

DISCATCH PROJECT

MARE/2012/24

Pilot project on catch and discard composition including solutions for limitation and possible elimination of unwanted by-catches in trawl net fisheries in the Mediterranean

WP 4. Quantifying and modelling catch and discard composition in trawl net fisheries



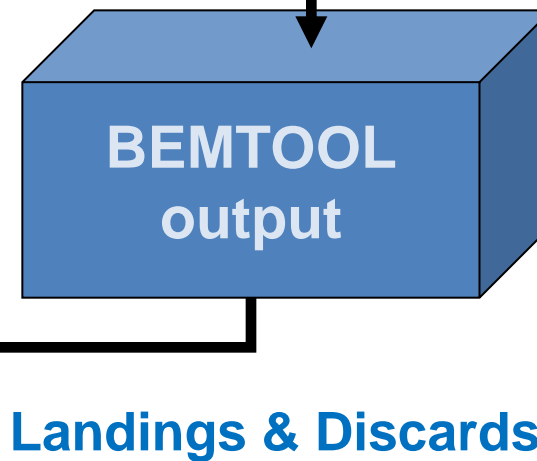
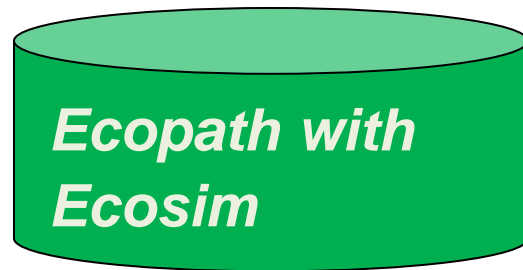
WP Coordinator Giuseppe Lembo COISPA. Participants CNR ISMAR, HCMR, COISPA

Task 4.1. BEMTOOL simulation approach

*Maria Teresa Spedicato, Isabella Bitetto, Maria Teresa Facchini
and Giuseppe Lembo*

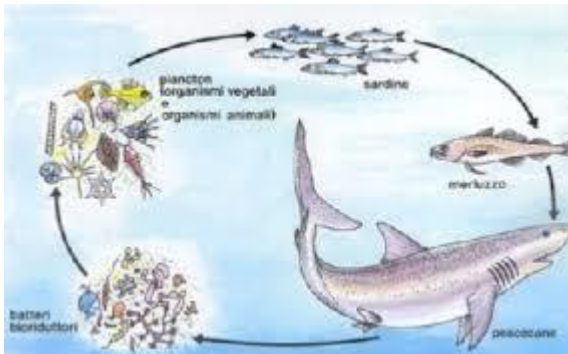
DISCATCH links between WP3 and WP4 *(from the selectivity to the ecosystem)*

WP3 – Modelling trawl selectivity with FISHSELECT & PRESEMO models

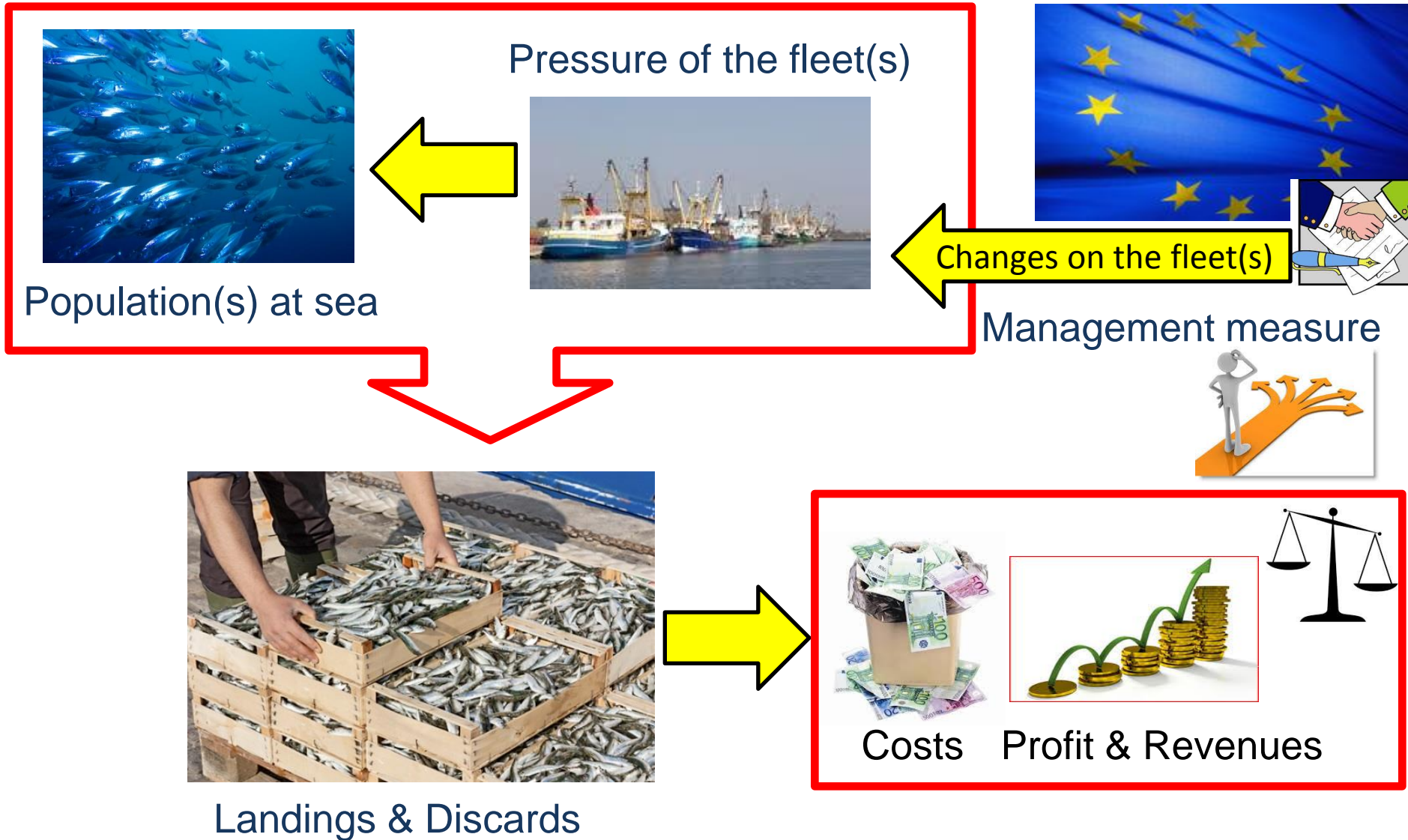


Task 4.1
Simulate how different selectivity affect fisheries productivity, sustainability and economic performance

