NC Marine Fisheries Commission Meeting
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Stock Status of Spotted Seatrout in North Carolina, 1991-2006

Glossary

- SSB = Spawning Stock Biomass
  - Amount of spawning females in population
- F = Fishing Mortality
  - Rate of fish dying due to fishing
- SPR = Spawning Potential Ratio
  - Potential of spawning to occur in a fished stock as compared to an unfished stock (maximum spawning potential = 100%)
    - SPR = $(SSB_{fished}/SSB_{unfished}) X 100$
    - Sustainable harvest usually varies from 20-40%

Introduction

Background Info

- Estuarine
- Currently, mostly a recreational fishery
- Some commercial harvest
- Previous stock status
  - Listed as viable (based on landings and samples)
  - However, no formal stock assessment

Unit Stock Definition

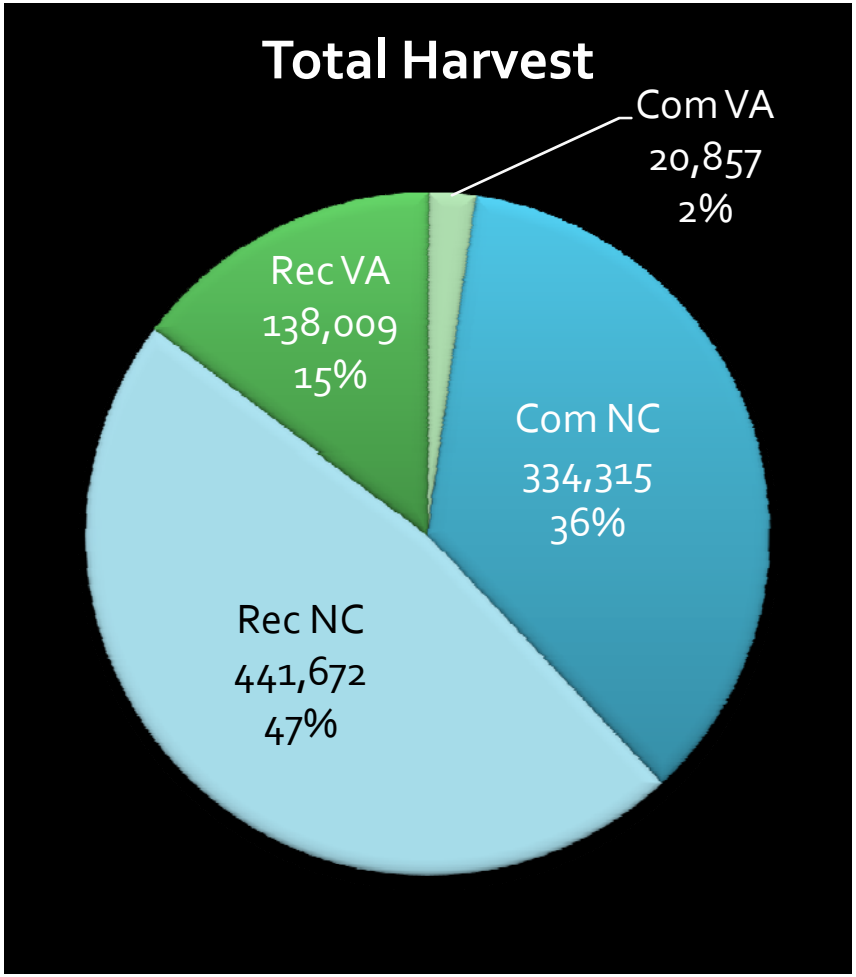
- Most remain in natal estuary throughout life cycle
- However, 15% of seatrout tagged in VA were recovered in NC
  - As far south as Wrightsville Beach
- Limited tagging in NC
- No evidence of mixture between NC/SC
- **NC and VA considered a unit stock**

Fishery Management Plans

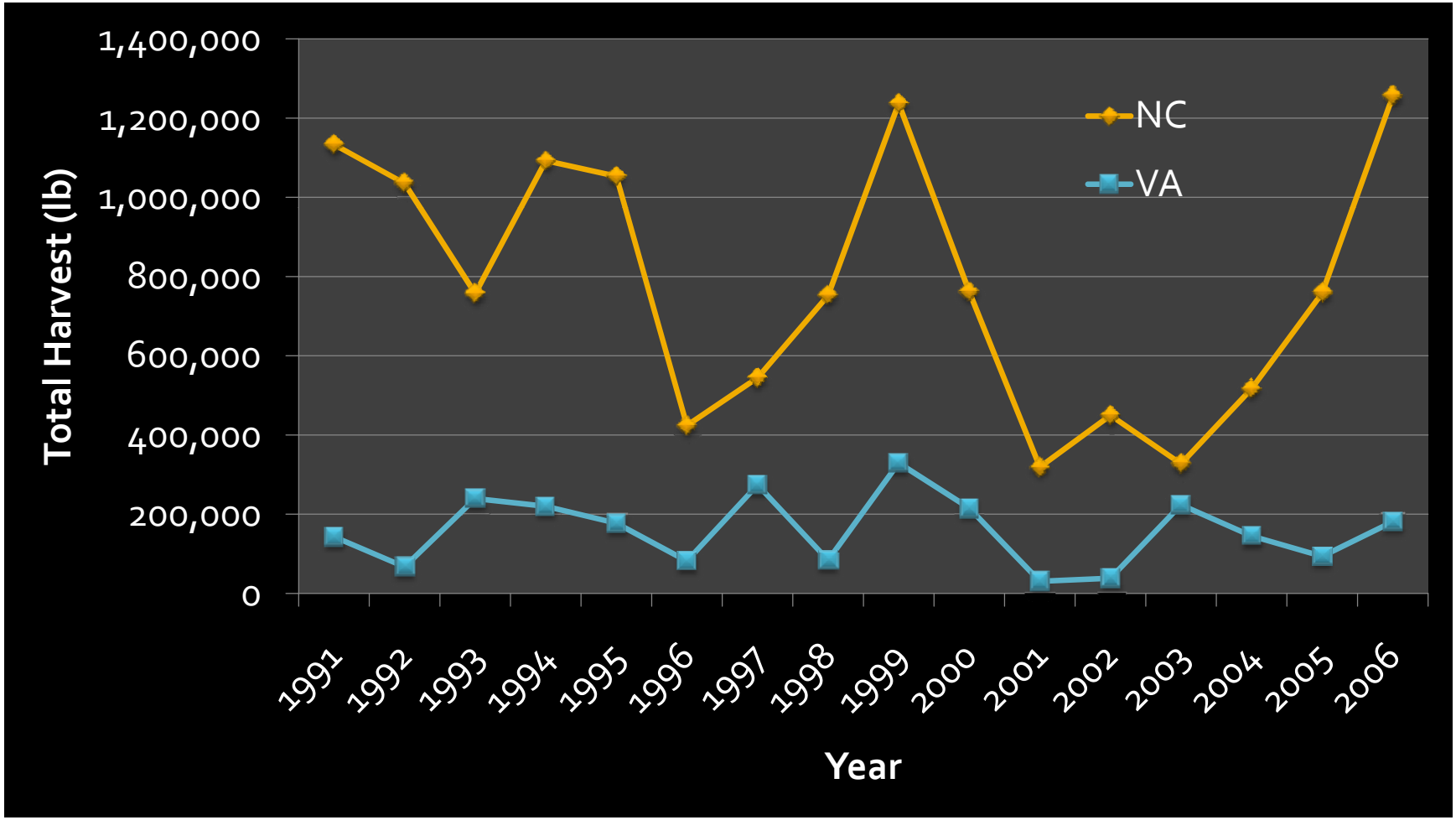
- ASMFC
  - FMP 1984
  - Amended in 1991
    - 20% SPR to minimize the possibility of recruitment failure
    - Discrete functional stocks
    - Recommended stock assessments be conducted at the state level
- NC FMP under development
- No VA FMP

