Revised P* Projections and Associated Analyses for South Atlantic Spanish Mackerel SEDAR 28 Stock Assessment

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[Updated response to request for P* projections; sent 6/06/2013]

This document responds to a request to (1) split Allowable Biological Catch (ABC) previously calculated using P* (probability of overfishing) projections into separate estimates for landings and discards. It is an update to a previous request for ABCs with P* = 0.4 and P* = 0.5. In addition, this document responds to requests for (2) projections based on F = 75% F_{MSY} and (3) distributions for MSY, MSST, and MFMT (F_{msy}) from the probabilistic projections.

1. Separate landings and discard ABCs

Allowable biological catch (ABC) values were provided for the south Atlantic Spanish mackerel SEDAR 28 final document (May 2013). The discards were not provided as a separate value, but rather were combined with landings to provide the ABC. The P* analyses was re-run in order to provide the ABC in both landings and discards (in both pounds and number). P* projections were not carried out further than 2015 because of the high levels of uncertainty past that point. Results are below (Tables 1-4).

Table 1. (C.1-revised). Acceptable biological catch (ABC) in units of 1000 lb whole weight, based on the annual probability of overfishing $P^* = 0.4$. F = fishing mortality rate (per yr), SSB = total biomass of mature females, Pr(SSB > SSB_{MSY}) = proportion of replicates not overfished (i.e., SSB above the base-run point estimate of 3266 mt), and R = recruits (1000 age-0 fish). Annual ABCs are a single quantity of landings and dead discards combined, while other values presented are medians.

Year	F	P*	SSB (mt)	Pr(SSB > SSBmsy)	R	ABC landings (1000 lb)	ABC dead discards (1000 lb)
2013	0.59	0.4	4222	0.89	18776	4620	188
2014	0.58	0.4	3943	0.72	18239	4336	172
2015	0.56	0.4	3919	0.66	17912	4226	170

Table 2. (C.2-revised). Acceptable biological catch (ABC) in units of 1000 lb whole weight, based on the annual probability of overfishing $P^* = 0.5$. F = fishing mortality rate (per yr), SSB = total biomass of mature females, Pr(SSB > SSB_{MSY}) = proportion of replicates not overfished (i.e., SSB above the base-run point estimate of 3266 mt), and R = recruits (1000 age-0 fish). Annual ABCs are a single quantity of landings and dead discards combined, while other values presented are medians.

Year	F	P*	SSB (mt)	Pr(SSB > SSBmsy)	R	ABC landings (1000 lb)	ABC dead discards (1000 lb)
2013	0.66	0.5	4198	0.88	18536	5100	212
2014	0.66	0.5	3722	0.65	17813	4683	194.8
2015	0.65	0.5	3628	0.58	17307	4517	195.2

Table 3. Acceptable biological catch (ABC) in 1000s of fish, based on the annual probability of overfishing P* = 0.4. F = fishing mortality rate (per yr), SSB = total biomass of mature females, Pr(SSB > SSB_{MSY}) = proportion of replicates not overfished (i.e., SSB above the base-run point estimate of 3266 mt), and R = recruits (1000 age-0 fish). Annual ABCs are a single quantity of landings and dead discards combined, while other values presented are medians.

Year	F	P*	SSB	Pr(SSB > SSBmsy)	R	ABC landings (1000 fish)	ABC dead discards (1000 fish)
2013	0.59	0.4	4222	0.89	18776	3946	471
2014	0.58	0.4	3943	0.72	18239	3819	430
2015	0.56	0.4	3919	0.66	17912	3708	424

Table 4. Acceptable biological catch (ABC) in 1000s of fish, based on the annual probability of overfishing P* = 0.5. F = fishing mortality rate (per yr), SSB = total biomass of mature females, Pr(SSB > SSB_{MSY}) = proportion of replicates not overfished (i.e., SSB above the base-run point estimate of 3266 mt), and R = recruits (1000 age-0 fish). Annual ABCs are a single quantity of landings and dead discards combined, while other values presented are medians.

Year	F	P*	SSB	Pr(SSB > SSBmsy)	R	ABC landings (1000 fish)	ABC dead discards (1000 fish)
2013	0.66	0.5	4198	0.88	18536	4384	530
2014	0.66	0.5	3722	0.65	17813	4207	487
2015	0.65	0.5	3628	0.58	17307	4090	488

2. Projections based on F = 75% F_{MSY}

Projections conducted at F = 75% F_{MSY} were also requested in addition to the $F_{current}$ and F_{msy} projections provided in the assessment report. The projection methodology is outlined in Section 3.0.1.8 of the assessment report. Table 5 below separates the projection results into landings and discards calculated in both numbers of fish and 1000 lb whole weight using the same methodology described above.

Table 5. Projected landings and discards of south Atlantic Spanish mackerel in number of fish and 1000 lb whole weight with F = 75% F_{MSY}.

Year	Landings (1000 lb)	Dead Discards (1000 lb)	Landings (1000s fish)	Dead Discards (1000s fish)
2012	4309	75	2658	188
2013	5079	156	4582	391
2014	4638	166	4207	414
2015	4660	162	4126	406
2016	4845	162	4008	406
2017	4993	163	3918	408
2018	5081	164	3834	409
2019	5128	164	3791	410
2020	5150	164	3774	411
2021	5168	164	3745	411

3. Distributions for MSY, MSST, and MFMT (F_{msy})

Distributions for MSY, MSST, and MFMT (F_{msy}) are not calculated as outputs of the projection methodology, but rather, are inputs to characterize future uncertainty in the projections. These probabilistic distributions are calculated as part of the Monte Carlo-bootstrap analysis described in the original assessment report. The methodology is described in section 3.0.1.7.2 of the report. Distributions for F_{msy}, SSB_{msy} and MSY are shown in Figure 3.36 of the assessment report. Distributions for SSB/MSST, SSB/SSB_{msy}, and F/F_{msy} are shown in Figure 3.41 of the assessment report.