Appendix E. Jittering

Jittering of scenarios 1 and 9 parameter estimates:

We followed the Stock Synthesis approach to do 100 jittering of scenarios 1 and 9 parameter estimates to use as initial parameter values to assess model stability and to determine whether a global as opposed to local minima has been found by the search algorithm:

The *Jitter* factor of 0.1 was multiplied by a random normal deviation $rdev=N(0,1)$, to a transformed parameter value based upon the predefined parameter:

$$temp = 0.5 * rdev * Jitterfactor * \ln\left(\frac{P_{\max} - P_{\min} + 0.0000002}{P_{val} - P_{\min} + 0.0000001} - 1\right), \quad \text{(E.1)}$$

with the final jittered initial parameter value back transformed as:

$$P_{new} = P_{\min} + \frac{P_{\max} - P_{\min}}{1.0 + \exp(-2.0\ temp)}, \quad \text{(E.2)}$$

where P_{max} and P_{min} are upper and lower bounds of parameter search space and P_{val} is the estimated parameter value before the jittering.

Examples of jittered parameter values for the 1st and 100th jitter for scenario 1 for EAG and WAG are listed in Tables E.1 and E.2. There were significant differences in the initial input parameter values at each jitter. The model results are summarized for scenarios 1 and 9 respectively in Tables E.3 and E.4 for EAG and Tables E.5 and E.6 for WAG. Almost all runs converged to the highest log likelihood values.

Table E.1. An example of the first and 100th jittered parameter values for scenario 1 compared to the original estimates for EAG.

Parameter	Original Parameter Value	Lower Bound	Upper Bound	Phase	Jitter#1	Jitter#100
rec_dev	-0.007621209	-5	5	2	-0.00074	-0.00003
rec_dev	-0.00983545	-5	5	2	-0.00113	0.001764
rec_dev	-0.012666822	-5	5	2	0.000609	0.002454
rec_dev	-0.016270708	-5	5	2	0.001421	-0.00013
rec_dev	-0.020830832	-5	5	2	-0.0007	0.002063
rec_dev	-0.02656543	-5	5	2	0.002309	-0.00314
rec_dev	-0.033718004	-5	5	2	0.002944	0.005426
rec_dev	-0.042549431	-5	5	2	-0.00144	-0.00361
rec_dev	-0.053324882	-5	5	2	0.00127	-0.01131
rec_dev	-0.066278019	-5	5	2	-0.004	0.006071
rec_dev	-0.081570571	-5	5	2	-0.00056	-0.00713
rec_dev	-0.099226953	-5	5	2	0.010832	0.013719
rec_dev	-0.119047323	-5	5	2	-0.02062	0.000781
rec_dev	-0.140503671	-5	5	2	-0.0355	0.001759
rec_dev	-0.162598904	-5	5	2	0.012222	0.00039
rec_dev	-0.183698125	-5	5	2	-0.00834	0.001598

rec_dev	-0.201256782	-5	5	2	0.006619	0.021168
rec_dev	-0.211319519	-5	5	2	0.000672	-0.03371
rec_dev	-0.207502036	-5	5	2	-0.00411	-0.0309
rec_dev	-0.180503692	-5	5	2	0.012694	-0.01542
rec_dev	-0.123342735	-5	5	2	0.001442	0.005442
rec_dev	-0.045201645	-5	5	2	0.00158	0.006621
rec_dev	0.029136582	-5	5	2	0.001061	0.001725
rec_dev	0.089402495	-5	5	2	0.007221	-0.0029
rec_dev	-0.384889343	-5	5	2	0.073548	0.047674
rec_dev	-0.902906835	-5	5	2	-0.0292	-0.08789
rec_dev	0.533564639	-5	5	2	0.037675	0.032778
rec_dev	0.44687304	-5	5	2	-0.01543	0.061101
rec_dev	-0.314047153	-5	5	2	0.023384	-0.01654
rec_dev	0.122576429	-5	5	2	-0.0039	-0.01561
rec_dev	0.412310368	-5	5	2	-0.02322	0.053463
rec_dev	-0.110123222	-5	5	2	-0.01218	-0.01082
rec_dev	-0.218632463	-5	5	2	0.025955	0.001872
rec_dev	0.006943443	-5	5	2	-0.00051	-9.2E-05
rec_dev	-0.046282794	-5	5	2	0.007969	-0.00549
rec_dev	-0.083888349	-5	5	2	-0.003	-0.00738
rec_dev	0.233016956	-5	5	2	-0.00577	0.047905
rec_dev	0.148955659	-5	5	2	0.017582	-0.02326
rec_dev	0.227641561	-5	5	2	0.020397	0.001212
rec_dev	0.168044398	-5	5	2	0.001588	0.0343
rec_dev	-0.108887188	-5	5	2	0.002945	0.002444
rec_dev	0.162407336	-5	5	2	-0.0209	0.009928
rec_dev	0.005113551	-5	5	2	0.000296	-0.00046
rec_dev	-0.160627991	-5	5	2	-0.0144	-0.01982
rec_dev	0.259949544	-5	5	2	0.012919	-0.00678
rec_dev	-0.00396377	-5	5	2	-6.1E-05	1.73E-05
rec_dev	-0.056389469	-5	5	2	0.004747	-0.00215
rec_dev	0.473415636	-5	5	2	0.050748	-0.02824
rec_dev	0.075169026	-5	5	2	-0.00795	0.007863
rec_dev	0.021190701	-5	5	2	0.000501	-0.00144
rec_dev	0.310880604	-5	5	2	-0.02787	-0.05911
rec_dev	0.294577467	-5	5	2	0.015264	-0.01329
rec_dev	0.109759588	-5	5	2	-0.00244	-0.01763
rec_dev	0.220969046	-5	5	2	-0.00903	-0.02374
rec_dev	0.084173082	-5	5	2	-0.00864	0.003339
rec_dev	0.000000172	-5	5	2	8.33E-09	1.28E-08
Fpot_dev	-2.043206656	-5	5	2	-0.2088	0.161353
Fpot_dev	-1.005945946	-5	5	2	-0.02969	-0.04945
Fpot_dev	-0.676481111	-5	5	2	-0.01163	-0.03165
Fpot_dev	-0.413911035	-5	5	2	0.037401	-0.05638
Fpot_dev	0.112602025	-5	5	2	0.009003	-0.00208
Fpot_dev	0.401936857	-5	5	2	0.035761	0.016653
Fpot_dev	0.178418014	-5	5	2	0.026166	-0.01577
Fpot_dev	0.765136564	-5	5	2	0.076145	-0.05429
Fpot_dev	1.17570096	-5	5	2	-0.06934	-0.06232
Fpot_dev	0.56061169	-5	5	2	-0.04209	0.079606
Fpot_dev	0.769584182	-5	5	2	-0.00569	0.02741
Fpot_dev	0.892126133	-5	5	2	-0.06133	0.069375
Fpot_dev	0.409840495	-5	5	2	-0.03908	-0.02549
Fpot_dev	0.677542871	-5	5	2	0.088008	0.024399

