2013 Stock Assessment of Atlantic Striped Bass

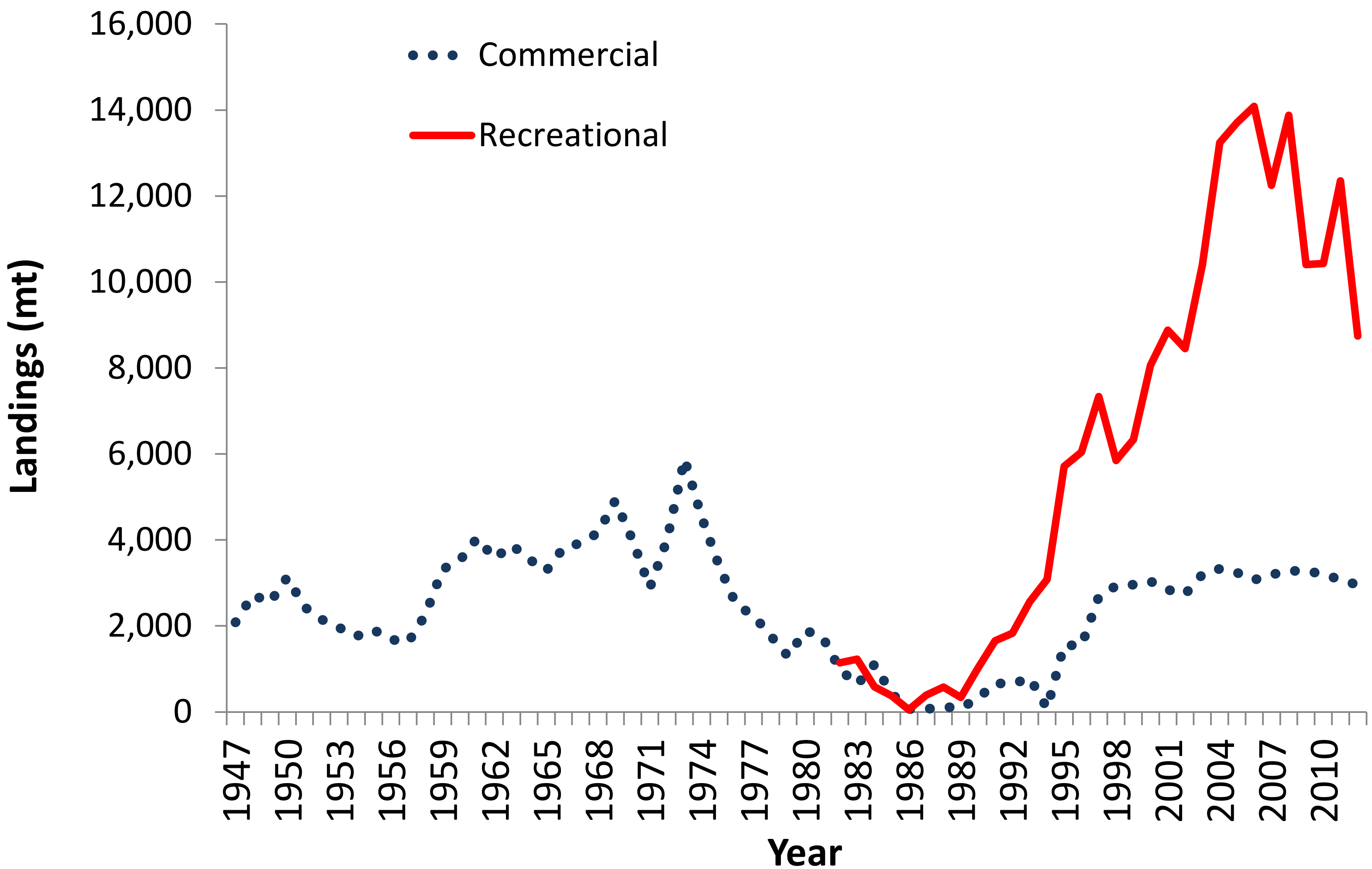
Gary Nelson

Stock Assessment Subcommittee Chair

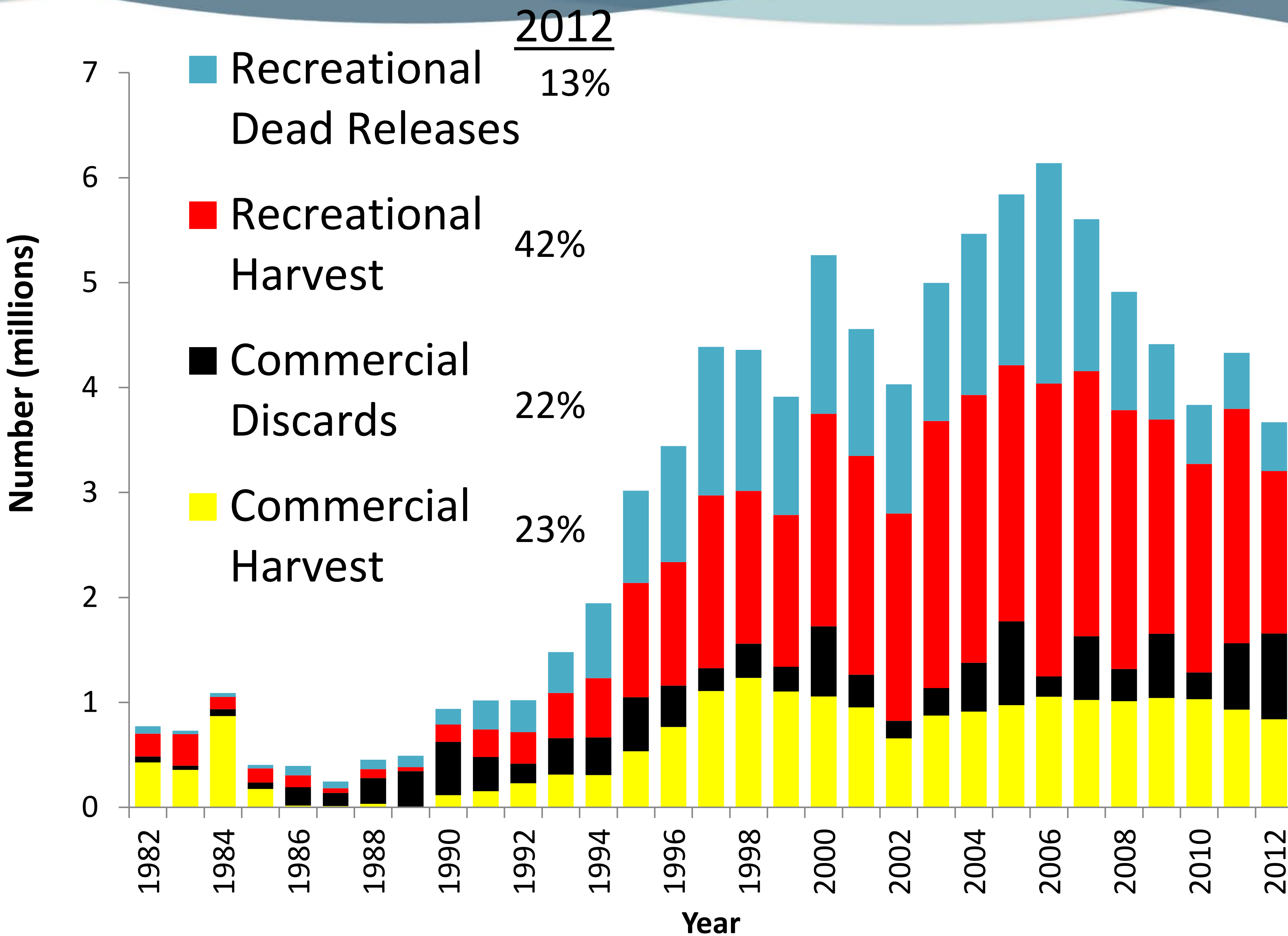
Alexei Sharov

Technical Committee Chair

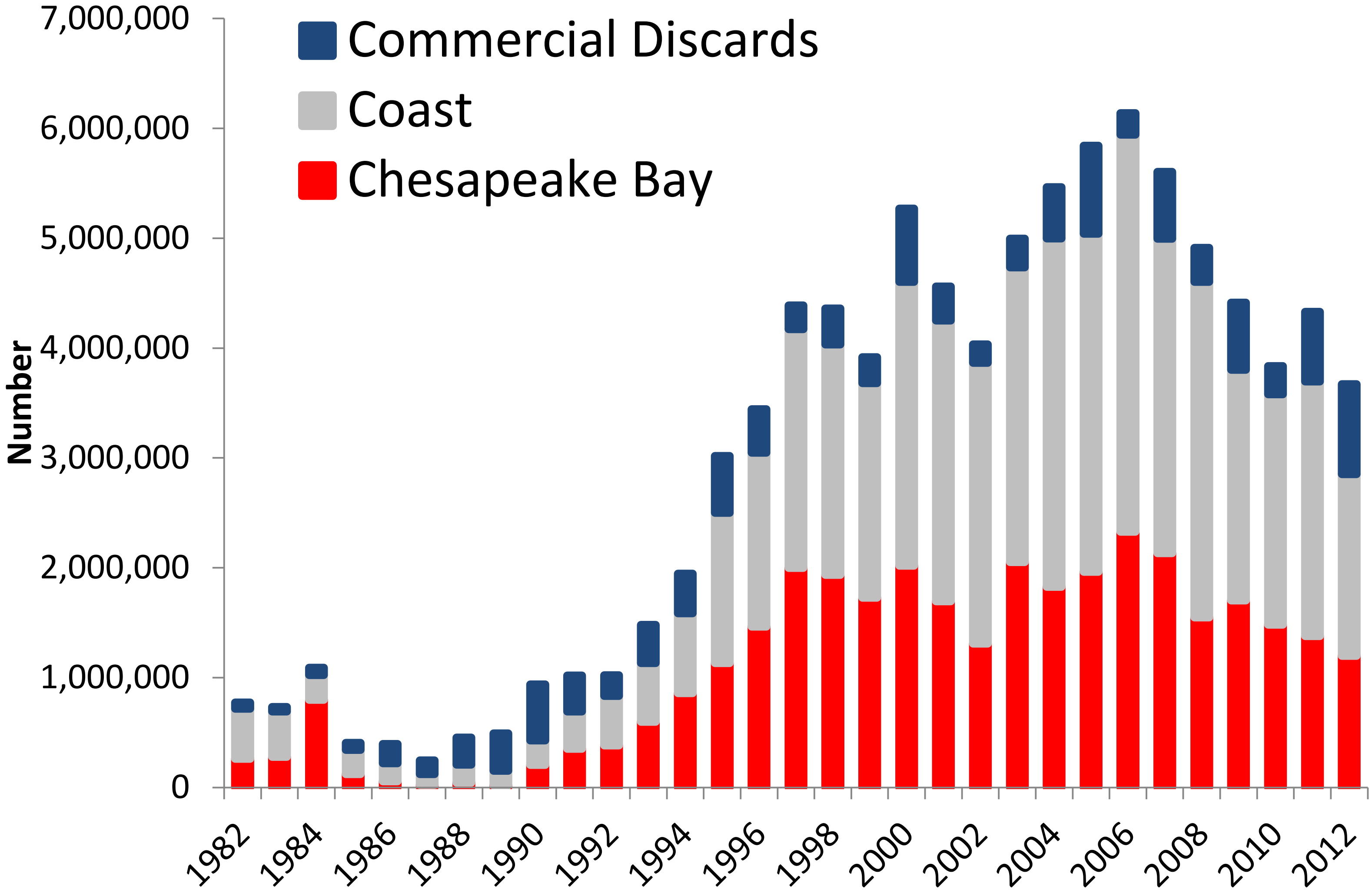
Coast-wide Landings (mt)



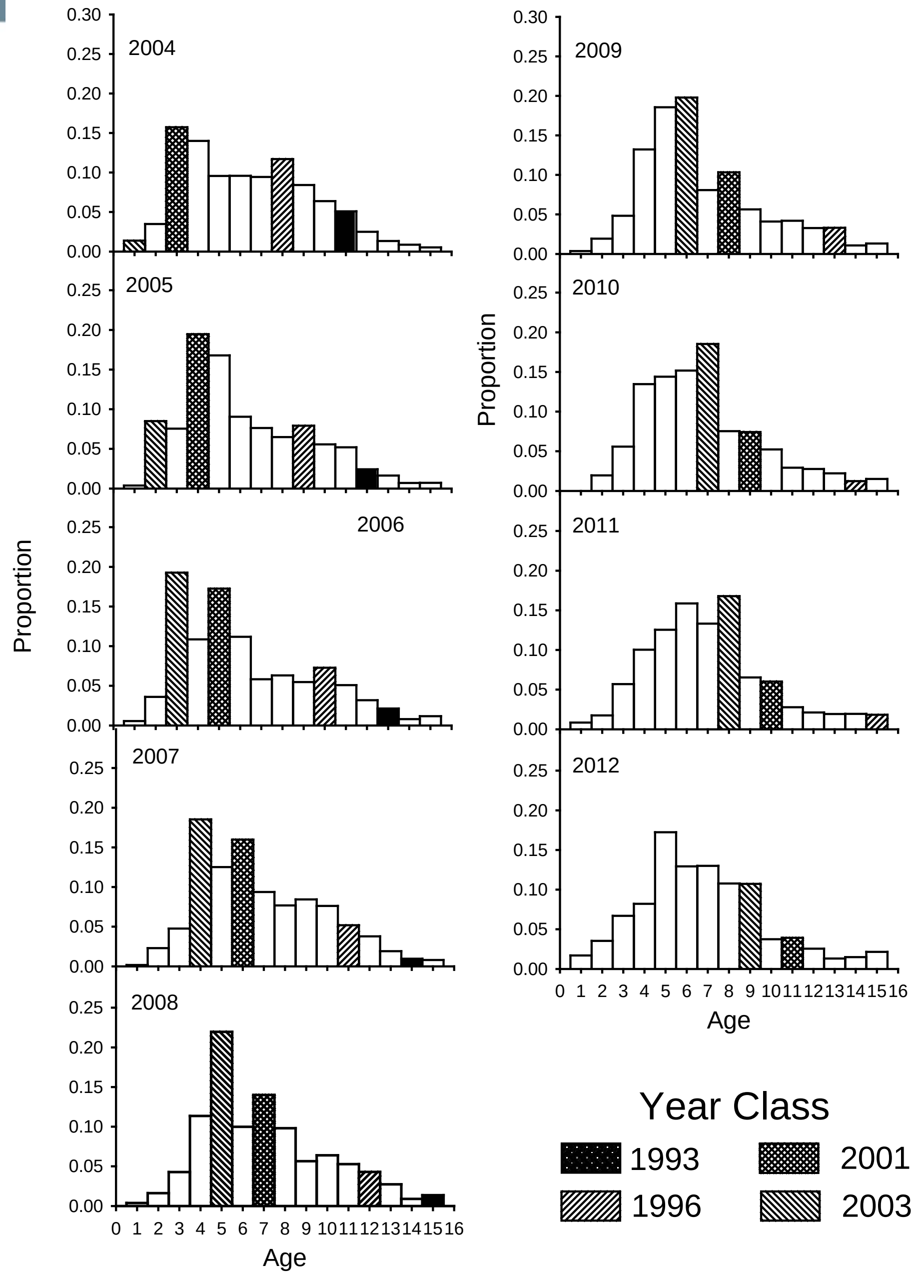
Coast-wide Removals



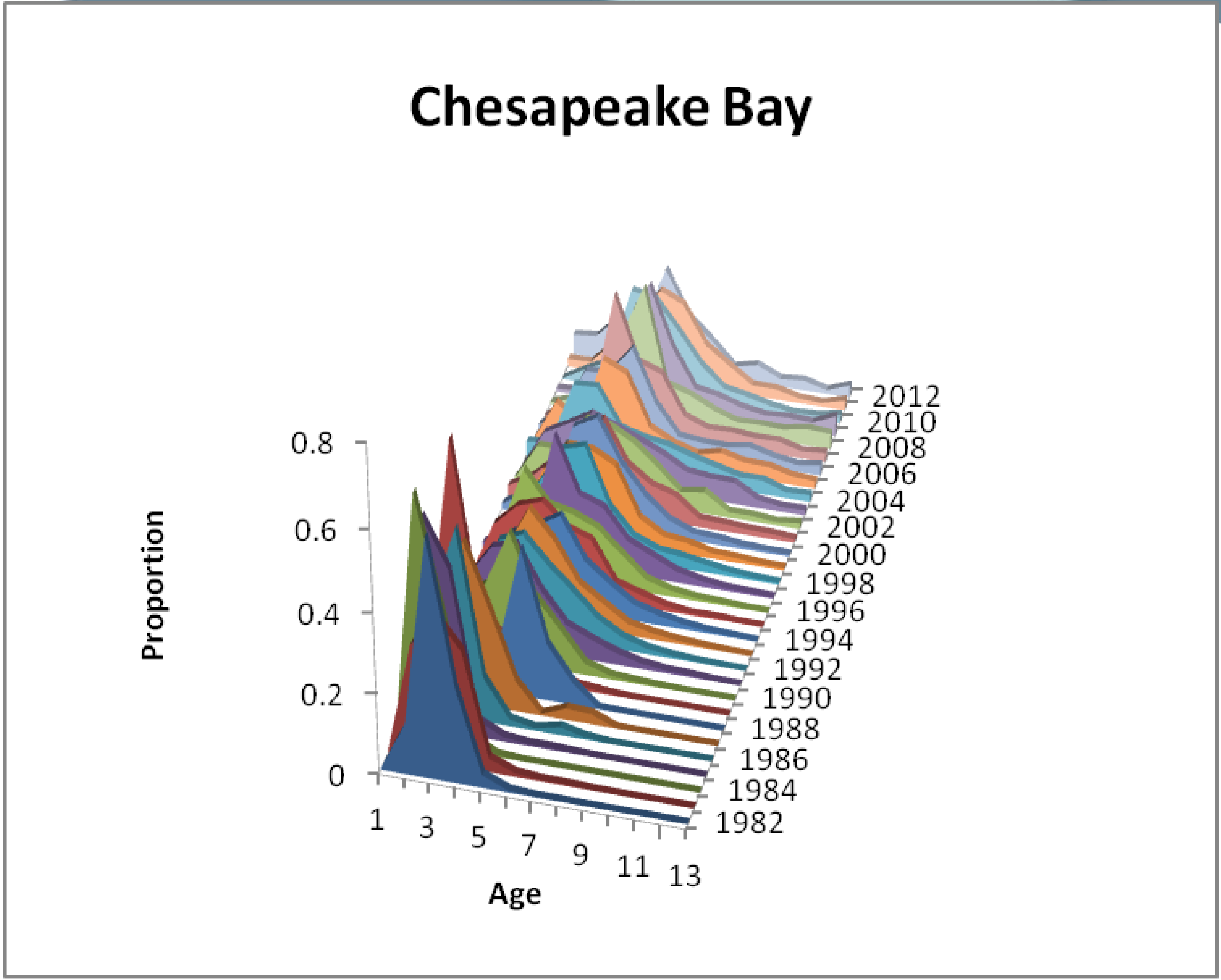
Total Removals By "Fleet"



