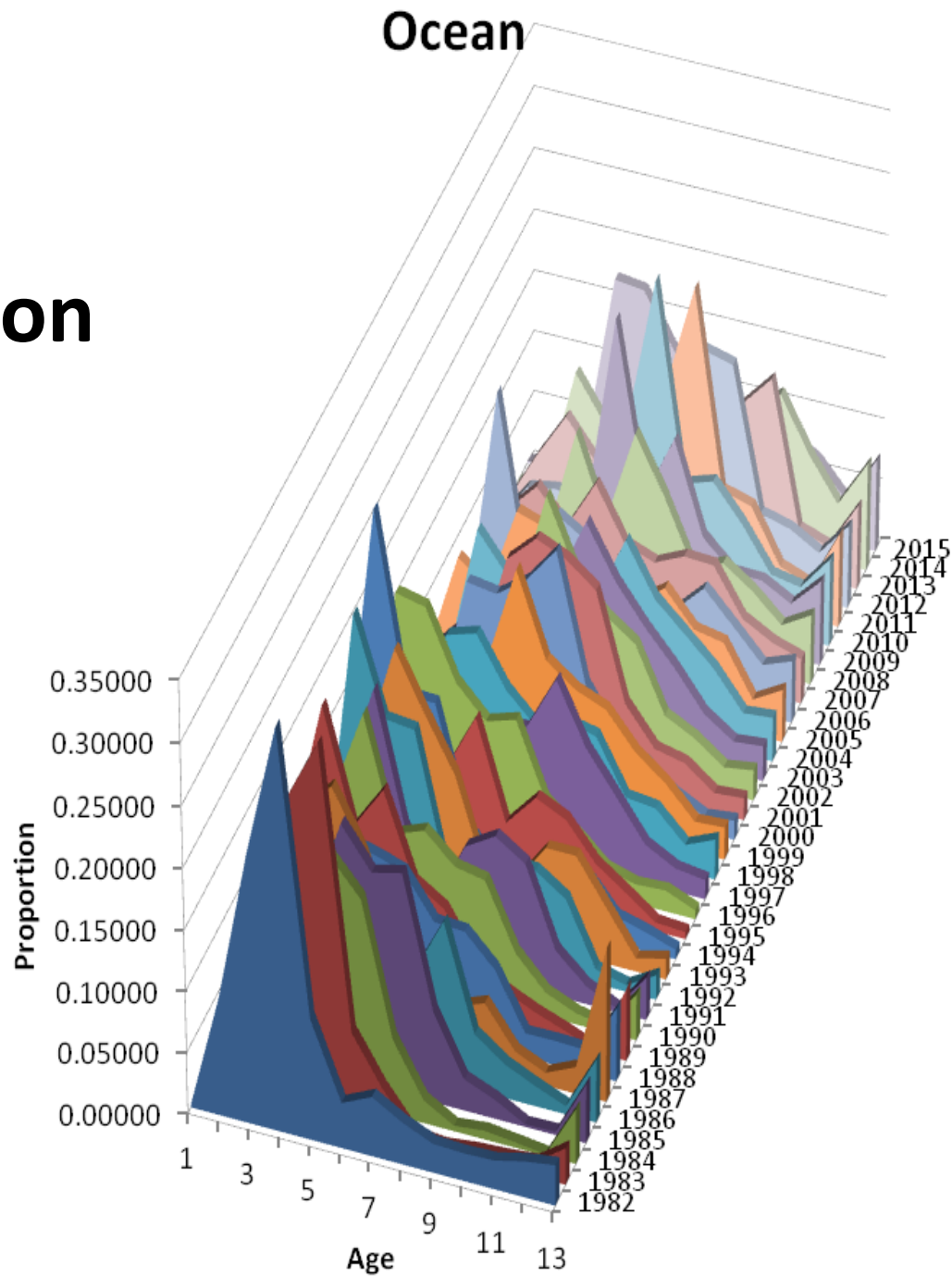
Total Catch By "Fleet"



Total Catch Composition



Catch Composition (cont.)





YOY, AGE-1, AGGREGATE AND AGE COMPOSITION SURVEYS

● YOY and Age 1

● Age 2+



Distribution of Indices

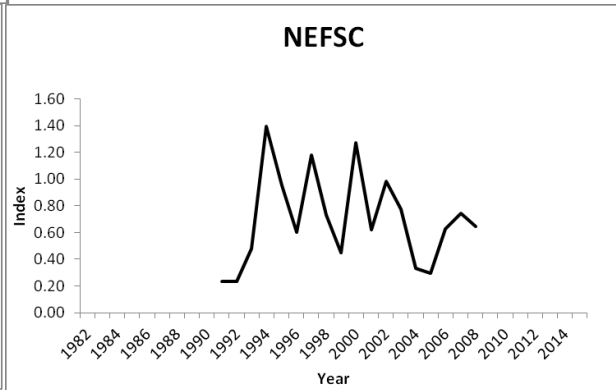
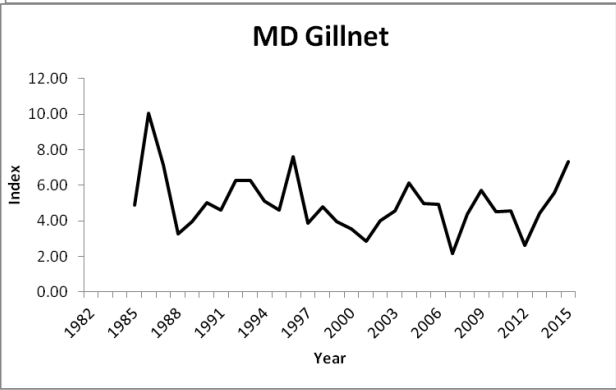
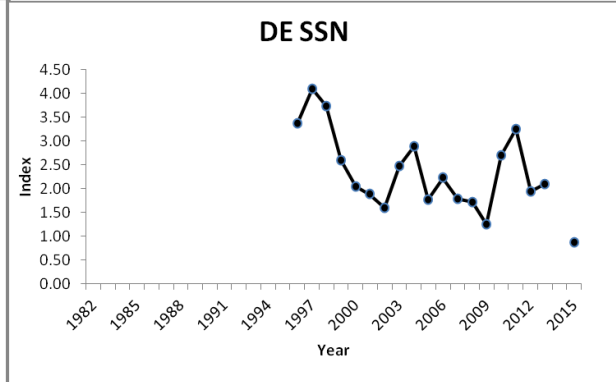
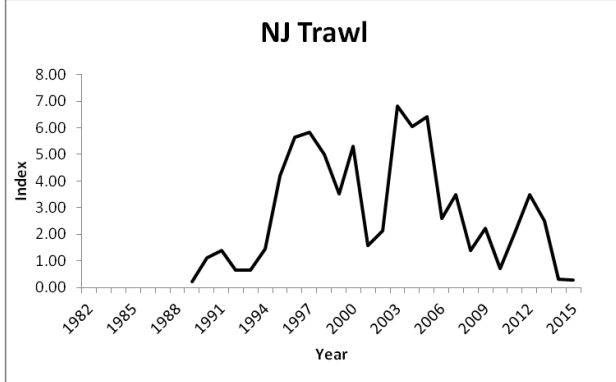
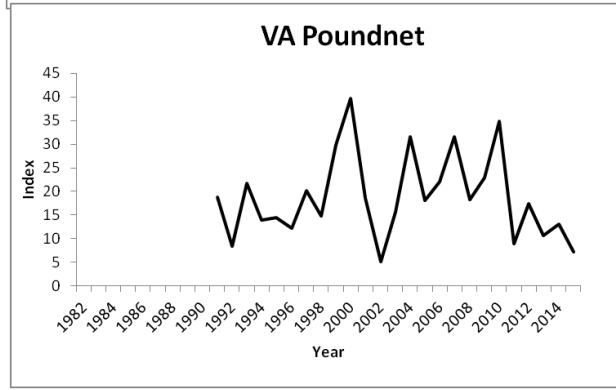
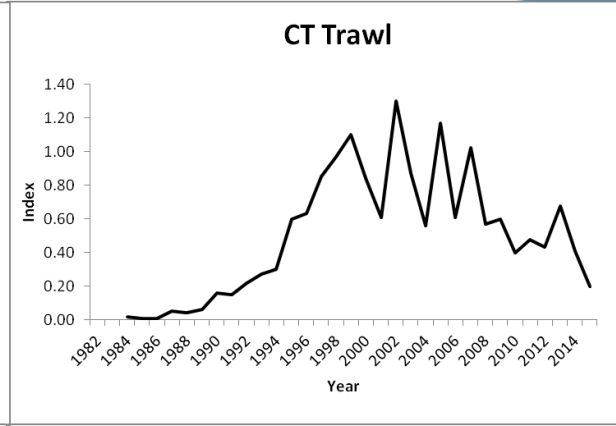
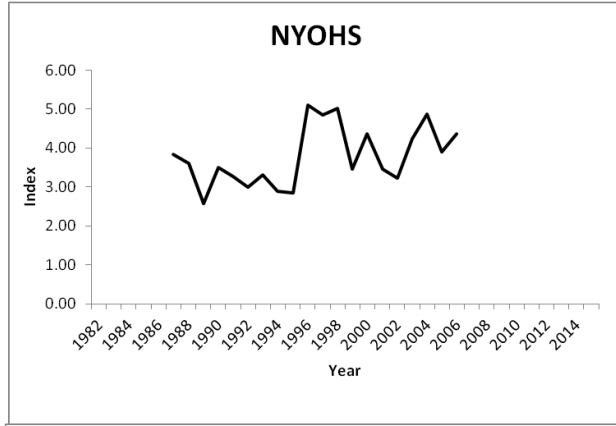
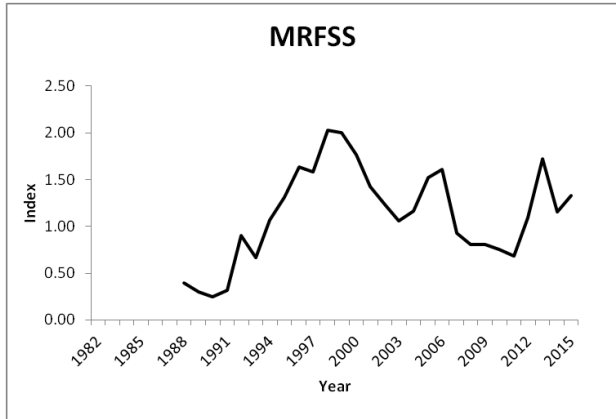


