Squarespot Rockfish (*Sebastes hopkinsi*) along the California U.S. West Coast in 2020

by
Chantel R. Wetzel[1]
Brian J. Langseth[1]
Jason M. Cope[1]
John E. Budrick[2]

[1]Northwest Fisheries Science Center, U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, 2725 Montlake Boulevard East, Seattle, Washington 98112
[2]California Department of Fish and Wildlife, 350 Harbor Boulevard, Belmont, California 94002

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2 Data

2.1 Fishery-Dependent Data

2.2 Fishery-Independent Data

2.2.1 NWFSC Hook and Line Survey

2.2.2 NWFSC West Coast Groundfish Bottom Trawl Survey

The NWFSC West Coast Groundfish Bottom Trawl Survey (WCGBTS) is based on a random-grid design; covering the coastal waters from a depth of 55-1,280 m (Bradburn, Keller, and Horness 2011). This design generally uses four industry-chartered vessels per year assigned to a roughly equal number of randomly selected grid cells and divided into two 'passes' of the coast. Two vessels fish from north to south during each pass between late May to early October. This design therefore incorporates both vessel-to-vessel differences in catchability, as well as variance associated with selecting a relatively small number (approximately 700) of possible cells from a very large set of possible cells spread from the Mexican to the Canadian borders.

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3.1 Summary of Previous Assessments

3.1.1 Bridging Analysis

3.2 Model Structure and Assumptions

Squarespot rockfish area assessed using a two-sex model with sex specific life history parameters.

3.2.1 Modeling Platform and Structure

Stock Synthesis version 3.30.16 was used to estimate the parameters in the model. The R package r4ss, version 1.38.0, along with R version 4.0.1 were used to investigate and plot model fits.

3.2.2 Priors

3.2.3 Data Weighting

3.2.4 Estimated and Fixed Parameters

3.3 Model Selection and Evaluation

The base assessment model for squarespot rockfish was developed to balance parsimony and realism, and the goal was to estimate a spawning output trajectory for the population of squarespot rockfish off the California coast. The model contains many assumptions to achieve parsimony and uses many different sources of data to estimate reality. A series of investigative model runs were done to achieve the final base model.

3.4 Base Model Results

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3.5.3 Retrospective Analysis

A five-year retrospective analysis was conducted by running the model using data only through 2015, 2016, 2017, 2018, 2019 and 2020.

3.5.4 Likelihood Profiles

Likelihood profiles were conducted for R_0, steepness, maximum length, and female natural mortality values separately. These likelihood profiles were conducted by fixing the parameter at specific values and estimated the remaining parameters based on the fixed parameter value.

3.5.5 Unresolved Problems and Major Uncertainties

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4.1 Reference Points

4.2 Unresolved Problems and Major Uncertainties

4.3 Harvest Projections and Decision Tables

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4.5 Research and Data Needs

5 Acknowledgments

6 References

Bradburn, M. J., A. A Keller, and B. H. Horness. 2011. "The 2003 to 2008 US West Coast Bottom Trawl Surveys of Groundfish Resources Off Washington, Oregon, and California: Estimates of Distribution, Abundance, Length, and Age Composition." US Department of Commerce, National Oceanic; Atmospheric Administration, National Marine Fisheries Service.

