

| Sensitivity analyses models. |   |                                   |   |   |
|------------------------------|---|-----------------------------------|---|---|
|                              | Object                                    | Model name                        | Description   | path  |
|                              | SS 3.24                                   | 13.sq                             | 2013 Assessment SS3.24  | model/2013_SST  |
| 0. Transition                |   |                                   |   |   |
| Item 0.0                     | SS 3.30.21                                | 23.sq.fixQ                        | 2023 Assessment SS3.30-fixed catchability   | model/2013_SST_SSV3_30_21   |
| Item 0.1                     | All Param fixed                           | 23.sq.fix                         | 13.sq assessment (SS V3.30.32) - All param fixed  | model/Sensitivity_Anal/0.1_Bridging_models/23.sq.fix  |
| Item 0.1                     | Floating Q                                | 23.sq.floatQ                      | 13.sq assessment (SS V3.30.21) - Param estimated as before but Q floating   | model/Sensitivity_Anal/0.1_Bridging_models/23.sq.floatQ                                       |
| Item 0.1                     | All Param estimated                       | 23.sq.est                         | 13.sq assessment (SS V3.30.21) - All param estimated  | model/Sensitivity_Anal/0.1_Bridging_models/23.sq.est  |
| Item 0.2                     | Update landings                           | 23.land.update                    | 23.sq.floatQ + landings updated   | model/Sensitivity_Anal/0.2_Update_Data/1_23.land.update                                       |
| Item 0.2                     | Updates discard rates                     | 23.disc.update                    | 23.land.update + discards updated   | model/Sensitivity_Anal/0.2_Update_Data/2_23.disc.update                                       |
| Item 0.2                     | Update survey geostat indices             | 23.surv_geo.update                | 23.disc.update + geo Indices  | model/Sensitivity_Anal/0.2_Update_Data/3_23.surv_geo.update                                   |
| Item 0.2                     | Update survey length comps                | 23.lcs_survey.update              | 23.surv_geo.update + Surv Lcs   | model/Sensitivity_Anal/0.2_Update_Data/4_23.lcs_survey.update                                 |
| Item 0.2                     | Update fisheries length comps             | 23.lcs_fisheries.update           | 23.lcs_survey.update + Fisheries Lcs  | model/Sensitivity_Anal/0.2_Update_Data/5_23.lcs_fisheries.update                              |
| Item 0.2                     | Update discard mean weights               | 23.disc_weight.update             | 23.lcs_fisheries.update + Discard weight updated  | model/Sensitivity_Anal/0.2_Update_Data/6_23.disc_weight.update                                |
| Item 0.2                     | Update growth                             | 23.growth.update                  | 23.disc_weight.update + growth updated  | model/Sensitivity_Anal/0.2_Update_Data/7_23.growth.update                                     |
| Item 0.2                     | Update maturity                           | 23.maturity.update                | 23.growth.update + maturity updated   | model/Sensitivity_Anal/0.2_Update_Data/8_23.maturity.update                                   |
| Item 0.2                     | Update fecundity                          | 23.fecundity.update               | 23.maturity.update + fecundity updated  | model/Sensitivity_Anal/0.2_Update_Data/9_23.fecundity.update                                  |
| Item 0.2                     | Update natural mortality                  | 23.mortality.update               | 23.fecundity.update + mortality updated   | model/Sensitivity_Anal/0.2_Update_Data/10_23.mortality.update                                 |