Task 4.2
Assess direct and indirect impacts on ecosystems

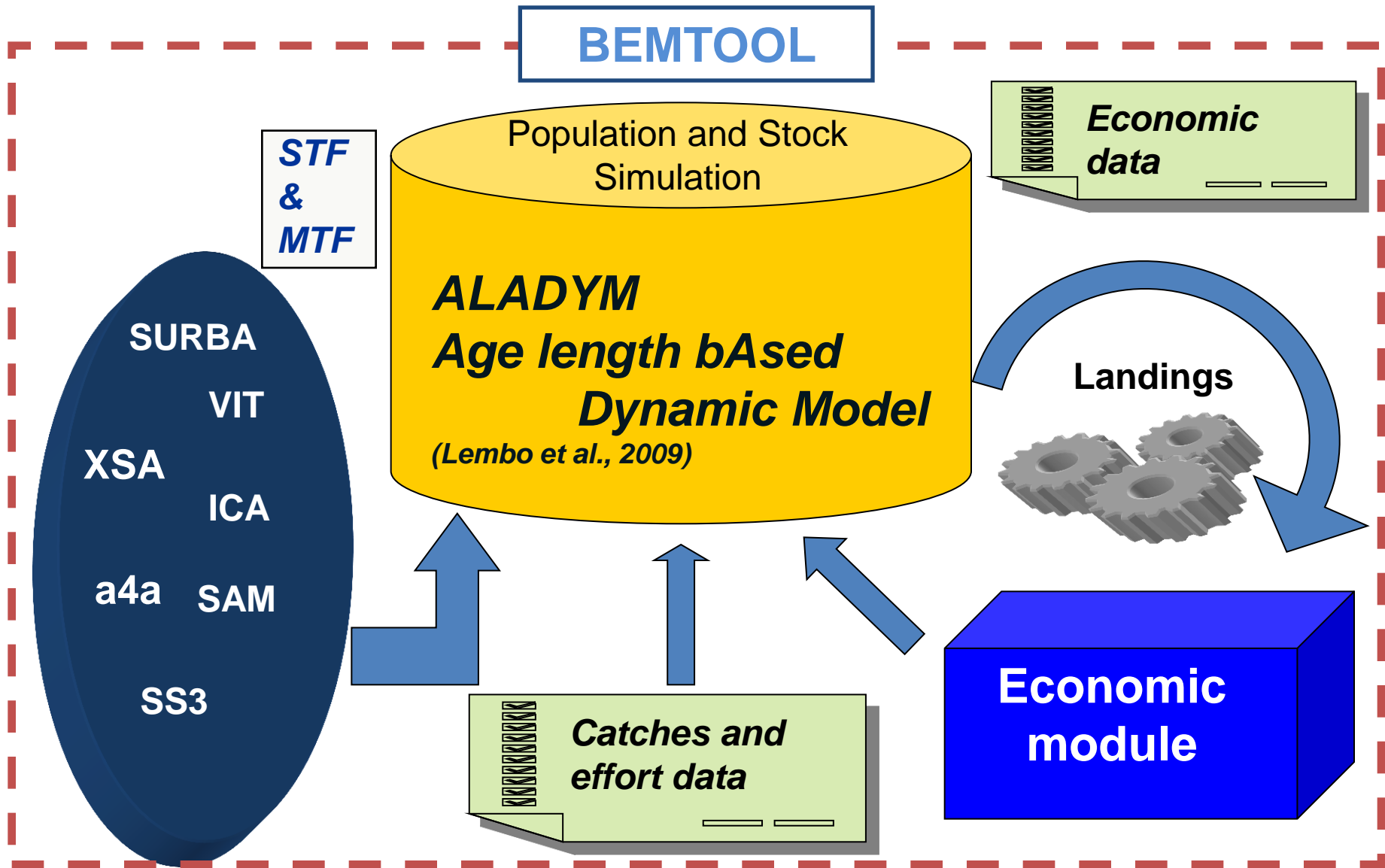


BEMTOOL model simulation process



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The tools



BEMTOOL model

The multidimension

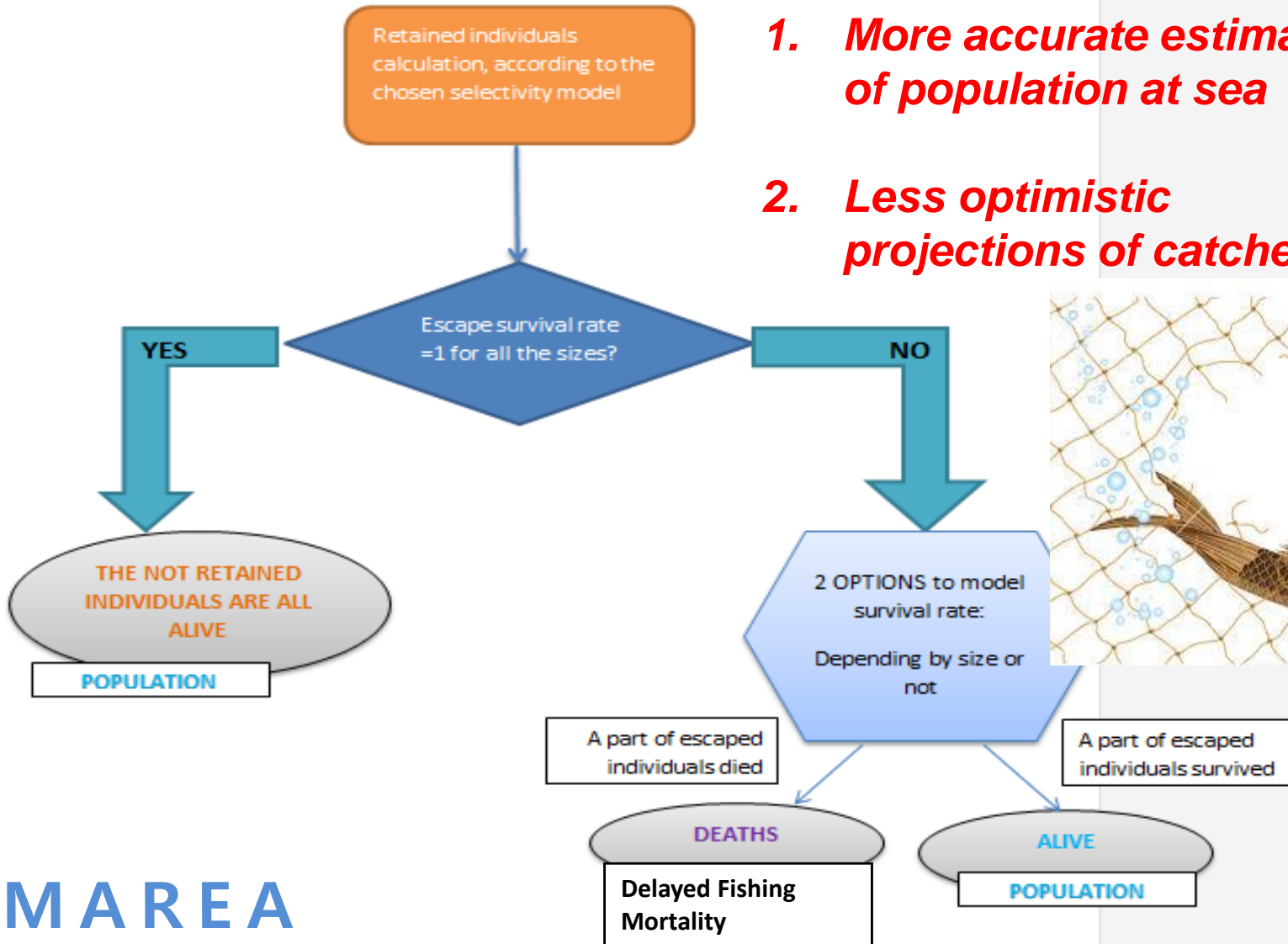
*biological, impact/pressure
and socio-economic*

