

# AN INDIRECT APPROACH TO ESTIMATE THE SEASONAL PATTERN OF THE DAILY SPAWNING FRACTION IN TWO SMALL PELAGIC FISH FROM CHILE

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## INTRODUCTION

The daily spawning fraction (S) is a key parameter for assessing the spawning biomass of species with undetermined fecundity. Traditionally, S is estimated through histological analyses of aging postovulatory follicles, which is a costly and temporally limited method. In contrast, routine fisheries monitoring of biological data offers the potential for an indirect approach, with the advantages of being low-cost and applicable to longer time series.

The present study aims to estimate the spawning fraction of two small pelagic fish species from Chile using monthly monitoring data.



Anchovy  
(*Engraulis ringens*)



Common sardine  
(*Strangomera bentincki*)

## MATERIALS AND METHODS



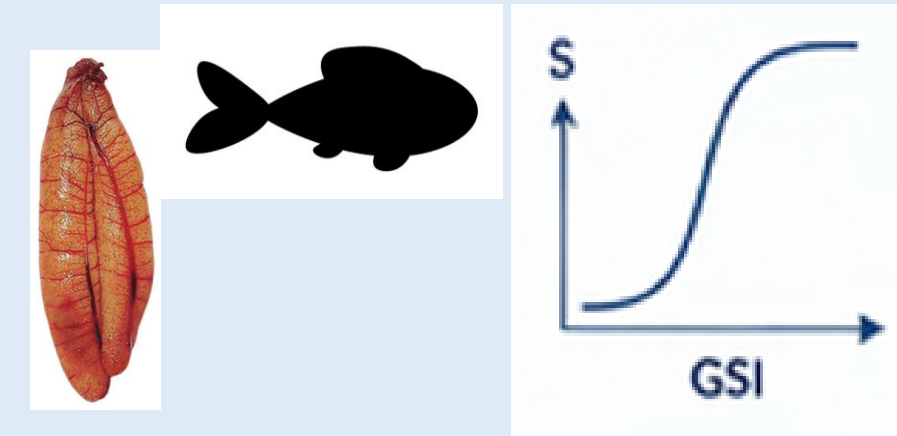
Data were obtained from fisheries monitoring programs conducted by Instituto de Fomento Pesquero in central-southern Chile.

The analysis were focused on common sardine (*Strangomera bentincki*) and anchovy (*Engraulis ringens*).

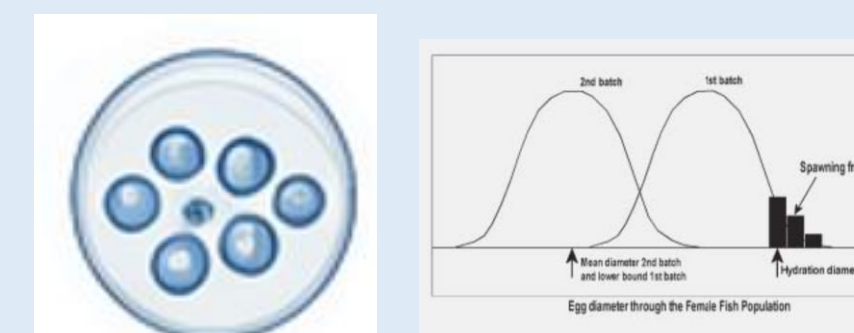
### ESTIMATION OF DAILY SPAWNING FRACTION (S)

The daily spawning fraction was stimulated using:

1 A logistic regression model based on macroscopic maturity stages and GSI thresholds.



2 An alternative approach relating GSI to hydrated oocyte diameter.



Seasonal patterns were evaluated over an anual cycle, and results from both methods were compared.