Fisheries

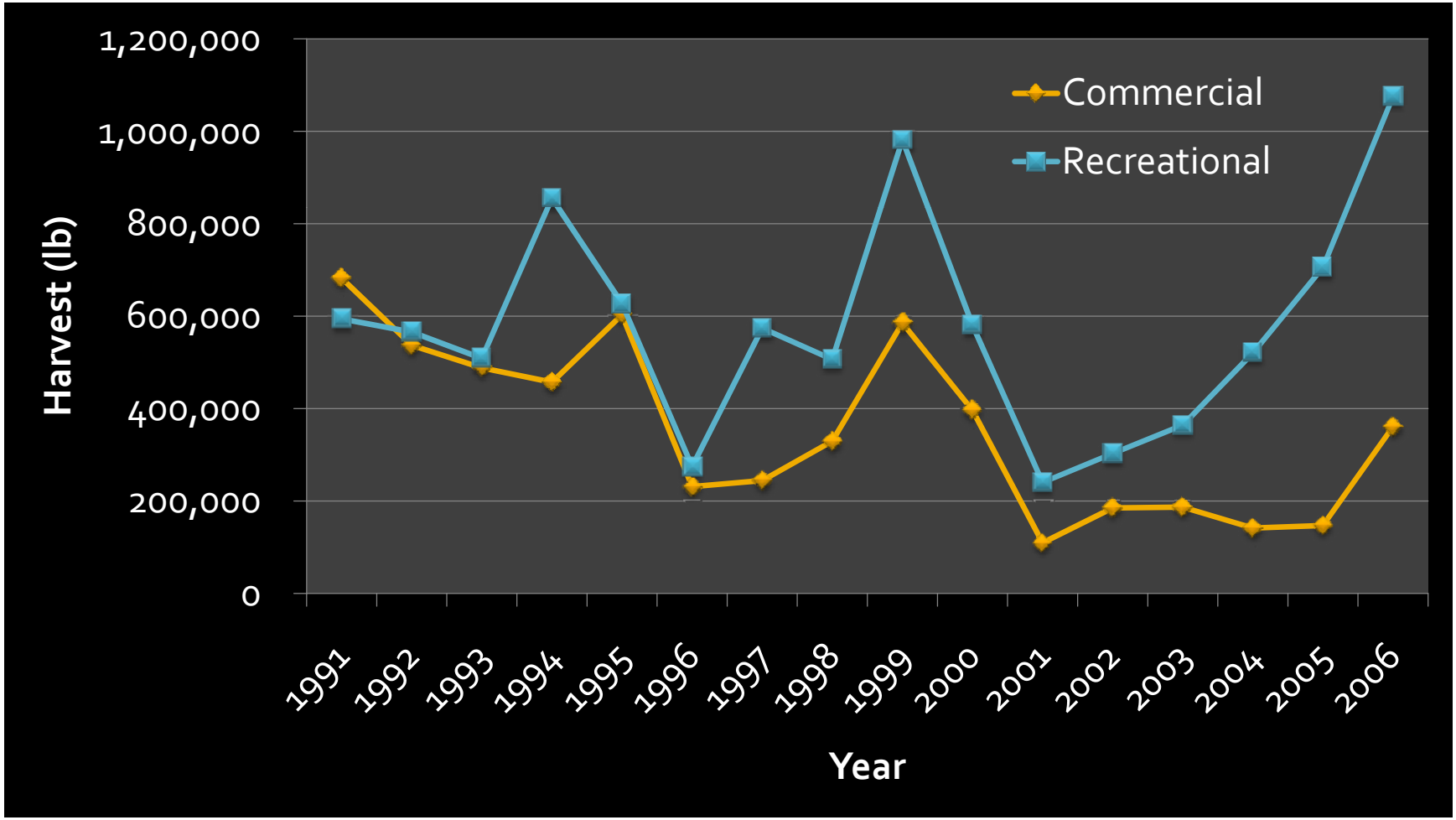
- Bulk of harvest is recreational
- VA makes up a much smaller portion of the harvest than NC