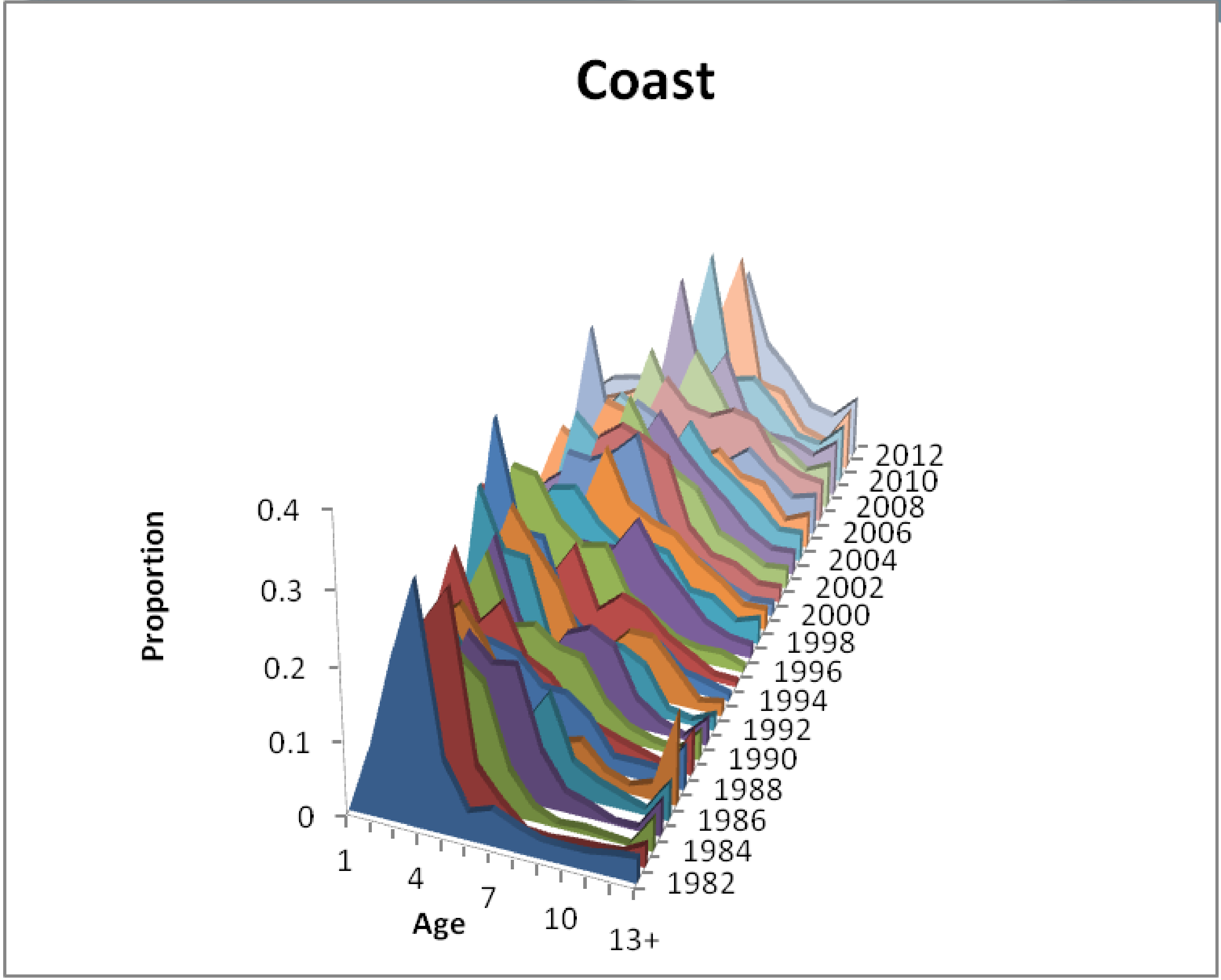
Total Catch Composition



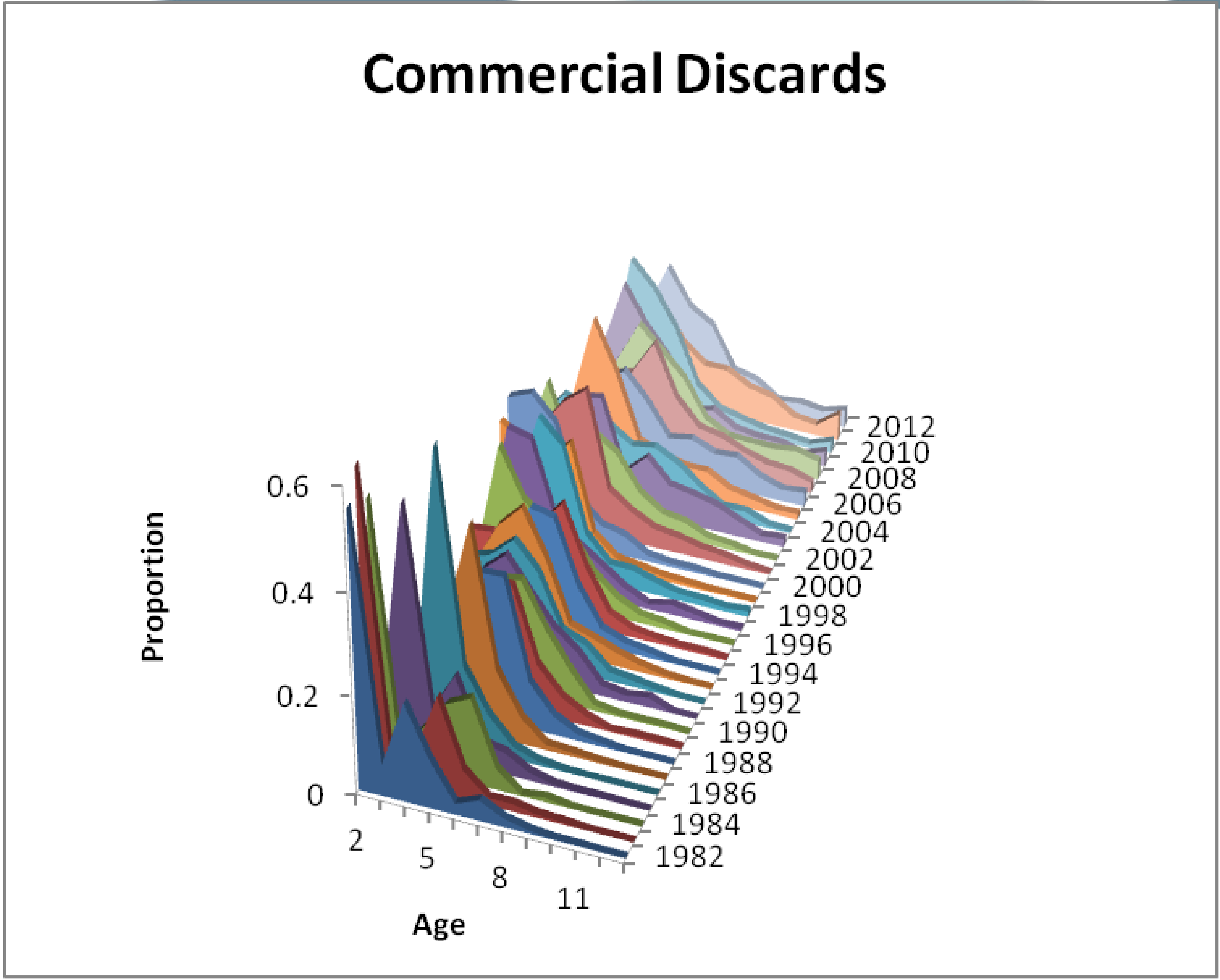
Catch Composition (cont.)



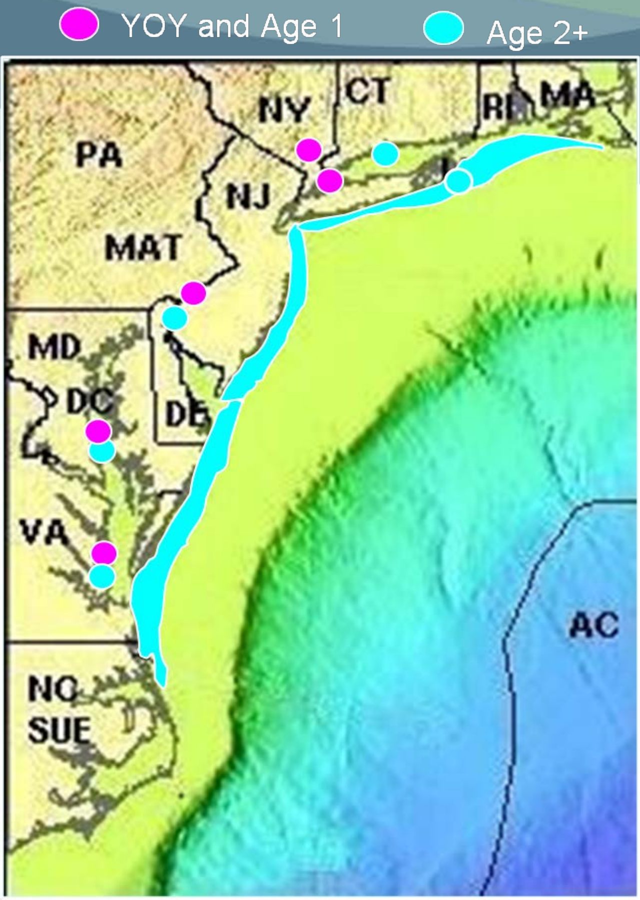
Catch Composition (cont.)



Catch Composition (cont.)



YOY, AGE-1, AGGREGATE AND AGE COMPOSITION SURVEYS

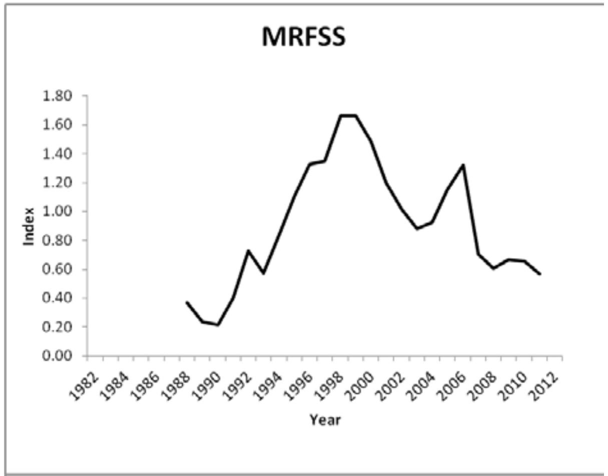


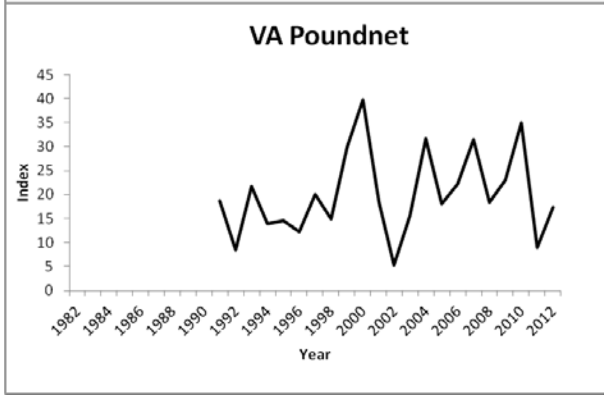
Distribution of Indices

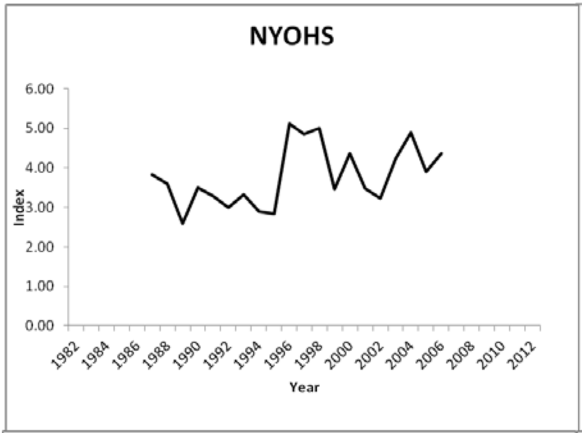
- Massachusetts Commercial CPUE – dropped; not reflective of abundance
- CT Recreational CPUE – dropped; irreproducible & double counting with MRFSS/MRIP
- VA Pound Net – re-instituted

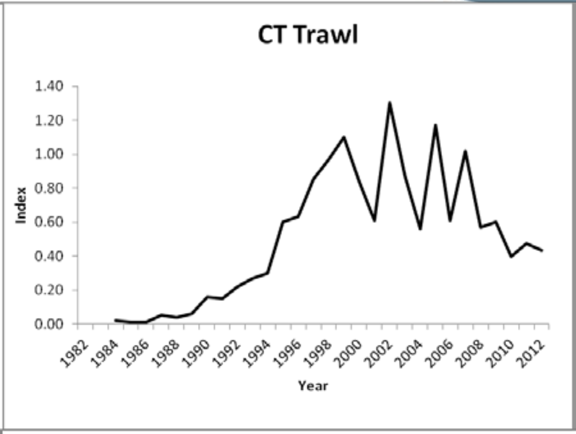
State	Index	Design	Time of Year	What Stock?	Ages
Marine Recreational Fisheries Survey	Total Catch Rate Index	Stratified Random	May-Dec	Mixed	Aggregate (3-13+)
Connecticut Trawl Survey	Mean number per tow	Stratified Random	April-June	Mixed	Aggregate (4-6)
NEFSC Trawl Survey	Mean number per tow	Stratified 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+