**MULTI-FLEET and MULTIPLE
STOCK dimensions to simulate
MIXED FISHERIES**

e.g. *trawlers* (mainly targeting hake, red mullet, shrimps), *bottom long-liners* (only hake), ...and *gillnetters* (red mullet, hake, other fish..) from different fleets

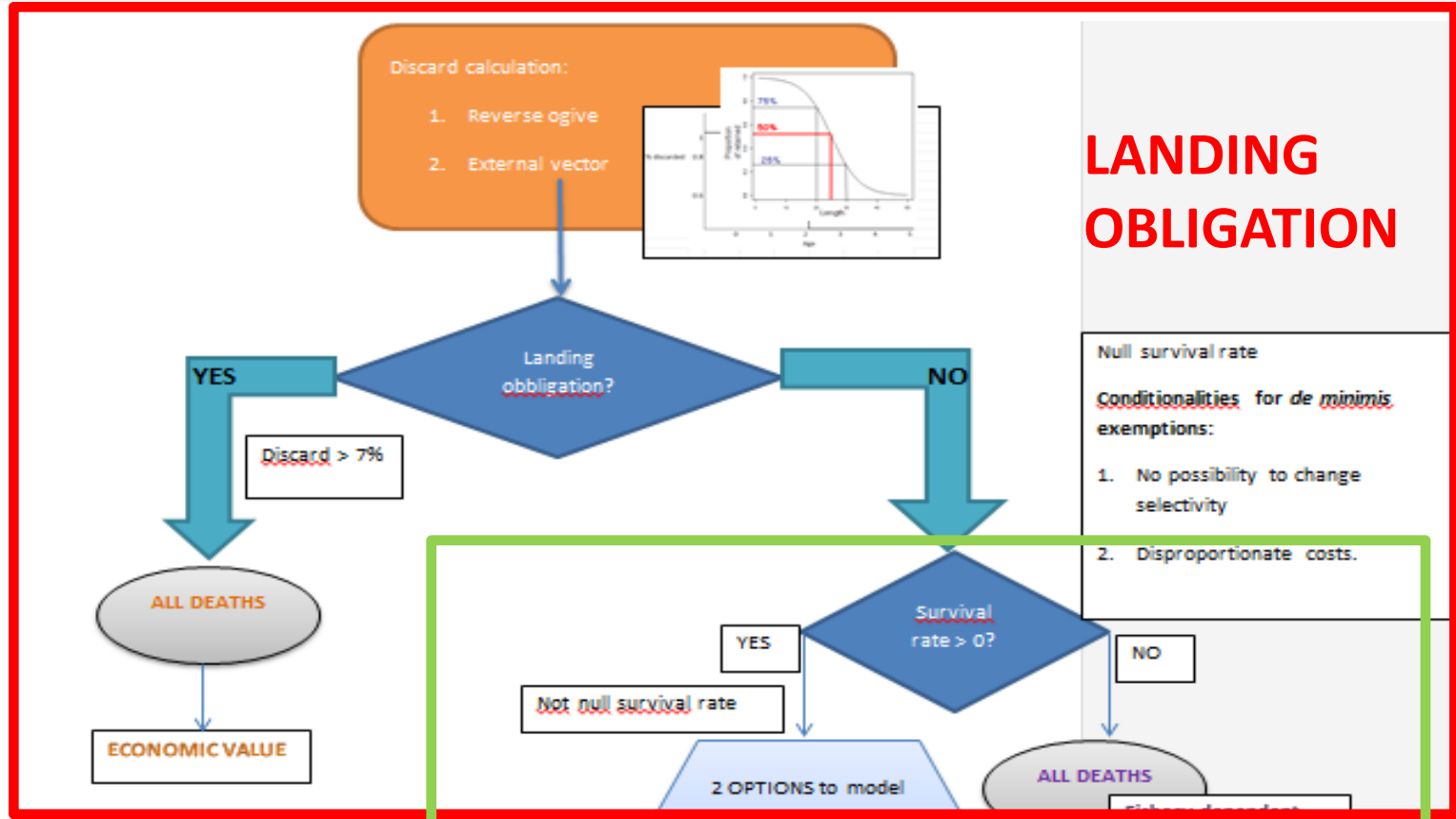
Escape survival rate

1. *More accurate estimate of population at sea*
2. *Less optimistic projections of catches*



Implementation of landing obligation (LANDMED Project)