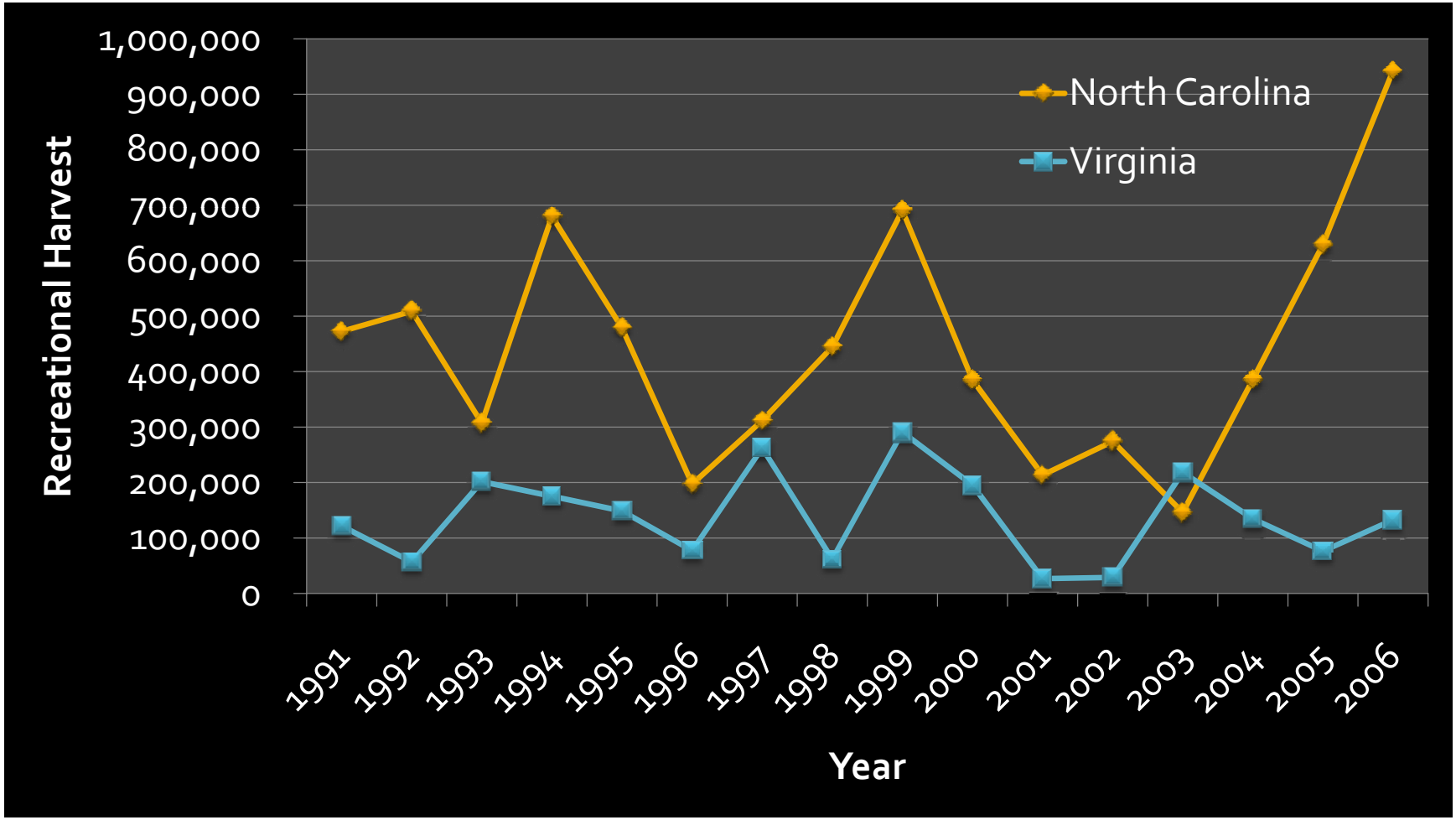
Fisheries – NC vs. VA



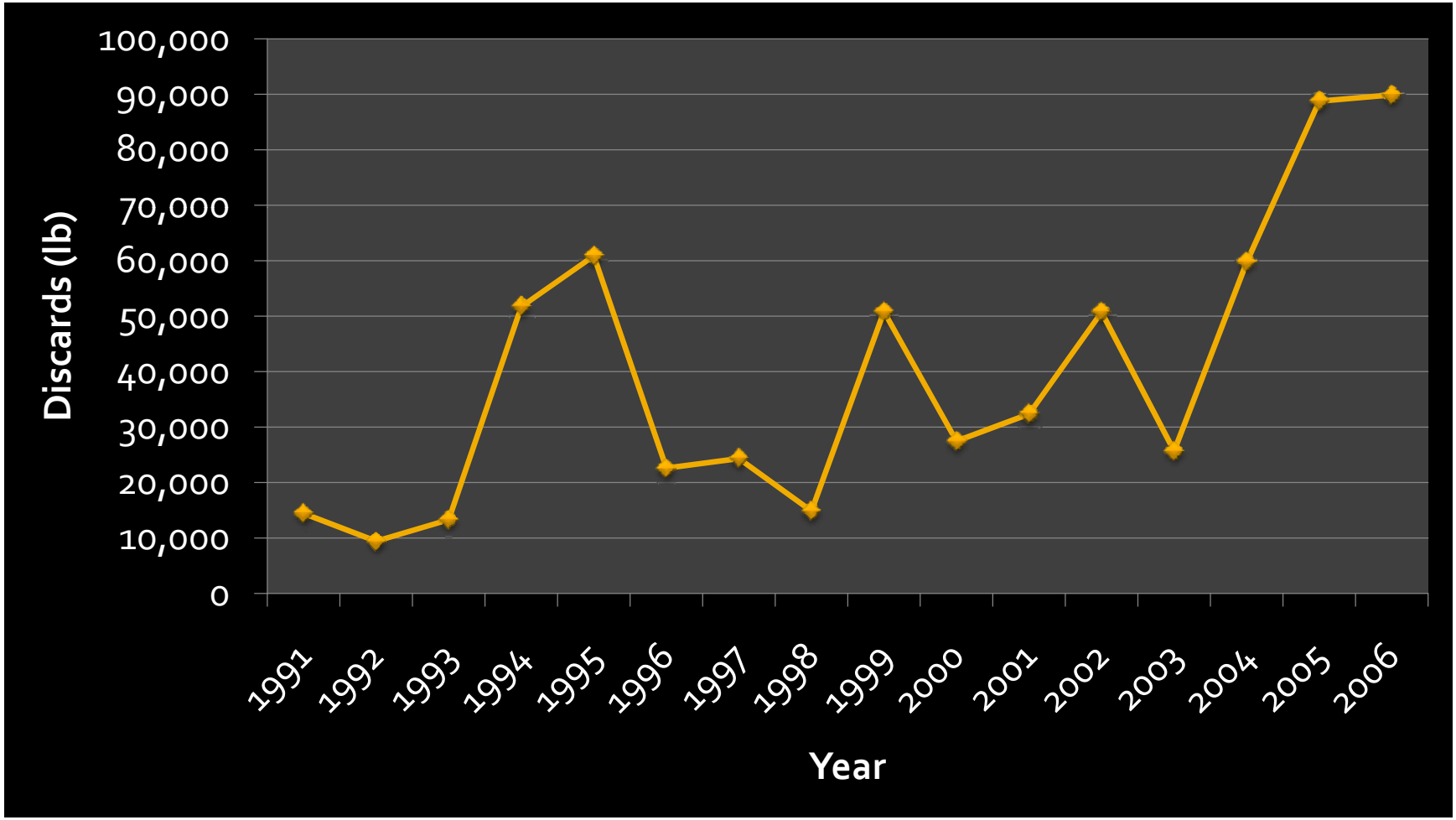
Fisheries – Com vs. Rec



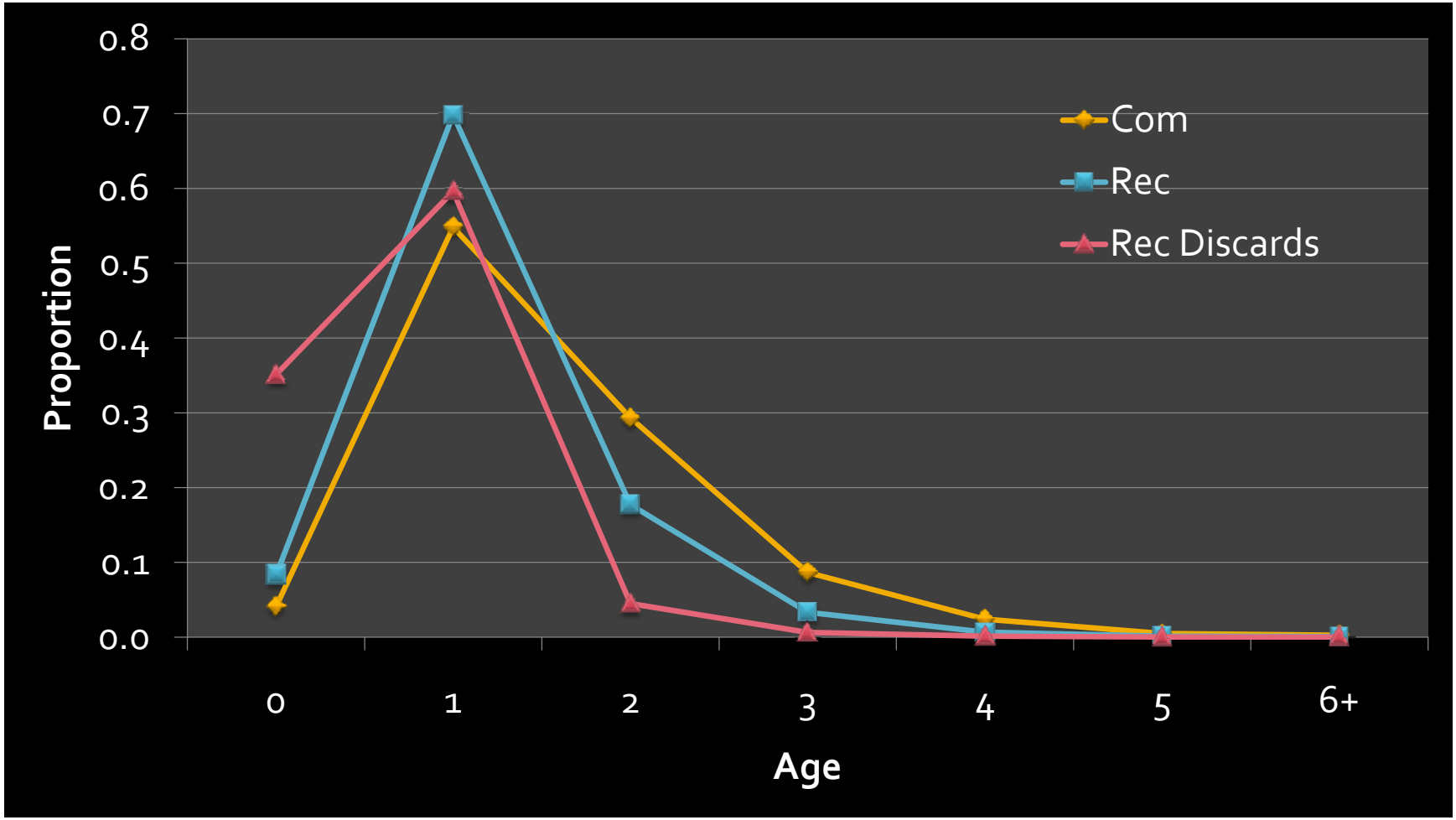
Recreational



Recreational Discards



Average Observed Age Composition



ASAP

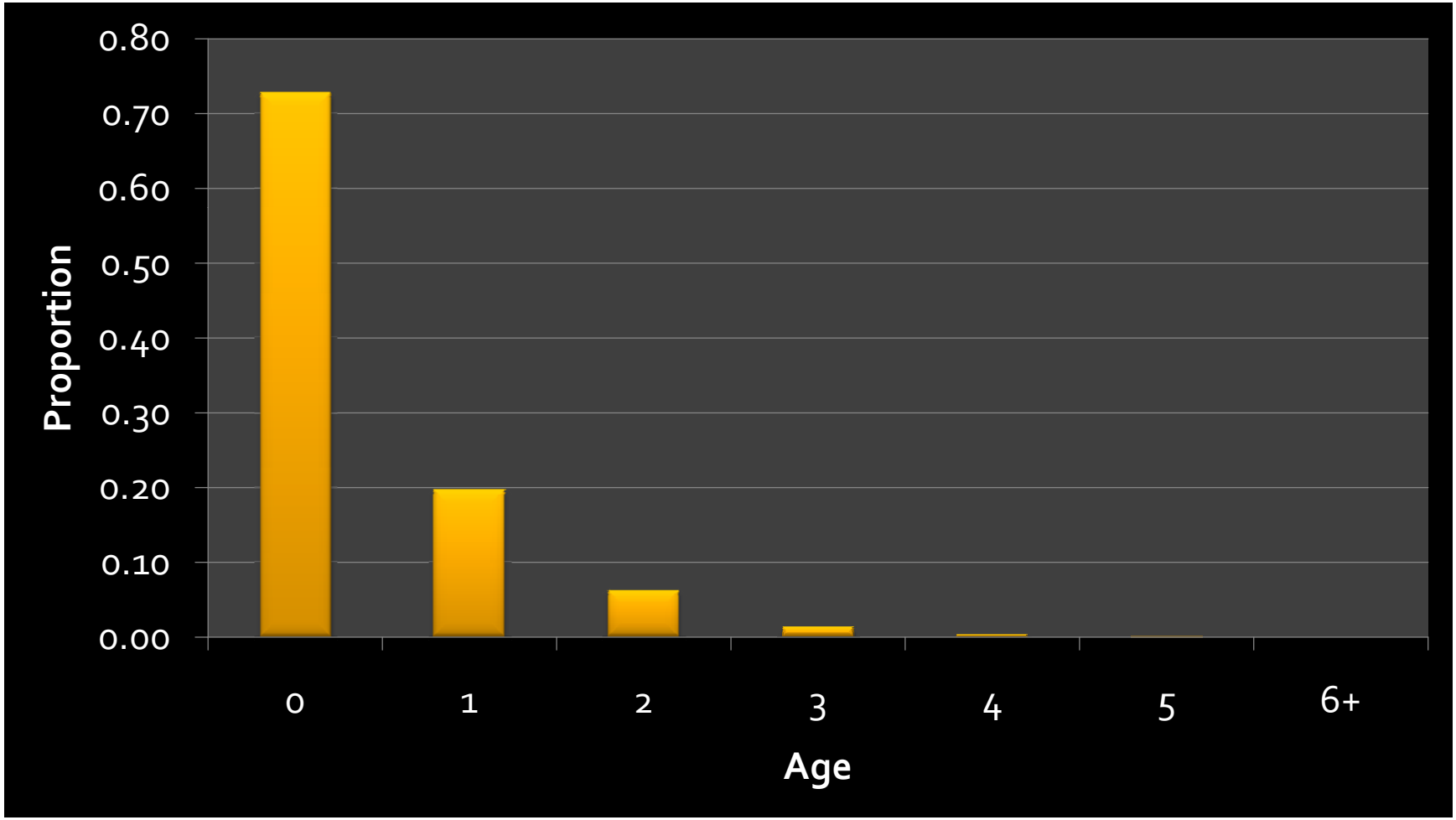
- Age Structured Assessment Program (ASAP)
- Statistical Catch-at-Age model
- Estimates population status based on:
  - Observed catches
  - Catch-at-age
  - Indices of abundance

