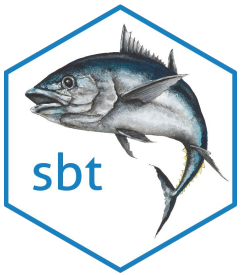
Operating Model Specification and Software Upgrade Project

Next steps

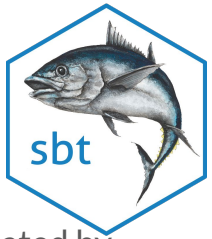
Darcy Webber

26 June 2024
Seattle

QUANTIFISH
Quantitative Fisheries Science



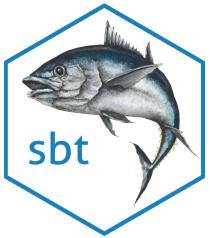
Next steps: prior to June 2024 OMMP



Ideally the following changes would be implemented before the June 2024 meeting so that they can be evaluated by the OMMP working group:

- ✓ Check age likelihood again (small difference in likelihood)
- ✓ Lump the LL3 and LL4 fisheries and cohort slice and treat as removals
- ❏ Specify the LL1, LL2, Australian and, Indonesian selectivity using GMRF
- ❏ Review this years sensitivities and robustness tests and make sure all the code to do these is available
- ❏ Can filter out some of the POPs in get_data that result in likelihood values that are not used in the estimation
- ✓ Name the grid runs in run_grid
- ❏ Implement grid sampling in the R code
- ✓ Re-code tag likelihoods to remove the H* parameters (harvest rate for mixing periods) and add the output for the PSIS-LOO diagnostic
- ✓ Implement the Dirichlet-multinomial likelihood for composition data
- ❏ Code prior distributions in short-hand (following R format; e.g., dnorm())
- ❏ Incorporate the age-uncertainty for the adult part of the POP calculations (the possible ages given length)
- ❏ Update website to improve documentation (e.g., add vignette on “how to run the grid”).
- ❏ Evaluate if other “Stan” R packages (e.g., adnuts) can be used to help evaluate model runs.

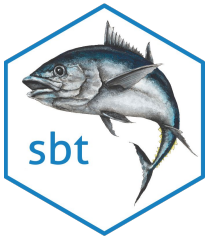
Next steps: at the June 2024 OMMP



Other tasks that could be completed at the June 2024 meeting include:

- ❏ Review harvest rate function and determine if a penalty is required to keep it below 0.9 (currently there is no penalty in the *sbt* model)
- ❏ Categorise what we want to add to REPORT and ADREPORT in the TMB code
- ❏ Implement “one-step ahead residuals” diagnostics for judging fits to composition data
- ❏ Evaluate how the grid should be modified in light of new MCMC capabilities

