Gag Projections

Prepared by NMFS Southeast Fisheries Science Center

Issued: 23 May 2014

1 Description of projections

This report describes gag projections requested in a memorandum dated 12 May 2014 from Bob Mahood to Dr. Bonnie Bonwith (see Appendix).

In these projections, the methods were identical to those described in the 2014 update assessment report, with the exception that the interim period (2013, 2014) prior to new management (2015) was fitted to current landings, whereas the previous projections applied the current fishing mortality rate. This entailed first obtaining the estimates of 2013 landings, and second developing a reasonable approximation of 2014 landings.

For 2013, estimates of landings were obtained from three different sources (Table 1). An estimate of total commercial landings was provided by ACCSP. An estimate of headboat landings was provided by analysts of the SRHS. An estimate of MRIP landings was provided by analysts at NMFS-Miami. If landings were provided in whole weight, they were converted to gutted weight using the relationship GW=WW/1.059. The total 2013 landings were estimated to be 497,868 lb GW.

For 2014, estimates of landings were assumed according to the following logic. The commercial landings were assumed equal to the ACL of landings only (326,722 lb GW). The recreational landings were assumed equal to the arithmetic average over the previous three years, 2011–2013. The total 2014 landings were estimated to be 469,048 lb GW.

Two different projections scenarios were considered: P*=0.3 and P*=0.5.

2 Results

Results for P*=0.3 are shown in Table 2. Results for P*=0.5 are shown in Table 3.

3. Comments on projections

As usual, projections should be interpreted in light of the model assumptions and key aspects of the data. Some major considerations are the following (reproduced verbatim from the assessment report):

- In general, projections of fish stocks are highly uncertain, particularly in the long term (e.g., beyond 5–10 years).

- Although projections included many major sources of uncertainty, they did not include structural (model) uncertainty. That is, projection results are conditional on one set of functional forms used to describe population dynamics, selectivity, recruitment, etc.

- Fisheries were assumed to continue fishing at their estimated current proportions of total effort, using the estimated current selectivity patterns. New management regulations that alter those proportions or selectivities would likely affect projection results.

- The projections assumed that the estimated spawner-recruit relationship applies in the future and that past residuals represent future uncertainty in recruitment. If future recruitment is characterized by runs of large or small year classes, possibly due to environmental or ecological conditions, stock trajectories may be affected.

- Projections apply the Baranov catch equation to relate F and landings using a one-year time step, as in the assessment. The catch equation implicitly assumes that mortality occurs throughout the year. This assumption is violated when seasonal closures are in effect, introducing additional and unquantified uncertainty into the projection results.

- The gag projections showed an initial drop in spawning biomass. This was due in part to the $F_{current}$ rate of fishing that exceeds F_{msy}, but occurred primarily because of poor estimated recruitment in 2010 and 2011. Although recruitment events near the end of the time series are typically less informed than those that occur earlier, the data do support that recruitment in these years was poor, as evidenced by a well-defined minimum of a negative log likelihood profile on 2011 recruitment.

Table 1. Estimated gag landings in 2013 (lb gutted weight).

	Commercial	Headboat	General recreational	Total
2013	405,731	14,571	77,566	497,868

Table 2. Projection results with fishing mortality rate such that P*=0.3 starting in 2015. R = number of age-1 recruits (in 1000s), F = fishing mortality rate (per year), S = spawning stock (mt), L = landings expressed in numbers (n, in 1000s) or gutted weight (w, in 1000 lb), D = dead discards expressed in numbers (n, in 1000s) or gutted weight (w, in 1000 lb), ABC=Acceptable Biological Catch (total removals) expressed in numbers (n, in 1000s) or gutted weight (w, in 1000 lb), pr.M = proportion of stochastic projection replicates with SSB≥MSST using the 1-M definition of MSST, and pr.75=proportion of stochastic projection replicates with SSB≥MSST using the 75% definition of MSST. All values except year and probabilities are medians from the stochastic projections.

year	R	F	S(mt)	L(n)	L(w)	D(n)	D(w)	ABC(n)	ABC(w)	pr.sdmsst	pr.sdmsst75
								ABC			
								Total of landings + discards, not ABC			
2013	205	0.18	1700	37	498	14	53	–	–	0.845	0.99
2014	203	0.15	1537	33	469	14	57	–	–	0.511	0.833
2015	202	0.23	1569	47	666	21	90	69	762	0.53	0.748
2016	200	0.23	1634	48	671	21	89	70	769	0.593	0.781
2017	201	0.23	1716	51	713	20	88	73	808	0.67	0.833
2018	202	0.23	1776	53	748	21	89	75	844	0.721	0.866
2019	204	0.23	1803	55	773	21	89	77	870	0.749	0.885
2020	204	0.23	1823	56	792	21	89	78	889	0.766	0.893
2021	203	0.23	1832	57	806	21	90	79	903	0.773	0.9
2022	203	0.23	1839	57	816	21	89	80	914	0.783	0.906

Inserted Note: The Columns ABC above are not ABC but the total of landings + discards. The totals are slightly different due to how landings and discards are estimated and the total is estimated. The SSC specified ABC based on landings and this has been shown above. So the ABC starting in 2015 is 666,000 then 671,000 in 2016 and so on.