- Updated
- NY YOY changed

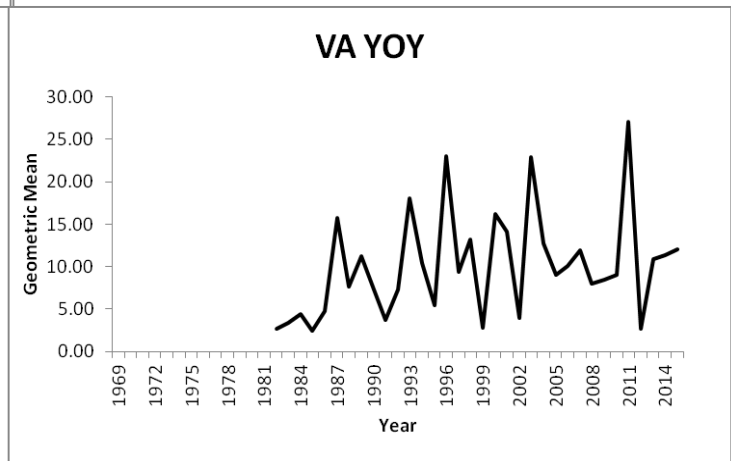
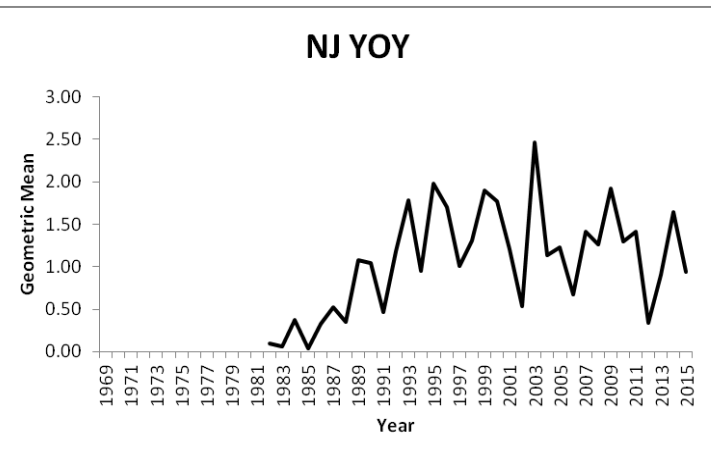
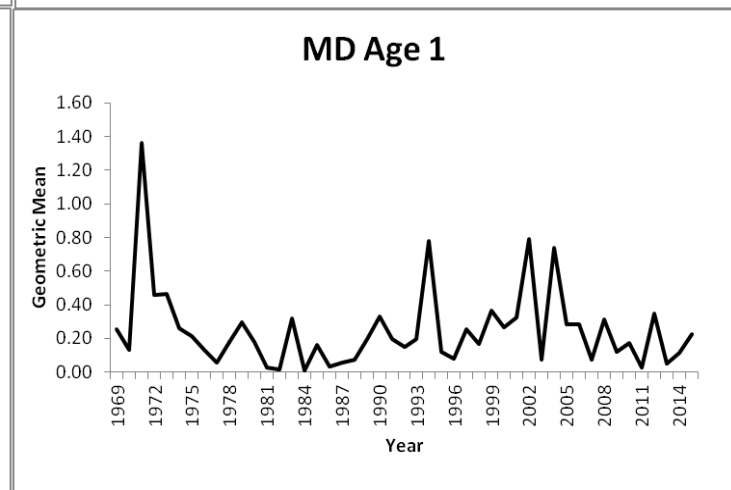
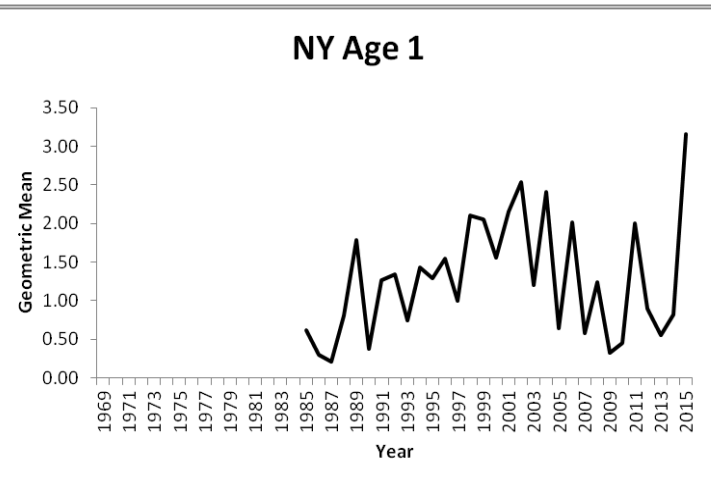
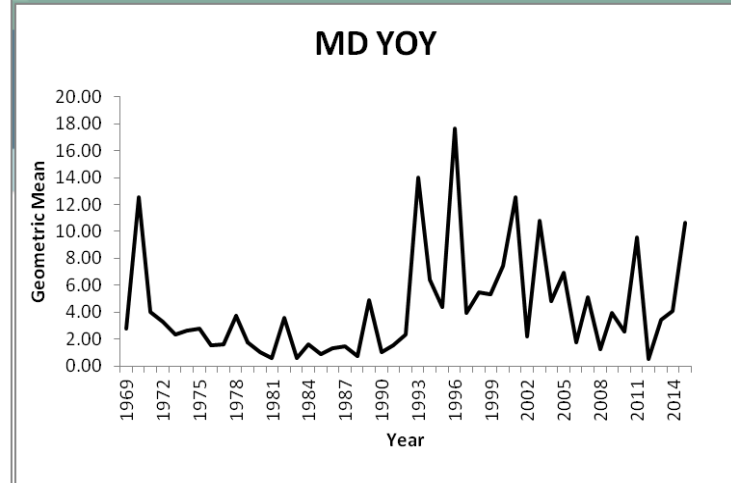
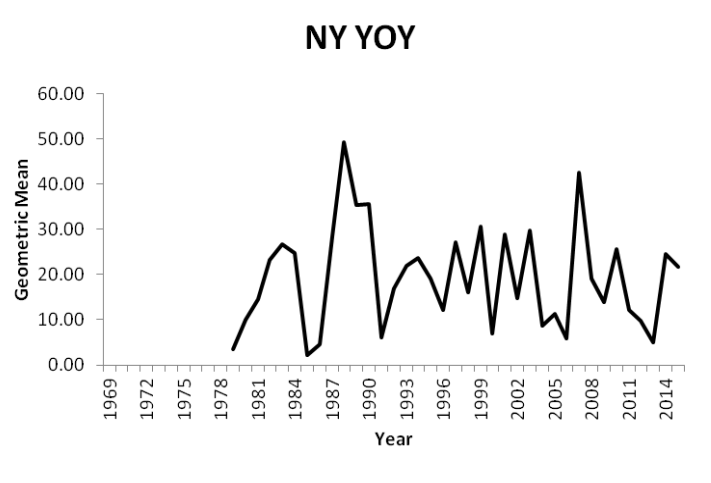
State	Index	Design	Time of Year	What Stock?	Ages
Marine Recreational Fisheries Survey	Total Catch Rate Index	Stratified Random	May-Dec	Mixed	Aggregate (3-13+)
Connecticut Trawl Survey	Mean number per tow	Stratified Random	April-June	Mixed	Aggregate (4-6)
NEFSC Trawl Survey	Mean number per tow	Stratified Random	March-May	Mixed	Aggregate (2-9)
New Jersey Trawl Survey	Mean number per tow	Stratified Random	April	Mixed	2-13+
New York Ocean Haul Seine Survey	Mean number per haul	Random	Sept-Nov	Mixed	2-13+
Delaware Electrofishing Survey	Mean number per hour	Lattice	April-May	Delaware	2-13+
New York YOY Seine Survey	Mean number per haul	Fixed	July-Nov	Hudson	0
New York W. Long Island Seine Survey	Mean number per haul	Fixed	May-Oct	Hudson	1
New Jersey YOY Seine Survey	Mean number per haul	Fixed/Random	Aug-Oct	Delaware	0
Virginia YOY Seine Survey	Mean number per haul	Fixed	July-Sept	Chesapeake	0
Maryland YOY and Age 1 Seine Survey	Mean number per haul	Fixed	July-Sept	Chesapeake	0-1
Maryland Gillnet Survey	Mean number per set	Stratified Random	April-May	Chesapeake	2-13+
Virginia Pound Net Survey	Mean number per set	Fixed	March-May	Chesapeake	1-13+

