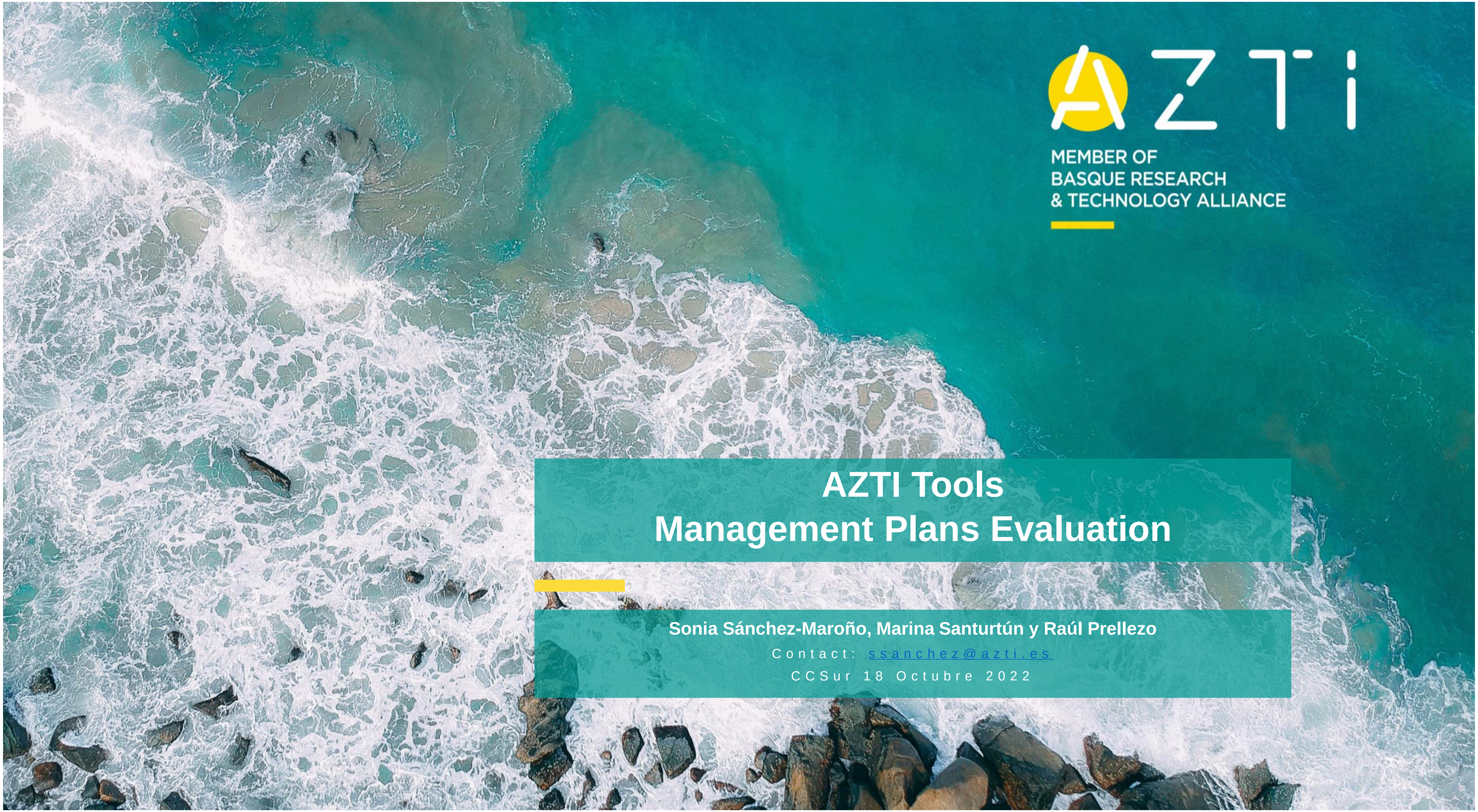

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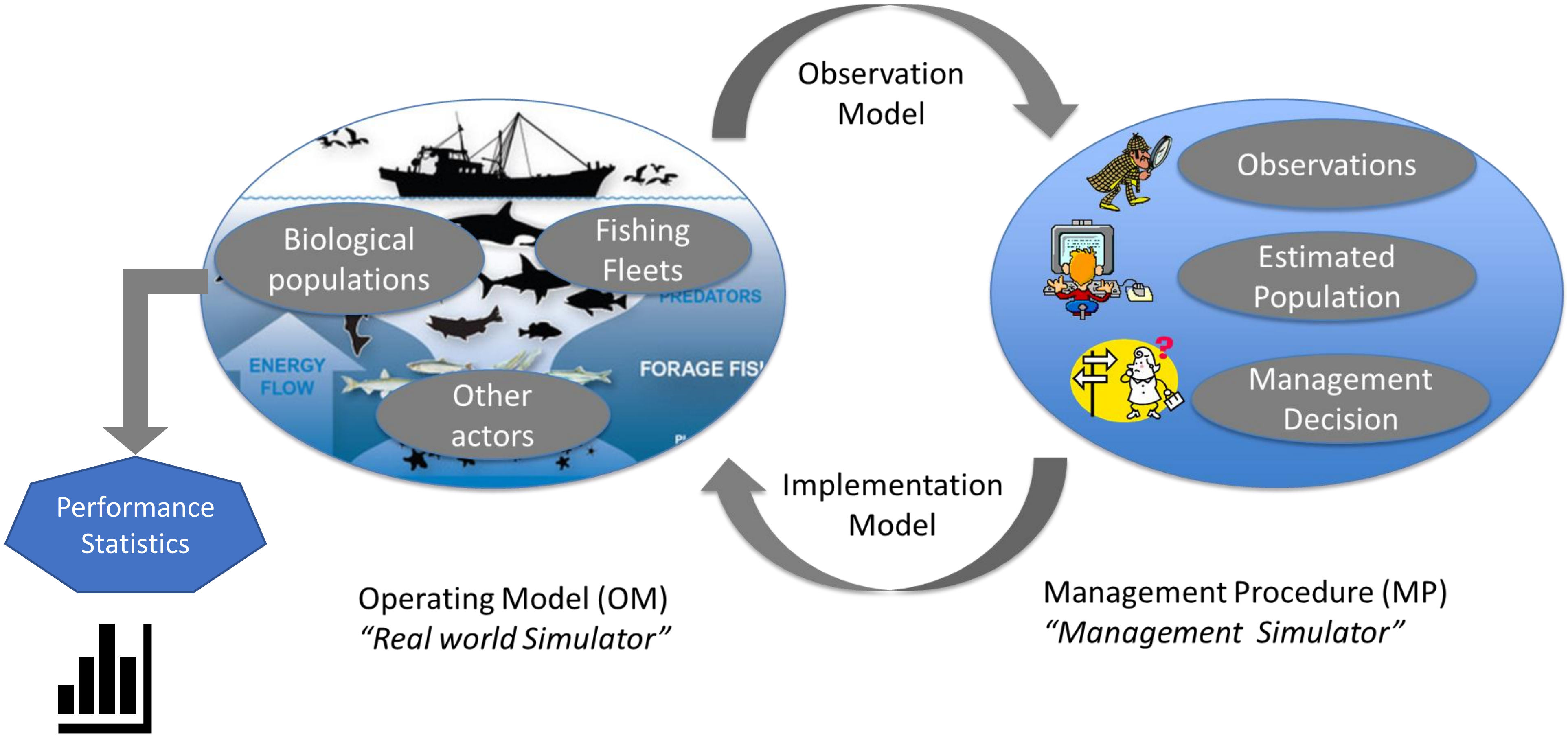
AZTI Tools
Management Plans Evaluation

