# Tables

**Table 1.** Summary of key improvements in reconstructing sport fish removals of rockfish using the Bayesian model as compared to the Howard et al. (2020) methods.

| Issue | Howard | Bayes |
| --- | --- | --- |
| Time series | 1999 - present | 1977 - present |
| Bias in SWHS | Not explicitly dealt with. Relies on logbook data and ratios of guided/unguided from SWHS data to estimate unguided releases and harvests. | Explicitly estimates bias in SWHS harvest and release estimates based on logbook data. |
| Species composition of releases | Assumes that species composition of releases is equal to that of the harvest, which is not evident in the logbook data. | Recognizes different release probabilities by species / species assemblage and estimates it from logbook data and bias corrected SWHS data |
| Sample size limitations | Uses sample size threshholds such that when areas fall below those threshholds values are borrowed from nearby areas. | Uses a hierarchichacal modelling approach that shares information between areas in the same region. Thus all data is used, even with small sample sizes. This is a more sound method that avoids assumptions and uses all of the data. |
| Error propogation | Error is propogated when variance estimates are available, but there is uncertainty associated with borrowing values from nearby areas, or the assumption of species compositions being identical in harvest and releases, are not dealt with. | By breaking the assumption that species composition is equal between harvests and releases, uncertainty in the release estimates is more reflective of the fishery. Furthermore, the hyerarchichal approach more accurately captures uncertainy within and between areas within a region. |

**Table 2.** Model priors for parameters associated with species composition, retention probability, the harvest trend spline, SWHS bias and proportion guided.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Model Component** | **Parameter** | **Region** | **Distribution** | **1st term** | **2nd term** |
| Species Composition | scomp | all | uniform | 0 | 10 |
| Proportion Harvested (pH) | spH | by logbook species complex | uniform | 0 | 5 |
| Harvest trend spline | ml | by region | normal | 1 | 0.1 |
| sl | by region | uniform | 0 | 20 |
| sHa | by area | normal | 0.25 | 1 |
| b0H | by area | normal | 0 | 0.000001 |
| SWHS harvest bias | mHb | by area | normal | 0 | 0.001 |
| sHb | by area | gamma | 2 | 2 |
| SWHS release bias | mRb | by area | normal | 0 | 0.001 |
| sRb | by area | gamma | 2 | 2 |
| Proportion Guided | l1a | by area | uniform | 1 | 50 |
| l2a | by area | uniform | 1 | 50 |

**Table 3.** Priors used for the logistic curve fit to the species composition of the proportion pelagic in all rockfish, including the hyper priors and area specific priors derived from the hyper priors and the distribution (dist.) and terms defining the distributions. is related to the standard deviation (SD) as = 1 / SD / SD. Y represents the terminal year of the time series.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Regional Hyperprior m** | | | **Regional Hyperprior t or standard deviation (SD)** | | | **Area specific priors**  ***b* (comp)ayu** | | | |
| **Param.** | **Definition** | **Reg.** | **Dist.** | **1st term** | **2nd term** | **Dist.** | **1st term** | **2nd term** | **Dist.** | **1st term** | **2nd term** | **Area notes** |
| b0 | Intercept | All | norm | 0 | 0.1 | SD unif | 0.1 | 5 | norm | m | t |  |
| b1 | Scaler | SC | lognorm | log(0.5) | 0.1 | SD unif | 0.1 | 5 | lognorm | log(m) | t | CI & NG Fixed at 0 |
| Kod | fixed | 0 |  | SD unif | 0.1 | 5 | norm | m | t |  |
| SE | lognorm | log(1) | 0.01 | SD unif | 0.1 | 5 | lognorm | log(m) | t |  |
| b2 | Slope | SC | lognorm | log(0.5) | 0.1 | SD unif | 0.1 | 4 | norm | m | t | CI & NG Fixed at 0 |
| Kod | fixed | 0 |  | SD unif | 0.1 | 1 | norm | m | t |  |
| SE | lognorm | log(1) | 0.05 | SD unif | 0.1 | 15 | norm | m | t |  |
| b3 | Inflection Point | SC | unif | 19 | Y -2 | SD unif | 0.1 | 4 | lognorm | log(m) | t |  |
| Kod | unif | 19 | Y -2 | SD unif | 0.1 | 4 | lognorm | log(m) | t |  |
| SE | unif | 20 | Y -2 | SD unif | 0.1 | 4 | lognorm | log(m) | t |  |
| b4 | User effect | All | norm | 0 | 0.1 | **t** gamma SD gamma | 0.1 | 0.1 | norm | m | t |  |