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LANDING OBLIGATION

Null survival rate

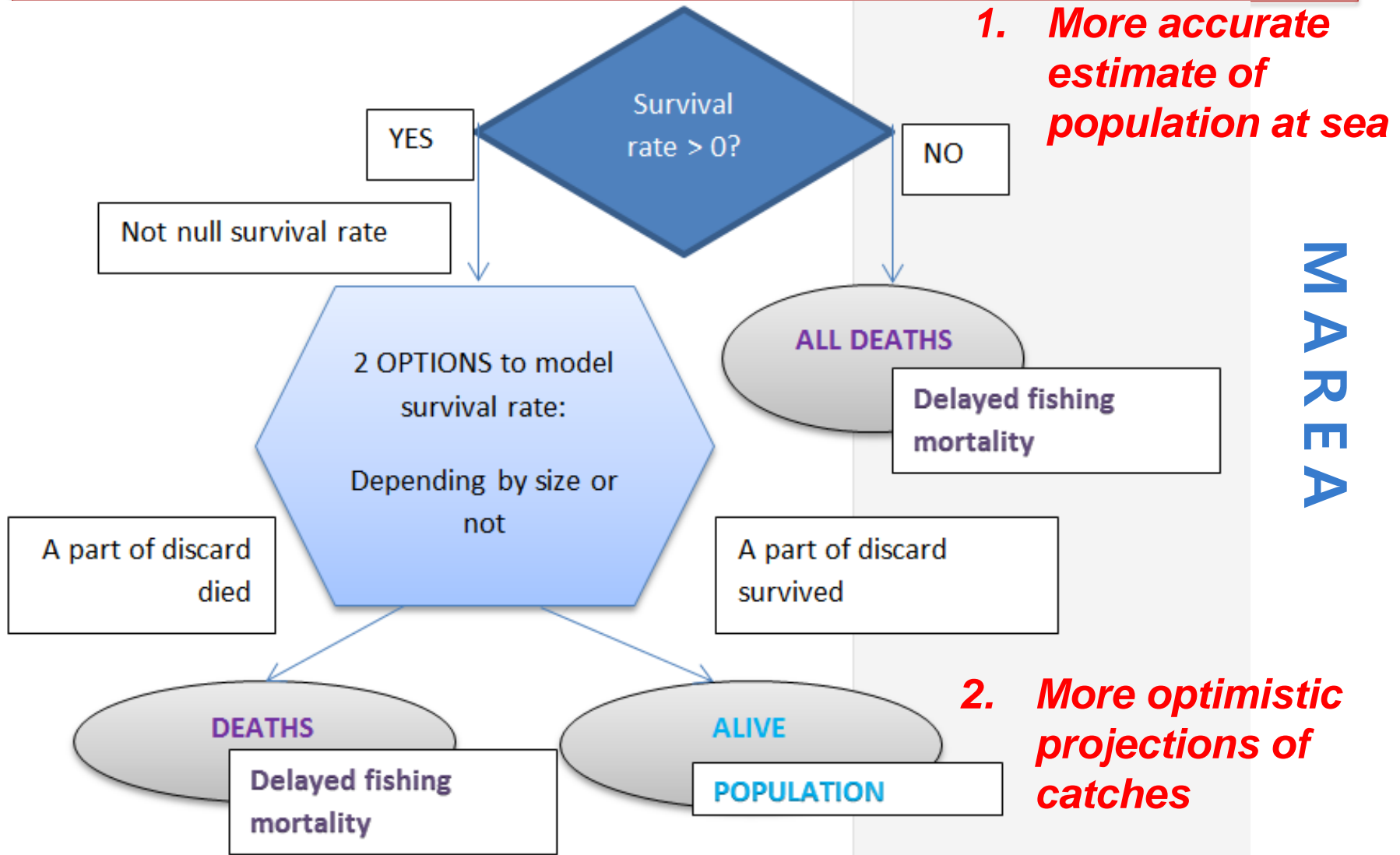
Conditionality for *de minimis* exemptions:

- No possibility to change selectivity
- Disproportionate costs.

- NEW OUTPUT by fleet segment:**
- Discard landed
 - Discard at sea

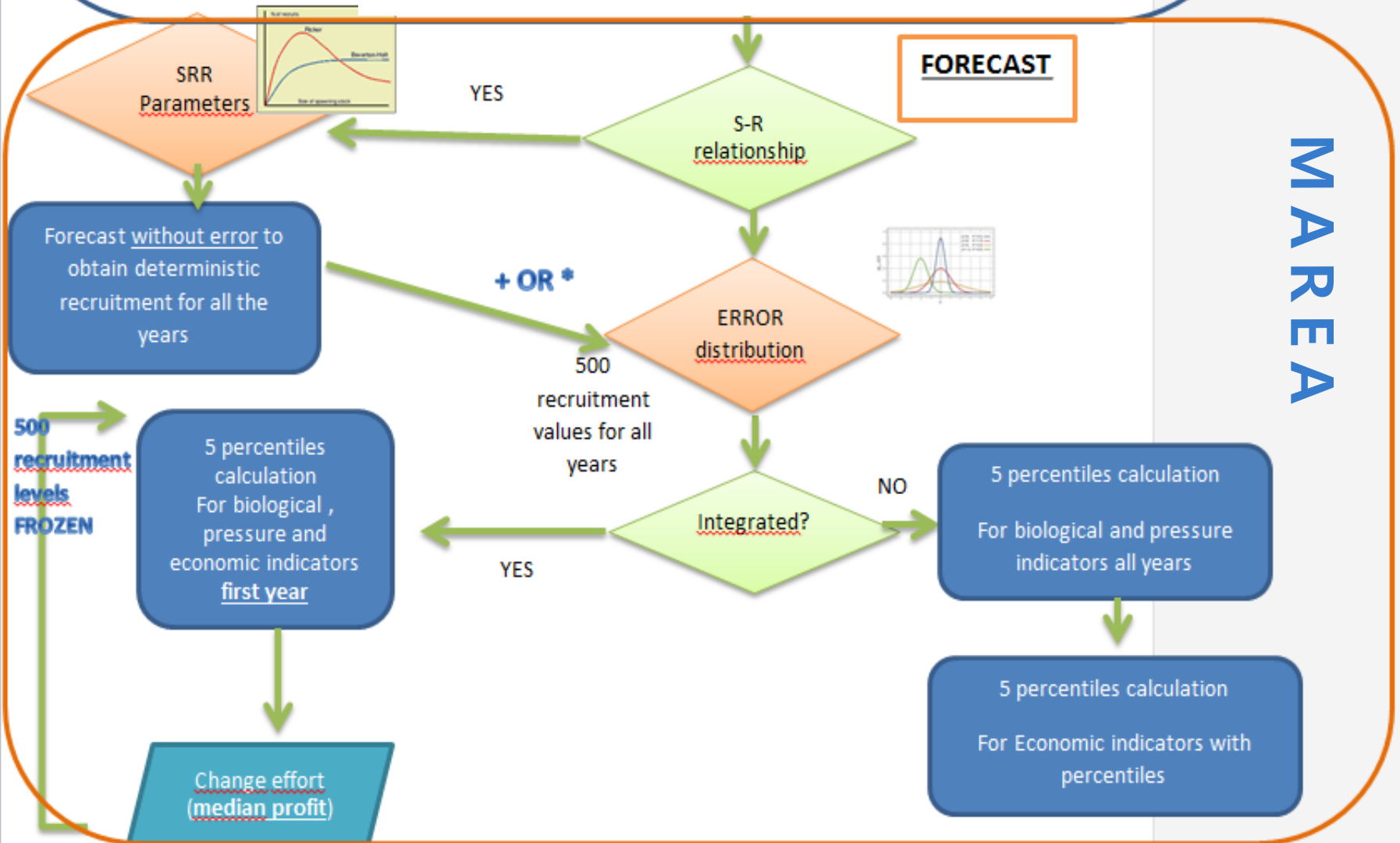
DISCARD SURVIVABILITY

Survivability of discard



Uncertainty

SIMULATION results



BEMTOOL Management measures

- ✓ Closed season (on fishing days at sea)

The fishing ban could protect the recruits/spawners increase the number of mature fishes and mitigate impact

- ✓ Fishing effort limitations (on fishing vessels)

- ✓ Mesh size changes (change of selectivity)

Increases in meshsize could lead to an increase of the mean size of the fishes and increase productivity in the medium term

- ✓ Discard impact (landing obligation)

Additional labour costs (due to landing obligations) could be offset by profit coming from different uses of discards

- ✓ Total Allowable Catch (TAC)

APPLICATION TO CASE STUDIES DISCATCH PROJECT



SIMULATION RESULTS SMALL PELAGICS GSA17

Main stocks of small pelagics in GSA 17: *E. encrasicolus* and *S. pilchardus*.

