Black Sea Bass Projections V

Prepared by NMFS Southeast Fisheries Science Center

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1 Description of projections

This report describes black sea bass projections requested in a memorandum dated 13 November 2012 from David Cupka to Dr. Bonnie Bonwith (Appendix). In these projections, fishing mortality rates in 2011 and in 2012 were set to provide the observed level of landings, and in subsequent years, F was set equal to $F_{rebuild}$. Here, $F_{rebuild}$ is defined to be the maximum fishing mortality rate that allows rebuilding in 2016 with probability of 0.625.

The first year of new management in these projections is 2013. Because the terminal year of the SEDAR25 assessment was 2010, these projections required as input the levels of total landings in 2011 and 2012. The 2011 landings were estimated to be 1,047,688 lb whole weight, as documented in the report titled, "Black Sea Bass Projections IV," dated 29 May 2012. However, the estimates of landings in 2012 are currently either preliminary or incomplete. For these projections, these landings were estimated from various sources as follows:

General recreational — The 2012 general recreational landings were obtained by querying the MRIP website (accessed 20 November 2012). The query was for A+B1 landings in weight (lb) and did not include any headboat landings. The 2012 estimate, listed on the website as preliminary, was 378,252 lb.

Headboat — Estimates of 2012 headboat landings were available from the Southeast Regional Headboat Survey database only through June. Consequently, these estimates would not have included a substantial amount of landings between June and the recreational closure in September. Instead, the 2012 headboat landings were estimated by multiplying the 2012 general recreational landings by the current ratio of headboat landing to general recreational landings. This current ratio (0.57) was estimated as the geometric mean of ratios from 2009 (0.59), 2010 (0.55), and 2011 (0.57). Thus, the 2012 headboat landings were estimated to be 378,252 × 0.57 = 215,604 lb whole weight.

Commercial — The 2012 commercial landings were obtained from the SERO quota monitoring website. (accessed 20 November 2012). This estimate included values from January through May 2012, as well as the value for the 2012-2013 fishing year. Those values were converted from gutted to whole weight using the relationship, WW=1.18GW. The 2012 commercial landings were estimated to be 366,494 lb whole weight.

Total 2012 landings — The total 2012 landings was estimated to be the sum of landings from the general recreational, headboat, and commercial fleets, as described above. This total was 960,350 lb whole weight.

2 Results

With 2011 landings (whole weight) equal to 1,047,688 lb and 2012 landings equal to 960,350 lb, $F_{rebuild}$=0.33 allows rebuilding in 2016 with probability of at least 0.625 (Figure 1, Table 1).

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 were based on the calendar year because they are extensions of the assessment model. A shift in the fishing year relative to calendar year may introduce some unquantified disconnect between projection results and management implementation. However, if quotas are reached each year prior to December 31, as might be expected, all fishing mortality within a fishing year would also occur within the same calendar year.
- 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 evenly throughout the year. This assumption is violated when seasonal closures are in effect, introducing additional and unquantified uncertainty into the projection results.
- The 2011 landings were expected to exceed the quota, but at the time of this assessment, the degree of overage is unknown. When that information becomes available, projections may need revision, as results were sensitive to 2011 landings in the $L_{rebuild}$ and $F_{rebuild}$ scenarios. Revised

projections might additionally account for any Accountability Measures implemented in response to exceeding the 2011 quota.

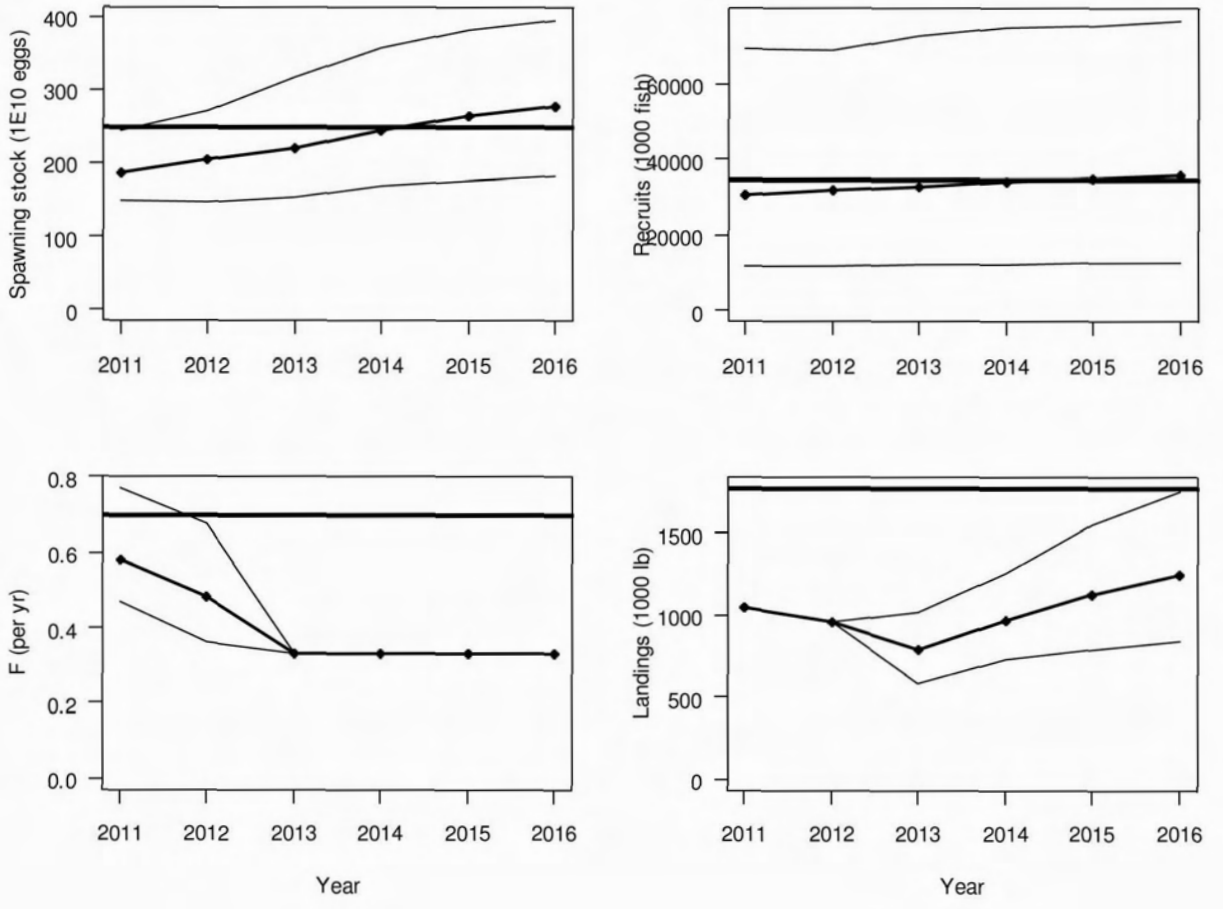
This current set of projections addresses uncertainty in the 2011 overage, as described in the last bullet above. However, it does not include effects of any Accountability Measures.