Next steps: after the June 2024 OMMP

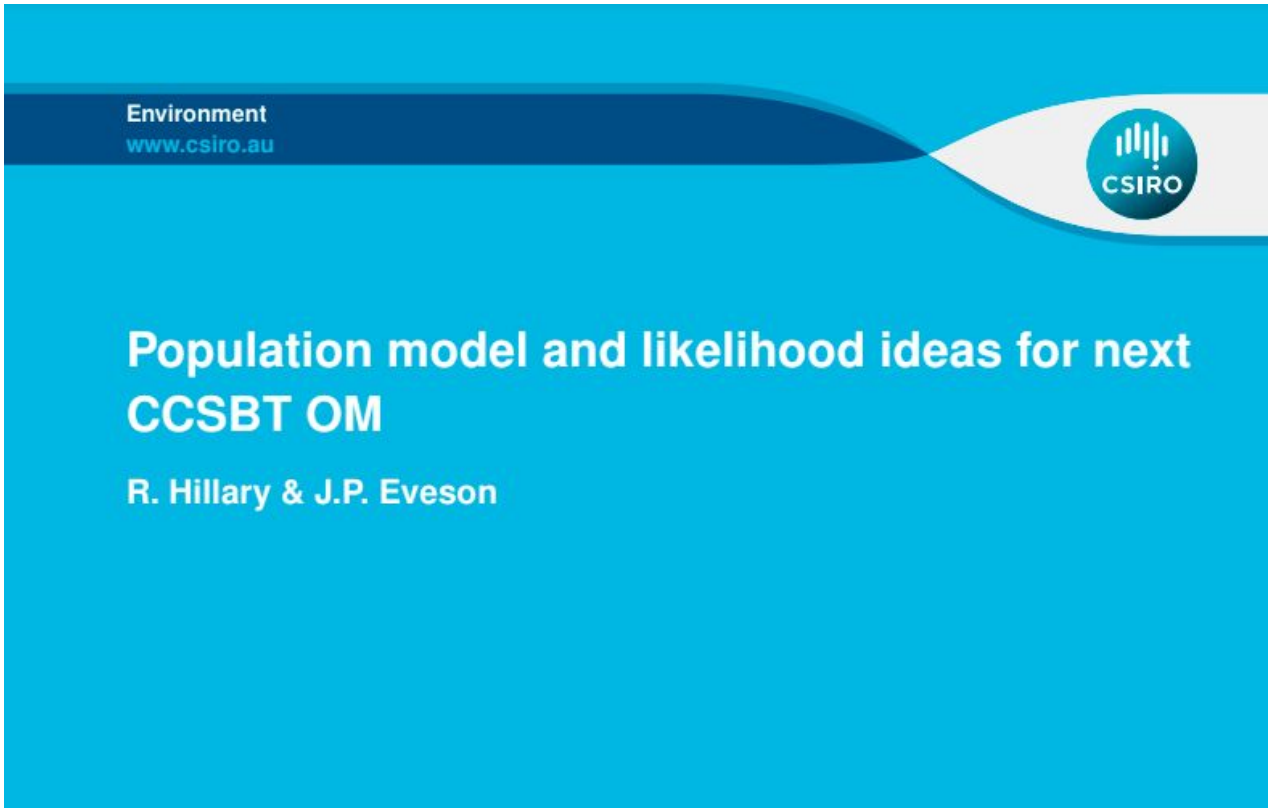


Tasks that could be done after the June 2024 meeting include:

- ❏ Projection model developments: two options were discussed, an interim option that requires the TMB code to output the same variables that the ADMB conditioning code passes to the projection code, so that the old projection code can be run (with inputs in the same format) or a final option where projections are implemented within the "simulate" blocks of the TMB code.
- ❏ Add in the supplemental optimization code to compute MSY quantities by year using year-specific parameters and catch allocations between fleets.

Next steps

Next steps: ideas for next OM



OSA residuals

Fisheries Research 257 (2023) 106487

Contents lists available at ScienceDirect

Fisheries Research

journal homepage: www.elsevier.com/locate/fishres

Check for updates

Model validation for compositional data in stock assessment models: Calculating residuals with correct properties

Vanessa Trijoulet [a,*], Christoffer Moesgaard Albertsen [a], Kasper Kristensen [a], Christopher M. Legault [b], Timothy J. Miller [b], Anders Nielsen [a]

[a] National Institute of Aquatic Resources, Technical University of Denmark, Kemitorvet 201, DK-2800 Kgs. Lyngby, Denmark
[b] Northeast Fisheries Science Center, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, 166 Water Street, Woods Hole, MA 02543, USA

Pearson residuals for multinomial distributions (e.g., LFs and age comps) are wrong!

