WHAM figures and tables

Diagnostics

Results

Tables

Parameter estimates

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Table 1. Parameter estimates, standard errors, and confidence intervals. Rounded to 3 decimal places.

	Estimate	Std. Error	95% CI lower	95% CI upper
stock 1 Mean Recruitment	2681785.253	691559.728	1617790.169	4445553.127
stock 1 NAA σ (age 1)	0.823	0.127	0.608	1.114
stock 1 NAA σ (ages 2-8+)	0.257	0.044	0.184	0.360
stock 1 NAA AR1 ρ age	0.837	0.061	0.670	0.923
Shrimp fully selected q	1.267×10^{-5}	2.052×10^{-6}	9.220×10^{-6}	1.740×10^{-5}
Acoust fully selected q	3.451×10^{-5}	6.172×10^{-6}	2.431×10^{-5}	4.900×10^{-5}
SprAlb85 fully selected q	7.684×10^{-6}	1.216×10^{-6}	5.634×10^{-6}	1.048×10^{-5}
FallAlb85 fully selected q	1.196×10^{-5}	2.259×10^{-6}	8.260×10^{-6}	1.732×10^{-5}
SprBig fully selected q	4.447×10^{-5}	7.864×10^{-6}	3.145×10^{-5}	6.290×10^{-5}
FallBig fully selected q	7.393×10^{-5}	1.986×10^{-5}	4.367×10^{-5}	1.252×10^{-4}
Block 1: Mobile Selectivity for age 1	3.541×10^{-4}	9.066×10^{-5}	2.144×10^{-4}	5.848×10^{-4}
Block 1: Mobile Selectivity for age 2	0.089	0.016	0.062	0.127
Block 1: Mobile Selectivity for age 3	0.342	0.056	0.242	0.459
Block 1: Mobile Selectivity for age 4	0.447	0.066	0.324	0.576
Block 1: Mobile Selectivity for age 5	0.540	0.067	0.408	0.666
Block 1: Mobile Selectivity for age 6	0.718	0.067	0.571	0.830
Block 1: Mobile Selectivity for age 7	1.000	–	–	–
Block 1: Mobile Selectivity for age 8+	1.000	–	–	–
Block 2: Fixed Selectivity for age 1	0.038	0.007	0.027	0.053
Block 2: Fixed Selectivity for age 2	1.000	–	–	–
Block 2: Fixed Selectivity for age 3	0.238	0.038	0.171	0.321
Block 2: Fixed Selectivity for age 4	0.103	0.024	0.065	0.160

Table 1. Parameter estimates, standard errors, and confidence intervals. Rounded to 3 decimal places. *(continued)*

	Estimate	Std. Error	95% CI lower	95% CI upper
Block 2: Fixed Selectivity for age 5	0.069	0.019	0.040	0.117
Block 2: Fixed Selectivity for age 6	0.062	0.019	0.034	0.112
Block 2: Fixed Selectivity for age 7	0.059	0.020	0.030	0.112
Block 2: Fixed Selectivity for age 8+	0.041	0.013	0.021	0.076
Block 3: Shrimp Selectivity for age 1	0.000	—	—	—
Block 3: Shrimp Selectivity for age 2	0.000	—	—	—
Block 3: Shrimp Selectivity for age 3	0.058	0.026	0.024	0.134
Block 3: Shrimp Selectivity for age 4	1.000	—	—	—
Block 3: Shrimp Selectivity for age 5	1.000	—	—	—
Block 3: Shrimp Selectivity for age 6	1.000	—	—	—
Block 3: Shrimp Selectivity for age 7	1.000	—	—	—
Block 3: Shrimp Selectivity for age 8+	1.000	—	—	—
Block 4: Acoust Selectivity for age 1	0.000	—	—	—
Block 4: Acoust Selectivity for age 2	0.000	—	—	—
Block 4: Acoust Selectivity for age 3	1.000	—	—	—
Block 4: Acoust Selectivity for age 4	1.000	—	—	—
Block 4: Acoust Selectivity for age 5	1.000	—	—	—
Block 4: Acoust Selectivity for age 6	1.000	—	—	—
Block 4: Acoust Selectivity for age 7	1.000	—	—	—
Block 4: Acoust Selectivity for age 8+	1.000	—	—	—
Block 5: SprAlb85 Selectivity for age 1	0.000	—	—	—
Block 5: SprAlb85 Selectivity for age 2	0.344	0.051	0.252	0.450