Sonia Sánchez-Maroño, Marina Santurtún y Raúl Prellezo
Contact: ssanchez@azti.es

CCSur 18 Octubre 2022

Management Strategy Evaluation (MSE)

MSE scheme



Observation Model

Biological populations

Fishing Fleets

Other actors

Observations

Estimated Population

Management Decision

Implementation Model

Performance Statistics

Operating Model (OM)
"Real world Simulator"

Management Procedure (MP)
"Management Simulator"

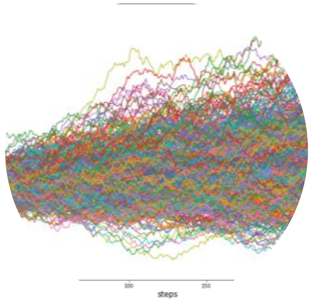
FLBEIA: Bio-Economic Impact Assessment in FLR

Bio-economic evaluation

MSE

Multi-stock + multi fleet

Source:
https://www.researchgate.net/publication/236866843_The_unintended_consequences_of_simplifying_the_sea_Making_the_case_for_complexity



Stochastic

(Monte Carlo simulation)

R package

Seasonal

Source:
https://www.istockphoto.com/es/foto/collage-de-la-temporada-de-tree-four-gm1287244794-383509723

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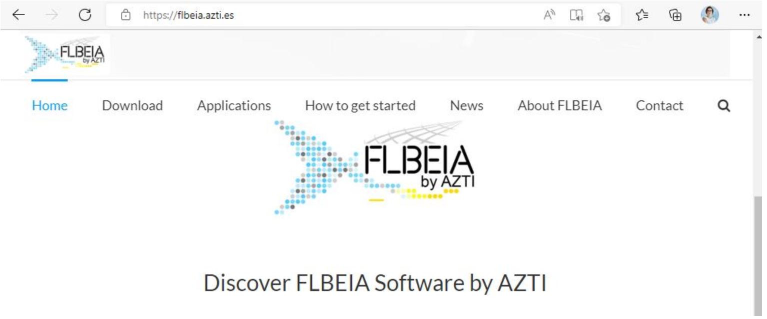
FLBEIA

Resources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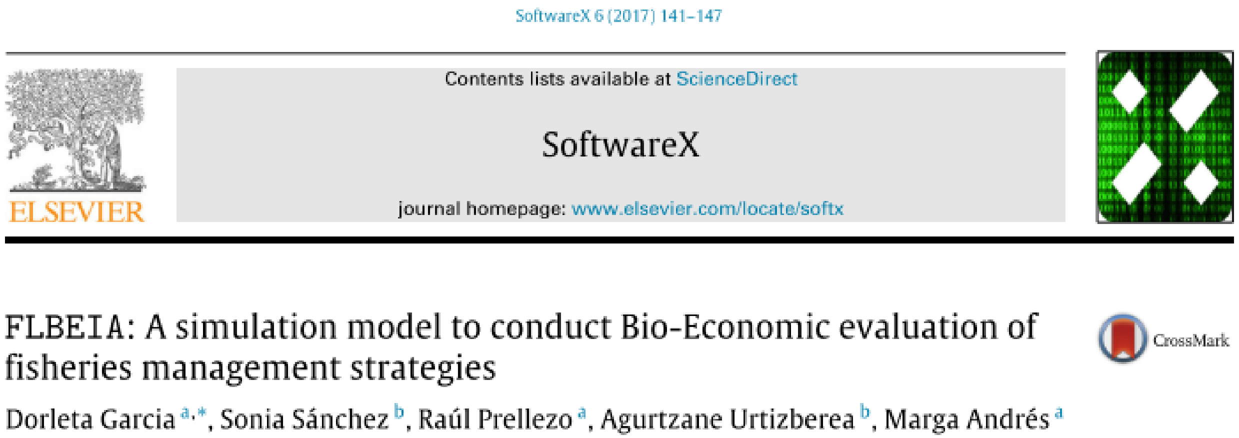
SoftwareX 6 (2017) 141–147

Contents lists available at ScienceDirect

SoftwareX

journal homepage: www.elsevier.com/locate/softx
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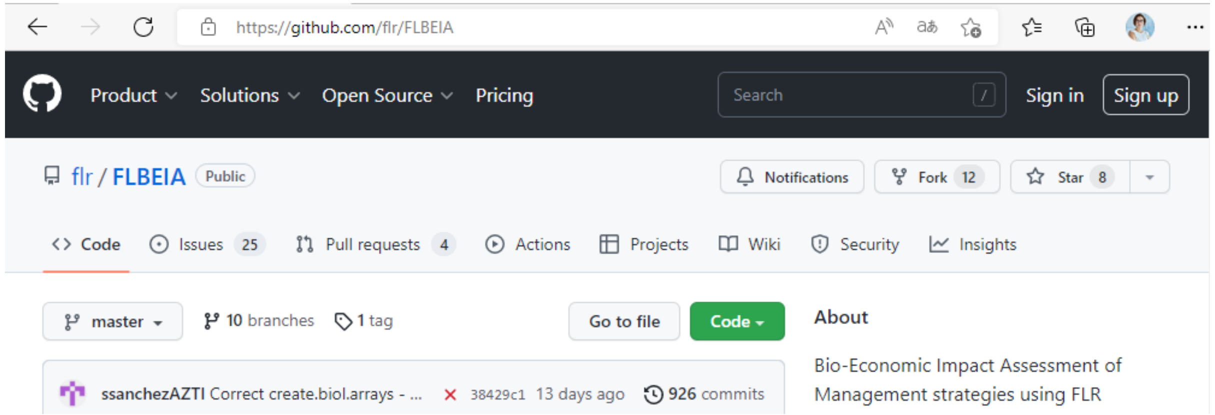
FLBEIA: A simulation model to conduct Bio-Economic evaluation of fisheries management strategies

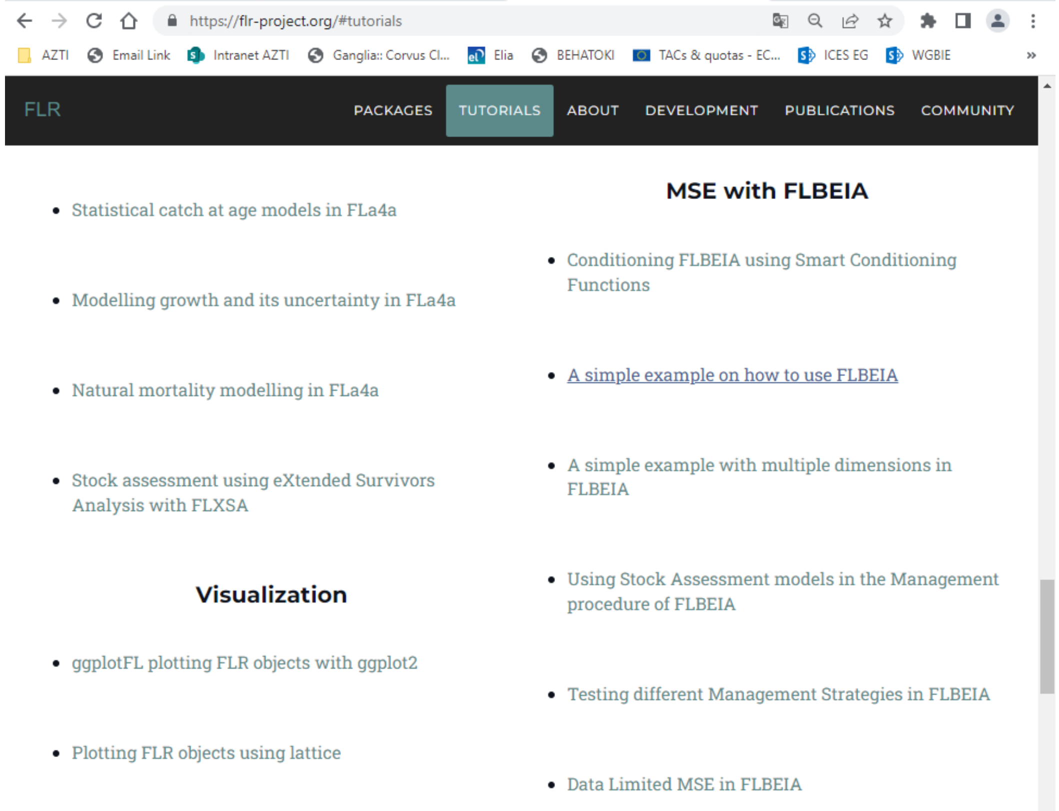
Dorleta Garcia [a,*], Sonia Sánchez [b], Raúl Prellezo [a], Agurtzane Urtizberea [b], Marga Andrés [a]