Fisheries-Dependent

Fisheries-Independent



YOY and Age 1





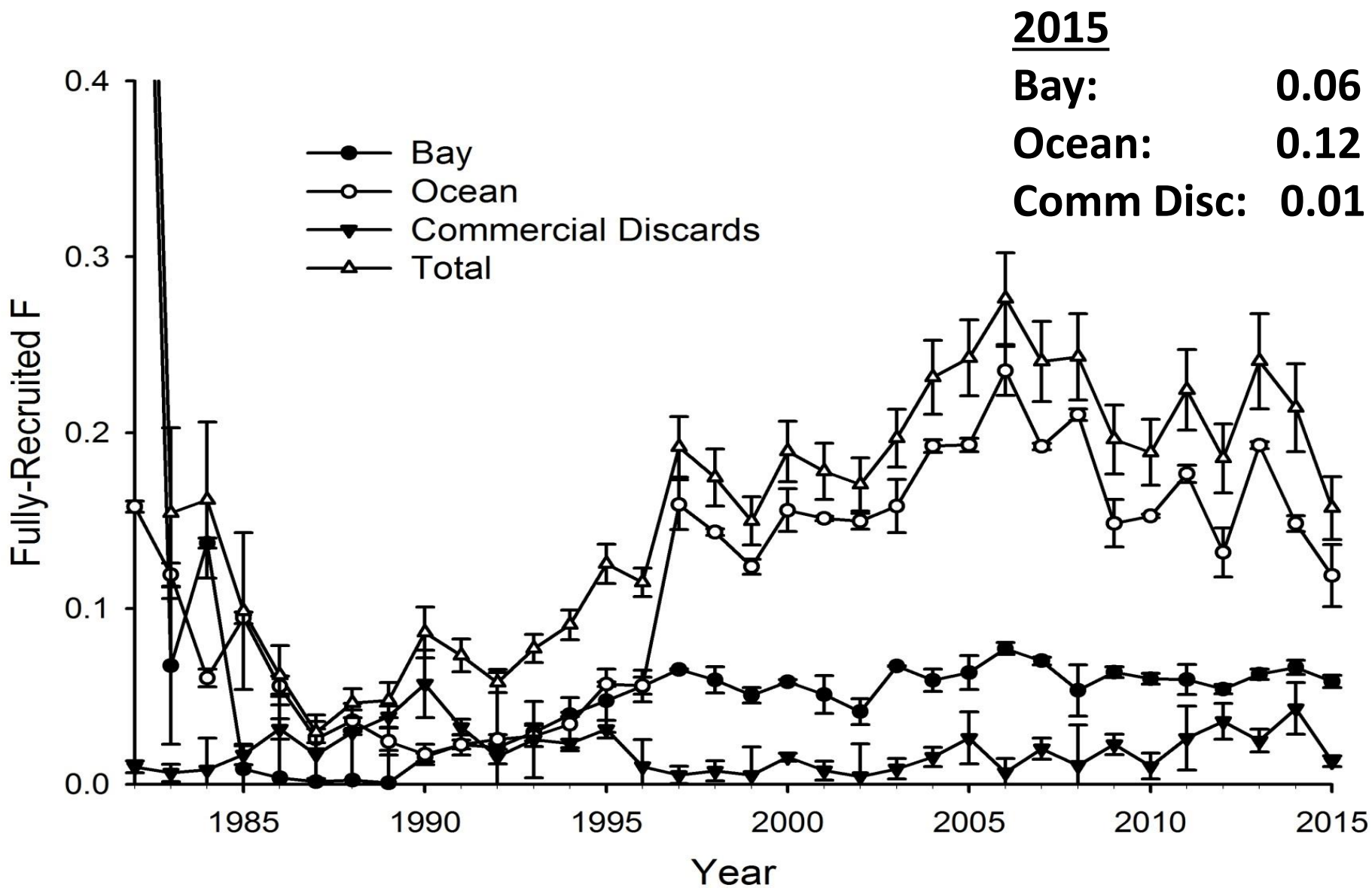
STATISTICAL CATCH-AT-AGE MODELING

Statistical Catch-At-Age Model

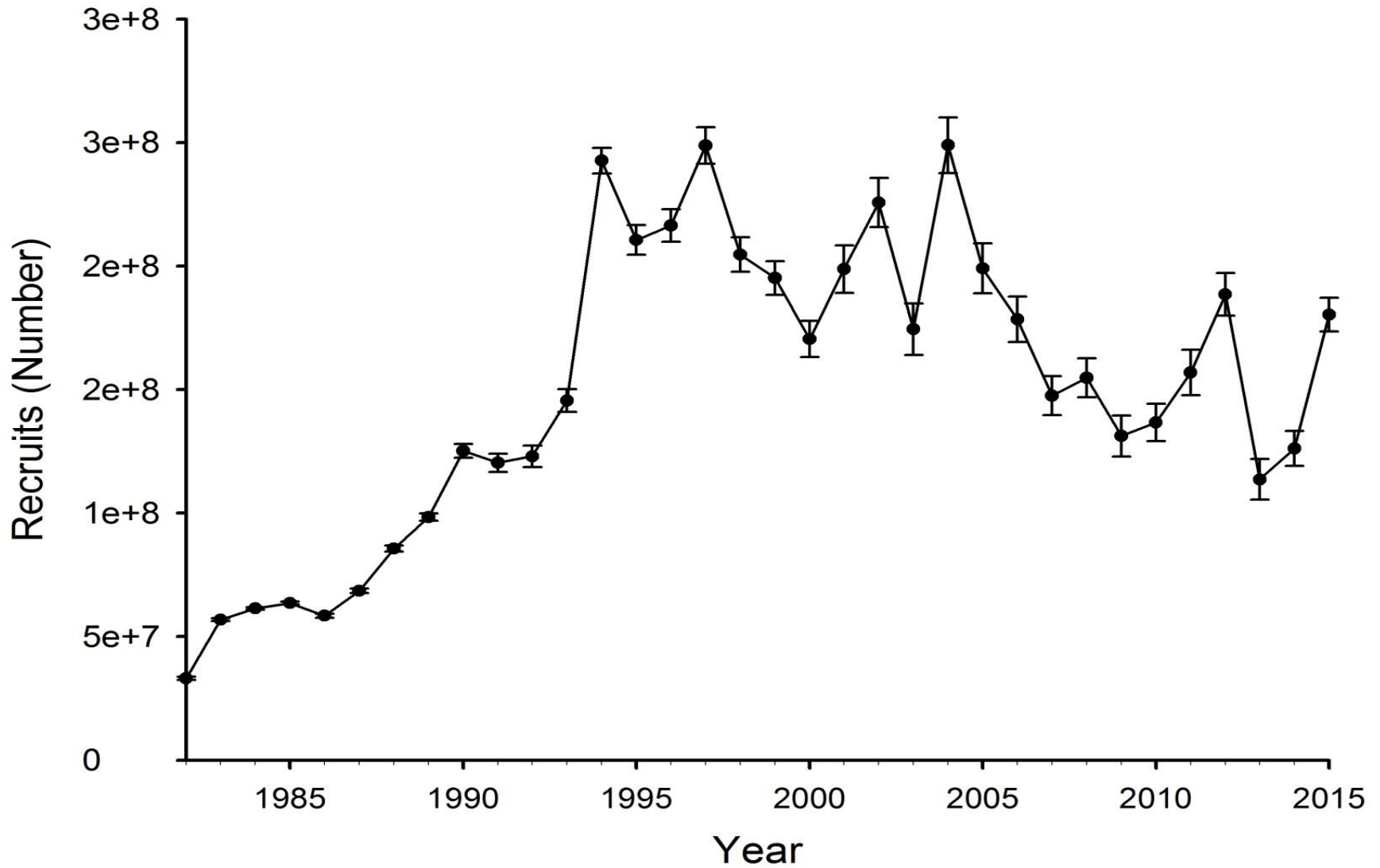


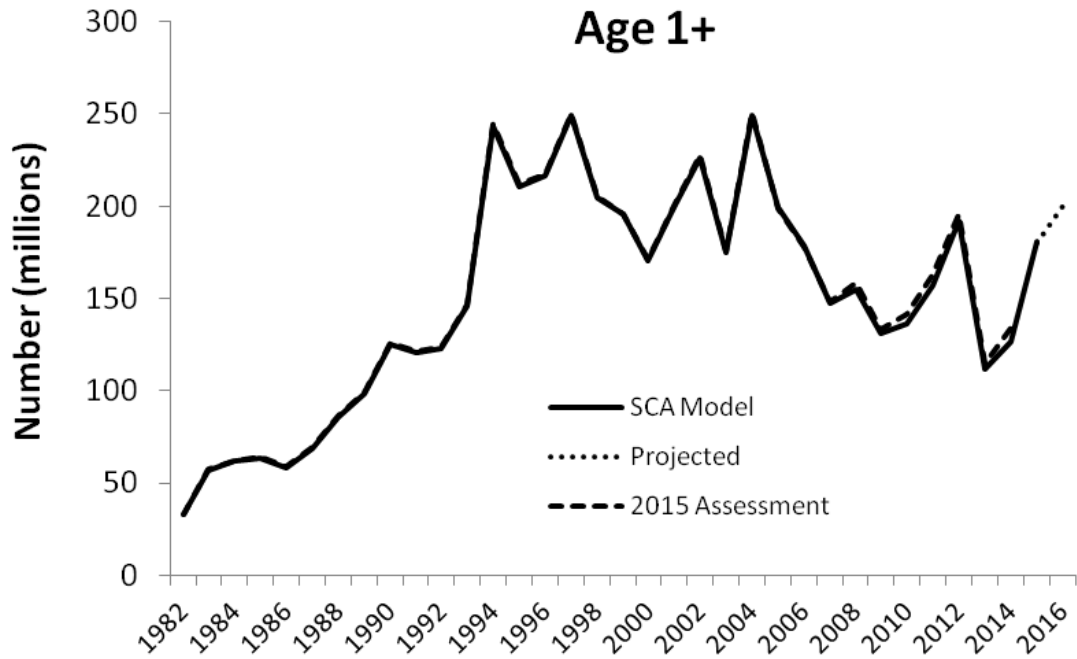
- Forward projecting statistical catch-at-age model
 - Age-1 abundance (recruitment) in each year
 - Fully-recruited F in each year
 - Catch selectivity in 4 regulatory periods
 - (try separate regulatory for 2015 – little difference)
 - Catchability coefficients for all indices
 - Selectivity for each survey with age composition data
- Data are split into three “Fleets” based on regions
 - Chesapeake Bay, Coast and Commercial Discards
 - Improved selectivity fits
 - Provided partial F for each fleet
- Age-specific M were used (1.13: age 1 to 0.15: age 7+)

Fully-Recruited F (± 1 SE) By "Fleet"