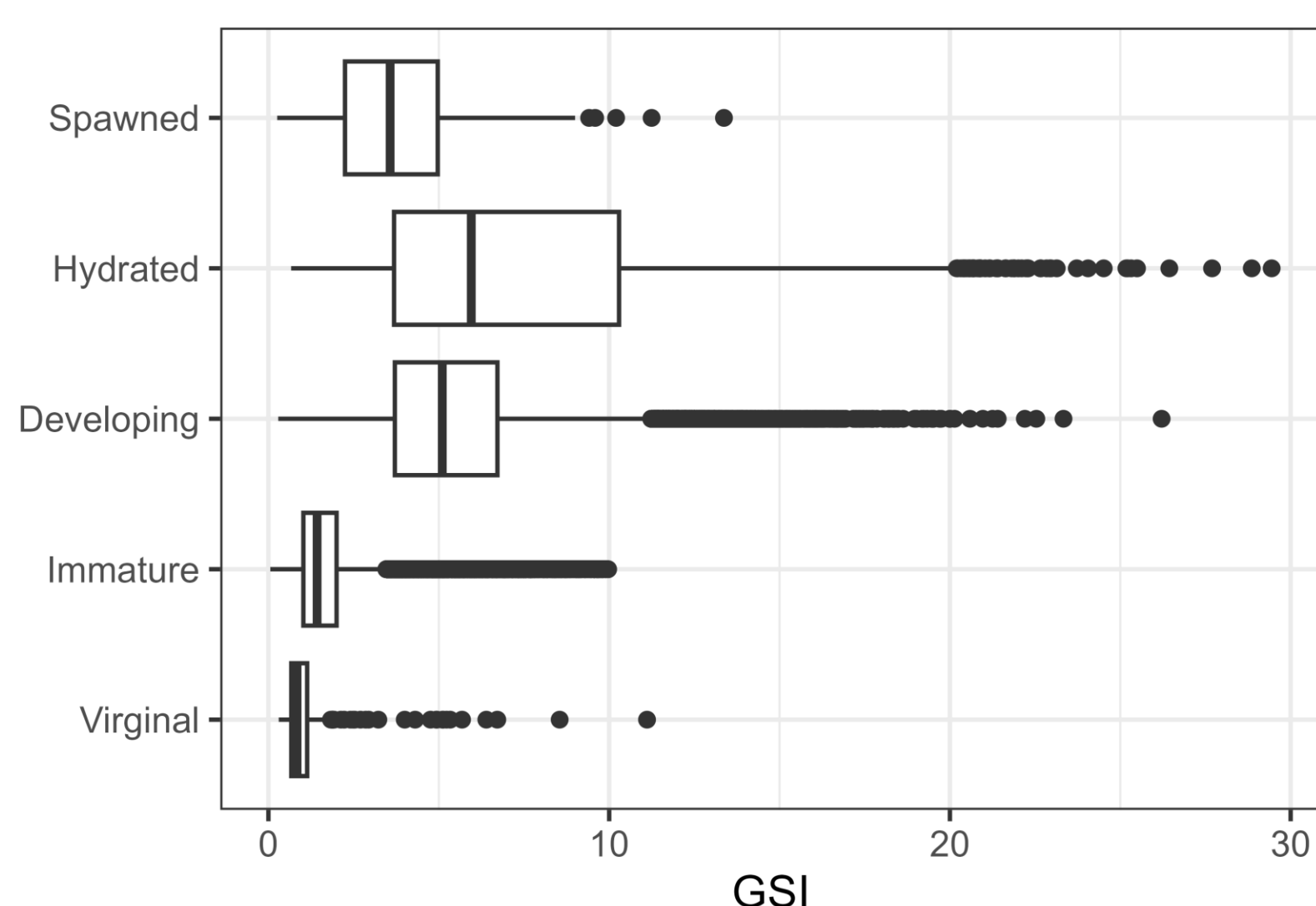
### DATA SOURCES AND SAMPLING

Biological samples collected between 1998 and 2023.