| 1. Landings                  |   |                                   |   |   |
| Item 1.1                     | Imputed historical landings               | 23.land.hist_impute               | Use imputed historical landings   | model/Sensitivity_Anal/1.1_Landings_Sensitivity/1_23.land.hist_impute                         |
| Item 1.1                     | 2013 assessment landings                  | 23.land.2013                      | Use 2013 assessment landings  | model/Sensitivity_Anal/1.1_Landings_Sensitivity/2_23.land.2013                                |
| Item 1.2                     | ASHOP Catches                             | 23.landings.ashop                 | 23.model.francis_2 + ASHOP catches  | model/Sensitivity_Anal/1.2_Landings_ashop/1_23.landings.ashop                                 |
| Item 1.3                     | 23.landings.4fleet                        | 23.landings.4fleet                | Base Model + 4 commercial fleets  | model/Sensitivity_Anal/1.3_Landings_4fleet/1_23.landings.4fleet                               |
| 3. Surveys                   |   |                                   |   |   |
| Item 3.1                     | gamma vs ln error                         | 23.surveys.gamvln                 | 23.model.francis_2 with lognormal error structure in geostatistical abundance indices                                 | model/Sensitivity_Anal/3.1_surveys_Sensitivity/1_23.surveys.gamvln                            |
| Item 3.2                     | MB vs DB indices                          | 23.surveys.db                     | base model w/ design-based indices  | model/Sensitivity_Anal/3.2_surveys2_Sensitivity/1_23.surveys.db                               |
| Item 3.3                     | No Triennial Survey                       | 23.surveys.notriennial            | 3 fleet 1 survey model structure  | model/Sensitivity_Anal/3.3_surveys3_Sensitivity/3_23.surveys.notriennial                      |
| Item 3.3                     | extra SD on WCGBTS                        | 23.surveys.extaSDwcgbts           | base model with an additional SD paramter estimated for WCGBTS  | model/Sensitivity_Anal/3.3_surveys3_Sensitivity/2_23.surveys.extaSDwcgbts                     |
| Item 3.3                     | 2 survey vs 4 survey structure            | 23.surveys.useslope               | 3 fleet 4 survey model structure  | model/Sensitivity_Anal/3.3_surveys3_Sensitivity/1_23.surveys.useslope                         |
| 4. Biological Info           |   |                                   |   |   |
| Item 4.1                     | Growth Sensitivity Low                    | 23.growth.low                     | 23.model.francis_2 + low growth   | model/Sensitivity_Anal/4.1_Growth_Sensitivity/2_23.growth.low                                 |
| Item 4.1                     | Growth Sensitivity High                   | 23.growth.high                    | 23.model.francis_2 + high growth  | model/Sensitivity_Anal/4.1_Growth_Sensitivity/1_23.growth.high                                |
| Item 4.2                     | Intermediate maturity curve               | 23.maturity.mix_curve             | 23.model.francis_2 + intermediate maturity curve  | model/Sensitivity_Anal/4.2_Maturity_Sensitivity/2_23.maturity.mix_curve                       |
| Item 4.2                     | PG maturity                               | 23.maturity.pgcurve               | 23.model.francis_2 + PG maturity  | model/Sensitivity_Anal/4.2_Maturity_Sensitivity/1_23.maturity.pgcurve                         |
| Item 4.3                     | Sensitivity to fecundity                  | 23.biology.no_fecundity           | Remove the length-fecundity relationship from base model  | model/Sensitivity_Anal/4.3_Fecundity_Sensitivity/1_23.biology.no_fecundity                    |
| Item 4.4                     | Sensitivity to weight-length relationship | 23.WL.sensitivity                 | new params, remove fish <=16cm  | model/Sensitivity_Anal/STAR_Panel/4.4_WL_Sensitivity/1_23.WL.sensitivity                      |