https://github.com/flr/FLBEIA
Product
Solutions
Open Source
Pricing
Search
Sign in
Sign up
flr / FLBEIA
Public
Notifications
Fork 12
Star 8
Code
Issues 25
Pull requests 4
Actions
Projects
Wiki
Security
Insights
master
10 branches
1 tag
Go to file
Code

ssanchezAZTI Correct create.biol.arrays - ... ✕ 38429c1 13 days ago 926 commits

About

Bio-Economic Impact Assessment of Management strategies using FLR


https://flr-project.org/#tutorials
AZTI
Email Link
Intranet AZTI
Ganglia:: Corvus Cl...
Elia
BEHATOKI
TACs & quotas - EC...
ICES EG
WGBIE
FLR
PACKAGES
TUTORIALS
ABOUT
DEVELOPMENT
PUBLICATIONS
COMMUNITY

- Statistical catch at age models in FLa4a
- Modelling growth and its uncertainty in FLa4a
- Natural mortality modelling in FLa4a
- Stock assessment using eXtended Survivors Analysis with FLXSA

Visualization

- ggplotFL plotting FLR objects with ggplot2
- Plotting FLR objects using lattice

MSE with FLBEIA

- Conditioning FLBEIA using Smart Conditioning Functions
- A simple example on how to use FLBEIA
- A simple example with multiple dimensions in FLBEIA
- Using Stock Assessment models in the Management procedure of FLBEIA
- Testing different Management Strategies in FLBEIA
- Data Limited MSE in FLBEIA

FLBEIA

Applications

Stock-based

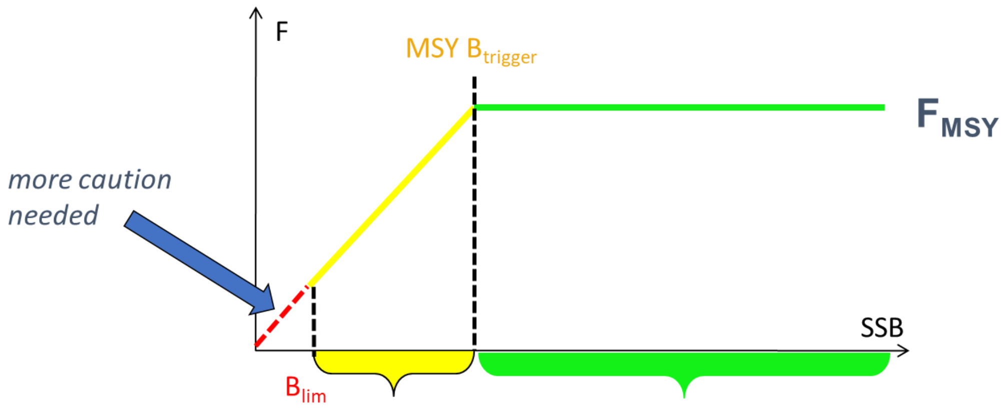
- Bay of Biscay anchovy.
- Iberian sardine.
- Bay of Biscay sardine.
- Northern hake.
- Redfish.
- Greenland Halibut - NAFO.
- NAFO COD (3M).
- …

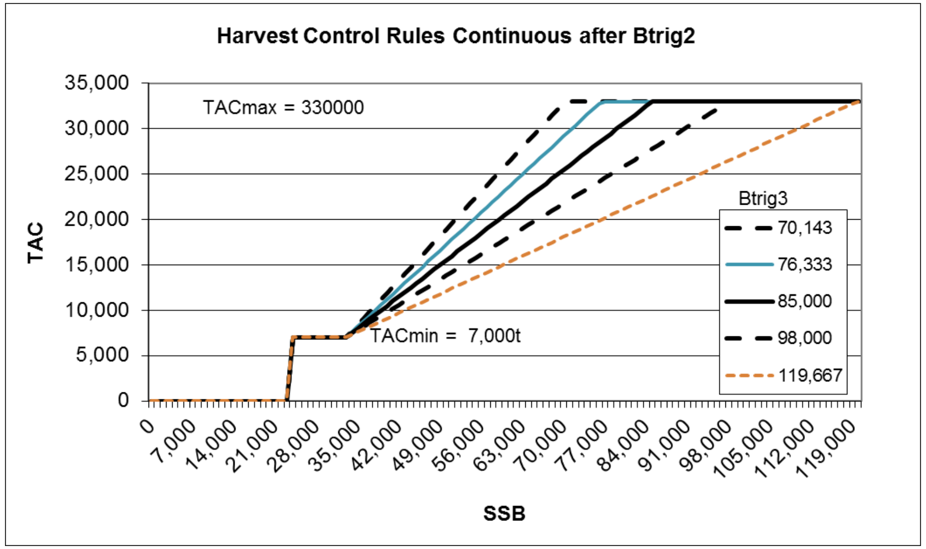
Fleet-based

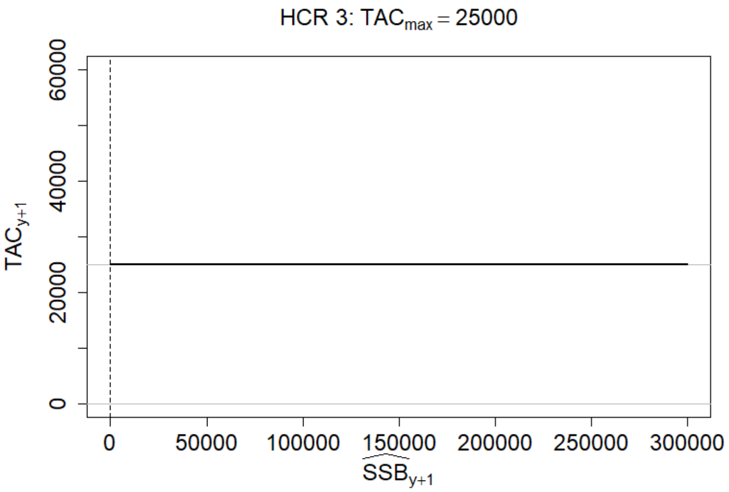
- Basque offshore fleet.
- Basque inshore fleet.
- Spanish OPPF-4 fleet.
- French mixed fisheries.
- Mixed Fisheries:
    - Iberian Waters
    - Bay of Biscay
    - North Sea
    - Celtic Sea
- Data-poor fisheries in the red sea.
- …