**Table 4.** Priors used for the logistic curve fit to the species composition of the proportion black in pelagic rockfish, including the hyper priors and area specific priors derived from the hyper priors and the distribution (dist.) and terms defining the distributions. is related to the standard deviation (SD) as = 1 / SD / SD. Y represents the terminal year of the time series.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Hyperprior m** | | | **Hyper prior t or standard deviation (SD)** | | | **Area specific priors** | | | |
| **Param.** | **Definition** | **Reg.** | **Dist.** | **1st term** | **2nd term** | **Dist.** | **1st term** | **2nd term** | **Dist.** | **1st term** | **2nd term** | **Area notes** |
| b0 | Intercept | All | norm | 0 | 0.1 | SD unif | 0.1 | 5 | norm | m | t |  |
| b1 | Scaler | SC | lognorm | log(0.0001) | 0.1 | SD unif | 0.1 | 10 | fixed | 0 |  | lognorm(m,t) for CI |
| Kod | fixed | 0 |  | SD unif | 0.1 | 10 | fixed | 0 |  |  |
| SE | lognorm | log(0.0001) | 0.5 | SD unif | 0.1 | 10 | fixed | 0 |  | lognorm(m,t) for NSEI |
| b2 | Slope | SC | lognorm | log(0.5) | 0.5 | SD unif | 0.25 | 5 | fixed | 0 |  | lognorm(m,t) for CI |
| Kod | fixed | 0 |  | SD unif | 0.25 | 5 | fixed | 0 |  |  |
| SE | norm | -1 | 1 | SD unif | 0.25 | 5 | fixed | 0 |  | norm(m,t) for NSEI |
| b3 | Inflection Point | SC | unif | 25 | Y -2 | SD unif | 0.1 | 4 | fixed | 25 |  | lognorm(m,t) for CI |
| Kod | unif | 19 | Y -2 | SD unif | 0.1 | 4 | fixed | 25 |  |  |
| SE | unif | 29 | Y -2 | SD unif | 0.1 | 4 | fixed | 0 |  | lognorm(m,t) for NSEI |
| b4 | User effect | All | norm | 0 | 0.1 | **t** gamma | 0.1 | 0.1 | norm | m | t |  |

**Table 5.** Priors used for the logistic curve fit to the species composition of the proportion yelloweye rockfish in non-pelagic (Southcentral and Kodiak) or demersal shelf rockfish (Southeast region) including the hyper priors and area specific priors derived from the hyper priors and the distribution (dist.) and terms defining the distributions. is related to the standard deviation (SD) as = 1 / SD / SD. Y represents the terminal year of the time series.

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|  |  |  | **Hyperprior m** | | | **Hyper prior t or standard deviation (SD)** | | | **Area specific priors** | | | |
| **Param.** | **Definition** | **Reg.** | **Dist.** | **1st term** | **2nd term** | **Dist.** | **1st term** | **2nd term** | **Dist.** | **1st term** | **2nd term** | **Area notes** |
| b0 | Intercept | All | norm | 0 | 0.5 | SD unif | 0.1 | 5 | norm | m | t |  |
| b1 | Scaler | SC | lognorm | log(0.25) | 0.1 | SD unif | 0.1 | 5 | lognorm | log(m) | t |  |
| Kod | fixed | 0 |  | SD unif | 0.1 | 5 | fixed | 0 |  |  |
| SE | lognorm | log(0.0001) | 0.1 | SD unif | 0.1 | 5 | lognorm | log(m) | t |  |
| b2 | Slope | SC | norm | -0.5 | 0.05 | SD unif | 0.1 | 5 | norm | m | t |  |
| Kod | fixed | 0 |  | SD unif | 0.1 | 5 | fixed | 0 |  |  |
| SE | norm | -0.5 | 0.05 | SD unif | 0.1 | 4 | norm | m | t |  |
| b3 | Inflection Point | SC | unif | 19 | Y -2 | SD unif | 0.1 | 4 | lognorm | log(m) | t |  |
| Kod | unif | 19 | Y -2 | SD unif | 0.1 | 4 | fixed | 25 |  |  |
| SE | unif | 35 | Y -2 | SD unif | 0.1 | 4 | lognorm | log(m) | t |  |
| b4 | User effect | All | norm | 0 | 0.1 | **t** gamma | 0.1 | 0.1 | norm | m | t |  |