Both stocks are shared among the countries of GSA 17: Italy, Croatia, Slovenia.

The main fishing gears targeting anchovy and sardine are pelagic trawls and purse seines.

8 fleet segments targeting the selected stocks :

ITA_TM_VL_1218

ITA_TM_VL_1824

ITA_TM_VL_2440

ITA_PS_VL_2440

HRV_PS_VL_1218

HRV_PS_VL_1824

HRV_PS_VL_2440

SVN_PS_VL_1218

95% of production and revenues of anchovy

around 93% of production and revenues of sardine in GSA 17 in 2013.

SIMULATION RESULTS SMALL PELAGICS GSA17

Data used for the parameterization of the biological module and the pressure module from the stock assessments carried out during the Working Group on Stock Assessment of Small Pelagic (GFCM-WGSASP report) held in November 2014.

Economic data from SEDAF project (MAREA Framework)

Scenarios:

HR2-RED_E04pil2018: reduction (20%) of F towards the reference point of sardine ($E=0.4$) in 2018 of the same percentage for all the fleet segments and applied only to fishing days;

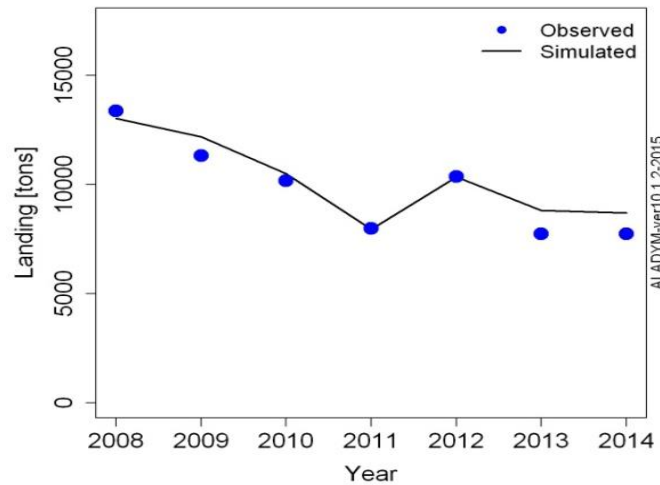
HR2-RED_Fprop_FB: fishing ban in the months with higher occurrence of offspring of sardine with percentages proportional to the impact of each fleet segment on the sardine stock. This measure is applied each year from 2015 to 2021. The fishing ban already carried out by the different fleet segments is taken into account.

SIMULATION RESULTS SMALL PELAGICS GSA17

Simulated vs Observed Landing - E. enc

ITA_TM_2440

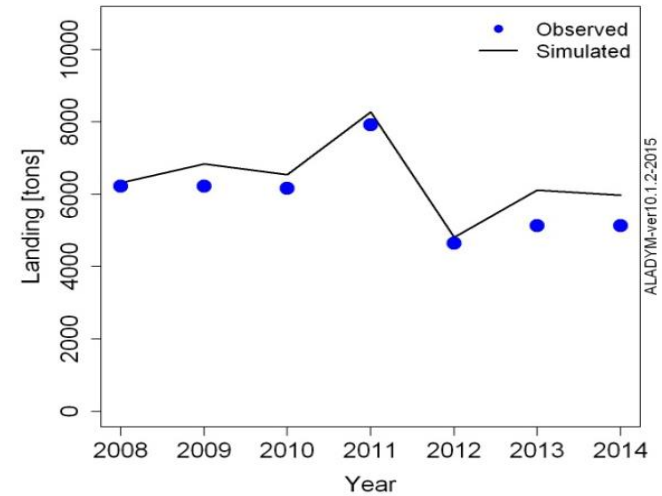
simulation [2008-2014]



Simulated vs Observed Landing - E. enc

HRV_PS_2440

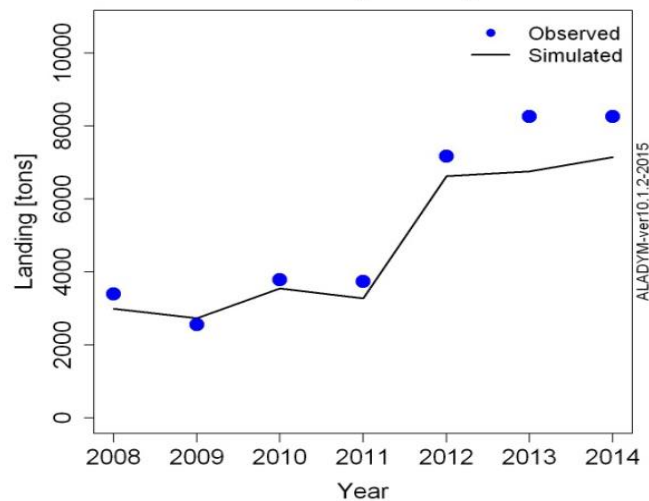
simulation [2008-2014]



Simulated vs Observed Landing - S. pil

ITA_TM_2440

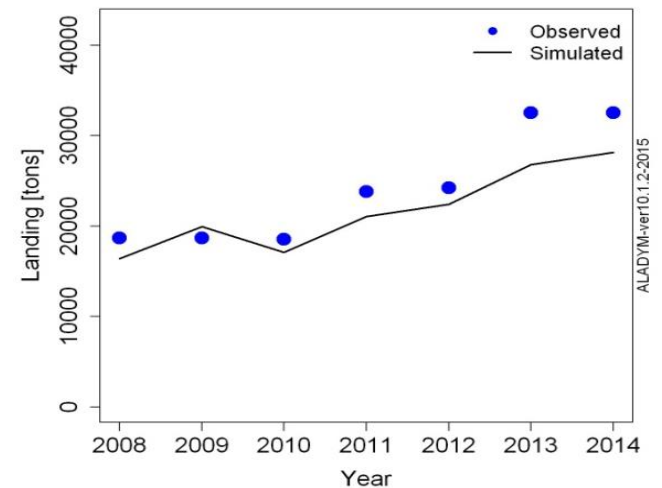
simulation [2008-2014]



Simulated vs Observed Landing - S. pil

HRV_PS_2440

simulation [2008-2014]