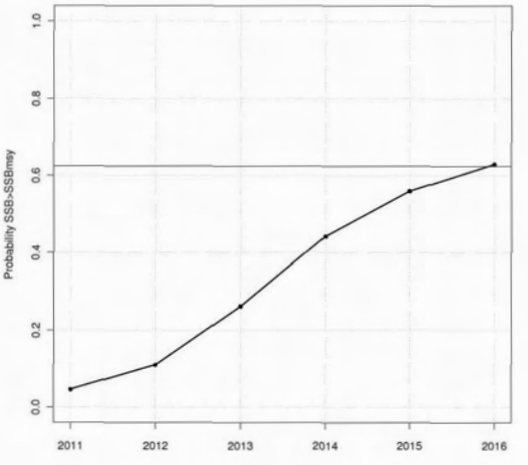
Because the values used to estimate the 2012 landings come from preliminary or incomplete data, the estimate is likely lower than the actual level of 2012 landings. For example, in-season monitoring of commercial landings (as reported on the SERO website) is based on incomplete data, and typically in the past these values have been underestimates of the actual landings. If the 2012 landings used here are indeed underestimated, these projections are more optimistic (higher landings in 2013—2016) than they would be if the actual level were used.

Table 1. Projection results under scenario where fishing mortality rate is fixed at $F = F_{rebuild}$, with 2011 and 2012 landings at their estimated levels (described above) and with rebuilding probability of at least 0.625 in 2016. F = fishing mortality rate (per year), $Pr(SSB > SSB_{MSY})$ = proportion of stochastic projection replicates exceeding SSB_{MSY}, SSB = spawning stock (1E10 eggs) at peak spawning time, R = recruits (1000 age-0 fish), D = discard mortalities (1000 fish or 1000 lb whole weight), L = landings (1000 fish or 1000 lb whole weight), and Sum L = cumulative landings (1000 lb whole weight). For reference, estimated benchmarks are $F_{MSY} = 0.698$ (per yr), $SSB_{MSY} = 248$ (1E10 eggs), and MSY = 1767 (1000 lb). Expected values presented are from deterministic projections.

year	F	$Pr(SSB > SSB_{MSY})$	SSB (1E10 eggs)	R (1000)	D (1000)	D (1000 lb)	L (1000)	L (1000 lb)	Sum L (1000 lb)
2011	0.58	0.04	186.5	30739	143	57	1356	1048	1048
2012	0.48	0.11	205.4	32005	130	51	1205	960	2008
2013	0.33	0.26	220.8	32942	102	41	973	786	2795
2014	0.33	0.44	245.3	34272	111	45	1173	968	3763
2015	0.33	0.56	263.6	35160	116	47	1325	1124	4887
2016	0.33	0.63	277.1	35770	120	49	1428	1241	6129

Figure 1. Projection results under scenario where fishing mortality rate is fixed at $F = F_{rebuild}$, with 2011 and 2012 landings at their estimated levels. In top four panels, expected values represented by dotted solid lines, and uncertainty represented by thin lines corresponding to 5th and 95th percentiles of replicate projections. Horizontal lines mark MSY-related quantities. Spawning stock (SSB) is at time of peak spawning. In bottom panel, the curve represents the proportion of projection replicates for which SSB has reached at least $SSB_{MSY} = 248$.





Appendix

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Robert K. Mahood, Executive Director
Gregg T. Waugh, Deputy Executive Director

November 13, 2012

MEMORANDUM

TO: Bonnie Ponwith

FROM: David Cupka David Cupka

SUBJECT: Black Sea Bass Projection Request

The Council requested that its Scientific and Statistical Committee apply the ABC control rule to the SEDAR 25 assessment of black sea bass and provide a recommendation for the probability of stock rebuild. The SSC addressed this request at their recent meeting and recommended a P-rebuild of 62.5%. As a result of this recommendation from the SSC, I am requesting that the SEFSC provide, for consideration by the Council at its December 2012 meeting, a projection of black sea bass ABC's for 2013 - 2016 based on P-rebuild=62.5%. I greatly appreciate you help in providing this information.

If you have any questions, please contact Bob or me.

cc: Ben Hartig
Michelle Duval
Theo Brainerd
Larry Massey
Bob Mahood
Gregg Waugh
Myra Brouwer
John Carmichael