| Item 4.5                     | Sensitivity to sigmaR                     | 23.SigmaR.sensitivity             | sigmaR 0.76   | model/Sensitivity_Anal/STAR_Panel/4.5_SigmaR_Sensitivity/1_23.SigmaR.sensitivity              |
| 5. Model                     |   |                                   |   |   |
| Item 5.1                     | S-R Steepness                             | 23.model.recdevs_steep            | 23.model.recdevs_initYear + h=0.72  | model/Sensitivity_Anal/5.1_Explore_RecDevs/3_23.model.recdevs_steep                           |
| Item 5.1                     | Bias Adjustment Years                     | 23.model.recdevs_bias             | 23.model.recdevs_steep + biaspars updated   | model/Sensitivity_Anal/5.1_Explore_RecDevs/4_23.model.recdevs_bias                            |
| Item 5.1                     | Update Initial RecDev Year                | 23.model.recdevs_initYear         | 23.model.recdevs_termYear + inityear change   | model/Sensitivity_Anal/5.1_Explore_RecDevs/2_23.model.recdevs_initYear                        |
| Item 5.1                     | Update Terminal RecDev Year               | 23.model.recdevs_termYear         | 23.mortality.update + termyear change   | model/Sensitivity_Anal/5.1_Explore_RecDevs/1_23.model.recdevs_termYear                        |
| Item 5.3                     | Francis Reweighting                       | 23.model.francis                  | 23.model.fleetstruct_5 + new Francis weights  | model/Sensitivity_Anal/5.3_Francis_Reweighting/1_23.model.francis                             |
| Item 5.4                     | Survey Timing                             | 23.model.survey_timing            | survey timing = -1  | model/Sensitivity_Anal/5.4_SS_Model_Warnings/1_23.model.survey_timing                         |
| Item 5.4                     | Settlement Events                         | 23.model.settlement_events        | simple settlement event   | model/Sensitivity_Anal/5.4_SS_Model_Warnings/2_23.model.settlement_events                     |
| Item 5.5                     | Remove small sample size LCs              | 23.model.sample_sizes             | remove small sample sizes   | model/Sensitivity_Anal/5.5_Improve_LC_Fits/1_23.model.sample_sizes                            |
| Item 5.5                     | Improve Trawl_N LC Fit                    | 23.model.improve_trawln           | change Trawl_N selectivity pars   | model/Sensitivity_Anal/5.5_Improve_LC_Fits/3_23.model.improve_trawln                          |
| Item 5.5                     | Improve Other LC Fits                     | 23.model.improve_other            | change other fleet selectivity pars   | model/Sensitivity_Anal/5.5_Improve_LC_Fits/4_23.model.improve_other                           |
| Item 5.5                     | Sex-Specific Survey Selectivity           | 23.model.sexed_survey_selectivity | sex-specific survey selectivity   | model/Sensitivity_Anal/5.5_Improve_LC_Fits/2_23.model.sexed_survey_selectivity                |
| Item 5.6                     | Modify recdev init year                   | 23.model.recdevs_inityear_1996    | update recdevs 1996   | model/Sensitivity_Anal/5.6_Update_Recdevs_Inityear/1_23.model.recdevs_inityear_1996           |
| Item 5.7                     | Fix warnings                              | 23.fix_warnings                   | Fix warnings  | model/Sensitivity_Anal/5.7_Fix_Warnings/1_23.fix_warnings                                     |
| Item 5.8                     | Francis Reweighting 2                     | 23.model.francis_2                | francis weighting part 2  | model/Sensitivity_Anal/5.8_Francis_Reweighting_2/1_23.model.francis_2                         |
| Item 5.9                     | blk Trawl 89                              | 23.blkret.T1                      | blk Trawl 89  | model/Sensitivity_Anal/5.9_Retention_Selectivity_Sensitivity/1_23.blkret.T1                   |