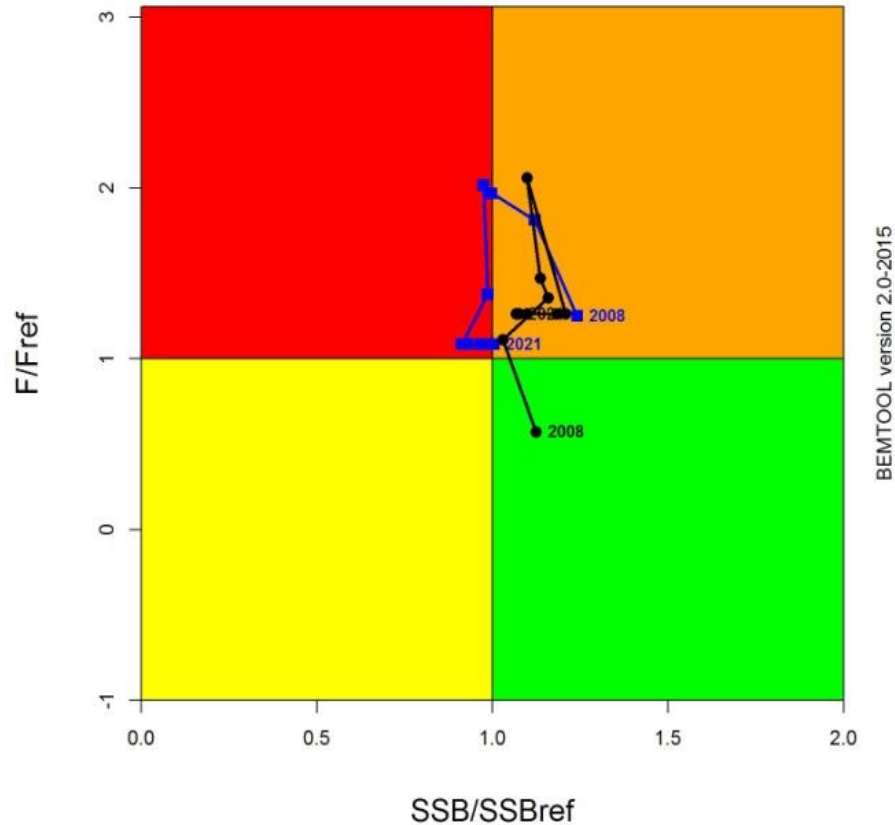


SIMULATION RESULTS SMALL PELAGICS GSA17

GSA17_SMALLPEL HR5-StatusQuo [2008-2021]

RISK EVALUATION plot

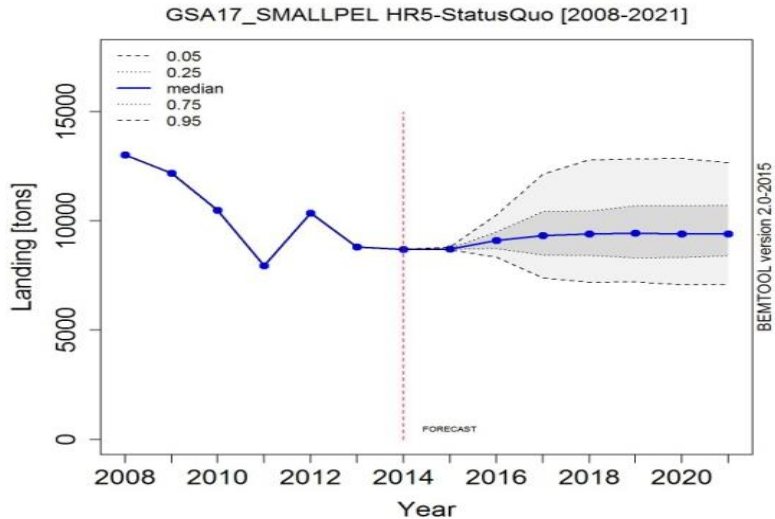
- E. enc SSB < SSBref 49.2%
- S. pil SSB < SSBref 35.6%



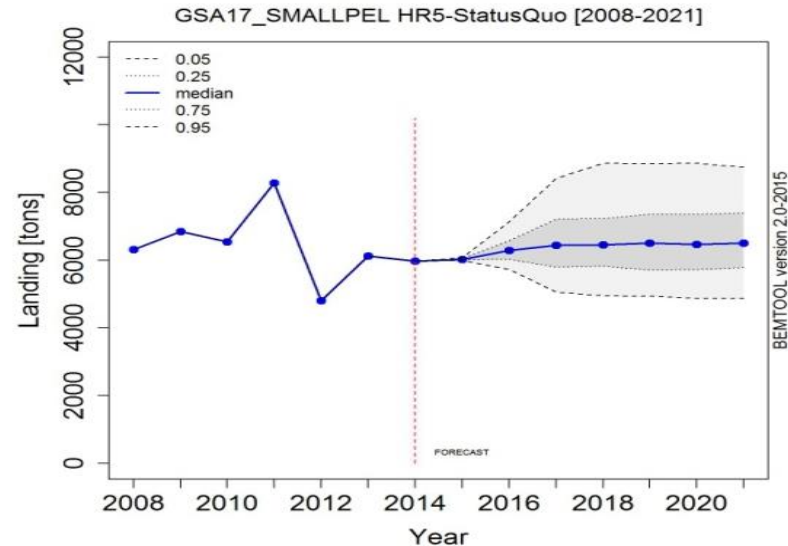
Stock	% needed reduction (last year)	Fcurrent	Reference point	SSBcurrent	SSBref	Comments
E. enc	7	0.69	0.64	86760	93394	E = 0.4
S. pil	20	0.69	0.55	147834	125010	E = 0.4

