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Bocaccio Rebuilding Analysis for 2007

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1. Introduction

In 1998, the PFMC adopted Amendment 11 of the Groundfish Management Plan, which established a minimum stock size threshold of 25% of unfished biomass. Based on the stock assessment by Ralston et al. (1996), bocaccio was declared formally to be overfished, thereby requiring development of a rebuilding plan for consideration by the Council in the fall of 1999. Rebuilding was initiated by catch restrictions beginning in 2000.

A number of bocaccio stock assessments (MacCall et al. 1999, MacCall 2002, MacCall 2003a, MacCall 2005a, MacCall 2007) and rebuilding analyses (MacCall 1999, MacCall and He 2002, MacCall 2003b, MacCall 2005b) have now been conducted since the stock was declared overfished. In 2004, a formal rebuilding plan for bocaccio was enacted by the Pacific Fishery Management Council (PFMC) as part of Amendment 16-3 to the Pacific Coast Groundfish Fishery Management Plan (PFMC 2004). That plan was revised by Amendment 16-4, which was based ont he 2005 rebuilding analysis (MacCall 2005b).

The 2003 stock assessment examined three models of bocaccio. One of those, the STATc model, was used as the basis for subsequent fishery management and as the basis of FMP Amendments 16-3 and 16-4. The 2007 bocaccio stock assessment updated the 2003 and 2005 STATc models, and is the basis of this rebuilding analysis.

2. Review of Management Performance

Details of management performance are provided in Table 1. Because total kill requires statistical estimation of discards, and an ongoing observer program is providing progressively more precise estimates, this accounting of management performance differs from those in MacCall (2005b).

2000-2002: The rebuilding OY was set at 100MT for all three years as a transition to a constant fishing mortality rate policy beginning in 2003. This was a learning period for fishery management, which required unprecedented restrictions on both commercial and recreational fishing opportunities. Although landed catch was below 100MT in all three years, total kill (including discards) exceeded targets in all three years, but with a smaller excess by the third year.

2003: In response to the 2002 bocaccio assessment, which indicated very low productivity, the 2003 OY was set at "less than" 20MT, and the retained catch was about 10MT, nearly all of which was in the recreational fishery. Including mortality of estimated discards, estimated 2003 total kill was 14MT.

2004: Based on the 2003 assessment, which showed a much more productive stock, the 2004 OY was set at an operational target of 199MT; the final catch was 66MT. Discards brought the estimated 2004 kill to 82MT.

2005: The OY was set at 307MT. Landed catch was 42MT, and estimated an discard of 45MT resulted in an estimated 2005 kill of 87MT.

2006: The OY was set at 306MT. Landed catch was 42MT, and estimated an discard of 25MT resulted in an estimated 2005 kill of 67MT.

2007: The 2007 and 2008 OYs were set at 218MT. The year is not yet complete, but as of August, the projected 2007 kill (landings plus discards) was 151MT (J. DeVore, PFMC, pers. comm.).

Summary: Although the rebuilding OY was exceeded during the first three years of rebuilding, kill during the subsequent five years (including the 2007 projection) has fallen far below the respective rebuilding OYs. For the eight years of rebuilding, the cumulative kill has fallen 40% below the cumulative OY, indicating excellent management performance overall.

Table 1. Recent history of bocaccio management performance.

	Commercial			Recreational			Total			ABC	OY
Year	Catch	Discard	Total	Catch	Discard	Total	Catch	Discard	Total		
2000	28	49	77	103	9	112	128	58	189	164	100
2001	22	76	98	103	6	109	125	82	207	122	100
2002	21	27	48	82	2	84	103	32	132	122	100
2003	1	2	3	9	2	11	10	12	14	244	<20
2004	12	8	20	55	8	62	66	18	82	400	199
2005	8	41	49	34	4	38	42	45	87	566	307
2006	5	20	25	37	5	42	42	25	67	549	306
2007			53**			98**			151**	602	218
2008										618	218

* Discarded commercial catch was not estimated and is assumed to be negligible.
** Projected as of August, 2007 (John. DeVore, pers. comm.)