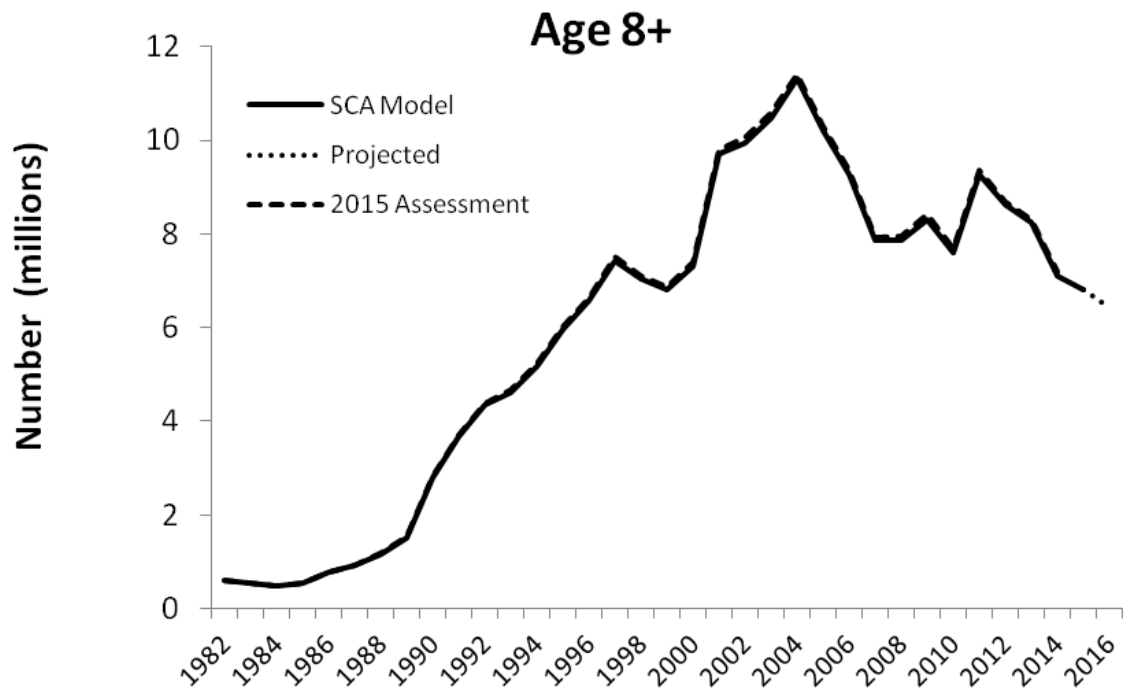


Recruits (Age-1) (+SE)

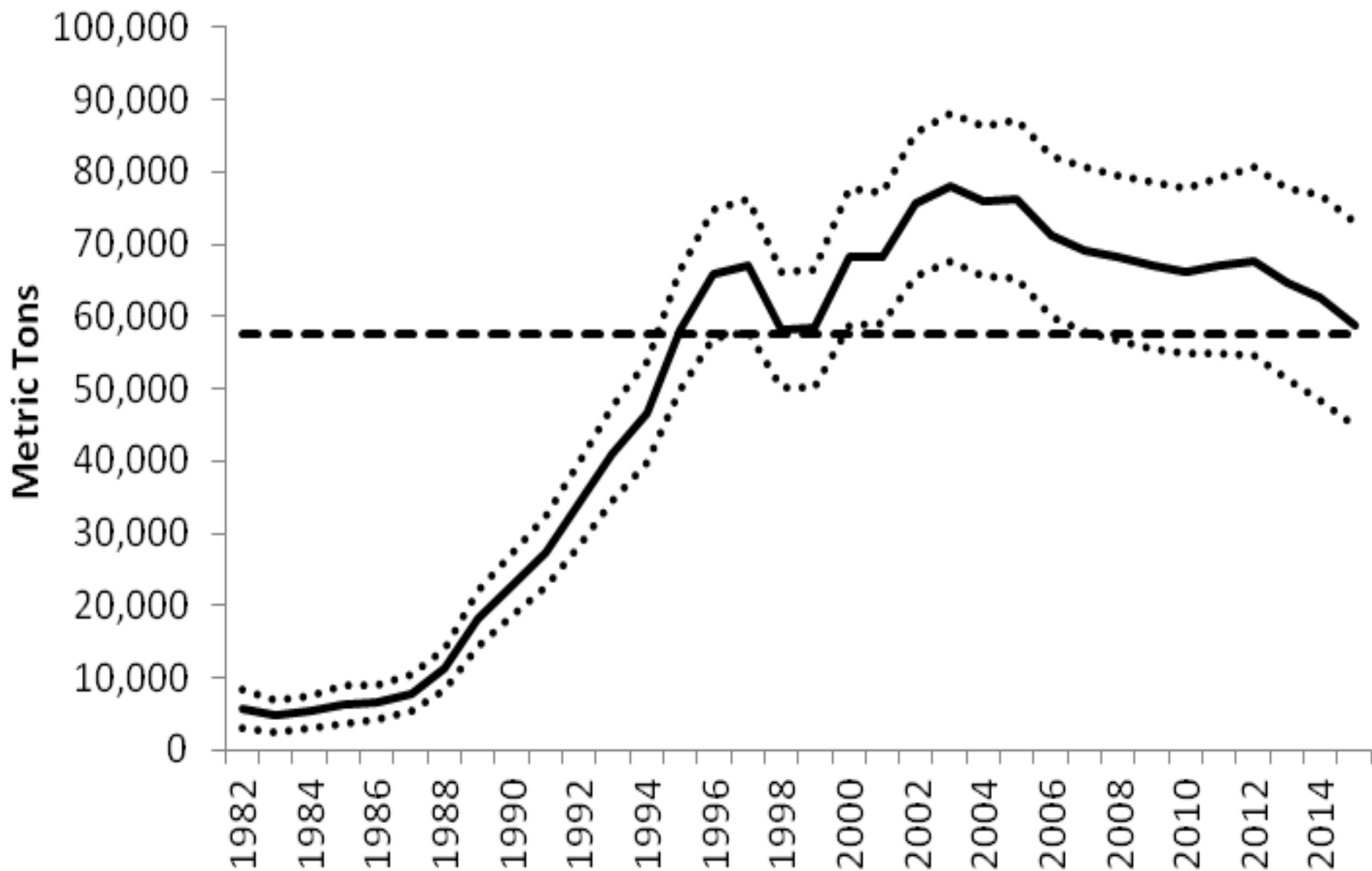




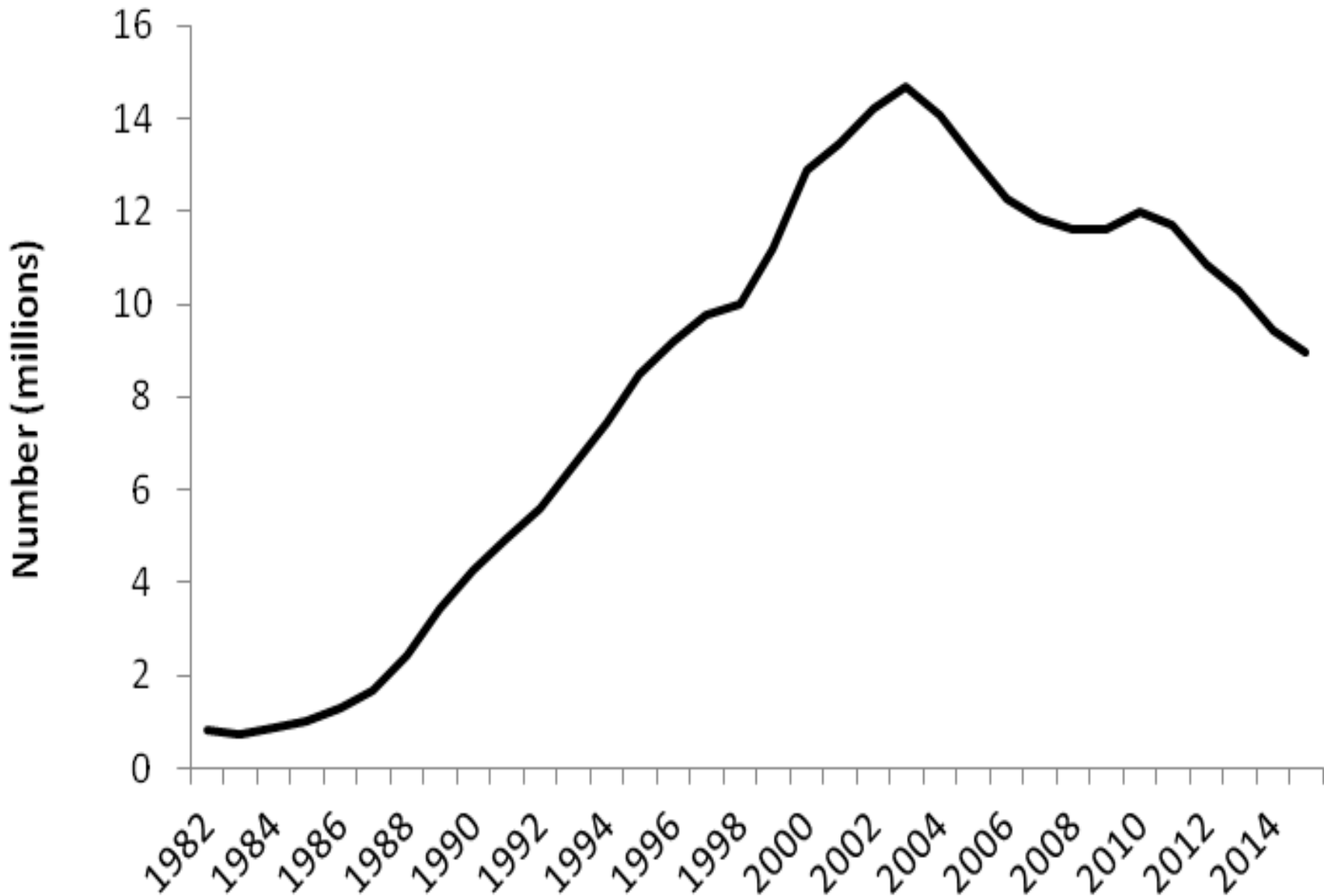
Abundance



Female Spawning Stock Biomass ($\pm 95\%CI$)



