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Multispecies ABCs

Science and Statistical Committee
New England Fishery Management Council
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ABC Guidance - Review

- Evaluate stock productivity and assessment uncertainty for each stock
- Use result to determine catch level from AGEPRO catch distribution output
- Rerun AGEPRO with catch level to estimate risk of exceeding desired fishing mortality

Stock Productivity Factors			
Factor	1	2	3
SSB/SSBMSY	Less than 0.5	0.5-1	Greater than 1
Recent recruitment	Below median	Median to average	Above average
Weights at age	Declining/Low	Stable	Increasing/High
Population Age Structure	Narrow/truncated	Mixed	Dispersed/expanded
Geographic Distribution	Stock becoming concentrated		Dispersed throughout range
Susceptibility			

Assessment Uncertainty Factors			
Factor	1	2	3
Type of Assessment	Index/None	SPM	Age-based (VPA, SCAA, etc.)
Historic Assessment Performance	Poor: estimates of F or B highly variable; predicted catch does not match realized F	Fair	Good: Assessment provides consistent estimates over time; predicted catches match realized Fs
Retrospective pattern	Pattern strongly over-estimates terminal year B, or under-estimates terminal year F, persistent	Pattern variable or minor	Minimal or no pattern
Amount of projected catch based on a recruitment assumption	Over 25%	10%-25%	Less than 10%

S t o c k P r o d u c t i v i t y	3	ABC = 10% Fcontrol rule 10% Freb	ABC=25% of Fcontrol rule Or 25% of Freb	ABC= Fcontrol rule Or ABC=Median catch at Freb
	2	ABC = 10% Fcontrol rule or 10% Freb	ABC=25% of Fcontrol rule Or 25% of Freb	ABC=25% of Fcontrol rule Or 25% of Freb
	1	ABC = 1% Fcontrol rule or 1% Freb	ABC = 10% Fcontrol rule or 10% Freb	ABC = 10% Fcontrol rule or 10% Freb
		1	2	3
	Assessment Uncertainty			

Test of Approach

- Apply proposed ABC framework to several stocks using GARM II assessment results
- Compare resulting TACs to actual catches and GARM III assessment results to determine if approach would have prevented overfishing
- Stocks used: GB cod, GOM cod, CC/GOM yellowtail flounder

Problems Interpreting Test

- Changes in assessment models and formulations from GARM II to GARM III
- GARM II did not correct for retrospective pattern; GARM III attempted to address retrospective patterns
- Changes in fully-recruited ages from GARM II to GARM III

GOM Cod ABC Approach

- Stock productivity average: 1.7
- Assessment uncertainty average:
– 2.5/2.25/2/2
- Selected percentile: 10%

YEAR	1%	5%	10%	25%	50%
2005	6.135	7.013	7.562	8.322	9.301
2006	3.296	3.718	4.053	4.496	5.146
2007	5.089	5.971	6.671	8.076	10.020
2008	6.246	7.092	7.717	8.871	10.491
2009	6.310	7.306	7.938	9.159	10.839

GOM Cod Results

- Run projection forward using ABC TACs (10th percentile from projection)
- Compare to GARM III results and GARM II projection using actual catch

Year	Projected F (4-5)	Projected SSB	ABC TAC	Actual Catch
2005	0.58	23.9 (19.4 - 30.0)	7.562	5.64
2006	0.18 (0.13-0.23)	35.5 (25.3 - 40.0)	4.053	4.53
2007	0.14 (0.09 - 0.23)	46.7 (32.5 - 69.0)	6.671	5.63

Year	GARM III F (5-7)	GARM III SSB	Expected F
2005	0.63	11	0.31 (0.25 -0.40)
2006	0.58	19.1	0.17 (0.13 - 0.23)
2007	0.46	33.9 (29.1 - 41.7)	0.11 (0.07 - 0.17)

CC/GOM Yellowtail (1) ABC Approach

- Stock productivity average: 2
- Assessment uncertainty average:
– 1.5/1.25/1.25/1.25
- Selected percentile: 10%

YEAR	1%	5%	10%	25%	50%
2005	0.724	0.846	0.901	1.044	1.234
2006	0.408	0.456	0.497	0.564	0.650
2007	0.841	0.900	0.934	0.997	1.078
2008	0.936	1.041	1.113	1.249	1.406
2009	0.398	0.450	0.484	0.541	0.608

CC/GOM Yellowtail (1) Results

- Run projection forward using ABC TACs (10th percentile from projection)
- Compare to GARM III results and GARM II projection with actual catch

Year	Projected F (4-5)	Projected SSB	ABC TAC	Actual Catch
2005	0.75	1.3 (1.0 - 1.8)	0.901	0.997
2006	0.19 (0.14 - 0.26)	2.0 (1.5 - 3.0)	0.407	0.62
2007	0.214 (0.17 - 0.26)	3.7 (3.0 - 4.9)	0.934	0.627

Year	GARM III F (4-5)	GARM III SSB	Expected F
2005	1.53	0.796	0.57 (0.41 - 0.87)
2006	1.01	1.1	0.23 (0.15 - 0.34)
2007	0.41 (.31 - .52)	1.92 (1.6 - 2.4)	0.14 (0.10 - 0.170)

CC/GOM Yellowtail (2)

- What if GARM II assessment was adjusted for its retrospective pattern using the Mohn's Rho approach developed in GARM III?

Year	ABC TAC	Retro. Adj. TAC	Actual Catch
2005	0.901	0.981	0.997
2006	0.407	0.719	0.62
2007	0.934	1.439	0.627

- Retrospective adjustment results in INCREASED TACs during time period

GB Cod ABC Approach

- Stock productivity average: 1.2
- Assessment uncertainty average:
– 2.25/2.25/2.25/2
- Selected percentile: 10%

YEAR	1%	5%	10%	25%	50%
2005	3.824	4.207	4.413	4.770	5.235
2006	4.974	5.602	5.920	6.636	7.458
2007	5.943	6.841	7.296	8.467	9.822
2008	6.685	7.934	8.604	10.045	11.855
2009	6.371	7.435	8.150	9.535	11.368

GB Cod Results

- Run projection forward using ABC TACs (10th percentile from projection)
- Compare to GARM III results and GARM II projection with actual catch

Year	Projected F (4-8)	Projected SSB	ABC TAC (landings)	Actual Catch
2005	0.24	25.9 (22.8 - 31.3)	4.433	4.401
2006	0.16 (0.12 - 0.21)	39.5 (32.5 - 53.6)	5.92	4.611
2007	0.15 (0.10 - 0.21)	49.3 (38.4 - 71.2)	7.296	5.957

Year	GARM III F (5-8)	GARM III SSB	Expected
2005	0.72	10.6	0.20 (0.16 - 0.24)
2006	0.52	14.3	0.12 (0.09 - 0.16)
2007	0.3	17.7	0.12 (0.08 - 0.16)

GB Cod (2)

- What if GARM II assessment was adjusted for its retrospective pattern using the Mohn's Rho approach developed in GARM III?

Year	ABC TAC	Retro. Adj. TAC	Actual Catch
2005	4.433	3.676	4.401
2006	5.92	6.844	4.611
2007	7.296	9.382	5.957

- Retrospective adjustment results in INCREASED TACs during time period

Conclusions

- Proposed method would not have ended overfishing if used with GARM II assessments
- Mohn's Rho adjustment can alter ABCs in the wrong direction
- Difficult to assess projection when assessment changes

Stocks Without Projections

- Determine median exploitation during period of increasing or stable biomass
- Apply to recent biomass estimate

Questions?