Table 1. Parameter estimates, standard errors, and confidence intervals. Rounded to 3 decimal places. *(continued)*

	Estimate	Std. Error	95% CI lower	95% CI upper
Block 5: SprAlb85 Selectivity for age 3	1.000	–	–	–
Block 5: SprAlb85 Selectivity for age 4	1.000	–	–	–
Block 5: SprAlb85 Selectivity for age 5	1.000	–	–	–
Block 5: SprAlb85 Selectivity for age 6	1.000	–	–	–
Block 5: SprAlb85 Selectivity for age 7	1.000	–	–	–
Block 5: SprAlb85 Selectivity for age 8+	1.000	–	–	–
Block 6: FallAlb85 a_{50}	2.737	0.141	2.468	3.020
Block 6: FallAlb85 1/slope (increasing)	0.353	0.042	0.279	0.446
Block 7: SprBig Selectivity for age 1	0.000	–	–	–
Block 7: SprBig Selectivity for age 2	0.138	0.033	0.085	0.218
Block 7: SprBig Selectivity for age 3	0.591	0.100	0.391	0.764
Block 7: SprBig Selectivity for age 4	1.000	–	–	–
Block 7: SprBig Selectivity for age 5	1.000	–	–	–
Block 7: SprBig Selectivity for age 6	1.000	–	–	–
Block 7: SprBig Selectivity for age 7	1.000	–	–	–
Block 7: SprBig Selectivity for age 8+	1.000	–	–	–
Block 8: FallBig a_{50}	3.822	0.293	3.254	4.396
Block 8: FallBig 1/slope (increasing)	0.476	0.062	0.368	0.612
Mobile in region 1 age comp, logistic-normal: σ	12.092	1.338	9.735	15.020
Mobile in region 1 age comp, logistic-normal: ρ	0.823	0.041	0.729	0.889
Fixed in region 1 age comp, logistic-normal: σ	25.828	2.442	21.459	31.085
Fixed in region 1 age comp, logistic-normal: ρ	0.819	0.036	0.739	0.879

Table 1. Parameter estimates, standard errors, and confidence intervals. Rounded to 3 decimal places. *(continued)*

	Estimate	Std. Error	95% CI lower	95% CI upper
Shrimp in region 1 age comp, logistic–normal: σ	22.908	5.922	13.802	38.022
Shrimp in region 1 age comp, logistic–normal: ρ	0.809	0.107	0.521	0.943
SprAlb85 in region 1 age comp, logistic–normal: σ	23.202	3.163	17.762	30.308
SprAlb85 in region 1 age comp, logistic–normal: ρ	0.884	0.034	0.798	0.936
FallAlb85 in region 1 age comp, logistic–normal: σ	23.193	3.341	17.489	30.759
FallAlb85 in region 1 age comp, logistic–normal: ρ	0.936	0.020	0.883	0.966
SprBig in region 1 age comp, logistic–normal: σ	15.531	2.750	10.977	21.973
SprBig in region 1 age comp, logistic–normal: ρ	0.754	0.093	0.534	0.892
FallBig in region 1 age comp, logistic–normal: σ	22.040	3.721	15.830	30.684
FallBig in region 1 age comp, logistic–normal: ρ	0.849	0.055	0.708	0.929

Abundance at age

Table 2. Abundance at age (1000s) for stock 1 in region 1.

