WHAM figures and tables

WHAM Tables

	Estimate	Std. Error	95\\% CI lower	95\\% CI upper

stock 1 mean log(R) intercept 2.062982e+01 1.201449e+00 1.827502e+01 2.298461e+01 stock 1 NAA *sigma* (age 1) 6.232443e-01 8.013748e-02 4.844063e-01 8.018752e-01 Shrimp fully selected q 1.061853e-05 8.586465e-07 9.062203e-06 1.244214e-05 Acoust fully selected q 3.301148e-05 1.995006e-06 2.932403e-05 3.716261e-05 SprAlb85 fully selected q 6.618899e-06 5.014314e-07 5.705594e-06 7.678399e-06 FallAlb85 fully selected q 1.118641e-05 1.299679e-06 8.908302e-06 1.404709e-05 Estimate Std. Error 95\% CI lower stock 1 mean log(R) intercept 20.630 1.201 18.275 stock 1 NAA
sigma (age 1) 0.623 0.080 0.484 Shrimp fully selected q 1.062
$times10^{-5}$ 8.586
$times10^{-7}$ 9.062
$times10^{-6}$ Acoust fully selected q 3.301
$times10^{-5}$ 1.995
$times10^{-6}$ 2.932
$times10^{-5}$ SprAlb85 fully selected q 6.619
$times10^{-6}$ 5.014
$times10^{-7}$ 5.706
$times10^{-6}$ FallAlb85 fully selected q 1.119
$times10^{-5}$ 1.300
$times10^{-6}$ 8.908
$times10^{-6}$ 95\% CI upper stock 1 mean log(R) intercept 22.985 stock 1 NAA
sigma (age 1) 0.802 Shrimp fully selected q 1.244
$times10^{-5}$ Acoust fully selected q 3.716
$times10^{-5}$ SprAlb85 fully selected q 7.678
$times10^{-6}$ FallAlb85 fully selected q 1.405
$times10^{-5}$

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 log(R) intercept	20.630	1.201	18.275	22.985
stock 1 NAA σ (age 1)	0.623	0.080	0.484	0.802
Shrimp fully selected q	1.062×10^{-5}	8.586×10^{-7}	9.062×10^{-6}	1.244×10^{-5}
Acoust fully selected q	3.301×10^{-5}	1.995×10^{-6}	2.932×10^{-5}	3.716×10^{-5}
SprAlb85 fully selected q	6.619×10^{-6}	5.014×10^{-7}	5.706×10^{-6}	7.678×10^{-6}
FallAlb85 fully selected q	1.119×10^{-5}	1.300×10^{-6}	8.908×10^{-6}	1.405×10^{-5}
SprBig fully selected q	3.639×10^{-5}	4.709×10^{-6}	2.824×10^{-5}	4.690×10^{-5}
FallBig fully selected q	4.551×10^{-5}	6.737×10^{-6}	3.405×10^{-5}	6.083×10^{-5}
Mobile Selectivity for age 1 (Block 1)	4.173×10^{-4}	9.658×10^{-5}	2.651×10^{-4}	6.567×10^{-4}
Mobile Selectivity for age 2 (Block 1)	0.089	0.015	0.064	0.124
Mobile Selectivity for age 3 (Block 1)	0.328	0.050	0.238	0.433
Mobile Selectivity for age 4 (Block 1)	0.425	0.061	0.311	0.547
Mobile Selectivity for age 5 (Block 1)	0.527	0.068	0.395	0.655
Mobile Selectivity for age 6 (Block 1)	0.715	0.072	0.558	0.833
Mobile Selectivity for age 7 (Block 1)	1.000	–	–	–
Mobile Selectivity for age 8+ (Block 1)	1.000	–	–	–
Fixed Selectivity for age 1 (Block 2)	0.038	0.007	0.027	0.053
Fixed Selectivity for age 2 (Block 2)	1.000	–	–	–
Fixed Selectivity for age 3 (Block 2)	0.217	0.036	0.156	0.296
Fixed Selectivity for age 4 (Block 2)	0.089	0.021	0.056	0.139
Fixed Selectivity for age 5 (Block 2)	0.060	0.017	0.035	0.102
Fixed Selectivity for age 6 (Block 2)	0.057	0.018	0.031	0.104