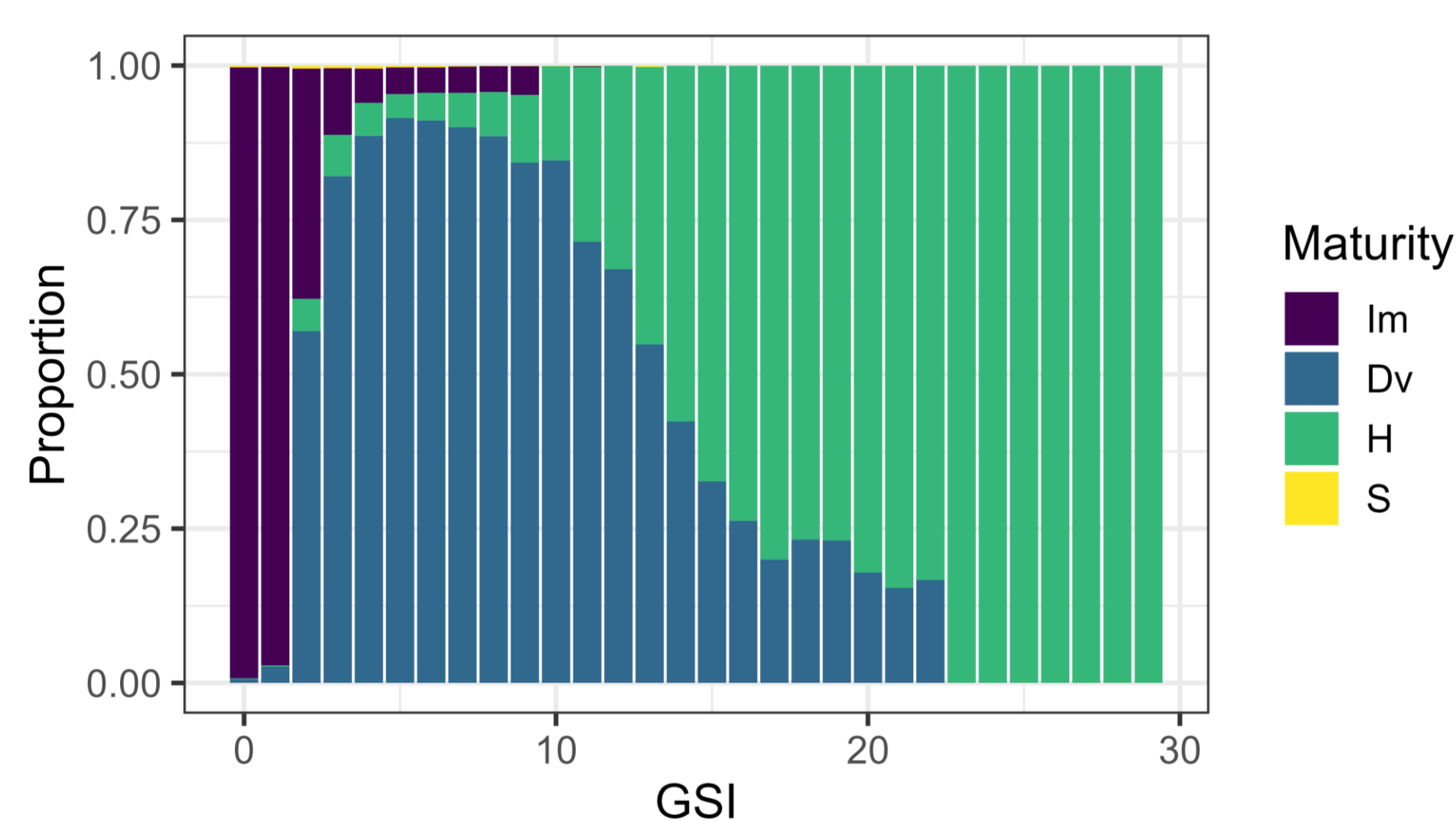
Sampling area: from Valparaíso (33°02'S) to Los Ríos (39°48'S), Chile.

