

TCSAM2013 Model Results: Tables

William Stockhausen

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Input model cases

2015AMO: '/Users/WilliamStockhausen/StockAssessments-Crab/Assessments/TannerCrab/2016-09/AssessmentM

Model C: '/Users/WilliamStockhausen/StockAssessments-Crab/Assessments/TannerCrab/2016-09/AssessmentM

case	path
2015AMO	../Runs.2015AM/2015AMO
Model C	Runs.ModelC/2016/best

Table 1. Model cases for comparison.

Objective function components

description	2015AMO	Model C
maturity curve smoothness (females)	1.4	2.3
maturity curve smoothness (males)	0.16	0.79
natural mortality penalty (immature females)	51	36
natural mortality penalty (immatures)	0.64	0.59
natural mortality penalty (mature males)	4.2	5.6
penalty on F-devs in BBRKC fishery	0	0.13
penalty on F-devs in directed fishery	49	57
penalty on F-devs in groundfish fishery	12	13
penalty on F-devs in snow crab fishery	7.7	7.5
recruitment penalty	2.3	2.4
sex ratio penalty	0	0
z50 devs for male selectivity in TCF (AR1)	0	0
z50 devs for male selectivity in TCF (norm2)	0	0

Table 2. Objective function penalty components.

description	2015AMO	Model C
female growth parameter a	0.9	0.9
female growth parameter b	0.68	0.64
female survey q penalty	16	29
male growth parameter a	0.57	0.23
male growth parameter b	0.04	0.03
survey q penalty	2	5

Table 3. Objective function priors components.

description	2015AMO	Model C
fishery: GTF males+females	135	463
fishery: RKC females	2.7	2.2
fishery: RKC males	24	27
fishery: SCF females	14	12
fishery: SCF males	49	53
fishery: TCF discarded females	14	9.7
fishery: TCF retained males	195	309
fishery: TCF total males	116	184
survey: immature females	307	281
survey: immature males	280	269
survey: mature females	99	129
survey: mature males	272	250

Table 4. Objective function likelihood: size comps components.

description	2015AMO	Model C
fishery: GTF total catch biomass	2.5	2.4
fishery: RKF total catch biomass	9.6	13
fishery: SCF total catch biomass	11	6.2
fishery: TCF female catch biomass	6.6	5.1
fishery: TCF male total catch biomass	18	12
fishery: TCF retained males	32	18
survey: mature crab	311	199

Table 5. Objective function likelihood: catch biomass components.

description	Model C-2015AMO
maturity curve smoothness (females)	0.93
maturity curve smoothness (males)	0.63
natural mortality penalty (immature females)	-15
natural mortality penalty (immatures)	-0.05
natural mortality penalty (mature males)	1.4
penalty on F-devs in BBRKC fishery	0.13
penalty on F-devs in directed fishery	7.4
penalty on F-devs in groundfish fishery	1.3
penalty on F-devs in snow crab fishery	-0.23
recruitment penalty	0.14
sex ratio penalty	0
z50 devs for male selectivity in TCF (AR1)	0
z50 devs for male selectivity in TCF (norm2)	0

Table 6. Objective function penalty component differences.

description	Model C-2015AMO
female growth parameter a	0
female growth parameter b	-0.04
female survey q penalty	13
male growth parameter a	-0.34
male growth parameter b	-0.01
survey q penalty	3

Table 7. Objective function priors component differences.

description	Model C-2015AMO
fishery: GTF males+females	328
fishery: RKC females	-0.42
fishery: RKC males	2.5
fishery: SCF females	-1.5
fishery: SCF males	3.4
fishery: TCF discarded females	-4.6
fishery: TCF retained males	114
fishery: TCF total males	69
survey: immature females	-26
survey: immature males	-11
survey: mature females	29
survey: mature males	-22

Table 8. Objective function likelihood: size comps component differences.

description	Model C-2015AMO
fishery: GTF total catch biomass	-0.09
fishery: RKF total catch biomass	3.2
fishery: SCF total catch biomass	-4.3
fishery: TCF female catch biomass	-1.5
fishery: TCF male total catch biomass	-6.7
fishery: TCF retained males	-13
survey: mature crab	-112

Table 9. Objective function likelihood: catch biomass component differences.

Parameter estimates

description	param	index	value 2015AMO	value Model C	stdv 2015AMO	stdv Model C
initial log-scale mean	pMnLnRecInit		5.585	5.527	0	0.4916
log-scale mean	pMnLnRec		4.922	5	0	0.06606
size distribution alpha parameter	pRecAlpha		11.5	11.5	0	0

description	param	index	value 2015AMO	value Model C	stdv 2015AMO	stdv Model C
size distribution beta parameter	pRecBeta		4	4	0	0

Table 10. Parameter estimates for population recruitment .

description	param	index	value 2015AMO	value Model C	stdv 2015AMO	stdv Model C
log-scale deviation	pRecDevs	1974	0.7814	NA	0	NA
log-scale deviation	pRecDevs	1975	1.009	1.407	0	0.1912
log-scale deviation	pRecDevs	1976	2.094	1.997	0	0.1238
log-scale deviation	pRecDevs	1977	1.799	1.761	0	0.13
log-scale deviation	pRecDevs	1978	1.022	1.09	0	0.1814
log-scale deviation	pRecDevs	1979	-0.08476	0.1659	0	0.2881
log-scale deviation	pRecDevs	1980	-0.8637	-0.4659	0	0.3725
log-scale deviation	pRecDevs	1981	-0.5838	-0.09987	0	0.2158
log-scale deviation	pRecDevs	1982	-1.25	-0.4922	0	0.257
log-scale deviation	pRecDevs	1983	0.6976	0.844	0	0.1013
log-scale deviation	pRecDevs	1984	0.6643	0.7737	0	0.1286
log-scale deviation	pRecDevs	1985	1.59	1.226	0	0.1092
log-scale deviation	pRecDevs	1986	1.328	1.145	0	0.1195
log-scale deviation	pRecDevs	1987	1.264	1.111	0	0.1202
log-scale deviation	pRecDevs	1988	1.174	1.086	0	0.1098
log-scale deviation	pRecDevs	1989	0.2063	0.2516	0	0.1522
log-scale deviation	pRecDevs	1990	-0.6595	-0.7003	0	0.2491
log-scale deviation	pRecDevs	1991	-1.214	-1.241	0	0.2836
log-scale deviation	pRecDevs	1992	-1.496	-1.515	0	0.2687
log-scale deviation	pRecDevs	1993	-1.599	-1.59	0	0.2478
log-scale deviation	pRecDevs	1994	-1.477	-1.364	0	0.2051
log-scale deviation	pRecDevs	1995	-1.193	-1.078	0	0.1733

description	param	index	value 2015AMO	value Model C	stdv 2015AMO	stdv Model C
log-scale deviation	pRecDevs	1996	-1.09	-1.055	0	0.1889
log-scale deviation	pRecDevs	1997	-0.1871	-0.151	0	0.1007
log-scale deviation	pRecDevs	1998	-1.092	-1.042	0	0.1802
log-scale deviation	pRecDevs	1999	0.024	0.02836	0	0.101
log-scale deviation	pRecDevs	2000	-0.4791	-0.4918	0	0.1734
log-scale deviation	pRecDevs	2001	0.7102	0.6223	0	0.09123
log-scale deviation	pRecDevs	2002	-0.2321	-0.3466	0	0.1917
log-scale deviation	pRecDevs	2003	0.299	0.3437	0	0.1251
log-scale deviation	pRecDevs	2004	0.8035	0.7747	0	0.08892
log-scale deviation	pRecDevs	2005	-0.4527	-0.4571	0	0.1948
log-scale deviation	pRecDevs	2006	-0.6608	-0.7169	0	0.2152
log-scale deviation	pRecDevs	2007	-0.9528	-1.118	0	0.2765
log-scale deviation	pRecDevs	2008	-0.8107	-0.8973	0	0.2538
log-scale deviation	pRecDevs	2009	0.9495	0.9792	0	0.09907
log-scale deviation	pRecDevs	2010	1.126	1.199	0	0.0933
log-scale deviation	pRecDevs	2011	0.6041	0.6586	0	0.1296
log-scale deviation	pRecDevs	2012	-0.9664	-1.096	0	0.383
log-scale deviation	pRecDevs	2013	-0.1697	-0.1788	0	0.1749
log-scale deviation	pRecDevs	2014	-0.1013	-0.4002	0	0.1993
log-scale deviation	pRecDevs	2015	-0.5307	-0.7564	0	0.263
log-scale deviation	pRecDevs	2016	NA	-0.2124	NA	0.2466