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

	Estimate	Std. Error	95% CI lower	95% CI upper
Fixed Selectivity for age 7 (Block 2)	0.055	0.019	0.028	0.107
Fixed Selectivity for age 8+ (Block 2)	0.040	0.014	0.020	0.079
Shrimp Selectivity for age 1 (Block 3)	0.000	–	–	–
Shrimp Selectivity for age 2 (Block 3)	0.000	–	–	–
Shrimp Selectivity for age 3 (Block 3)	0.106	0.038	0.051	0.208
Shrimp Selectivity for age 4 (Block 3)	1.000	–	–	–
Shrimp Selectivity for age 5 (Block 3)	1.000	–	–	–
Shrimp Selectivity for age 6 (Block 3)	1.000	–	–	–
Shrimp Selectivity for age 7 (Block 3)	1.000	–	–	–
Shrimp Selectivity for age 8+ (Block 3)	1.000	–	–	–
Acoust Selectivity for age 1 (Block 4)	0.000	–	–	–
Acoust Selectivity for age 2 (Block 4)	0.000	–	–	–
Acoust Selectivity for age 3 (Block 4)	1.000	–	–	–
Acoust Selectivity for age 4 (Block 4)	1.000	–	–	–
Acoust Selectivity for age 5 (Block 4)	1.000	–	–	–
Acoust Selectivity for age 6 (Block 4)	1.000	–	–	–
Acoust Selectivity for age 7 (Block 4)	1.000	–	–	–
Acoust Selectivity for age 8+ (Block 4)	1.000	–	–	–
SprAlb85 Selectivity for age 1 (Block 5)	0.000	–	–	–
SprAlb85 Selectivity for age 2 (Block 5)	0.315	0.049	0.228	0.418
SprAlb85 Selectivity for age 3 (Block 5)	1.000	–	–	–
SprAlb85 Selectivity for age 4 (Block 5)	1.000	–	–	–

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

	Estimate	Std. Error	95% CI lower	95% CI upper
SprAlb85 Selectivity for age 5 (Block 5)	1.000	–	–	–
SprAlb85 Selectivity for age 6 (Block 5)	1.000	–	–	–
SprAlb85 Selectivity for age 7 (Block 5)	1.000	–	–	–
SprAlb85 Selectivity for age 8+ (Block 5)	1.000	–	–	–
FallAlb85 a_{50} (Block 6)	2.843	0.154	2.549	3.152
FallAlb85 1/slope (increasing) (Block 6)	0.374	0.045	0.295	0.474
SprBig Selectivity for age 1 (Block 7)	0.000	–	–	–
SprBig Selectivity for age 2 (Block 7)	0.300	0.072	0.180	0.456
SprBig Selectivity for age 3 (Block 7)	0.942	0.168	0.039	1.000
SprBig Selectivity for age 4 (Block 7)	1.000	–	–	–
SprBig Selectivity for age 5 (Block 7)	1.000	–	–	–
SprBig Selectivity for age 6 (Block 7)	1.000	–	–	–
SprBig Selectivity for age 7 (Block 7)	1.000	–	–	–
SprBig Selectivity for age 8+ (Block 7)	1.000	–	–	–
FallBig a_{50} (Block 8)	3.204	0.206	2.810	3.614
FallBig 1/slope (increasing) (Block 8)	0.428	0.058	0.328	0.556
Mobile age comp, logistic-normal: σ	16.809	1.647	13.871	20.368
Mobile age comp, logistic-normal: ρ	0.881	0.025	0.823	0.922
Fixed age comp, logistic-normal: σ	29.575	2.728	24.684	35.435
Fixed age comp, logistic-normal: ρ	0.847	0.031	0.777	0.898
Shrimp age comp, logistic-normal: σ	15.828	3.570	10.173	24.627
Shrimp age comp, logistic-normal: ρ	0.738	0.129	0.432	0.912

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

	Estimate	Std. Error	95% CI lower	95% CI upper
SprAlb85 age comp, logistic-normal: σ	21.687	2.536	17.245	27.274
SprAlb85 age comp, logistic-normal: ρ	0.827	0.045	0.720	0.898
FallAlb85 age comp, logistic-normal: σ	21.556	2.794	16.720	27.790
FallAlb85 age comp, logistic-normal: ρ	0.898	0.029	0.827	0.942
SprBig age comp, logistic-normal: σ	17.858	2.680	13.308	23.964
SprBig age comp, logistic-normal: ρ	0.766	0.079	0.580	0.886
FallBig age comp, logistic-normal: σ	24.025	3.870	17.521	32.944
FallBig age comp, logistic-normal: ρ	0.873	0.045	0.755	0.939
Ecov Haddock Predation on Eggs: RW Ecov_1	14.563	0.230	14.112	15.013
Ecov Haddock Predation on Eggs: RW σ	0.503	0.089	0.355	0.711
stock 1 Recruitment Ecov: Haddock Predation on Eggs β_1	−0.435	0.089	−0.609	−0.261
Ecov: Haddock Predation on Eggs obs. sd.	0.250	0.094	0.120	0.522