Fpot_dev	0.914433283	-5	5	2	0.045073	0.030075
Fpot_dev	0.594511978	-5	5	2	0.031985	0.037231
Fpot_dev	0.559553031	-5	5	2	-0.0054	0.035317
Fpot_dev	0.476766604	-5	5	2	-0.05612	-0.01349
Fpot_dev	0.246789033	-5	5	2	0.006829	0.014387
Fpot_dev	0.114871314	-5	5	2	0.001589	0.010866
Fpot_dev	-0.05005792	-5	5	2	0.001826	0.003591
Fpot_dev	-0.299486201	-5	5	2	-0.00262	0.049051
Fpot_dev	-0.339042566	-5	5	2	-0.00339	0.047638
Fpot_dev	-0.433904962	-5	5	2	0.020182	0.070041
Fpot_dev	-0.291197186	-5	5	2	-0.05808	0.026351
Fpot_dev	-0.240779046	-5	5	2	-0.01305	-0.00896
Fpot_dev	-0.292344124	-5	5	2	-0.04096	-0.0097
Fpot_dev	-0.274120848	-5	5	2	-0.01807	-0.02918
Fpot_dev	-0.258960118	-5	5	2	0.018398	-0.04268
Fpot_dev	-0.34871274	-5	5	2	0.061286	0.029559
Fpot_dev	-0.396008834	-5	5	2	-0.03428	-0.00575
Fpot_dev	-0.374943981	-5	5	2	0.020376	0.040815
Fpot_dev	-0.368594822	-5	5	2	-0.09801	0.045321
Fpot_dev	-0.404710921	-5	5	2	0.003849	0.006273
Fpot_dev	-0.338016015	-5	5	2	-0.02806	-0.00015
Fground_dev	0.174390609	-10	15	2	2.337762	2.581353
Fground_dev	1.35546881	-10	15	2	2.388202	2.398121
Fground_dev	0.000000201	-10	15	2	2.284926	2.810396
Fground_dev	0.672768389	-10	15	2	2.610206	2.929459
Fground_dev	0.702294918	-10	15	2	2.6574	2.732086
Fground_dev	-0.515785649	-10	15	2	2.7874	2.460403
Fground_dev	0.537155944	-10	15	2	2.414025	2.308584
Fground_dev	-2.415444682	-10	15	2	2.935845	2.473627
Fground_dev	-1.56355901	-10	15	2	2.381744	2.802964
Fground_dev	0.388375903	-10	15	2	2.271547	2.444883
Fground_dev	-0.468543028	-10	15	2	2.462521	2.810034
Fground_dev	-0.269970599	-10	15	2	2.853102	2.409323
Fground_dev	0.838013548	-10	15	2	2.327215	2.555227
Fground_dev	0.016126262	-10	15	2	2.177965	2.09686
Fground_dev	-0.462605641	-10	15	2	2.922303	2.682303
Fground_dev	-1.774804578	-10	15	2	2.447922	2.460607
Fground_dev	-0.878071988	-10	15	2	2.771126	2.617666
Fground_dev	0.004524048	-10	15	2	2.867741	2.143513
Fground_dev	-0.001948155	-10	15	2	2.653258	2.264557
Fground_dev	0.110353853	-10	15	2	2.43473	2.638914
Fground_dev	0.382225092	-10	15	2	2.179648	2.714046
Fground_dev	1.110836887	-10	15	2	2.72255	2.628658
Fground_dev	0.331671068	-10	15	2	2.568864	2.918852
Fground_dev	1.426410285	-10	15	2	2.489174	2.546676
Fground_dev	0.848886418	-10	15	2	2.491412	2.522649
Fground_dev	0.963284595	-10	15	2	2.349253	2.535847
Fground_dev	-1.5120535	-10	15	2	2.453916	2.216008
log_a:	2.537613653	1	4.5	2	2.742709	2.73427
G_b:	-8.23950454	-12	-5	2	-8.51024	-8.50679
log_aa:	-2.518807718	-4.61	-1.39	2	-2.98017	-2.96114
log_b:	4.949007858	3.869	5.05	2	4.379704	4.472672
stdx:	3.680207823	0.1	12	3	6.178232	6.300719
log_T04delta:	3.364342947	0	4.4	3	2.235199	2.333779

log_T12delta:	2.989201242	0	4.4	3	2.152641	2.157542
log_R04delta:	1.852051648	0	4.4	3	2.194152	2.225931
log_matLdelta:	3.800662374	0	4.4	7	1.973719	2.427614
log_matL50:	4.706093694	4.4	4.85	7	4.630267	4.619203
log_T04L50:	4.841721825	4	5	3	4.539841	4.495495
log_T12L50:	4.922880263	4	5	3	4.456259	4.698603
log_R04L50:	4.914186905	4	5	4	4.544697	4.495618
log_betar:	-1.08019942	-12	12	3	-0.02894	0.086335
logq2:	-0.625086917	-9	2.25	5	-3.52296	-2.80097
logq3:	-1.067916742	-9	2.25	6	-3.35288	-3.65839
log_mean_rec:	0.958560977	0.01	5	1	2.296695	2.673824
log_mean_Fpot:	-1.1110088	-15	-0.01	1	-6.85182	-6.33306
log_mean_Fground:	-9.347570915	-15	-1.6	1	-8.3305	-8.41907
M	0.224	0.224	0.224	-1	0.224	0.224
prelegal_var:	0.018045511	0	0.15	6	0.077529	0.073004
fishtick_var:	0.051774166	0	1	6	0.509406	0.529959

Table E.2. An example of the first and 100th jittered parameter values for scenario 1 compared to the original estimates for WAG.