Table 11. Parameter estimates for population recruitment devs .

description	param	index	value 2015AMO	value Model C	stdv 2015AMO	stdv Model C
log-scale deviation	pRecDevsHist	1949	-1.496	-1.511	0	1.634
log-scale deviation	pRecDevsHist	1950	-1.494	-1.508	0	1.491

description	param	index	value 2015AMO	value Model C	stdv 2015AMO	stdv Model C
log-scale deviation	pRecDevsHist	1951	-1.488	-1.502	0	1.354
log-scale deviation	pRecDevsHist	1952	-1.478	-1.491	0	1.224
log-scale deviation	pRecDevsHist	1953	-1.461	-1.473	0	1.103
log-scale deviation	pRecDevsHist	1954	-1.435	-1.445	0	0.9945
log-scale deviation	pRecDevsHist	1955	-1.395	-1.403	0	0.9007
log-scale deviation	pRecDevsHist	1956	-1.337	-1.341	0	0.8245
log-scale deviation	pRecDevsHist	1957	-1.25	-1.249	0	0.7677
log-scale deviation	pRecDevsHist	1958	-1.12	-1.113	0	0.73
log-scale deviation	pRecDevsHist	1959	-0.9226	-0.9055	0	0.7094
log-scale deviation	pRecDevsHist	1960	-0.6096	-0.5769	0	0.7035
log-scale deviation	pRecDevsHist	1961	-0.08975	-0.03491	0	0.7116
log-scale deviation	pRecDevsHist	1962	0.6968	0.7601	0	0.7125
log-scale deviation	pRecDevsHist	1963	1.541	1.544	0	0.6966
log-scale deviation	pRecDevsHist	1964	1.98	1.859	0	0.6698
log-scale deviation	pRecDevsHist	1965	1.98	1.752	0	0.6674
log-scale deviation	pRecDevsHist	1966	1.758	1.493	0	0.6755
log-scale deviation	pRecDevsHist	1967	1.517	1.291	0	0.6735
log-scale deviation	pRecDevsHist	1968	1.338	1.233	0	0.6577
log-scale deviation	pRecDevsHist	1969	1.246	1.325	0	0.6379
log-scale deviation	pRecDevsHist	1970	1.194	1.424	0	0.61
log-scale deviation	pRecDevsHist	1971	1.018	1.261	0	0.5646
log-scale deviation	pRecDevsHist	1972	0.7648	0.9553	0	0.5423
log-scale deviation	pRecDevsHist	1973	0.5428	0.47	0	0.5477
log-scale deviation	pRecDevsHist	1974	NA	0.1865	NA	0.5771

Table 12. Parameter estimates for population initial recruitment devs .

description	param	index	value 2015AMO	value Model C	stdv 2015AMO	stdv Model C
multiplier for 1980-1984	pMfac_Big	1	1.494	1.329	0	0.1094
multiplier for 1980-1984	pMfac_Big	2	3.503	2.823	0	0.3356
multiplier for immature crab	pMfac_Imm		1.057	1.054	0	0.04957
multiplier for mature female crab	pMfac_MatF		1.506	1.427	0	0.03686
multiplier for mature male crab	pMfac_MatM		1.145	1.168	0	0.04104

Table 13. Parameter estimates for population natural mortality multipliers .

description	param	index	value 2015AMO	value Model C	stdv 2015AMO	stdv Model C
female	pPrM2MF	1	-15	-15	0	0.001669
female	pPrM2MF	10	-0.8169	-0.3237	0	0.09239
female	pPrM2MF	11	-0.4904	0.3518	0	0.09791
female	pPrM2MF	12	-0.3648	0.6246	0	0.112
female	pPrM2MF	13	-0.1162	1.568	0	0.2016
female	pPrM2MF	14	-1.62e-09	3.36	0	0.4349
female	pPrM2MF	15	-0.004397	5.297	0	0.9121
female	pPrM2MF	16	-7.31e-09	7.251	0	1.673
female	pPrM2MF	2	-13.75	-13.76	0	0.784
female	pPrM2MF	3	-12.44	-12.47	0	1.186
female	pPrM2MF	4	-11.04	-11.06	0	1.288
female	pPrM2MF	5	-9.48	-9.495	0	1.152
female	pPrM2MF	6	-7.722	-7.715	0	0.8623
female	pPrM2MF	7	-5.741	-5.695	0	0.5246
female	pPrM2MF	8	-3.608	-3.519	0	0.2412
female	pPrM2MF	9	-1.843	-1.685	0	0.1137

Table 14. Parameter estimates for population molt-to-maturity: females .

description	param	index	value	value Model C	stdv	stdv Model C
			2015AMO		2015AMO	
male	pPrM2MM	1	-12.6	-12.57	0	7.658
male	pPrM2MM	10	-3.738	-3.669	0	0.2484
male	pPrM2MM	11	-3.22	-3.078	0	0.19
male	pPrM2MM	12	-2.725	-2.616	0	0.1547
male	pPrM2MM	13	-2.219	-2.157	0	0.1313
male	pPrM2MM	14	-1.694	-1.58	0	0.1109
male	pPrM2MM	15	-1.343	-1.044	0	0.1008
male	pPrM2MM	16	-1.154	-0.6823	0	0.09545
male	pPrM2MM	17	-1.032	-0.4916	0	0.0915
male	pPrM2MM	18	-0.7441	-0.01116	0	0.1025
male	pPrM2MM	19	-0.4572	0.6144	0	0.1261
male	pPrM2MM	2	-11.39	-11.35	0	5.804
male	pPrM2MM	20	-0.198	1.469	0	0.1821
male	pPrM2MM	21	-0.05715	2.806	0	0.3254
male	pPrM2MM	22	-3.53e-09	4.836	0	0.5877
male	pPrM2MM	23	-1.2e-09	6.833	0	1.042
male	pPrM2MM	24	-5.72e-10	8.574	0	1.637
male	pPrM2MM	25	-8.69e-10	10.03	0	2.258
male	pPrM2MM	26	-1.11e-09	11.23	0	2.786
male	pPrM2MM	27	-1.69e-09	12.2	0	3.126
male	pPrM2MM	28	-2.68e-09	12.99	0	3.207
male	pPrM2MM	29	-6.06e-09	13.62	0	2.977
male	pPrM2MM	3	-10.18	-10.12	0	4.179
male	pPrM2MM	30	-2.54e-08	14.14	0	2.393
male	pPrM2MM	31	-0.02458	14.59	0	1.425

description	param	index	value	value Model C	stdv	stdv Model C
			2015AMO		2015AMO	
male	pPrM2MM	32	-0.04667	15	0	0.004866
male	pPrM2MM	4	-8.967	-8.9	0	2.821
male	pPrM2MM	5	-7.763	-7.682	0	1.77
male	pPrM2MM	6	-6.587	-6.493	0	1.055
male	pPrM2MM	7	-5.502	-5.415	0	0.6557
male	pPrM2MM	8	-4.754	-4.732	0	0.4245
male	pPrM2MM	9	-4.284	-4.298	0	0.3213