Assumptions

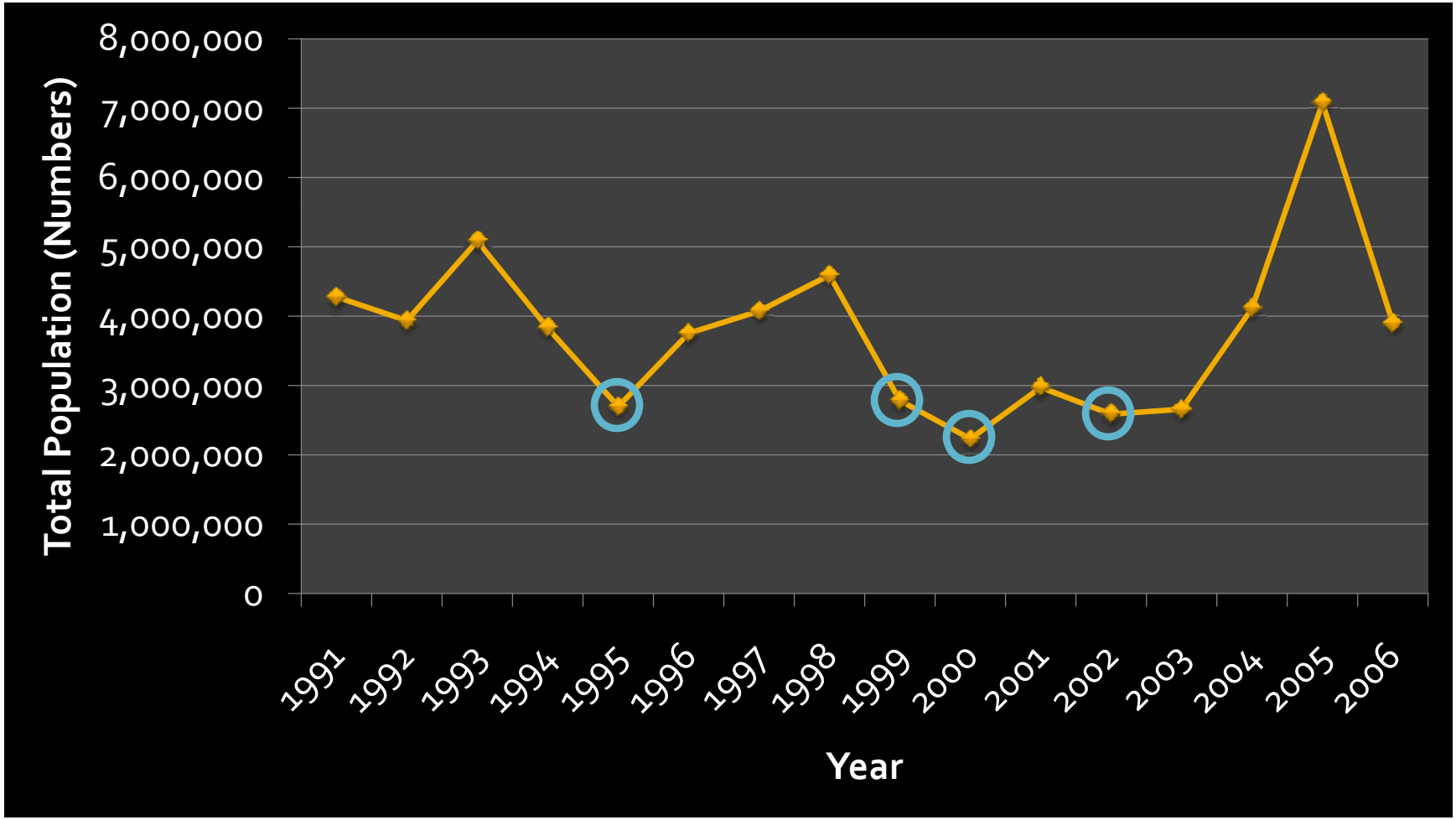
- NC & VA are a unit stock
- No multiple stocks within NC
  - e.g., southern and northern stock
- Sex ratio at age remains constant over time
- No bycatch present in the commercial fishery
  - Most mesh sizes do not retain sublegal-sized fish