Female Spawning Stock Numbers



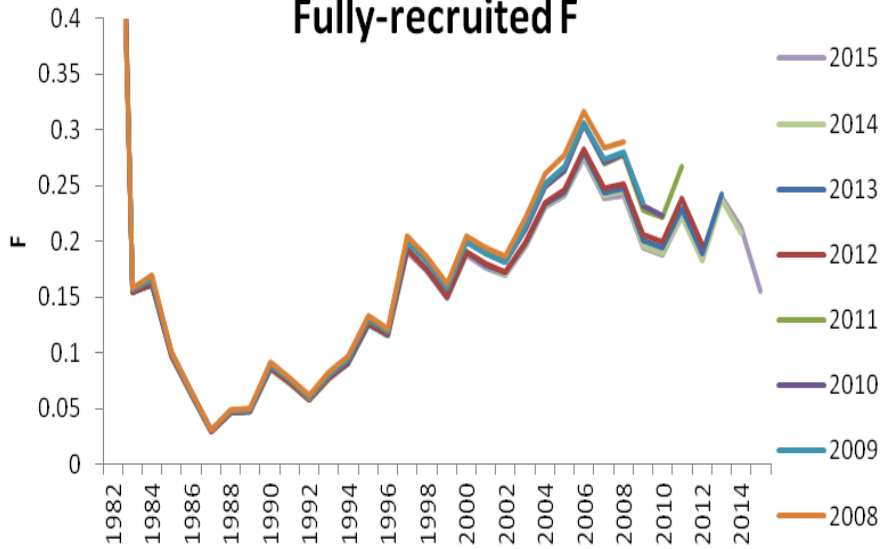


RETROSPECTIVE

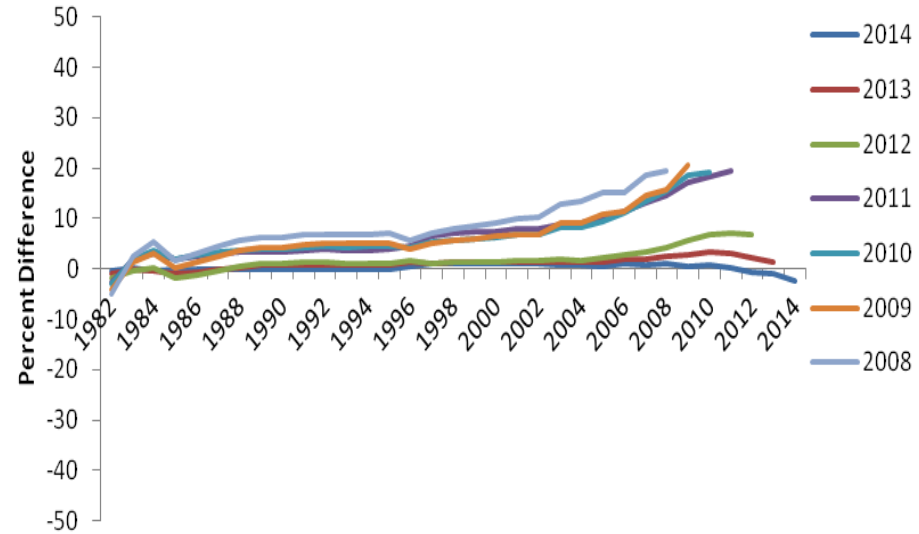
Retrospective Analysis



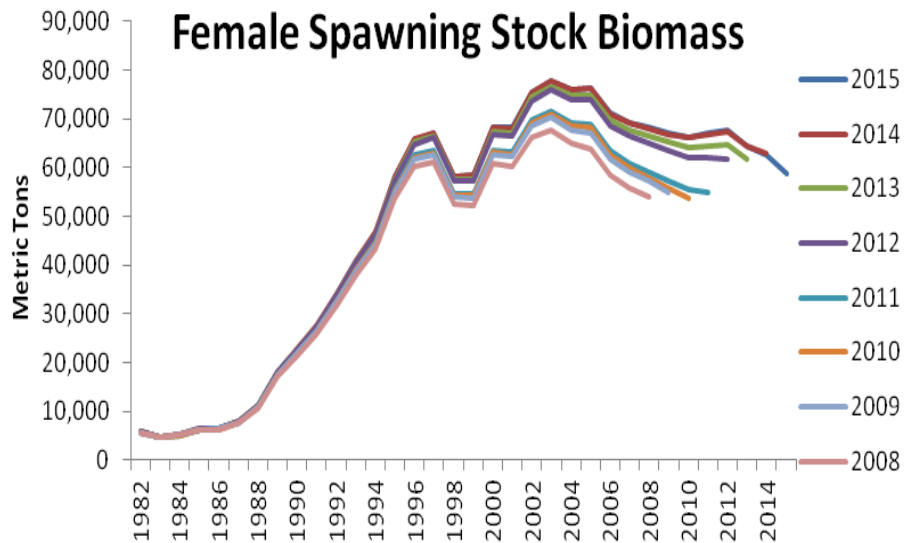
Fully-recruited F



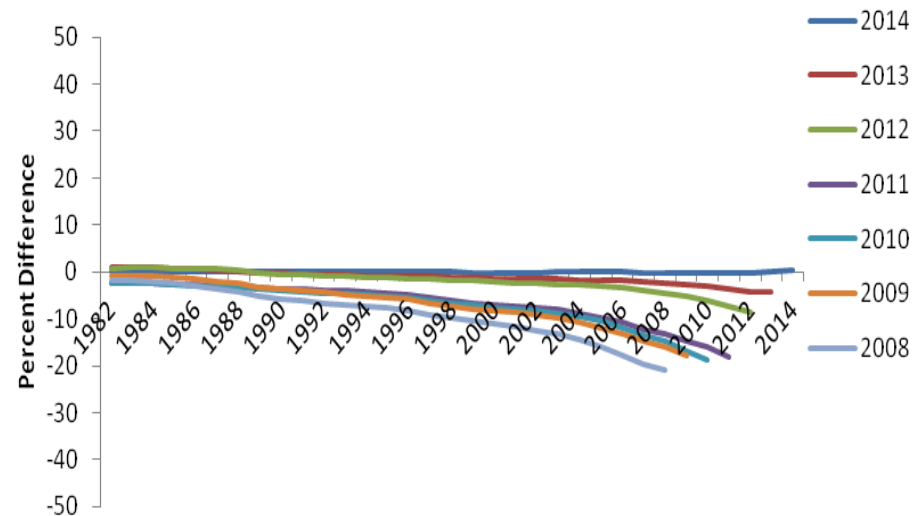
Difference in F between 2015 and Peels



Female Spawning Stock Biomass



Difference in SSB between 2015 and Peels

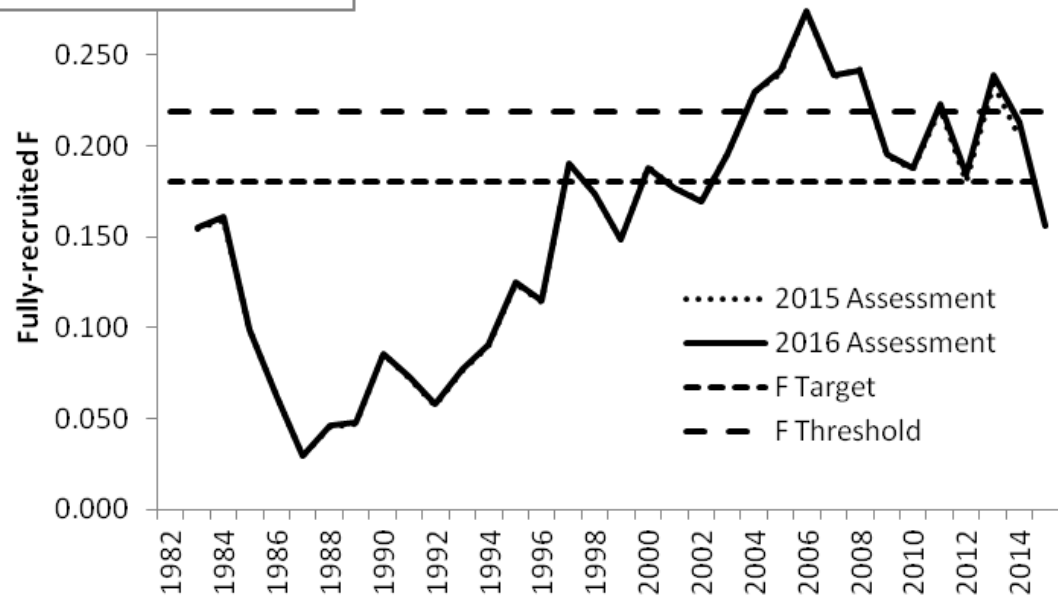
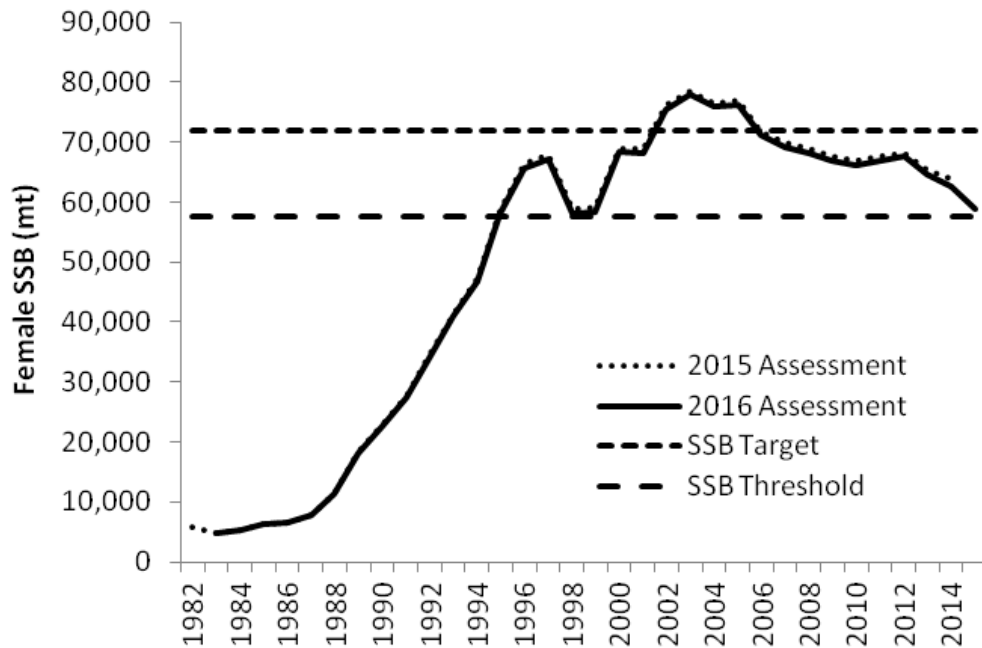