Parameter	Original Parameter Value	Lower Bound	Upper Bound	Phase	Jitter #1	Jitter# 100
rec_dev	-0.008063154	-5	5	2	-0.00091	0.002301
rec_dev	-0.00978087	-5	5	2	-0.00067	-0.00191
rec_dev	-0.011816765	-5	5	2	-0.00052	-0.00191
rec_dev	-0.014221245	-5	5	2	0.001137	0.004131
rec_dev	-0.017031588	-5	5	2	-0.00084	0.001241
rec_dev	-0.020284059	-5	5	2	-0.0019	0.004063
rec_dev	-0.02400396	-5	5	2	0.00051	0.001359
rec_dev	-0.028190918	-5	5	2	-0.00358	0.005322
rec_dev	-0.032816518	-5	5	2	0.003274	-0.00513
rec_dev	-0.037807785	-5	5	2	-0.00116	-0.0002
rec_dev	-0.043033727	-5	5	2	0.016417	-0.00241
rec_dev	-0.048268279	-5	5	2	-0.00721	0.0014
rec_dev	-0.053191363	-5	5	2	-0.00587	0.003168
rec_dev	-0.057340294	-5	5	2	-0.00188	0.008884
rec_dev	-0.060091827	-5	5	2	-0.02577	-0.0213
rec_dev	-0.060595142	-5	5	2	-0.00069	-0.02674
rec_dev	-0.057624174	-5	5	2	-0.00176	-0.00674
rec_dev	-0.049063386	-5	5	2	-0.01857	-0.00425
rec_dev	-0.030519063	-5	5	2	-0.00833	-0.00095
rec_dev	0.007031467	-5	5	2	-0.00012	0.000789
rec_dev	0.072706409	-5	5	2	0.007403	0.004484
rec_dev	0.156569327	-5	5	2	0.021303	0.026841
rec_dev	0.28356529	-5	5	2	0.016504	0.102956
rec_dev	0.534392075	-5	5	2	-0.02417	-0.04185
rec_dev	0.629095682	-5	5	2	0.248615	-0.10565
rec_dev	0.5248473	-5	5	2	-0.08266	0.014412
rec_dev	0.259957227	-5	5	2	0.034184	-0.02924
rec_dev	-0.109533657	-5	5	2	-0.0498	-0.02017
rec_dev	0.17943553	-5	5	2	-8.6E-05	0.052807

rec_dev	-0.067864791	-5	5	2	-0.02104	-0.00506
rec_dev	-0.293657605	-5	5	2	0.057997	0.019413
rec_dev	-0.010999312	-5	5	2	-0.00075	0.001503
rec_dev	-0.257019554	-5	5	2	-0.05485	-0.04815
rec_dev	-0.064084073	-5	5	2	-0.01792	0.008792
rec_dev	-0.094375875	-5	5	2	-0.00966	-0.02522
rec_dev	-0.183588462	-5	5	2	0.052279	0.051892
rec_dev	-0.113411471	-5	5	2	-0.01331	-0.01429
rec_dev	-0.088579472	-5	5	2	0.043412	-0.02008
rec_dev	0.083702342	-5	5	2	-0.01975	0.00918
rec_dev	0.200477188	-5	5	2	0.028294	-0.01553
rec_dev	0.224821834	-5	5	2	0.012402	0.03042
rec_dev	0.20807378	-5	5	2	-0.00342	0.038067
rec_dev	-0.140016396	-5	5	2	-0.02333	0.049768
rec_dev	0.114428395	-5	5	2	0.001581	-0.00202
rec_dev	0.1226708	-5	5	2	-0.00893	-0.03072
rec_dev	0.201039805	-5	5	2	-0.01608	-0.04787
rec_dev	-0.161709877	-5	5	2	-0.02013	0.002006
rec_dev	-0.313486894	-5	5	2	0.04291	0.1491
rec_dev	-0.06409633	-5	5	2	-0.01388	0.001384
rec_dev	-0.235743001	-5	5	2	0.02175	0.030929
rec_dev	-0.555435131	-5	5	2	-0.09766	-0.0733
rec_dev	-0.072343335	-5	5	2	0.026099	0.01357
rec_dev	0.023564723	-5	5	2	0.006199	-0.00776
rec_dev	-0.364189561	-5	5	2	0.022057	0.047748
rec_dev	0.027498367	-5	5	2	0.000164	-0.00162
rec_dev	0.00000137	-5	5	2	-3.2E-07	3.62E-07
Fpot_dev	-3.924112609	-5	5	2	-0.41797	-2.60238
Fpot_dev	-0.470333935	-5	5	2	-0.09624	-0.07202
Fpot_dev	-0.060146787	-5	5	2	0.021983	-0.00561
Fpot_dev	-1.877169953	-5	5	2	-0.08916	0.056157
Fpot_dev	-0.27407322	-5	5	2	-0.05142	0.084482
Fpot_dev	0.792542432	-5	5	2	-0.19056	-0.02265
Fpot_dev	0.556393628	-5	5	2	-0.11619	-0.01884
Fpot_dev	0.621819135	-5	5	2	-0.12675	-0.03975
Fpot_dev	1.167884591	-5	5	2	-0.31695	0.082328
Fpot_dev	0.887495204	-5	5	2	-0.01233	0.087504
Fpot_dev	0.738343054	-5	5	2	-0.05995	0.025948
Fpot_dev	0.361344189	-5	5	2	-0.07207	-0.03727
Fpot_dev	-0.219187562	-5	5	2	0.043482	0.001679
Fpot_dev	0.734942761	-5	5	2	-0.1214	0.000649
Fpot_dev	0.533875412	-5	5	2	0.013037	-0.06489
Fpot_dev	0.499632461	-5	5	2	0.068636	0.118536
Fpot_dev	0.385835606	-5	5	2	-0.0263	0.082773
Fpot_dev	0.126996314	-5	5	2	0.024954	-0.01662
Fpot_dev	0.412724753	-5	5	2	0.046771	0.121588
Fpot_dev	0.508707407	-5	5	2	-0.03366	0.172472
Fpot_dev	0.379856346	-5	5	2	0.197416	0.014886
Fpot_dev	0.172048379	-5	5	2	0.029462	0.015716
Fpot_dev	0.005708468	-5	5	2	-0.00026	0.001462
Fpot_dev	-0.128459694	-5	5	2	0.019458	-0.00782
Fpot_dev	-0.211394032	-5	5	2	0.010564	-0.09031
Fpot_dev	-0.428901935	-5	5	2	-0.04252	0.087386
Fpot_dev	-0.345860637	-5	5	2	-0.01006	-0.06468