	1	2	3	4	5	6	7	8+
1987	1699605	1137682	557477	648249	106129	50463	11422	5205
1988	3147936	1895172	679620	509637	583998	93874	31287	7388
1989	2630725	2241917	645900	340597	258008	330485	56460	20256
1990	2765059	2120813	859602	406837	199765	147285	197231	42203
1991	3072060	3142320	1344905	750208	281379	116478	80918	131525
1992	2311434	3238064	2549602	1016189	472019	161086	62508	102665
1993	2102126	1678794	1427657	1052011	485608	179295	58030	52902
1994	1983424	1888322	805547	918885	718260	349536	110065	55966
1995	10626515	2219232	1484903	951954	1258160	868092	351698	133038
1996	6173868	9378816	1566265	1025093	650565	751538	400238	180315
1997	3566101	3040668	4363434	717653	413092	277431	222723	137768
1998	1334064	2327337	1265139	1979726	412424	206151	131680	127055
1999	4424329	1218468	1499199	879347	1164339	265580	105917	95584
2000	2089196	4467079	745724	801924	564281	535140	115516	65661
2001	1701005	1519325	3163053	548845	559517	431442	320947	87711
2002	7912179	1590699	994045	2389651	536342	395578	228948	152230
2003	4882349	3150872	685821	487743	1137864	333390	199936	152601
2004	4278474	4879525	2976047	743909	471800	707533	211654	149671
2005	902536	1161590	1111325	875344	294061	188199	204095	89963
2006	4531274	1029182	1182912	1133863	701314	205901	101731	107414
2007	1229424	3372146	676436	625753	623559	384904	100139	76728
2008	2577870	593435	1281930	294878	223153	239717	152844	66863
2009	18049505	3905905	888034	967559	173887	120022	100158	67313
2010	2760384	17106419	2738791	455149	416504	68658	40076	38573
2011	2553525	1171252	4576835	740069	129194	94071	16578	16271
2012	8273074	1436500	623303	2026438	305313	55995	31445	9454
2013	3156182	7204628	1047923	428460	1018817	133741	21992	10435
2014	3501396	1274724	2997599	432301	228289	494096	60589	11690
2015	1016230	1406251	448000	1226898	220627	151445	282620	34852
2016	404250	570597	753850	285328	617906	123531	83575	148219

Table 2. Abundance at age (1000s) for stock 1 in region 1. *(continued)*

	1	2	3	4	5	6	7	8+
2017	1895652	265838	364712	393500	172119	303039	57795	92838
2018	620777	874182	92502	92399	96678	52176	86112	43386
2019	6261230	722025	694654	53252	51060	47842	21979	31905
2020	2399339	1888356	229595	168680	11550	12888	12311	12809
2021	1350415	1034886	676440	83544	46468	3817	3554	5616
2022	1624236	791918	536750	321098	49909	27232	2120	4533
2023	2556448	1160838	553824	265058	153844	26010	13189	3034

Fishing mortality at age by region

Table 3. Total fishing mortality at age in region 1.

	1	2	3	4	5	6	7	8+
1987	0.025	0.739	0.482	0.493	0.560	0.725	0.992	0.980
1988	0.028	0.792	0.377	0.339	0.369	0.469	0.633	0.619
1989	0.031	0.870	0.424	0.385	0.421	0.536	0.724	0.709
1990	0.024	0.676	0.325	0.293	0.319	0.406	0.548	0.536
1991	0.010	0.309	0.288	0.324	0.377	0.494	0.682	0.677
1992	0.010	0.303	0.243	0.265	0.306	0.399	0.549	0.544
1993	0.017	0.482	0.287	0.285	0.320	0.413	0.563	0.555
1994	0.013	0.380	0.229	0.228	0.257	0.332	0.453	0.446
1995	0.005	0.162	0.158	0.179	0.209	0.274	0.379	0.376
1996	0.002	0.079	0.148	0.184	0.220	0.292	0.405	0.404
1997	0.004	0.151	0.206	0.247	0.292	0.386	0.534	0.533
1998	0.009	0.296	0.264	0.294	0.342	0.448	0.617	0.613
1999	0.009	0.292	0.286	0.325	0.380	0.498	0.687	0.683
2000	0.003	0.125	0.230	0.285	0.341	0.452	0.627	0.626
2001	0.007	0.224	0.224	0.256	0.300	0.393	0.543	0.539
2002	0.004	0.144	0.156	0.180	0.212	0.279	0.385	0.383
2003	0.003	0.114	0.202	0.250	0.298	0.395	0.548	0.547
2004	0.004	0.135	0.147	0.170	0.200	0.263	0.363	0.361
2005	0.009	0.296	0.316	0.365	0.429	0.564	0.779	0.775