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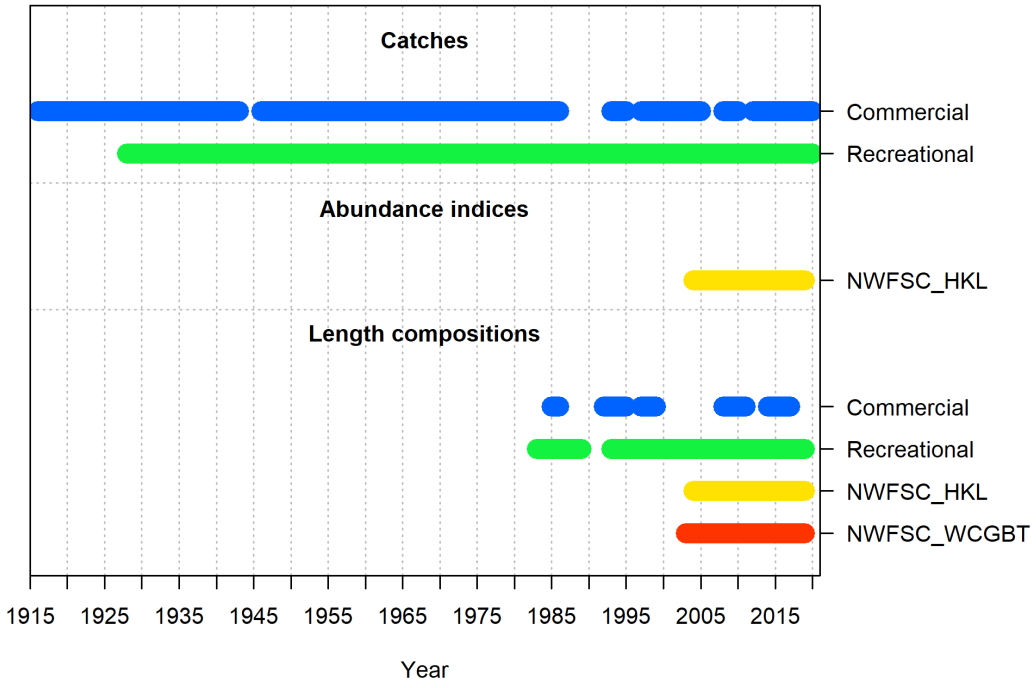

Figure 1: Summary of data sources used in the base model.

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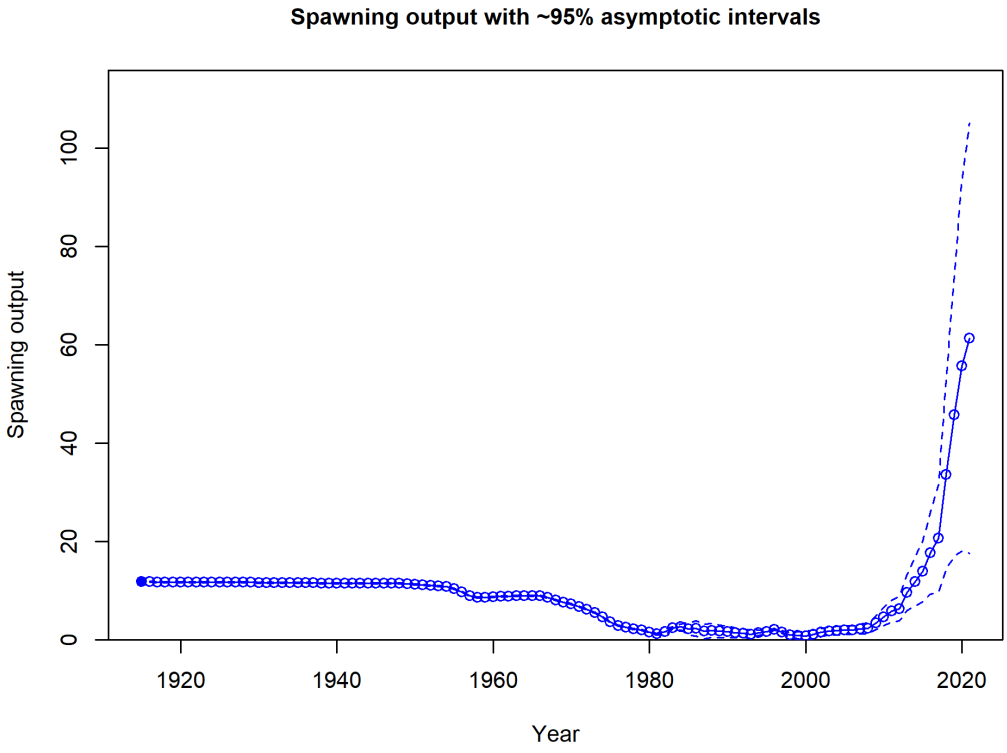

Figure 2: Estimated time series of spawning output.