Fpot_dev	-0.429188753	-5	5	2	0.040988	0.148252
Fpot_dev	-0.338676995	-5	5	2	-0.00495	0.004081
Fpot_dev	-0.2920727	-5	5	2	-0.09507	-0.05632
Fpot_dev	-0.214805708	-5	5	2	0.016547	-0.04179
Fpot_dev	-0.042275157	-5	5	2	-0.01497	-0.00178
Fpot_dev	0.163841908	-5	5	2	0.020198	0.07839
Fpot_dev	0.143669186	-5	5	2	0.012531	-0.03948
Fpot_dev	0.062998442	-5	5	2	-0.0079	0.011719
Fground_dev	-2.440488208	-10	15	2	2.359756	3.130849
Fground_dev	-0.372149119	-10	15	2	2.541846	2.029075
Fground_dev	-3.26	-10	15	2	2.179811	0.920483
Fground_dev	-0.565669617	-10	15	2	2.213998	3.17078
Fground_dev	-0.00000727	-10	15	2	2.746651	3.199194
Fground_dev	-1.908822385	-10	15	2	3.209888	2.13417
Fground_dev	-0.050231846	-10	15	2	1.692876	3.135659
Fground_dev	0.335486336	-10	15	2	2.0031	2.826001
Fground_dev	-0.712524737	-10	15	2	0.997206	2.70973
Fground_dev	0.863452175	-10	15	2	1.785468	2.955309
Fground_dev	0.521163497	-10	15	2	2.731771	3.582807
Fground_dev	-0.155686865	-10	15	2	1.26512	2.572691
Fground_dev	-0.870248846	-10	15	2	2.592969	2.19296
Fground_dev	-0.197726437	-10	15	2	3.177496	2.674357
Fground_dev	-1.282915275	-10	15	2	2.786811	3.74742
Fground_dev	-0.233157359	-10	15	2	2.721733	1.474349
Fground_dev	1.010610724	-10	15	2	2.543949	3.04321
Fground_dev	0.565462468	-10	15	2	3.14692	2.669997
Fground_dev	0.166111618	-10	15	2	2.259299	1.370372
Fground_dev	1.63423837	-10	15	2	2.425685	2.530707
Fground_dev	1.276103152	-10	15	2	2.523669	2.481544
Fground_dev	0.765142575	-10	15	2	2.040027	2.428058
Fground_dev	0.775744468	-10	15	2	2.584536	2.4801
Fground_dev	1.335804918	-10	15	2	2.740495	2.277926
Fground_dev	1.388266886	-10	15	2	2.456294	2.363862
Fground_dev	0.994105891	-10	15	2	2.576245	2.639869
Fground_dev	0.413632001	-10	15	2	3.047562	2.140107
log_a:	2.536301348	1	4.5	2	2.867759	2.774788
G_b:	-7.81906066	-12	-5	2	-8.5627	-8.50172
log_aa:	-2.620209733	-4.61	-1.39	2	-2.99533	-3.03558
log_b:	4.947100169	3.869	5.05	2	4.296492	4.497449
stdx:	3.690898346	0.1	12	3	5.464769	6.378315
log_T04delta:	3.393564363	0	4.4	3	2.253755	1.716587
log_T12delta:	2.884535294	0	4.4	3	2.19479	2.211836
log_R04delta:	1.776557894	0	4.4	3	2.171414	2.172032
log_matLdelta:	3.800660574	0	4.4	7	2.260495	2.009727
log_matL50:	4.706094557	4.4	4.85	7	4.628311	4.610868
log_T04L50:	4.866964489	4	5	3	4.465743	4.604589
log_T12L50:	4.897637193	4	5	3	4.504364	4.566974
log_R04L50:	4.915014257	4	5	4	4.423721	4.30154
log_betar:	-1.025105044	-12	12	3	0.122286	-0.04557
logq2:	-0.087721529	-9	2.25	5	-3.32739	-2.21786
logq3:	-0.479087511	-9	2.25	6	-2.98757	-3.00965
log_mean_rec:	0.792838442	0.01	5	1	2.45569	1.967809
log_mean_Fpot:	-0.73101877	-15	-0.01	1	-7.96403	-13.3393
log_mean_Fground:	-8.439545564	-15	-1.6	1	-8.29552	-8.2656

M	0.224	0.224	0.224	-1	0.224	0.224
prelegal_var:	0.020928046	0	0.15	6	0.087381	0.07614
fishtick_var:	0.016400027	0	1	6	0.226077	0.188182

Table E.3. Results from 100 jitter runs for scenario 1 for EAG. Jitter run 0 corresponds to the original optimized estimates. Note: B_{MSY} reference points were based on average recruitment for 1986–2016.

Jitter Run	Objective Function	Maximum Gradient	$B_{35\%}$ (t)	OFL (t)	Current MMB (t)
0	**357.95**	**0.00001631**	**6276.30**	**3985.93**	**8536.48**
1	357.93	0.00000020	6276.36	3985.78	8536.79
2	357.93	0.00000541	6276.36	3985.78	8536.79
3	357.93	0.00011579	6276.36	3985.78	8536.79
4	357.93	0.00006966	6276.36	3985.78	8536.79
5	357.93	0.00003572	6276.36	3985.78	8536.79
6	357.93	0.00001752	6276.36	3985.78	8536.79
7	357.93	0.00005470	6276.36	3985.78	8536.79
8	357.93	0.00011744	6276.36	3985.78	8536.79
9	357.93	0.00005891	6276.36	3985.78	8536.79
10	357.93	0.00003164	6276.36	3985.78	8536.79
11	357.93	0.00000319	6276.36	3985.78	8536.79
12	357.93	0.00002234	6276.36	3985.78	8536.79
13	357.93	0.00001383	6276.36	3985.78	8536.79
14	357.93	0.00001126	6276.36	3985.78	8536.79
15	357.93	0.00010222	6276.36	3985.78	8536.79
16	357.93	0.00000291	6276.36	3985.78	8536.79
17	357.93	0.00002518	6276.36	3985.78	8536.79
18	357.93	0.00010882	6276.36	3985.78	8536.78
19	357.93	0.00000005	6276.36	3985.78	8536.79
20	357.93	0.00006426	6276.36	3985.78	8536.79
21	357.93	0.00000069	6276.36	3985.78	8536.79
22	357.93	0.00001009	6276.36	3985.78	8536.79
23	357.93	0.00003613	6276.36	3985.78	8536.79
24	357.93	0.00009340	6276.36	3985.78	8536.79
25	357.93	0.00026646	6276.35	3985.78	8536.78
26	357.93	0.00006301	6276.36	3985.78	8536.79
27	357.93	0.00004337	6276.36	3985.78	8536.79
28	357.93	0.00003351	6276.36	3985.78	8536.79
29	357.93	0.00003022	6276.36	3985.78	8536.78
30	357.93	0.00005049	6276.36	3985.78	8536.79
31	357.93	0.00000001	6276.36	3985.78	8536.79
32	357.93	0.00017354	6276.36	3985.78	8536.79
33	357.93	0.00010732	6276.36	3985.78	8536.79