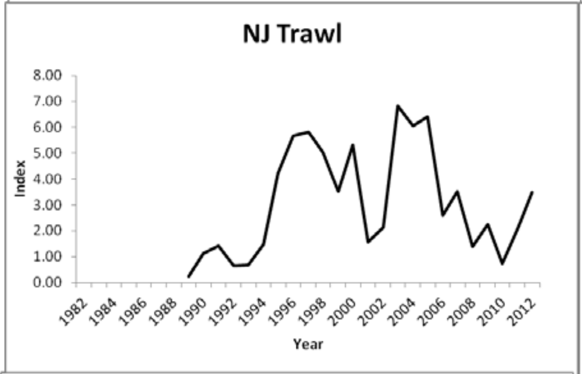
Fisheries-Dependent

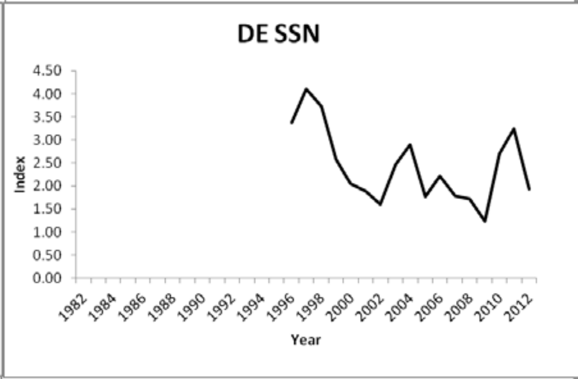


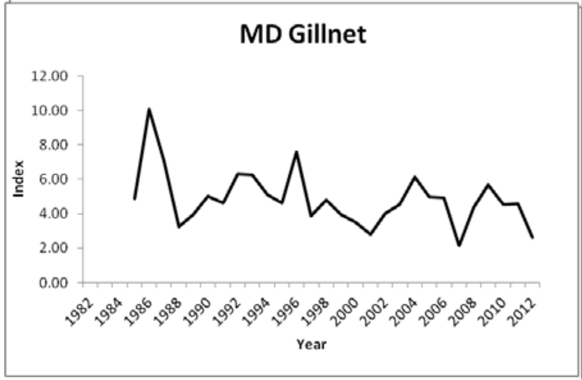


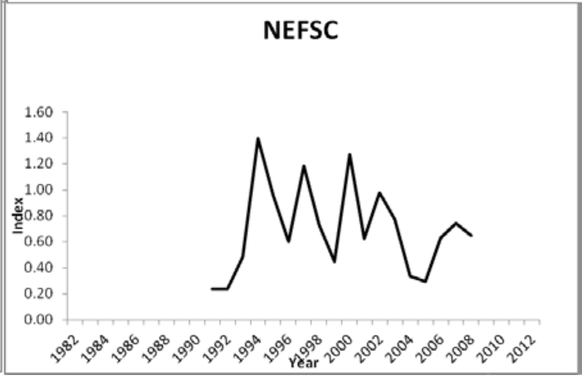




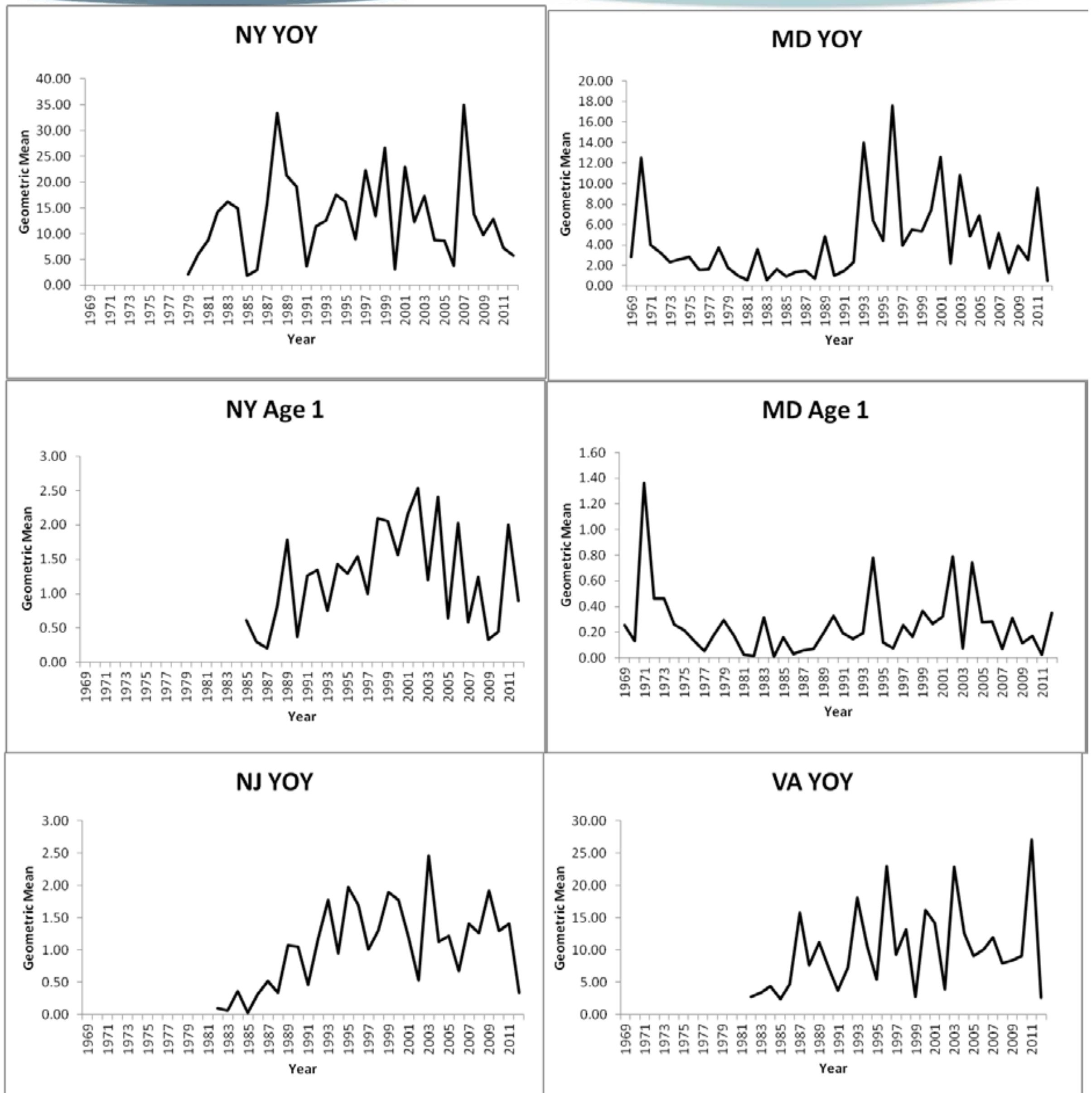








YOY and Age 1



STATISTICAL CATCH-AT-AGE MODELING

Statistical Catch-At-Age Model

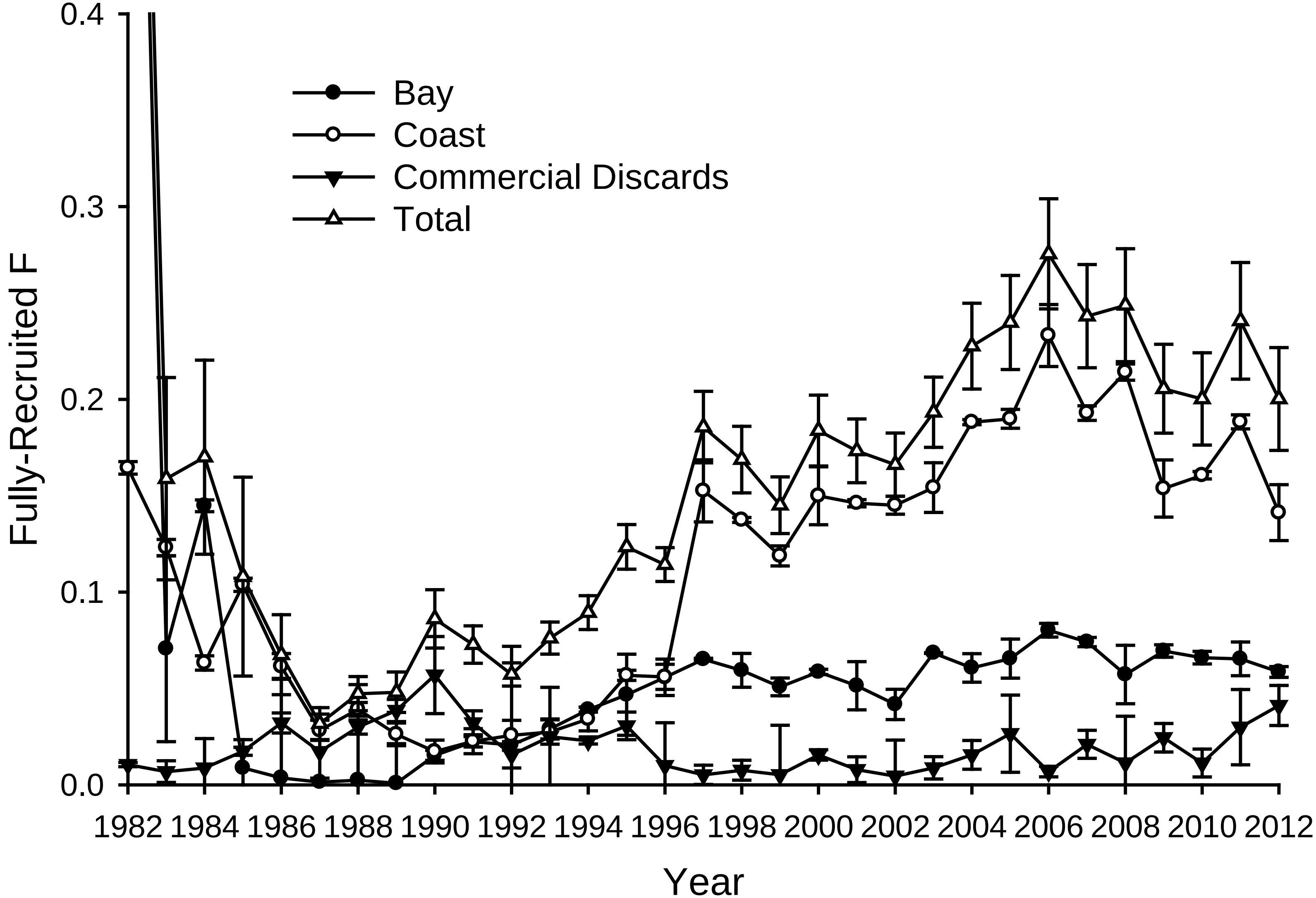
- Forward projecting statistical catch-at-age model
  - Age-1 abundance (recruitment) in each year
  - Fully-recruited F in each year
  - Catch selectivity in 4 regulatory periods
  - Catchability coefficients for all indices
  - Selectivity for each survey with age composition data

- Data are split into three "Fleets" based on regions
  - Chesapeake Bay, Coast and Commercials Discards
  - Improved selectivity fits
  - Provided partial F for each fleet

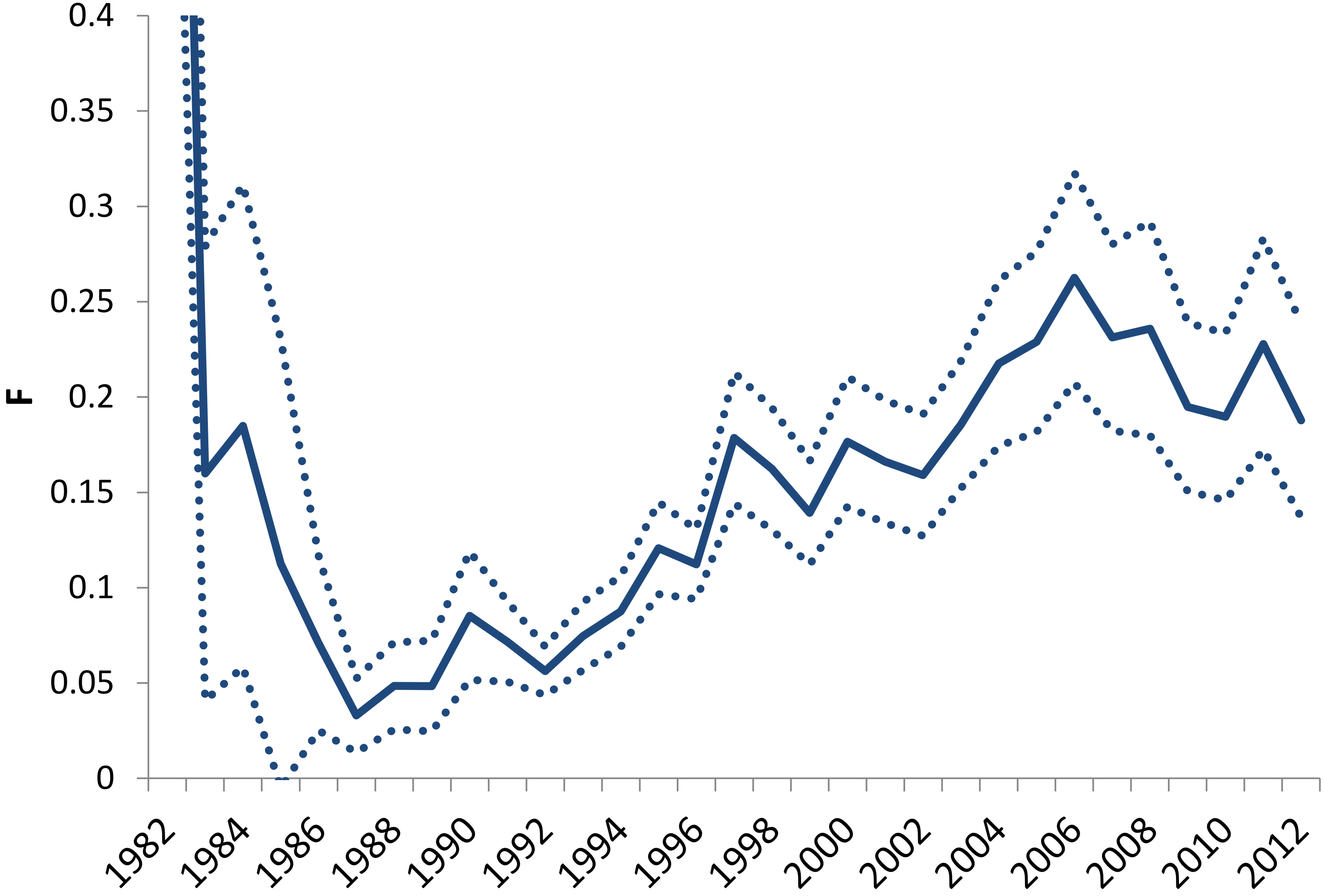
- Age-specific M were used (1.13: age 1 to 0.15: age 7+)

- F is now fully-recruited F (fleets combined), not average F of ages 8-11

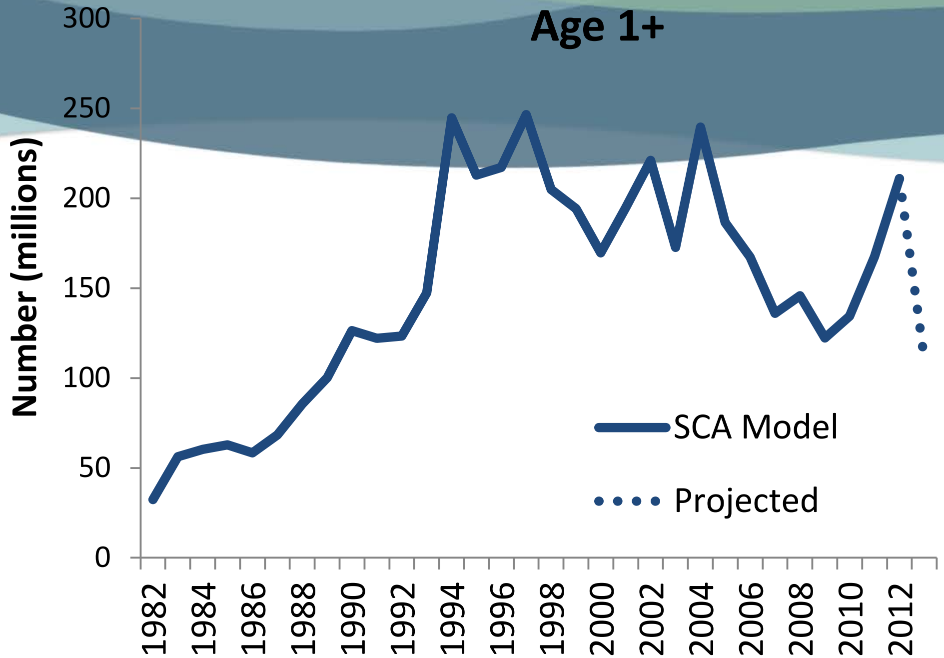
Fully-Recruited F (±1 SD) By "Fleet"



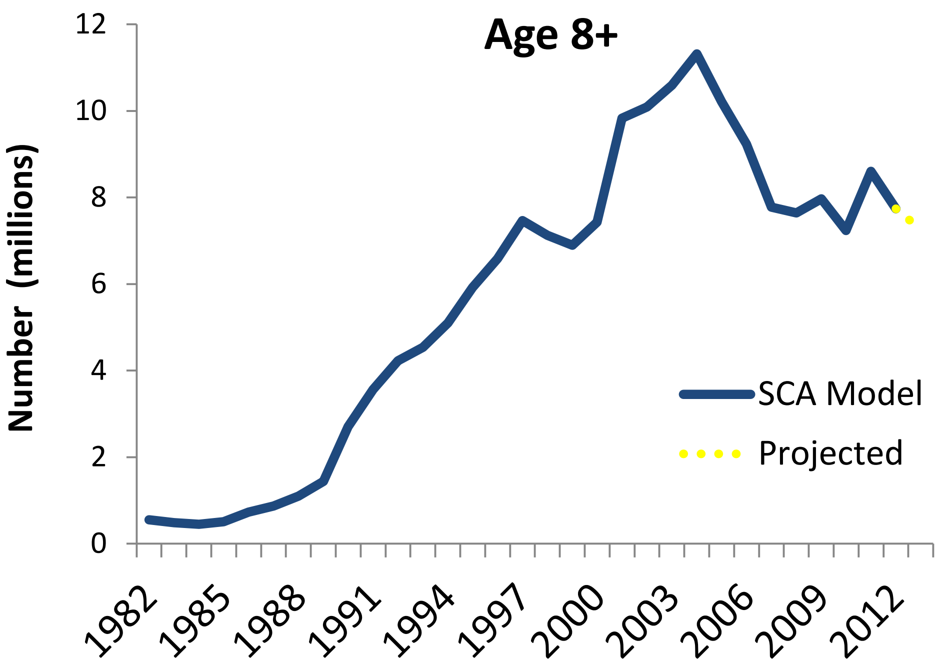
Fully-Recruited F (+95%CI)