SIMULATION RESULTS SMALL PELAGICS GSA17

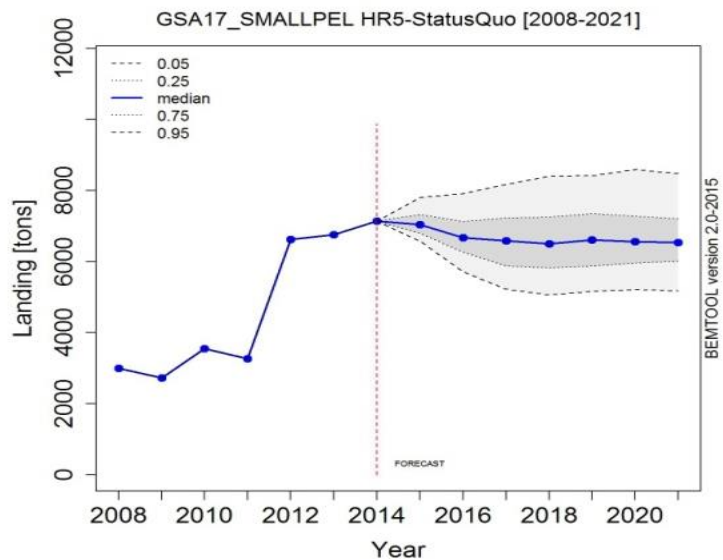
Landing - E. enc
ITA_TM_2440



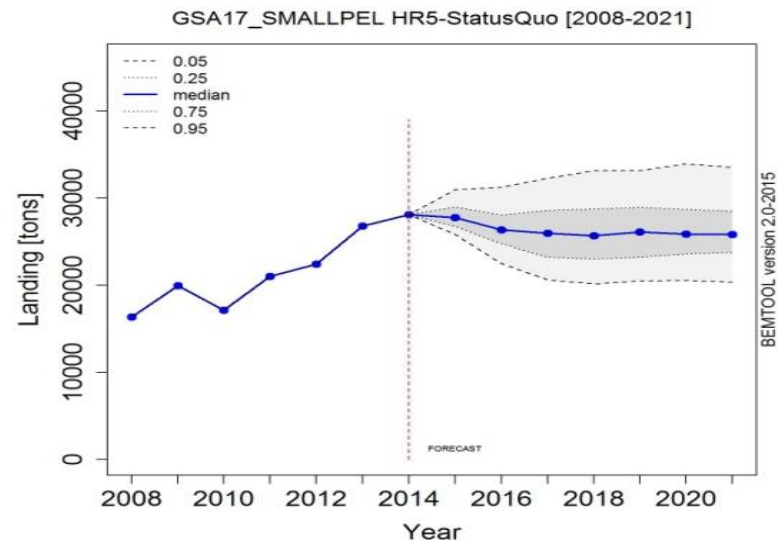
Landing - E. enc
HRV_PS_2440



Landing - S. pil
ITA_TM_2440



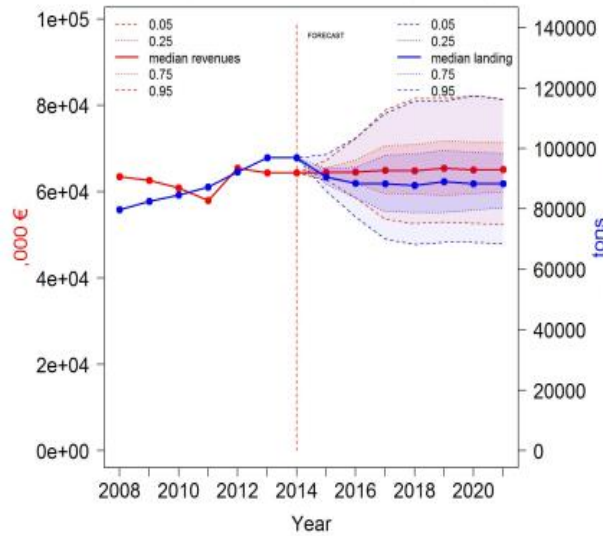
Landing - S. pil
HRV_PS_2440



SIMULATION RESULTS SMALL PELAGICS GSA17

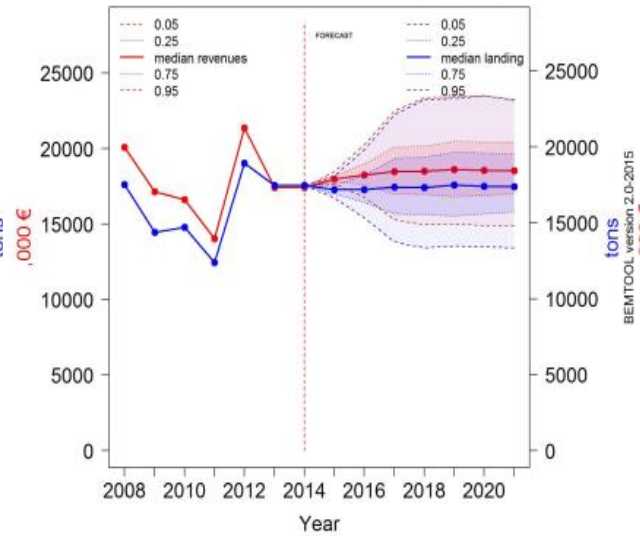
Revenues-Landing - Overall

GSA17_SMALLPEL HR5-StatusQuo [2008-2021]



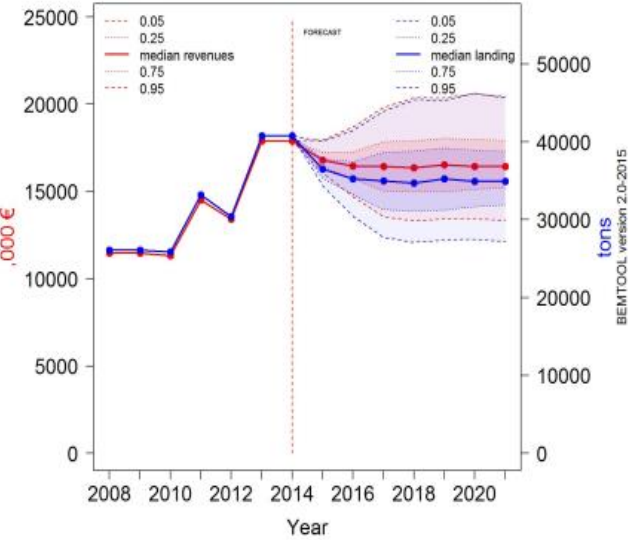
Revenues-Landing - ITA_TM_2440

GSA17_SMALLPEL HR5-StatusQuo [2008-2021]



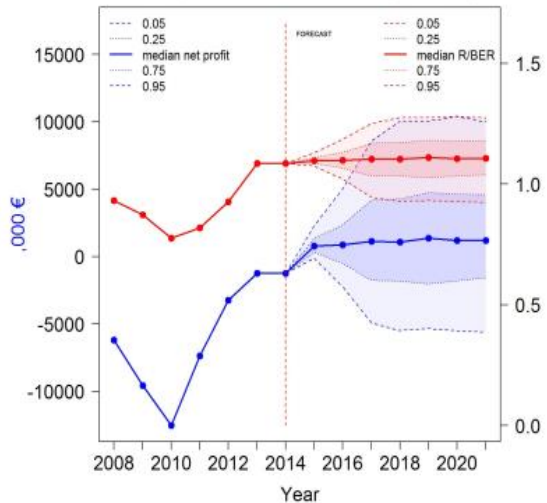
Revenues-Landing - HRV_PS_2440

GSA17_SMALLPEL HR5-StatusQuo [2008-2021]



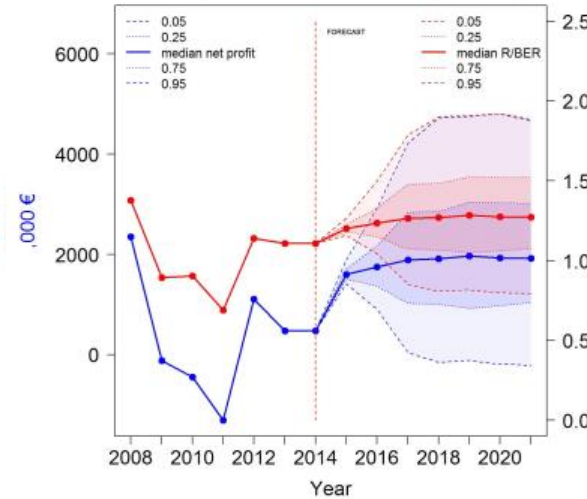
Net profit-R/BER - Overall

GSA17_SMALLPEL HR5-StatusQuo [2008-2021]