34	357.93	0.00003140	6276.36	3985.78	8536.79
35	357.93	0.00018539	6276.36	3985.78	8536.79
36	357.93	0.00001242	6276.36	3985.78	8536.79
37	357.93	0.00012196	6276.36	3985.78	8536.78
38	357.93	0.00000610	6276.36	3985.78	8536.79
39	357.93	0.00001384	6276.36	3985.78	8536.79
40	357.93	0.00001617	6276.36	3985.78	8536.79
41	357.93	0.00008444	6276.36	3985.78	8536.79
42	357.93	0.00011264	6276.36	3985.78	8536.79
43	357.93	0.00000742	6276.36	3985.78	8536.79
44	357.93	0.00088110	6276.37	3985.78	8536.80
45	357.93	0.00000432	6276.36	3985.78	8536.79
46	357.93	0.00004927	6276.36	3985.78	8536.79
47	357.93	0.00003060	6276.36	3985.78	8536.79
48	357.93	0.00011714	6276.35	3985.78	8536.79
49	357.93	0.00010607	6276.36	3985.78	8536.79
50	357.93	0.00001854	6276.36	3985.78	8536.79
51	357.93	0.00003346	6276.36	3985.78	8536.79
52	357.93	0.00003206	6276.36	3985.78	8536.79
53	357.93	0.00005319	6276.36	3985.78	8536.79
54	357.93	0.00002535	6276.36	3985.78	8536.79
55	357.93	0.00001109	6276.36	3985.78	8536.79
56	357.93	0.00005972	6276.36	3985.78	8536.79
57	357.93	0.00000006	6276.36	3985.78	8536.79
58	357.93	0.00060162	6276.36	3985.78	8536.79
59	357.93	0.00001156	6276.36	3985.78	8536.79
60	357.93	0.00018979	6276.36	3985.78	8536.79
61	357.93	0.00001340	6276.36	3985.78	8536.79
62	357.93	0.00000860	6276.36	3985.78	8536.79
63	357.93	0.00003140	6276.36	3985.78	8536.79
64	357.93	0.00008224	6276.36	3985.78	8536.79
65	357.93	0.00067994	6276.35	3985.78	8536.77
66	357.93	0.00015629	6276.36	3985.78	8536.79
67	357.93	0.00000958	6276.36	3985.78	8536.79
68	357.93	0.00002085	6276.36	3985.78	8536.79
69	357.93	0.00001779	6276.36	3985.78	8536.79
70	357.93	0.00013929	6276.36	3985.78	8536.79
71	357.93	0.00033909	6276.36	3985.78	8536.79
72	357.93	0.00005027	6276.36	3985.78	8536.79
73	357.93	0.00039076	6276.35	3985.78	8536.78
74	357.93	0.00004030	6276.36	3985.78	8536.79
75	365.64	0.00000047	6691.96	4201.83	8967.41
76	357.93	0.00000065	6276.36	3985.78	8536.79

77	357.93	0.00007385	6276.36	3985.78	8536.79
78	357.93	0.00001649	6276.36	3985.78	8536.79
79	357.93	0.00005696	6276.36	3985.78	8536.79
80	357.93	0.00040599	6276.36	3985.78	8536.79
81	357.93	0.00004797	6276.36	3985.78	8536.79
82	357.93	0.00000075	6276.36	3985.78	8536.79
83	357.93	0.00005594	6276.36	3985.78	8536.79
84	357.93	0.00027085	6276.36	3985.78	8536.79
85	357.93	0.00006286	6276.36	3985.78	8536.79
86	357.93	0.00001511	6276.36	3985.78	8536.79
87	357.93	0.00000012	6276.36	3985.78	8536.79
88	357.93	0.00000239	6276.36	3985.78	8536.79
89	357.93	0.00003953	6276.36	3985.78	8536.79
90	357.93	0.00006176	6276.36	3985.78	8536.79
91	357.93	0.00001704	6276.36	3985.78	8536.79
92	357.93	0.00000050	6276.36	3985.78	8536.79
93	357.93	0.00013988	6276.36	3985.78	8536.79
94	357.93	0.00006838	6276.36	3985.78	8536.79
95	357.93	0.00039626	6276.36	3985.78	8536.79
96	357.93	0.00005871	6276.36	3985.78	8536.79
97	357.93	0.00001415	6276.36	3985.78	8536.79
98	357.93	0.00003001	6276.36	3985.78	8536.79
99	357.93	0.00017344	6276.36	3985.78	8536.79
100	357.93	0.00001320	6276.36	3985.78	8536.79

Table E.4. Results from 100 jitter runs for scenario 9 for EAG. Jitter run 0 corresponds to the original optimized estimates. Note: B_{MSY} reference points were based on average recruitment for 1986–2016.

Jitter Run	Objective Function	Maximum Gradient	$B_{35\%}$ (t)	OFL (t)	Current MMB (t)
0	**357.7782**	**0.00000067**	**6879.26**	**4485.98**	**9305.66**
1	357.7782	0.00002027	6879.22	4485.98	9305.62
2	357.7782	0.00000417	6879.26	4485.98	9305.66
3	357.7782	0.00000452	6879.26	4485.98	9305.66
4	357.7782	0.00000200	6879.26	4485.98	9305.66
5	357.7782	0.00000957	6879.26	4485.98	9305.66
6	357.7782	0.00001232	6879.26	4485.98	9305.66
7	357.7782	0.00000591	6879.26	4485.98	9305.66
8	357.7782	0.00000004	6879.26	4485.98	9305.66
9	357.7782	0.00000329	6879.26	4485.98	9305.66