Table 3. Total fishing mortality at age in region 1. *(continued)*

	1	2	3	4	5	6	7	8+
2006	0.007	0.233	0.263	0.307	0.361	0.476	0.658	0.654
2007	0.008	0.272	0.252	0.283	0.330	0.432	0.596	0.592
2008	0.006	0.238	0.326	0.391	0.464	0.612	0.848	0.845
2009	0.001	0.102	0.312	0.403	0.486	0.646	0.899	0.899
2010	0.001	0.060	0.148	0.189	0.227	0.301	0.418	0.418
2011	0.002	0.104	0.239	0.303	0.364	0.482	0.671	0.670
2012	0.001	0.084	0.301	0.392	0.473	0.629	0.876	0.876
2013	0.001	0.089	0.279	0.361	0.435	0.578	0.805	0.805
2014	0.001	0.074	0.211	0.271	0.326	0.434	0.603	0.603
2015	0.001	0.072	0.231	0.299	0.360	0.479	0.666	0.666
2016	0.005	0.181	0.251	0.303	0.359	0.474	0.656	0.654
2017	0.004	0.153	0.214	0.258	0.305	0.403	0.559	0.557
2018	0.015	0.535	0.686	0.816	0.965	1.272	1.762	1.755
2019	0.010	0.294	0.207	0.217	0.248	0.322	0.441	0.436
2020	0.003	0.106	0.151	0.182	0.216	0.285	0.395	0.394
2021	0.005	0.157	0.111	0.117	0.133	0.173	0.237	0.235
2022	0.003	0.087	0.056	0.058	0.065	0.084	0.116	0.114
2023	0.001	0.039	0.082	0.103	0.124	0.164	0.228	0.227

Fishing mortality at age by fleet

Table 4. Total fishing mortality at age in Mobile.

	1	2	3	4	5	6	7	8+
1987	0.000	0.085	0.326	0.426	0.514	0.684	0.953	0.953
1988	0.000	0.052	0.201	0.263	0.318	0.423	0.589	0.589
1989	0.000	0.060	0.231	0.302	0.365	0.485	0.676	0.676
1990	0.000	0.045	0.175	0.228	0.275	0.366	0.510	0.510
1991	0.000	0.059	0.228	0.298	0.360	0.479	0.667	0.667
1992	0.000	0.048	0.183	0.238	0.288	0.383	0.534	0.534
1993	0.000	0.048	0.184	0.240	0.290	0.386	0.538	0.538
1994	0.000	0.039	0.148	0.193	0.233	0.310	0.432	0.432

Table 4. Total fishing mortality at age in Mobile. *(continued)*

	1	2	3	4	5	6	7	8+
1995	0.000	0.033	0.127	0.166	0.200	0.266	0.371	0.371
1996	0.000	0.036	0.138	0.180	0.217	0.289	0.402	0.402
1997	0.000	0.047	0.181	0.236	0.285	0.379	0.528	0.528
1998	0.000	0.054	0.206	0.269	0.325	0.433	0.603	0.603
1999	0.000	0.060	0.230	0.301	0.364	0.484	0.674	0.674
2000	0.000	0.056	0.213	0.278	0.336	0.447	0.623	0.623
2001	0.000	0.047	0.182	0.238	0.287	0.382	0.532	0.532
2002	0.000	0.034	0.130	0.169	0.204	0.272	0.379	0.379
2003	0.000	0.048	0.186	0.243	0.294	0.391	0.544	0.544
2004	0.000	0.032	0.122	0.160	0.193	0.256	0.357	0.357
2005	0.000	0.068	0.262	0.342	0.413	0.550	0.766	0.766
2006	0.000	0.058	0.221	0.289	0.349	0.465	0.647	0.647
2007	0.000	0.052	0.199	0.260	0.315	0.418	0.583	0.583
2008	0.000	0.075	0.287	0.374	0.452	0.602	0.838	0.838
2009	0.000	0.080	0.307	0.401	0.485	0.645	0.898	0.898
2010	0.000	0.037	0.143	0.186	0.225	0.299	0.417	0.417
2011	0.000	0.060	0.229	0.298	0.361	0.480	0.668	0.668
2012	0.000	0.078	0.300	0.391	0.473	0.629	0.876	0.876
2013	0.000	0.072	0.275	0.359	0.434	0.577	0.804	0.804
2014	0.000	0.054	0.206	0.269	0.325	0.432	0.602	0.602
2015	0.000	0.059	0.228	0.297	0.359	0.478	0.666	0.666
2016	0.000	0.058	0.222	0.290	0.350	0.466	0.649	0.649
2017	0.000	0.049	0.189	0.247	0.298	0.397	0.553	0.553
2018	0.001	0.155	0.595	0.777	0.939	1.249	1.739	1.739
2019	0.000	0.038	0.146	0.190	0.230	0.306	0.426	0.426
2020	0.000	0.035	0.134	0.175	0.211	0.281	0.391	0.391
2021	0.000	0.020	0.078	0.102	0.124	0.165	0.229	0.229
2022	0.000	0.010	0.038	0.050	0.060	0.080	0.111	0.111
2023	0.000	0.020	0.077	0.101	0.122	0.163	0.226	0.226