Table 15. Parameter estimates for population molt-to-maturity: males .

description	param	index	value	value Model C	stdv	stdv Model C
			2015AMO	C	2015AMO	C
female mean growth a parameter	pGrAF1		0.7	0.7	0	6.982e-05
female mean growth b parameter	pGrBF1		0.8842	0.885	0	0.001135
male mean growth a parameter	pGrAM1		0.4112	0.4208	0	0.02185
male mean growth b parameter	pGrBM1		0.9768	0.9727	0	0.005172
size transition beta parameter	pGrBeta_x	1	0.75	0.75	0	0
size transition beta parameter	pGrBeta_x	2	0.75	0.75	0	0

Table 16. Parameter estimates for population growth .

description	param	index	value	value Model C	stdv	stdv Model C
			2015AMO	C	2015AMO	C
females [-1981]	pSrv1_QF		0.5	0.5	0	4.938e-05
females [1982+]	pSrv2_QF		0.594	0.4985	0	0.03225
male offset to 95%-selected [-1981]	pSrv1M_dz5095		21.57	22.13	0	3.262
male offset to 95%-selected [1982+]	pSrv2M_dz5095		55.62	62.92	0	8.292
male size at 50%-selected [-1981]	pSrv1M_z50		49.01	50.22	0	1.919
male size at 50%-selected [1982+]	pSrv2M_z50		32.49	32.01	0	3.201

description	param	index	value 2015AMO	value Model C	stdv 2015AMO	stdv Model C
males [-1981]	pSrv1_QM		0.5	0.5	0	1.953e-05
males [1982+]	pSrv2_QM		0.7808	0.7223	0	0.03642

Table 17. Parameter estimates for surveys surveys .

description	param	index	value 2015AMO	value Model C	stdv 2015AMO	stdv Model C
female offset to 95%-selected [-1981]	pSrv1F_dz5095		40.82	38.34	0	6.138
female offset to 95%-selected [1982+]	pSrv2F_dz5095		100	100	0	0.001195
female size at 50%-selected [-1981]	pSrv1F_z50		53.63	54.2	0	2.79
female size at 50%-selected [1982+]	pSrv2F_z50		7.101	-9.243	0	15.07

Table 18. Parameter estimates for surveys survey selectivity .

description	param	index	value 2015AMO	value Model C	stdv 2015AMO	stdv Model C
GTF effort extrapolation	pLnEffXtr_GTF		1	1	0	0
GTF ln-scale female offset	pAvgLnF_GTFF		0	-1.024	0	0.06681
GTF ln-scale mean [1973+]	pAvgLnF_GTF		-4.161	-4.116	0	0.07218
RKF effort extrapolation	pLnEffXtr_RKF		1	1	0	0
RKF ln-scale female offset	pAvgLnF_RKFF		0	2.439	0	1.314
RKF ln-scale mean [1992+]	pAvgLnF_RKF		-5.25	-4.297	0	0.92
SCF effort extrapolation	pLnEffXtr_SCF		1	1	0	0
SCF ln-scale female offset	pAvgLnF_SCFF		0	-1.484	0	0.2129
SCF ln-scale mean [1992+]	pAvgLnF_SCF		-3.71	-2.56	0	0.1239
TCF effort extrapolation	pLnEffXtr_TCF		1	1	0	0
TCF ln-scale female offset	pAvgLnF_TCFF		0	-1.611	0	0.3415
TCF ln-scale mean [1965+]	pAvgLnF_TCF		-1.496	-1.326	0	0.08658

Table 19. Parameter estimates for fisheries mortality/capture rate .

description	param	index	value 2015AMO	value Model C	stdv 2015AMO	stdv Model C
ln-scale devs [1965+]	pF__DevsTCF 1		-0.5182	-0.5121	0	0.4999
ln-scale devs [1965+]	pF__DevsTCF 10		-0.3239	-0.1265	0	0.1435
ln-scale devs [1965+]	pF__DevsTCF 11		-0.04086	0.05576	0	0.105
ln-scale devs [1965+]	pF__DevsTCF 12		0.7613	0.8105	0	0.09597
ln-scale devs [1965+]	pF__DevsTCF 13		1.491	1.601	0	0.1092
ln-scale devs [1965+]	pF__DevsTCF 14		1.688	1.981	0	0.1505
ln-scale devs [1965+]	pF__DevsTCF 15		2.387	2.807	0	0.1968
ln-scale devs [1965+]	pF__DevsTCF 16		2.443	2.343	0	0.2776
ln-scale devs [1965+]	pF__DevsTCF 17		0.5962	0.3044	0	0.1457
ln-scale devs [1965+]	pF__DevsTCF 18		-0.3502	-0.7098	0	0.1271
ln-scale devs [1965+]	pF__DevsTCF 19		-1.277	-1.69	0	0.2479
ln-scale devs [1965+]	pF__DevsTCF 2		-0.7735	-0.7536	0	0.3872
ln-scale devs [1965+]	pF__DevsTCF 20		0.09703	-0.6117	0	0.182
ln-scale devs [1965+]	pF__DevsTCF 21		-0.8667	-1.303	0	0.2113
ln-scale devs [1965+]	pF__DevsTCF 22		-0.1135	-0.4774	0	0.1069
ln-scale devs [1965+]	pF__DevsTCF 23		0.8798	0.7349	0	0.08342
ln-scale devs [1965+]	pF__DevsTCF 24		1.372	1.459	0	0.09428
ln-scale devs [1965+]	pF__DevsTCF 25		1.289	1.415	0	0.1554
ln-scale devs [1965+]	pF__DevsTCF 26		1.668	1.638	0	0.1443
ln-scale devs [1965+]	pF__DevsTCF 27		0.9613	0.9957	0	0.1399
ln-scale devs [1965+]	pF__DevsTCF 28		0.7619	0.9826	0	0.1977
ln-scale devs [1965+]	pF__DevsTCF 29		-0.0703	-0.1684	0	0.134
ln-scale devs [1965+]	pF__DevsTCF 3		0.3592	0.4311	0	0.3491
ln-scale devs [1965+]	pF__DevsTCF 30		-1.228	-0.9591	0	0.1776
ln-scale devs [1965+]	pF__DevsTCF 31		-2.148	-2.129	0	0.2098

description	param	index	value 2015AMO	value Model C	stdv 2015AMO	stdv Model C
ln-scale devs [1965+]	pF_DevsTCF 32		-1.652	-1.648	0	0.143
ln-scale devs [1965+]	pF_DevsTCF 33		-1.69	-1.648	0	0.1361
ln-scale devs [1965+]	pF_DevsTCF 34		-1.753	-1.963	0	0.1598
ln-scale devs [1965+]	pF_DevsTCF 35		-1.049	-1.32	0	0.2573
ln-scale devs [1965+]	pF_DevsTCF 36		-1.686	-1.709	0	0.1386
ln-scale devs [1965+]	pF_DevsTCF 37		-0.4424	-0.4911	0	0.09236
ln-scale devs [1965+]	pF_DevsTCF 38		NA	-0.199	NA	0.09397
ln-scale devs [1965+]	pF_DevsTCF 4		0.1213	0.2534	0	0.3249
ln-scale devs [1965+]	pF_DevsTCF 5		0.2209	0.434	0	0.3129
ln-scale devs [1965+]	pF_DevsTCF 6		0.02202	0.3146	0	0.3127
ln-scale devs [1965+]	pF_DevsTCF 7		-0.2003	0.1447	0	0.3077
ln-scale devs [1965+]	pF_DevsTCF 8		-0.3655	-0.01342	0	0.2797
ln-scale devs [1965+]	pF_DevsTCF 9		-0.5702	-0.2734	0	0.2159