Abundance

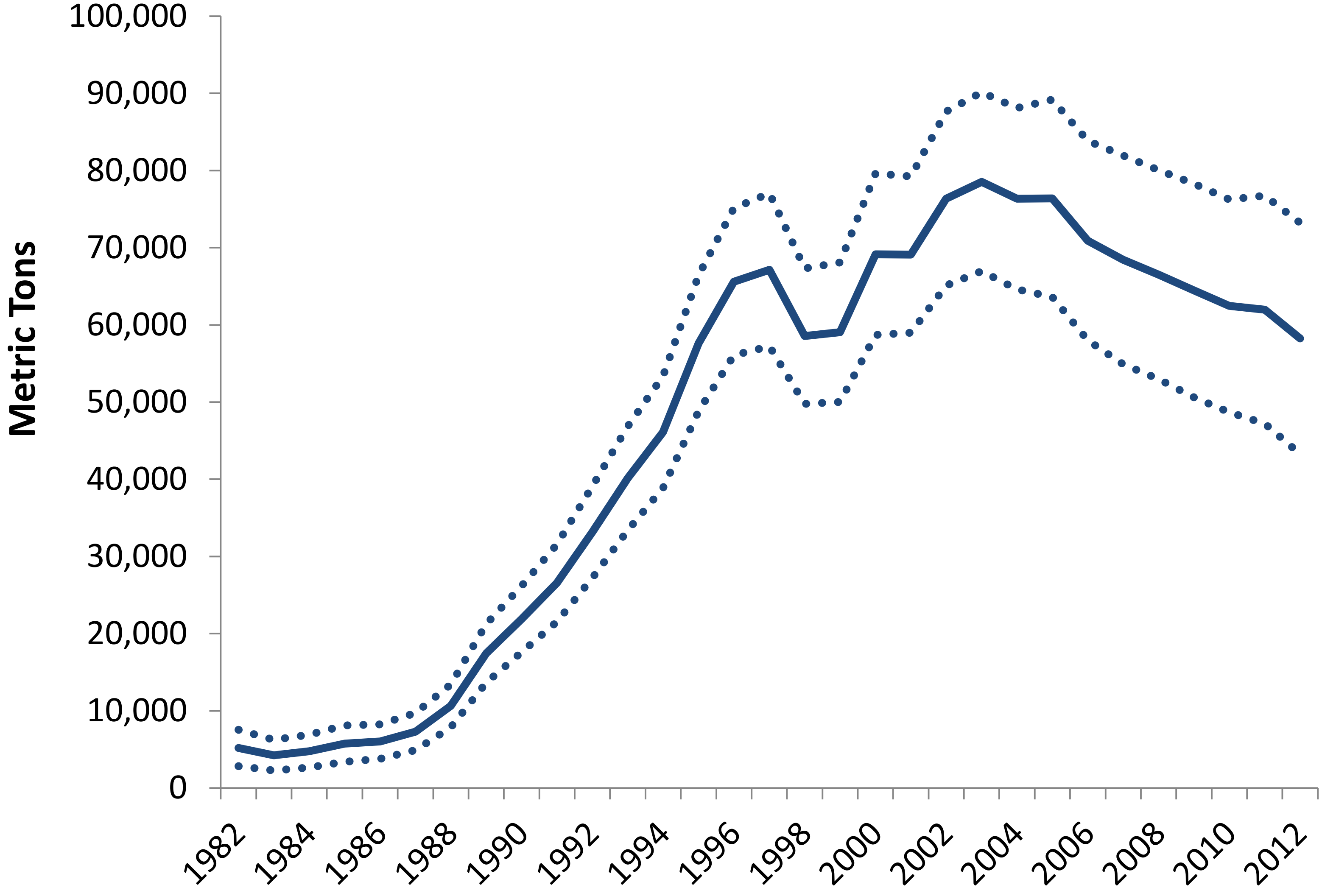


Age 1+
Number (millions)
300
250
200
150
100
50
0
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
SCA Model
Projected

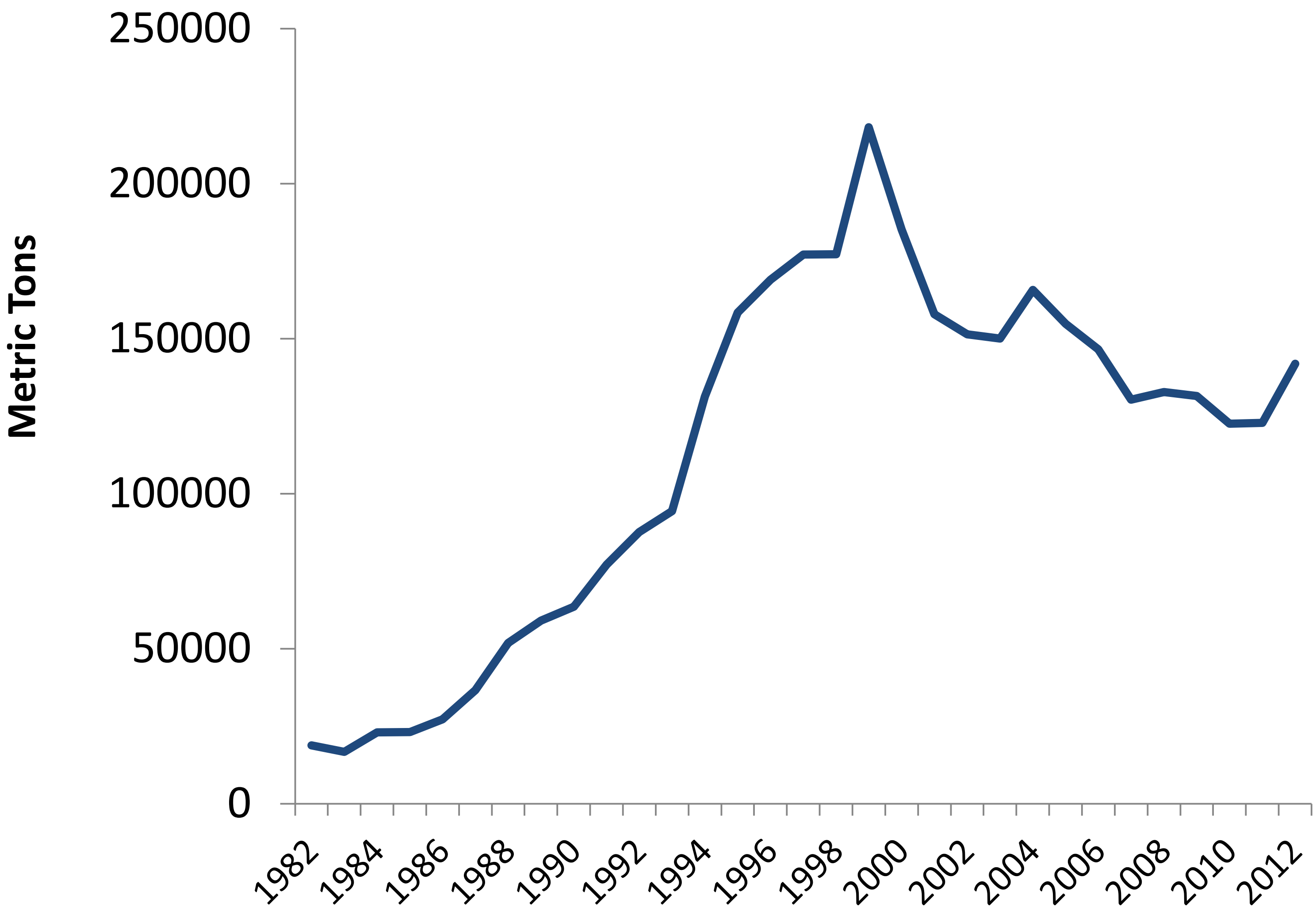


Age 8+
Number (millions)
12
10
8
6
4
2
0
1982
1985
1988
1991
1994
1997
2000
2003
2006
2009
2012
SCA Model
Projected

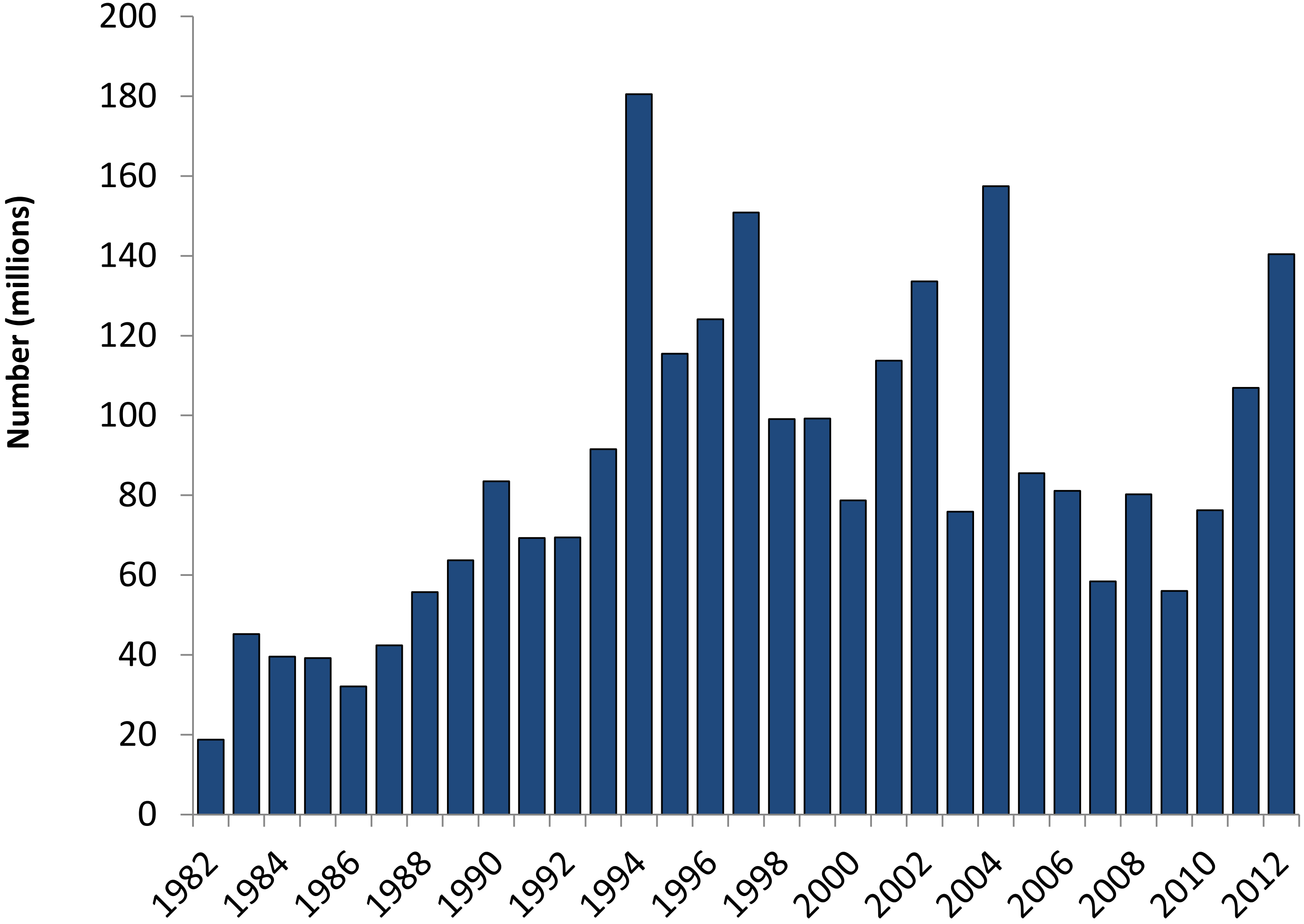
Female Spawning Stock Biomass (±95%CI)



Total Biomass

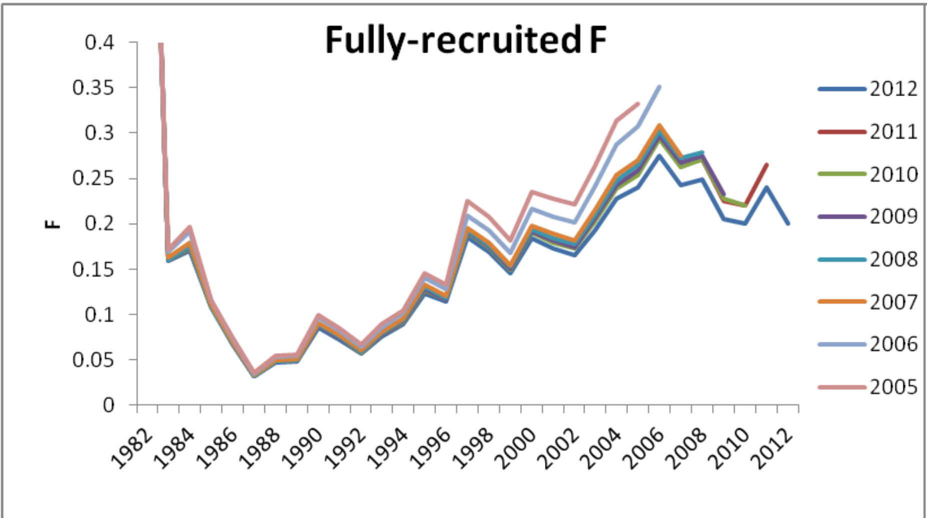


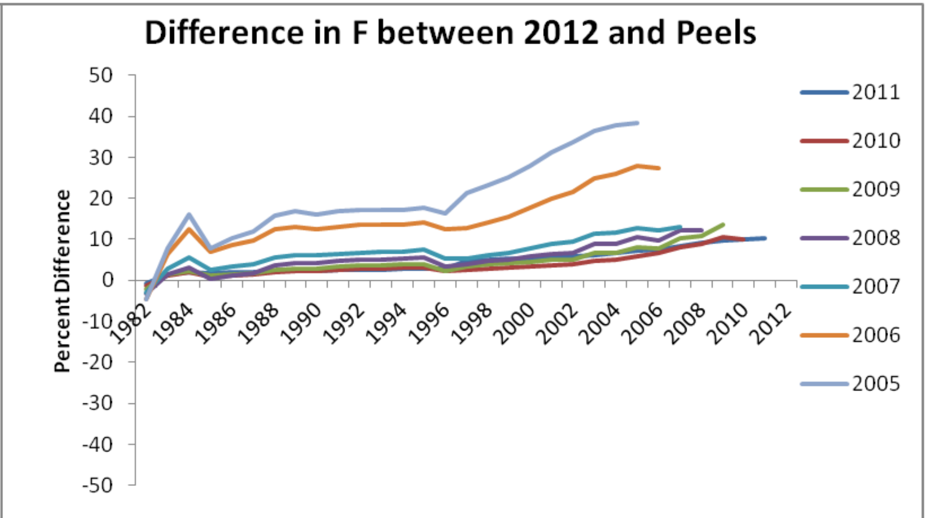
Recruitment (Age 1)