STATUS OF THE STOCK



Status of the Stock



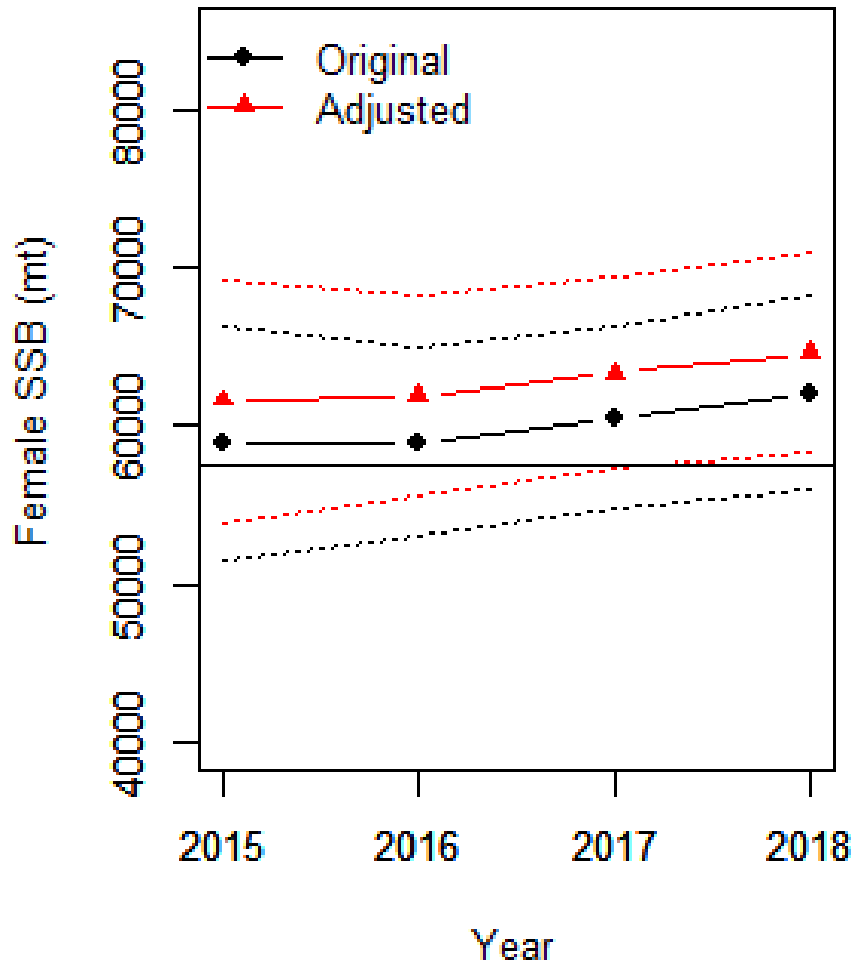


PROJECTIONS

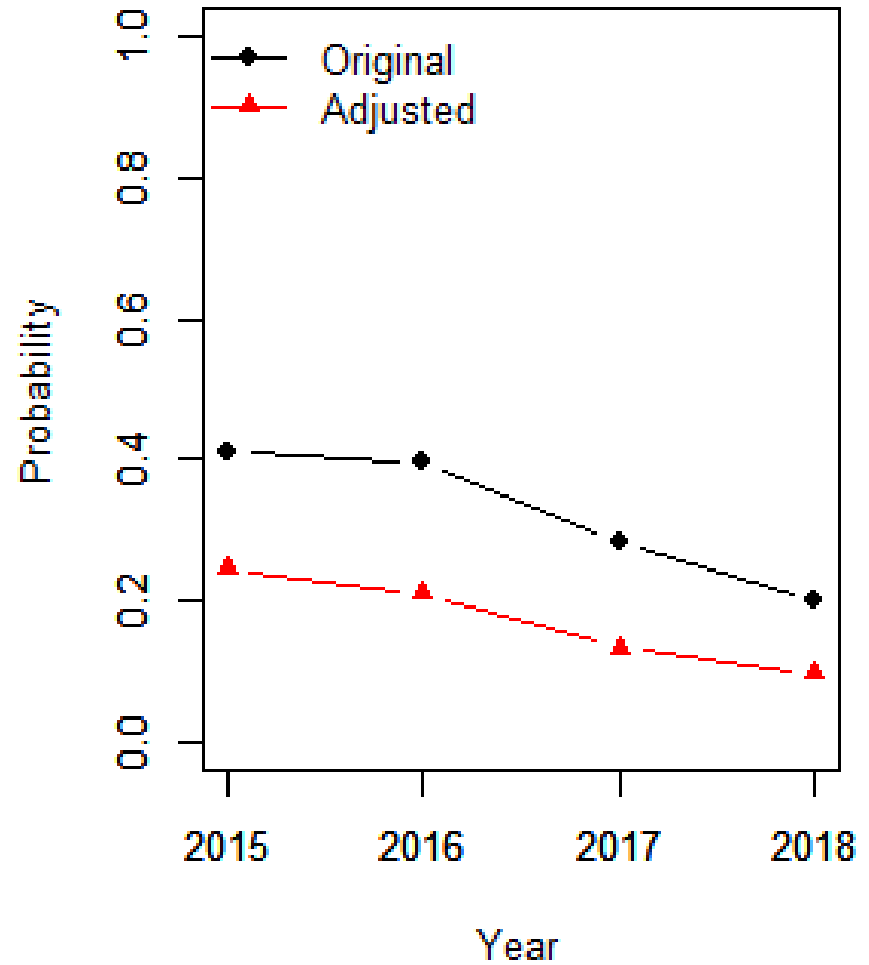
Constant Catch



SSB



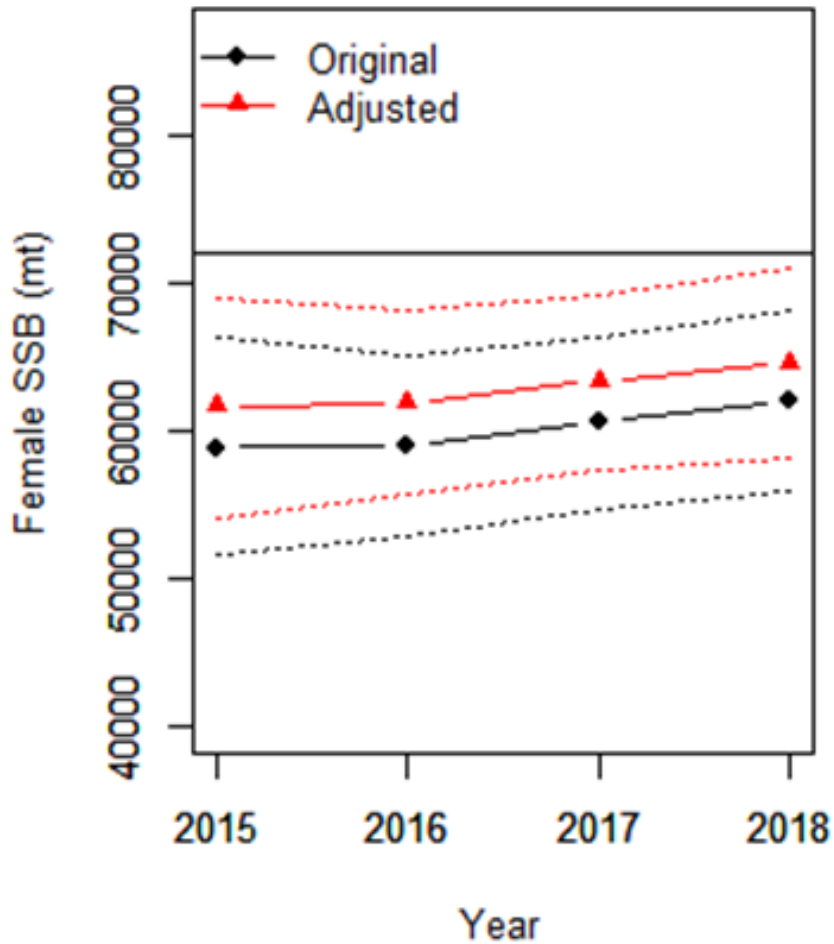
Probability of being overfished



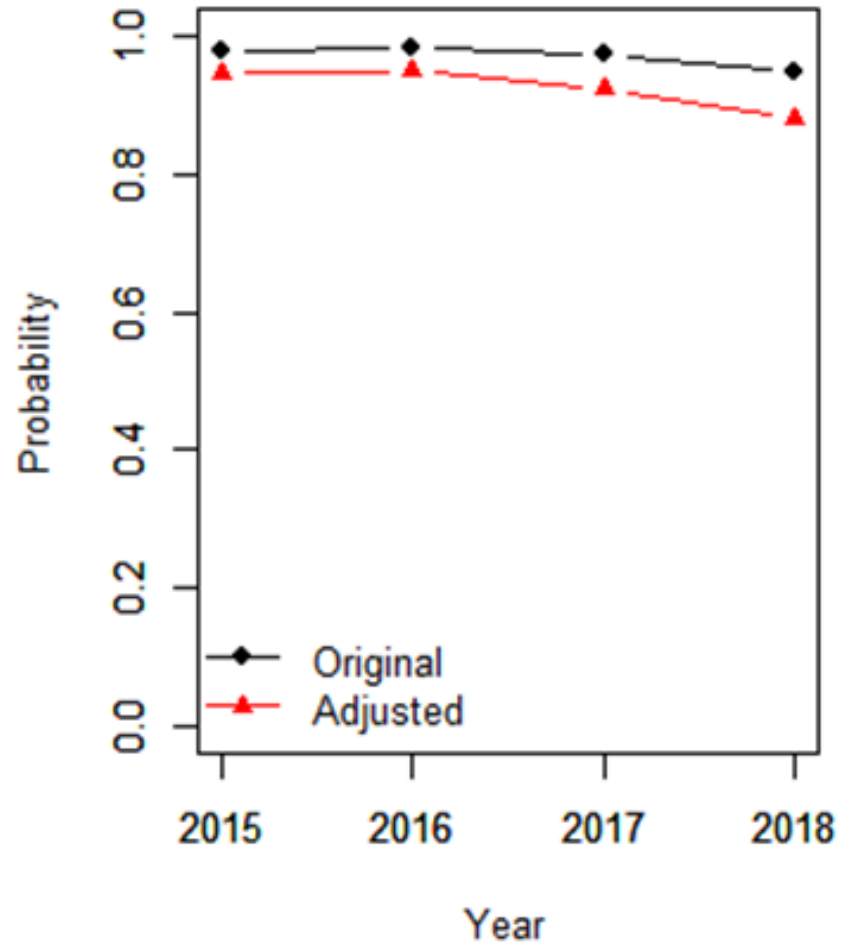
Constant Catch



SSB



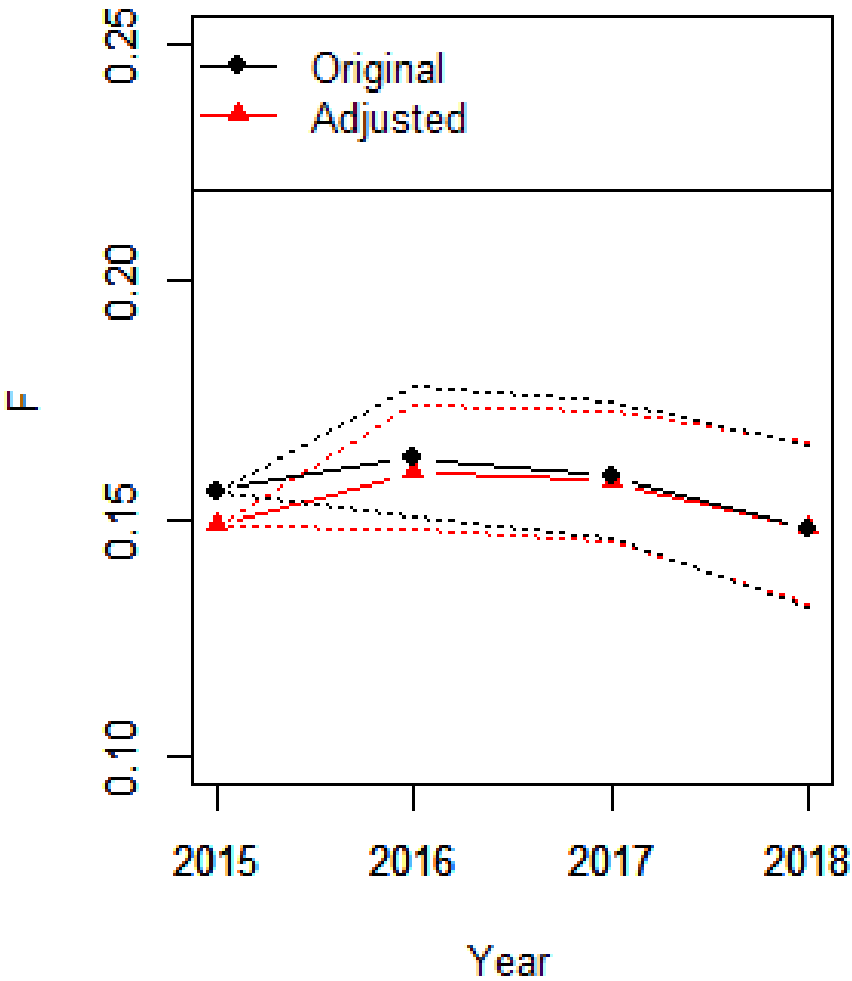
Probability of being below the SSB target