Gonadosomatic index (GSI) = (gonad weight/viscerated weight)x100

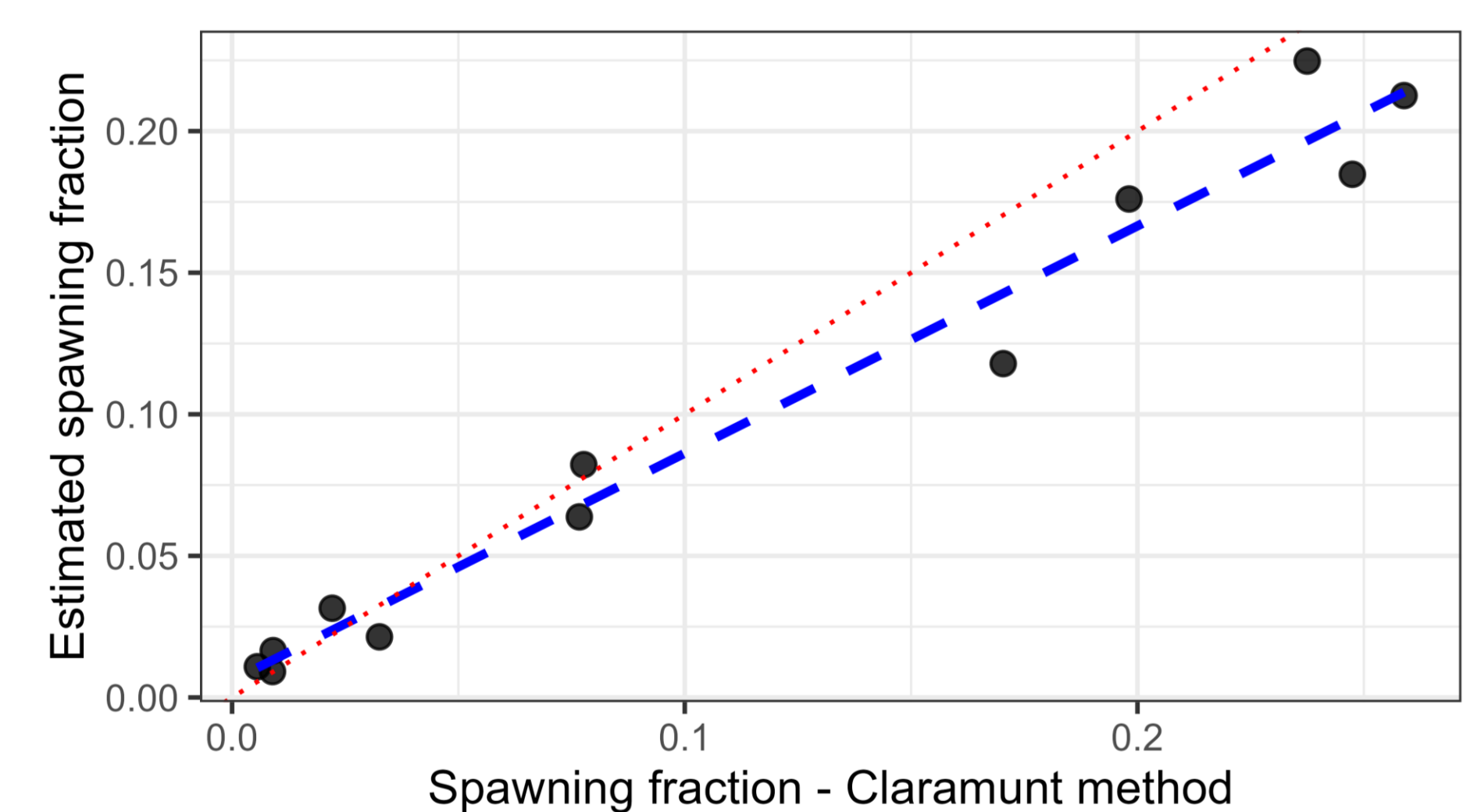
