MEDAC
MEDITERRANEAN ADVISORY COUNCIL

Report of the STECF EWG-18-01 Data gaps and Biomass Escapement Strategy for Adriatic anchovy and sardine

Ispra, Italy, 26 February - 2 March 2018

INTRODUCTION

Objective

Main observations, comments and outputs of the EWG 18-01 meeting report concerning the Mediterranean Sea and of interest for the MEDAC's members

Additional information about the scientific methods and more details will be available on the JRC website (Report PLEN-18-01)

The scientific output expressed in the Plenary meeting Report does not imply a policy position of the European Commission

Background

STECF PLEN 17-03

- having evaluated possible reference points for Adriatic small pelagic stocks and
- having examined alternative management strategies

identified a Biomass escapement strategy as a viable approach that could allow higher catches while maintaining similar risks with a traditional

F_{MSY}-based strategy

Report of the STECF EWG-18-01

Background - $B_{escapement}$ strategy

MSY $B_{escapement}$ strategy is used by ICES for stocks of short-lived species that either

die after spawning

have very high natural mortality implying that future SSB is largely independent of survival after spawning

Sardine and anchovy in GSA 17-18 have a large M and fall into category (b) of the ICES classification

Report of the STECF EWG-18-01

Biomass escapement strategy

When the stock is more variable: the required limit biomass (B_{lim}) does not correspond to a fixed fraction of fishing mortality.

strategy for highly variable stocks

to utilize higher fraction when the stock is high and smaller fraction when the stock is low, but always maintain a high probability that the biomass of mature fish (spawning biomass) in the subsequent year is sufficient to avoid stock collapse.

Report of the STECF EWG-18-01

Background

MSY $B_{escapement}$ is defined by ICES as a deterministic biomass limit below which a stock is considered to have reduced reproductive capacity. $B_{escapement}$ is often set to B_{lim} and the object of the plan is to have a high probability to keep $SSB>B_{lim}$.

The reference points F_{pa} and F_{lim} are not considered relevant for these stocks of short-lived species where the advice is based on biomass escapement strategies.

Background

F_{cap} is defined to limit exploitation rates when biomass is high. A large stock is usually estimated with greater uncertainty

By capping the F, the escapement biomass is effectively increased in proportion to stock size, maintaining a high probability of achieving the minimum amount of biomass left to spawn.

Report of the STECF EWG-18-01

The yearly TAC

- 5% probability of SSB falling below Blim following fishing,
- overall limit to exploitation rate if the stock is high.

B_{lim} is set based on the observed dynamics of the stock.

Overall, it is expected that catches in good years can be higher under the biomass escapement strategy.

Report of the STECF EWG-18-01

Management based on $B_{escapement}$ strategy - Steps

In order to move to management of the fisheries on these two stocks using the $B_{escapement}$ strategy there is a number of steps needed:

- Identify which information can be obtained from surveys and fisheries to give the necessary management data quickly.

- Using the available data flow, evaluate the parameters of the harvest rules that can be implemented to maximize catch while maintain SSB>B_{lim} with a high probability.

- Put in place the timetable for data collection, data analysis, provision of catch advice, and decision process to define TAC.

- Implement the required data collection, analysis, decision process.

- Move to management using this approach.

Report of the STECF EWG-18-01

Management based on $B_{escapement}$ strategy - Steps

The approach requires that survey data be evaluated quickly […]

It is not expected that the approach will increase the total workload, as surveys and data analysis are needed for both F_{MSY} and $B_{escapement}$ management.

Once the data availability has been agreed, it will then be possible to parameterize the models to test different strategies for managers to consider.

[…] the development of this process may take a few (2+) years to complete the necessary planning and evaluation.

Terms of Reference

For anchovy and sardine in the Adriatic Sea (GSA 17-18)

Develop a biomass escapement harvest control rule (HCR):

- that will ensure a low probability of SSB to fall below B_{lim} (5% probability)

-HCR should be tested in a Management Strategy Evaluation (MSE)

-HCR needs to be robust to different assumptions on recruitment, assessment model, to misspecification of age 0 maturity, M and age.

Conditioning / background

The EWG is requested to undertake MSE simulations commencing in January 2021

Some of the conditioning / background for simulation testing:

➢Model an intermediate period 2017-2018-2019-2020
- ✓ using real reported catches from 2017,
- ✓assuming status quo catches in 2018
- ✓according to different levels of catch reductions for sardine [of 5-10-20% per year] and anchovy [of 5-10-20% per year] starting in January 2019 and ending in December 2020.

Terms of Reference

TOR 1:
In the MSE follow the specifications below:

1. Implementation Model - Annual catch limits to be set for the period from January to December;

2. Observation Model - The MSE testing should address questions on the current eco-survey set up;

3. Management Decision:

Develop a biomass escapement HCR that will ensure a low probability of SSB to fall below B_{lim} (5% probability) for anchovy and sardine. The HCR should start operating in January 2021.

Report of the STECF EWG-18-01

Terms of Reference

ToR 2:
Economic Performance
If economic data are available and of adequate quality, evaluate the maximum economic performance of the HCR.

ToR 3:
Evaluate performance of alternate scenarios (at least 250 iterations) on 10-20 year time scale, focusing in particular on the following in relation to Harvest Rate:

Probability of SSB falling below B_{lim}.
Risk vs catch level.
Catch variability.
Average catch.
Level of SSB.