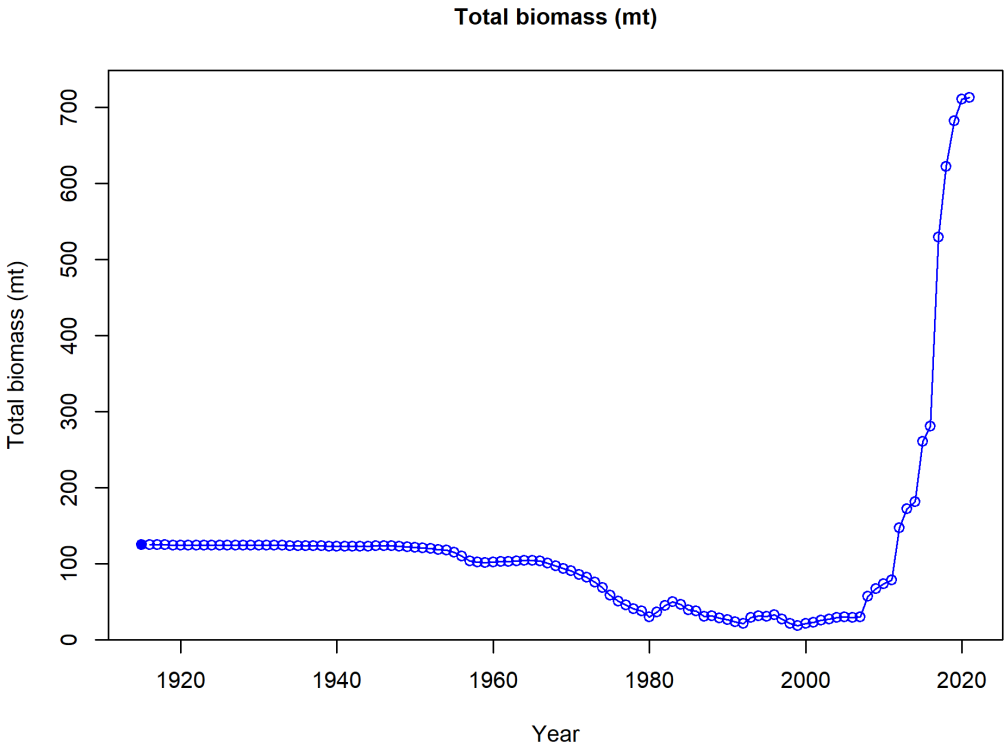

Figure 3: Estimated time series of total biomass.