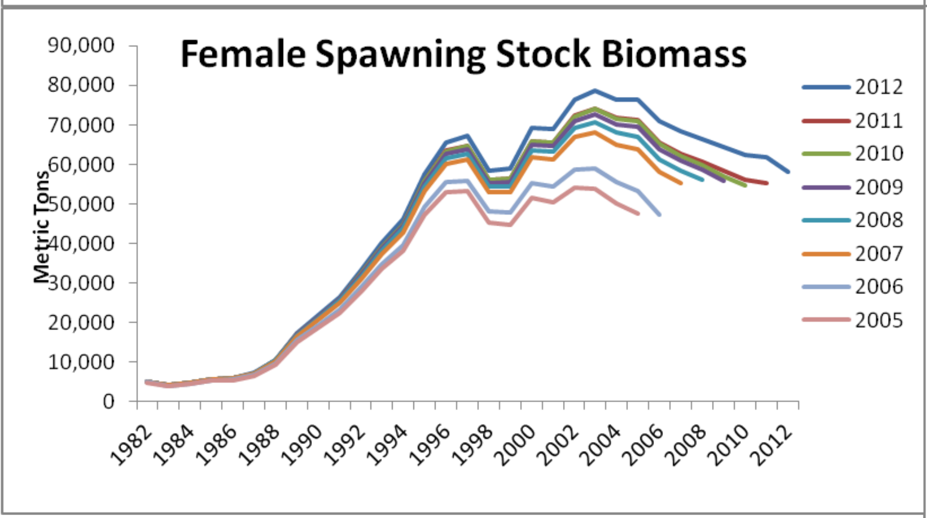


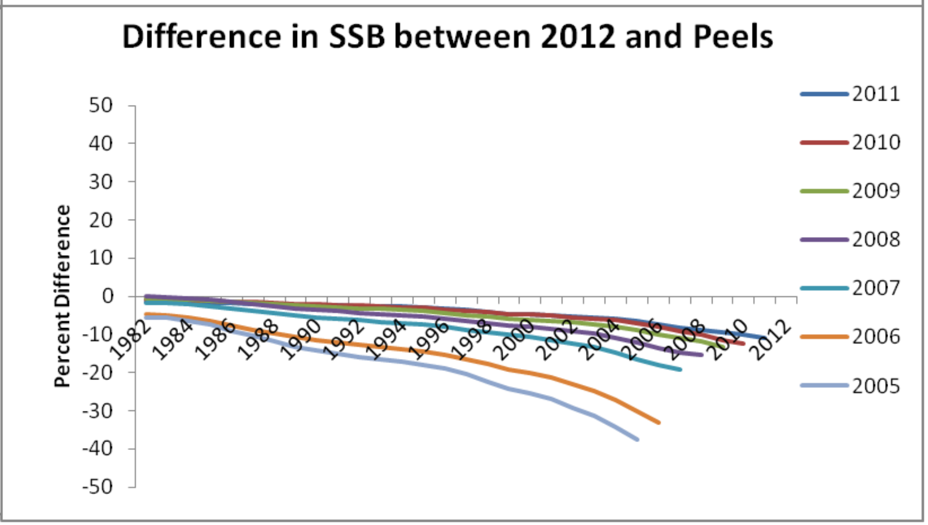
RETROSPECTIVE

Retrospective Analysis









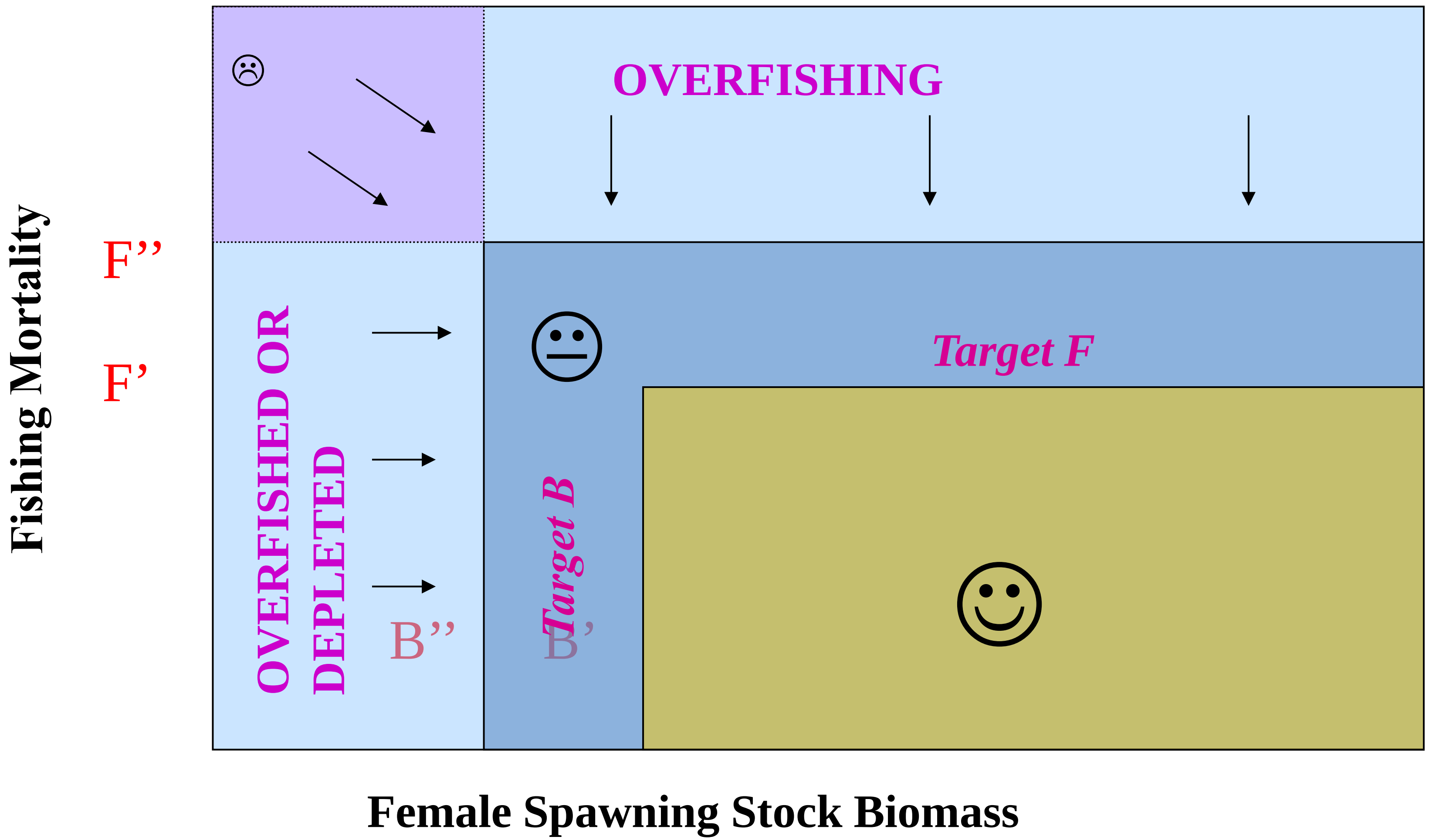
REFERENCE POINTS

Current Reference Points

- Use female spawning stock biomass (SSB) and fishing mortality (F) to gauge the status of the stock and the fishery

- Include target and threshold for SSB and F

Current control rule



Current Reference Points

- Target and limit SSB values were defined in Amendment VI as
- $SSB_{threshold} = SSB_{1995}$
- SSB_{target} =125% of $SSB_{threshold}$

- Last time reviewed at SAW 46 (2007)
- SSB threshold = 36,000 mt
- SSBtarget =46,101 mt

Current Reference Points

Fishing mortality

Threshold F = F_{msy}

Target F < F_{msy}

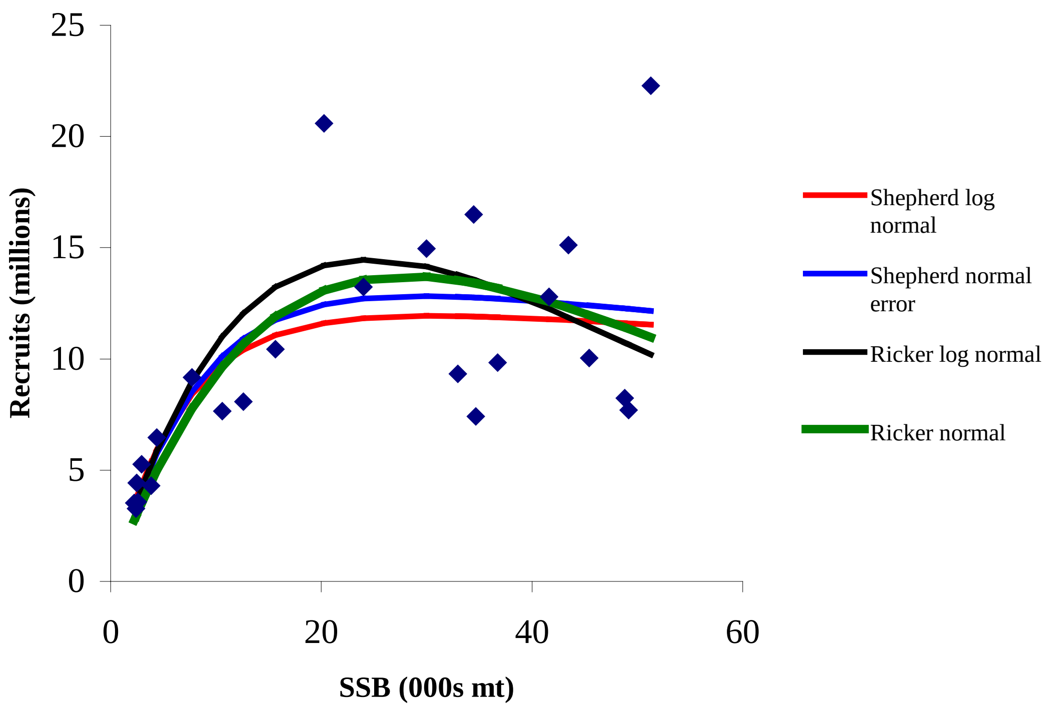
(corresponds to the annual exploitation rate of 24%).

SAW 46 update:

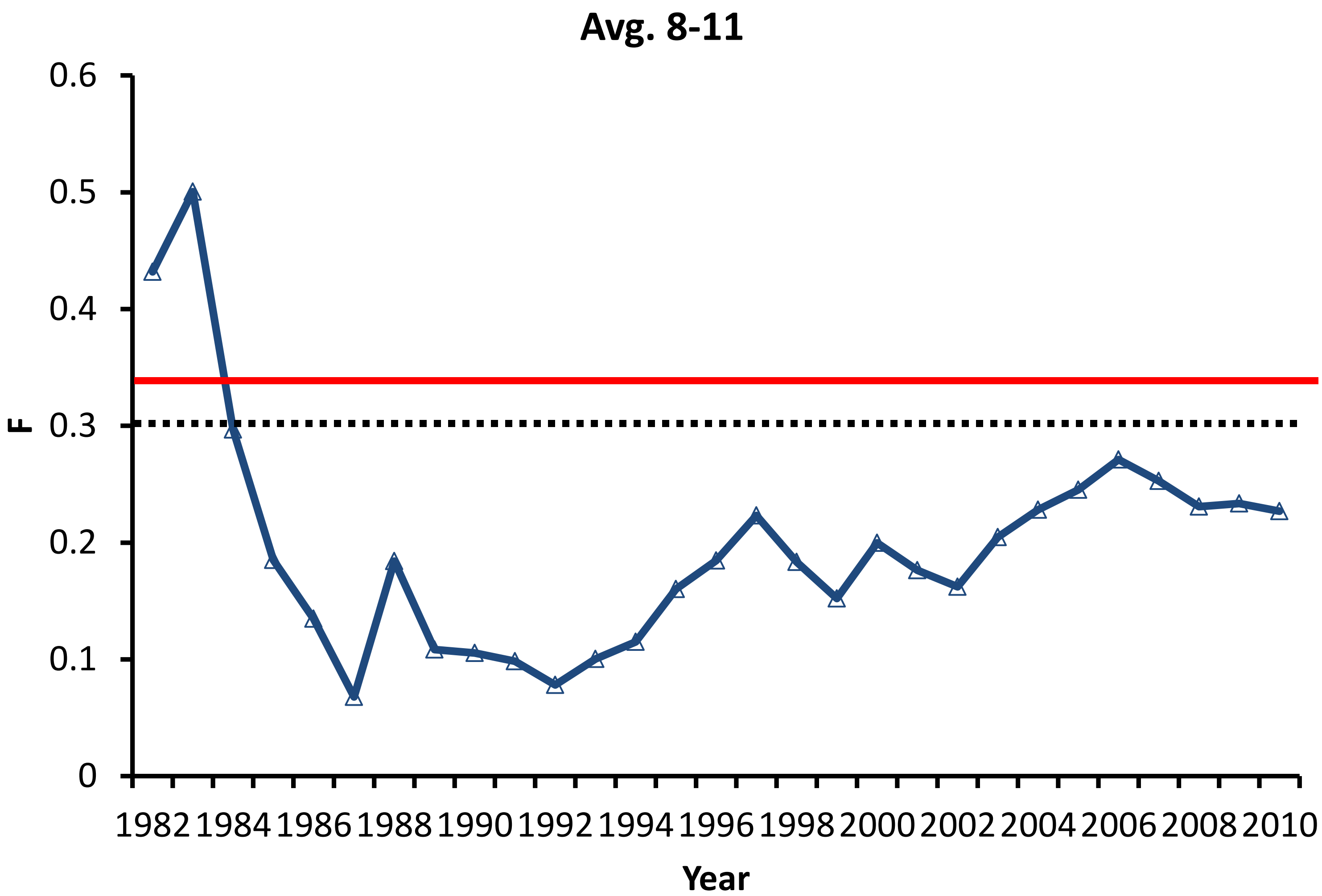
$F_{threshold} = F_{msy} = 0.34$

Based on four Stock recruitment models average

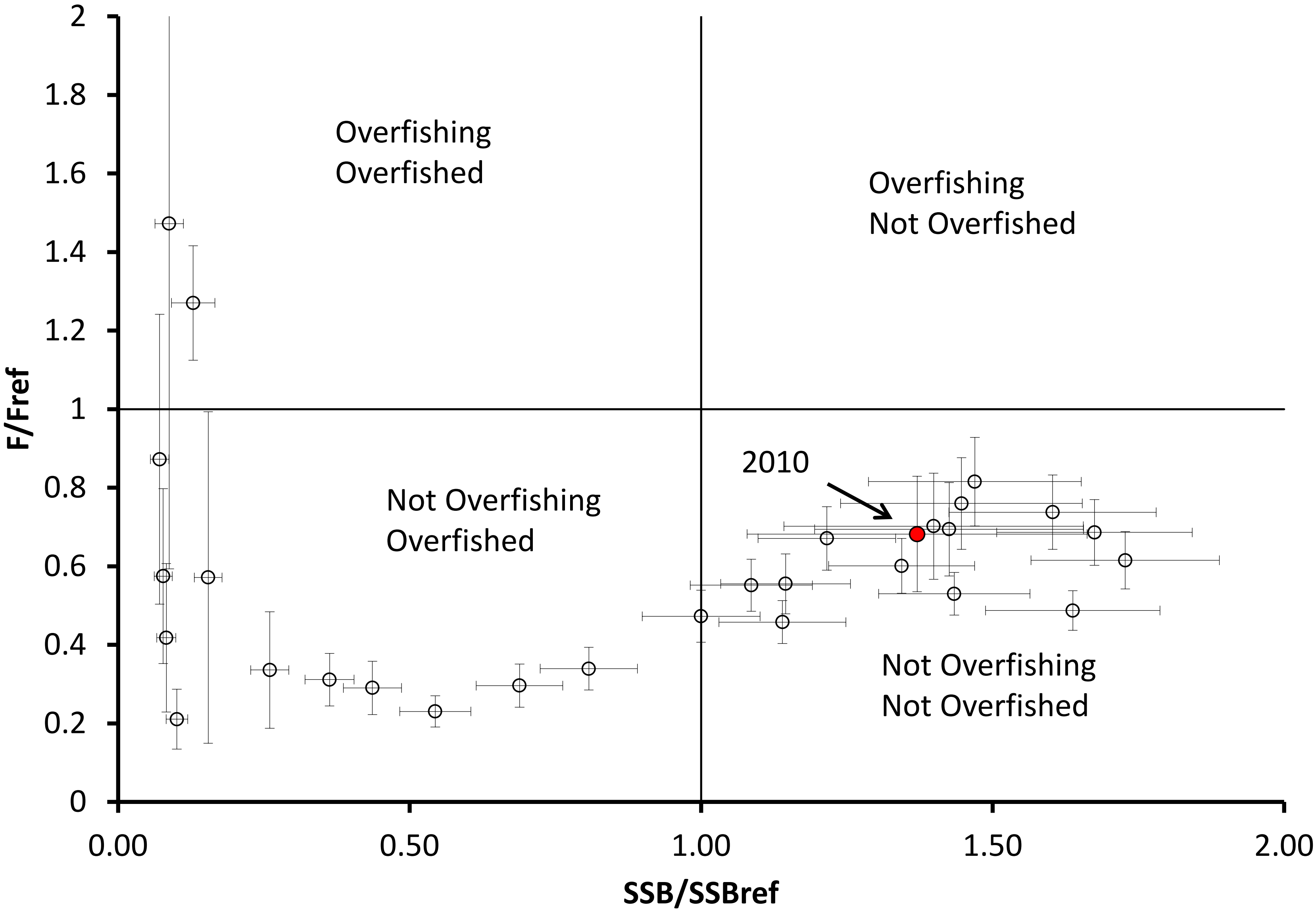
$F_{target} = 0.3$



Fishing Mortality (2012 update)



2012 stock status update



Striped bass reference points proposed in new SAW/SARC 57 2013 assessment

- No change to definition of SSB reference points, but numbers changed

- Revised F_{target} and $F_{threshold}$ such that

- F_{target} – fishing mortlatiy that results in SSB = SSB_{target} in longterm

- $F_{threshold}$ – fishing mortlatiy that in reusults in SSB = $SSB_{threshold}$ in longterm

Major reasons for reference points revision

- F_{MSY} estimates are sensitive to S/R model assumptions
- Calculations imply that F_{MSY} ~ F20% SPR
- SSB_{MSY} > 1995_{SSB} threshold
- Disconnect between F_{MSY} and long term projection if SSB (< SSB_{MSY})

- Alternative approach:
  - Use long term projection drawing from empirical recruitment since 1990 and average selectivity (5 year avg.) and calculate F which produces SSBtarget and SSBthreshold

- Advantages:
- 1995 SSB robust to model S/R assumptions
- Avoids management to optimal yield for recreational species
- Aligns SSB reference points with fishing mortality target and threshold

Striped Bass reference points proposed in new SAW/SARC 57 2013 assessment

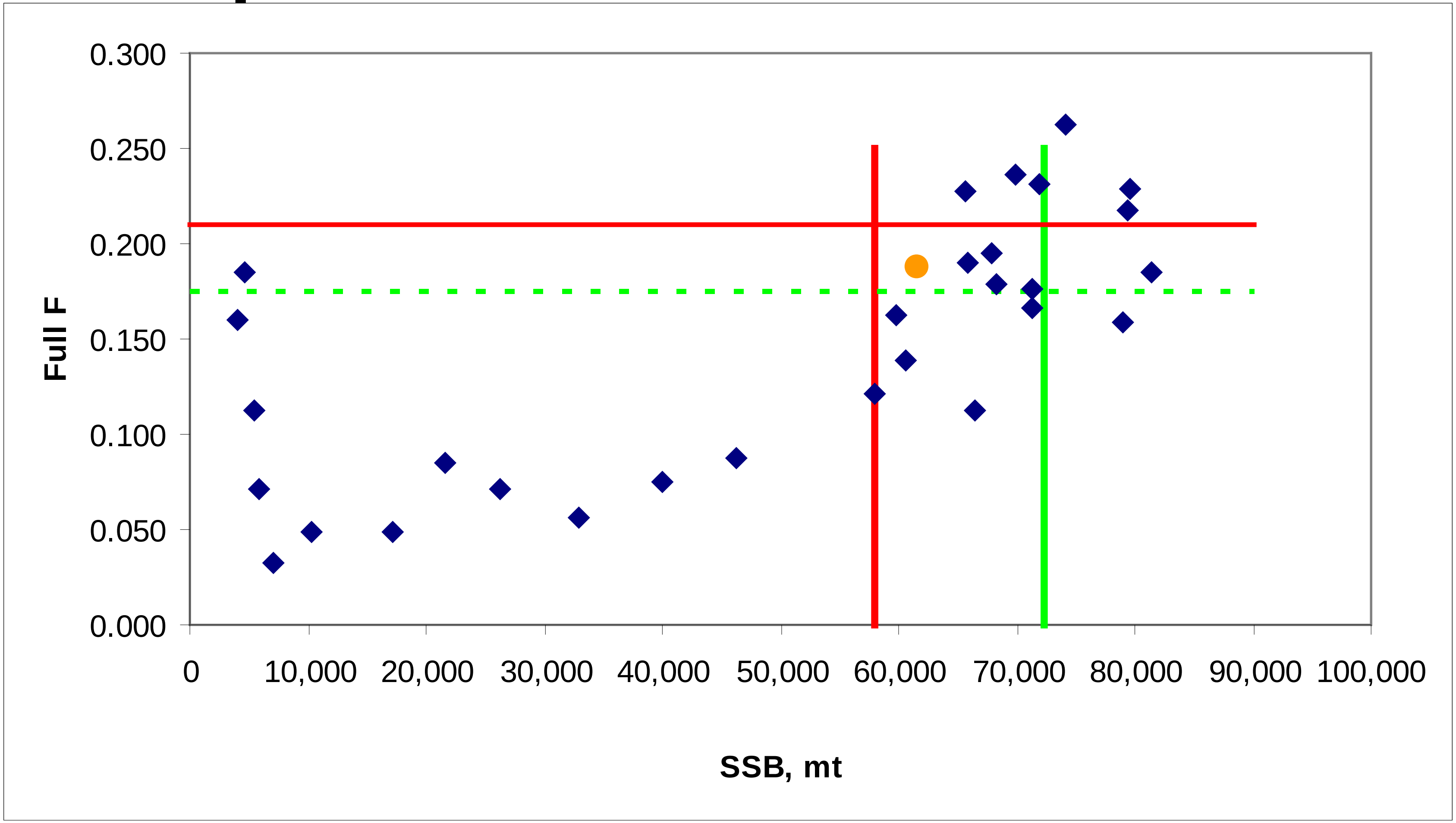
- Inputs affecting reference points calculations:

- Sex ratio information remains the same
- Maturity information remains the same
- Revised natural mortality (age specific)
- New SCA model results
- Beverton- Holt stock recruitment model
- Updated mean weights at age

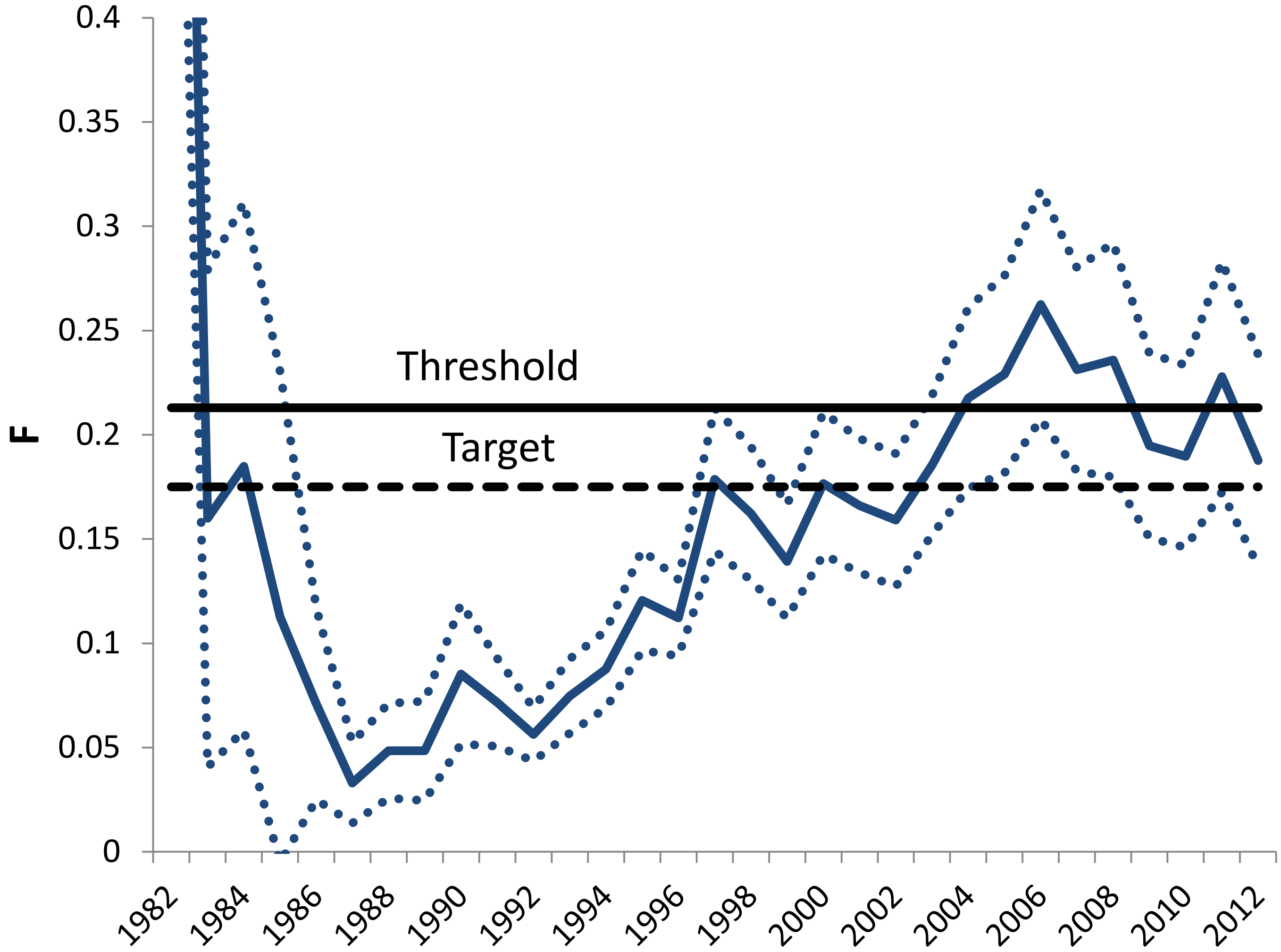
SAW/SARC 57 Updated Striped Bass biological reference points

BRP	Mean
SSB_{lim}	57,904
SSB_{target}	72,380
F_{lim}	0.213
F_{target}	0.175
SSB_{2012}	58,238
F_{2012}	0.200

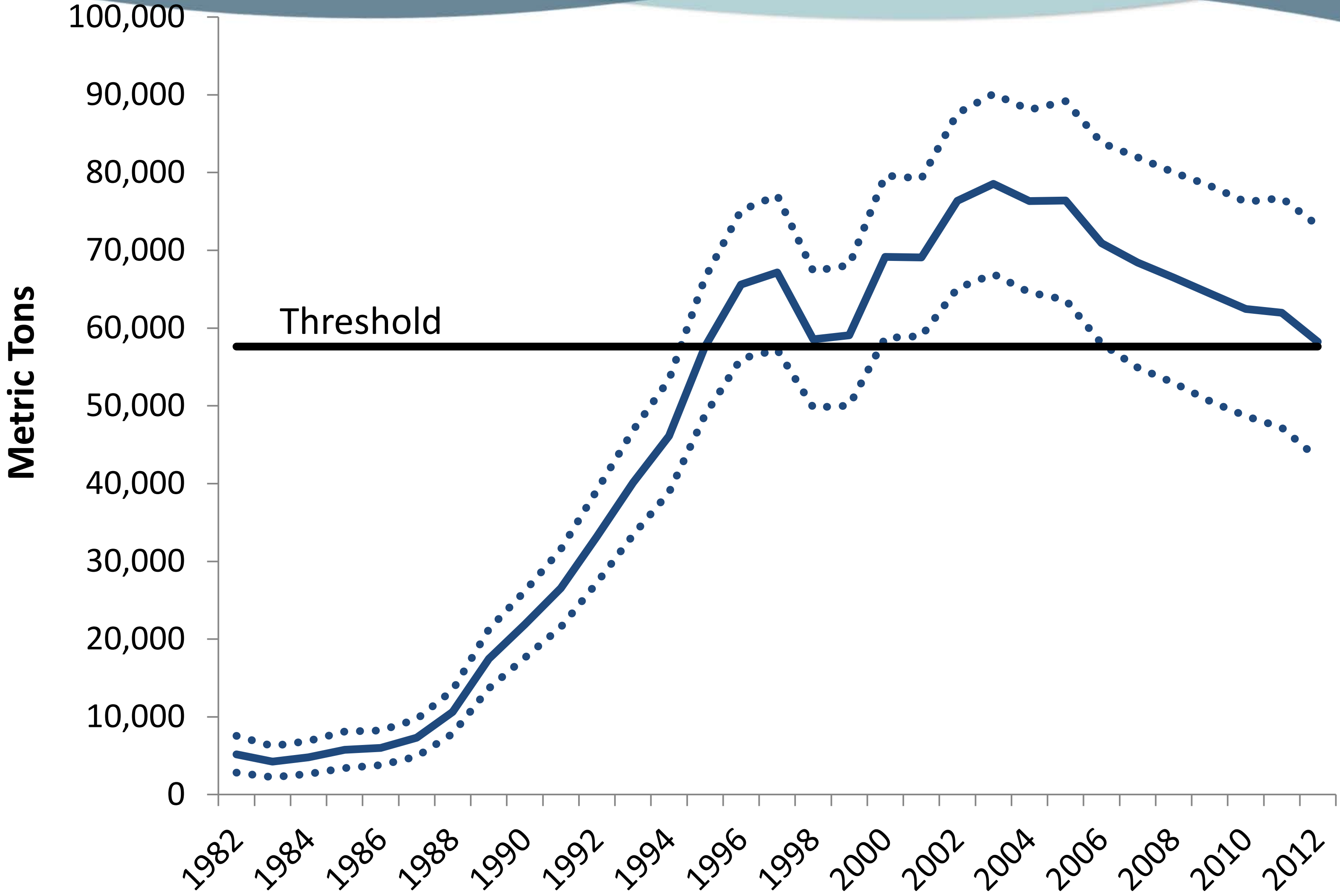
Striped bass stock status relative to new

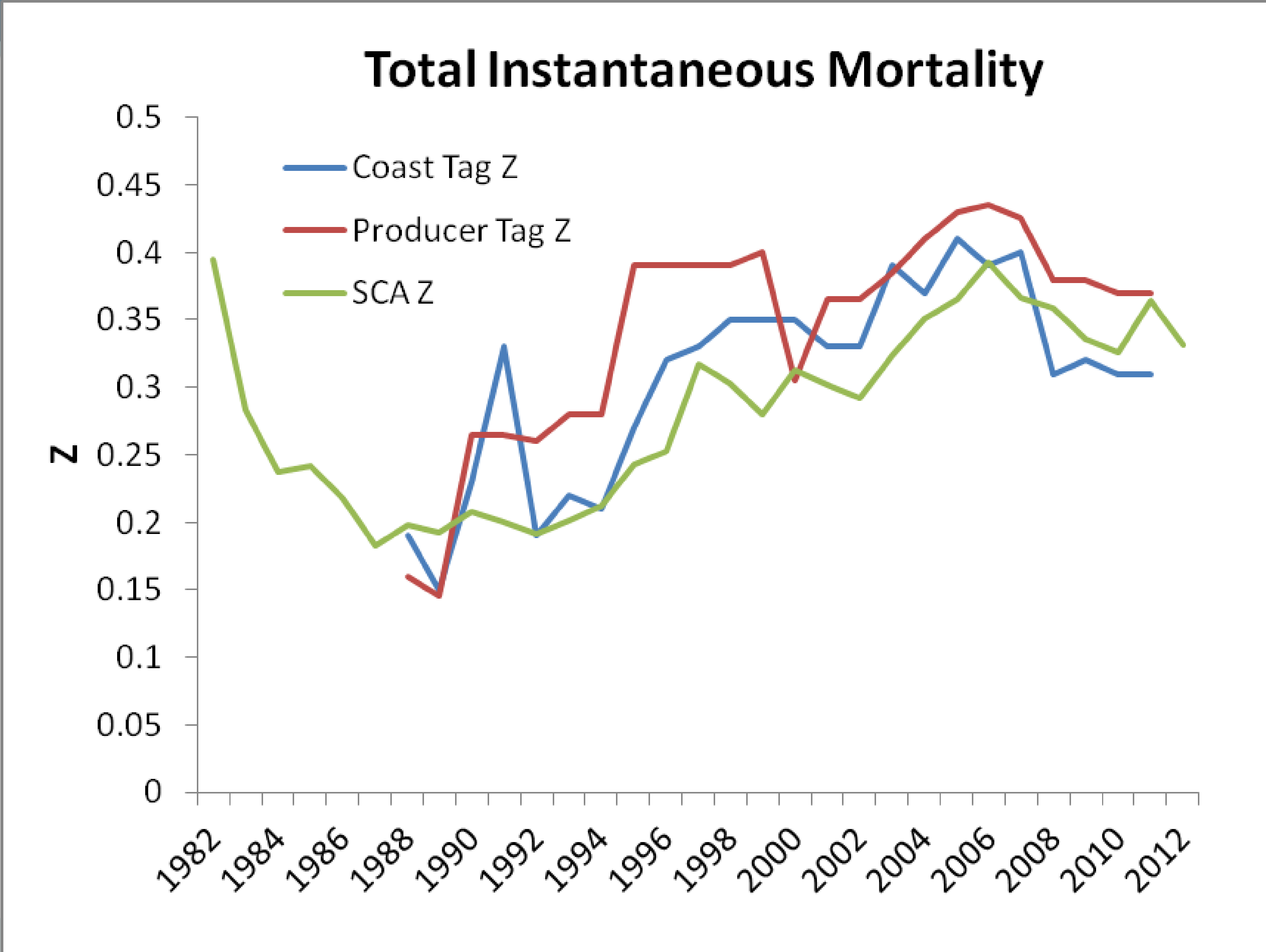


Fishing Mortality (+95% CI)



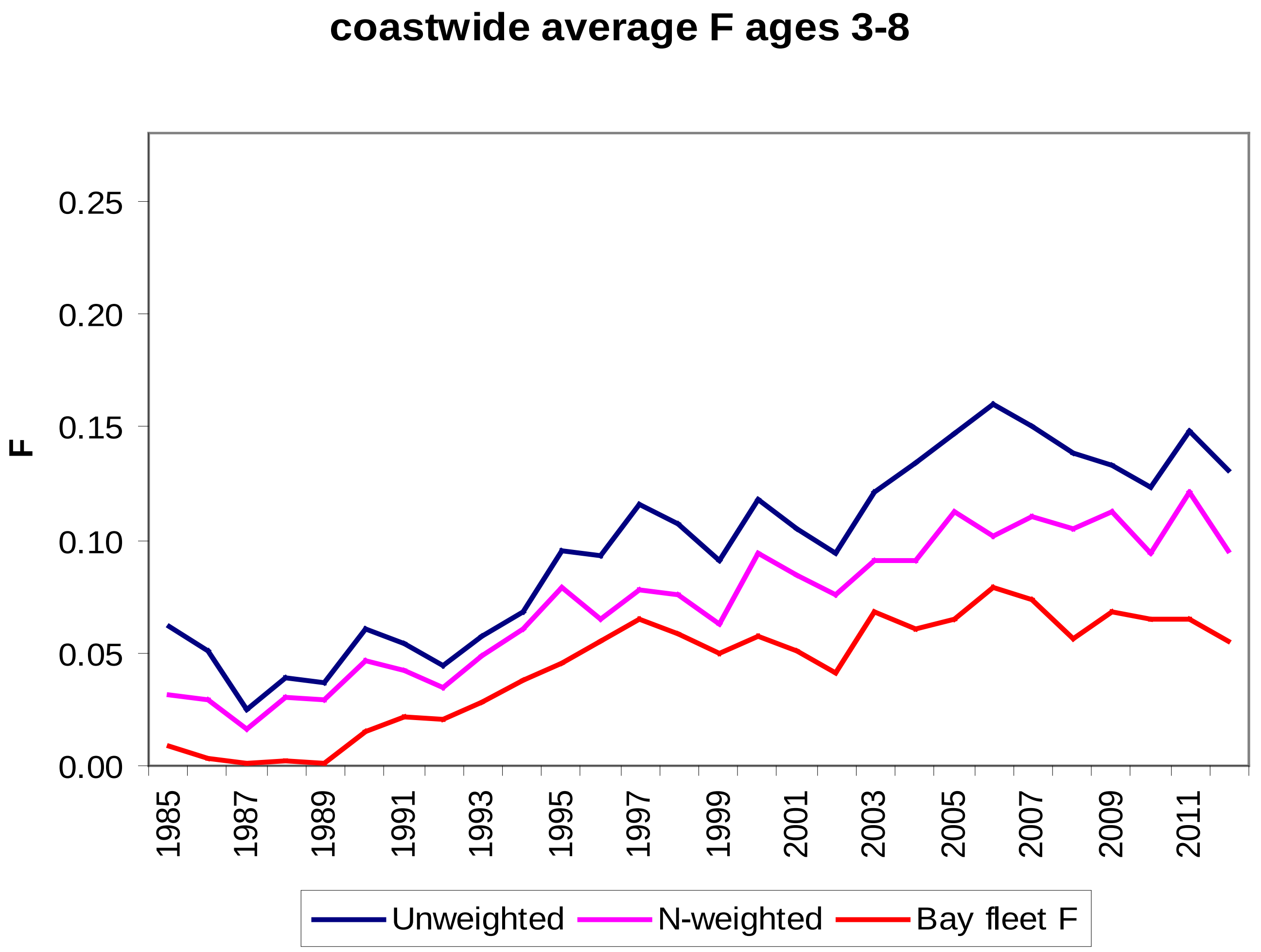
Female Spawning Stock Biomass (±95%CI)



