ABC CONTROL RULE SUBCOMMITTEE REPORT

Steve Cadrin, Subcommittee Chair

May 5 2016

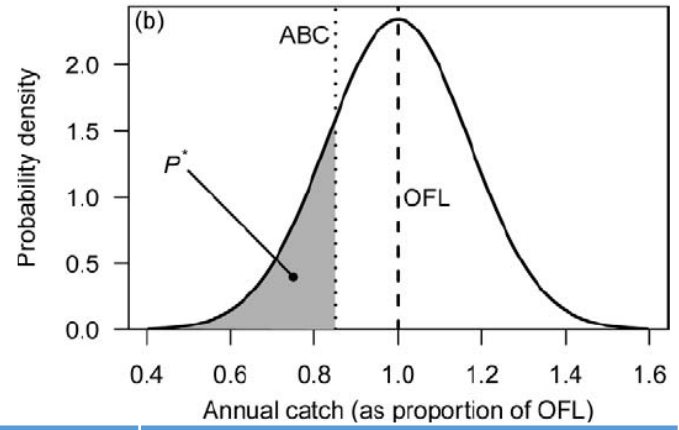
Background

- 2007 - Reauthorized Magnuson-Stevens Act requires Annual Catch Limits by 2011 for federally managed stocks based Acceptable Biological Catch (ABC) recommendations from the SSC.
- 2010 - South Atlantic Council adopts an ABC Control Rule based on probability of overfishing P*, in which P* is derived from assessment information, characterization of uncertainty, stock status and vulnerability.
- 2014 - ABC Control Rule Workshop to consider how the current control rule has performed and how continuing advances in assessments, particularly methods for data-limited stocks, can best be incorporated.
- 2015 - formed a sub-committee to develop a draft proposal to bring to the entire SSC for review.
  - Steve Cadrin (chair), John Boreman, Amy Schueller, Tracy Yandle, Eric Johnson, Carolyn Belcher, Fred Serchuk
  - Thanks to Luiz Barbieri and John Carmichael for their participation and Mike Errigo for compiling P* and SEDAR information

Progress on Evaluating ABC Control Rule Performance

- Subcommittee Conference Call (Jan 4 2016) and Work Plan
- Review of performance of ABC Control Rule
  - Review of P* derivations (Mike Errigo & John Boreman)
    - Attachment 29. P-star Scoring Summary
    - Attachment 30. P-star Values
  - Review of SEDAR Stock Assessment Estimates (Mike Errigo)
    - Attachment 31. SA Stock Info
    - Attachment 32. SEDAR Status Plots
  - Comparison of ABC and catch
    - Attachment 33. Landings vs ABC
- Expansion of evaluation to include socio-economic indicators
  - Attachment 34. MAFMC Fishery Performance Report
  - Attachment 35. NEFSC Fishery Performance Report

ABC Control Rule



- ABC is a percentile (P*) of the overfishing limit (OFL) distribution
- P*=50% for a a 'perfect' situation, with reductions for 'imperfections'

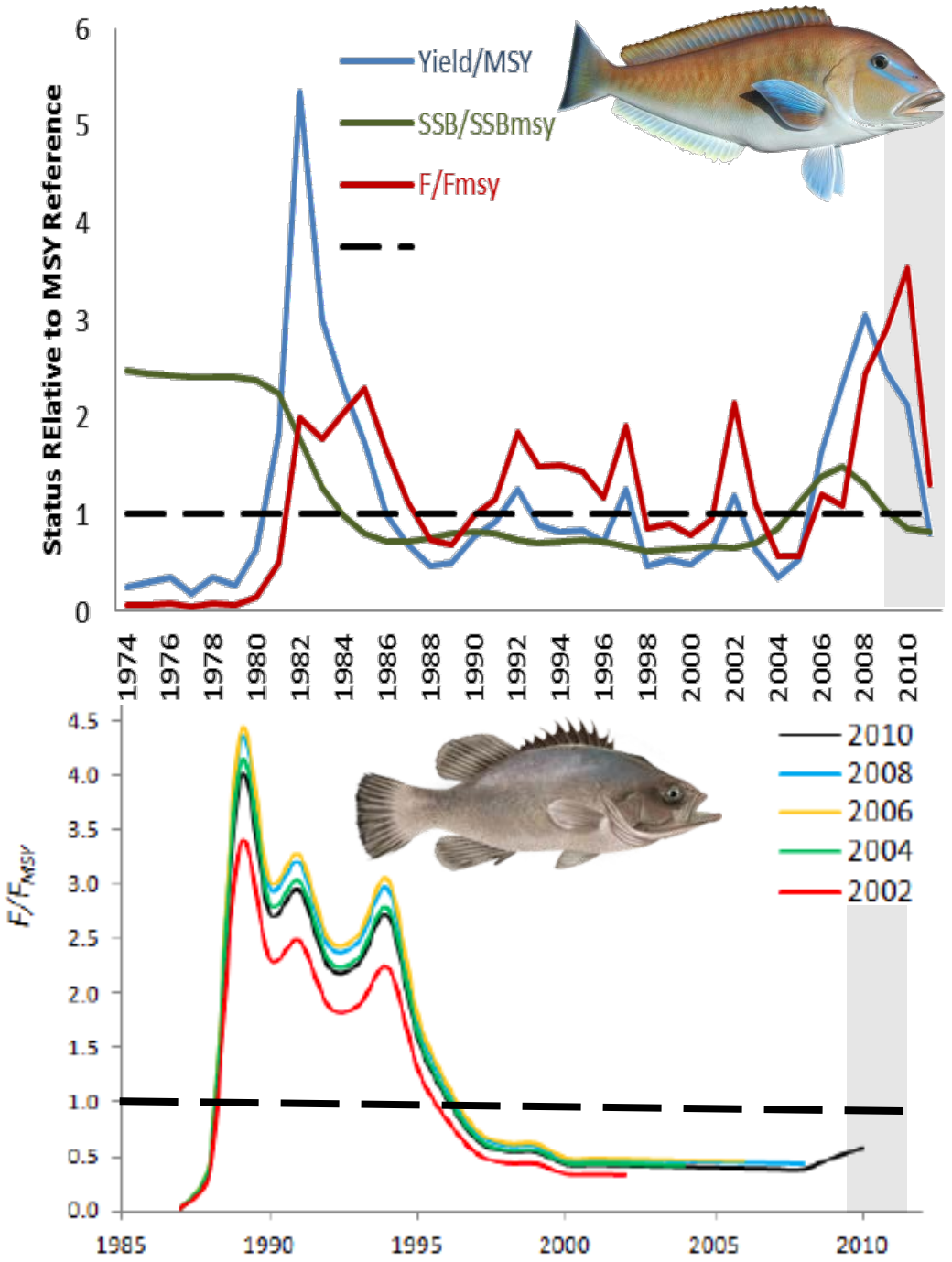
Tiers	Dimension I	Dimension II	Dimension III	Dimension IV
	Assessment Information	**Uncertainty Characterization**	**Stock Status**	**PSA Risk Analysis**
Tier 1	Quantitative assessment provides estimates of exploitation and biomass; includes MSY-derived benchmarks. **(0)**	Complete. Key Determinant – uncertainty in both assessment inputs and environmental conditions are included. **(0)**	Neither overfished nor overfishing. Stock is at high biomass and low exploitation relative to benchmark values. **(0)**	Low risk. High productivity, low vulnerability, low susceptibility. **(0)**
Tier 2	Reliable measures of exploitation or biomass; no MSY benchmarks, proxy reference points. **(-2.5%)**	High. Key Determinant – reflects more than just uncertainty in future recruitment. **(-2.5%)**	Neither overfished nor overfishing. Stock may be in close proximity to benchmark values. **(-2.5%)**	Medium risk. Moderate productivity, moderate vulnerability, moderate susceptibility. **(-5%)**
Tier 3	Relative measures of exploitation or biomass, absolute measures of status unavailable. Proxy reference points. **(-5%)**	Medium. Uncertainties are addressed via statistical techniques and sensitivities, but full uncertainty is not carried forward in projections. **(-5%)**	Stock is either overfished or overfishing. **(-5%)**	High risk. Low productivity, high vulnerability, high susceptibility. **(-10%)**
Tier 4	Reliable catch history. (-7.5%)	Low. Distributions of Fmsy and MSY are lacking. **(-7.5%)**	Stock is both overfished and overfishing. **(-7.5%)**	NA
Tier 5	Scarce or unreliable catch records. **(-10%)**	None. Only single point estimates; no sensitivities or uncertainty	Either status criterion is unknown. **(-10%)**	NA

2014 ABC Control Rule Workshop

- ***Term of Reference 1.*** *Evaluate the performance of the ABC control rule based on recent assessments, i.e., benchmark vs. subsequent update. What was the realized performance of the control rule for avoiding overfishing and achieving the expected yield when applied to different assessments?*
- Few SAFMC-managed stocks have had benchmark assessments followed by a subsequent update, and none of the stocks that fit this criterion have had ABC values set according to this control rule (i.e., their ABC setting process preceded implementation of the control rule).

2014 ABC Workshop

- Some stocks had ABC recommendations that later were considered inadequate.
  - blueline tilefish was originally assigned an ABC value based on an assessment level 5, but the subsequent benchmark assessment determined that ABC to be too high.
  - Wreckfish had a DCAC-based ABC (level 3) that was much lower than the SCAA-derived ABC value obtained through a subsequent stock assessment.



2014 ABC Control Rule Workshop

- The SSC identified a lack of information to properly evaluate the efficacy of the control rule.
  - evaluating differences in P* values across similar species/assessments
  - metrics to evaluate performance
- Although the ABC control rule can be improved, there isn't enough evidence indicating the current rule is not working properly.

2014 ABC Control Rule Workshop

- ***Term of Reference 2.*** *Evaluate the current ABC control rule, considering whether it achieves the original objective of scaling uncertainty catch level adjustments (i.e., buffers) relative to assessment uncertainty, and whether it provides adequate categories and resolution given the types of available assessment information now encountered.*
- ABC control rule performance cannot be properly evaluated at this time.
- The SSC recognized that there is a general lack of understanding of the current use and formulation of the control rule by the Council and stakeholders.
- The Committee suggested running several SAFMC-managed species with different life histories through other Councils' ABC control rules to see how they compare to the current SAFMC approach.

2014 ABC Control Rule Workshop

- Suggested modifications included:
  - Revise the control rule to address 3 main categories of assessments:
    1. Analytical assessments supporting P* (BAM, Production Model, etc.)
    2. Analyses supported by other approaches (DBSRA, DCAC, etc.)
    3. Analyses applied to unassessed, data limited stocks (ORCS, Decision Tree, etc.)
  - Use the main types of uncertainty characterization techniques currently associated with assessments to group stocks/assign tiers within the Uncertainty Dimension. For example:
    1. Monte Carlo-based approaches: Tier 1
    2. Simpler bootstrapping approaches: Tier 2
    3. Just sensitivity analyses (no bootstrapping): Tier 3
  - Characterization of uncertainty is also important (e.g., how many parameters are fixed vs. freely estimated? How often are CV's assigned or 'borrowed' rather than calculated or estimated as part of the assessment framework?)

2014 ABC Control Rule Workshop

- ***Term of Reference 3.*** *Evaluate the scoring criteria of each of the factors within control rule dimensions and consider whether criteria should be revised based on performance, as considered in TOR #1 and #2, or in light of new scientific information. For example, recently published analyses demonstrate that fixing steepness is equivalent to choosing a spawner-per-recruit proxy.*
- Recommendations:
  - The control rule's Assessment Levels 2 and 3 should be less prescriptive about the methodology to be used.
  - The SSC considered whether 'overfished' should have more weight than 'overfishing' when evaluating stock status.
  - The SSC considers fixed steepness as a proxy reference point in assessment tier 2, but a more explicit criterion is needed.
  - Assessment Tiers 4 and 5 present a problem in the control rule, because those assessments do not produce a distribution of OFL to determine ABC from P*.
  - If tiers are revised, penalties may also need to be revised.