## RESULTS AND CONCLUSIONS



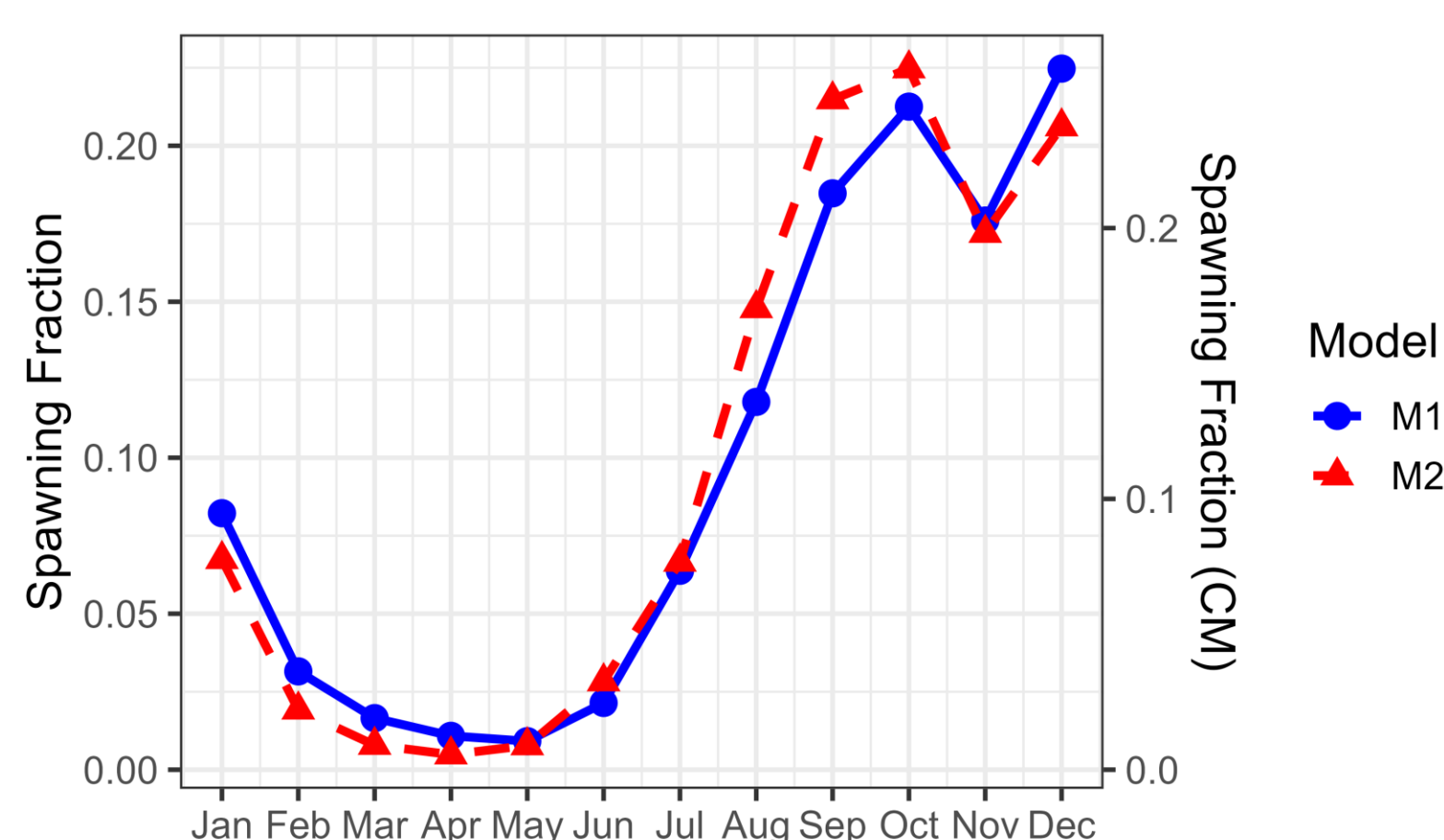
GSI by macroscopic gonadal maturity stages