Table 20. Parameter estimates for fisheries TCF mortality/capture rate devs .

description	param	index	value 2015AMO	value Model C	stdv 2015AMO	stdv Model C
ln-scale devs [1992+]	pF_DevsSCF1992		1.85	1.821	0	0.1186
ln-scale devs [1992+]	pF_DevsSCF1993		1.627	1.579	0	0.1257
ln-scale devs [1992+]	pF_DevsSCF1994		1.273	1.218	0	0.149
ln-scale devs [1992+]	pF_DevsSCF1995		1.276	1.206	0	0.1751
ln-scale devs [1992+]	pF_DevsSCF1996		0.1966	0.1478	0	0.4561
ln-scale devs [1992+]	pF_DevsSCF1997		0.7336	0.7503	0	0.3891
ln-scale devs [1992+]	pF_DevsSCF1998		0.4942	0.6729	0	0.4395
ln-scale devs [1992+]	pF_DevsSCF1999		-0.3819	-0.3261	0	0.6841
ln-scale devs [1992+]	pF_DevsSCF2000		-0.622	-0.6544	0	0.6612
ln-scale devs [1992+]	pF_DevsSCF2001		-0.5801	-0.6188	0	0.6298

description	param	index	value	value Model	stdv	stdv Model
			2015AMO	C	2015AMO	C
ln-scale devs [1992+]	pF_DevsSCF2002		-0.5681	-0.5474	0	0.5951
ln-scale devs [1992+]	pF_DevsSCF2003		-0.8117	-0.8531	0	0.5888
ln-scale devs [1992+]	pF_DevsSCF2004		-1.146	-1.083	0	0.5689
ln-scale devs [1992+]	pF_DevsSCF2005		-0.6494	-0.6097	0	0.504
ln-scale devs [1992+]	pF_DevsSCF2006		-0.3398	-0.3325	0	0.4196
ln-scale devs [1992+]	pF_DevsSCF2007		-0.2064	-0.2243	0	0.3499
ln-scale devs [1992+]	pF_DevsSCF2008		-0.6099	-0.6621	0	0.4299
ln-scale devs [1992+]	pF_DevsSCF2009		-0.4861	-0.5214	0	0.4248
ln-scale devs [1992+]	pF_DevsSCF2010		-0.4197	-0.3796	0	0.4345
ln-scale devs [1992+]	pF_DevsSCF2011		0.01307	0.08325	0	0.3501
ln-scale devs [1992+]	pF_DevsSCF2012		-0.5777	-0.526	0	0.4669
ln-scale devs [1992+]	pF_DevsSCF2013		-0.4793	-0.4941	0	0.3501
ln-scale devs [1992+]	pF_DevsSCF2014		0.4142	0.3534	0	0.1773
ln-scale devs [1992+]	pF_DevsSCF2015		NA	0.0005361	NA	0.2323

Table 21. Parameter estimates for fisheries SCF mortality/capture rate devs .

description	param	index	value	value Model	stdv	stdv Model
			2015AMO	C	2015AMO	C
ln-scale devs [1992+]	pF_DevsRKF 1		0	-0.1412	0	0.3561
ln-scale devs [1992+]	pF_DevsRKF10		0	-0.009504	0	0.3933
ln-scale devs [1992+]	pF_DevsRKF11		0	-0.02002	0	0.3911
ln-scale devs [1992+]	pF_DevsRKF12		0	-0.005217	0	0.3916
ln-scale devs [1992+]	pF_DevsRKF13		0	-0.02902	0	0.3877
ln-scale devs [1992+]	pF_DevsRKF14		0	0.009176	0	0.3997
ln-scale devs [1992+]	pF_DevsRKF15		0	0.009851	0	0.3992
ln-scale devs [1992+]	pF_DevsRKF16		0	0.01192	0	0.3992
ln-scale devs [1992+]	pF_DevsRKF17		0	0.02674	0	0.401

description	param	index	value 2015AMO	value Model C	stdv 2015AMO	stdv Model C
ln-scale devs [1992+]	pF_DevsRKF18		0	0.0172	0	0.3989
ln-scale devs [1992+]	pF_DevsRKF19		0	0.008294	0	0.3981
ln-scale devs [1992+]	pF_DevsRKF 2		0	-0.02859	0	0.3741
ln-scale devs [1992+]	pF_DevsRKF20		0	0.002897	0	0.3979
ln-scale devs [1992+]	pF_DevsRKF21		0	0.003038	0	0.3982
ln-scale devs [1992+]	pF_DevsRKF22		0	0.01013	0	0.3983
ln-scale devs [1992+]	pF_DevsRKF23		0	0.02512	0	0.3984
ln-scale devs [1992+]	pF_DevsRKF24		NA	-0.00686	NA	0.3931
ln-scale devs [1992+]	pF_DevsRKF 3		0	-0.07104	0	0.3689
ln-scale devs [1992+]	pF_DevsRKF 4		0	0.01187	0	0.3853
ln-scale devs [1992+]	pF_DevsRKF 5		0	0.08041	0	0.4039
ln-scale devs [1992+]	pF_DevsRKF 6		0	0.08178	0	0.4092
ln-scale devs [1992+]	pF_DevsRKF 7		0	0.01292	0	0.3976
ln-scale devs [1992+]	pF_DevsRKF 8		0	-0.001109	0	0.3959
ln-scale devs [1992+]	pF_DevsRKF 9		0	0.001211	0	0.3961

Table 22. Parameter estimates for fisheries RKF mortality/capture rate devs .

description	param	index	value 2015AMO	value Model C	stdv 2015AMO	stdv Model C
ln-scale devs [1973+]	pF_DevsGTH973		0.8448	1.1	0	0.1045
ln-scale devs [1973+]	pF_DevsGTH974		1.273	1.469	0	0.08161
ln-scale devs [1973+]	pF_DevsGTH975		0.4606	0.6096	0	0.07822
ln-scale devs [1973+]	pF_DevsGTH976		-0.02814	0.07746	0	0.09029
ln-scale devs [1973+]	pF_DevsGTH977		-0.2487	-0.2098	0	0.1181
ln-scale devs [1973+]	pF_DevsGTH978		-0.4198	-0.4403	0	0.156
ln-scale devs [1973+]	pF_DevsGTH979		0.2182	0.2331	0	0.1127
ln-scale devs [1973+]	pF_DevsGTH980		0.0456	-0.02168	0	0.1522