Model Results

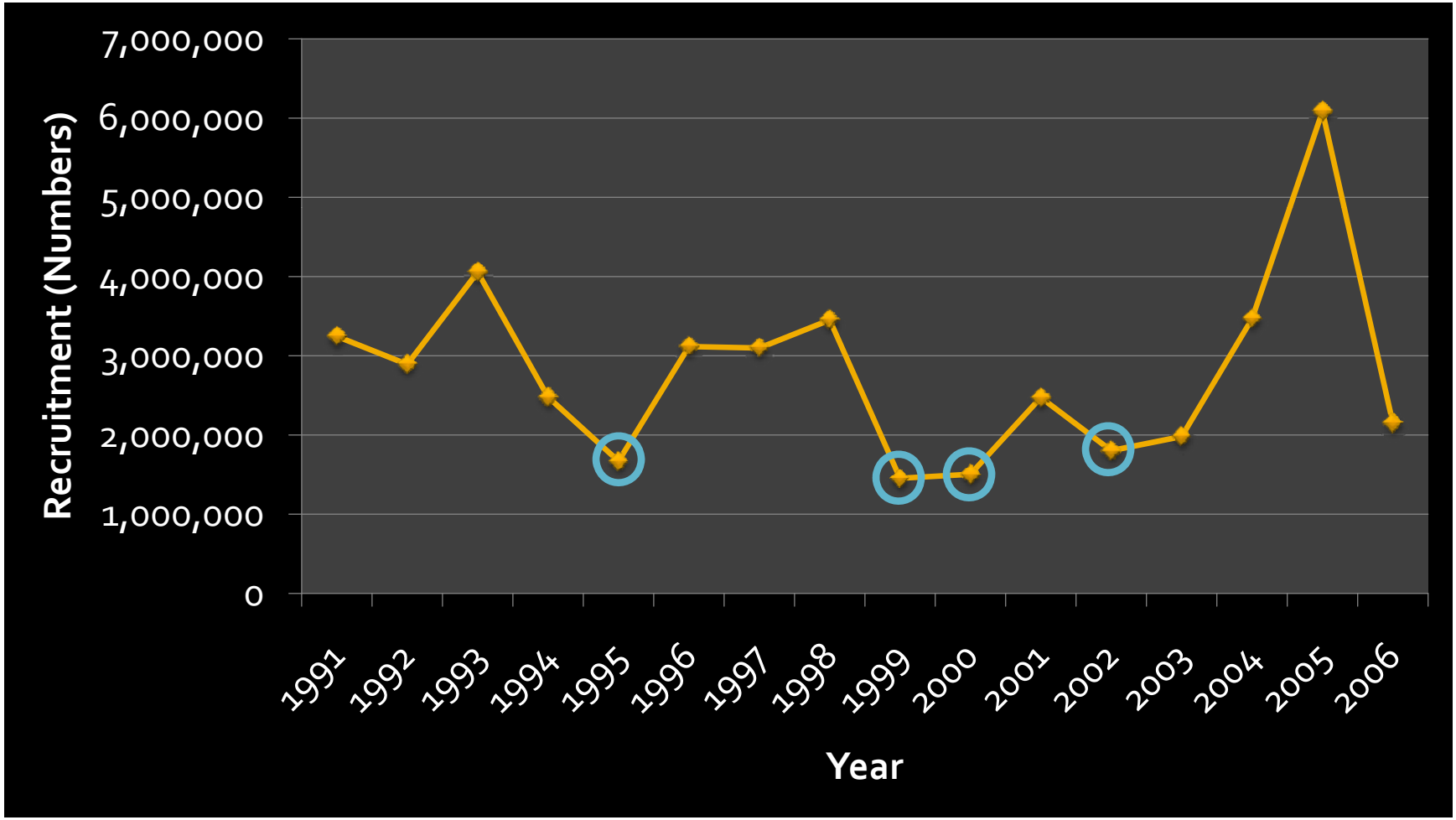
Avg Estimated Age Composition



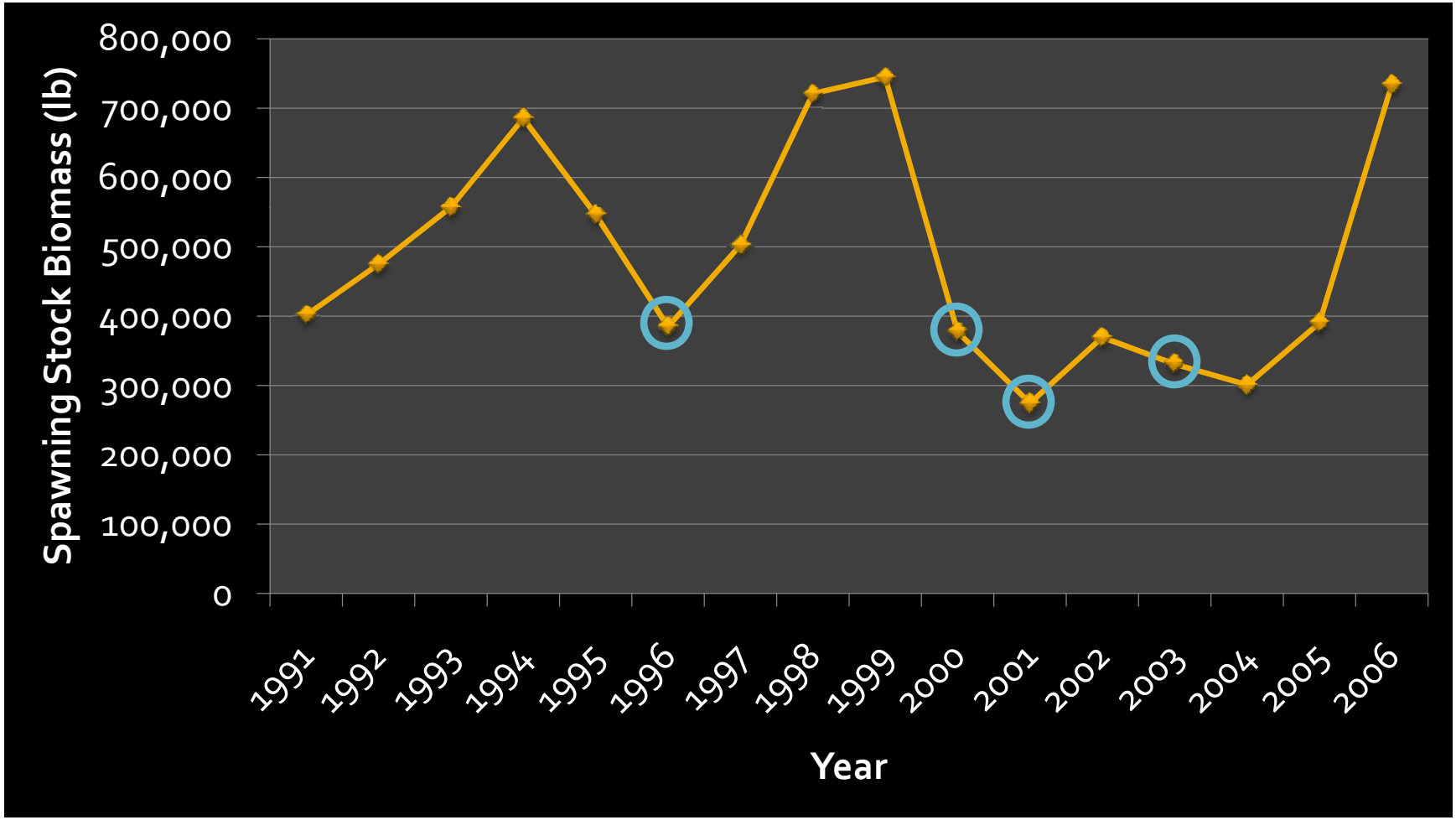
Total Abundance



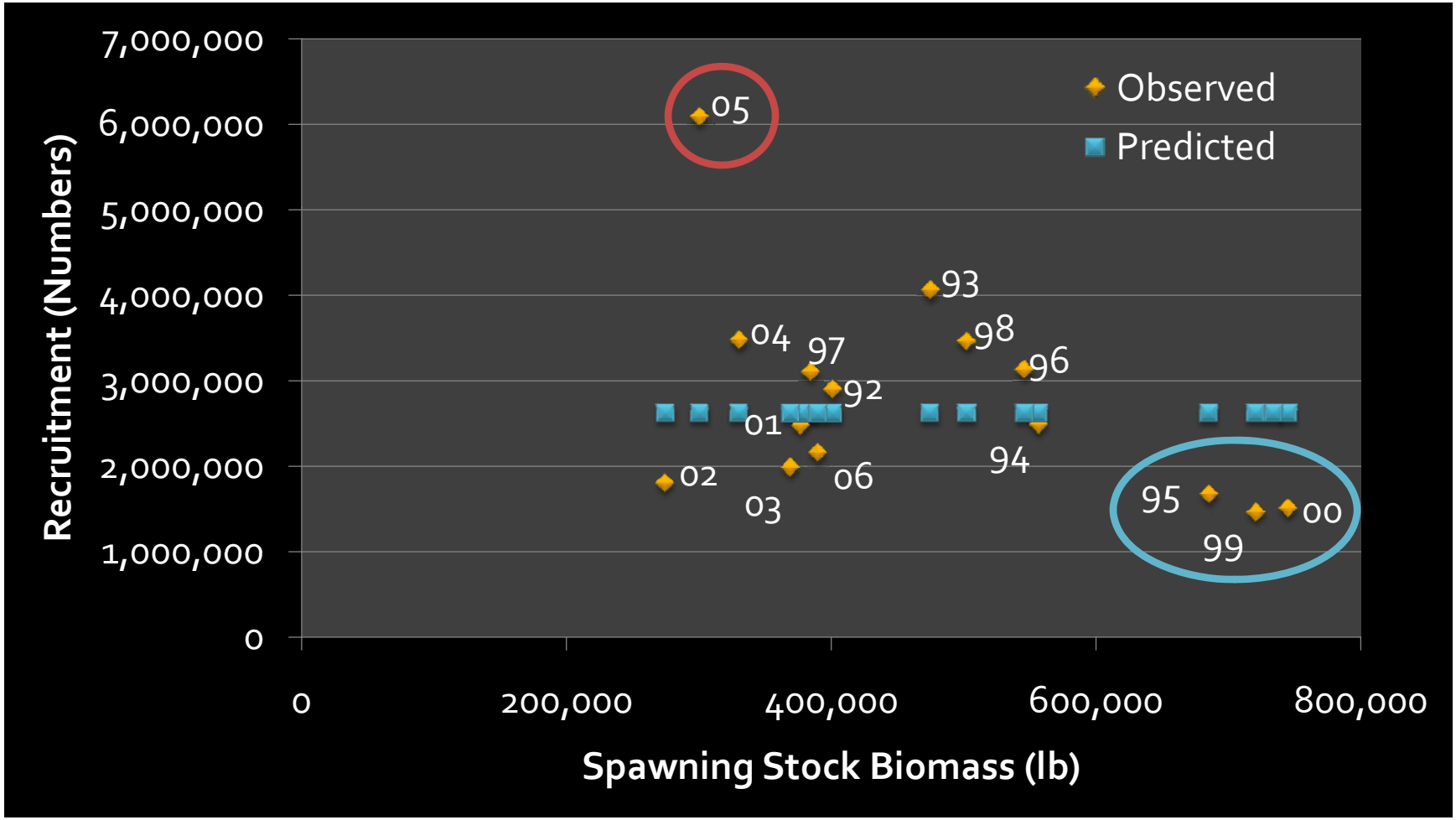
Recruitment



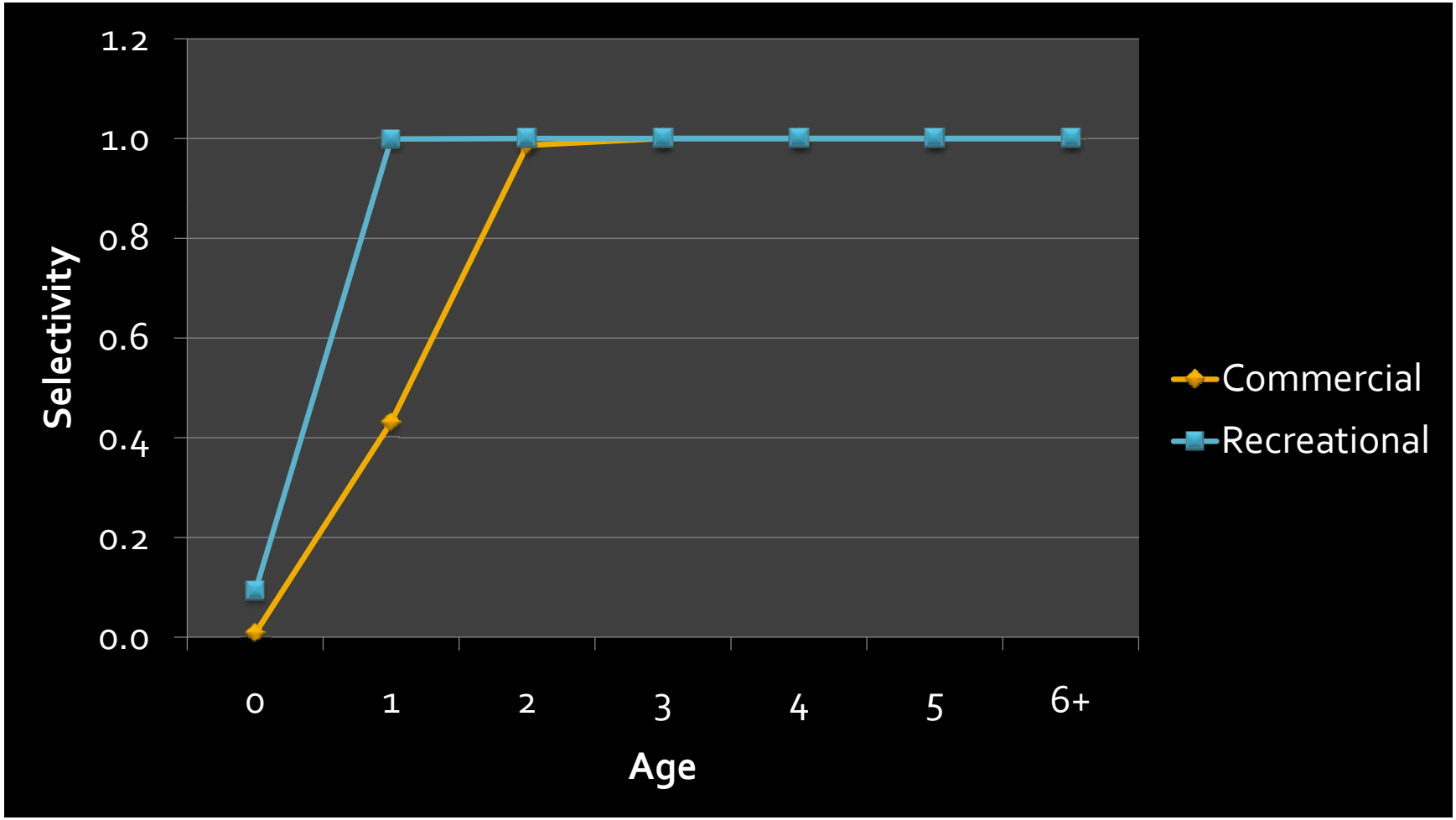
Spawning Stock Biomass



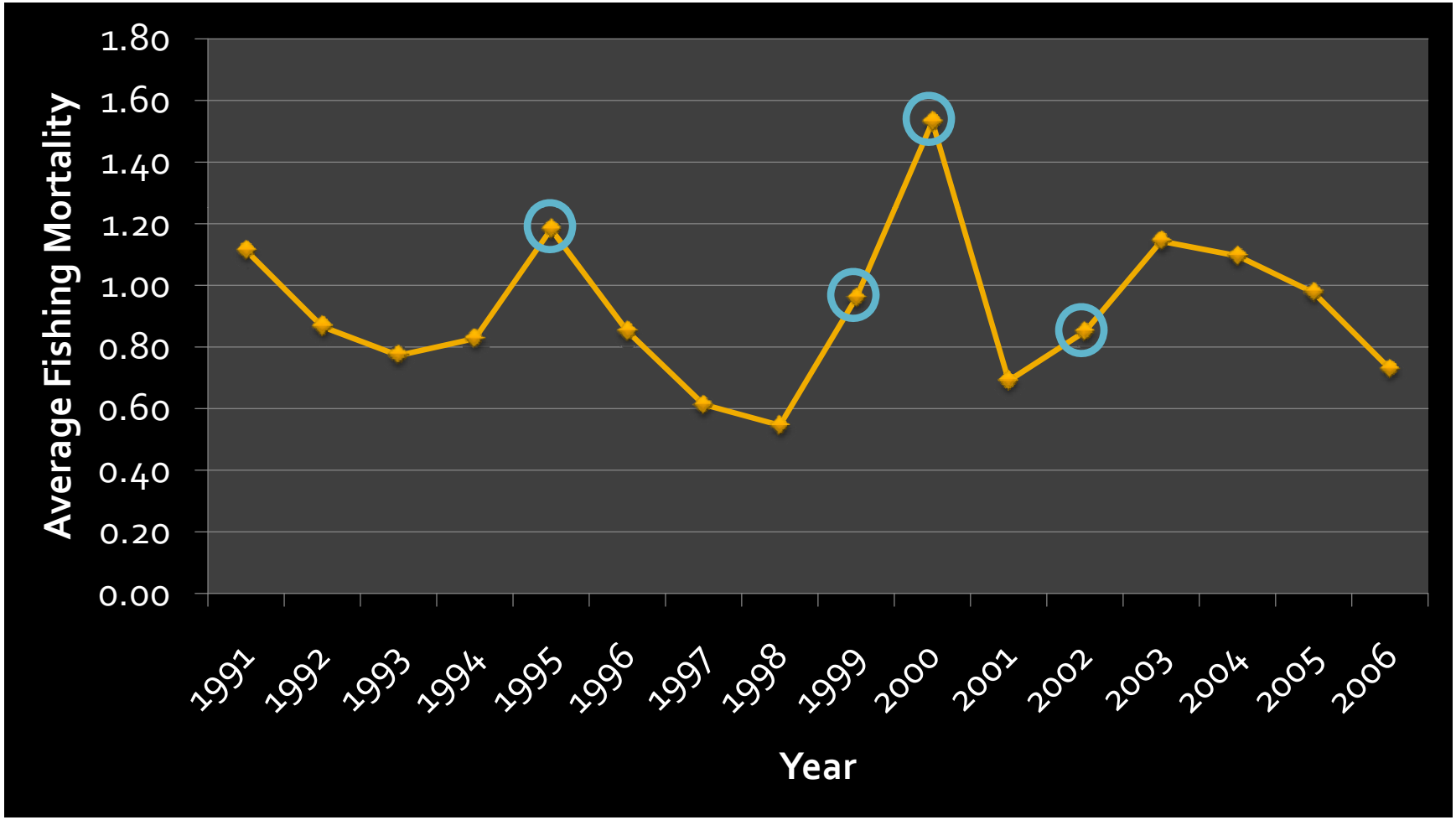
Stock-Recruitment Relationship



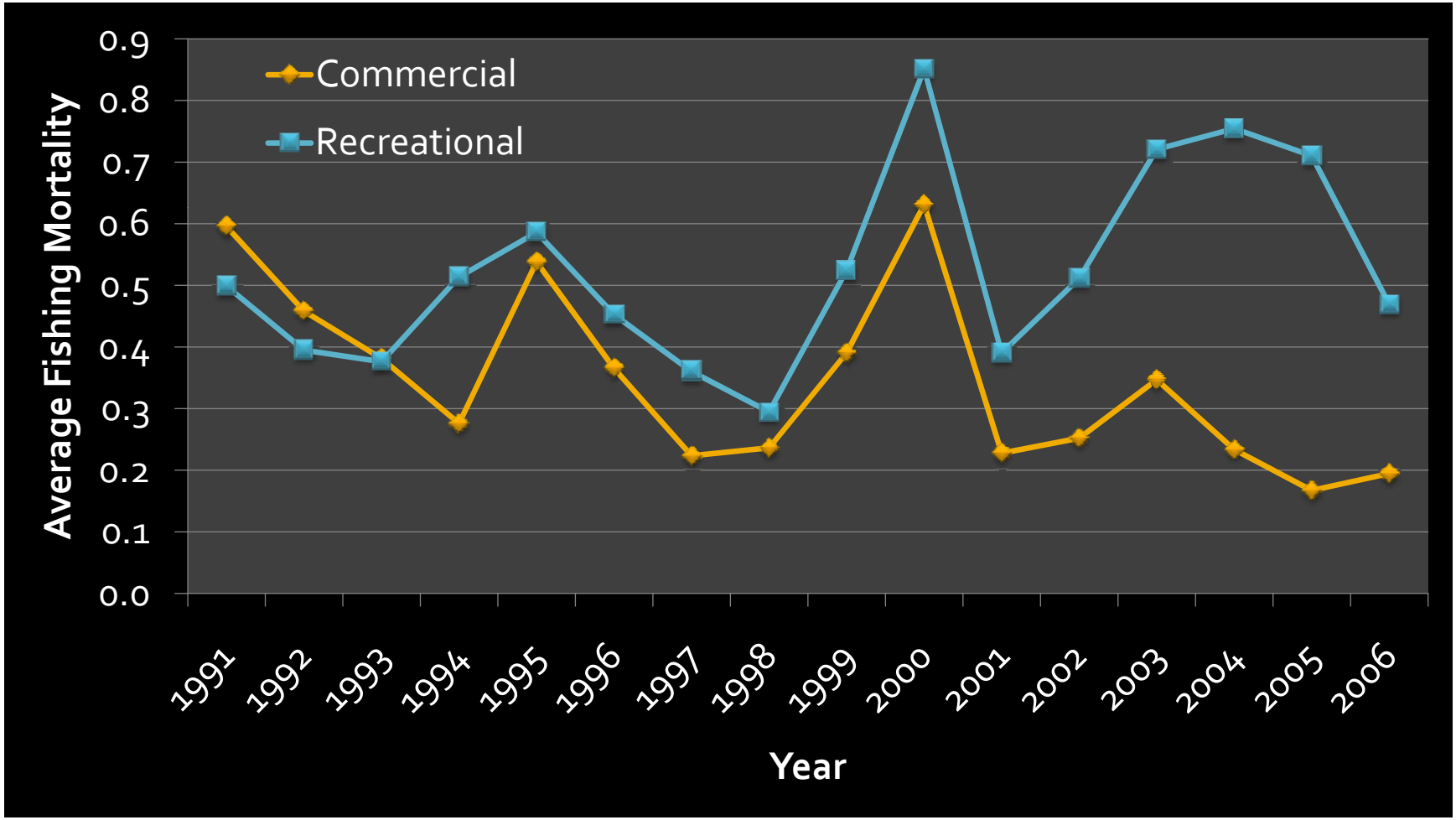
Selectivity



Fishing Mortality



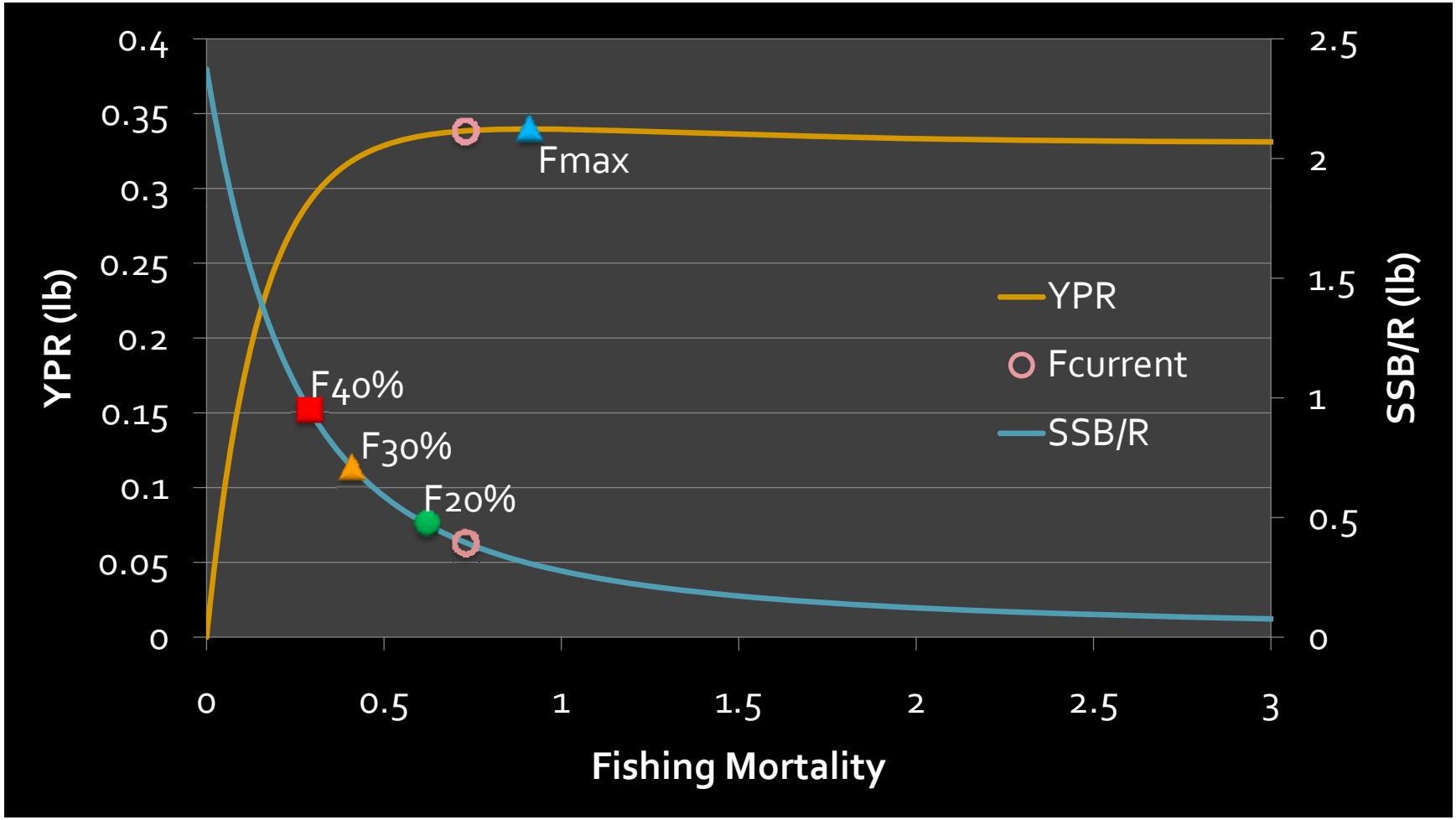
Fishing Mortality



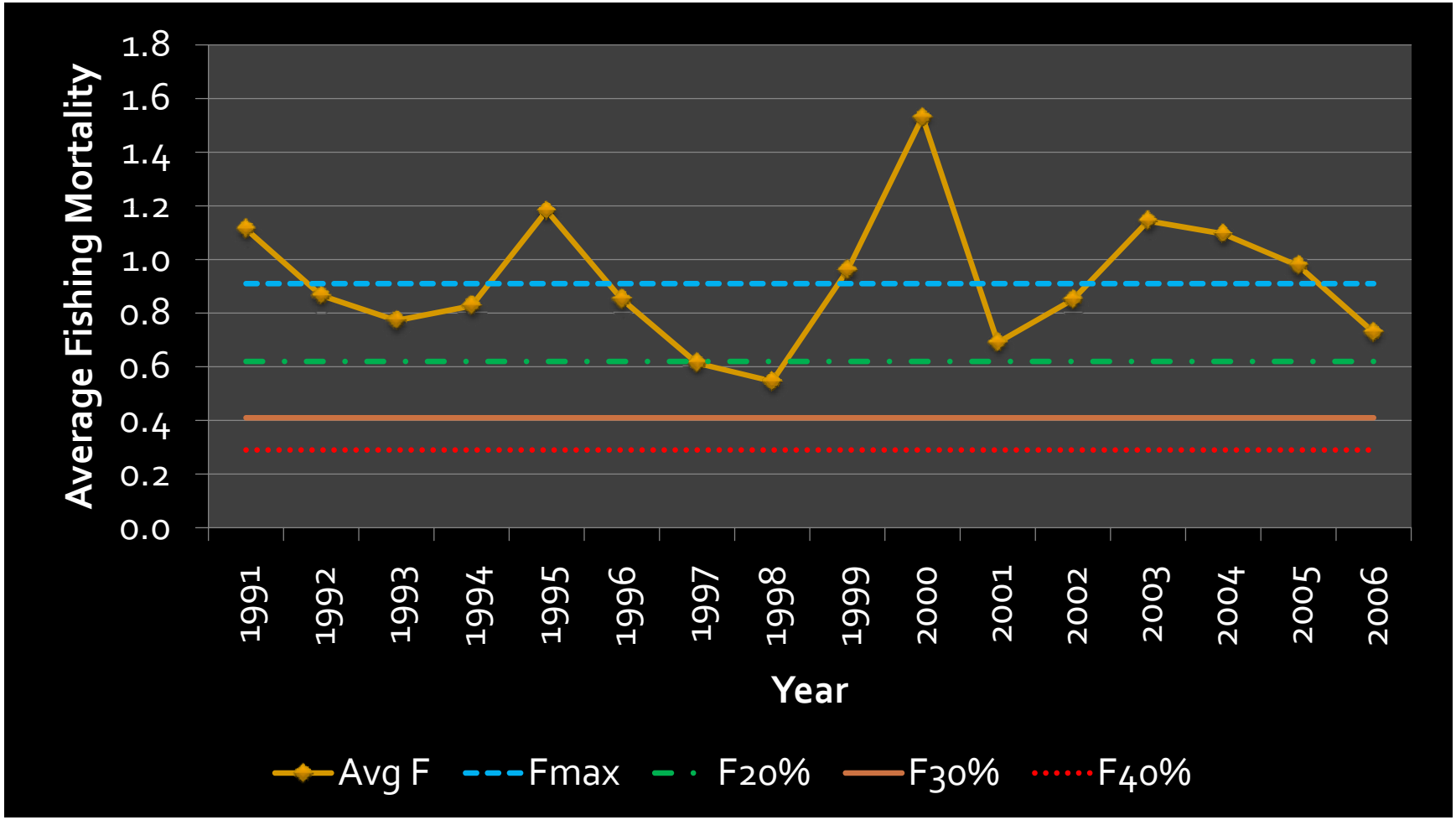
Calculation of Benchmarks

- YPR (Yield Per Recruit) used to determine
  - Growth overfishing
  - Yield
- SSB/R used to determine
  - Spawning Potential Ratio (SPR)
- Benchmarks based on the average # of recruits from 1991-2006 (= 2,807,404)