**Table 6.** Priors used for the logistic curve fit to the species composition of the proportion demersal shelf and slope rockfish in non-pelagic rockfish in Southeast region, including the hyper priors and area specific priors derived from the hyper priors and the distribution (dist.) and terms defining the distributions. is related to the standard deviation (SD) as = 1 / SD / SD. Y represents the terminal year of the time series.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Hyperprior m** | | | **Hyper prior t or standard deviation (SD)** | | | **Area specific priors** | | | |
| **Species Complex** | **Param.** | **Definition** | **Dist.** | **1st term** | **2nd term** | **Dist.** | **1st term** | **2nd term** | **Dist.** | **1st term** | **2nd term** | **Area notes** |
| DSR | b0 | Intercept | norm | 0 | 0.1 | SD unif | 0.1 | 5 | norm | m | t |  |
| b1 | Scaler | lognorm | log(0.0001) | 0.1 | SD unif | 0.1 | 5 | lognorm | log(m) | t |  |
| b2 | Slope | norm | -0.5 | 0.1 | SD unif | 0.1 | 4 | norm | m | t |  |
| b3 | Inflection Point | unif | 29 | Y - 3 | SD unif | 0.1 | 5 | lognorm | log(m) | t |  |
| b4 | User effect | norm | 0 | 0.1 | gamma | 0.1 | 0.1 | norm | m | t |  |
| Slope | b0 | Intercept | norm | 0 | 0.1 | SD unif | 0 | 5 | norm | m | t |  |
| b1 | Scaler | lognorm | log(0.0001) | 0.1 | SD unif | 0 | 5 | lognorm | log(m) | t |  |
| b2 | Slope | norm | 0.1 | 0.1 | SD unif | 0.01 | 4 | norm | m | t |  |
| b3 | Inflection Point | unif | 29 | Y -3 | SD unif | 0 | 5 | lognorm | log(m) | t |  |
| b4 | User effect | norm | 0 | 0.1 | **t** gamma | 0.1 | 0.1 | norm | m | t |  |
| b5 | Release offset | fixed | 0.1 |  | fixed | 0.01 |  | Norm | 0.1 | 0.01 |  |

**Table 7.** Priors used for the logistic curve fit to the retention probability, *pH*, for pelagic rockfish including the hyper priors and area specific priors derived from the hyper priors and the distribution (dist.) and terms defining the distributions. is related to the standard deviation (SD) as = 1 / SD / SD. Y represents the terminal year of the time series.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Hyperprior m** | | | **Hyper prior standard deviation (SD)** | | | **Area specific priors** | | | |
| **Param.** | **Definition** | **Reg.** | **Dist.** | **1st term** | **2nd term** | **Dist.** | **1st term** | **2nd term** | **Dist.** | **1st term** | **2nd term** | **Area notes** |
| b0 | Intercept | All | norm | 0 | 0.01 | unif | 0.1 | 5 | norm | m | t |  |
| b1 | Scaler | SC | lognorm | log(0.00001) | 0.01 | unif | 0.1 | 4 | lognorm | log(m) | t |  |
| Kod | lognorm | log(0.00001) | 0.01 | unif | 0.1 | 4 | lognorm | log(m) | t |  |
| SE | lognorm | log(0.00001) | 0.01 | unif | 0.1 | 4 | lognorm | log(m) | t |  |
| b2 | Slope | SC | norm | 0 | 0.01 | unif | 0.1 | 5 | norm | m | t |  |
| Kod | lognorm | log(0.00001) | 0.01 | unif | 0.1 | 5 | norm | m | t | Lognorm for WKMA |
| SE | norm | 0 | 0.01 | unif | 0.1 | 5 | norm | m | t |  |
| b3 | Inflection Point | SC | unif | 19 | Y -3 | unif | 0.1 | 5 | lognorm | log(m) | t |  |
| Kod | unif | 19 | Y -3 | unif | 0.1 | 5 | lognorm | log(m) | t |  |
| SE | unif | 19 | Y -3 | unif | 0.1 | 5 | lognorm | log(m) | t |  |
| b4 | User effect | All | norm | 0 | 1 | unif | 0.1 | 4 | norm | m | t |  |