3. Simulation Model

This analysis uses the SSC Default Rebuilding Analysis (version 2.11, dated September 2007). All data and parameters use as input to this analysis were taken from the STATc model in the 2007 assessment. An example input file is given in Appendix A. Future recruitments were simulated by re-sampling estimated historical recruits/spawning output (**R/B**) ratios from years 1970 to 2005. e-sampling **R/B** values is justified by the estimated Mace-Doonan steepness value of $\boldsymbol{h}$ = 0.2 in the 2007 stock assessment. This value of steepness indicates negligible curvature in the estimated stock-recruitment relationship. Probability distributions are based on 2000 simulations. Note: There may be minor differences between some values estimated in the stock assessment (STATc2007) and those estimated by the SSC Default Rebuilding Analysis.

4. Rebuilding Parameters/Management Reference Points

A history of recent changes in model parameters is given in Table 2.

$B_{unfished}$: Unfished biomass (measures as spawning output) is estimated by multiplying average recruitment (**R**) by the spawning output per recruit achieved when the fishing mortality rate is zero (**$SPR_{F=0}$** = 2.49), spawning output in billion eggs, recruitment in thousand fish at age 1). Based on the 2007 bocaccio assessment, the estimated unfished spawning output (**$B_{unfished}$**) is 13554 billion eggs, based on the average recruitment from spawning years between 1950 and 1985. This time period was chosen as representing a presumably "natural" range of stock abundance. Because recruitment is highly variable, this calculation of unfished abundance is imprecise (CV $10%; variability is underestimated because estimated recruitment in the first ten years is held constant).

B_{msy}: The rebuilding target is the spawning abundance level that produces MSY. This value cannot be determined directly for bocaccio, so this analysis uses the PFMC proxy value of 40% of estimated unfished spawning output. Estimated **B_{msy}** is 5421 billion eggs.

Current status: According to the 2007 stock assessment as modified for input to the SSC Rebuilding Analysis model, the 2006 spawning output is 1727 billion eggs, which is 32% of the estimated **B_{msy}**, and 13% of estimated **$B_{unfished}$**.

Mean generation time: Mean generation time of bocaccio is estimated from the net maternity function, and is 14 years.

Table 2. Parameters and reference points for rebuilding

Date of Analysis	2003	2005	2007
Assessment model used as basis	STATc	STATc2005	STATc2007
Spawning output per recruit at F=0	2.50	2.50	2.49
Bunfished (billion eggs)	13387	13402	13554
Btarget=B40 (billion eggs)	5355	5361	5421
First year of rebuilding	2000	2000	2000
Present year (Final year of assessment)	2003	2005	2006
First simulated year	2004	2006	2007
Tmin estimated	2018	2018	2019
Mean Generation Time	14	14	14
Tmax estimated	2032	2032	2033
Adopted Policy	Amend 16-3	Amend 16-4	TBD
Prob rebuild by Tmax	0.7	0.8	
Rebuild SPR	0.693	0.777	
Exploitation Rate	0.0498	0.0340	
Ttarg (median rebuild date)	2027	2026	
Ttarg from Amendment 16-3 (wrong)	2023		

5. Simulation Runs

Nine new scenarios are examined (Table 3). The scenarios include cases of no fishing, three alternative interpretations of status quo management, two scenarios with 50% probability of rebuilding by the old and new values of $\mathbf{T_{max}}$ respectively, a 40-10 harvest policy scenario, and an $\mathbf{F_{msy}}$ scenario. An additional scenario of $\mathbf{T_{target}}$ = 2029 was added as an intermediate solution.

Table 3. Summary of rebuilding simulations, ordered by SPR.

Case	Run Name	Description	T50%	2009OY	SPR
1	C	F=0	2020	0	1
2	D2	F(currentOY)	2022	218	0.8262
3	D1	current SPR	2023	288	0.777
4	D3	P(Ttarg)=0.5	2026	468	0.6641
5	Alt2029	P(2029)=0.5	2029	594	0.595
6	Tmax2032	Tmax=2032	2032	691	0.546
7	Tmax2033	Tmax=2033	2033	714	0.536
8	ABC	SPR=0.5	2037	793	0.5
9	4010	40-10 Policy	2030	384	variable

6. Results

Simulated individual rebuilding trajectories are erratic due to rare large recruitments (Figure 1). The time series of percentiles and medians of simulated catch and abundance trajectories (Table 4, Figure 2) provide a more informative overview of likely rebuilding performance and uncertainty.