General Approach of ABC Control Rule Subcommittee

- The number of stocks with ‘bookend’ assessments between ABC implementation are still limited.
- Reviewing the information available will help to refine the approach to evaluating performance and eventually refining the control rule to improve performance.
  - Review of P* derivations (John Boreman & Mike Errigo)
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- Expansion of evaluation to include socio-economic indicators
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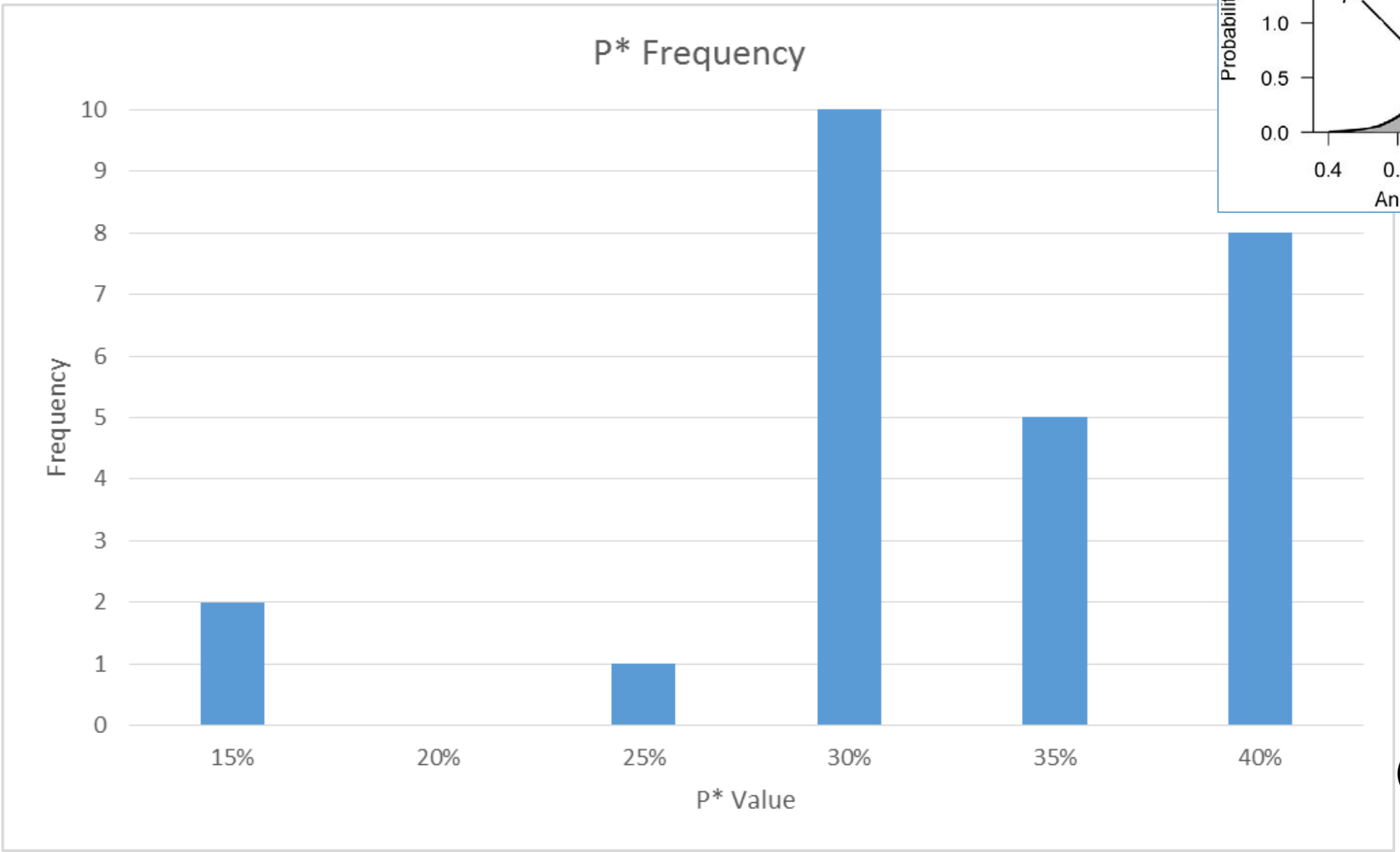
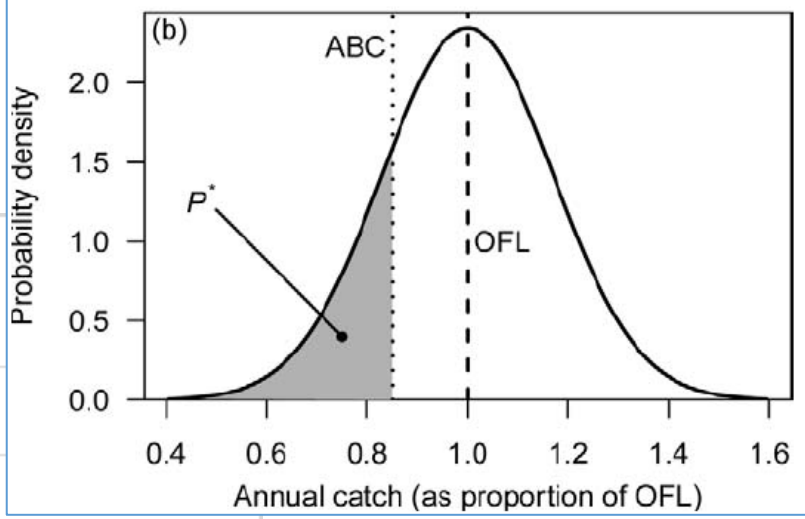
- Eventually evaluate performance with Management Strategy Evaluation

Review of P* Scoring

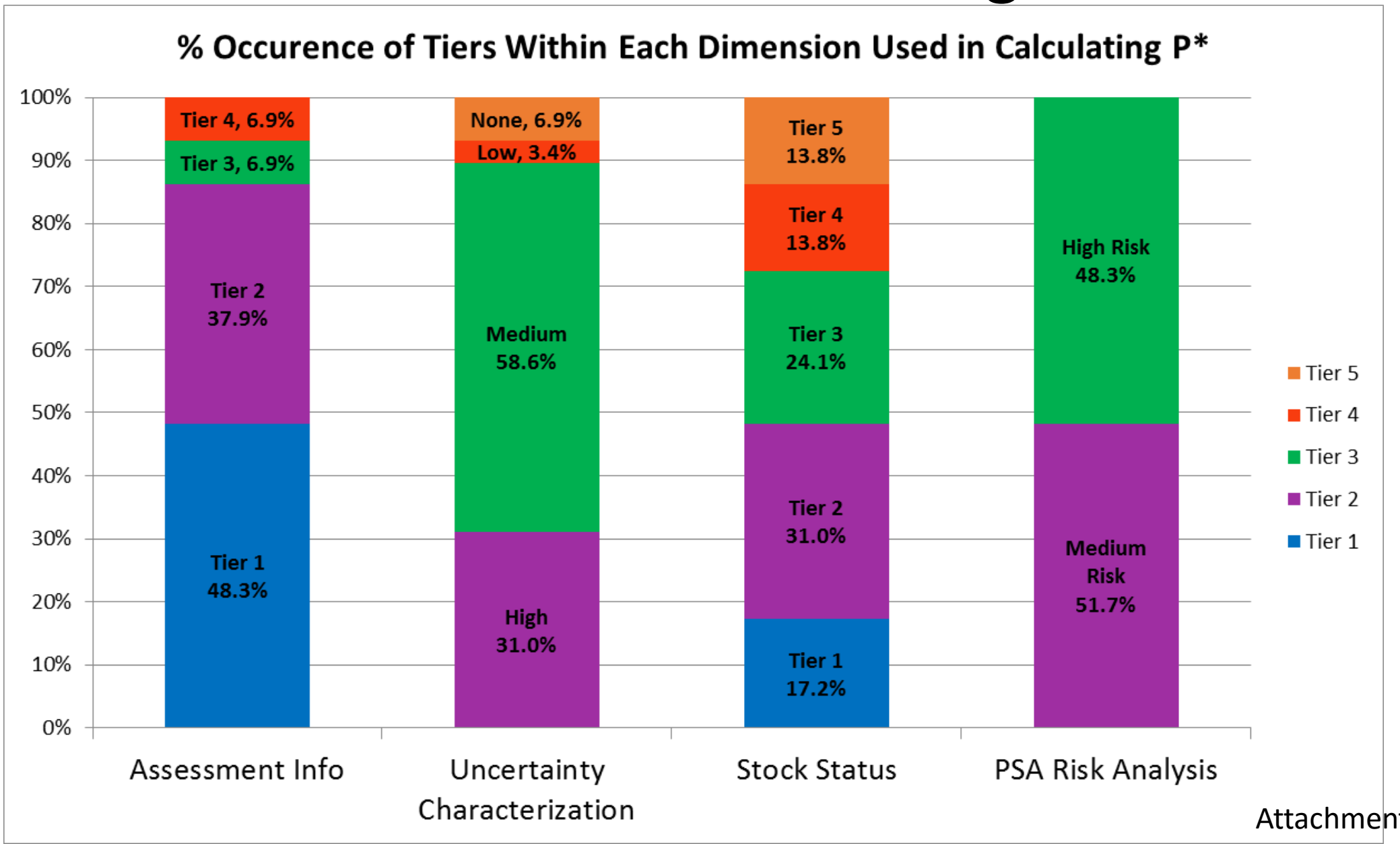




(29 ABC recommendations)