Abundance at age

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

	1	2	3	4	5	6	7	8+
1987	3865618	1830696	906307	965581	168708	66845	13462	6208
1988	5010980	2685167	841946	486353	513821	85537	30402	7597
1989	5563942	3458003	1038214	435877	255456	258618	38682	14620
1990	6511099	3847042	1402789	535969	225842	126087	113748	19709
1991	6357209	4527386	1833491	785263	299769	121639	62212	57667
1992	4458195	4448569	2518788	1005164	413679	148609	53408	43842
1993	4359508	3116094	2410181	1395624	540111	210511	67658	37448
1994	3697575	3042825	1651236	1411106	811573	303753	109878	49042
1995	8455420	2584665	1686444	997082	847723	474282	166870	79547
1996	4128422	5929078	1534465	975915	557623	451365	229145	102810
1997	4291919	2901074	3701554	876603	530875	286043	207030	128573
1998	3285118	3010446	1727350	2102719	477842	273702	132260	131660
1999	8740126	2297501	1662447	974913	1153865	249393	128916	106541
2000	3135890	6121967	1313230	921950	518766	578435	111102	87800
2001	2419783	2205155	3919409	774380	520782	278594	282230	83959
2002	4458192	1695998	1295469	2279727	437019	280602	136831	156361
2003	3791327	3127829	1029322	777018	1332191	245549	145795	135416
2004	2583896	2664721	1978459	608282	441289	720728	121054	120487
2005	1697950	1807677	1492461	1144737	344198	239156	357211	104680
2006	4576578	1189305	1040341	852615	633174	181045	113730	188607
2007	1907876	3203038	664760	572174	450683	315148	79915	111424
2008	3466066	1331983	1674138	358033	298071	221034	136568	68864
2009	9116558	2432444	795617	912511	184444	143163	92794	70375
2010	1814446	6413333	1514452	400477	418575	76451	49127	42081
2011	1921442	1275334	3981376	823958	204181	198054	31418	30293
2012	5761119	1351189	804357	2200120	427636	98706	83773	21332
2013	1197171	4057561	885210	443154	1128425	203288	40769	35096
2014	1384329	842391	2584663	477844	222379	522727	81115	24156
2015	606005	974225	545441	1471231	256747	112113	233962	39354
2016	255046	426675	637413	308906	783435	127926	49370	99837

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

	1	2	3	4	5	6	7	8+
2017	1325988	178633	242813	349557	162051	385897	55648	53846
2018	627218	928933	102088	132260	181549	78811	164961	38536
2019	1247882	436298	424760	46139	55870	68976	24202	45295
2020	1069255	864433	188074	232134	25501	29802	33670	29765
2021	945300	749063	507947	115232	140534	15001	16496	32049
2022	1745848	661569	434787	328145	75126	90759	9432	29350
2023	3897857	1225983	422151	292226	221363	50386	59937	25040

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	0.014	0.427	0.272	0.281	0.329	0.438	0.603	0.597
1988	0.021	0.600	0.308	0.294	0.337	0.444	0.607	0.598
1989	0.019	0.552	0.311	0.308	0.356	0.471	0.647	0.639
1990	0.013	0.391	0.230	0.231	0.269	0.356	0.490	0.484
1991	0.007	0.236	0.251	0.291	0.352	0.473	0.657	0.654
1992	0.008	0.263	0.240	0.271	0.326	0.437	0.606	0.603
1993	0.010	0.285	0.185	0.192	0.226	0.300	0.414	0.410
1994	0.008	0.240	0.154	0.160	0.187	0.249	0.343	0.340
1995	0.005	0.171	0.197	0.231	0.280	0.377	0.525	0.523
1996	0.003	0.121	0.210	0.259	0.318	0.429	0.599	0.598
1997	0.005	0.168	0.216	0.257	0.312	0.421	0.586	0.585
1998	0.008	0.244	0.222	0.250	0.300	0.403	0.559	0.556
1999	0.006	0.209	0.240	0.281	0.341	0.459	0.638	0.635
2000	0.002	0.096	0.178	0.221	0.272	0.368	0.513	0.512
2001	0.005	0.182	0.192	0.222	0.268	0.361	0.501	0.499
2002	0.004	0.149	0.161	0.187	0.226	0.305	0.423	0.422
2003	0.003	0.108	0.176	0.216	0.264	0.357	0.498	0.497
2004	0.007	0.230	0.197	0.219	0.263	0.352	0.488	0.485
2005	0.006	0.202	0.210	0.242	0.292	0.393	0.546	0.544