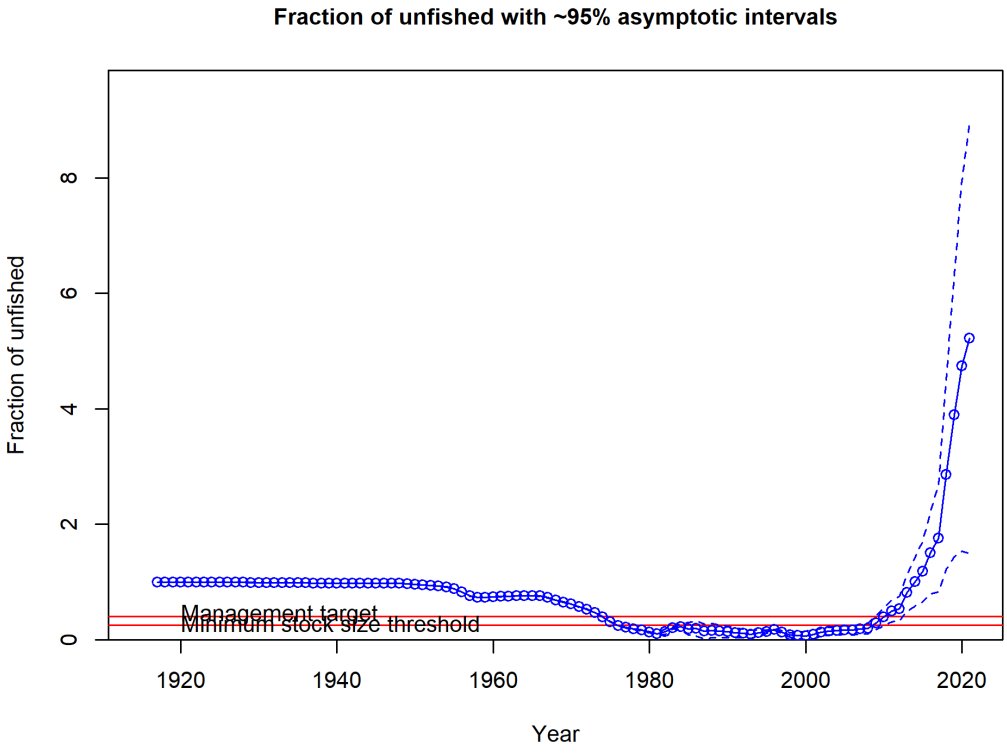

Figure 4: Estimated time series of fraction of unfished spawning output.

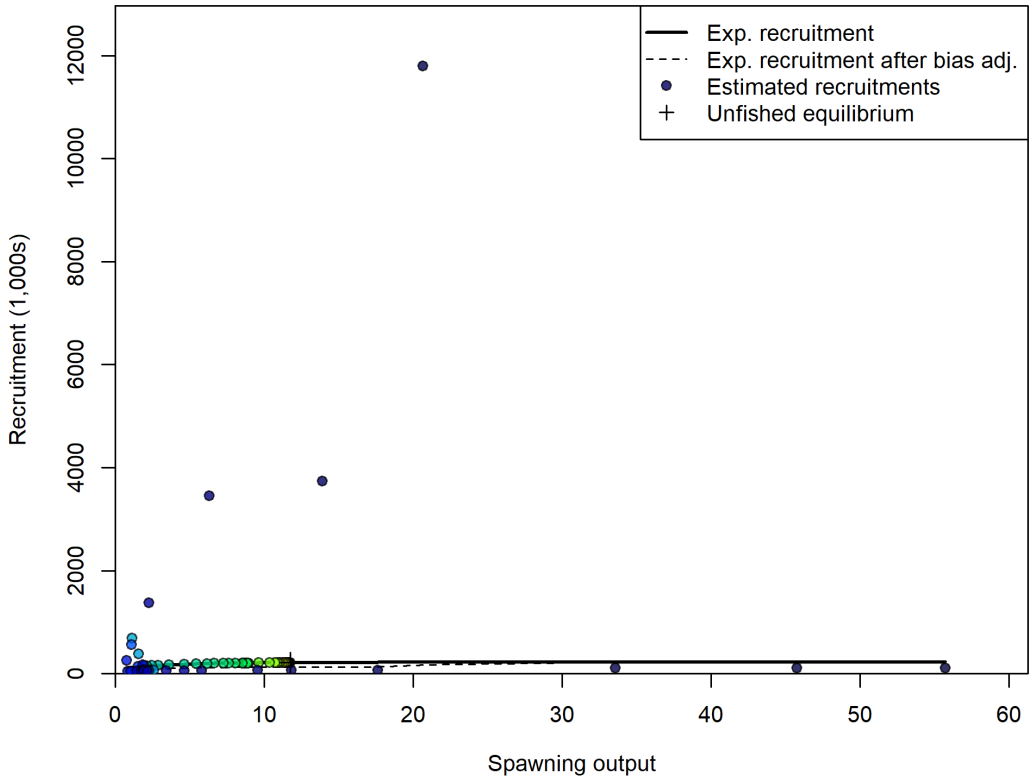

Figure 5: Stock-recruit curve. Point colors indicate year, with warmer colors indicating earlier years and cooler colors in showing later years.