Table 5. Total fishing mortality at age in Fixed.

	1	2	3	4	5	6	7	8+
1987	0.025	0.654	0.156	0.067	0.045	0.041	0.039	0.027
1988	0.028	0.740	0.176	0.076	0.051	0.046	0.044	0.030
1989	0.031	0.810	0.193	0.084	0.056	0.050	0.048	0.033
1990	0.024	0.630	0.150	0.065	0.044	0.039	0.037	0.026
1991	0.009	0.250	0.059	0.026	0.017	0.016	0.015	0.010
1992	0.010	0.256	0.061	0.026	0.018	0.016	0.015	0.010
1993	0.016	0.434	0.103	0.045	0.030	0.027	0.026	0.018
1994	0.013	0.342	0.081	0.035	0.024	0.021	0.020	0.014
1995	0.005	0.129	0.031	0.013	0.009	0.008	0.008	0.005
1996	0.002	0.043	0.010	0.004	0.003	0.003	0.003	0.002
1997	0.004	0.104	0.025	0.011	0.007	0.006	0.006	0.004
1998	0.009	0.242	0.058	0.025	0.017	0.015	0.014	0.010
1999	0.009	0.232	0.055	0.024	0.016	0.014	0.014	0.009
2000	0.003	0.070	0.017	0.007	0.005	0.004	0.004	0.003
2001	0.007	0.177	0.042	0.018	0.012	0.011	0.010	0.007
2002	0.004	0.110	0.026	0.011	0.008	0.007	0.007	0.004
2003	0.002	0.065	0.016	0.007	0.005	0.004	0.004	0.003
2004	0.004	0.103	0.025	0.011	0.007	0.006	0.006	0.004
2005	0.009	0.228	0.054	0.024	0.016	0.014	0.014	0.009
2006	0.007	0.175	0.042	0.018	0.012	0.011	0.010	0.007
2007	0.008	0.220	0.052	0.023	0.015	0.014	0.013	0.009
2008	0.006	0.163	0.039	0.017	0.011	0.010	0.010	0.007
2009	0.001	0.022	0.005	0.002	0.002	0.001	0.001	0.001
2010	0.001	0.022	0.005	0.002	0.002	0.001	0.001	0.001
2011	0.002	0.044	0.011	0.005	0.003	0.003	0.003	0.002
2012	0.000	0.006	0.001	0.001	0.000	0.000	0.000	0.000
2013	0.001	0.018	0.004	0.002	0.001	0.001	0.001	0.001
2014	0.001	0.021	0.005	0.002	0.001	0.001	0.001	0.001
2015	0.000	0.013	0.003	0.001	0.001	0.001	0.001	0.001
2016	0.005	0.123	0.029	0.013	0.009	0.008	0.007	0.005
2017	0.004	0.104	0.025	0.011	0.007	0.006	0.006	0.004

Table 5. Total fishing mortality at age in Fixed. *(continued)*

	1	2	3	4	5	6	7	8+
2018	0.014	0.380	0.090	0.039	0.026	0.024	0.022	0.015
2019	0.010	0.256	0.061	0.026	0.018	0.016	0.015	0.010
2020	0.003	0.071	0.017	0.007	0.005	0.004	0.004	0.003
2021	0.005	0.137	0.033	0.014	0.009	0.009	0.008	0.006
2022	0.003	0.077	0.018	0.008	0.005	0.005	0.005	0.003
2023	0.001	0.019	0.005	0.002	0.001	0.001	0.001	0.001