Addressing the ToRs - ToR 1.2 Acoustic surveys

In particular ToR 1.2 was mostly based on expert discussions, supported by partial quantitative analysis.

The EWG notes that information about sampling design, sampling errors, or abundance estimates uncertainty were not available, which severely limited the analysis carried out during the EWG.

Final comments – ToR 1.2 Acoustic surveys

The current acoustic survey settings (direct observations of stock's biomass and abundance of recruits) can be used to set fishing opportunities based on a biomass escapement strategy

Two separate surveys in appropriate periods

- to estimate recruitment for each stock, in the beginning of the year for anchovy and second half of the year for sardine,

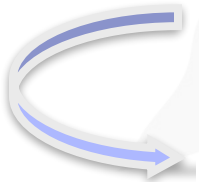
- to provide indications of spawning stock biomass, in the summer for anchovy and winter for sardine

Final comments – ToR 1.2 Acoustic surveys

Timing for data provision should be reduced as much as possible in order to enable the assessment of the stocks in the same year of the survey;

If it cannot be possible to deliver the full set of echo-surveys data in the assessment year:

- recruitment indices from preliminary survey information;
- environmental data collected during the acoustic surveys



Both cases have the potential to improve recruitment forecasts and consequently estimate fishing opportunities more precisely

MEDIAS protocols and DCF programmes of Italy, Croatia and Slovenia revision

Report of the STECF EWG-18-01

Final comments – ToR 1.3 Parameterization

A set of parameters were selected and tested as candidates to parameterize the HCR (harvest control rules) and the required set of indicators were computed for each one of them.

➢ The long term effects showed the common trade off (negative relationship) between stock size and catch levels.

➢ The short term effects for each set of parameters and catch reduction options were computed.
The EWG notes that analysis of short term effects requires a more dedicated EWG, like the stock assessment EWG, where

- ✓ recent information about the stock and the fishery may be available,
- ✓ parameterization of short term forecasts can be more precise

ToR 1.3 Parameterization

Short term effects were simulated by forcing the intermediate period to follow the pre-specified paths described in the ToRs

Catches used to condition the intermediate period options: derived from the preliminary declarations of Italy and Croatia to FIDES and the input data for stock assessment, both provided by DG MARE.

Discrepancy found in the Italian landings between FIDES reports and assessment data: for anchovy in 2016 FIDES=15164t while stock assessment = 22430t, for sardine in 2016 FIDES=12002t while stock assessment = 24092t

EWG adjusted the total landings in 2017, which were estimated to be 33300t for anchovy and 71149t for sardine.

Final comments – ToR 1.3 Parameterization

In the case of anchovy, the 2017 catches, which are maintained in 2018, crashed the stock since SSB is at a very low level and recruitment is also at a historical low

The full analysis was not possible to be carried out without having more precise information about catches and recent information on recruitment.

For sardine, smaller reductions in catches generate larger catches and smaller increases in SSB during the intermediate period.
Furthermore, in the low recruitment scenarios there is a non-negligible probability of closing the fishery in the period after the catch constraints.

Final comments – ToR 1.3 Parameterization

Testing the robustness of HCRs to uncertainty in relevant processes is extremely important to clarify potential 'weak points' of the MP.

Robustness tests showed the results to be robust to changes in maturity and natural mortality but not to stock assessment uncertainty

Final comments – ToR 2 Mixed fisheries

➢ These fisheries have a component of mixed fisheries:

results showed that a high percentage of clean catches were observed in both Member States, suggesting that choke species effects should not be limiting considerably the majority of the fleet.

Nevertheless, part of the fishery may be affected by choke species limitations, which may require further consideration.

Final comments – ToR 2 Economic performance

An approach based on short-term projections models was explored
-> Bio-Economic Model of European Fleets (BEMEF)

✓ The model simulates the future changes in the economic variables by fleet segment using the changes in TAC as the main driver (TACs impact on prices and revenues);

✓Effects of changes in the size of biomass, expressed in terms of SSB are also included. Changes in fishing effort are then converted into changes in variable costs.

Final comments – ToR 2 Economic performance

✓Economic data for the Italian and Croatian fleets are available from the 2017 Annual Economic Report;

✓ Furthermore time series provided by the Italian Ministry covered the period 2008-2016 (9 years).

✓Data available for Croatian fleets covered the period 2012-2015 (4 years).

✓Economic data include all variables collected under the DCF.

Economic analysis of the different scenarios and HCRs was attempted but the short time series of data available for economic variables did not allow a full analysis of management options.

Main conclusions

✓ Current acoustic survey settings (stock's biomass and abundance of recruits) can be used to set fishing opportunities based on a biomass escapement strategy (two separate surveys in appropriate periods)

✓Robustness tests of HCRs showed the results to be robust to changes in maturity and natural mortality but not to stock assessment uncertainty

✓These fisheries have a component of mixed fisheries

✓ Economic analysis of the different scenarios and HCRs was attempted but a full analysis of management options wasn't possible.

MEDAC
MEDITERRANEAN ADVISORY COUNCIL

Thanks for your attention!

info@med-ac.eu
marzia_piron@hotmail.it