description	param	index	value 2015AMO	value Model C	stdv 2015AMO	stdv Model C
ln-scale devs [1973+]	pF_DevsGTH981		-0.07109	-0.2065	0	0.1925
ln-scale devs [1973+]	pF_DevsGTH982		-0.7261	-0.9161	0	0.3942
ln-scale devs [1973+]	pF_DevsGTH983		-0.1502	-0.413	0	0.3591
ln-scale devs [1973+]	pF_DevsGTH984		0.2517	-0.2044	0	0.3921
ln-scale devs [1973+]	pF_DevsGTH985		-0.2853	-0.6293	0	0.4777
ln-scale devs [1973+]	pF_DevsGTH986		-0.3679	-0.5482	0	0.3802
ln-scale devs [1973+]	pF_DevsGTH987		-0.6498	-0.7199	0	0.3776
ln-scale devs [1973+]	pF_DevsGTH988		-1.116	-1.104	0	0.4079
ln-scale devs [1973+]	pF_DevsGTH989		-1.033	-0.9517	0	0.3444
ln-scale devs [1973+]	pF_DevsGTH990		-0.7165	-0.6056	0	0.2799
ln-scale devs [1973+]	pF_DevsGTH991		0.3923	0.4937	0	0.1277
ln-scale devs [1973+]	pF_DevsGTH992		0.6863	0.7839	0	0.1192
ln-scale devs [1973+]	pF_DevsGTH993		0.5558	0.6352	0	0.165
ln-scale devs [1973+]	pF_DevsGTH994		1.068	1.128	0	0.1428
ln-scale devs [1973+]	pF_DevsGTH995		1.115	1.152	0	0.1811
ln-scale devs [1973+]	pF_DevsGTH996		1.473	1.487	0	0.1717
ln-scale devs [1973+]	pF_DevsGTH997		1.374	1.442	0	0.2321
ln-scale devs [1973+]	pF_DevsGTH998		1.066	1.119	0	0.3324
ln-scale devs [1973+]	pF_DevsGTH999		0.5314	0.5735	0	0.5015
ln-scale devs [1973+]	pF_DevsGTE000		0.6577	0.6482	0	0.4107
ln-scale devs [1973+]	pF_DevsGTE001		1.003	1.015	0	0.2527
ln-scale devs [1973+]	pF_DevsGTE002		0.3666	0.3961	0	0.3767
ln-scale devs [1973+]	pF_DevsGTE003		-0.2167	-0.1519	0	0.4806
ln-scale devs [1973+]	pF_DevsGTE004		-0.1253	-0.0009307	0	0.3687
ln-scale devs [1973+]	pF_DevsGTE005		-0.3531	-0.2226	0	0.3766

description	param	index	value	value Model	stdv	stdv Model
			2015AMO	C	2015AMO	C
ln-scale devs [1973+]	pF_DevsGTE006		-0.2895	-0.1745	0	0.3325
ln-scale devs [1973+]	pF_DevsGTE007		-0.3671	-0.2808	0	0.3313
ln-scale devs [1973+]	pF_DevsGTE008		-0.584	-0.5177	0	0.3744
ln-scale devs [1973+]	pF_DevsGTE009		-0.7691	-0.6727	0	0.4316
ln-scale devs [1973+]	pF_DevsGTE010		-0.881	-0.7459	0	0.4845
ln-scale devs [1973+]	pF_DevsGTE011		-0.8796	-0.7536	0	0.503
ln-scale devs [1973+]	pF_DevsGTE012		-1.057	-0.9462	0	0.5031
ln-scale devs [1973+]	pF_DevsGTE013		-1.017	-0.9322	0	0.4268
ln-scale devs [1973+]	pF_DevsGTE014		-1.03	-0.9635	0	0.3941
ln-scale devs [1973+]	pF_DevsGTE015		NA	-1.029	NA	0.4289

Table 23. Parameter estimates for fisheries GTF mortality/capture rate devs .

description	param	index	value	value	stdv	stdv Model
			2015AMO	Model C	2015AMO	C
size at 50%-selected [-1990]	pRetTCFM_z50A1		137.7	138.3	0	0.4633
size at 50%-selected [1991+]	pRetTCFM_z50A2		133.1	133	0	0.5927
slope [-1990]	pRetTCFM_slpA1		0.7907	0.6845	0	0.1209
slope [1991+]	pRetTCFM_slpA2		0.367	0.2546	0	0.01865

Table 24. Parameter estimates for fisheries TCF retention .

description	param	index	value	value	stdv	stdv
			2015AMO	Model C	2015AMO	Model C
female size at 50%-selected [all years]	pSelTCFF_z50		117.5	94.5	0	2.157
female slope [all years]	pSelTCFF_slp		0.1405	0.196	0	0.02035
male ln-scale devs in size at 50%-selected [1991+]	pSelTCFM_devsZ50		0.08323	0.1609	0	0.03071
male ln-scale devs in size at 50%-selected [1991+]	pSelTCFM_devsZ50		0.04608	0.03313	0	0.02221

description	param	index	value 2015AMO	value Model C	stdv 2015AMO	stdv Model C
male ln-scale devs in size at 50%-selected [1991+]	pSelTCFM_devsZ50	150	0.2191	0.2646	0	0.0202
male ln-scale devs in size at 50%-selected [1991+]	pSelTCFM_devsZ50	150	-0.0185	-0.01658	0	0.0217
male ln-scale devs in size at 50%-selected [1991+]	pSelTCFM_devsZ50	150	-0.04222	-0.04799	0	0.01917
male ln-scale devs in size at 50%-selected [1991+]	pSelTCFM_devsZ50	150	NA	-0.09001	NA	0.02161
male ln-scale devs in size at 50%-selected [1991+]	pSelTCFM_devsZ50	150	0.1301	0.1677	0	0.02231
male ln-scale devs in size at 50%-selected [1991+]	pSelTCFM_devsZ50	150	0.1002	0.1523	0	0.02604
male ln-scale devs in size at 50%-selected [1991+]	pSelTCFM_devsZ50	150	0.137	0.2455	0	0.02842
male ln-scale devs in size at 50%-selected [1991+]	pSelTCFM_devsZ50	150	-0.009329	-0.1167	0	0.09122
male ln-scale devs in size at 50%-selected [1991+]	pSelTCFM_devsZ50	150	-0.4311	-0.5005	0	0.01317
male ln-scale devs in size at 50%-selected [1991+]	pSelTCFM_devsZ50	150	-0.05624	-0.06913	0	0.0245
male ln-scale devs in size at 50%-selected [1991+]	pSelTCFM_devsZ50	150	-0.06404	-0.08556	0	0.02357
male ln-scale devs in size at 50%-selected [1991+]	pSelTCFM_devsZ50	150	-0.09431	-0.09775	0	0.02153
male ln-scale mean size at 50%-selected	pSelTCFM_mnLnZ50A2	150A2	4.832	4.757	0	0.01168
male slope [-1996]	pSelTCFM_slpA1		0.1141	0.08984	0	0.006701
male slope [1997+]	pSelTCFM_slpA2		0.1446	0.1793	0	0.0141

Table 25. Parameter estimates for fisheries TCF selectivity .

description	param	index	value 2015AMO	value Model C	stdv 2015AMO	stdv Model C
female size at 50%-selected [-1996]	pSelSCFF_z50A1		110.4	67.49	0	7.138

description	param	index	value 2015AMO	value Model C	stdv 2015AMO	stdv Model C
female size at 50%-selected [1997-2004]	pSelSCFF_z50A2		76.19	75.34	0	4.723
female size at 50%-selected [2005+]	pSelSCFF_z50A3		88.7	78.98	0	3.917
female slope [-1996]	pSelSCFF_slpA1		0.05	0.2065	0	0.1721
female slope [1997-2004]	pSelSCFF_slpA2		0.254	0.2711	0	0.1435
female slope [2005+]	pSelSCFF_slpA3		0.1348	0.206	0	0.06865
male ascending size at 50%-selected [-1996]	pSelSCFM_z50A1		86.8	87.61	0	1.468
male ascending size at 50%-selected [1997-2004]	pSelSCFM_z50A2		93.91	94.19	0	3.392
male ascending size at 50%-selected [2005+]	pSelSCFM_z50A3		103.6	104.9	0	1.61
male ascending slope [-1996]	pSelSCFM_slpA1		0.4043	0.4016	0	0.1341
male ascending slope [1997-2004]	pSelSCFM_slpA2		0.2318	0.2262	0	0.07431
male ascending slope [2005+]	pSelSCFM_slpA3		0.1786	0.172	0	0.01611
male descending ln-scale offset to size at 50%-selected [-1996]	pSelSCFM_lnZ50D1		3.972	3.957	0	0.03687
male descending ln-scale offset to size at 50%-selected [1997-2004]	pSelSCFM_lnZ50D2		3.801	3.793	0	0.1648
male descending ln-scale offset to size at 50%-selected [2005+]	pSelSCFM_lnZ50D3		3.531	3.485	0	0.09174
male descending slope [-1996]	pSelSCFM_slpD1		0.5	0.5	0	0.0003341
male descending slope [1997-2004]	pSelSCFM_slpD2		0.1771	0.1546	0	0.09008
male descending slope [2005+]	pSelSCFM_slpD3		0.1835	0.1761	0	0.02709