Attachments 29 & 30

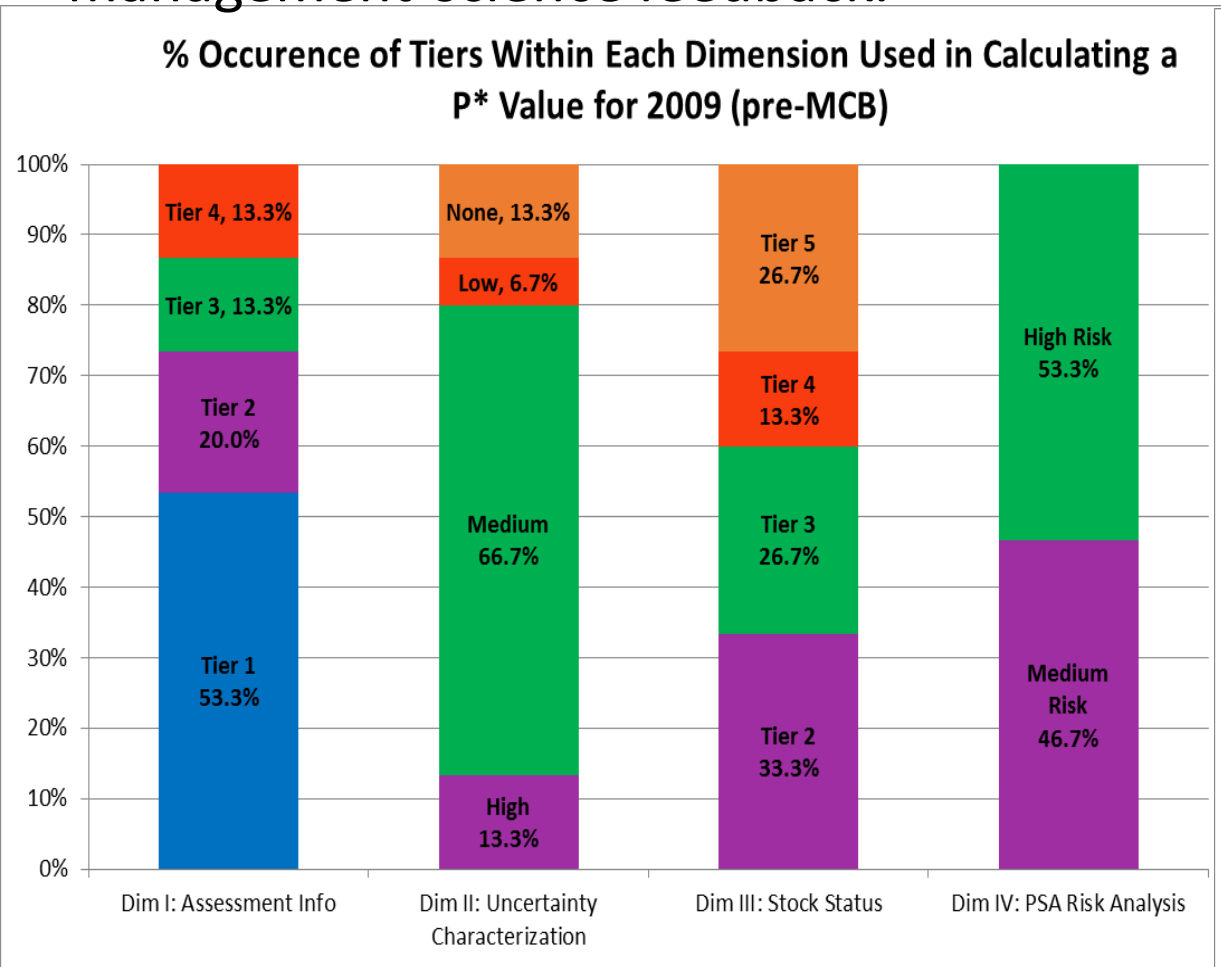
Review of P* Scoring

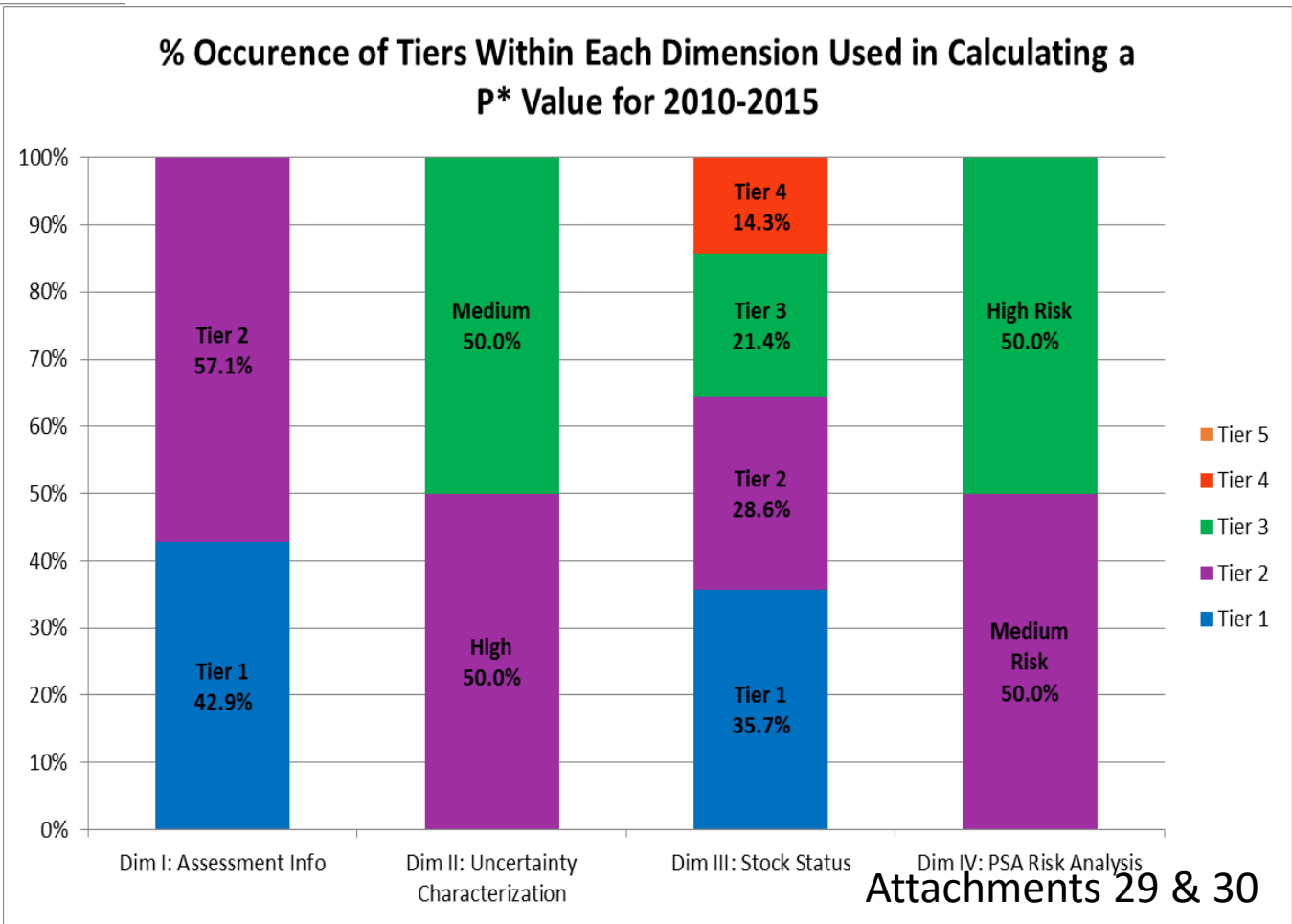


Attachments 29 & 30

Review of P* Scoring

- P* scores within dimensions generally became less conservative (i.e., tended to shift to lower-numbered tiers) over time.
- This trend may reflect an expanding information base with more years of surveys or a positive management-science feedback.





Attachments 29 & 30

Review of P* Scoring

- P* scores for stocks with multiple ABC reviews tended to improve over time.

Stock	1st P*	2nd P*	3rd P*
Black Sea Bass:	35.0%	37.5%	40.0%
Gag:	30.0%	30.0%	
Golden Tilefish:	32.5%	35.0%	
Hogfish:	12.5%	27.5%	(split into 2 stocks for 2nd scoring)
King Mackerel:	27.5%	32.5%	
Mutton Snapper:	32.5%	30.0%	
Spanish Mackerel:	25.0%	40.0%	
Vermillion Snapper:	27.5%	40.0%	
Yellowtail Snapper:	37.5%	40.0%	

Attachments 29 & 30

Review of SEDAR Stock Assessment Information

- Recent SEDAR (post ACL) assessments of SA Snapper-Grouper complex (Cadrin 2016 for "Assessing and Managing Data-Limited Fish Stocks".

Stock	% Recreational	Assessment type	Assessment period	Source document
Red porgy	16-87%	Age-based	1972-2011	SEFSC 2012a
Vermilion snapper	17-100%	Age-based	1946-2011	SEFSC 2012b
Blueline tilefish	0-88%	Age-based	1974-2011	SEDAR 2013a
Snowy grouper	0-17%	Age-based	1974-2012	SEDAR 2013b
Hogfish (GA-NC)	3-87%	Age-based	1986-2012	Cooper et al. 2014
Black sea bass	41-84%	Age-based	1978-2012	SEFSC 2013

Review of SEDAR Stock Assessment Information

- All SEDAR assessments of SA Council management units.
- Categorized as 'data-rich' (analytical with estimated stock status), unassessed, and 'catch-22' (unknown status) stocks.

FMP/Complex	Stock	Status Determination Criteria					Stock Status		Fishing Level Recommendation (lbs ww, unless otherwise noted)					
		MFMT Definition	MFMT Value	MSST Definition	MSST Value	M	Overfishing?	Overfished?	OFL	ABC	Year	ABC Basis	ACL Definition	ACL
Snapper - Grouper	Atlantic Spadefish	$F_{30\%SPR}$	UNK	$(1-M)*SSB_{30\%SPR}$	UNK	NA	UNK	UNK	UNK	812,478	2015	ORCS	ACL = ABC	812,478
	Bar Jack	$F_{30\%SPR}$	UNK	$(1-M)*SSB_{30\%SPR}$	UNK	NA	UNK	UNK	UNK	62,249	2015	ORCS	ACL = ABC	62,249
	Black Grouper	$F_{30\%SPR}$	0.216	$(1-M)*SSB_{MSY}$	5.92 mp	0.15	No	No	294,949	262,594	2015	Tier 1	ACL = ABC	262,594
	Black Sea Bass	F_{MSY}	0.61	$(1-M)*SSB_{MSY}$	256E10 eggs	0.3	No	No	2,296,000	1,814,000	2015	Tier 1	ACL = Yield 75% F_{MSY}	1,756,450
	Blueline Tilefish	F_{MSY}	0.302	$75\%*SSB_{MSY}$	184.95 mt	0.1	Yes	No	UNK	224,100	2016	Tier 1/Yield F_{MSY}	ACL = 78% ABC	174,798
	Gag	F_{MSY}	0.21	$(1-M)*SSB_{MSY}$	6.82 mp	0.15	Yes	No	782,000 gw	666,000 gw	2015	Tier 1	ACL = 95% ABC	632,700 gw
	Golden Tilefish	F_{MSY}	0.185	$75\%*SSB_{MSY}$	22.6 mt	0.07	No	No	1,242,000	715,000	2015	Tier 1	ACL = Yield 75% F_{MSY}	560,490 gw
	Goliath Grouper	$F_{40\%SPR}$	UNK	$(1-M)*SSB_{40\%SPR}$	UNK	0.13	No	UNK	UNK	0	1990	Decision Tree	ACL = ABC	0
	Gray Triggerfish	$F_{30\%SPR}$	UNK	$(1-M)*SSB_{30\%SPR}$	UNK	0.3	No	UNK	UNK	717,000	2015	ORCS	ACL = ABC	717,000
	Greater Amberjack	F_{MSY}	0.424	$(1-M)*SSB_{MSY}$	3.21 mp	0.25	No	No	2,005,000	1,968,000	2015	Decision Tree	ACL = ABC	1,968,000
	FLK/EFL Hogfish	F_{MSY}	0.138	$(1-M)*SSB_{MSY}$	856.664 mt	0.13	Yes	Yes	48,026	38,367	2017	Tier 1	ACL = ABC	38,367
	GA-NC Hogfish	$F_{30\%SPR}$	UNK	$(1-M)*SSB_{30\%SPR}$	UNK	0.13	UNK	UNK	UNK	28,161	2017	ORCS	ACL = 95% ABC	26,753
	Mutton Snapper	$F_{30\%SPR}$	0.34	$(1-M)*SSB_{MSY}$	12.35 mp	0.21	No	No	1,515,300 (GM+SA)	926,600	2012	Tier 1	ACL = ABC	926,600
	Nassau Grouper	$F_{40\%SPR}$	UNK	$(1-M)*SSB_{40\%SPR}$	UNK	0.18	No	UNK	UNK	0	1992	Decision Tree	ACL = ABC	0
	Red Grouper	F_{MSY}	0.221	$75\%*SSB_{MSY}$	4.29 mp	0.2	No	No	865,000	780,000	2014	Tier 1	ACL = ABC	780,000
	Red Porgy	F_{MSY}	0.17	$(1-M)*SSB_{MSY}$	6.72 mp	0.225	No	Yes	400,000	354,000	2016	Tier 1	ACL = ABC	354,000
	Red Snapper	F_{MSY}	0.178	$(1-M)*SSB_{MSY}$	317,500 lbs	0.25	Yes	Yes	109,000 fish	114,000 fish	2015	Tier 1	ACL = Formula Am 24	0
	Scamp	$F_{30\%SPR}$	UNK	$(1-M)*SSB_{30\%SPR}$	UNK	0.15	No	UNK	UNK	335,744	2015	ORCS	ACL = ABC	335,744
	Snowy Grouper	F_{MSY}	0.05	$75\%*SSB_{MSY}$	3.50 mp	0.12	Yes	Yes	129,503	102,960	2013	Tier 1	A	
	Speckled Hind	F_{MSY}	UNK	$(1-M)*SSB_{MSY}$	UNK	0.13	Yes	UNK	UNK	0	2010	Decision Tree	A	

Attachment 31

Review of SEDAR Stock Assessment Information

Assessment Information					Sampling Levels (Avergaes from last 5 years)				Average Landings Last 5 Years (lbs ww)		
Last SEDAR	Next SEDAR	Non-SEDAR	Terminal Year of Data	Time Since Terminal	MARMAP/SEFIS /SEAMAP	Num of Indices	Avg # Dep Samples Per Yr	Avg # Age Samples Per Yr	Commercial	Recreational	Total
NA	NA	NA	NA	NA	SM	1	99	0	25,449	272,360	297,810
NA	NA	NA	NA	NA	NA	0	9	0	4,539	5,376	9,915
SEDAR 19 (2010)	Benchmark (2016)	NA	2008	8	NA	0	130	94	56,473	34,052	90,525
Update (2013)	NA	NA	2010	6	Chevron	1	6,754	2,283	441,070	595,960	1,037,031
SEDAR 32 (2013)	Update (2017)	NA	2011	5	S-B LL	1	1,197	765	273,593	140,271	413,864
Update (2014)	NA	NA	2012	4	Chevron, S-B LL	2	1,276	665	445,117	201,960	647,077
SEDAR 25 (2011)	Update (2016)	NA	2010	6	L-B LL	1	1,285	1,095	557,038	13,125	570,163
SEDAR 23 (2011, Rejected)	Benchmark (2016)	NA	2009	7	NA	0	0	0	0	1	1
NA	Benchmark (2016)	YPR (2011)	2009	7	Chevron	1	4,306	314	359,861	394,915	754,776
SEDAR 15 (2008)	NA	NA	2006	10	S-B LL	1	862	117	976,649	719,224	1,695,873
SEDAR 37 (2013)	NA	NA	2012	4	REEF, RVC	9	250	29	12,573	177,369	189,942
NA	NA	NA	NA	NA	NA	0	168	22	27,892	6,970	34,862
Update (2015)	NA	NA	2013	3	NA	0	897	605	76,881	488,119	565,000
NA	NA	NA	NA	NA	NA	0	0	0	0	0	0
SEDAR 19 (2010)	Update (2017)	NA	2008	8	Chevron, S-B LL	2	152	108	202,196	92,879	295,075
Update (2012)	Benchmark (2016)	NA	2011	5	Chevron, S-B LL	2	413	126	167,253	77,122	244,375
SEDAR 24 (2010)	Benchmark (2016)	NA	2009	7	Chevron	1	1,837	561	190,471	489,173	679,644
NA	Benchmark (2016)	Catch Curve (2001)	1999	17	Chevron, S-B LL	2	1,072	683	173,092	54,431	227,522
SEDAR 36 (2014)	NA	NA	2012	4	Chevron, S-B LL	2	869	306	91,120	59,701	150,821
NA	NA	Catch Curve (2011)	2007	9	Chevron, S-B LL	2	3	2	1,239		
Update (2012)	Update (2015)	NA	2011	5	Chevron	1	8,622	3,224	966,019		