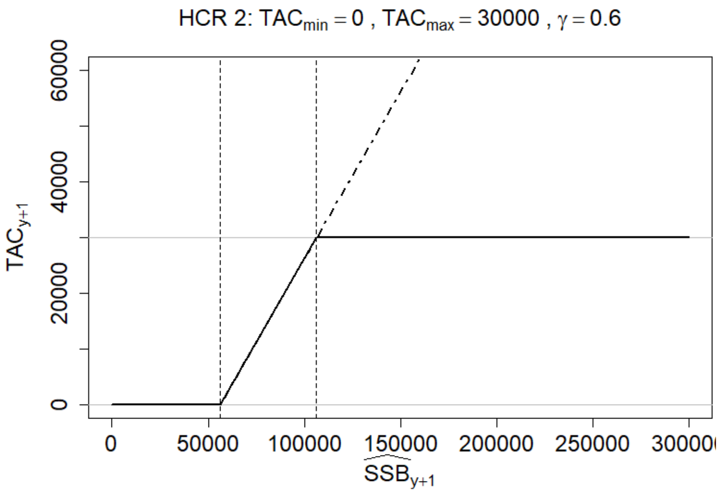
Examples: long-term management plans

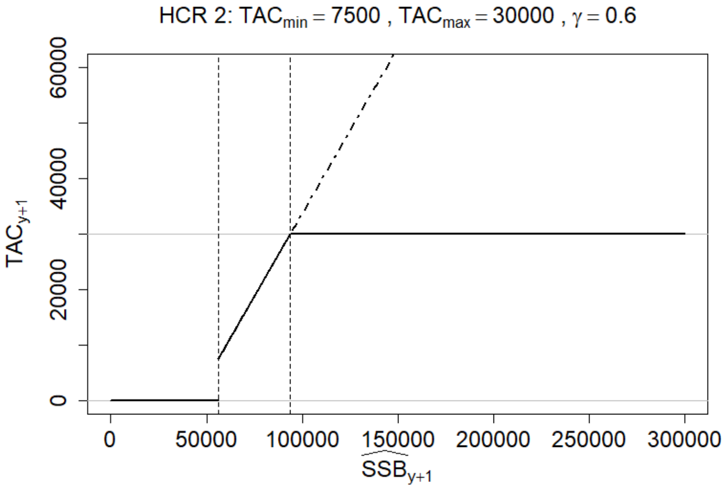
- Harvest Control Rules (single stock)


F
MSY B$_{trigger}$
F_{MSY}
more caution needed
SSB
B$_{lim}$


Harvest Control Rules Continuous after Btrig2


HCR 3: $TAC_{max} = 25000$


HCR 2: $TAC_{min} = 0$, $TAC_{max} = 30000$, $\gamma = 0.6$


HCR 2: $TAC_{min} = 7500$, $TAC_{max} = 30000$, $\gamma = 0.6$

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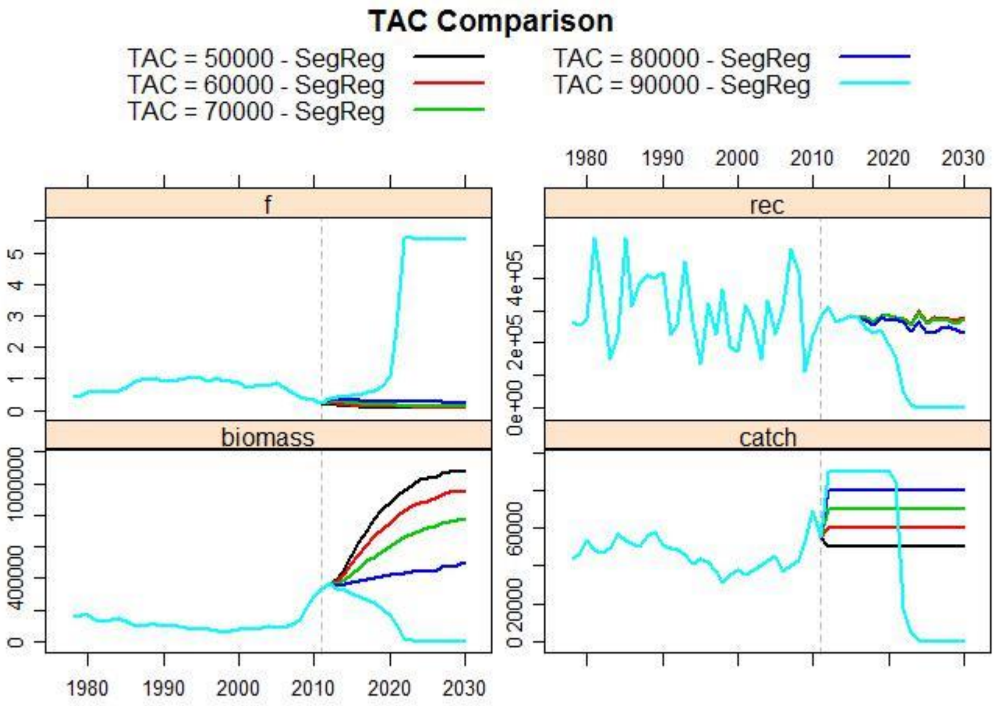
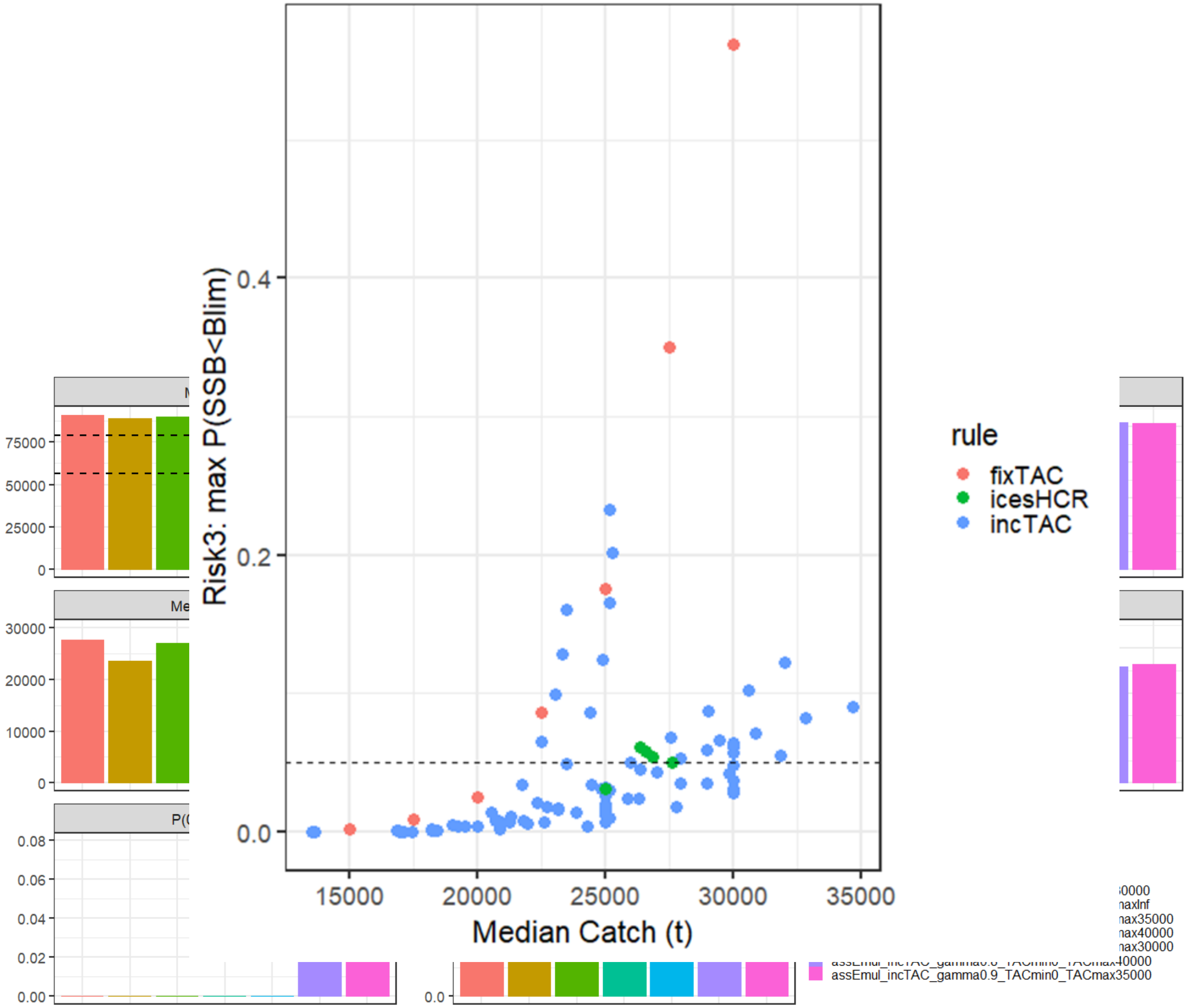
Examples: long-term management plans