Table 26. Parameter estimates for fisheries SCF selectivity .

description	param	index	value 2015AMO	value Model C	stdv 2015AMO	stdv Model C
female size at 50%-selected [-1996]	pSelRKFF_z50A1		98.35	97.25	0	11.72
female size at 50%-selected [1997-2004]	pSelRKFF_z50A2		103.3	97.03	0	10.2

description	param	index	value	value	stdv	stdv Model
			2015AMO	Model C	2015AMO	C
female size at 50%-selected [2005+]	pSelRKFF_z50A3		157.1	114.7	0	17.97
female slope [-1996]	pSelRKFF_slpA1		0.2384	0.2101	0	0.1168
female slope [1997-2004]	pSelRKFF_slpA2		0.1795	0.204	0	0.14
female slope [2005+]	pSelRKFF_slpA3		0.1832	0.1644	0	0.06032
male size at 50%-selected [-1996]	pSelRKFM_z50A1		150	150	0	0.0006112
male size at 50%-selected [1997-2004]	pSelRKFM_z50A2		133.2	139	0	14.13
male size at 50%-selected [2005+]	pSelRKFM_z50A3		150	150	0	0.001334
male slope [-1996]	pSelRKFM_slpA1		0.1012	0.1131	0	0.01111
male slope [1997-2004]	pSelRKFM_slpA2		0.09151	0.08633	0	0.02292
male slope [2005+]	pSelRKFM_slpA3		0.08236	0.08519	0	0.006282

Table 27. Parameter estimates for fisheries RKF selectivity .

description	param	index	value	value	stdv	stdv Model
			2015AMO	Model C	2015AMO	C
female size at 50%-selected [-1987]	pSelGTFF_z50A1		125	40.08	0	1.45
female size at 50%-selected [1988-1996]	pSelGTFF_z50A2		159.2	40	0	0.000155
female size at 50%-selected [1997+]	pSelGTFF_z50A3		144	79.15	0	2.456
female slope [-1987]	pSelGTFF_slpA1		0.02868	0.1522	0	0.02319
female slope [1988-1996]	pSelGTFF_slpA2		0.01589	0.1832	0	0.03752
female slope [1997+]	pSelGTFF_slpA3		0.05204	0.07686	0	0.005855
male size at 50%-selected [-1987]	pSelGTFM_z50A1		57.07	54.73	0	1.833
male size at 50%-selected [1988-1996]	pSelGTFM_z50A2		72.61	66.4	0	4.993
male size at 50%-selected [1997+]	pSelGTFM_z50A3		83.19	84.67	0	2.008
male slope [-1987]	pSelGTFM_slpA1		0.1087	0.1035	0	0.009792
male slope [1988-1996]	pSelGTFM_slpA2		0.04273	0.0484	0	0.007576

description	param	index	value	value	stdv	stdv Model
			2015AMO	Model C	2015AMO	C
male slope [1997+]	pSelGTFM_slpA3		0.07776	0.0754	0	0.003877

Table 28. Parameter estimates for fisheries GTF selectivity .

Mature biomass-at-mating

year	2015AMO	Model C
1949	0	0
1950	0.01005	0.008918
1951	0.1737	0.1478
1952	1.362	1.157
1953	4.754	4.138
1954	8.656	7.769
1955	11.63	10.61
1956	13.84	12.74
1957	15.53	14.39
1958	16.92	15.75
1959	18.15	16.98
1960	19.43	18.23
1961	20.97	19.73
1962	23.15	21.84
1963	26.8	25.36
1964	34.23	32.52
1965	49.92	47.55
1966	90.17	84.19
1967	150.6	136.5
1968	233.5	200.1
1969	291.4	235.6
1970	317	244.9
1971	317.5	240.8
1972	305.4	236.2
1973	287.6	235.9
1974	257.2	229.8
1975	226.4	219.6
1976	171.8	179.3
1977	106.2	119
1978	70.3	81.14
1979	48.18	54.75
1980	31.15	44.87
1981	40.66	56.61
1982	37.88	54.89
1983	25.33	41.04
1984	12.79	25.72
1985	13.61	26.23
1986	19.12	32.59
1987	31.17	44.41
1988	48.32	58.52

year	2015AMO	Model C
1989	60.28	63.34
1990	55.1	54.34
1991	55.11	52.54
1992	48.23	45.21
1993	40.85	39.52
1994	31.48	31.41
1995	22.85	23.13
1996	17.66	18.08
1997	14.71	15.22
1998	13.22	13.87
1999	13.39	14.29
2000	15.17	16.28
2001	18.42	19.8
2002	21.49	23.13
2003	26.2	27.68
2004	32.9	33.84
2005	41.89	41.61
2006	46.77	46.33
2007	51.35	51.29
2008	58.42	58.87
2009	57.44	58.45
2010	50.95	51.7
2011	45.1	45.17
2012	46.55	46.23
2013	60.59	61.21
2014	71.57	75.41
2015	NA	73.93

Table 29. Estimated MMB-at-mating time (1000's t).

year	2015AMO	Model C
1949	0	0
1950	0.03301	0.03094
1951	0.2882	0.2727
1952	1.118	1.057
1953	2.308	2.209
1954	3.321	3.22
1955	4.057	3.965
1956	4.598	4.517
1957	5.019	4.962
1958	5.38	5.344
1959	5.737	5.727
1960	6.156	6.171
1961	6.736	6.748
1962	7.681	7.673
1963	9.537	9.51
1964	13.89	13.91
1965	24.34	24.27
1966	45.29	43.67
1967	74.94	68.6
1968	103	89

year	2015AMO	Model C
1969	118.9	98.44
1970	121.9	98.91
1971	117.2	96.41
1972	109.7	93.91
1973	101.5	92.69
1974	92.15	89.36
1975	82.26	82.97
1976	71.14	71.79
1977	60.04	60.02
1978	53.83	55.33
1979	55.1	57.4
1980	52.06	56.04
1981	44.44	49.72
1982	33.31	40.52
1983	22.76	30.76
1984	15.2	23.06
1985	12.51	20.04
1986	13.67	20.61
1987	18.02	23.76
1988	25.34	28.51
1989	32.2	32.64
1990	35.06	34.31
1991	34.72	34.01
1992	30.23	30.61
1993	24.02	24.97
1994	17.98	18.96
1995	13.28	14.18
1996	10	10.76
1997	7.628	8.519
1998	6.265	7.255
1999	5.832	6.877
2000	6.165	7.289
2001	6.697	7.903
2002	7.508	8.787
2003	8.932	10.23
2004	11.16	12.37
2005	13.08	14.36
2006	14.4	16.02
2007	16.09	18.15
2008	16.27	18.55
2009	14.25	16.43
2010	12.07	13.94
2011	11.5	13.3
2012	14.58	16.97
2013	19.73	23.36
2014	22.01	26.71
2015	NA	24.9

Table 30. Estimated MFB-at-mating time (1000's t).