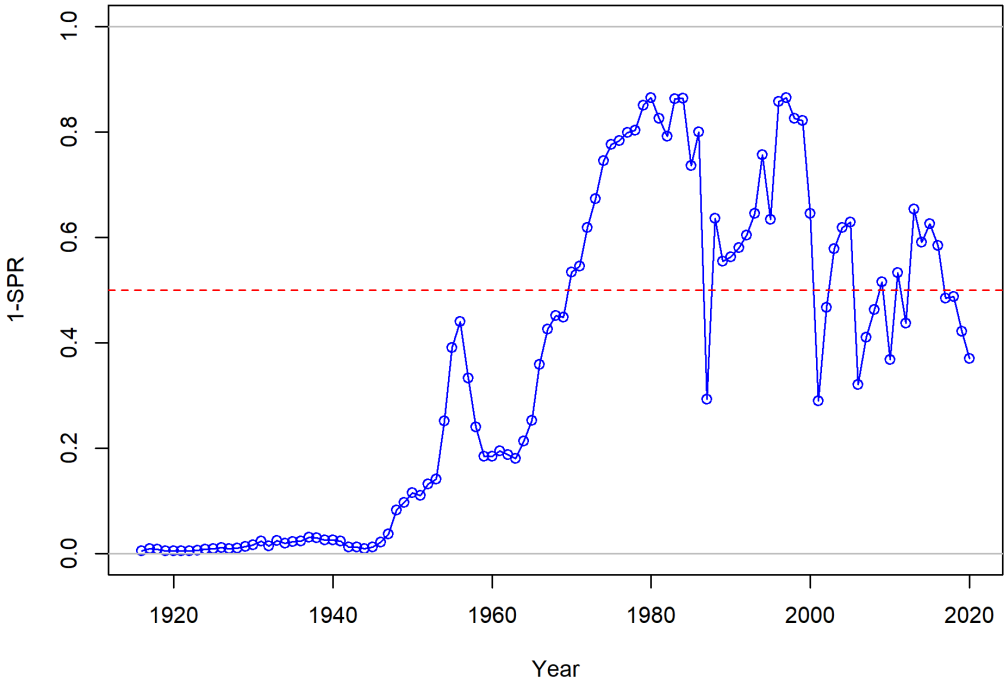

Figure 6: Estimated 1 - relative spawning ratio (SPR) by year.

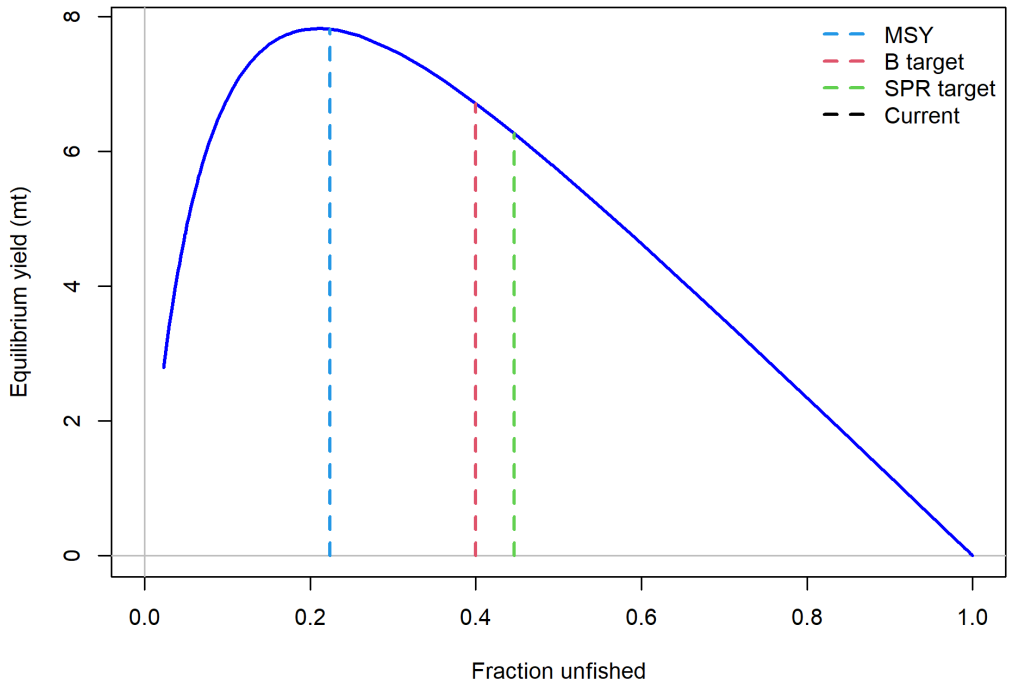

Figure 7: Equilibrium yield curve for the base case model. Values are based on the 2020 fishery selectivity and with steepness fixed at 0.72.

9 Appendix A. Detailed Fit to Length Composition Data