- Results





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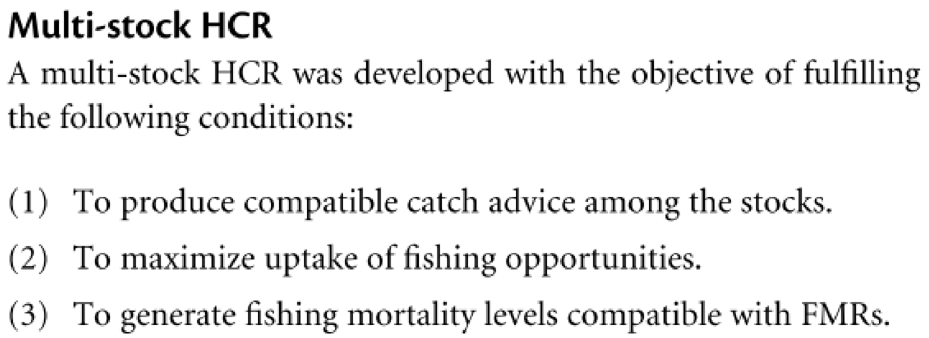
Examples: long-term management plans

- Harvest Control Rules (multi stock)



Multi-stock HCR

A multi-stock HCR was developed with the objective of fulfilling the following conditions:

(1) To produce compatible catch advice among the stocks.
(2) To maximize uptake of fishing opportunities.
(3) To generate fishing mortality levels compatible with FMRs.

ICES Journal of Marine Science

ICES CIEM

International Council for the Exploration of the Sea

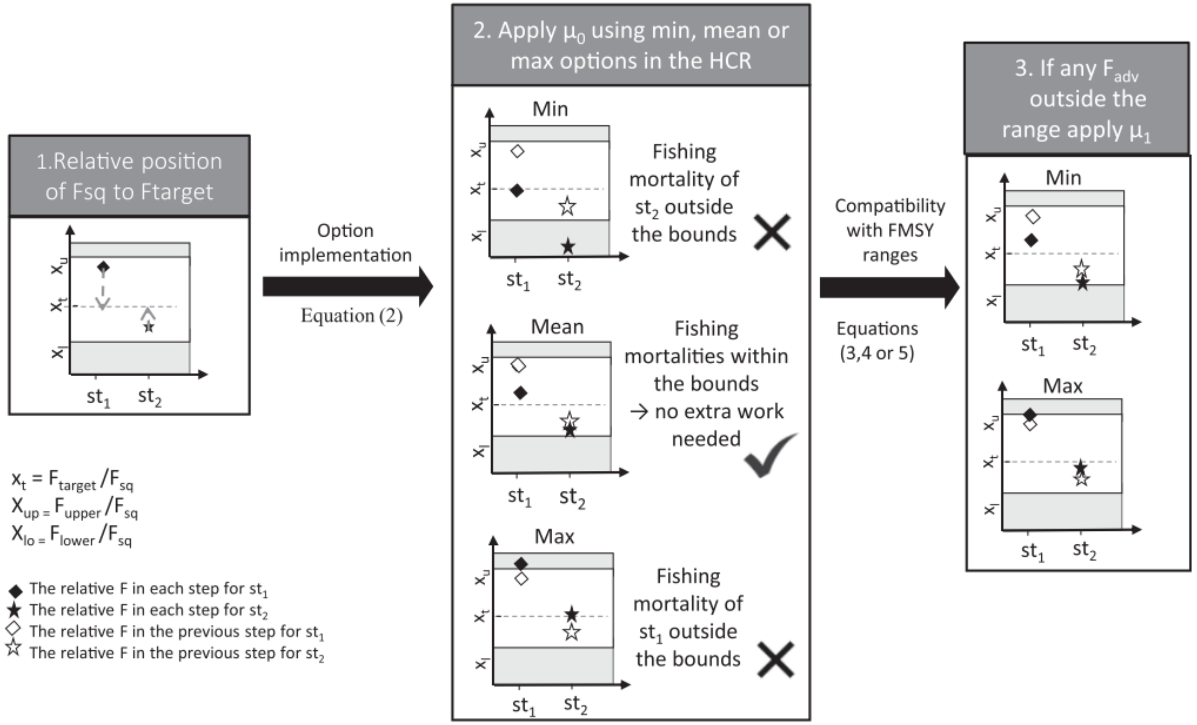
Conseil International pour l'Exploration de la Mer

ICES Journal of Marine Science (2019), doi:10.1093/icesjms/fsz181

A multi-stock harvest control rule based on "pretty good yield" ranges to support mixed-fisheries management

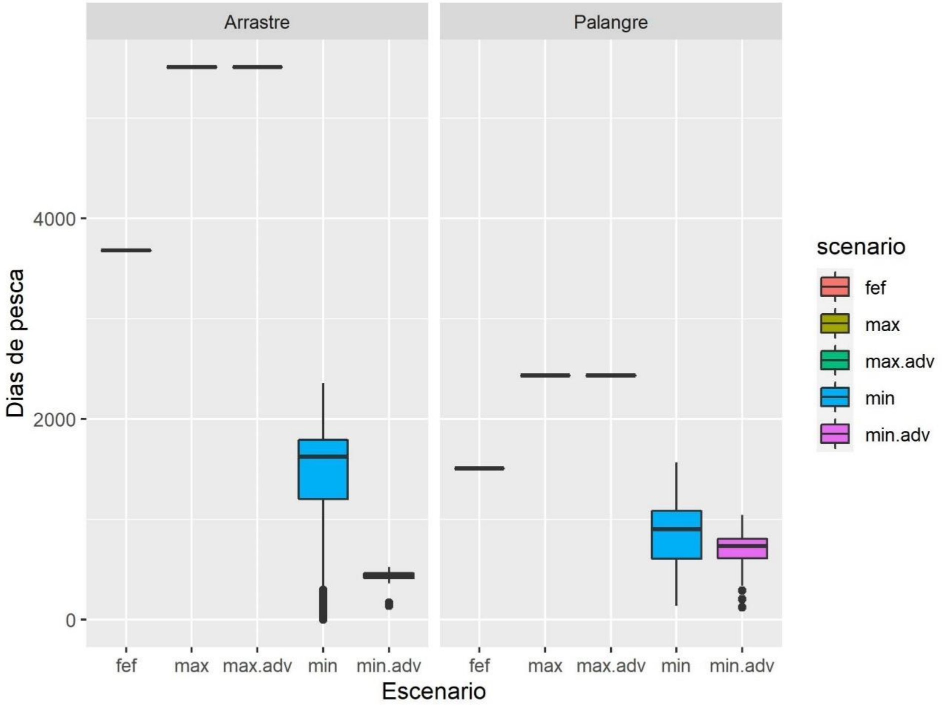
Dorleta Garcia [1]*, Paul J. Dolder[2,3], Ane Iriondo[1], Claire Moore [4], Raúl Prellezo [1], and Agurtzane Urtizberea[5]