One step ahead (OSA) residuals

NOAA FISHERIES

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2023 September Plan Team

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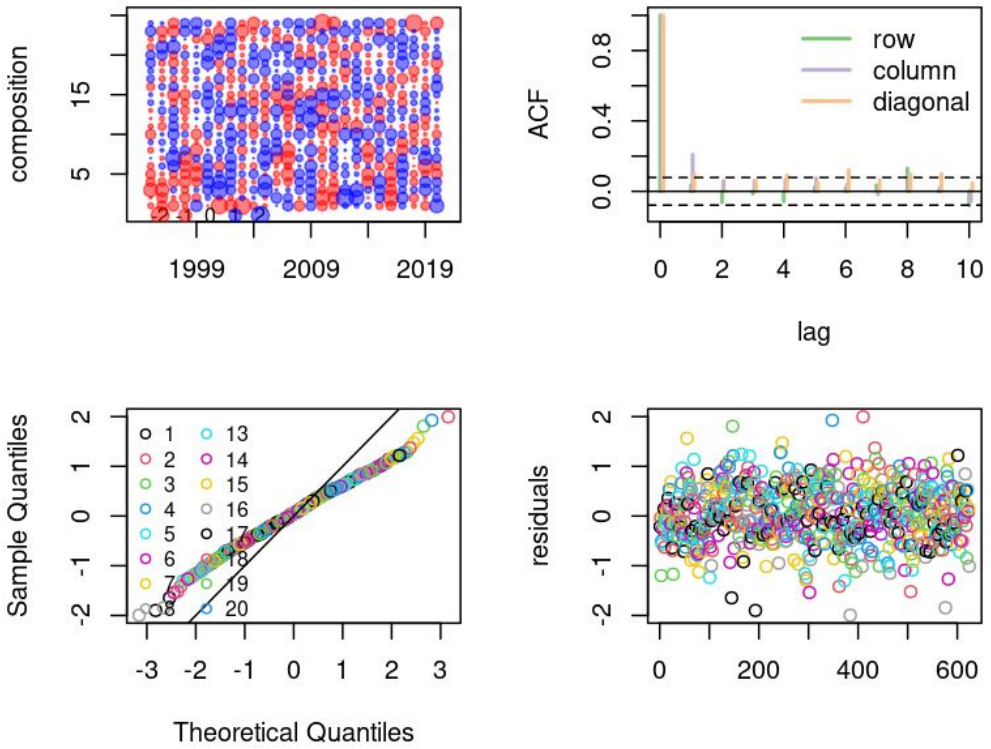
https://meetings.npfmc.org/CommentReview/DownloadFile?p=647c6817-09f4-4fcf-8f92-2014bda48db3.pdf&fileName=One%20step%20ahead%20residuals%20PRESENTATION.pdf

OSA residuals - age compositions



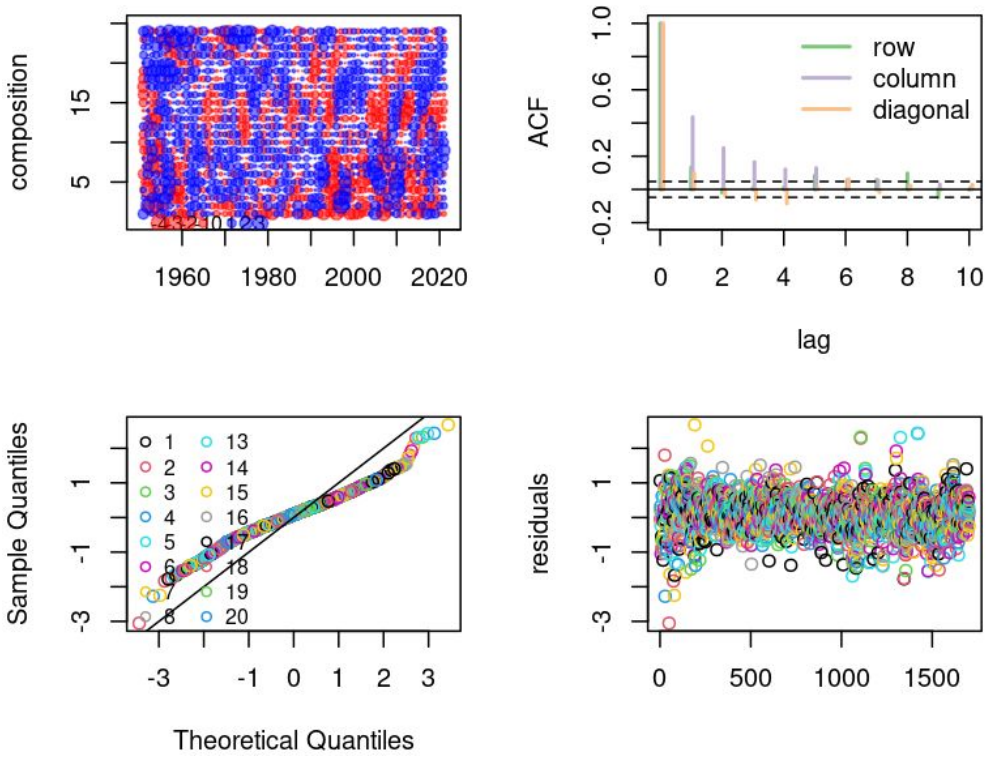

```
library(compResidual)

# Age comps ----

X <- t(Data$af_obs * Data$af_n)
P <- t(obj1$report()$af_pred)

X5 <- X[7:31, Data$af_fishery == 5]
P5 <- P[7:31, Data$af_fishery == 5]
res5 <- resMulti(obs = X5, pred = P5)
colnames(res5) <-
c(Data$first_yr:Data$last_yr)[Data$af_year[
Data$af_fishery == 5]]
plot(res5)
```