Attachment 31

Review of SEDAR Stock Assessment Information

- Revised evaluation of overfishing frequency for 14 stocks (and 27 ABC recommendations)
  - Snapper/Grouper Complex

Stock	% Recreational	Assessment type	Assessment period	Source document
Red porgy	16-87%	Age-based	1972-2011	SEFSC 2012a
Vermilion snapper	17-100%	Age-based	1946-2011	SEFSC 2012b
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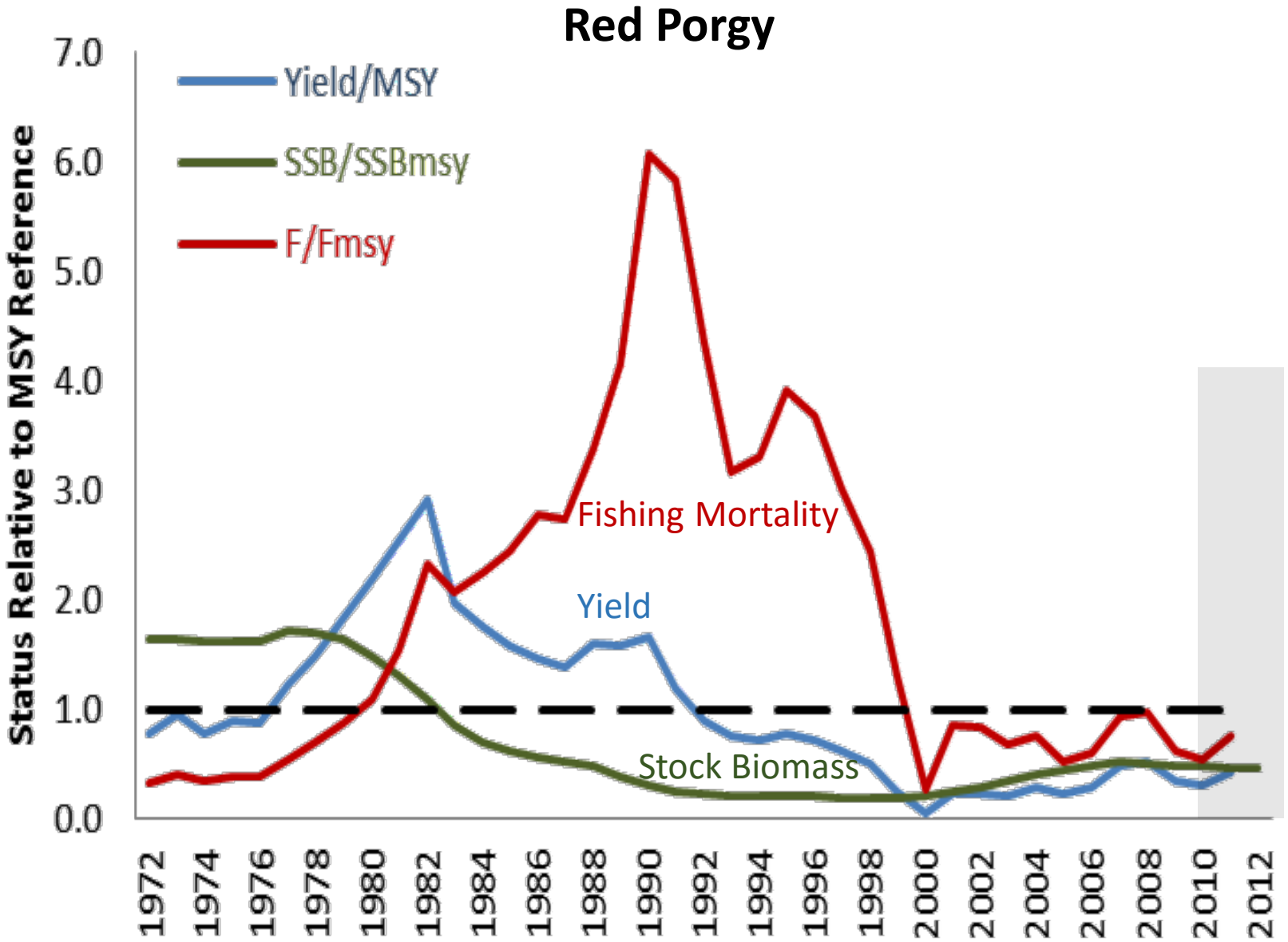
Black sea bass	41-84%	Age-based	1978-2012	SEFSC 2013

(from Cadrin 2016)

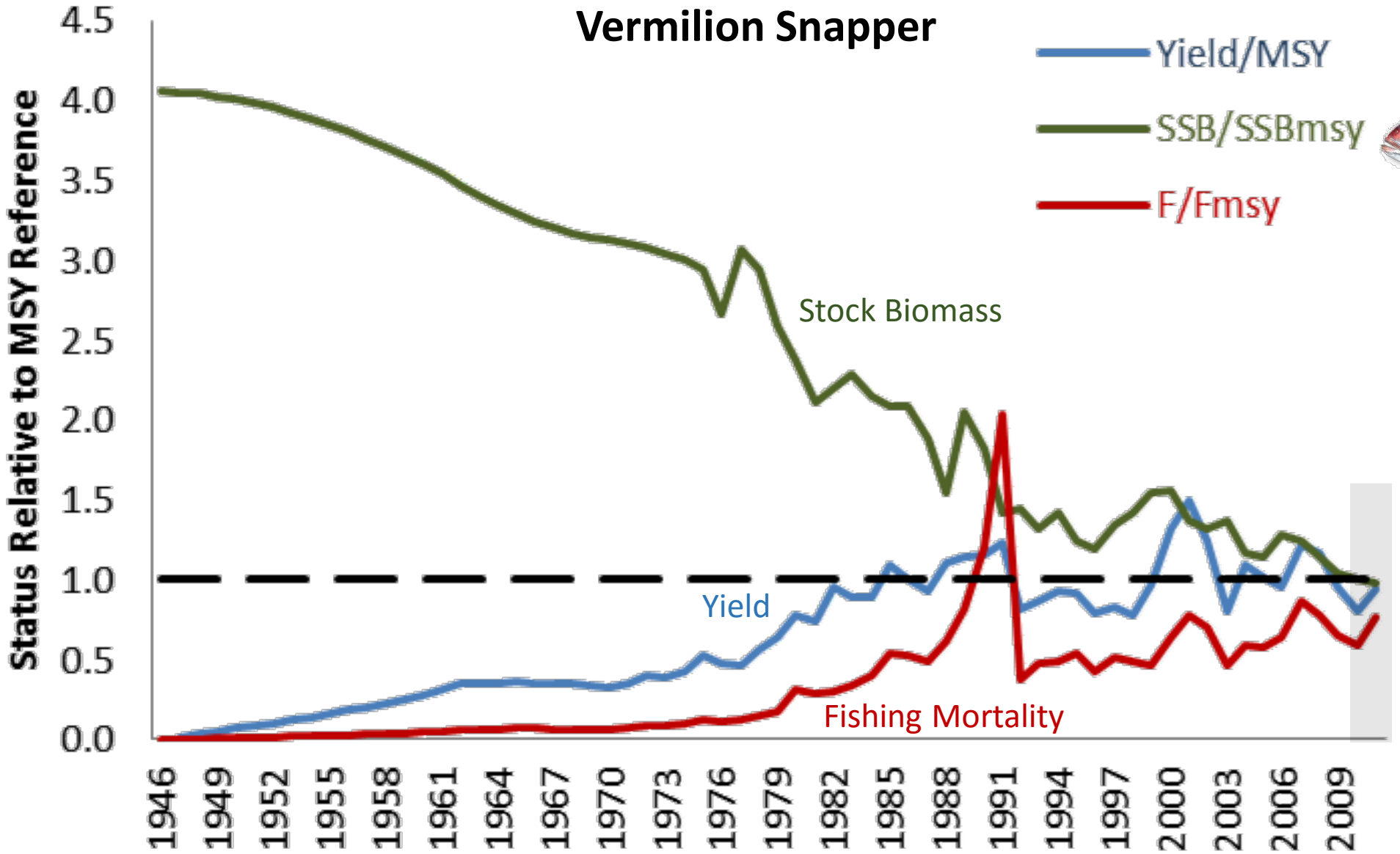
    - Red Snapper 1950-2014 SEDAR41
    - Hogfish (FLK/EFL) 1986-2012 SEDAR37
    - Golden Tilefish 1962-2010 2016 update
    - Yellowtail Snapper 1980-2010 FWRI 2012
    - Wreckfish 1987-2010 Butterworth & Rademeyer 2014
  - Coastal Migratory Pelagics
    - King Mackerel 1901-2011 SEDAR38
    - Spanish Mackerel 1950-2011 SEDAR28
    - Cobia 1950-2011 SEDAR28 (from Attachment 31)

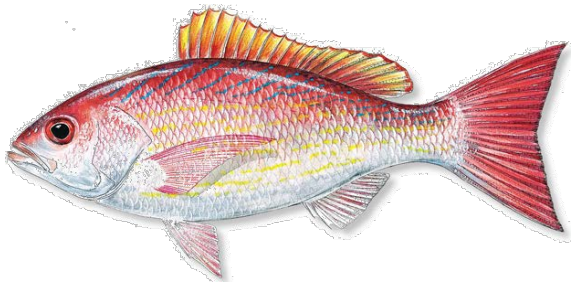
Review of SEDAR Stock Assessment Information



- 0/2 ABCs led to overfishing.
- No rebuilding
- Yield<< MSY because of rebuilding plan.

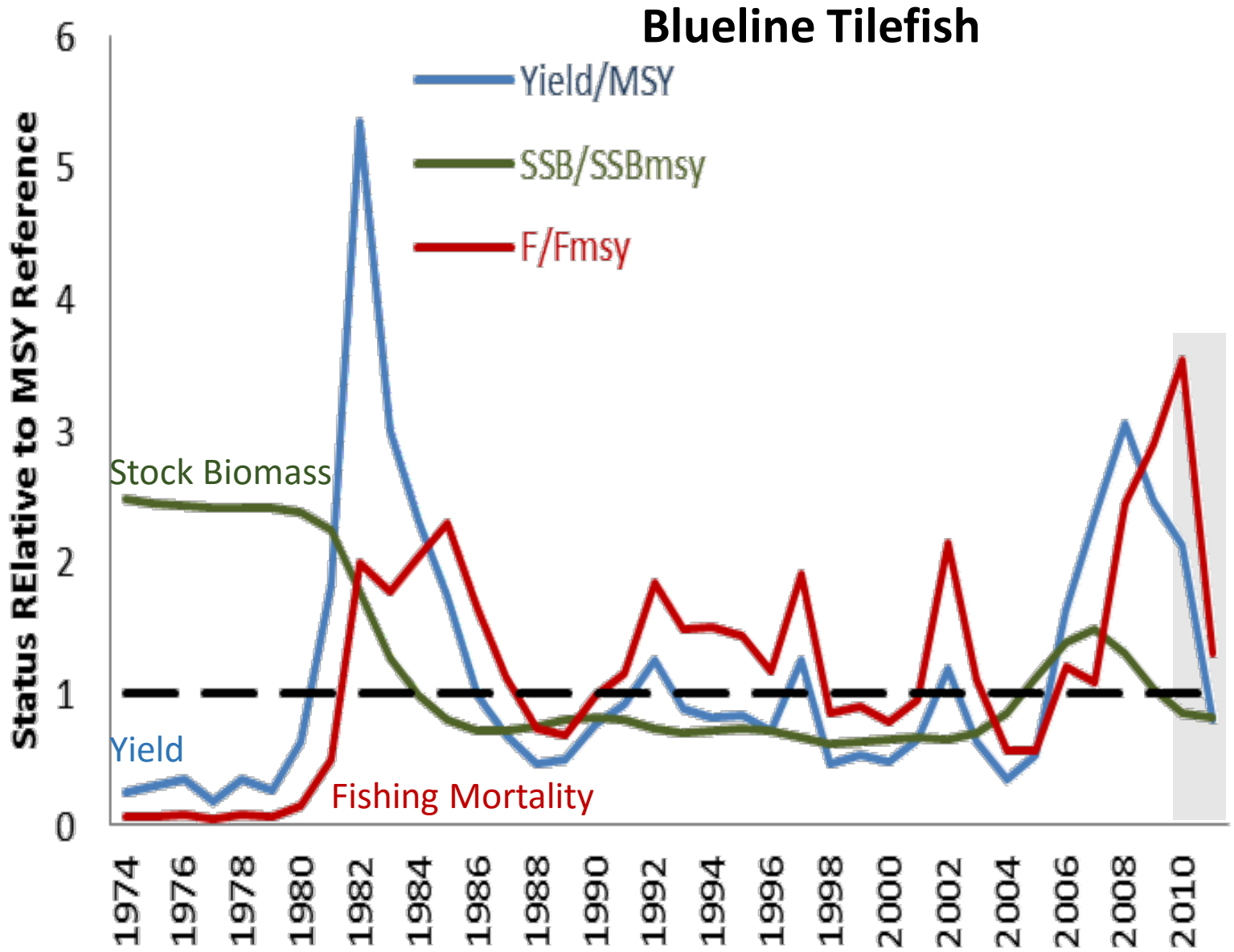
Review of SEDAR Stock Assessment Information