| Item 5.9                     | blk Trawl mid10                           | 23.blkret.T2                      | blk Trawl mid10   | model/Sensitivity_Anal/5.9_Retention_Selectivity_Sensitivity/2_23.blkret.T2                   |
| Item 5.9                     | blk Trawl 89-mid10                        | 23.blkret.T3                      | blk Trawl 89-mid10  | model/Sensitivity_Anal/5.9_Retention_Selectivity_Sensitivity/3_23.blkret.T3                   |
| Item 5.9                     | blk Trawl 89-mid10-19                     | 23.blkret.T4                      | blk Trawl 89-mid10-19   | model/Sensitivity_Anal/5.9_Retention_Selectivity_Sensitivity/4_23.blkret.T4                   |
| Item 5.9                     | blk Trawl 89-mid10 NonTrawl 05-13         | 23.blkret.T3.NT1                  | blk Trawl 89-mid10 NonTrawl 05-13   | model/Sensitivity_Anal/5.9_Retention_Selectivity_Sensitivity/5_23.blkret.T3.NT1               |
| Item 5.9                     | blk Trawl 89-mid10 NonTrawl 05-13-17      | 23.blkret.T3.NT2                  | blk Trawl 89-mid10 NonTrawl 05-13-17  | model/Sensitivity_Anal/5.9_Retention_Selectivity_Sensitivity/6_23.blkret.T3.NT2               |
| Item 5.10                    | Prior on Selectivity - 3 Blks             | 23.slx.Prior.3Blk                 | 23.blkret.T3 + 3 Time Blocks  | model/Sensitivity_Anal/5.10_Prior_Selectivity_Sensitivity/3_23.slx.Prior.3Blk                 |
| Item 5.10                    | Prior on Selectivity - 1 Blk              | 23.slx.Prior.1Blk                 | 23.blkret.T3 + 1 Time Block   | model/Sensitivity_Anal/5.10_Prior_Selectivity_Sensitivity/1_23.slx.Prior.1Blk                 |
| Item 5.10                    | Prior on Selectivity - 2 Blks             | 23.slx.Prior.2Blk                 | 23.blkret.T3 + 2 Time Blocks  | model/Sensitivity_Anal/5.10_Prior_Selectivity_Sensitivity/2_23.slx.Prior.2Blk                 |
| Item 5.11                    | base blksel 2003                          | 23.blkssel.T1                     | base blksel 2003  | model/Sensitivity_Anal/5.11_Selectivity_Sensitivity/1_23.blkssel.T1                           |
| Item 5.11                    | base blksel 2011                          | 23.blkssel.T2                     | base blksel 2011  | model/Sensitivity_Anal/5.11_Selectivity_Sensitivity/2_23.blkssel.T2                           |
| Item 5.11                    | base blksel 2003+2011                     | 23.blkssel.T3                     | base blksel 2003+2011   | model/Sensitivity_Anal/5.11_Selectivity_Sensitivity/3_23.blkssel.T3                           |
| Item 5.11                    | base blksel 2003+2011+2019                | 23.blkssel.T4                     | base blksel 2003+2011+2019  | model/Sensitivity_Anal/5.11_Selectivity_Sensitivity/4_23.blkssel.T4                           |
| Item 5.11                    | blkretT3 blksel 2003                      | 23.blkret.T3.blkssel.T1           | blkretT3 blksel 2003  | model/Sensitivity_Anal/5.11_Selectivity_Sensitivity/5_23.blkret.T3.blkssel.T1                 |
| Item 5.11                    | blkretT3 blksel 2011                      | 23.blkret.T3.blkssel.T2           | blkretT3 blksel 2011  | model/Sensitivity_Anal/5.11_Selectivity_Sensitivity/6_23.blkret.T3.blkssel.T2                 |
| Item 5.11                    | blkretT3 blksel 2003+2011                 | 23.blkret.T3.blkssel.T3           | blkretT3 blksel 2003+2011   | model/Sensitivity_Anal/5.11_Selectivity_Sensitivity/7_23.blkret.T3.blkssel.T3                 |
| Item 5.11                    | blkretT3 blksel 2003+2011+2019            | 23.blkret.T3.blkssel.T4           | blkretT3 blksel 2003+2011+2019  | model/Sensitivity_Anal/5.11_Selectivity_Sensitivity/8_23.blkret.T3.blkssel.T4                 |
| Item 5.12                    | Dirichlet Multinomial Length Comps        | 23.dmn                            | DMN length comps  | model/Sensitivity_Anal/5.12_Dirichlet_Multinomial/1_23.dmn                                    |