Table 3. Projection results with fishing mortality rate such that P*=0.5 starting in 2015. R = number of age-1 recruits (in 1000s), F = fishing mortality rate (per year), S = spawning stock (mt), L = landings expressed in numbers (n, in 1000s) or gutted weight (w, in 1000 lb), D = dead discards expressed in numbers (n, in 1000s) or gutted weight (w, in 1000 lb), ABC=Acceptable Biological Catch (total removals) expressed in numbers (n, in 1000s) or gutted weight (w, in 1000 lb), pr.M = proportion of stochastic projection replicates with SSB≥MSST using the 1-M definition of MSST, and pr.75=proportion of stochastic projection replicates with SSB≥MSST using the 75% definition of MSST. All values except year and probabilities are medians from the stochastic projections.

year	R	F	S(mt)	L(n)	L(w)	D(n)	D(w)	ABC(n)	ABC(w)	pr.sdmsst	pr.sdmsst75
2013	205	0.18	1700	37	498	14	53	50	551	0.845	0.99
2014	203	0.15	1537	33	469	14	57	47	526	0.511	0.833
2015	202	0.27	1569	55	782	25	107	82	898	0.53	0.748
2016	200	0.27	1596	55	765	24	105	81	880	0.558	0.753
2017	200	0.27	1649	57	792	24	104	83	904	0.612	0.796
2018	201	0.27	1683	58	813	24	104	84	924	0.649	0.819
2019	202	0.27	1692	59	825	24	104	85	939	0.668	0.834
2020	202	0.27	1700	60	833	24	105	86	945	0.671	0.839
2021	202	0.27	1701	60	838	24	105	86	951	0.672	0.842
2022	201	0.27	1703	60	842	24	104	86	955	0.675	0.847

Appendix

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May 12, 2014

MEMORANDUM

TO: Bonnie Ponwith

FROM: Bob Mahood *RKM*

SUBJECT: Requests and Actions from the April 2014 SAFMC SSC meeting

This memo is provided to request information necessary to evaluate recommendations of the SSC and to provide notification of other actions taken at the SAFMC Scientific and Statistical Committee meeting of April 28 - May 1, 2014.

1. The SSC accepted the gag stock assessment update, while noting that the projections using average fishing mortality during the interim period (2013 and 2014) result in total removals exceeding both the ACL and recent removals. The SSC requests that revised projections be prepared that are based on removals rather than exploitation during the interim period.

   The assessment update indicates that the management program is successfully restricting the fishery to the ACL. In the most recent year, 2012, total removals were 99% of the ACL, and over the last 3 years removals averaged 107% of the ACL. However, because the projection model is configured to fit landings and estimate associated discards, simply fitting the projections to the total ACL could result in total removals in excess of both ACL and recent removals, although by an amount considerably less than that observed in the projections considered at the meeting. While using actual landings in 2013 to inform the projections is

preferred, such data may not be available at this time for the headboat sector, and some alternative approach would still be required for 2014. After discussions between SEFSC and SAFMC staff, the following guidance is provided for interim period landings: Base commercial landings during 2013 and 2014 on the ACL implemented in Regulatory Amendment 15: 326,722 pounds gw, and recreational landings (all sectors) on the average observed during the last 3 years of the assessment period (2010-2012): 176,630 pounds gw.

- Provide projections of yield and stock conditions for 2013 to 2022, with management changes taking place in 2015, based on P* values of 30% for ABC and 50% for OFL. Report annual landings and discards by sector in both pounds and numbers.
- These projections are requested for consideration by the Council at its June meeting. Briefing materials for this meeting are due to the Council office no later than May 30, 2014.

2. The SSC much appreciated SEFSC staff participation at the April meeting, and notes that assessment and other technical discussions benefitted from in-person interaction between the Committee and SEFSC staff. Therefore, the SSC formally requests that a SEFSC representative of the Beaufort assessment team attend all future SSC meetings. In addition, the SSC requests that this representative have authority to commit to completing SSC requests and tasks that may arise as a result of SSC discussions. Having such authority at the meeting will help to reduce delays that are inevitable with the formal communication path illustrated by this memo.

Please contact John Carmichael if there are any questions regarding this request.

cc: Ben Hartig
Michelle Duval
Luiz Barbieri
Monica Smit-Brunello
Theo Brainerd
Tom Jamir