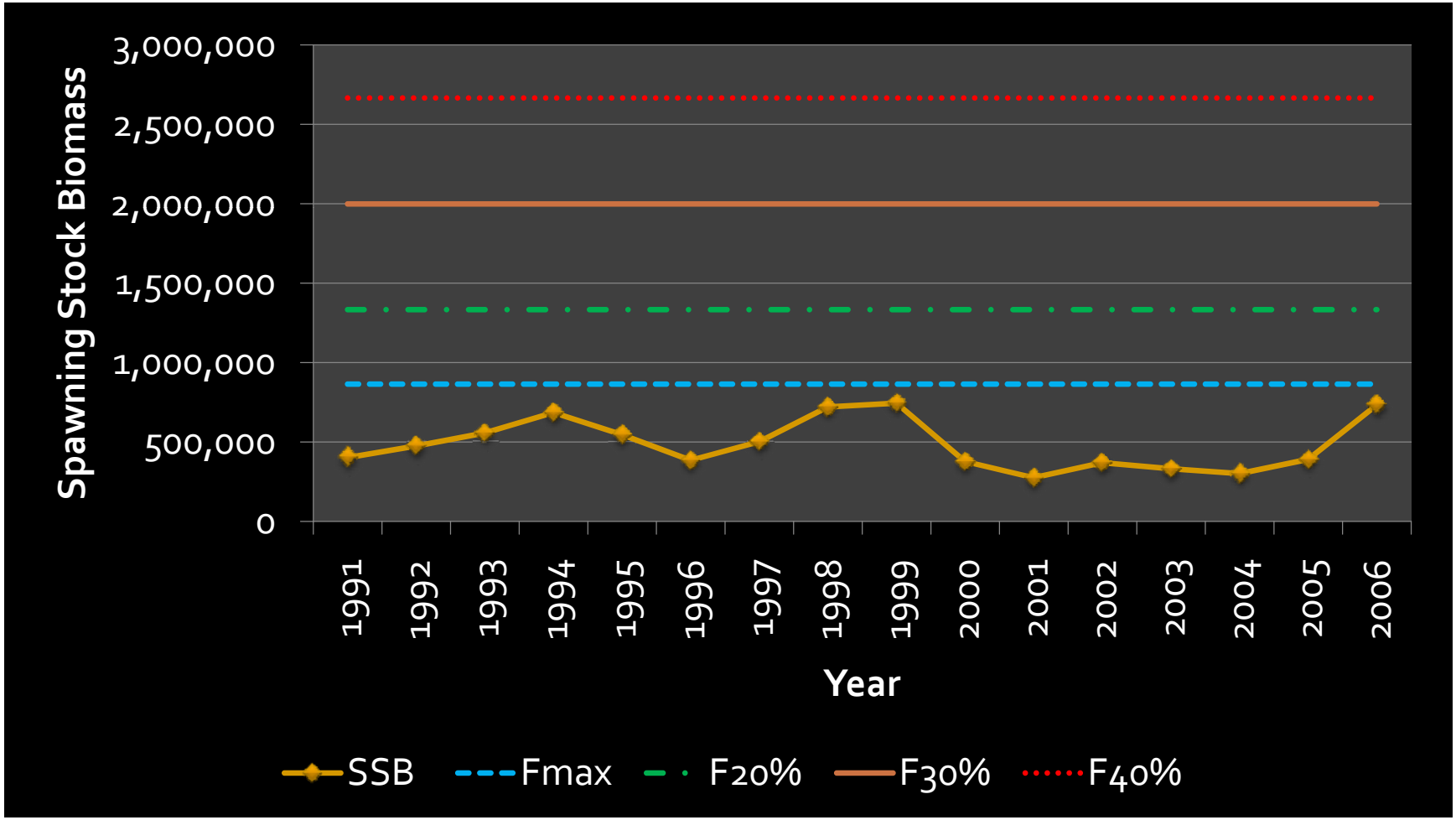
YPR & SSB/R


0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
YPR (lb)
2.5
2
1.5
1
0.5
0
SSB/R (lb)
0
0.5
1
1.5
2
2.5
3
Fishing Mortality
Fmax
F40%
F30%
F20%
YPR
Fcurrent
SSB/R

F Benchmarks



SSB Benchmarks



Potential Benchmarks

Reference Point	F	Spawning Potential Ratio	Est SSB (lb)	Est Yield (lb)
F0	0.00	100%	6,662,756	0
F0.1	0.34	35%	2,341,515	857,325
Fmax	0.91	13%	864,372	953,535
F20% SPR	0.62	20%	1,332,731	941,828
F30% SPR	0.41	30%	1,998,844	893,484
F40% SPR	0.29	40%	2,665,714	817,179
F2004-2006	0.93	13%	843,681	953,507
Fcurrent	0.73	17%	1,109,149	950,166

Conclusion

Stock Status

- Overfished for the entire time series
- Overfishing has been occurring for at least half of that time
  - Much of it in recent years as recreational fishing and discards have increased
- Recent SPRs are below the ASMFC recommended criteria of 20%

Cold Stun Events

- Not possible to quantify at this time
- Appear in model as increases in F
  - Cannot distinguish between mortality due to fishing or to cold stuns
- Have a large impact on spotted seatrout population dynamics
- Should be considered when choosing management strategies as cold stuns are likely to continue to occur

Stock-Recruitment Relationship

- No detectable Stock – Recruitment Relationship
  - Since spotted seatrout spend most of their life in an estuarine environment, it may be possible that environmental factors, such as temperature or salinity, could have a larger impact on recruitment than does spawning stock biomass.

High Fishing Mortality

- F rates still high in recent years, even though there has not been a cold stun event in several years
- Decrease in commercial F
- Concern over increase in Recreational F
  - Selects for smaller, younger seatrout than commercial fishery
  - Increase in recreational discards in recent years

In the Future

- Strong year class in 2005 contributed to good fishing seen in 2006
- Life-history traits should allow the population to recover relatively quickly
  - Assuming there are few significant cold stun events during the recovery period.
- Management measures should be implemented that would:
  - Account for recent increases in recreational fishing and discard mortality
  - Maintain a sufficiently large spotted seatrout population to act as a buffer against the effects of future cold stun events.