10	357.7782	0.00000106	6879.26	4485.98	9305.66
11	357.7782	0.00000078	6879.27	4485.98	9305.66
12	357.7782	0.00001539	6879.26	4485.98	9305.66
13	357.7782	0.00012618	6879.26	4485.98	9305.66
14	357.7782	0.00000005	6879.26	4485.98	9305.66
15	357.7782	0.00000571	6879.26	4485.98	9305.66
16	357.7782	0.00000764	6879.26	4485.98	9305.66
17	357.7782	0.00000338	6879.26	4485.98	9305.66
18	357.7782	0.00000077	6879.26	4485.98	9305.66
19	357.7782	0.00005681	6879.27	4485.98	9305.66
20	357.7782	0.00000377	6879.26	4485.98	9305.66
21	357.7782	0.00001781	6879.26	4485.98	9305.66
22	357.7782	0.00000041	6879.26	4485.98	9305.66
23	357.7782	0.00000448	6879.26	4485.98	9305.66
24	357.7782	0.00000060	6879.26	4485.98	9305.66
25	357.8240	0.14128300	6879.63	4532.16	9273.56
26	357.7782	0.00000064	6879.26	4485.98	9305.66
27	357.7782	0.00000054	6879.26	4485.98	9305.66
28	357.7782	0.00000204	6879.26	4485.98	9305.66
29	357.7782	0.00001235	6879.26	4485.98	9305.66
30	357.7782	0.00000964	6879.26	4485.98	9305.66
31	365.4934	0.00017560	7296.68	4774.49	9728.41
32	357.7782	0.00000932	6879.26	4485.98	9305.66
33	357.7782	0.00000019	6879.26	4485.98	9305.66
34	357.7782	0.00000048	6879.26	4485.98	9305.66
35	357.7782	0.00000056	6879.26	4485.98	9305.66
36	357.7782	0.00000166	6879.26	4485.98	9305.66
37	357.7782	0.00005135	6879.26	4485.98	9305.66
38	357.7782	0.00001054	6879.26	4485.98	9305.66
39	357.7782	0.00000060	6879.26	4485.98	9305.66
40	357.7782	0.00000061	6879.26	4485.98	9305.66
41	357.7782	0.00000183	6879.26	4485.98	9305.66
42	357.7782	0.00000876	6879.26	4485.98	9305.66
43	357.7782	0.00000086	6879.26	4485.98	9305.66
44	357.7782	0.00001746	6879.26	4485.98	9305.66
45	357.7782	0.00000035	6879.26	4485.98	9305.66
46	357.7782	0.00000083	6879.26	4485.98	9305.66
47	357.7782	0.00000286	6879.26	4485.98	9305.66
48	357.7782	0.00000686	6879.26	4485.98	9305.66
49	357.7782	0.00000193	6879.26	4485.98	9305.66
50	357.7782	0.00000202	6879.26	4485.98	9305.66
51	357.7782	0.00000040	6879.26	4485.98	9305.66
52	357.7782	0.00000676	6879.26	4485.98	9305.66

53	357.7782	0.00001494	6879.27	4485.98	9305.66
54	357.7782	0.00001841	6879.26	4485.98	9305.66
55	357.7782	0.00000103	6879.26	4485.98	9305.66
56	357.7782	0.00000528	6879.26	4485.98	9305.66
57	357.7782	0.00000792	6879.26	4485.98	9305.66
58	357.7782	0.00000052	6879.26	4485.98	9305.66
59	357.7782	0.00003530	6879.26	4485.98	9305.66
60	357.7782	0.00000137	6879.26	4485.98	9305.66
61	357.7782	0.00000891	6879.26	4485.98	9305.66
62	357.7782	0.00006055	6879.27	4485.98	9305.66
63	357.7782	0.00000095	6879.26	4485.98	9305.66
64	357.7782	0.00000438	6879.26	4485.98	9305.66
65	357.7782	0.00000373	6879.26	4485.98	9305.66
66	357.7782	0.00000581	6879.26	4485.98	9305.66
67	357.7782	0.00000273	6879.26	4485.98	9305.66
68	357.7782	0.00000145	6879.26	4485.98	9305.66
69	357.7782	0.00000018	6879.26	4485.98	9305.66
70	357.7782	0.00000925	6879.26	4485.98	9305.66
71	357.7782	0.00000041	6879.26	4485.98	9305.66
72	357.7782	0.00000031	6879.26	4485.98	9305.66
73	357.7782	0.00000176	6879.26	4485.98	9305.66
74	357.7782	0.00000060	6879.26	4485.98	9305.66
75	357.7782	0.00001089	6879.26	4485.98	9305.66
76	357.7782	0.00000229	6879.26	4485.98	9305.66
77	357.7782	0.00000185	6879.26	4485.98	9305.66
78	357.7782	0.00002407	6879.26	4485.98	9305.66
79	357.7782	0.00000660	6879.26	4485.98	9305.66
80	357.7782	0.00000035	6879.26	4485.98	9305.66
81	357.7782	0.00000359	6879.26	4485.98	9305.66
82	357.7782	0.00001785	6879.28	4485.98	9305.67
83	357.7782	0.00000048	6879.26	4485.98	9305.66
84	357.7782	0.00000043	6879.26	4485.98	9305.66
85	357.7782	0.00003714	6879.35	4485.98	9305.75
86	357.7782	0.00000420	6879.26	4485.98	9305.66
87	357.7782	0.00001208	6879.26	4485.98	9305.66
88	357.7782	0.00004316	6879.26	4485.98	9305.66
89	357.7782	0.00000040	6879.26	4485.98	9305.66
90	357.7782	0.00000110	6879.26	4485.98	9305.66
91	357.7782	0.00000039	6879.26	4485.98	9305.66
92	357.7782	0.00000028	6879.26	4485.98	9305.66
93	357.7782	0.00000122	6879.26	4485.98	9305.66
94	357.7782	0.00001483	6879.27	4485.98	9305.66
95	357.7782	0.00002021	6879.26	4485.98	9305.66

96	357.7782	0.00000712	6879.26	4485.98	9305.66
97	357.7782	0.00000112	6879.26	4485.98	9305.66
98	357.7782	0.00006316	6879.32	4485.98	9305.72
99	357.7782	0.00000930	6879.26	4485.98	9305.66
100	357.7782	0.00000044	6879.26	4485.98	9305.66

Table E.5. Results from 100 jitter runs for scenario 1for WAG. Jitter run 0 corresponds to the original optimized estimates. Note: B_{MSY} reference points were based on average recruitment for 1986–2016.