Simulation results, including time series of median catch and median spawning output relative to the rebuilding target are shown in Tables 3a and 3b, and in Figure 3. Previous projections for **SPR** = 0.777 (the policy adopted under Amendment 16-4) for comparison. The current projection indicates that at **SPR** = 0.777, rebuilding may occur about two years earlier than under the 2005 rebuilding scenario, and a policy of setting the 2009 fishing rate to a value that achieves the 2008 OY (218 mtons) would rebuild three years earlier. This difference is presumably mainly due to evidence of a strong 2003 yearclass. Alternatively, if the rebuilding policy seeks to maintain a 50% probability of rebuilding by $\mathbf{T_{target}}$ = 2026, the allowable catch could be increased substantially. It is noteworthy that the Council's 40-10 harvest policy (which normally is applied to healthy groundfish stocks) is now also a viable rebuilding policy, with a median rebuilding date of 2030.

Catches and biomasses projected under an ABC (i.e., $\mathbf{F_{msy}}$ proxy = $\mathbf{F_{50\%}}$) harvest policy do not correspond to the ABC for individual years under other policies, but rather represent projections under the maximum allowable harvest rate. Also note that the **F**=0 projection (no catches beginning in 2009) now has a median rebuilding date of 2020, as opposed to the original $\mathbf{T_{min}}$ of 2018 which assumed no harvest beginning in 2000, among other things.

6. Analysis of Sustainability

Under the fishing rates given by this rebuilding analysis, the probability of further long-term decline in bocaccio abundance is negligibly small (less than one percent over the next 100 years).

8. Acceptable Biological Catch (ABC) in 2007 and 2008

The value of ABC for 2009 is 793mtons, as given by the median catch for the ABC scenario in Table 4.

9. Postscript

A revised expected catch for year 2007 became available after this document was finalized. The 2007 catch according to the GMT "scorecard" (dated November 2007) was expected to be 105.6 mtons, which is substantially less than the value of 151 mtons used in these rebuilding projections (J. DeVore, PFMC, pers. comm.). Use of the revised 2007 catch results in insignificant changes to the projections presented in this document.

Table 4a. Results of rebuilding projections. Bold numbers are specifications for runs. Where applicable, rebuilding policy reverts to 40-10 policy upon achieving target abundance.

Run Name		from 2005	C	D2	D1	D3	Alt2029	Tmax2032	Tmax2033	ABC	40-10
Description		P(2032)=0.8	F=0	F(currentOY)	current SPR	P(Ttarg)=0.5	P(2029)=0.5	oldTmax	newTmax	**F50%(ABC)**	**40-10 Policy**
SPR		0.777	1.000	**0.8262**	**0.777**	0.6641	0.595	0.546	0.536	**0.5**	variable
F		0.034	**0**	**0.0287**	0.0381	0.0624	0.0798	0.0932	0.0964	0.0971	variable
P(by 2018)	old Tmin	0.080	0.320	0.191	0.146	0.085	0.047	0.032	0.028	0.017	0.042
P(by 2021)	old T(F=0)	0.240	0.585	0.432	0.363	0.234	0.149	0.097	0.112	0.064	0.139
P(by 2026)	old Ttarg	0.551	0.863	0.723	0.668	**0.500**	0.369	0.285	0.264	0.204	0.357
P(by 2029)		0.690	0.935	0.837	0.790	0.632	**0.500**	0.387	0.363	0.290	0.489
P(by 2032)	old Tmax	**0.800**	0.968	0.903	0.873	0.747	0.612	**0.500**	0.473	0.376	0.604
P(by 2033)	new Tmax	0.833	0.975	0.915	0.888	0.777	0.646	0.527	**0.500**	0.408	0.628
median Trebuild		2026	2020	2022	2023	**2026**	**2029**	**2032**	**2033**	2037	2030
Median Catch											
2006	actual	*150*	*67*	*67*	*67*	*67*	*67*	*67*	*67*	*67*	*67*
2007	projected	216	*151*	*151*	*151*	*151*	*151*	*151*	*151*	*151*	*151*
2008	assumed	219	*218*	*218*	*218*	*218*	*218*	*218*	*218*	*218*	*218*
2009		234	0	**218**	288	468	594	691	714	793	384
2010		254	0	227	302	482	606	698	719	793	422
2011		277	0	246	323	509	632	724	745	816	472
2012		306	0	265	354	549	676	767	788	858	535
2013		336	0	289	387	593	726	818	839	908	615
2014		365	0	316	426	646	782	876	897	965	702
2015		395	0	344	467	696	834	927	949	1015	811
2016		423	0	375	507	750	893	987	1007	1071	912
2017		453	0	409	546	796	937	1028	1048	1108	995
2018		485	0	440	586	842	982	1072	1090	1147	1089
2019		516	0	472	622	882	1018	1099	1116	1167	1167
2020		551	0	510	661	930	1064	1143	1160	1210	1237