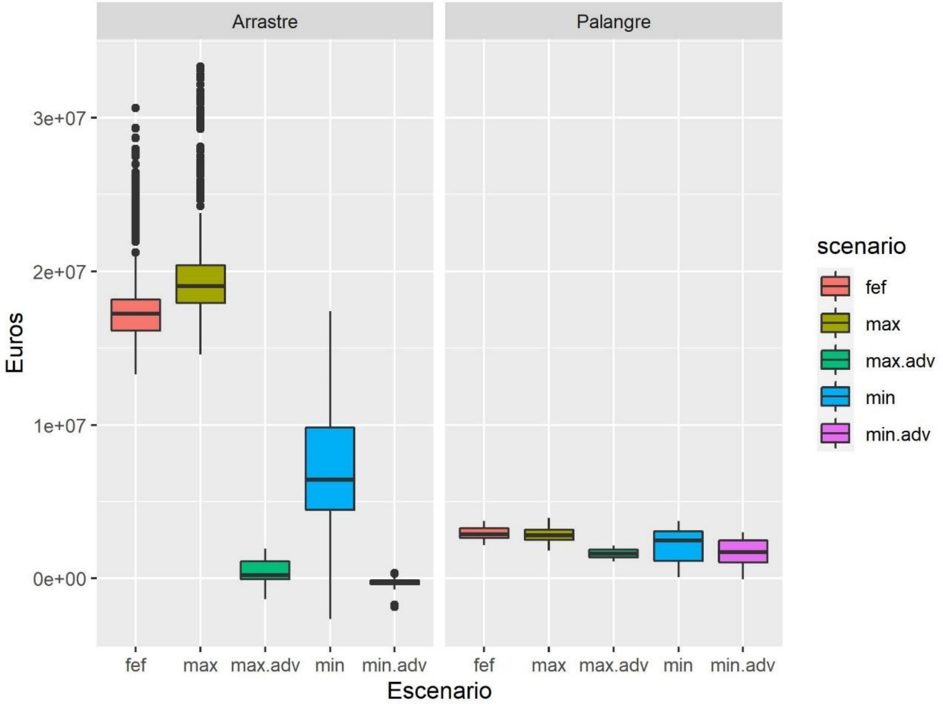
Downloaded from https://academic.ou


1.Relative position of Fsq to Ftarget
x_{up}
x_t
x_{lo}
st$_1$ st$_2$
Option implementation
Equation (2)
$x_t = F_{target}/F_{sq}$
$X_{up} = F_{upper}/F_{sq}$
$X_{lo} = F_{lower}/F_{sq}$
◆ The relative F in each step for st$_1$
★ The relative F in each step for st$_2$
◇ The relative F in the previous step for st$_1$
☆ The relative F in the previous step for st$_2$
2. Apply μ_0 using min, mean or max options in the HCR
Min
Fishing mortality of st$_2$ outside the bounds ✗
Mean
Fishing mortalities within the bounds → no extra work needed ✓
Max
Fishing mortality of st$_1$ outside the bounds ✗
Compatibility with FMSY ranges
Equations (3,4 or 5)
3. If any F_{adv} outside the range apply μ_1
Min
Max
st$_1$ st$_2$

Examples: impact of ICES advice on Mixed fisheries

- OPPF-4 fleet

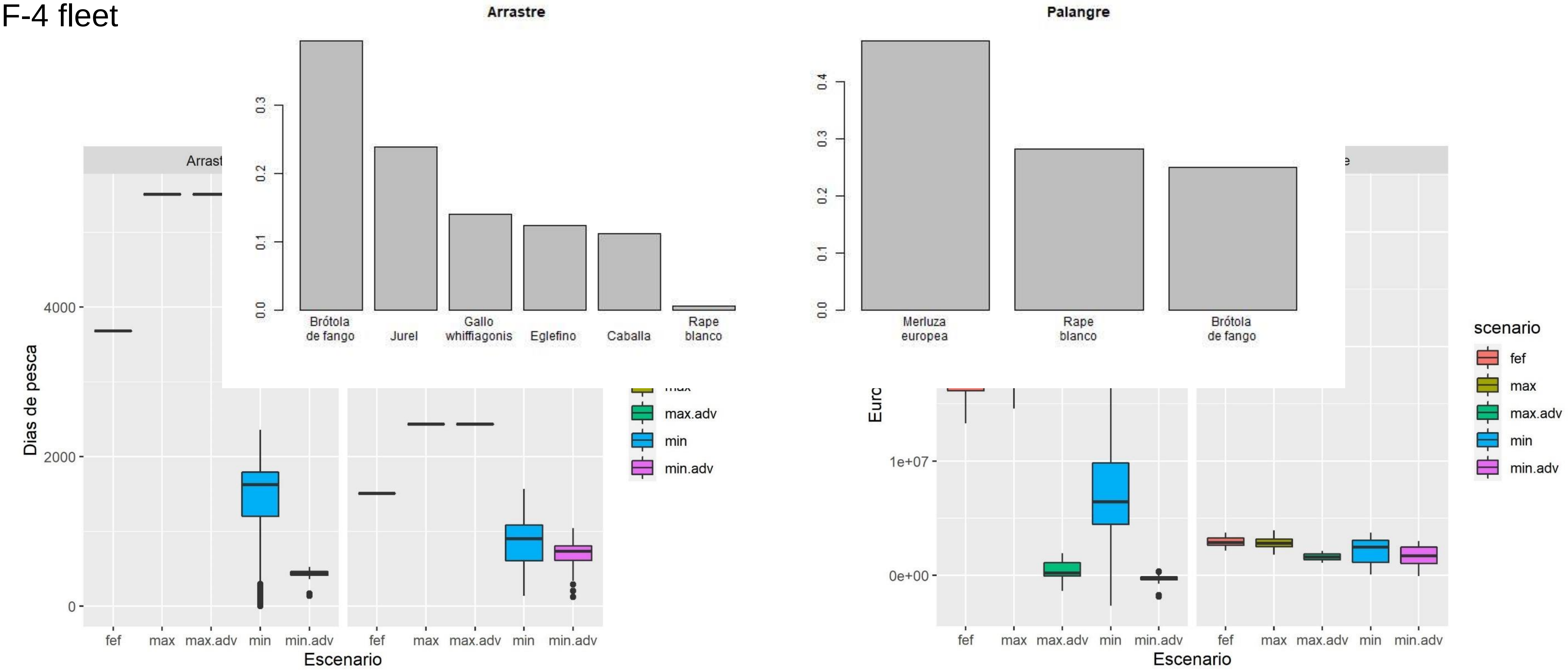




OPPF-4
XUNTA DE GALICIA
CONSELLERÍA DO MAR
UNIÓN EUROPEA
FONDO EUROPEO MARÍTIMO Y DE PESCA (FEMP)