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

	1	2	3	4	5	6	7	8+
2006	0.007	0.232	0.248	0.288	0.348	0.468	0.650	0.647
2007	0.009	0.299	0.269	0.302	0.362	0.486	0.674	0.670
2008	0.004	0.165	0.257	0.313	0.383	0.518	0.722	0.720
2009	0.002	0.124	0.336	0.429	0.531	0.720	1.005	1.005
2010	0.003	0.127	0.259	0.324	0.398	0.539	0.753	0.752
2011	0.002	0.111	0.243	0.306	0.377	0.510	0.713	0.712
2012	0.001	0.073	0.246	0.318	0.394	0.534	0.747	0.747
2013	0.001	0.101	0.267	0.340	0.420	0.569	0.795	0.794
2014	0.001	0.085	0.213	0.271	0.335	0.454	0.634	0.634
2015	0.001	0.074	0.219	0.280	0.347	0.470	0.657	0.657
2016	0.006	0.214	0.251	0.295	0.358	0.482	0.671	0.668
2017	0.006	0.209	0.258	0.305	0.371	0.500	0.695	0.693
2018	0.013	0.433	0.444	0.512	0.618	0.831	1.153	1.148
2019	0.017	0.491	0.254	0.243	0.278	0.367	0.502	0.496
2020	0.006	0.182	0.140	0.152	0.181	0.241	0.334	0.332
2021	0.007	0.194	0.087	0.078	0.087	0.114	0.155	0.152
2022	0.003	0.099	0.047	0.044	0.049	0.065	0.089	0.087
2023	0.001	0.033	0.063	0.079	0.097	0.131	0.183	0.182

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	0.052	0.191	0.247	0.307	0.416	0.582	0.582
1988	0	0.051	0.189	0.245	0.304	0.412	0.576	0.576
1989	0	0.055	0.203	0.263	0.326	0.443	0.619	0.619
1990	0	0.042	0.154	0.200	0.248	0.337	0.471	0.471
1991	0	0.058	0.212	0.275	0.341	0.463	0.647	0.647
1992	0	0.053	0.195	0.252	0.313	0.425	0.594	0.594
1993	0	0.036	0.131	0.170	0.211	0.286	0.400	0.400
1994	0	0.030	0.109	0.141	0.175	0.237	0.331	0.331

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

	1	2	3	4	5	6	7	8+
1995	0	0.046	0.170	0.220	0.273	0.370	0.518	0.518
1996	0	0.053	0.195	0.253	0.313	0.426	0.595	0.595
1997	0	0.052	0.190	0.246	0.306	0.415	0.580	0.580
1998	0	0.049	0.180	0.233	0.289	0.392	0.548	0.548
1999	0	0.056	0.206	0.267	0.331	0.450	0.629	0.629
2000	0	0.046	0.167	0.217	0.269	0.365	0.510	0.510
2001	0	0.044	0.162	0.210	0.260	0.353	0.494	0.494
2002	0	0.037	0.137	0.177	0.220	0.298	0.417	0.417
2003	0	0.044	0.162	0.210	0.260	0.354	0.494	0.494
2004	0	0.043	0.156	0.203	0.251	0.341	0.477	0.477
2005	0	0.048	0.176	0.228	0.283	0.384	0.538	0.538
2006	0	0.057	0.210	0.272	0.337	0.458	0.640	0.640
2007	0	0.059	0.217	0.281	0.348	0.473	0.661	0.661
2008	0	0.064	0.235	0.304	0.377	0.512	0.716	0.716
2009	0	0.090	0.329	0.426	0.529	0.718	1.004	1.004
2010	0	0.067	0.246	0.318	0.395	0.536	0.749	0.749
2011	0	0.063	0.233	0.302	0.374	0.508	0.710	0.710
2012	0	0.067	0.245	0.317	0.393	0.534	0.747	0.747
2013	0	0.071	0.260	0.337	0.418	0.567	0.793	0.793
2014	0	0.056	0.207	0.269	0.333	0.452	0.632	0.632
2015	0	0.059	0.215	0.279	0.346	0.469	0.656	0.656
2016	0	0.059	0.217	0.281	0.349	0.474	0.662	0.662
2017	0	0.061	0.225	0.292	0.362	0.491	0.687	0.687
2018	0	0.101	0.372	0.482	0.598	0.812	1.135	1.135
2019	0	0.043	0.157	0.203	0.252	0.342	0.478	0.478
2020	0	0.029	0.107	0.138	0.171	0.233	0.325	0.325
2021	0	0.013	0.048	0.062	0.076	0.104	0.145	0.145
2022	0	0.007	0.027	0.035	0.044	0.060	0.083	0.083
2023	0	0.016	0.060	0.077	0.096	0.130	0.182	0.182