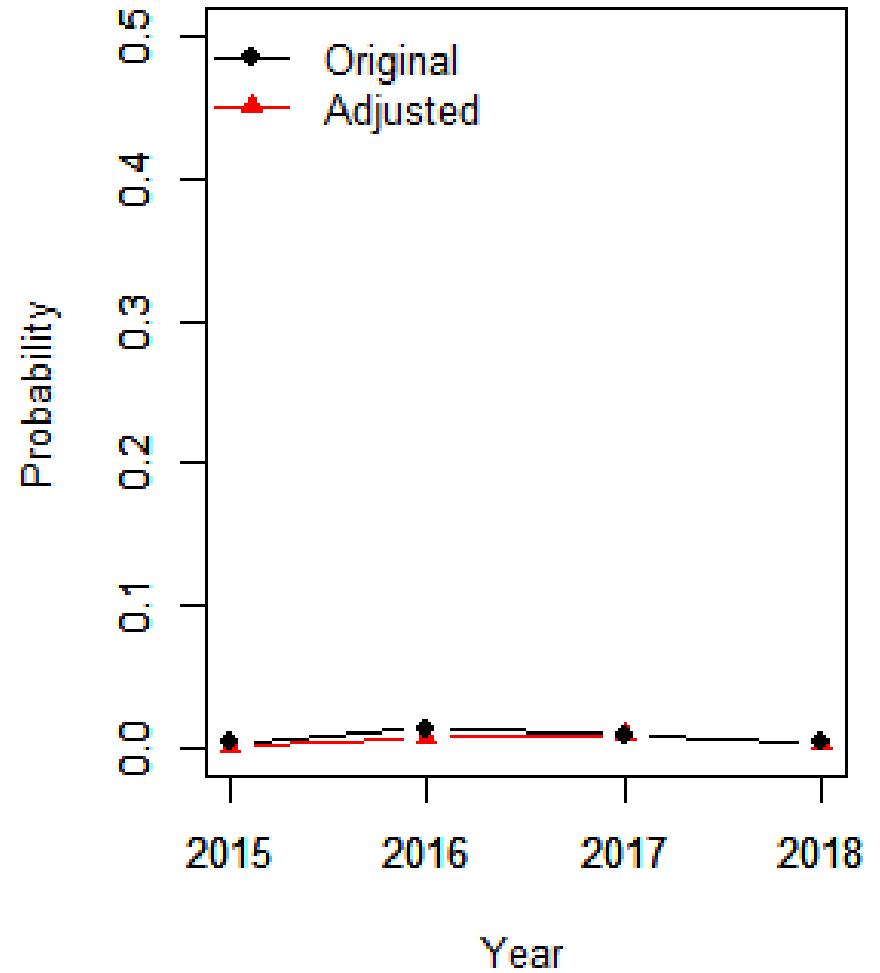
Constant Catch



F



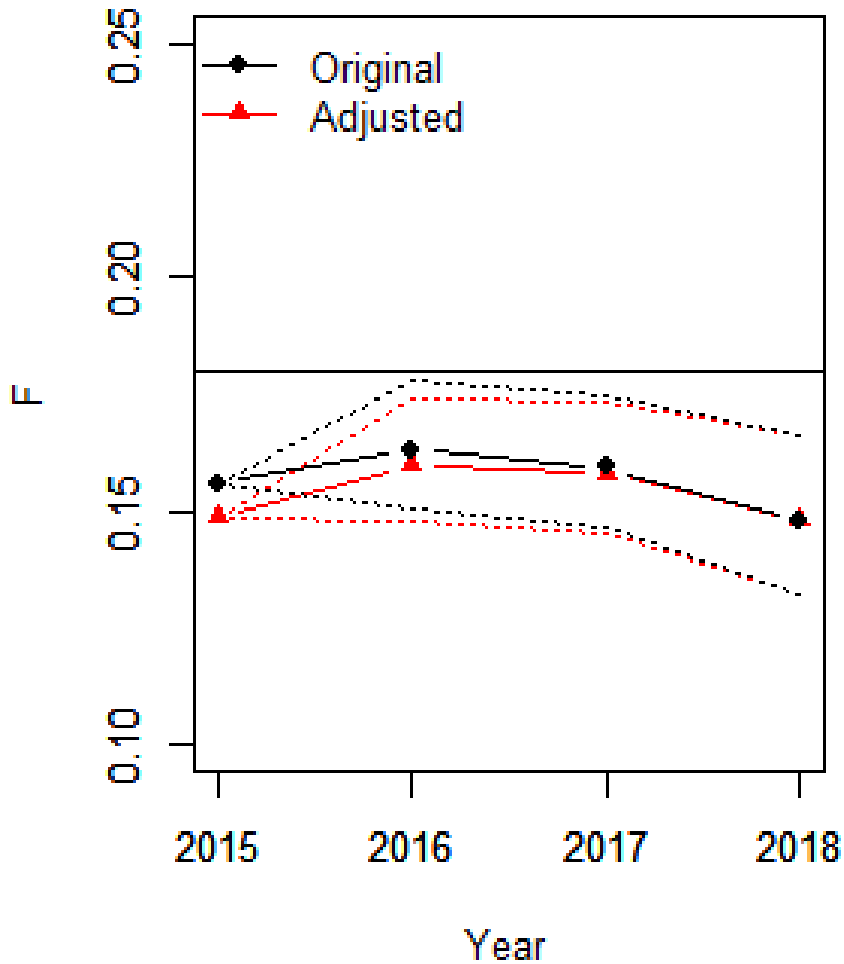
Probability of overfishing



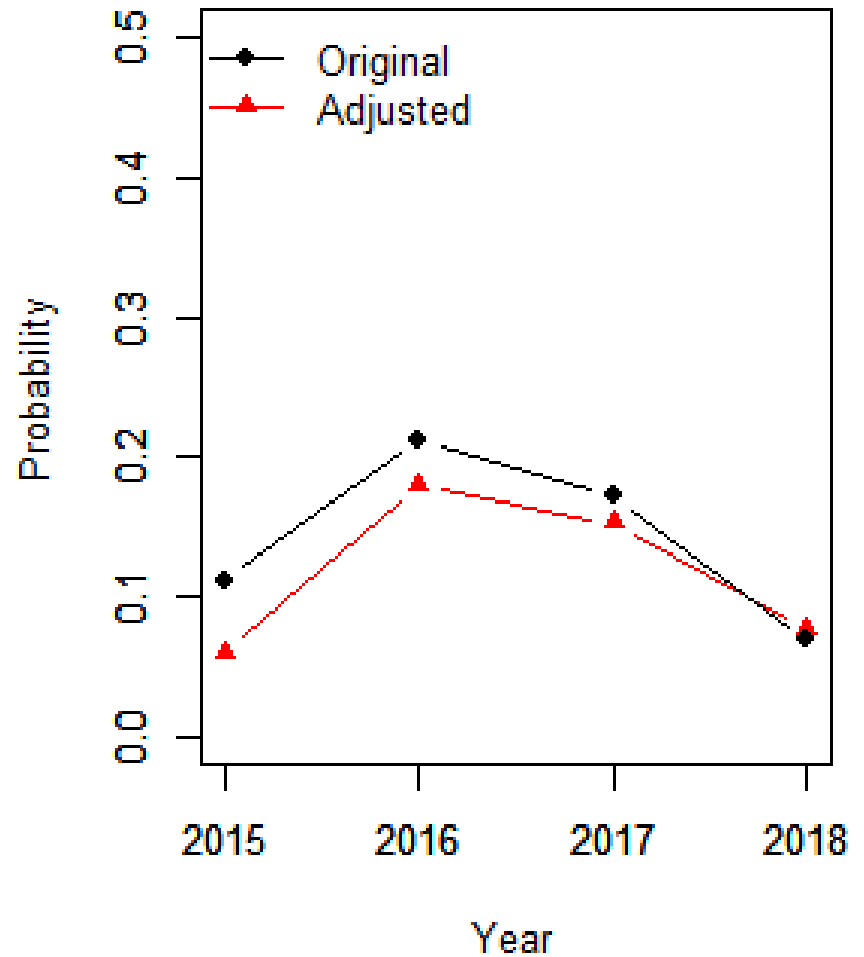
Constant Catch



F



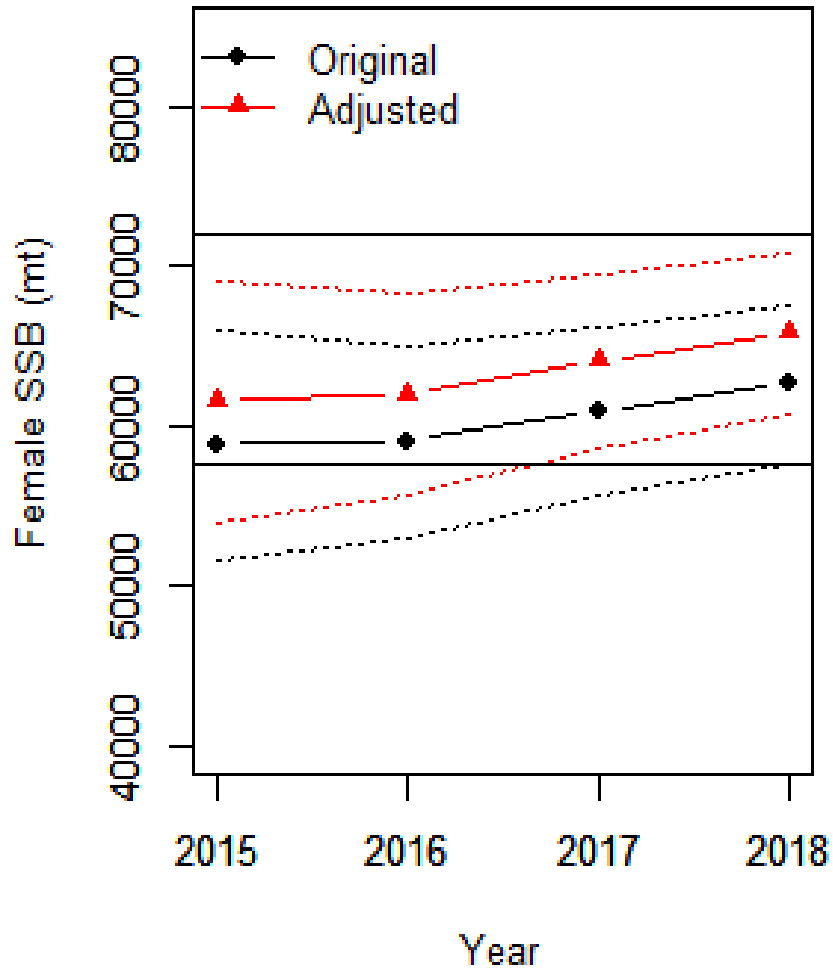
Probability of being above the target