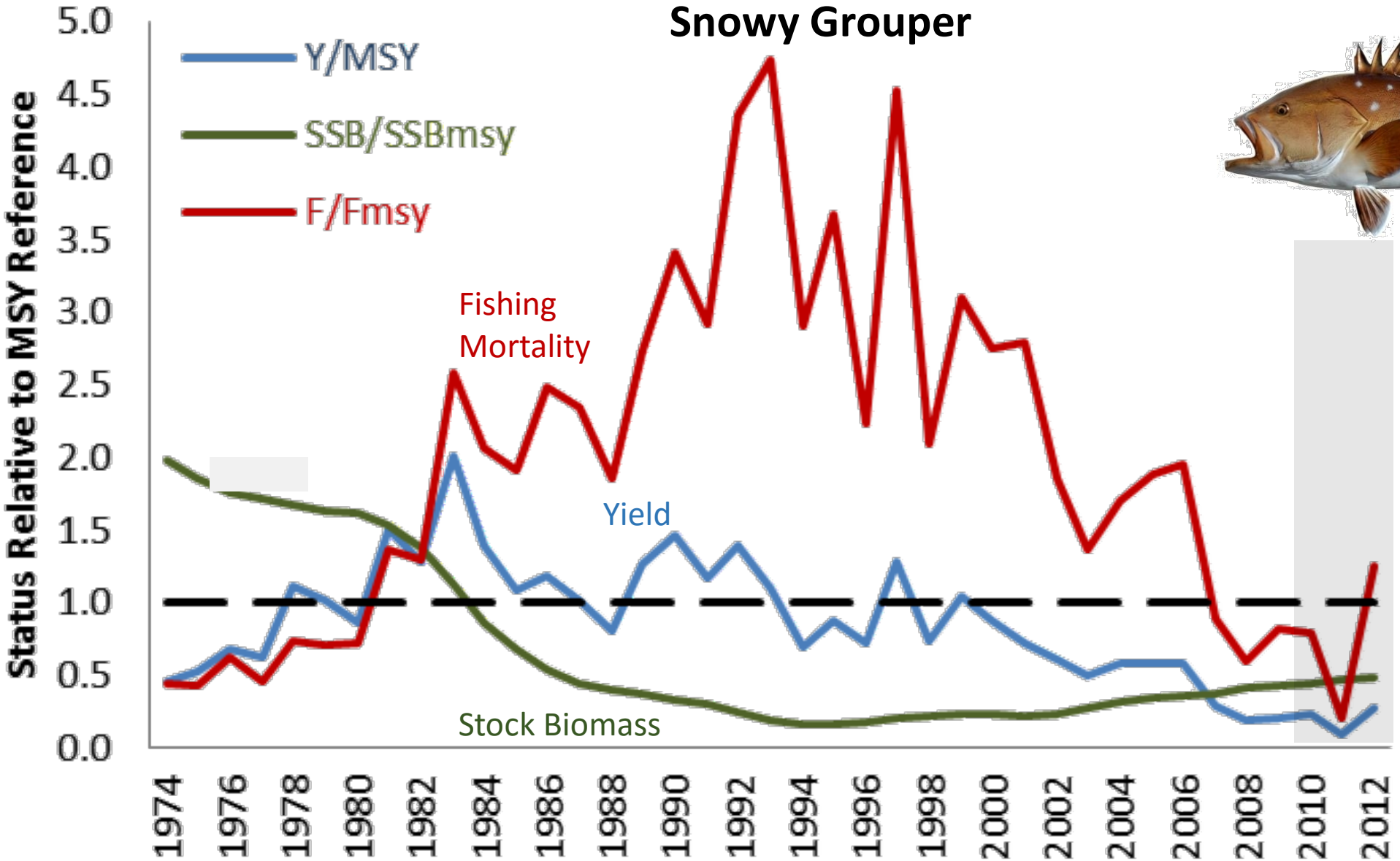
- 0/2 ABCs led to overfishing.
- Rebuilding N/A
- Yield~MSY

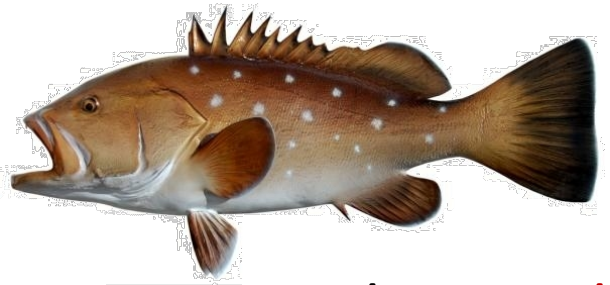
Review of SEDAR Stock Assessment Information



- Revised assessment from level 5 to level 2
- 2/2 data-poor ABCs led to overfishing.
- Rebuilding N/A
- Yield~ACL
  - 2010 yield>>MSY
  - 2011 yield<MSY

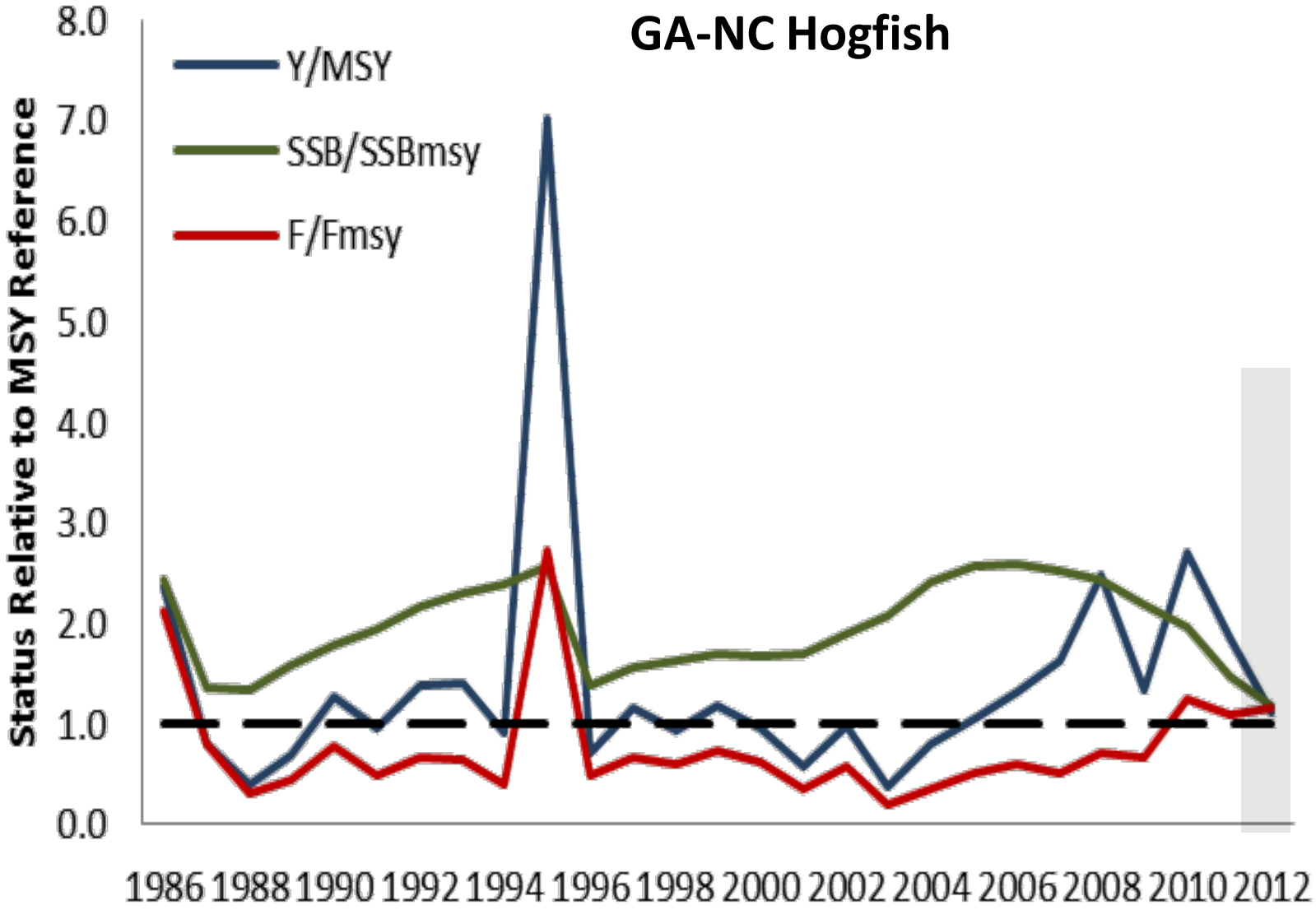
Review of SEDAR Stock Assessment Information





- 1/3 (or 0/2*) ABCs led to overfishing.
- Slight rebuilding
- Yield<< MSY because of rebuilding plan.
- *2012 yield>ACL

Review of SEDAR Stock Assessment Information



- Combined-stock ABC in 2012
- 1/1 (or 0/0*) ABC led to overfishing.
- Rebuilding N/A
- Yield~MSY
  - *2012 yield>ACL

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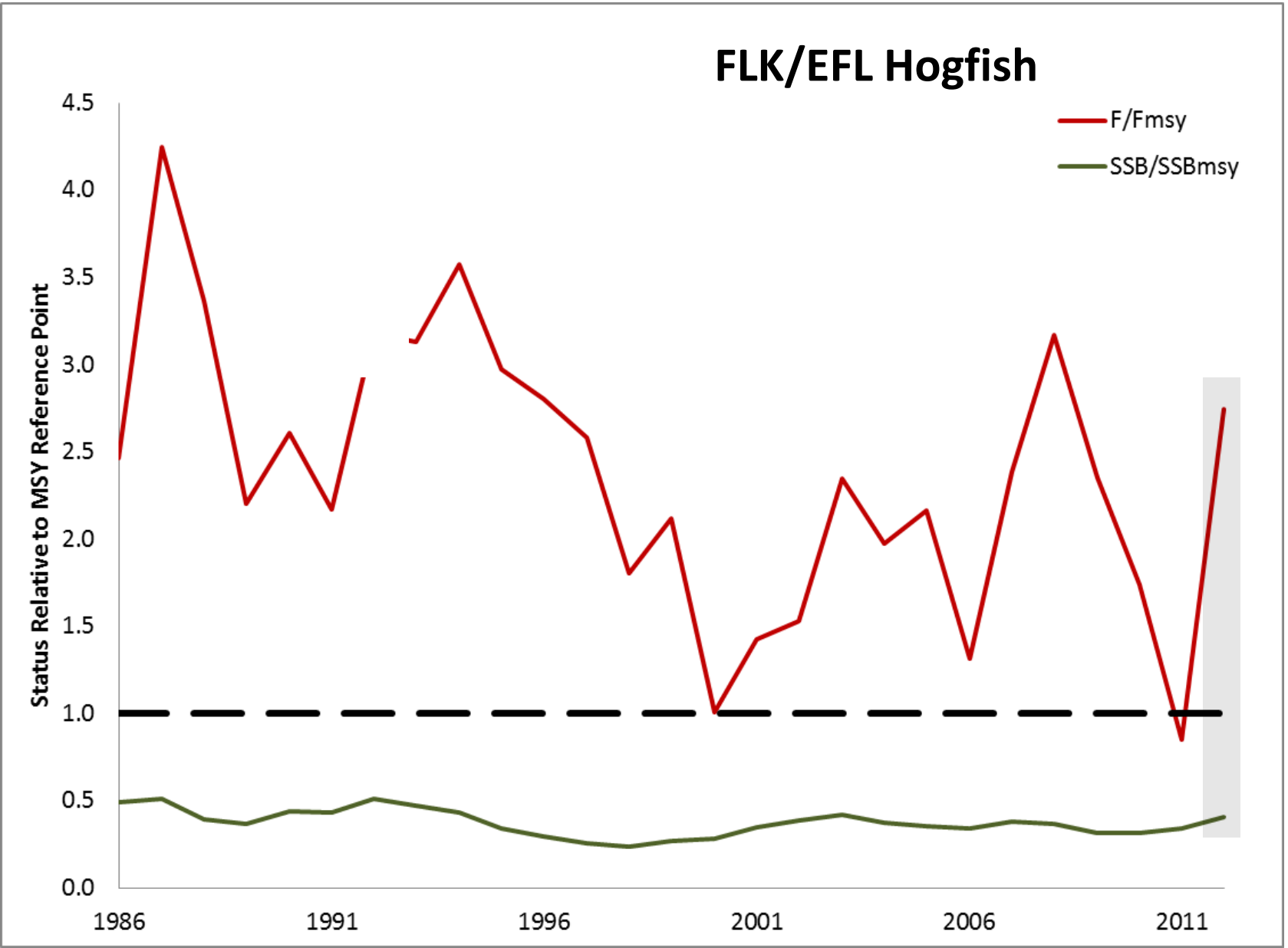