Table 4b. Results of rebuilding projections. Bold numbers are specifications for runs. Shaded cells indicate median abundance exceeds rebuilding target. Where applicable, rebuilding policy reverts to 40-10 policy upon achieving target abundance.

Run Name		from 2005	C	D2	D1	D3	Alt2029	Tmax2032	Tmax2033	ABC	40-10
Description		P(2032)=0.8	F=0	F(currentOY)	current SPR	P(Ttarg)=0.5	P(2029)=0.5	oldTmax	newTmax	**F50%(ABC)**	**40-10 Policy**
SPR		0.777	1.000	**0.8262**	**0.777**	0.6641	0.595	0.546	0.536	**0.5**	variable
F		0.034	**0**	**0.0287**	0.0381	0.0624	0.0798	0.0932	0.0964	0.0971	variable
P(by 2018)	old Tmin	0.080	0.320	0.191	0.146	0.085	0.047	0.032	0.028	0.017	0.042
P(by 2021)	old T(F=0)	0.240	0.585	0.432	0.363	0.234	0.149	0.097	0.112	0.064	0.139
P(by 2026)	old Ttarg	0.551	0.863	0.723	0.668	**0.500**	0.369	0.285	0.264	0.204	0.357
P(by 2029)		0.690	0.935	0.837	0.790	0.632	**0.500**	0.387	0.363	0.290	0.489
P(by 2032)	old Tmax	**0.800**	0.968	0.903	0.873	0.747	0.612	**0.500**	0.473	0.376	0.604
P(by 2033)	new Tmax	0.833	0.975	0.915	0.888	0.777	0.646	0.527	**0.500**	0.408	0.628
median Trebuild		2026	2020	2022	2023	**2026**	**2029**	**2032**	**2033**	2037	2030
Median Spawning Output Relative to Target											
2006		0.284	0.319	0.319	0.319	0.319	0.319	0.319	0.319	0.319	0.319
2007		0.298	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345	0.345
2008		0.309	0.372	0.372	0.372	0.372	0.372	0.372	0.372	0.372	0.372
2009		0.320	0.393	0.393	0.393	0.393	0.393	0.393	0.393	0.393	0.393
2010		0.334	0.415	0.409	0.408	0.403	0.399	0.397	0.396	0.394	0.405
2011		0.354	0.440	0.428	0.424	0.414	0.407	0.401	0.400	0.396	0.418
2012		0.378	0.474	0.453	0.446	0.430	0.418	0.410	0.408	0.401	0.435
2013		0.405	0.512	0.482	0.472	0.449	0.434	0.422	0.419	0.410	0.456
2014		0.439	0.560	0.520	0.506	0.475	0.454	0.438	0.435	0.422	0.481
2015		0.477	0.617	0.563	0.546	0.506	0.479	0.458	0.454	0.438	0.510
2016		0.519	0.683	0.616	0.593	0.543	0.510	0.485	0.480	0.461	0.542
2017		0.564	0.762	0.676	0.646	0.584	0.543	0.514	0.507	0.484	0.579
2018	old Tmin	0.605	0.840	0.732	0.698	0.620	0.572	0.537	0.529	0.502	0.608
2019		0.648	0.923	0.797	0.752	0.662	0.604	0.563	0.554	0.523	0.642
2020		0.692	1.017	0.860	0.811	0.704	0.637	0.589	0.579	0.542	0.670
2021		0.741	1.106	0.921	0.863	0.742	0.664	0.611	0.598	0.557	0.699
2022		0.794	1.207	0.996	0.927	0.785	0.697	0.636	0.623	0.577	0.728
2023		0.849	1.327	1.078	0.998	0.832	0.734	0.665	0.650	0.599	0.763
2024		0.908	1.454	1.164	1.075	0.883	0.773	0.695	0.678	0.623	0.795
2025		0.953	1.601	1.266	1.159	0.939	0.817	0.731	0.712	0.650	0.829
2026	old Ttarg	1.000	1.743	1.357	1.236	0.972	0.848	0.755	0.735	0.667	0.857
2027		1.033	1.899	1.459	1.321	1.007	0.888	0.787	0.764	0.689	0.885
2028		1.065	2.085	1.585	1.420	1.040	0.931	0.820	0.795	0.713	0.916
2029		1.103	2.279	1.701	1.524	1.084	0.971	0.854	0.827	0.737	0.966
2030		1.144	2.518	1.843	1.648	1.128	1.012	0.897	0.868	0.770	1.003
2031		1.187	2.752	1.983	1.769	1.177	1.045	0.933	0.903	0.797	1.043
2032	old Tmax	1.241	3.031	2.166	1.907	1.220	1.084	0.971	0.945	0.828	1.080
2033		1.304	3.314	2.336	2.042	1.256	1.125	1.000	0.973	0.855	1.116