**Table 8.** Priors used for the logistic curve fit to the retention probability, *pH*, for yelloweye rockfish including the hyper priors and area specific priors derived from the hyper priors and the distribution (dist.) and terms defining the distributions. is related to the standard deviation (SD) as = 1 / SD / SD. Y represents the terminal year of the time series.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Hyperprior m** | | | **Hyper prior t or standard deviation (SD)** | | | **Area specific priors** | | | |
| **Param.** | **Definition** | **Reg.** | **Dist.** | **1st term** | **2nd term** | **Dist.** | **1st term** | **2nd term** | **Dist.** | **1st term** | **2nd term** | **Area notes** |
| b0 | Intercept | All | norm | 0 | 0.01 | unif | 0.1 | 5 | norm | m | t |  |
| b1 | Scaler | SC | lognorm | log(0.00001) | 0.01 | unif | 0.1 | 3 | lognorm | log(m) | t | fixed at 0 for NGC, PWSI, PWSO |
| Kod | lognorm | log(0.00001) | 0.01 | unif | 0.1 | 4 | lognorm | log(m) | t |  |
| SE | lognorm | log(0.00001) | 0.01 | unif | 0.1 | 4 | lognorm | log(m) | t |  |
| b2 | Slope | SC | norm | -0.5 | 0.5 | unif | 0.1 | 4 | norm | m | t | fixed at 0 for NGC, PWSI, PWSO |
| Kod | lognorm | 0 | 0.01 | unif | 0.1 | 4 | fixed | 0 |  |  |
| SE | norm | 5 | 0.01 | unif | 0.1 | 4 | norm | m | t |  |
| b3 | Inflection Point | SC | unif | 19 | Y -3 | unif | 0.1 | 5 | lognorm | log(m) | t |  |
| Kod | unif | 19 | Y -3 | unif | 0.1 | 5 | lognorm | log(m) | t |  |
| SE | unif | 19 | Y -3 | unif | 0.1 | 5 | lognorm | log(m) | t |  |
| b4 | User effect | All | norm | 0 | 1 | unif | 0.1 | 4 | norm | m | t |  |

**Table 9.** Priors used for the logistic curve fit to the retention probability, *pH*, for “other” (non-pelagic, non-yelloweye) rockfish including the hyper priors and area specific priors derived from the hyper priors and the distribution (dist.) and terms defining the distributions. is related to the standard deviation (SD) as = 1 / SD / SD. Y represents the terminal year of the time series.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Hyperprior m** | | | **Hyper prior t or standard deviation (SD)** | | | **Area specific priors** | | | |
| **Param.** | **Definition** | **Reg.** | **Dist.** | **1st term** | **2nd term** | **Dist.** | **1st term** | **2nd term** | **Dist.** | **1st term** | **2nd term** | **Area notes** |
| b0 | Intercept | All | norm | 0 | 0.01 | unif | 0.1 | 5 | norm | m | t |  |
| b1 | Scaler | SC | lognorm | log(0.00001) | 0.5 | unif | 0.1 | 5 | lognorm | log(m) | t | fixed at 0 for NGC, PWSI, PWSO |
| Kod | lognorm | log(0.5) | 0.05 | unif | 0.1 | 5 | lognorm | log(m) | t |  |
| SE | lognorm | log(0.00001) | 0.01 | unif | 0.1 | 5 | lognorm | log(m) | t |  |
| b2 | Slope | SC | lognorm | log(0.00001) | 0.5 | unif | 0.1 | 5 | norm | m | t | fixed at 0 for NGC, PWSI, PWSO |
| Kod | norm | 0 | 0.01 | unif | 0.1 | 5 | norm | m | m |  |
| SE | norm | 0 | 0.01 | unif | 0.1 | 5 | norm | m | t |  |
| b3 | Inflection Point | SC | unif | 19 | Y -3 | unif | 0.1 | 5 | lognorm | log(m) | t |  |
| Kod | unif | 19 | Y -3 | unif | 0.1 | 5 | lognorm | log(m) | t |  |
| SE | unif | 31 | Y -3 | unif | 0.1 | 5 | lognorm | log(m) | t |  |
| b4 | User effect | All | norm | 0 | 1 | unif | 0.1 | 4 | norm | m | t |  |