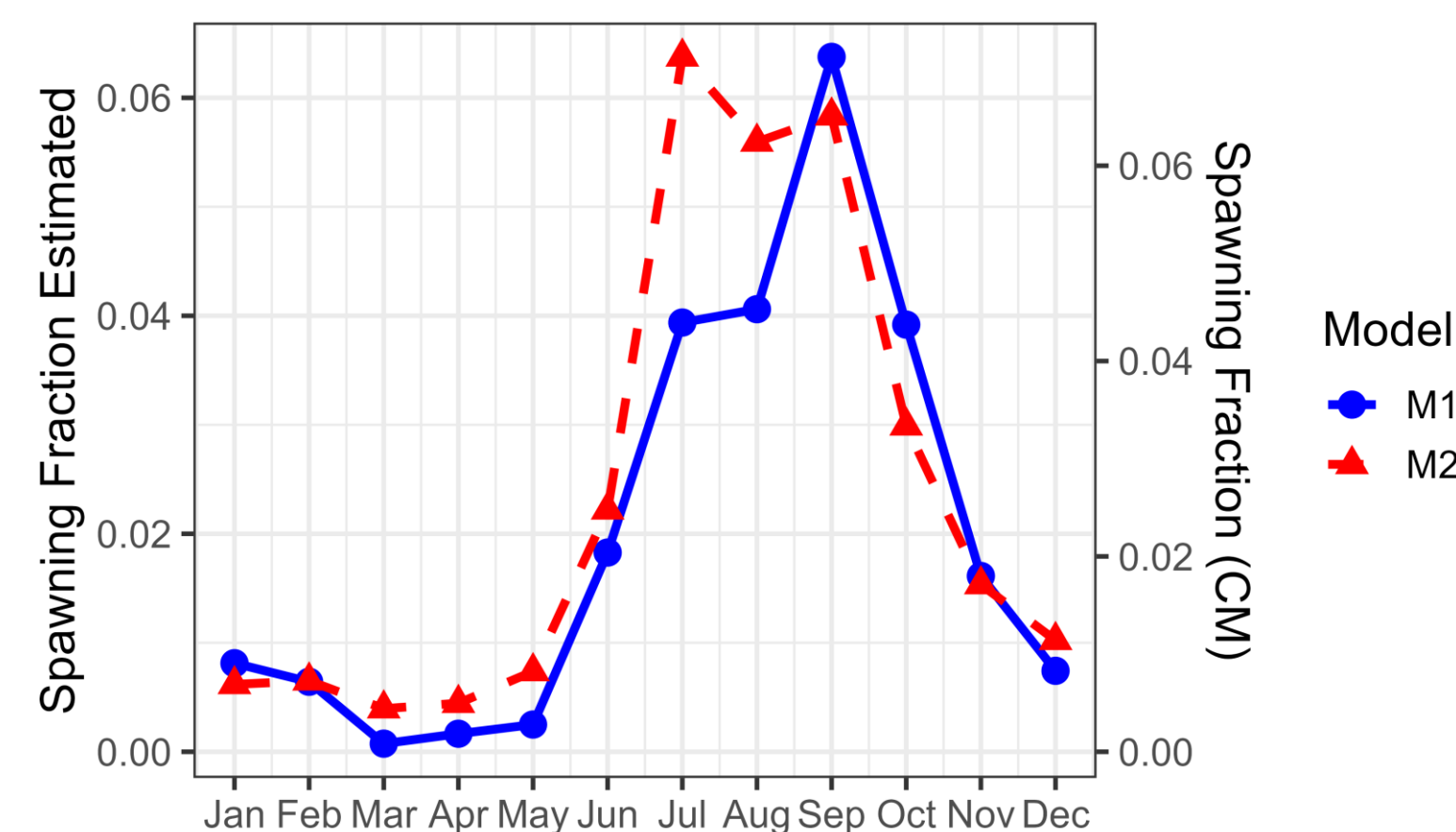
Proportion of gonadal maturity stages by GSI



Comparison of methods - Anchovy



Monthly spawning fraction – Anchovy



Monthly spawning fraction – Common sardine



Both methods produced similar seasonal patterns; however differences in magnitude were observed between estimates.



GSI-based methods provide a practical and low-cost alternative for estimating spawning activity using routine monitoring data.



However, calibration with histological techniques is required.

## REFERENCES

Claramunt y Roa. (2001). An indirect approach of estimating spawning fraction as applied to *Sardinops sagax* from northern Chile. *Scientia Marina*, 65(2), 87-94.

<https://doi.org/10.3989/scimar.2001.65n287>

Claramunt, Roa y Cubillos. (2003). Estimating daily spawning fraction using the gonadosomatic index: application to three stocks of small pelagic fish from Chile. *Report of the working group on Modern approaches to assess maturity and fecundity of warm-and cold-water fish and squids*. p 43.