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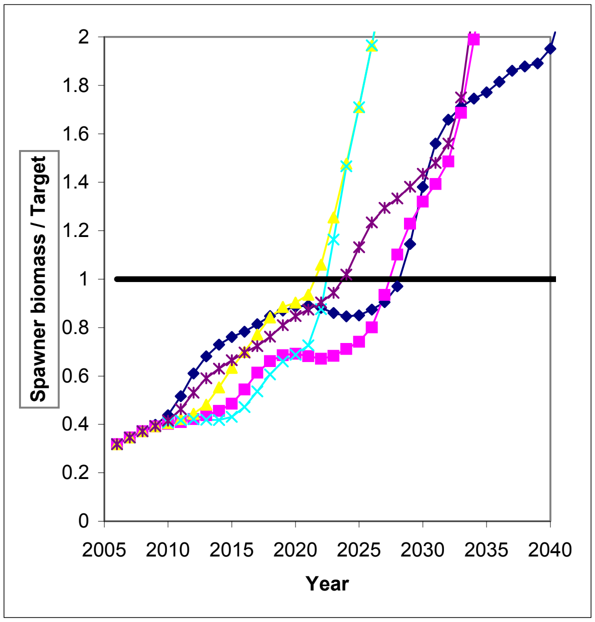

Figure 1. Example individual rebuilding trajectories for bocaccio.

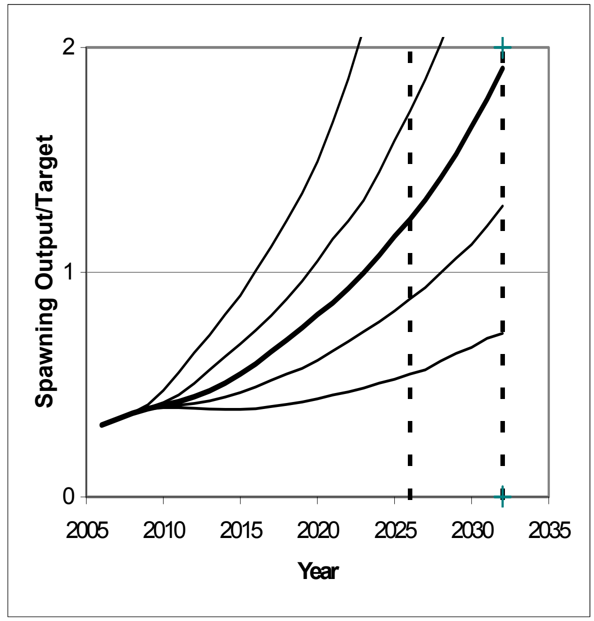

Figure 2. Envelope of rebuilding trajectories for current SPR = 0.777. Lines are 5, 25, 50, 75 and 95 percentiles of 2000 simulations.