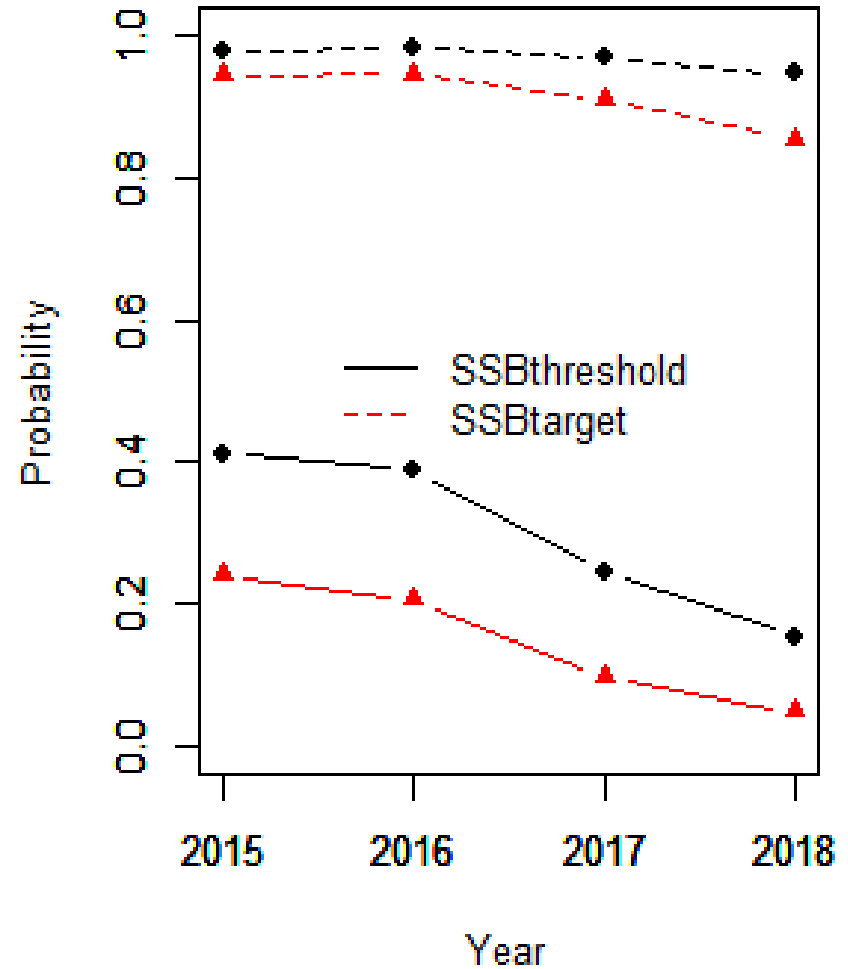
Constant $F = F_{2015} = 0.16$



SSB



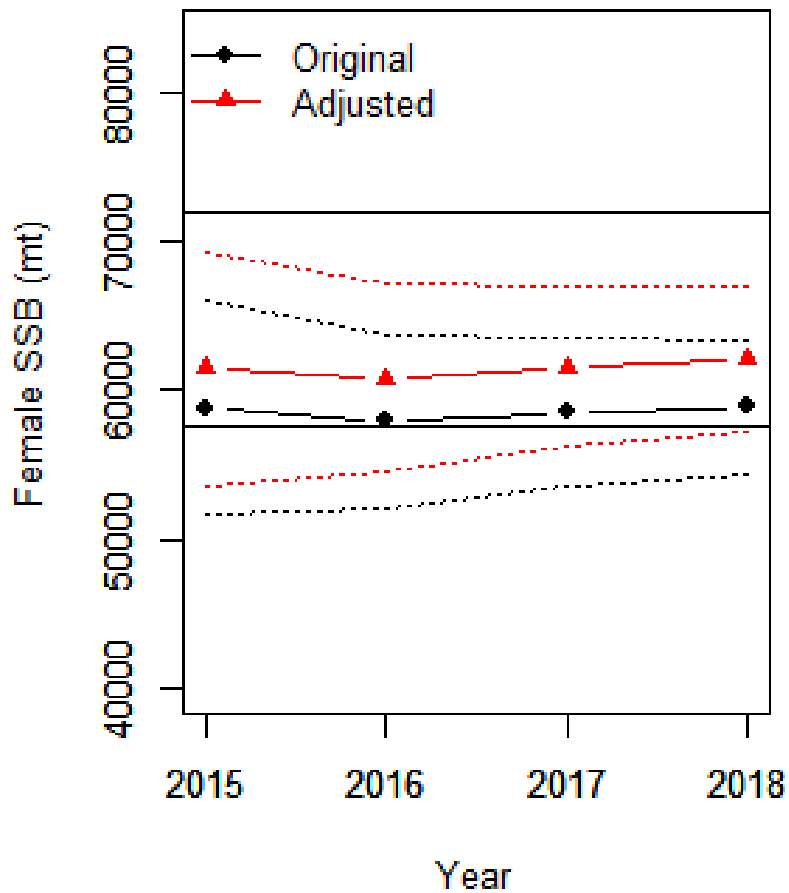
$P(SSB) \leq$ Target/Threshold



Constant $F = F_{\text{target}} = 0.18$



SSB



$P(\text{SSB}) \leq$ Target/Threshold