- Combined-stock ABC in 2012
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- Rebuilding N/A
- Yield~MSY
  - *2012 yield>ACL

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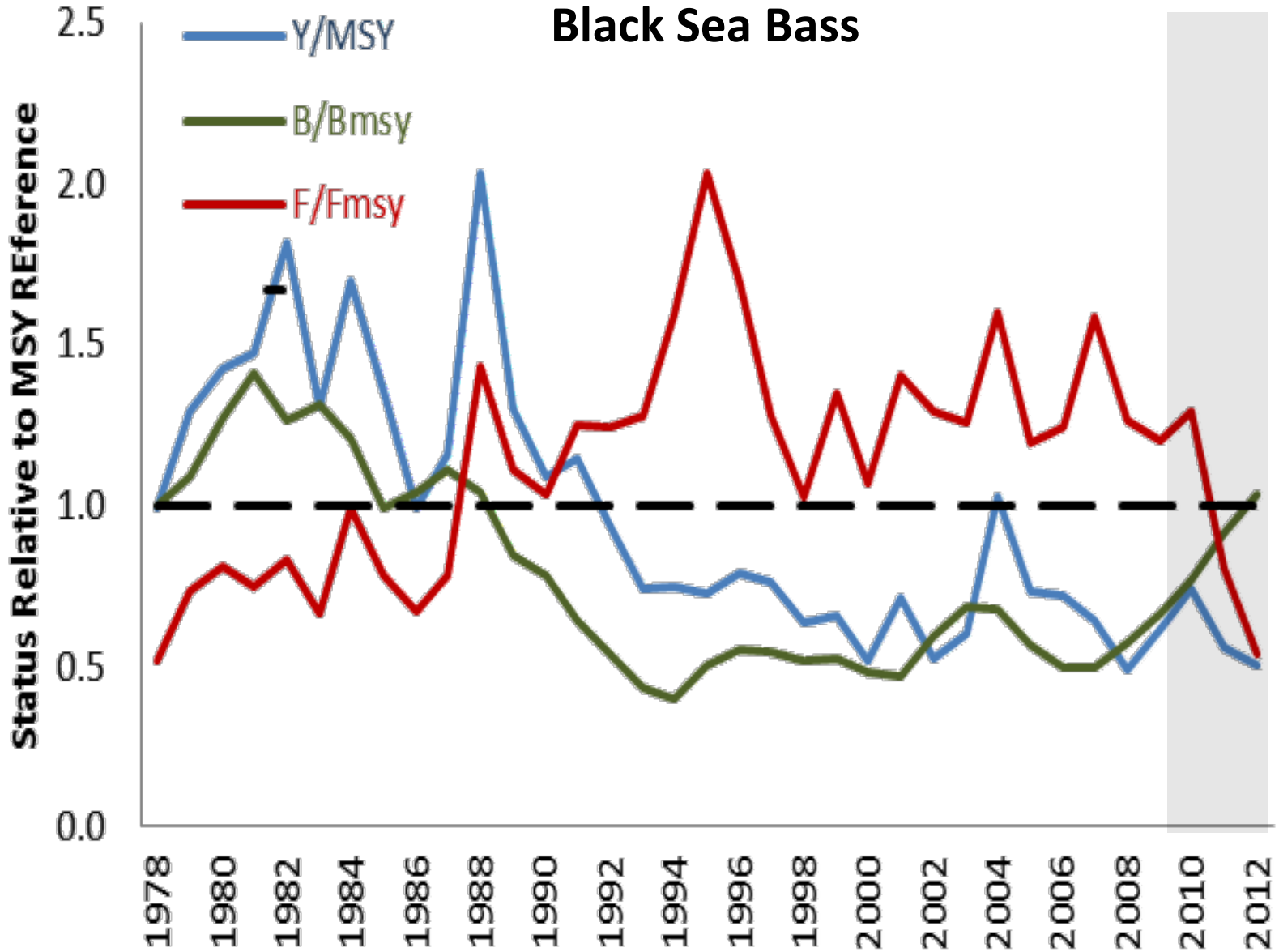

- 1/3 (or 0/2*) ABCs led to overfishing.
- Successful rebuilding
- Yield<<MSY because of rebuilding plan.
  - *2010 yield>>ACL

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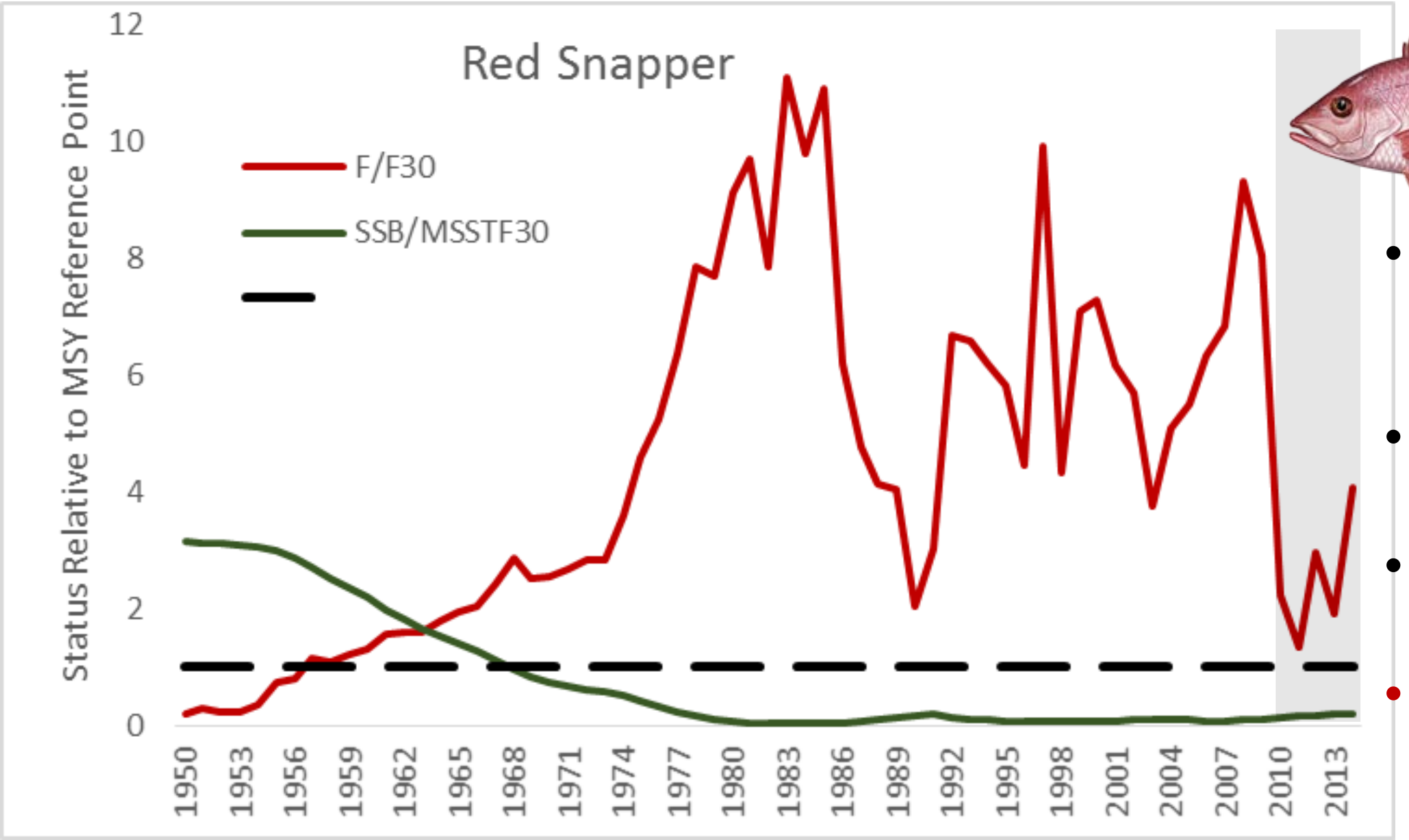
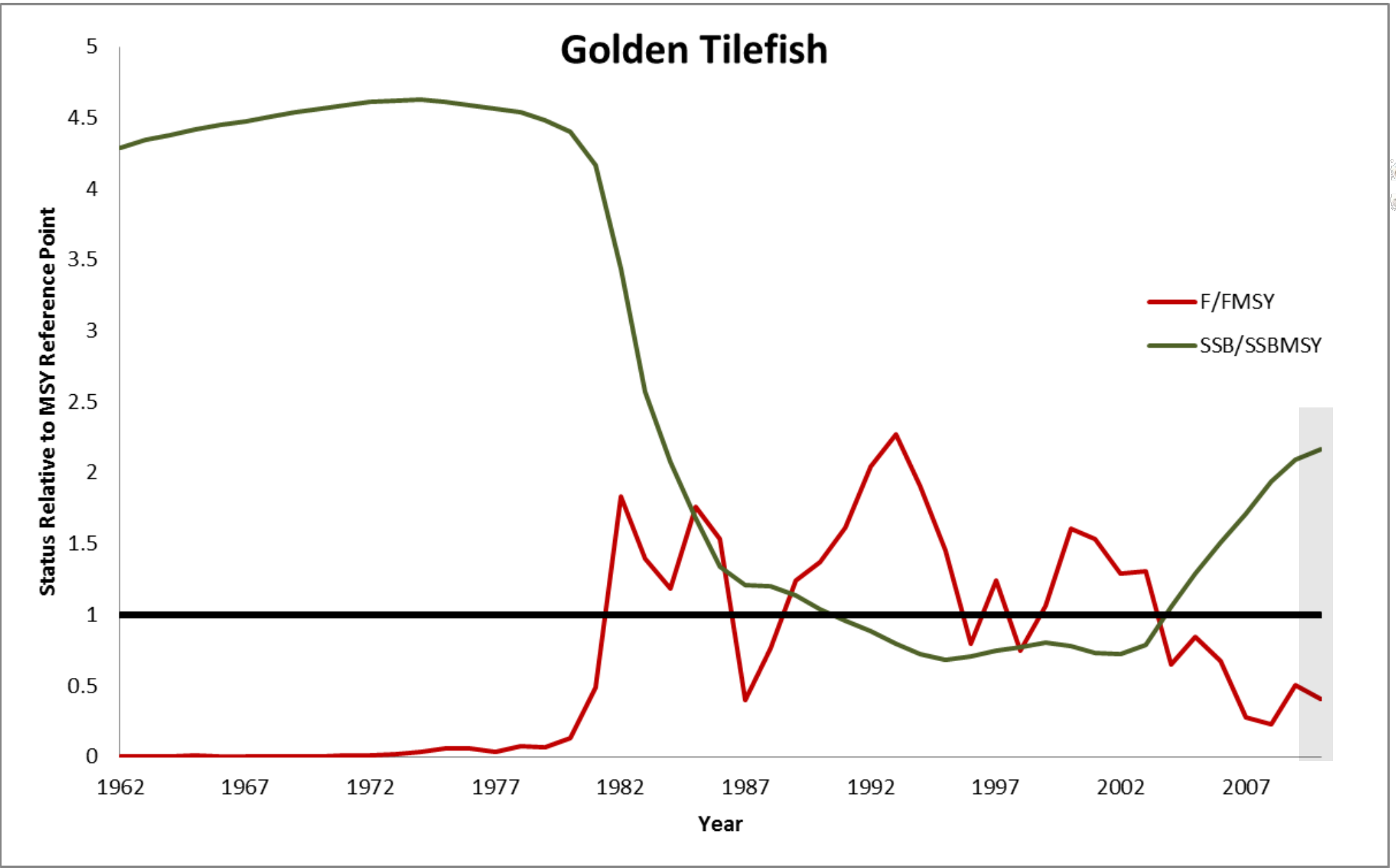
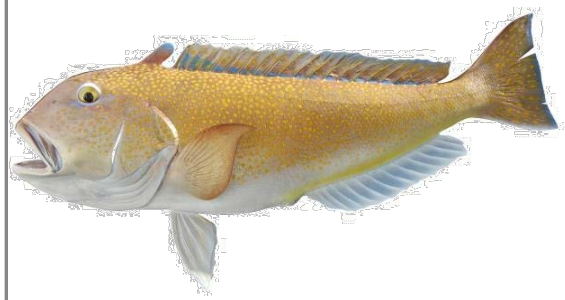


- 5/5 (or 4/4*) ABCs led to overfishing.
- Slight rebuilding
- Rebuilding plan
- * 2014 Yield>ACL

