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## How strong is fisheries-induced selection? A general framework for estimating fisheries-induced selection differentials



Mikko Heino<sup>1</sup>, Bruno Ernande<sup>2</sup>, Shuichi Matsumura<sup>3</sup>, Adriaan Rijnsdorp<sup>4</sup>, Ulf Dieckmann<sup>5</sup>, and the WGEVO<sup>\*</sup> participants

**ISSUE.** There is a need to better understand how strong selection pressures created by fishing are – first at the level of single stocks, but then also more generally – what are the patterns across stocks and different traits? Which kind of stocks are most at risk? To provide answers, we need tools that make such estimations easy and practical. **Solution.** In WGEVO\* we have developed a framework that is complex enough to respect stock-specific differences, yet simple enough to be easy to apply to a wide range of stocks. Most parameters can be estimated with commonly available types of data. The whole framework is implemented in *R*, making it free and universally available.

#### Parameter estimation

- Natural and fishing mortality
- Probabilistic maturation reaction norm (PMRN)
- Growth model
- Length-weight relationship
- Growth-survival trade-off

#### Two-step process

- 1. Estimate parameters
- 2. Run the population projection model

### Population projection model (age-structured)

- Mortality
- Growth
- Maturation

# Estimated selection gradients

- Standardization for
  - comparability
- PMRN intercept
- PMRN slope

• Reproduction

- Gonadosomatic index
- Growth rate

**Challenges.** Data availability will vary from case to case. Good data on natural mortality and growth-survival trade-off are almost always lacking.

**Outlook.** It works! We have completed parameterization for 12 stocks, with a similar number in preparation. Check E:02 for some first results!

1 University of Bergen and Institute of Marine Research, Norway; International Institute for Applied Systems Analysis (IIASA), Austria; 2 Ifremer, France; 3 Gifu University, Japan; 4 Wageningen IMARES, the Netherlands;
5 International Institute for Applied Systems Analysis (IIASA), Austria
\* ICES Working Group on Fisheries-Induced Evolution