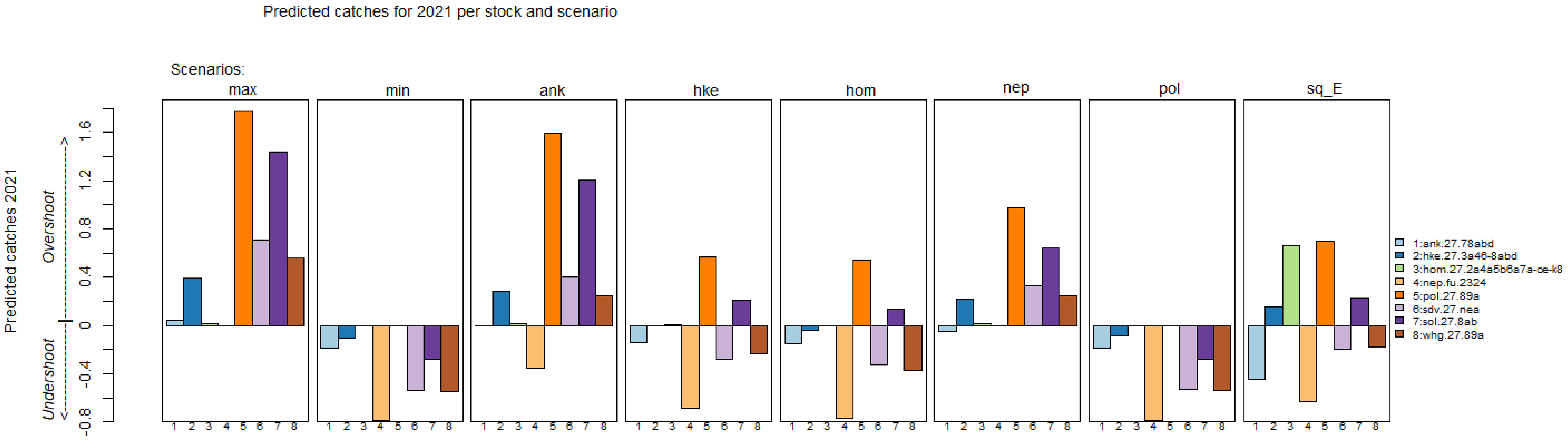
Examples: impact of ICES advice on Mixed fisheries

- OPPF-4 fleet



Examples: impact of ICES advice on Mixed fisheries

- Bay of Biscay



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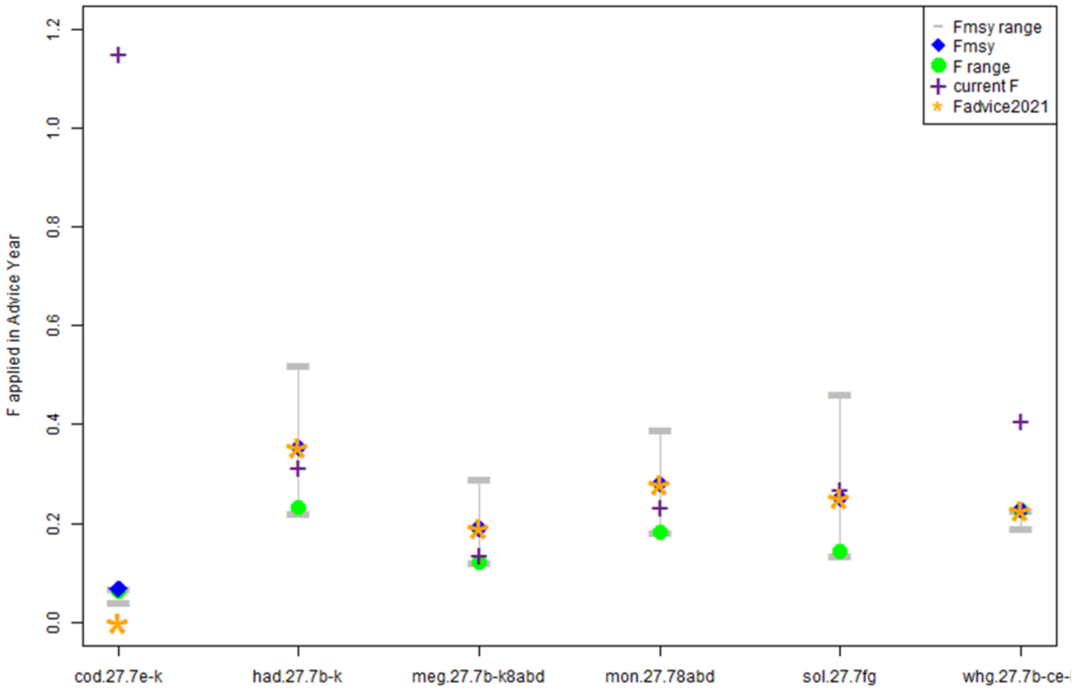
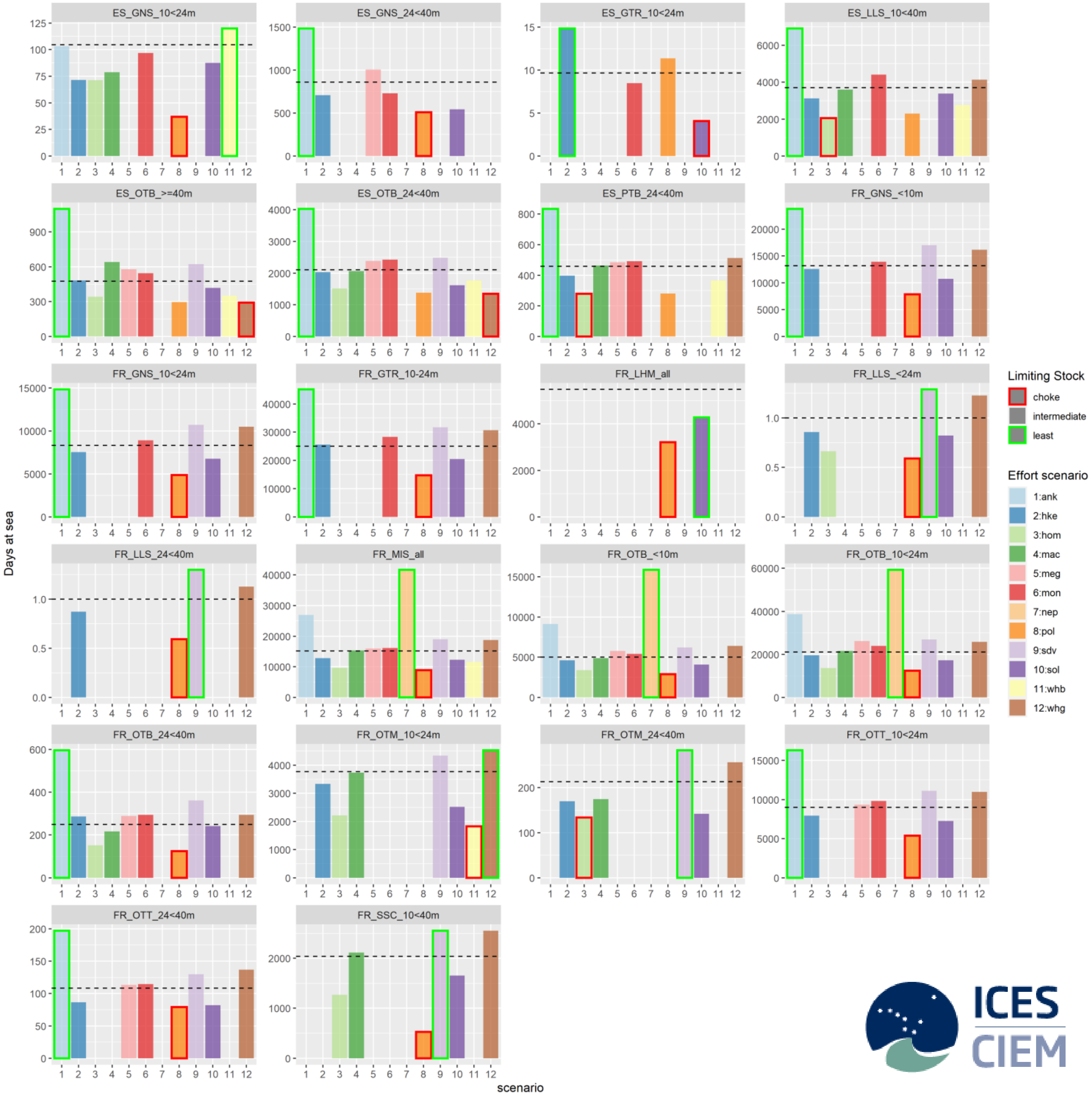
Examples: impact