Recruitment

year	2015AMO	Model C
1949	59.68	55.5
1950	59.82	55.65
1951	60.16	55.99
1952	60.79	56.62
1953	61.83	57.66
1954	63.47	59.3
1955	66.02	61.84
1956	70	65.8
1957	76.35	72.11
1958	86.92	82.65
1959	105.9	101.7
1960	144.8	141.2
1961	243.6	242.9
1962	534.9	537.9
1963	1245	1177
1964	1931	1615
1965	1929	1450
1966	1546	1119
1967	1215	914.8
1968	1016	862.8
1969	926.1	946.3
1970	879.7	1045
1971	737.4	887.8
1972	572.6	653.8
1973	458.6	402.4
1974	299.8	303.1
1975	376.5	606.3
1976	1114	1094
1977	829.2	863.9
1978	381.1	441.6
1979	126.1	175.2
1980	57.85	93.15
1981	76.54	134.3
1982	39.31	90.73
1983	275.7	345.2
1984	266.6	321.8
1985	673.1	505.7
1986	517.9	466.2
1987	485.6	451
1988	444	439.7
1989	168.7	190.9
1990	70.95	73.68
1991	40.76	42.9
1992	30.74	32.61
1993	27.74	30.27
1994	31.32	37.96
1995	41.62	50.53
1996	46.14	51.67
1997	113.8	127.6
1998	46.05	52.35

year	2015AMO	Model C
1999	140.6	152.7
2000	84.99	90.77
2001	279.2	276.6
2002	108.8	105
2003	185	209.3
2004	306.4	322
2005	87.26	93.97
2006	70.87	72.47
2007	52.92	48.53
2008	61	60.51
2009	354.6	395.2
2010	422.9	492.1
2011	251.1	286.8
2012	52.2	49.61
2013	115.8	124.1
2014	124	99.47
2015	80.71	69.67
2016	NA	120

Table 31. Estimated recruitment (millions).

Mature survey biomass

year	observed	2015AMO	Model C
1975	246	155.1	148.1
1976	126.2	133.7	133.6
1977	110.6	102.2	105.5
1978	77.6	68.29	75.14
1979	32.21	59.04	66.99
1980	86.15	61.48	63.01
1981	49.36	46.38	53.76
1982	48.97	58.9	68.14
1983	28.46	37.31	49.07
1984	24.17	21.45	32.61
1985	11.36	12.96	23.01
1986	12.81	18.33	28.78
1987	24.08	31.57	40.73
1988	60.43	51.14	55.24
1989	91.93	76.99	70.24
1990	96.29	85.74	74.42
1991	109.7	74.51	64.83
1992	103.2	68.36	60.06
1993	60.14	50.42	45.05
1994	42.13	35.97	32.9
1995	31.1	25.86	23.93
1996	26.26	18.56	17.32
1997	10.69	14.64	13.91
1998	10.29	12.87	12.46
1999	12.45	12.64	12.41

year	observed	2015AMO	Model C
2000	16.15	14.34	14.12
2001	17.85	17.63	17.37
2002	17.8	20.19	20
2003	23.32	24.36	23.71
2004	26.35	30.56	28.99
2005	43.14	39.6	36.28
2006	64.2	44.92	41
2007	66.44	49.34	45.36
2008	62.71	55.27	51.33
2009	36.32	53.94	50.67
2010	37.61	47.22	44.26
2011	41.49	41.93	38.81
2012	41.18	42.95	39.36
2013	65.66	57.42	53.43
2014	79.47	73.84	71.11
2015	60.18	72.59	72.18
2016	NA	NA	59.11

Table 32. Observed and estimated mature male survey biomass (1000's t).

year	observed	2015AMO	Model C
1975	31.71	46.41	47.76
1976	31.44	40.4	42
1977	38.76	34.51	35.8
1978	26.18	30.86	32.72
1979	19.65	32.15	34.7
1980	64.16	34.17	36.48
1981	43.06	28.17	31.54
1982	64.43	25.2	25.7
1983	20.61	17.18	19.19
1984	15.01	11.59	14.48
1985	5.629	8.507	11.75
1986	3.452	9.275	12.3
1987	5.193	12.26	14.27
1988	25.47	17.22	16.98
1989	19.5	22.24	19.81
1990	37.84	24.76	21.4
1991	45.03	24.55	21.21
1992	26.47	21.78	19.09
1993	11.74	16.94	15.32
1994	10.01	12.59	11.61
1995	12.72	9.241	8.605
1996	9.797	6.87	6.482
1997	3.514	5.328	5.095
1998	2.315	4.329	4.313
1999	3.877	3.947	4.044
2000	4.181	4.159	4.28
2001	4.607	4.527	4.656
2002	4.495	5.067	5.156
2003	8.436	6.008	5.989
2004	4.903	7.489	7.237

year	observed	2015AMO	Model C
2005	11.62	8.787	8.348
2006	15.04	9.693	9.321
2007	13.53	10.85	10.57
2008	11.73	10.97	10.8
2009	8.556	9.64	9.583
2010	5.524	8.144	8.122
2011	5.493	7.756	7.737
2012	12.5	9.752	9.821
2013	17.98	13.24	13.55
2014	14.95	15	15.62
2015	11.29	13.78	14.58
2016	NA	NA	12.39

Table 33. Observed and estimated mature female survey biomass (1000's t).

Retained catch

year	observed	2015AMO	Model C
1965	1.923	1.952	1.952
1966	2.445	2.475	2.474
1967	13.6	13.59	13.59
1968	18	18	18
1969	27.49	27.48	27.48
1970	25.49	25.49	25.49
1971	20.71	20.71	20.71
1972	16.91	16.9	16.9
1973	13.03	13.02	13.02
1974	15.24	15.22	15.22
1975	17.65	17.65	17.64
1976	30.02	30	30
1977	35.53	35.51	35.51
1978	21.09	21.09	21.07
1979	19.01	18.84	18.92
1980	13.43	13.45	13.44
1981	4.99	5.072	5.047
1982	2.391	2.479	2.465
1983	0.5489	0.7278	0.7838
1984	1.429	1.531	1.496
1985	0	0	0
1986	0	0	0
1987	0.998	0.9314	1.014
1988	3.18	3.044	3.065
1989	11.11	10.97	10.96
1990	18.19	18.04	18.01
1991	14.43	14.32	14.28
1992	15.92	14.85	15.22
1993	7.666	7.184	7.523
1994	3.538	3.695	3.839
1995	1.919	1.871	1.98

year	observed	2015AMO	Model C
1996	0.821	0.5067	0.7165
1997	0	0	0
1998	0	0	0
1999	0	0	0
2000	0	0	0
2001	0	0	0
2002	0	0	0
2003	0	0	0
2004	0	0	0
2005	0.4309	0.5047	0.5973
2006	0.9617	0.9845	1.129
2007	0.9571	1.018	1.203
2008	0.88	0.9588	0.9983
2009	0.6026	0.7265	0.7622
2010	0	0	0
2011	0	0	0
2012	0	0	0
2013	1.248	1.064	1.223
2014	6.158	4.955	5.67
2015	NA	NA	8.1

Table 34. Observed and estimated retained catch (1000's t).

Total catch mortality

/Users/WilliamStockhausen/StockAssessments-Crab/Assessments/TannerCrab/2016-09/AssessmentModelRuns/NewData/Mo
2016C/ModelComparison.TotalCatch.TCF.male.csv

year	observed	2015AMO	Model C
1992	17.9	18.68	18.37
1993	8.909	9.282	8.974
1994	4.543	4.467	4.267
1995	2.806	2.965	2.864
1996	0.8583	1.278	1.162
2005	0.5792	0.8221	0.7888
2006	1.402	1.554	1.472
2007	1.612	1.754	1.62
2008	1.018	1.221	1.184
2009	0.6255	0.7528	0.7723
2013	1.372	1.636	1.582
2014	6.966	7.769	7.413
2015	NA	NA	10.54

Table 35. Observed and estimated total male catch mortality biomass (1000's t) in TCF.