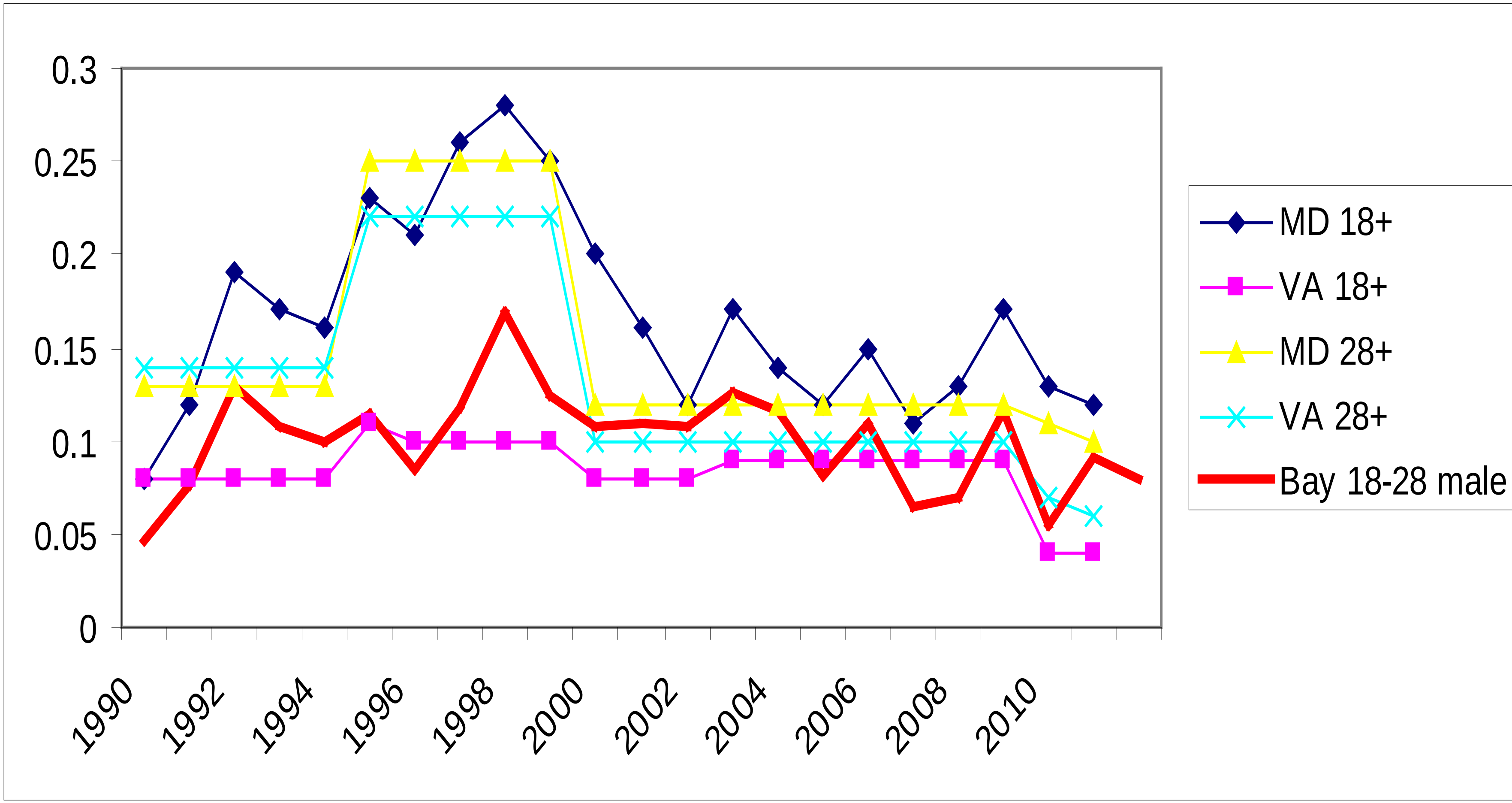


Total Instantaneous Mortality
Coast Tag Z
Producer Tag Z
SCA Z
Z
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012

Chesapeake Bay F (SCAA model)



Chesapeake Bay tag based F

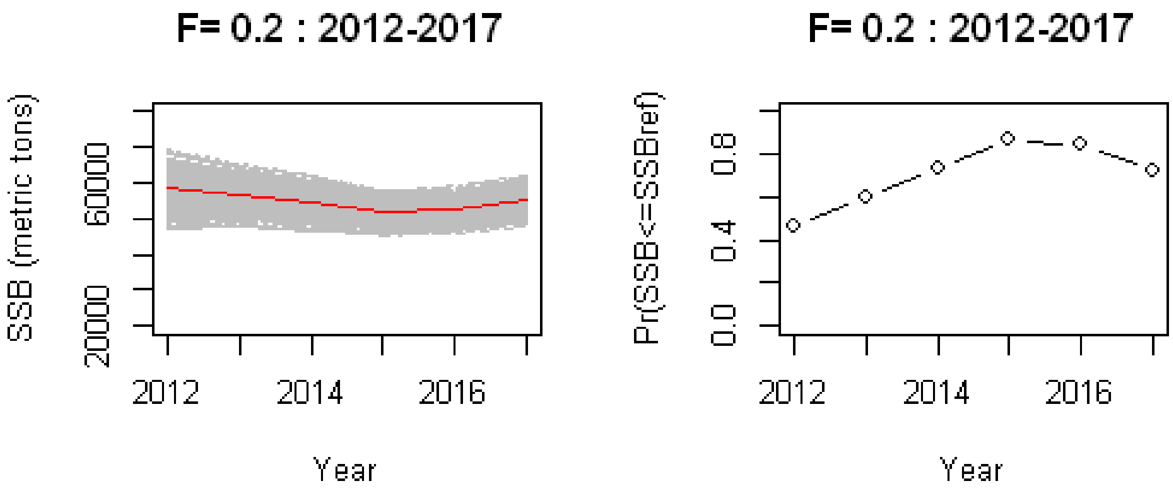


PROJECTIONS

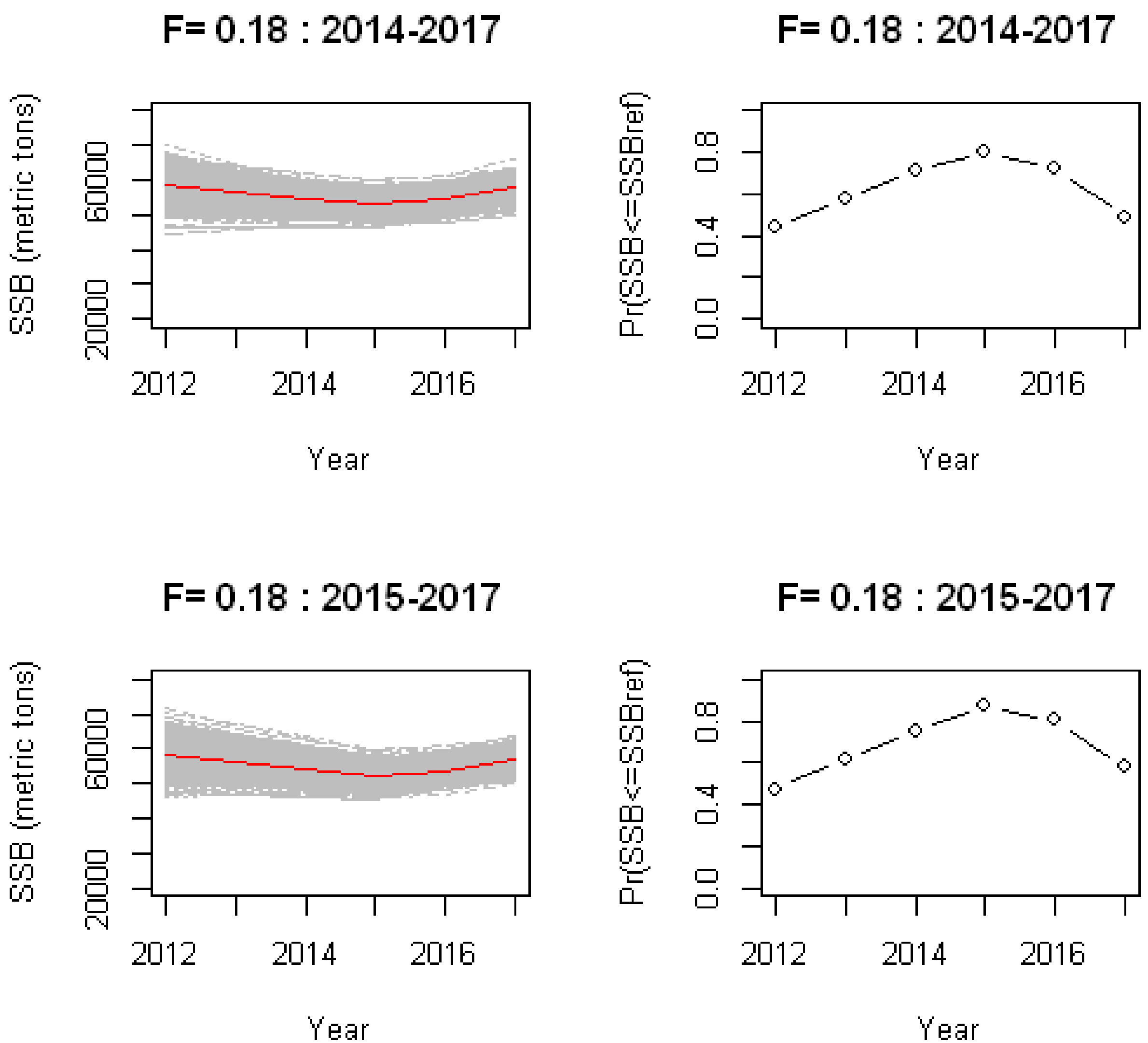
Projections

- Projected 2012 abundance-at-age forward through 2017
- Calculated SSB and probability of going below SSB reference point
- Used 2012 selectivity pattern for 2012; average 2008-2012 for 2013-2017
- Resampled from empirical recruitment values from 1990-2012
- Starting abundance-at age in 2012 resampled 1000 times
- Used F_{2012}=0.200, F=0.219 (Fthreshold), F=0.180 (target), F=0.34 (old Fref), F=0.15, F=0.10

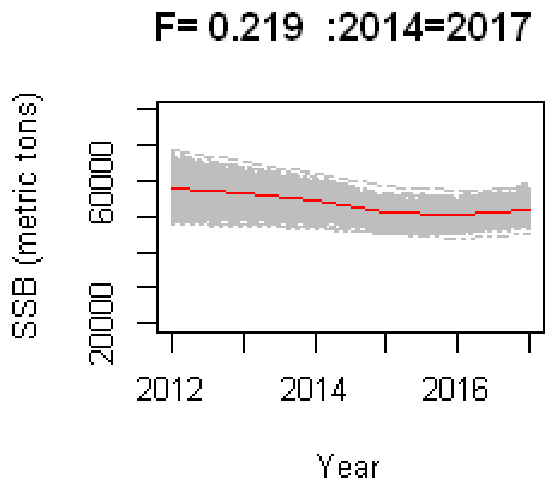
Constant Fishing Mortality

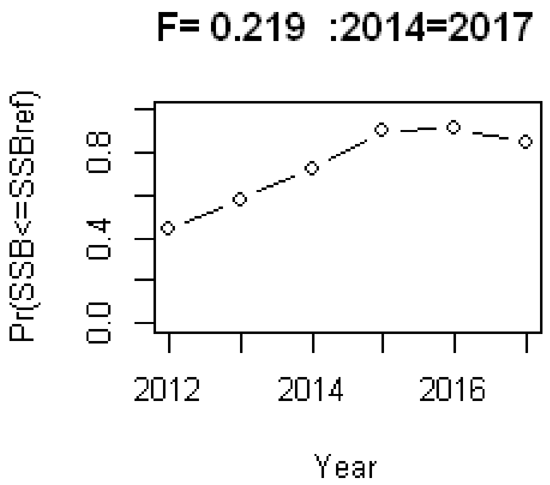


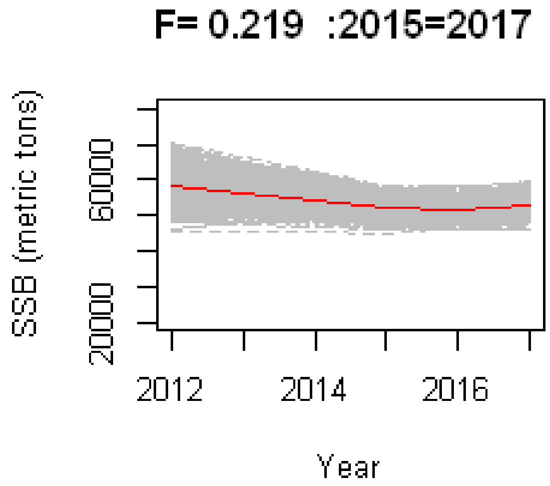
Constant Fishing Mortality (cont.)

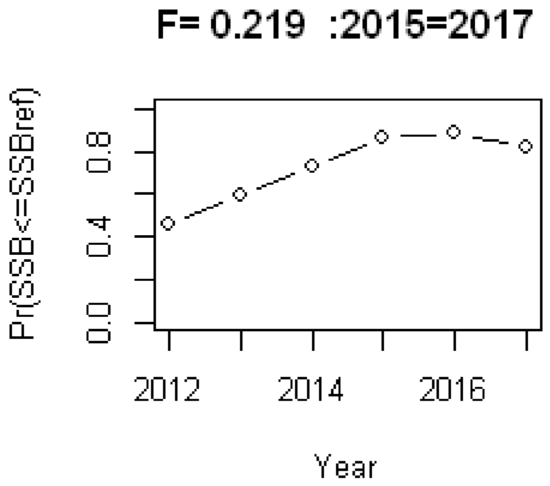


Constant Fishing Mortality (cont.)

