# Appendices

**Appendix A: Spline fomulae:** The following formulas were used to fit the penalized spline to the harvest trend in the model. In region *R* parameters and were calculated as

where and were derived from priors (Table PRIORS1).

The harvest trend spline by area, *a*, was modeled such that was derived from the regional and parameters based on a gamma distribution such that

Area specific matrices with *a* by *C* dimensions where *C* is equal to the number of knots in the spline were derived from a multivariate normal distribution such that

where was derived from a prior (Table PRIORS1), is a vector of zeros and is a matrix derived from the number of knots (see <https://bragqut.github.io/2016/05/24/samclifford-splines/> for original formulation and the model code in <https://github.com/ADFG-DSF/RockfishSportMort/tree/main/models>).

The true harvest in area *a* and year *y*, , was fit to the spline trend line such that

where

and was derived from a prior distribution (Table PRIORS1). The spine trend was calculated as

where is a matrix derived from the number of knots and the number of years in the time series (see <https://bragqut.github.io/2016/05/24/samclifford-splines/> for original formulation and the model code in <https://github.com/ADFG-DSF/RockfishSportMort/tree/main/models>).

**Appendix B: Model fit to weight data.**