/Users/WilliamStockhausen/StockAssessments-Crab/Assessments/TannerCrab/2016-09/AssessmentModelRuns/NewData/Mo
2016C/ModelComparison.TotalCatch.TCF.female.csv

year	observed	2015AMO	Model C
1992	0.3225	0.9321	0.783
1993	0.33	0.3723	0.3465
1994	0.4077	0.2285	0.2615
1995	0.565	0.07253	0.06108
1996	0.01434	0.01694	0.02066
2005	0.01412	0.008495	0.008019
2006	0.114	0.0156	0.01444
2007	0.03113	0.01654	0.01642
2008	0.004368	0.01706	0.01326
2009	0.0007281	0.03234	0.02348
2013	0.007428	0.01854	0.01849
2014	0.01243	0.08142	0.0802
2015	NA	NA	0.1084

Table 36. Observed and estimated total female catch mortality biomass (1000's t) in TCF.

/Users/WilliamStockhausen/StockAssessments-Crab/Assessments/TannerCrab/2016-09/AssessmentModelRuns/NewData/Mo
2016C/ModelComparison.TotalCatch.SCF.male.csv

year	observed	2015AMO	Model C
1992	8.269	8.162	8.198
1993	4.664	4.641	4.681
1994	2.287	2.308	2.345
1995	1.54	1.647	1.667
1996	0.2674	0.4126	0.4327
1997	0.5616	0.5076	0.5723
1998	0.6385	0.3641	0.4885
1999	0.2232	0.1574	0.1871
2000	0.04674	0.1505	0.1618
2001	0.1038	0.1842	0.1986
2002	0.1788	0.2132	0.2409
2003	0.06193	0.2064	0.215
2004	0.02513	0.1926	0.2131
2005	0.3106	0.3169	0.328
2006	0.4693	0.4537	0.4583
2007	0.601	0.5963	0.5927
2008	0.3591	0.4337	0.4239
2009	0.4249	0.437	0.44
2010	0.4314	0.4037	0.434
2011	0.6801	0.5586	0.6063
2012	0.381	0.3632	0.3798
2013	0.5881	0.5756	0.5815
2014	1.728	1.617	1.643
2015	NA	NA	1.051

Table 37. Observed and estimated total male catch mortality biomass (1000's t) in SCF.

/Users/WilliamStockhausen/StockAssessments-Crab/Assessments/TannerCrab/2016-09/AssessmentModelRuns/NewData/Mo
2016C/ModelComparison.TotalCatch.SCF.female.csv

year	observed	2015AMO	Model C
1992	0.5738	1.218	1.109
1993	0.5822	0.7547	0.6816
1994	0.4081	0.3929	0.3558
1995	0.5646	0.2902	0.2619
1996	0.07355	0.07454	0.06941
1997	0.07259	0.3167	0.08665
1998	0.05622	0.2046	0.06872
1999	0.0466	0.0793	0.02417
2000	0.006962	0.06687	0.01879
2001	0.003563	0.07608	0.02116
2002	0.01184	0.08665	0.02538
2003	0.008456	0.08091	0.02182
2004	0.004416	0.07287	0.02114
2005	0.0138	0.07322	0.03321
2006	0.05432	0.1096	0.04868
2007	0.03271	0.1395	0.06188
2008	0.0159	0.09667	0.04089
2009	0.004597	0.09743	0.0415
2010	0.005022	0.08819	0.0405
2011	0.004337	0.1263	0.06094
2012	0.002776	0.08444	0.04235
2013	0.004927	0.1274	0.06095
2014	0.01612	0.361	0.1635
2015	NA	NA	0.1064

Table 38. Observed and estimated total female catch mortality biomass (1000's t) in SCF.

/Users/WilliamStockhausen/StockAssessments-Crab/Assessments/TannerCrab/2016-09/AssessmentModelRuns/NewData/Mo
2016C/ModelComparison.TotalCatch.RKF.male.csv

year	observed	2015AMO	Model C
1992	0.3813	0.05833	0.03174
1993	0.9526	0.04874	0.03148
1994	0	0.03651	0.02363
1995	0	0.02658	0.01909
1996	0.008674	0.02049	0.01595
1997	0.05291	0.03566	0.02584
1998	0.0381	0.03236	0.02248
1999	0.02454	0.03273	0.02305
2000	0.02137	0.03722	0.02659
2001	0.01379	0.04693	0.03324
2002	0.01982	0.05529	0.03942
2003	0.01787	0.06686	0.04747
2004	0.01539	0.08356	0.0568
2005	0.01351	0.05799	0.04807
2006	0.008403	0.06826	0.05611
2007	0.01808	0.07293	0.06016
2008	0.08648	0.08427	0.07134
2009	0.0483	0.08726	0.07454
2010	0.01051	0.0777	0.06607
2011	0.005605	0.06826	0.05711
2012	0.0135	0.06474	0.05318

year	observed	2015AMO	Model C
2013	0.03639	0.08051	0.06631
2014	0.09495	0.1041	0.09037
2015	NA	NA	0.09235

Table 39. Observed and estimated total male catch mortality biomass (1000's t) in RKF.

/Users/WilliamStockhausen/StockAssessments-Crab/Assessments/TannerCrab/2016-09/AssessmentModelRuns/NewData/Mo
2016C/ModelComparison.TotalCatch.RKF.female.csv

year	observed	2015AMO	Model C
1992	0.009223	0.02474	0.2931
1993	0.06348	0.02016	0.279
1994	0	0.01513	0.2053
1995	0	0.01104	0.1646
1996	0.001375	0.008187	0.1311
1997	0.0009669	0.004153	0.1041
1998	0.0009392	0.003302	0.07974
1999	0.001251	0.002925	0.07131
2000	0.0007645	0.00299	0.07346
2001	0.0005664	0.003381	0.08175
2002	0.0008795	0.003739	0.08866
2003	0.001041	0.004375	0.1039
2004	0.0009072	0.005359	0.1211
2005	0.0005781	6.176e-07	0.02215
2006	0.0008124	7.018e-07	0.02522
2007	0.002943	7.65e-07	0.02832
2008	0.001417	8.59e-07	0.03263
2009	0.0003304	8.303e-07	0.03135
2010	0.0003171	7.06e-07	0.02649
2011	2.301e-05	6.025e-07	0.02252
2012	0.00043	6.056e-07	0.02308
2013	0.0003977	8.191e-07	0.03224
2014	0.0003172	1.079e-06	0.04408
2015	NA	NA	0.04541

Table 40. Observed and estimated total female catch mortality biomass (1000's t) in RKF.

/Users/WilliamStockhausen/StockAssessments-Crab/Assessments/TannerCrab/2016-09/AssessmentModelRuns/NewData/Mo
2016C/ModelComparison.TotalCatch.GTF.male.csv

year	observed	2015AMO	Model C
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Table 41. Observed and estimated total male catch mortality biomass (1000's t) in GTF.

/Users/WilliamStockhausen/StockAssessments-Crab/Assessments/TannerCrab/2016-09/AssessmentModelRuns/NewData/Mo
2016C/ModelComparison.TotalCatch.GTF.female.csv

year	observed	2015AMO	Model C
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Table 42. Observed and estimated total female catch mortality biomass (1000's t) in GTF.