# September Models changes from base Model 22.2

**Model 23.1.0**

1. All configured like Model 22.2 except
   1. Changed survey length composition input sample size to bootstrap ISS
   2. Changed fishery length composition sample size to raw number of hauls standardized to mean survey input sample size
   3. Changed from Dirichlet multinomial to standard multinomial for length and age comps
   4. Removed length composition data for years with age composition data (1994-2021) which were duplicated in the age comps
   5. CV growth pattern changed from 2 SD=F(LAA) to 0 CV=f(LAA)
   6. Reconfigure survey selectivity to estimate parameters 1-4 and using new asymptotic option for parameter 6
   7. Fixed pre-2007 bias
   8. Fixed CV old at 0.06, fixed CV young at 0.2

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model | # param. | -LL | Annually varying growth | AV Fishery selectivity | AV Survey selectivity | Max age to 12 | Catch to 1964 no regime | CAAL | Split fishery comps |
| 23.1.0.a | 82 | 251.03 |  |  |  |  |  |  |  |
| 23.1.0.b | 176 | 143.23 | **x** |  |  |  |  |  |  |
| 23.1.0.c | 317 | 139.22 | **x** | **x** |  |  |  |  |  |
| 23.1.0.d | 218 | 133.04 | **x** |  | **x** |  |  |  |  |
| 23.1.0.e | 210 | 137.31 | **x** |  | **x** | **x** |  |  |  |
| 23.1.0.f | 217 | 134.73 | **x** |  | **x** |  | **x** |  |  |
| 23.1.0.g | 217 | 137.95 | **x** |  | **x** | **x** | **x** |  |  |
| 23.1.0.h | 217 | 630.68 | **x** |  | **x** | **x** | **x** | **x** |  |
| 23.1.1a | 218 | 319.64 | **x** |  | **x** | **x** | **x** |  | **x** |
| 23.1.1.b | 235 | 291.52 | **x** |  | **x** | **x** | **x** |  | **x** |
| 23.1.1.c | 219 | 290.74 | **x** |  | **X** | **x** | **x** |  | **x** |

Model 23.1.0.a

1. Same as Model 23.1.0 except
   1. No annually varying parameters
   2. Francis reweighting (all following 23.1.0 models use same weighting)
2. Fails fishery length comp runs test

Model 23.1.0.b

1. Same as Model 23.1.0a except
   1. Annually varying Lmin and Richards growth parameter with random walk
   2. Used Model 23.1.0.a fit growth parameters as priors (value and standard deviation)
   3. Tuned SE for varying parameter

Model 23.1.0.c

1. Same as Model 23.1.0b except
   1. Annually varying fishery selectivity parameters
2. Fails fishery length and survey age comp runs test

Model 23.1.0.d

1. Same as Model 23.1.0b except
   1. Annually varying survey selectivity parameters

Model 23.1.0.e

1. Same as Model 23.1.0d except
   1. Max age from 20 to 12

Model 23.1.0.f

1. Same as Model 23.1.0d except
   1. Catch to 1964
   2. No regime change parameter

Model 23.1.0.g

1. Same as Model 23.1.0f except
   1. Max age from 20 to 12

Model 23.1.0.h

1. Same as model 23.1.0.g except
   1. Addition of survey conditional-age-at-length data

Model 23.1.0.i

1. Same as Model 23.2.0.e except
   1. Removed survey age composition data for pre-2007
   2. Reinstated survey length composition data for 1994-2006
   3. Removed aging bias parameters

**Model 23.1.1**

1. Same as Model 23.1.0.e except
2. Split fishery to 3 gears, trawl, longline, and pot

Model 23.1.1.a

1. Trawl fishery selectivity is length-based
2. Longline and pot are age-based selectivity option 17 with 12 nodes
   1. Longline selectivity fixed with higher selectivity at older ages based on Sean Rohan’s work

Model 23.1.1.b

1. Same as Model 23.1.1.a except
   1. Longline and pot selectivity at length fit as double normal
2. Note: failed trawl and longline length and survey age comp runs test

Model 23.1.1.c

1. Same as Model 23.1.1.b except
   1. Survey selectivity allowed to be dome-shaped.
2. Note: failed trawl and longline length and survey age comp runs test

**Model 23.2.0**

1. All configured like Model 22.2 except
   1. Changed survey length composition input sample size to bootstrap ISS
   2. Changed fishery length composition sample size to raw number of hauls standardized to mean survey input sample size
   3. Changed from Dirichlet multinomial to standard multinomial for length and age comps
   4. Removed length composition data for years with age composition data (1994-2021)
   5. CV growth pattern changed from 2 SD=F(LAA) to 0 CV=f(LAA)
   6. Survey Selectivity to age-based
      1. Reconfigure survey selectivity to estimate parameters 1-4 and using new asymptotic option for parameter 6

Model 23.2.0.a

1. Same as Model 23.2.0 except
   1. No annually varying parameters
   2. Francis reweighting (all following 23.2.0 models use same weighting)

Model 23.2.0.b

1. Same as Model 23.1.0a except
   1. Annually varying Lmin and Richards growth parameter with random walk
   2. Tuned SE for varying parameter

Model 23.2.0.c

1. Same as Model 23.1.0b except
   1. Annually varying fishery selectivity parameters

Model 23.2.0.d

1. Same as Model 23.1.0b except
   1. Annually varying survey selectivity parameters

Model 23.2.0.e

1. Same as Model 23.1.0d except
   1. Max age from 20 to 12

Model 23.2.0.f

1. Same as Model 23.1.0.d except
   1. Catch back to 1964
   2. No regime change parameter

Model 23.2.0.g

1. Same as Model 23.1.0.d except
   1. Catch to 1964

Model 23.2.0.h

1. Same as Model 23.1.0g except
   1. Use mean length at age

Model 23.2.0.i

1. Same as model 23.2.0.e except
   1. Addition of survey conditional-age-at-length data

Model 23.2.0.j

1. Same as Model 23.2.0.d except
   1. Removed survey age composition data for pre-2007
   2. Reinstated survey length composition data for 1994-2006
   3. Removed aging bias parameters

Exactly! My experience with time-varying selectivity for Pacific Hake found that the tuning of parameter deviations was hard. We used Thorson's laplace approximation function <https://r4ss.github.io/r4ss/reference/NegLogInt_Fn.html> and then tried to switch to the Xu/Thorson semi-parametric approach, but I think in the end didn't use either approach and just manually set the sigma value based on trying to balance plausible recruitment deviations with plausible amounts of selectivity variability.

I'm quitting for lunch, but happy to chat more later.