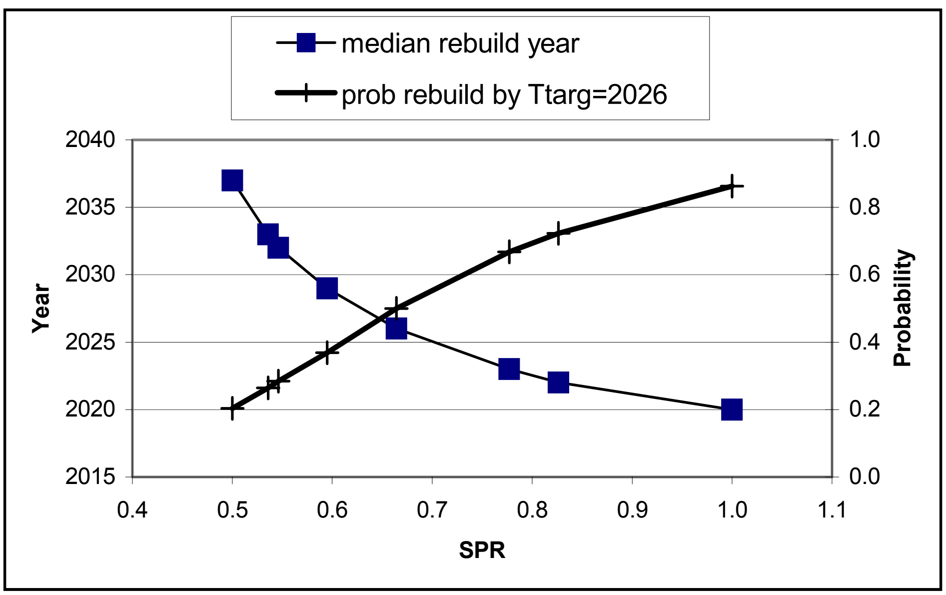

Figure 3. Relationship of median rebuild time and probability of rebuilding by 2026 as related to the SPR rate specified in alternaive rebuilding scenarios.

Appendix A. Projection data file for Run D1.

```
# Title
bocaccio model STATC2007revC at SPR=0.777
# Number of sexes
2
# Age range to consider (minimum age; maximum age)
1 21
# Number of fleets to consider
1
# First year of the projection
2006
# Year declared overfished
2000
# Is the maximum age a plus-group (1=Yes;2=No)
1
"# Generate future recruitments using historical recruitments (1), historical recruits/spawner (2), or a stock-recruitment (3)"
2
# Constant fishing mortality (1) or constant Catch (2) projections
1
# Fishing mortality based on SPR (1) or actual rate (2)
2
# Pre-specify the year of recovery (or -1) to ignore
-1
# Fecundity-at-age
# 1 2 3 4 5 6 7 8 9 ... 21+
0.0001  0.0018  0.0257  0.1296  0.322   0.5436  0.7579  0.9606  1.155   1.3396  1.5077  1.6538  1.7766
        1.8782  1.9613  2.0289  2.0831  2.1266  2.1612  2.189   2.2466
# Age specific information (Females then males) weight and selectivit
# Females wt and composite selectivity
0.2227  0.4983  0.8752  1.3083  1.7649  2.2191  2.6541  3.0613  3.4362  3.7726  4.0643  4.3101  4.5145
        4.6831  4.8214  4.9333  5.0235  5.0958  5.1537  5.2002  5.2963
0.21    0.56    0.81    0.98    0.96    0.82    0.66    0.52    0.42    0.35    0.31    0.29    0.27
        0.26    0.25    0.24    0.24    0.23    0.23    0.23    0.22
# Males wt and composite selectivity
0.2235  0.4604  0.7631  1.0904  1.4172  1.7266  2.0089  2.2597  2.478   2.6652  2.8241  2.9578  3.0698
        3.163   3.2404  3.3044  3.3574  3.4008  3.4364  3.4656  3.5245
0.21    0.52    0.75    0.93    1       0.98    0.9     0.8     0.72    0.65    0.58    0.54    0.5
        0.47    0.45    0.44    0.42    0.41    0.4     0.4     0.39
"# Age specific information (Females then males), natural mortality and numbers at age in2006"
# Females
0.15    0.15    0.15    0.15    0.15    0.15    0.15    0.15    0.15    0.15    0.15    0.15    0.15
        0.15    0.15    0.15    0.15    0.15    0.15    0.15    0.15
524.5   394     1002.4  153     128.1   11.2    1119.3  57.1    31.1    105.3   36.8    52.8    43.6
        14      37.9    30.9    1.5     38.1    6.9     3.7     27.8
# Males

0.15    0.15    0.15    0.15    0.15    0.15    0.15    0.15    0.15    0.15    0.15    0.15    0.15
        0.15    0.15    0.15    0.15    0.15    0.15    0.15    0.15
524.5   393.9   1002.8  153.2   128.2   11.3    1119.6  57.1    31.2    104.9   36.5    52.5    43.3
        13.9    37.9    30.5    1.4     34.5    5.7     2.8     12.4
# Initial age-structure (for Tmin)

2972    156     87      296     102     144     117     37      100     81      4       99      18
        10      6       34      1       0       1       1       28
2972    156     87      298     104     148     121     38      104     83      4       93      15
        7       4       20      1       0       1       0       7
# Year for Tmin Age-structure
2000
# Number of simulations
2000
# Recruitment and Spanwer biomasses
# Number of historical assessment years
56
```