| Item 5.13                    | Fix M at 0.045                            | 23.STAR.Panel.M.045               | 23.model.francis_2 + M fixed at 0.045   | model/Sensitivity_Anal/STAR_Panel/5.13_Request_3/1_23.STAR.Panel.M.045                        |
| Item 5.13                    | Fix M at 0.05                             | 23.STAR.Panel.M.05                | 23.model.francis_2 + M fixed at 0.05  | model/Sensitivity_Anal/STAR_Panel/5.13_Request_3/2_23.STAR.Panel.M.05                         |
| Item 5.14                    | Estimate Maximum Retention                | 23.est.max.ret                    | 23.blkret.T3.blkssel.T3 + Max ret estimated   | model/Sensitivity_Anal/STAR_Panel/5.14_Request_4/1_23.est.max.ret                             |
| Item 5.14                    | Day2 Base Update                          | 23.base.day2.update               | BAse model after day 1 requests   | model/Sensitivity_Anal/STAR_Panel/5.14_Day2_Base_Update/1_23.base.day2.update                 |
| Item 5.15                    | Length Comp Re-weight                     | 23.length.comp.reweight           | explore alternative length comp re-weighting (Variance Adjustment Factors)  | model/Sensitivity_Anal/5.15_Length_Comp_Reweight/1_23.length.comp.reweight                    |
| Item 5.16                    | lenght comp combo only                    | 23.lencomp.Combo.Only             | base model with variance adjustment parameter specified for combo survey only   | model/Sensitivity_Anal/5.16_LenComp_Reweight_by_Fleet/1_23.lencomp.Combo.Only                 |
| Item 5.16                    | lenght comp add triennial                 | 23.lencomp.AddTriennial           | base model with variance adjustment parameter specified for combo + triennial survey                                  | model/Sensitivity_Anal/5.16_LenComp_Reweight_by_Fleet/2_23.lencomp.AddTriennial               |
| Item 5.16                    | lenght comp add NonTrawl                  | 23.lencomp.AddNonTrawl            | base model with variance adjustment parameter specified for combo + triennial + Non trawl                             | model/Sensitivity_Anal/5.16_LenComp_Reweight_by_Fleet/3_23.lencomp.AddNonTrawl                |
| Item 5.16                    | lenght comp add SouthTrawl                | 23.lencomp.AddSouthTrawl          | base model with variance adjustment parameter specified for combo + triennial + Non trawl + South Trawl               | model/Sensitivity_Anal/5.16_LenComp_Reweight_by_Fleet/4_23.lencomp.AddSouthTrawl              |
| Item 5.16                    | lenght comp add NorthTrawl                | 23.lencomp.AddNorthTrawl          | base model with variance adjustment parameter specified for combo + triennial + Non trawl + South Trawl + North Trawl | model/Sensitivity_Anal/5.16_LenComp_Reweight_by_Fleet/5_23.lencomp.AddNorthTrawl              |
| Item 5.17                    | Recruitment Bias Adjustment               | 23.model.rec_biasadj              | Updated recruitment bias adjustment to use maximum of 0.3.  | model/Sensitivity_Anal/STAR_Panel/5.17_Recruitment_Requests/1_23.model.rec_biasadj            |
| Item 5.17                    | New Recruitment Main Period               | 23.model.rec_main_period          | Shifting main period deviates to end in 2012.   | model/Sensitivity_Anal/STAR_Panel/5.17_Recruitment_Requests/2_23.model.rec_main_period        |
| Item 5.18                    | SigmaR_non_sum_to_zero                    | 23.model.SigmaR.non.zero          | free up rec devs to not sum to zero   | model/Sensitivity_Anal/STAR_Panel/5.18_SigmaR_non_sum_to_zero/1_23.model.SigmaR.non.zero      |
| Item 5.19                    | New Recruitment Main Period Full          | 23.model.rec_long_main_period     | Extended main phase deviates  | model/Sensitivity_Anal/STAR_Panel/5.19_Recruitment_Requests_2/1_23.model.rec_long_main_period |