Table 5. Total fishing mortality at age in Fixed.

	1	2	3	4	5	6	7	8+
1987	0.014	0.375	0.082	0.033	0.022	0.021	0.021	0.015
1988	0.021	0.549	0.119	0.049	0.033	0.031	0.030	0.022
1989	0.019	0.497	0.108	0.044	0.030	0.028	0.028	0.020
1990	0.013	0.349	0.076	0.031	0.021	0.020	0.019	0.014
1991	0.007	0.179	0.039	0.016	0.011	0.010	0.010	0.007
1992	0.008	0.210	0.046	0.019	0.013	0.012	0.012	0.008
1993	0.009	0.249	0.054	0.022	0.015	0.014	0.014	0.010
1994	0.008	0.211	0.046	0.019	0.013	0.012	0.012	0.008
1995	0.005	0.125	0.027	0.011	0.007	0.007	0.007	0.005
1996	0.003	0.068	0.015	0.006	0.004	0.004	0.004	0.003
1997	0.004	0.117	0.025	0.010	0.007	0.007	0.006	0.005
1998	0.007	0.195	0.042	0.017	0.012	0.011	0.011	0.008
1999	0.006	0.153	0.033	0.014	0.009	0.009	0.008	0.006
2000	0.002	0.050	0.011	0.005	0.003	0.003	0.003	0.002
2001	0.005	0.138	0.030	0.012	0.008	0.008	0.008	0.006
2002	0.004	0.112	0.024	0.010	0.007	0.006	0.006	0.004
2003	0.002	0.064	0.014	0.006	0.004	0.004	0.004	0.003
2004	0.007	0.187	0.041	0.017	0.011	0.011	0.010	0.007
2005	0.006	0.155	0.034	0.014	0.009	0.009	0.009	0.006
2006	0.007	0.175	0.038	0.016	0.010	0.010	0.010	0.007
2007	0.009	0.240	0.052	0.021	0.014	0.014	0.013	0.010
2008	0.004	0.101	0.022	0.009	0.006	0.006	0.006	0.004
2009	0.001	0.034	0.007	0.003	0.002	0.002	0.002	0.001
2010	0.002	0.060	0.013	0.005	0.004	0.003	0.003	0.002
2011	0.002	0.048	0.010	0.004	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	0.030	0.007	0.003	0.002	0.002	0.002	0.001
2014	0.001	0.028	0.006	0.003	0.002	0.002	0.002	0.001
2015	0.001	0.016	0.003	0.001	0.001	0.001	0.001	0.001
2016	0.006	0.155	0.034	0.014	0.009	0.009	0.009	0.006
2017	0.006	0.148	0.032	0.013	0.009	0.008	0.008	0.006

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

	1	2	3	4	5	6	7	8+
2018	0.012	0.331	0.072	0.030	0.020	0.019	0.018	0.013
2019	0.017	0.449	0.098	0.040	0.027	0.026	0.025	0.018
2020	0.006	0.153	0.033	0.014	0.009	0.009	0.008	0.006
2021	0.007	0.181	0.039	0.016	0.011	0.010	0.010	0.007
2022	0.003	0.092	0.020	0.008	0.005	0.005	0.005	0.004
2023	0.001	0.017	0.004	0.002	0.001	0.001	0.001	0.001