"# Historical data: Year, Recruitment, Spawner biomass, Used to compute B0, Used to project based"
"# on R, Used to project based on R/S"

1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963
	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
	2000	2001	2002	2003	2004	2005	2006					
3523	3523	3523	3523	3523	3523	3523	3523	3523	5698	1333	1192	52337
	860	757	890	1344	2156	3044	3199	14364	1818	1982	15876	5545
	1291	537	23791	1980	8373	1397	1599	151	637	10838	1454	1421
	1683	5857	143	1881	1527	385	869	796	435	1006	245	368
	5944	50	481	489	2732	917	1049					
3580	3560	3547	3486	3396	3285	3088	2858	2565	2359	2221	2213	2311
	2312	2801	4331	6221	7227	7736	7910	7766	7499	7063	6137	5034
	4335	3961	4027	3923	3600	3552	3584	3305	2837	2256	1858	1459
	1351	1349	1179	968	958	921	857	820	808	804	802	836
	871	901	958	1134	1386	1585	1727					
1	1	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0					
0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	0	0					

Number of years with pre-specified catches
3
#line20Catches for years with pre-specified catches
2006 67
2007 151
2008 218
Number of future recruitments to override
0
Process for overiding (-1 for average otherwise index in data list)
"# Which probability to product detailed results for (1=0.5,2=0.6,etc.)"
2
Steepness and sigma-R and auto-correlations
0.2 1.0 0.0
#line26Target SPR rate (FMSY Proxy)
0.5
Target SPR information: Use (1=Yes) and power
0 20
Discount rate (for cumulative catch)
0.1
Truncate the series when 0.4B0 is reached (1=Yes)
0
Set F to FMSY once 0.4B0 is reached (1=Yes; 2=Apply 40:10 rule after recovery)
2
Percentage of FMSY which defines Ftarget
0.9
Maximum possible F for projection (-1 to set to FMSY)
-1
Conduct MacCall transition policy (1=Yes)
0
Defintion of recovery (1=now only;2=now or before)
2
Projection type
1
"# Definition of the ""40-10"" rule"

```
10 40
# Produce the risk-reward plots (1=Yes)
0
# Calculate coefficients of variation (1=Yes)
0
# Number of replicates to use
20
# First Random number seed
-89102
# Conduct projections for multiple starting values (0=No;else yes)
0
# File with multiple parameter vectors
MCMC.PRJ
# Number of parameter vectors
100
#line44 User-specific projection (1=Yes); Output replaced (1->6)
1 2  0 0
# Catches and Fs (Year; 1/2 (F or C); value); Final row is -1
2009 3 0.777
-1        -1        -1
# Split of Fs
2006 1
-1 1
# Five pre-specified years (used to define Ttarget for option 4)
2010 2011 2012 2013 2014
# Year for which a probability of recovery is needed
2032
# Time varying weight-at-age (1=Yes;0=No)
0
# File with time series of weight-at-age data
HakWght.Csv
# Use bisection (0) or linear interpolation (1)
0
# Target Depletion
0.4
# Project with Historical recruitments when computing Tmin (1=Yes)
0
# CV of implementation error
0
```