- Bay of Biscay





Management plans

In order to define the work possibilities that will lead us to the objective,

it is necessary t**o have a very clear definition of the objectives.**

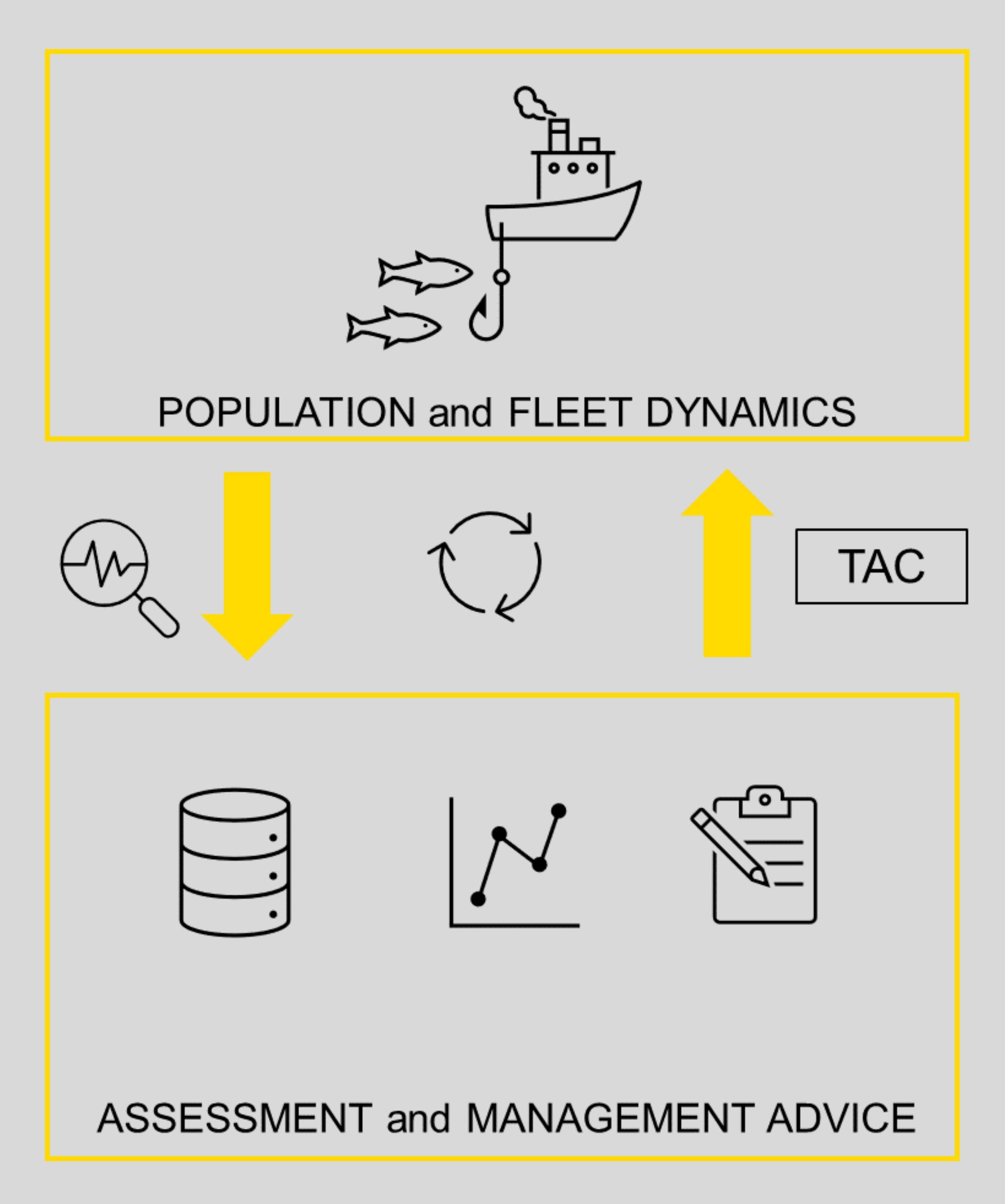
Objectives

Definition of clear objectives is required

- Stock or fleet management?
- Yearly or multi-year management?
- Fixed TACs or HCR-based?
- Management objectives:
    i. Biological sustainability (level of acceptable risks)
    ii. Catch stability (maximum % TAC variation, minimum or maximum TACs….)
    iii. Catch levels based on MSY, % above B_{lim}…

Data requirements

- Based on best available science
- Requires fleet information with specific resolution
    i. Effort
    ii. Fixed & variable costs
    iii. …
- Spatial information


POPULATION and FLEET DYNAMICS
TAC
ASSESSMENT and MANAGEMENT ADVICE

Do we want to work at the stock level (in the pre-meeting we talked about sole and southern hake?) or at the level of mixed fisheries?

We understand that we should work within the current ICES stock assessment framework. We do not recommend alternative assessments. But yes, management alternatives are possible to be redefined.

In this sense, the variability and the biological reference points should be the same as in the ICES assessment.

Any approach to management on a multi-annual basis means, in general, reduction of fishing possibilities in the short-medium term.

The definition of harvesting rules is usually a long process in which the consensus of the fishing sector is needed.

Biological sustainability is not in question; it must be ensured in all scenarios, including variability and uncertainty.

In summary, any definition of management scenarios which could include harvest control rules should assure the **sustainable state of the populations**, an **assumable variability** that ensures their sustainability, stability of catches with the assumable % of change and the periods of revision of the new TACs proposed.

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thank you
danke
謝謝
ngiyabonga
teşekkür ederim
gracias
спасибо
Баярлалаа
рахмат
dank je
bedankt
dziękuję
hvala
mauruuru
mochchakkeram
go raibh maith agat
obrigado
sukriya
kop khun krap
sağolun
grazie
arigatô
takk
dakujem
terima kasih
merci
감사합니다
ありがとう
ευχαριστώ
мерси
tapadh leat
enkosi
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gracies
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djiere dieuf
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taiku
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merce
dhanyavadagalu
diolch
xiexie
tanemirt
rahmet
rahmat
najis tuke
kam sah hamnida
didi madloba
mesi
dekuji
sobodi
nanni
nandri
dhanyavad
gracje
bayarlalaa
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akun
dankon
aciū
tau

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