OSA residuals - length compositions




```
# Length comps ----

X <- t(Data$lf_obs * Data$lf_n)
P <- t(obj1$report()$lf_pred)

i <- 1
Xi <- X[,Data$lf_fishery == i]
Pi <- P[,Data$lf_fishery == i]
resi <- resMulti(obs = Xi, pred = Pi)
colnames(resi) <-
c(Data$first_yr:Data$last_yr)[Data$lf_year[D
ata$lf_fishery == i]]
plot(resi)
```

Length based M

Fisheries Research 255 (2022) 106454

Contents lists available at ScienceDirect

Fisheries Research

journal homepage: www.elsevier.com/locate/fishres

Check for updates

Size- and age-dependent natural mortality in fish populations: Biology, models, implications, and a generalized length-inverse mortality paradigm

Kai Lorenzen

School of Forest, Fisheries, and Geomatics Sciences, University of Florida, Gainesville, FL 32653, USA

Natural mortality is likely to be a length-based process.

Fisheries Research 252 (2022) 106327

Contents lists available at ScienceDirect

Fisheries Research

journal homepage: www.elsevier.com/locate/fishres

Natural mortality and body size in fish populations

Kai Lorenzen *, Edward V. Camp, Taryn M. Garlock

School of Forest, Fisheries, and Geomatics Sciences, University of Florida, Gainesville, FL 32653, USA

Natural mortality is likely to be a length-based process.

Other stuff

Fisheries Research 275 (2024) 107024

Contents lists available at ScienceDirect

Fisheries Research

journal homepage: www.elsevier.com/locate/fishres

Toward good practices for Bayesian data-rich fisheries stock assessments using a modern statistical workflow

Cole C. Monnahan

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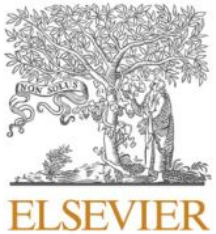
We are doing this reasonably well, but can always do better! I am meeting with Cole later this month to discuss.

Fisheries Research 249 (2022) 106247



Contents lists available at ScienceDirect

Fisheries Research

journal homepage: www.elsevier.com/locate/fishres

Towards best practice for specifying selectivity in age-structured integrated stock assessments

Kristin M. Privitera-Johnson [a,*], Richard D. Methot [b], André E. Punt [a]

[a] School of Aquatic and Fishery Sciences, University of Washington, Seattle, WA, USA
[b] NOAA Fisheries, Northwest Fisheries Science Center, Seattle, WA, USA

Fisheries Research 229 (2020) 105594

Contents lists available at ScienceDirect

Fisheries Research

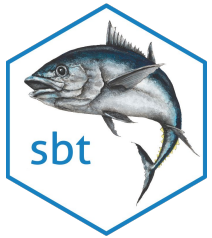
journal homepage: www.elsevier.com/locate/fishres

The need for spatio-temporal modeling to determine catch-per-unit effort based indices of abundance and associated composition data for inclusion in stock assessment models

Mark N. Maunder[a,b,*], James T. Thorson[c], Haikun Xu[a], Ricardo Oliveros-Ramos[a], Simon D. Hoyle[d], Laura Tremblay-Boyer[e], Hui Hua Lee[f], Mikihiko Kai[g], Shui-Kai Chang[h], Toshihide Kitakado[i], Christoffer M. Albertsen[j], Carolina V. Minte-Vera[a], Cleridy E. Lennert-Cody[a], Alexandre M. Aires-da-Silva[a], Kevin R. Piner[f]

Assuming LFs are the same for catch and CPUE may be wrong!

Other new features to consider



- GMRF selectivity by age and year, treat selectivity parameters as random effects - almost done
- One step ahead (OSA) residuals - almost done
- Length based M
- Self-weighting likelihoods (i.e., estimate data set weights as parameters). This is set up for the AFs/LFs but would need to be set up for the other data sources too:
  - ✓ CPUE (cpue_sigma), aerial survey (aerial_tau), troll index (troll tau)
  - ○ POPs
  - ○ HSPs
  - ○ GT
  - ○ tags
- Treat recruitment deviates as random-effects and estimate sigma_r
- Length dimension? Spatial structure?