SEDAR41

Review of SEDAR Stock Assessment Information





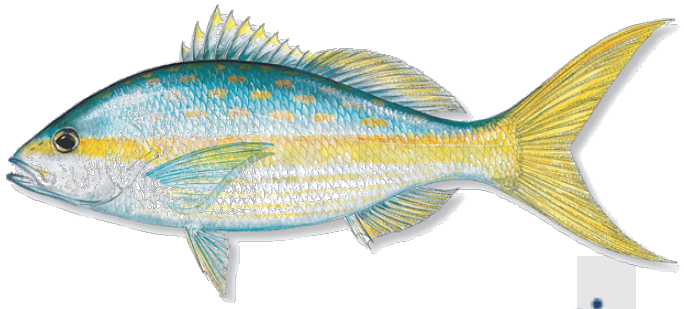
- 0/1 ABC led to overfishing.
- Rebuilding N/A
- (2016 update indicates 3/5 ABCs led to overfishing)

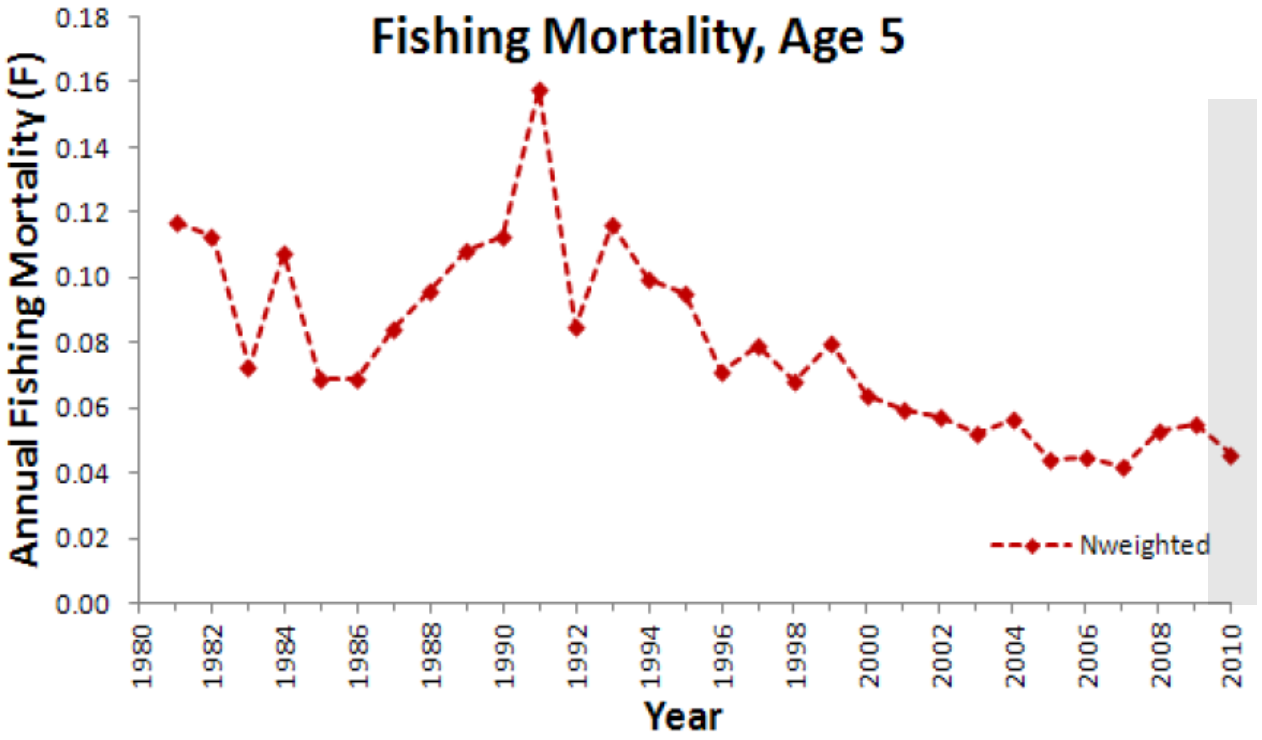
Attachment 32

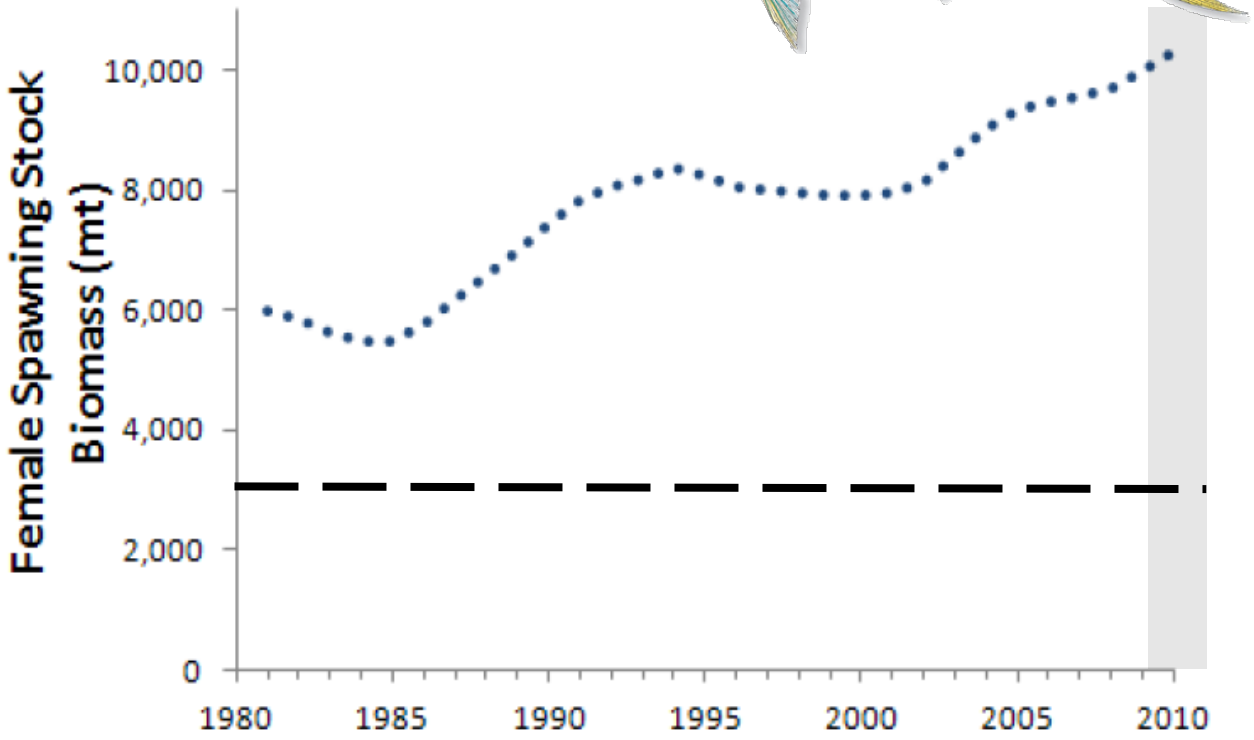
Review of SEDAR Stock Assessment Information

Yellowtail Snapper (Fmsy=0.29)