Jitter Run	Objective Function	Maximum Gradient	$B_{35\%}$ (t)	OFL (t)	Current MMB (t)
0	**275.26**	**0.00006408**	**4722.22**	**1280.18**	**4402.63**
1	272.08	0.00020991	5157.51	1256.94	4609.18
2	275.22	0.00000181	4741.02	1250.49	4395.09
3	275.22	0.00006921	4741.02	1250.49	4395.09
4	275.22	0.00000046	4741.02	1250.49	4395.09
5	275.22	0.00026624	4741.03	1250.49	4395.09
6	275.22	0.00002435	4741.02	1250.49	4395.09
7	275.22	0.00009719	4741.02	1250.49	4395.09
8	275.22	0.00009279	4741.02	1250.49	4395.09
9	275.22	0.00000384	4741.02	1250.49	4395.09
10	275.22	0.00000921	4741.02	1250.49	4395.09
11	275.22	0.00010524	4741.02	1250.49	4395.08
12	272.08	0.00003695	5157.51	1256.94	4609.18
13	275.22	0.00000345	4741.02	1250.49	4395.09
14	275.22	0.00002612	4741.02	1250.49	4395.09
15	275.22	0.00003335	4741.02	1250.49	4395.09
16	271.90	0.00001829	5186.77	1242.78	4594.43
17	275.22	0.00005598	4741.02	1250.49	4395.09
18	275.22	0.00000156	4741.02	1250.49	4395.09
19	275.22	0.00000216	4741.02	1250.49	4395.09
20	275.22	0.00000317	4741.02	1250.49	4395.09
21	275.22	0.00022139	4741.02	1250.49	4395.09
22	275.22	0.00004471	4741.02	1250.49	4395.09
23	275.22	0.00005165	4741.02	1250.49	4395.09
24	275.22	0.00001324	4741.02	1250.49	4395.09
25	275.22	0.00010225	4741.02	1250.49	4395.09
26	275.22	0.00011112	4741.02	1250.49	4395.09
27	275.22	0.00004498	4741.02	1250.49	4395.09
28	275.22	0.00000013	4741.02	1250.49	4395.09

29	272.08	0.00011043	5157.52	1256.94	4609.18
30	275.22	0.00006034	4741.02	1250.49	4395.09
31	275.22	0.00000778	4741.02	1250.49	4395.09
32	275.22	0.00000002	4741.02	1250.49	4395.09
33	275.22	0.00000001	4741.02	1250.49	4395.09
34	275.22	0.00004915	4741.02	1250.49	4395.09
35	275.22	0.00014347	4741.02	1250.49	4395.09
36	275.22	0.00000968	4741.02	1250.49	4395.09
37	275.22	0.00008531	4741.02	1250.49	4395.09
38	275.22	0.00003593	4741.02	1250.49	4395.09
39	276.19	0.00000038	5128.26	1252.06	4580.12
40	272.08	0.00010997	5157.51	1256.94	4609.18
41	275.22	0.00012720	4741.02	1250.49	4395.09
42	275.22	0.00012620	4741.03	1250.49	4395.09
43	275.22	0.00003131	4741.02	1250.49	4395.09
44	275.22	0.00005433	4741.02	1250.49	4395.09
45	275.22	0.00005734	4741.02	1250.49	4395.08
46	275.22	0.00000293	4741.02	1250.49	4395.09
47	275.22	0.00016022	4741.02	1250.49	4395.09
48	275.22	0.00002603	4741.02	1250.49	4395.09
49	275.22	0.00000061	4741.02	1250.49	4395.09
50	275.22	0.00005500	4741.02	1250.49	4395.09
51	275.22	0.00000071	4741.02	1250.49	4395.09
52	275.22	0.00002028	4741.02	1250.49	4395.09
53	275.22	0.00011690	4741.02	1250.49	4395.09
54	275.22	0.00000509	4741.02	1250.49	4395.09
55	275.22	0.00005520	4741.02	1250.49	4395.09
56	275.22	0.00012576	4741.02	1250.49	4395.09
57	275.22	0.00055220	4741.02	1250.49	4395.08
58	275.22	0.00000021	4741.02	1250.49	4395.09
59	275.22	0.00008351	4741.02	1250.49	4395.09
60	275.22	0.00000071	4741.02	1250.49	4395.09
61	275.22	0.00000113	4741.02	1250.49	4395.09
62	275.22	0.00004604	4741.02	1250.49	4395.09
63	275.22	0.00020403	4741.02	1250.49	4395.09
64	275.22	0.00006138	4741.02	1250.49	4395.09
65	275.22	0.00000096	4741.02	1250.49	4395.09
66	275.22	0.00001358	4741.02	1250.49	4395.09
67	275.22	0.00002428	4741.02	1250.49	4395.09
68	275.22	0.00000259	4741.02	1250.49	4395.09
69	275.22	0.00000901	4741.02	1250.49	4395.09
70	272.08	0.00000705	5157.51	1256.94	4609.18
71	275.22	0.00000697	4741.02	1250.49	4395.09

72	272.08	0.00000119	5157.51	1256.94	4609.18
73	275.22	0.00017395	4741.03	1250.49	4395.09
74	275.22	0.00067063	4741.02	1250.49	4395.08
75	275.22	0.00001000	4741.02	1250.49	4395.09
76	275.22	0.00002803	4741.02	1250.49	4395.09
77	275.22	0.00002205	4741.02	1250.49	4395.09
78	275.22	0.00000185	4741.02	1250.49	4395.09
79	275.22	0.00009501	4741.03	1250.49	4395.09
80	272.08	0.00000206	5157.51	1256.94	4609.18
81	275.22	0.00002467	4741.02	1250.49	4395.09
82	275.22	0.00000349	4741.02	1250.49	4395.09
83	275.22	0.00005818	4741.02	1250.49	4395.09
84	275.22	0.00001808	4741.02	1250.49	4395.09
85	275.22	0.00000908	4741.02	1250.49	4395.09
86	275.22	0.00000007	4741.02	1250.49	4395.09
87	275.22	0.00000079	4741.02	1250.49	4395.09
88	275.22	0.00000072	4741.02	1250.49	4395.09
89	272.08	0.00000361	5157.51	1256.94	4609.18
90	275.22	0.00005307	4741.02	1250.49	4395.09
91	275.22	0.00003018	4741.02	1250.49	4395.09
92	275.22	0.00017475	4741.02	1250.49	4395.09
93	275.22	0.00000536	4741.02	1250.49	4395.09
94	275.22	0.00002238	4741.02	1250.49	4395.09
95	275.22	0.00002886	4741.02	1250.49	4395.09
96	275.22	0.00041212	4741.03	1250.49	4395.09
97	275.22	0.00008484	4741.02	1250.49	4395.09
98	275.22	0.00090622	4741.02	1250.49	4395.08
99	275.22	0.00000052	4741.02	1250.49	4395.09
100	275.22	0.00008280	4741.03	1250.49	4395.09

Table E.6. Results from 100 jitter runs for scenario 9 for WAG. Jitter run 0 corresponds to the original optimized estimates. Note: B_{MSY} reference points were based on average recruitment for 1986–2016.