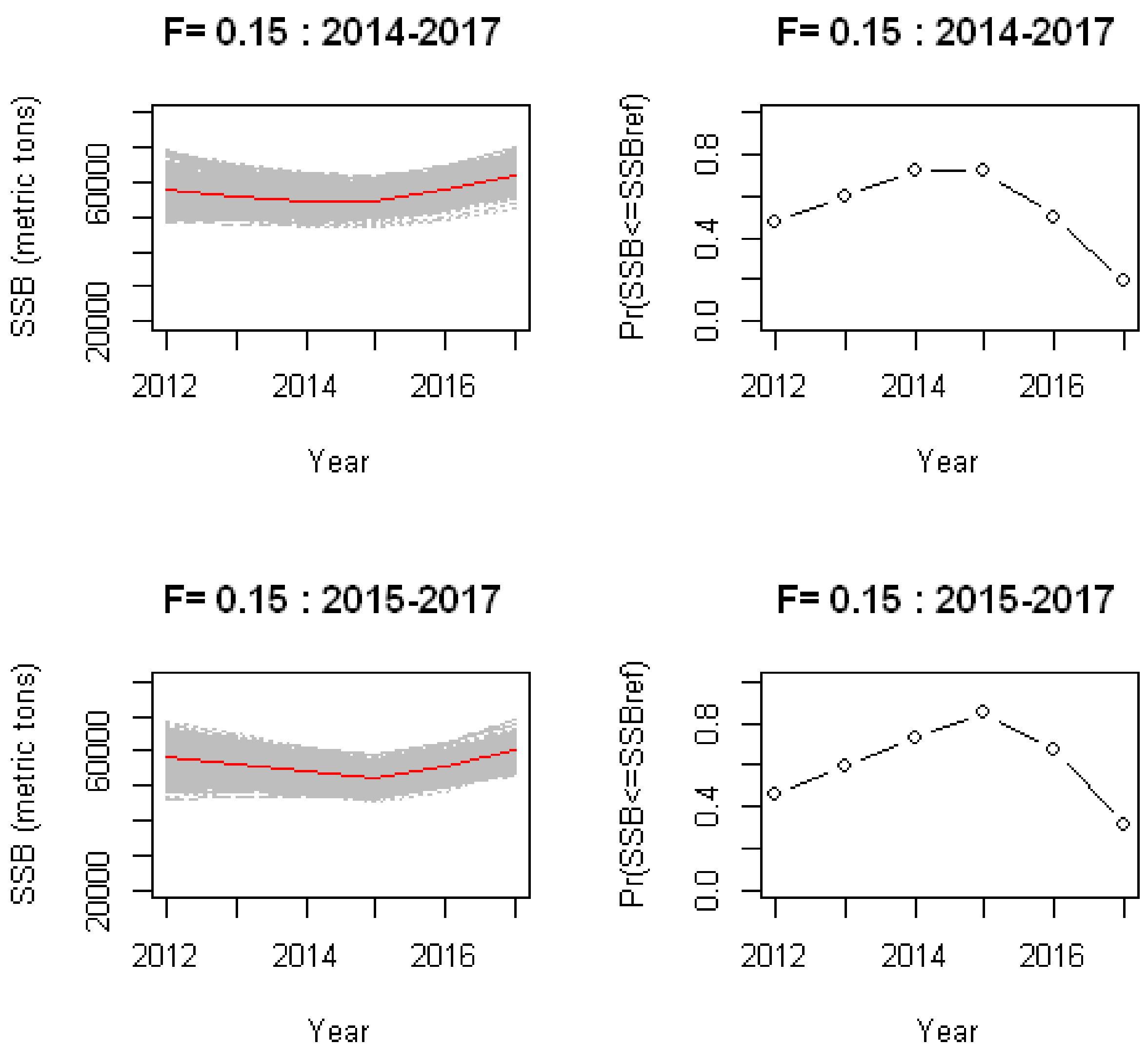




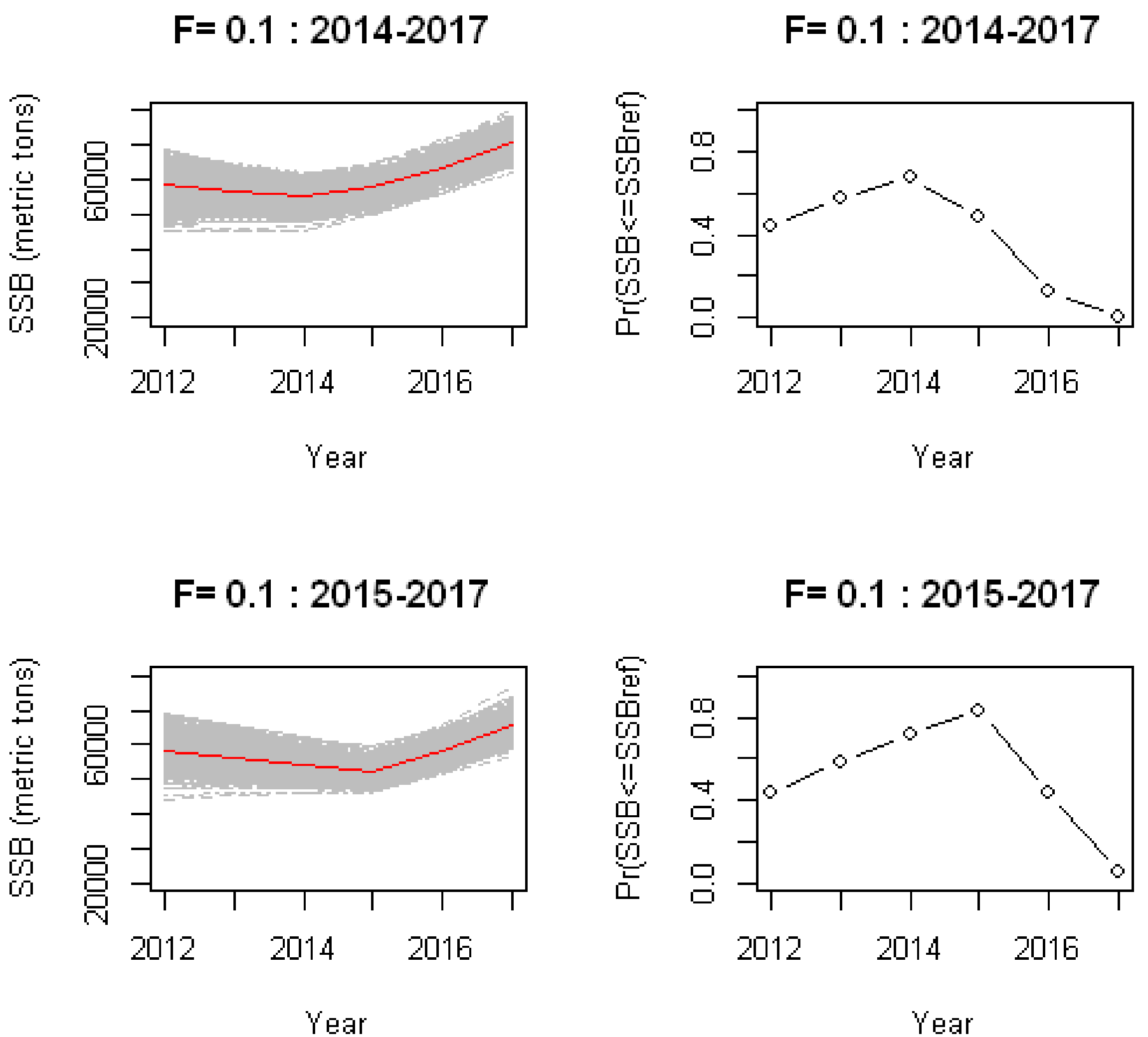




Constant Fishing Mortality (cont.)

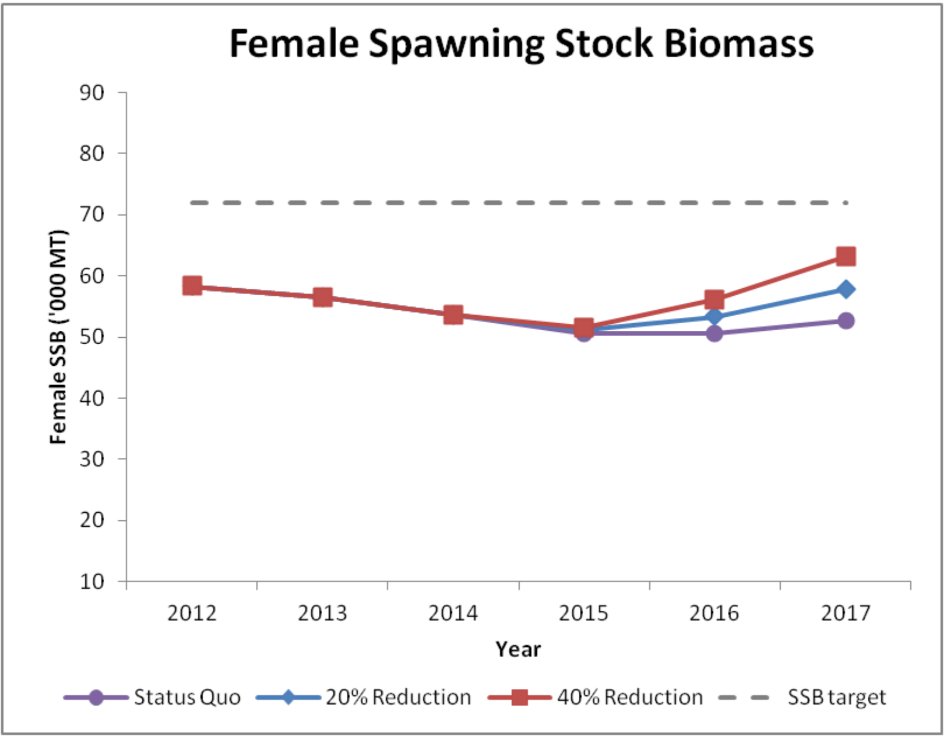


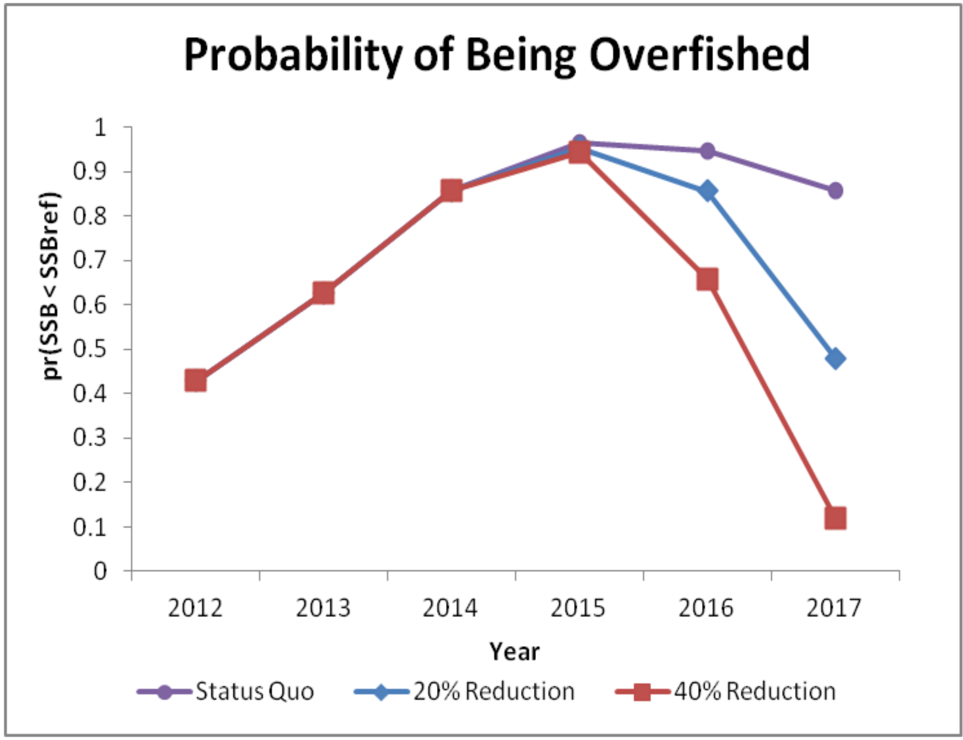
Constant Fishing Mortality (cont.)



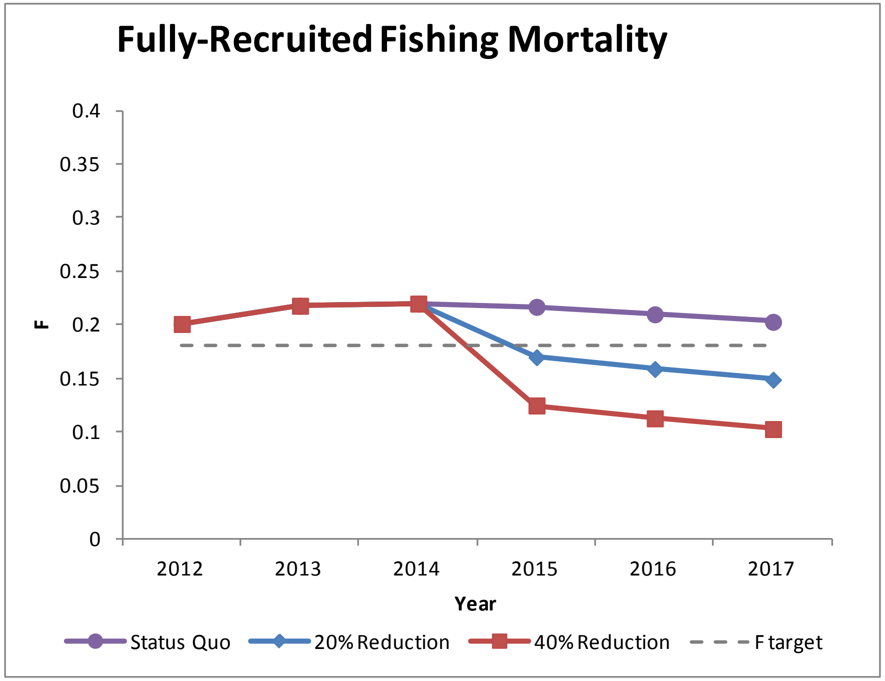
CONSTANT HARVEST SCENARIOS

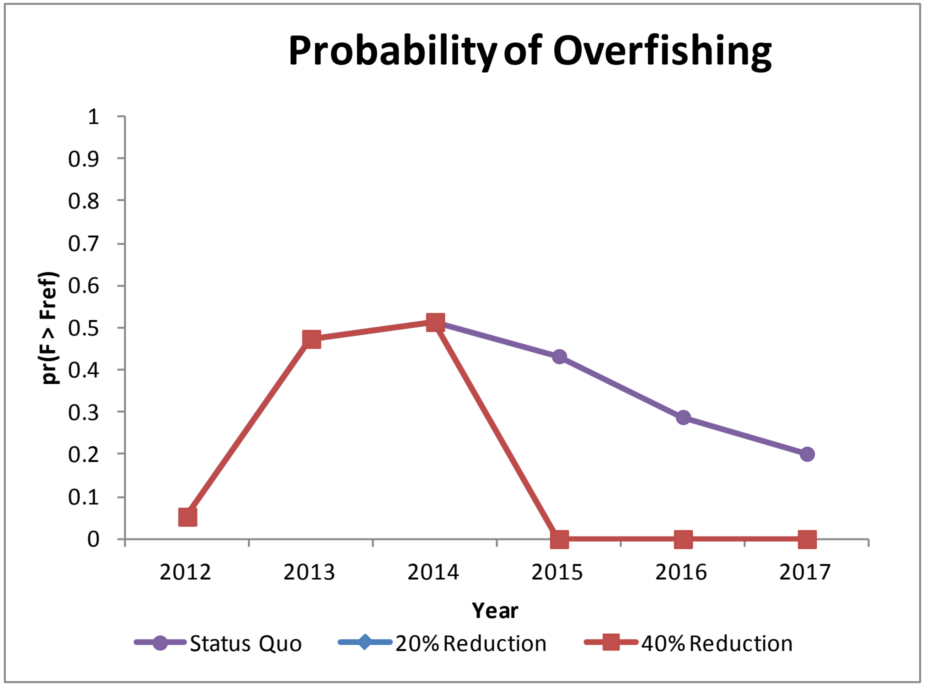
Constant Harvest Scenarios



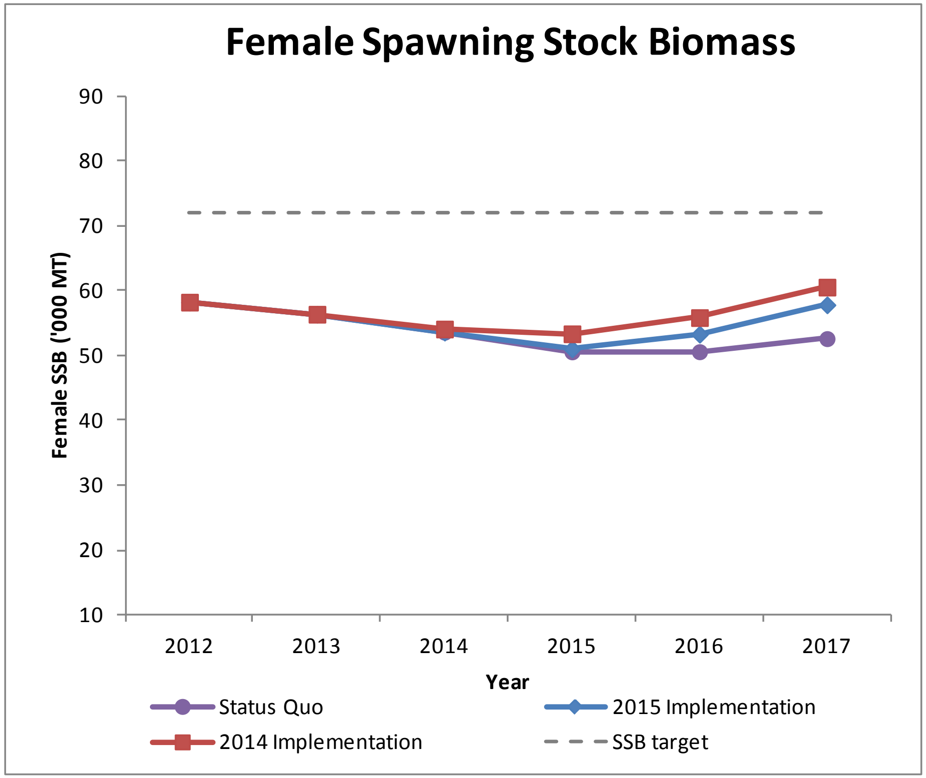


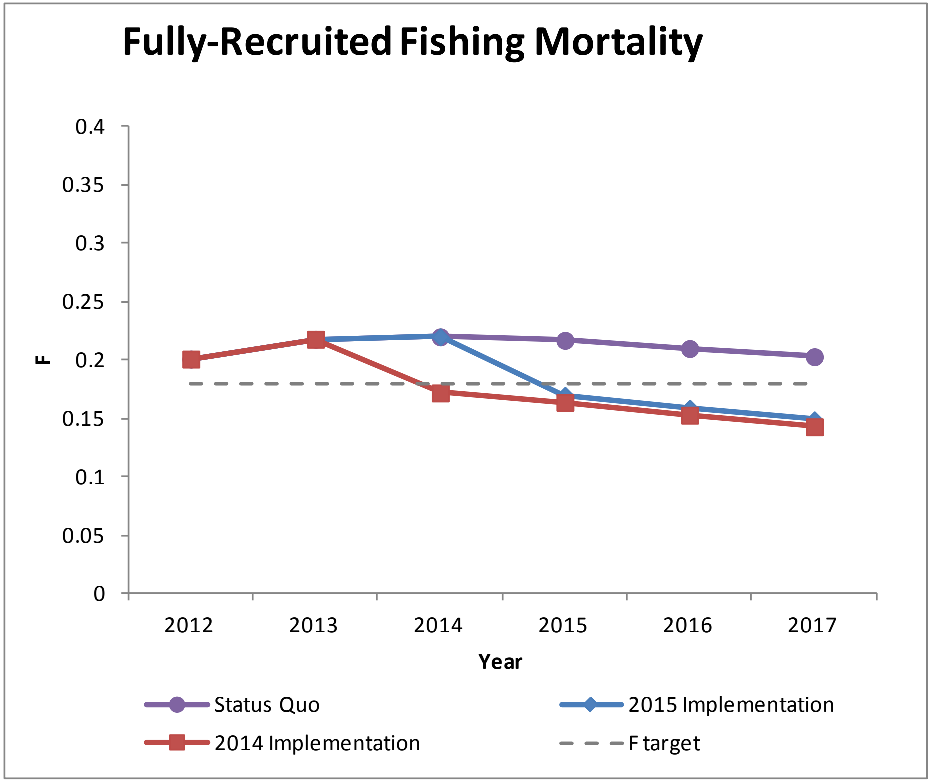
Constant Harvest Scenarios





Constant Harvest Scenario





20% Reduction in Harvest

Questions?

Harvest data for Benchmark

- MRFSS recreational data (harvest and dead releases)
  - 2004-2012 re-estimated by MRIP
  - corrected some historical estimates
  - Used 0.09 release mortality (Diodati and Richards, 1996)

- Commercial landings data from state reports

- Commercial discards calculated from tag recoveries and MRIP releases
  - Re-estimated 2004-2012 with new MRIP estimates of harvest and releases
  - Used 0.09 release mortality for hook & line

- States apportion catches into age classes by using scale-based ages

- Preliminary 2012 data used in benchmark; updated with final 2012 data