- 0/1 ABC led to overfishing
- Rebuilding N/A





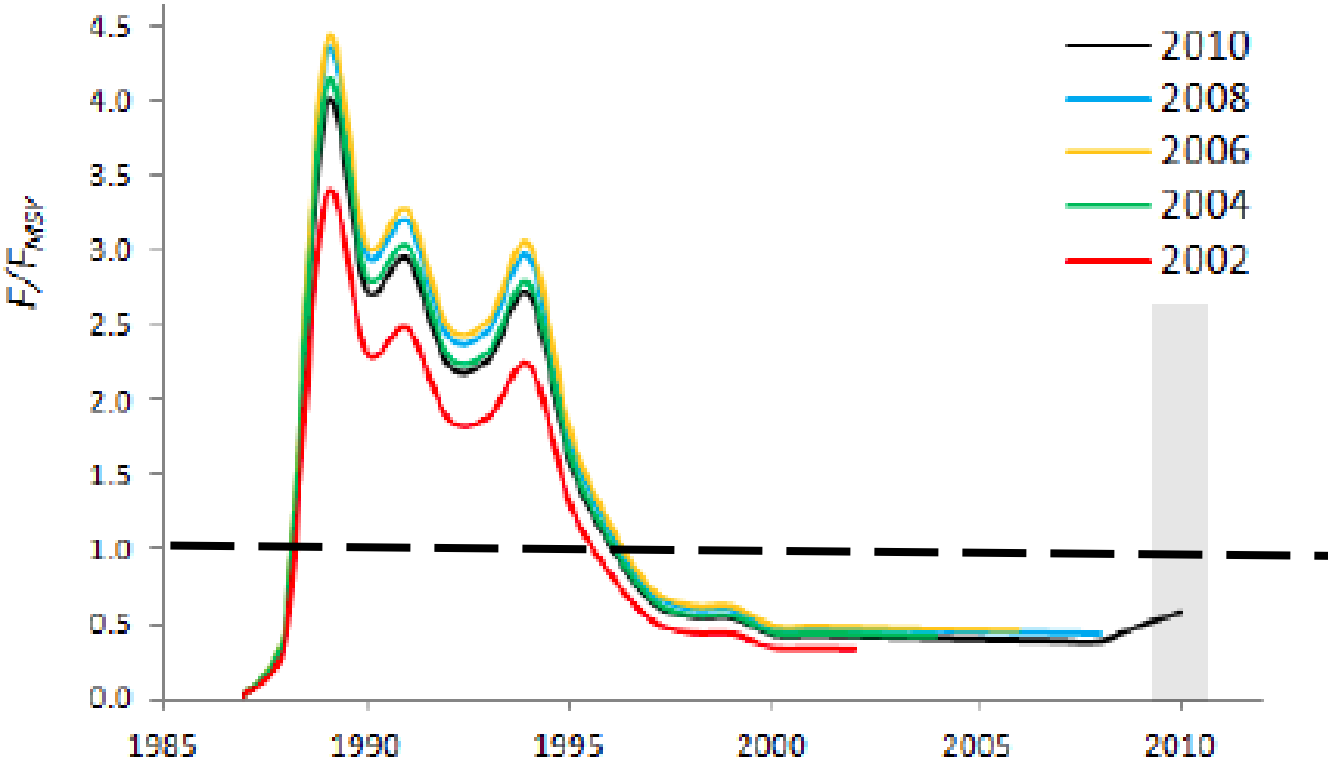


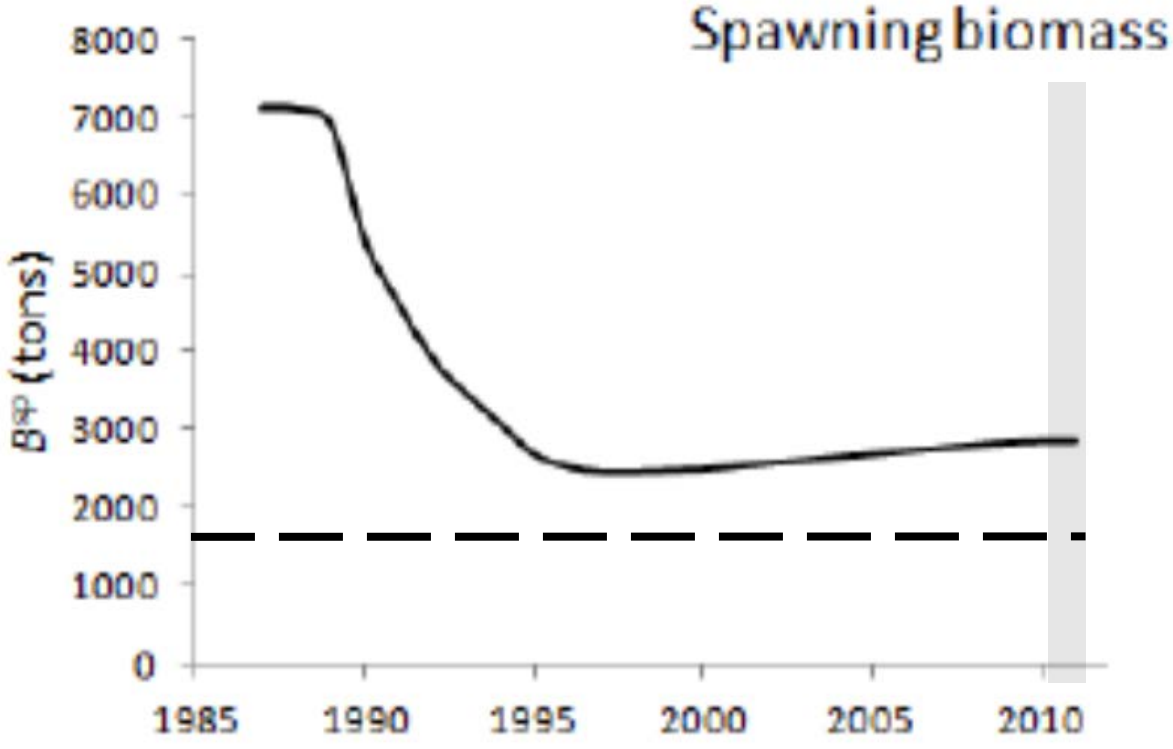
Attachment 32

Review of SEDAR Stock Assessment Information

Wreckfish

- 0/1 ABC led to overfishing
- Rebuilding N/A

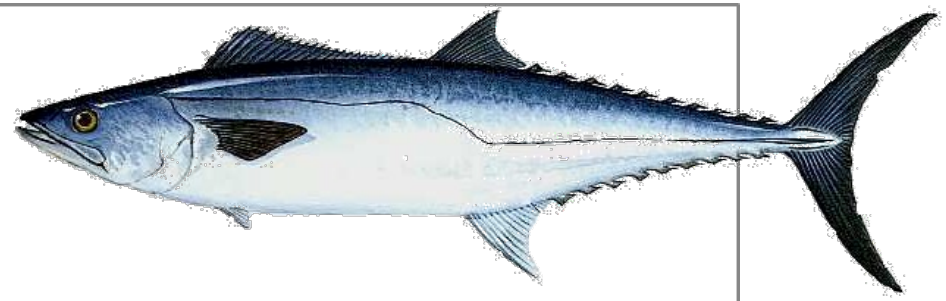




Attachment 32

Review of SEDAR Stock Assessment Information

King Mackerel



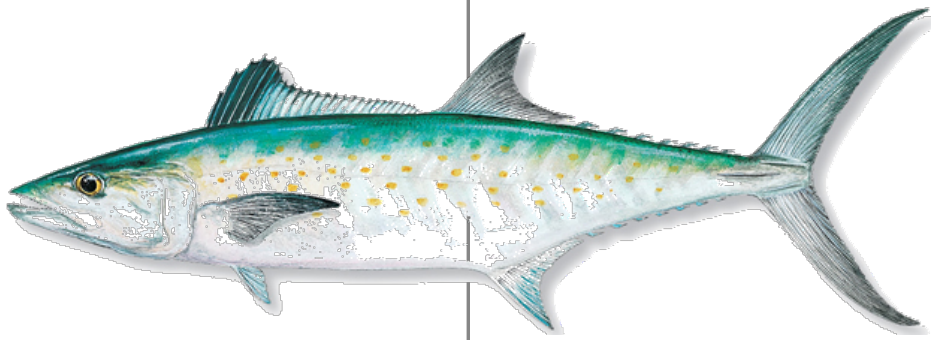
- 0/3 ABCs led to overfishing
- Rebuilding N/A

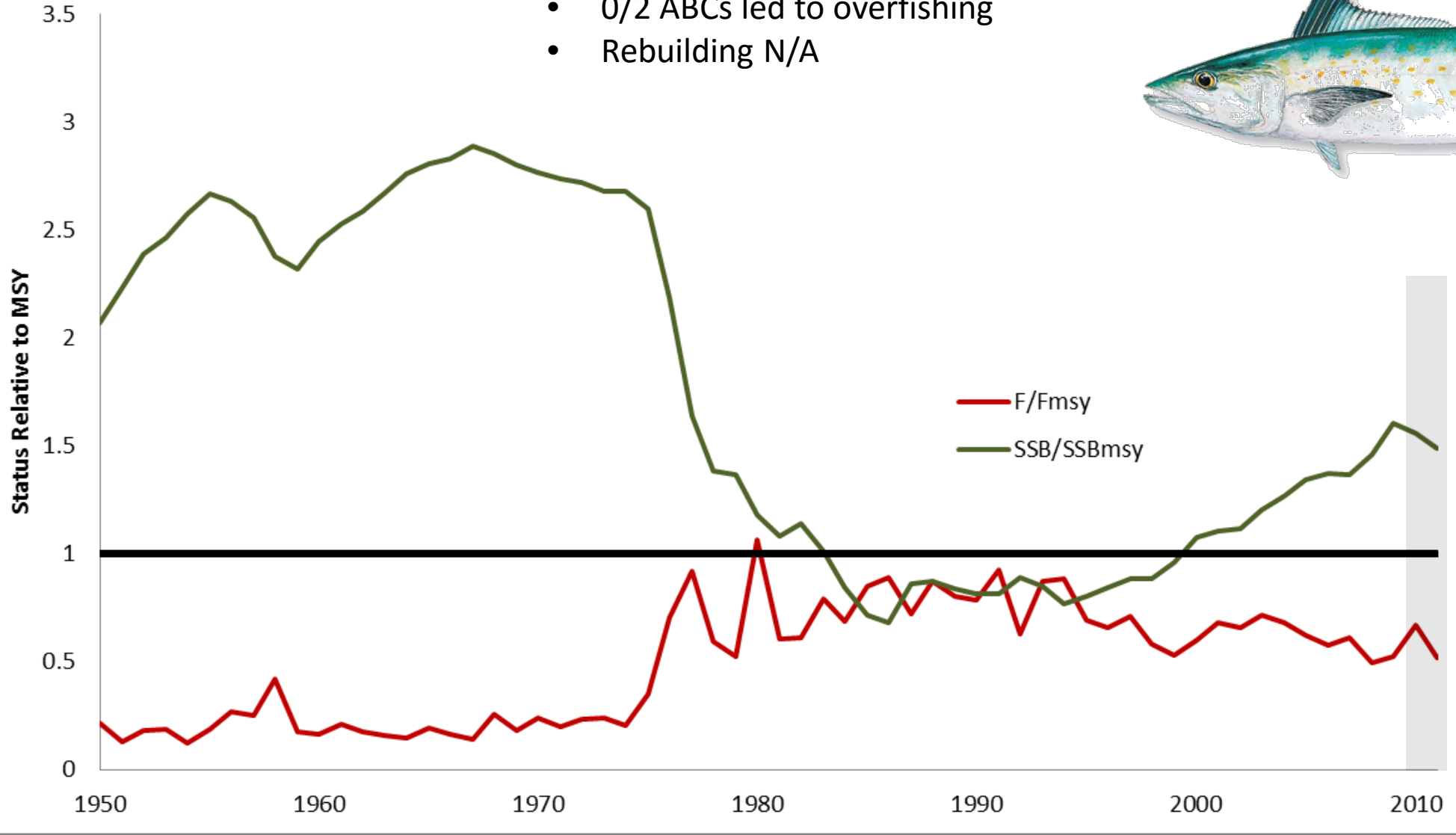
Attachment 32

Review of SEDAR Stock Assessment Information

Spanish Mackerel

- 0/2 ABCs led to overfishing
- Rebuilding N/A



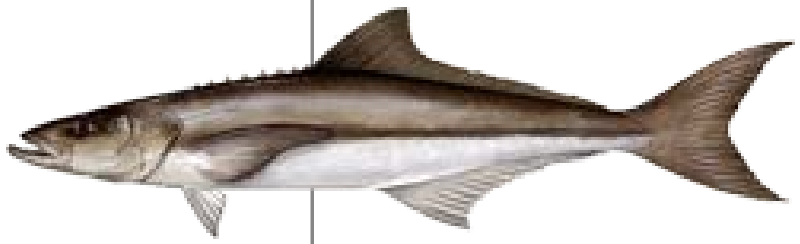


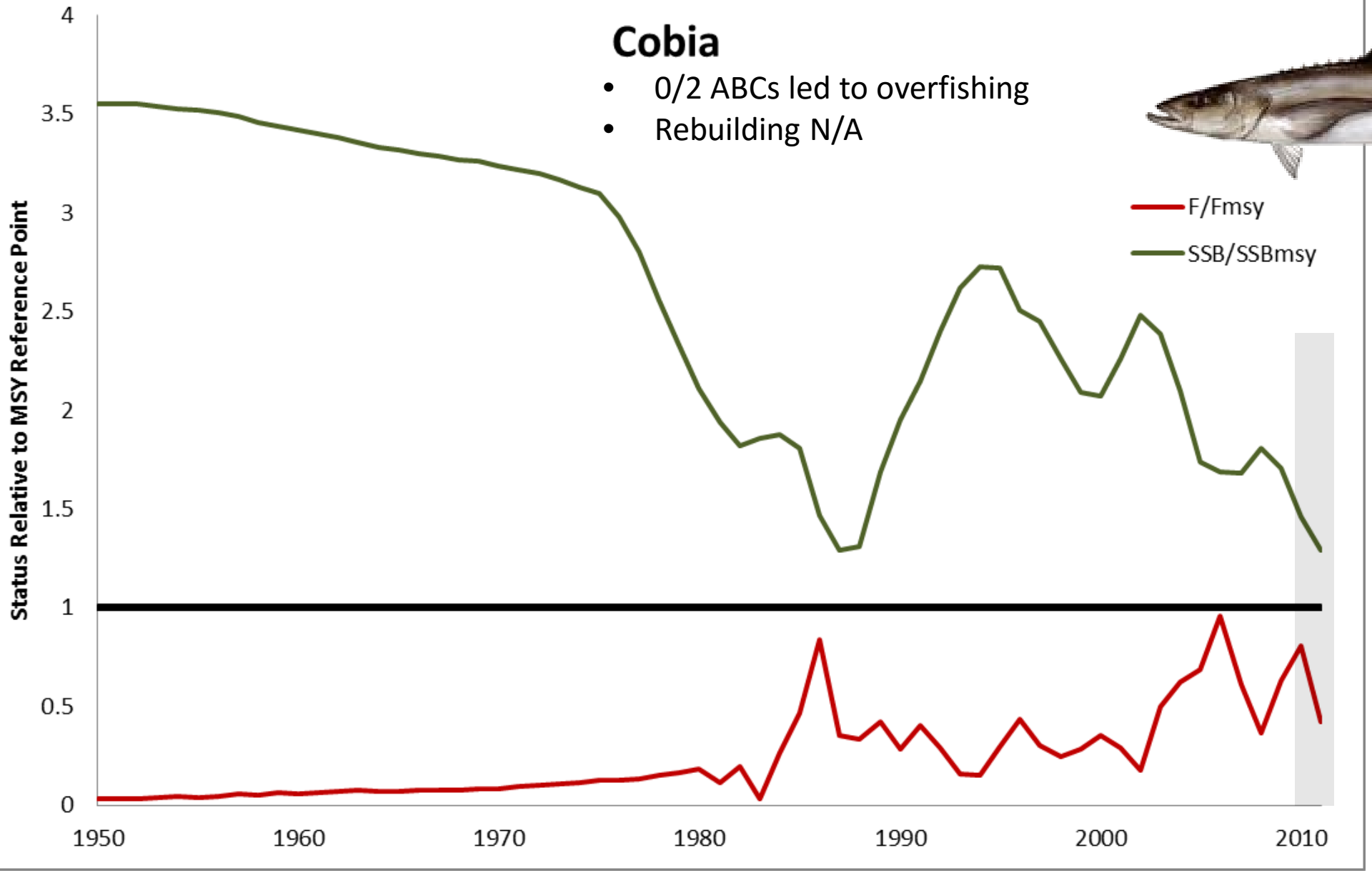
Attachment 32

Review of SEDAR Stock Assessment Information

Cobia

- 0/2 ABCs led to overfishing
- Rebuilding N/A





Attachment 32

Review of SEDAR Stock Assessment Information

- The performance of 27 ABC recommendations for 14 stocks were evaluated by subsequent stock assessments (some with different assessment methods).
- Avoiding Overfishing
  - 41% (11/27) resulted in overfishing
  - Removing cases of overfishing from excessive catch (>ACL, e.g., 2012 snowy grouper, 2012 hogfish, 2012 black seabass, 2014 red snapper) improved the performance to 27% (6/22) which is approximately the expected frequency of P*= 15% to 40%.
  - No overfishing of Coastal Migratory Pelagic stocks, less than the expected frequency
  - 38% (6/16) overfishing of snapper-grouper stocks, approximately the expected frequency
- Rebuilding Stocks
  - ABCs allowed for growth of some overfished stocks (black sea bass, snowy grouper)
  - … but not others (red porgy)

Review of SEDAR Stock Assessment Information

- These preliminary results are insufficient for a definitive evaluation
  - Such evaluations should be updated to accumulate a sufficient number of stocks and ABC recommendations.
  - Evaluations should be expanded to include more performance metrics (e.g., socio-economics).
  - Evaluations assume stock assessments are correct.
  - Management Strategy Evaluation would consider assessment bias and precision

Actions?

- Consider and comment on the ABC Control Rule performance information presented by the sub-committee.
- Provide recommendations on control rule revisions, if appropriate and necessary.
  - Consider removing Stock Status from the ABC Control Rule since NMFS, not the SSC, determines status.
  - Provide guidance on next steps to be taken in considering revisions to the control rule.