Jitter Run	Objective Function	Maximum Gradient	$B_{35\%}$ (t)	OFL (t)	Current MMB (t)
0	**275.10**	**0.00000122**	**5136.69**	**1512.39**	**4946.18**
1	275.10	0.00000086	5136.69	1512.39	4946.18
2	271.92	0.00001024	5593.79	1524.07	5196.63
3	275.10	0.00000062	5136.69	1512.39	4946.18
4	275.10	0.00000066	5136.69	1512.39	4946.18

5	275.10	0.00000056	5136.69	1512.39	4946.18
6	275.10	0.00000434	5136.69	1512.39	4946.18
7	275.10	0.00000009	5136.69	1512.39	4946.18
8	275.10	0.00000150	5136.69	1512.39	4946.18
9	275.10	0.00001277	5136.69	1512.39	4946.18
10	275.10	0.00000602	5136.69	1512.39	4946.18
11	275.10	0.00019482	5136.69	1512.39	4946.18
12	275.10	0.00000832	5136.69	1512.39	4946.18
13	275.10	0.00002946	5136.69	1512.39	4946.18
14	275.10	0.00000191	5136.69	1512.39	4946.18
15	275.10	0.00000150	5136.69	1512.39	4946.18
16	271.92	0.00000079	5593.79	1524.07	5196.63
17	275.10	0.00002771	5136.69	1512.39	4946.18
18	275.10	0.00000567	5136.69	1512.39	4946.18
19	275.10	0.00004282	5136.69	1512.39	4946.18
20	275.10	0.00004036	5136.67	1512.39	4946.16
21	275.10	0.00000322	5136.69	1512.39	4946.18
22	275.10	0.00000084	5136.69	1512.39	4946.18
23	275.10	0.00000631	5136.69	1512.39	4946.18
24	275.10	0.00000067	5136.69	1512.39	4946.18
25	275.10	0.00000252	5136.69	1512.39	4946.18
26	275.10	0.00002649	5136.69	1512.39	4946.18
27	275.10	0.00003961	5136.69	1512.39	4946.18
28	275.10	0.00006224	5136.70	1512.39	4946.19
29	275.10	0.00000407	5136.69	1512.39	4946.18
30	275.10	0.00002247	5136.69	1512.39	4946.18
31	275.10	0.00000775	5136.68	1512.39	4946.18
32	275.10	0.00008106	5136.80	1512.39	4946.28
33	275.10	0.00000194	5136.69	1512.39	4946.18
34	275.10	0.00000129	5136.69	1512.39	4946.18
35	275.10	0.00002378	5136.68	1512.39	4946.18
36	275.10	0.00000064	5136.69	1512.39	4946.18
37	275.10	0.00000085	5136.69	1512.39	4946.18
38	275.10	0.00001217	5136.68	1512.39	4946.18
39	271.92	0.00000258	5593.79	1524.07	5196.63
40	275.10	0.00010939	5136.68	1512.39	4946.18
41	275.10	0.00000042	5136.69	1512.39	4946.18
42	275.10	0.00000576	5136.69	1512.39	4946.18
43	275.10	0.00003408	5136.69	1512.39	4946.18
44	275.10	0.00000485	5136.69	1512.39	4946.18
45	275.10	0.00000276	5136.69	1512.39	4946.18
46	275.10	0.00003539	5136.66	1512.39	4946.15
47	275.10	0.00000805	5136.69	1512.39	4946.18

48	275.10	0.00000289	5136.69	1512.39	4946.18
49	271.92	0.00000859	5593.79	1524.07	5196.63
50	275.10	0.00002747	5136.69	1512.39	4946.18
51	275.10	0.00000924	5136.69	1512.39	4946.18
52	275.10	0.00002677	5136.69	1512.39	4946.18
53	275.10	0.00000723	5136.69	1512.39	4946.18
54	275.10	0.00010187	5136.69	1512.39	4946.18
55	275.10	0.00000062	5136.69	1512.39	4946.18
56	275.10	0.00052373	5136.66	1512.39	4946.15
57	275.10	0.00001702	5136.69	1512.39	4946.18
58	275.10	0.00001190	5136.69	1512.39	4946.18
59	275.10	0.00003031	5136.69	1512.39	4946.18
60	275.10	0.00001616	5136.69	1512.39	4946.18
61	275.10	0.00000107	5136.69	1512.39	4946.18
62	271.92	0.00000451	5593.79	1524.07	5196.63
63	275.10	0.00000550	5136.69	1512.39	4946.18
64	275.10	0.00000364	5136.69	1512.39	4946.18
65	275.10	0.00001160	5136.69	1512.39	4946.18
66	275.10	0.00002502	5136.69	1512.39	4946.18
67	275.10	0.00000063	5136.69	1512.39	4946.18
68	275.10	0.00006237	5136.61	1512.39	4946.10
69	275.10	0.00003332	5136.69	1512.39	4946.18
70	275.10	0.00002605	5136.69	1512.39	4946.18
71	275.10	0.00003483	5136.69	1512.39	4946.18
72	271.92	0.00000709	5593.79	1524.07	5196.63
73	275.10	0.00000939	5136.69	1512.39	4946.18
74	275.10	0.00005860	5136.79	1512.39	4946.28
75	275.10	0.00007549	5136.69	1512.39	4946.18
76	275.10	0.00005234	5136.69	1512.39	4946.18
77	275.10	0.00001132	5136.69	1512.39	4946.18
78	275.10	0.00000234	5136.69	1512.39	4946.18
79	275.10	0.00004273	5136.69	1512.39	4946.18
80	275.10	0.00000006	5136.69	1512.39	4946.18
81	275.10	0.00000030	5136.69	1512.39	4946.18
82	275.10	0.00000206	5136.69	1512.39	4946.18
83	275.10	0.00002295	5136.69	1512.39	4946.18
84	275.10	0.00000575	5136.69	1512.39	4946.18
85	275.10	0.00000560	5136.69	1512.39	4946.18
86	275.10	0.00000295	5136.69	1512.39	4946.18
87	275.10	0.00007985	5136.69	1512.39	4946.18
88	275.10	0.00000062	5136.69	1512.39	4946.18
89	275.10	0.00001151	5136.69	1512.39	4946.18
90	275.10	0.00000134	5136.69	1512.39	4946.18

91	275.10	0.00000020	5136.69	1512.39	4946.18
92	275.10	0.00002228	5136.69	1512.39	4946.18
93	275.10	0.00000090	5136.69	1512.39	4946.18
94	275.10	0.00007147	5136.69	1512.39	4946.18
95	275.15	0.02132790	5159.06	1513.41	4966.70
96	275.10	0.00004049	5136.69	1512.39	4946.18
97	275.10	0.00000421	5136.69	1512.39	4946.18
98	275.10	0.00007738	5136.69	1512.39	4946.18
99	275.10	0.00000237	5136.69	1512.39	4946.18
100	275.10	0.00000092	5136.69	1512.39	4946.18