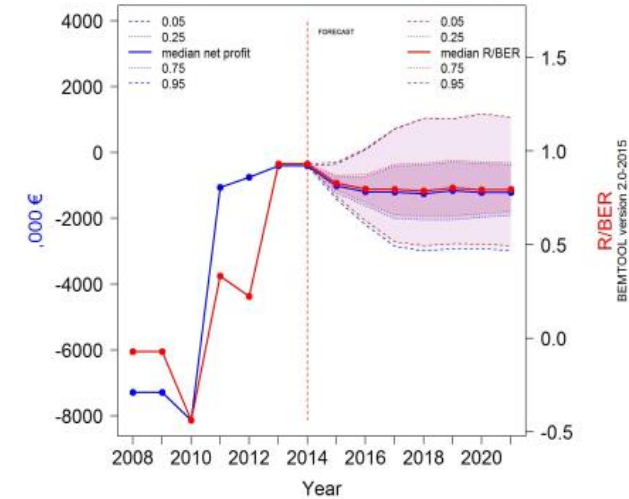
Net profit-R/BER - ITA_TM_2440

GSA17_SMALLPEL HR5-StatusQuo [2008-2021]



Net profit-R/BER - HRV_PS_2440

GSA17_SMALLPEL HR5-StatusQuo [2008-2021]



SIMULATION RESULTS SMALL PELAGICS GSA17

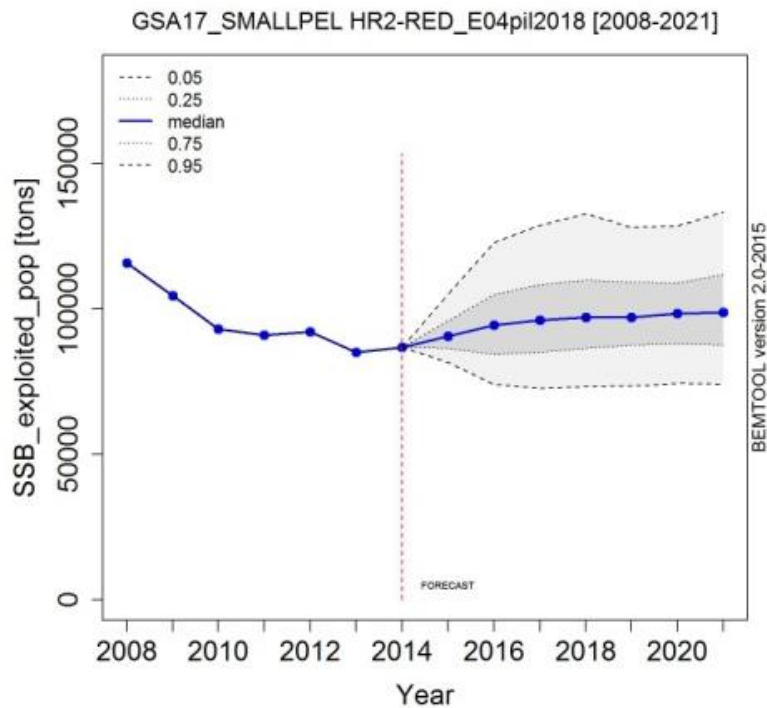
In both Harvest Rules

HR2-RED_E04pil2018: and

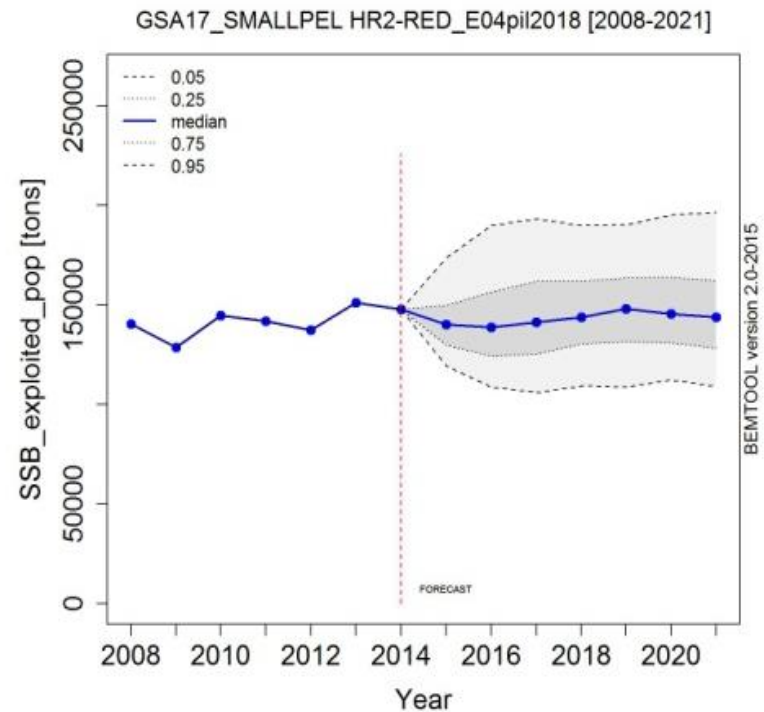
HR2-RED_Fprop_FB

SSB_exploited_pop - E. enc

SSB_exploited_pop - S. pil



~ 5% higher than SQ

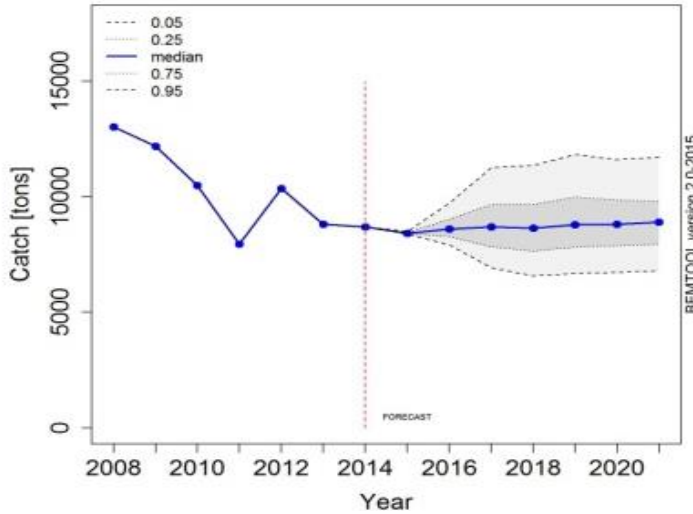


~8% higher than SQ

SIMULATION RESULTS SMALL PELAGICS GSA17

Catch - E. enc
ITA_TM_2440

GSA17_SMALLPEL HR2-RED_E04pil2018 [2008-2021]

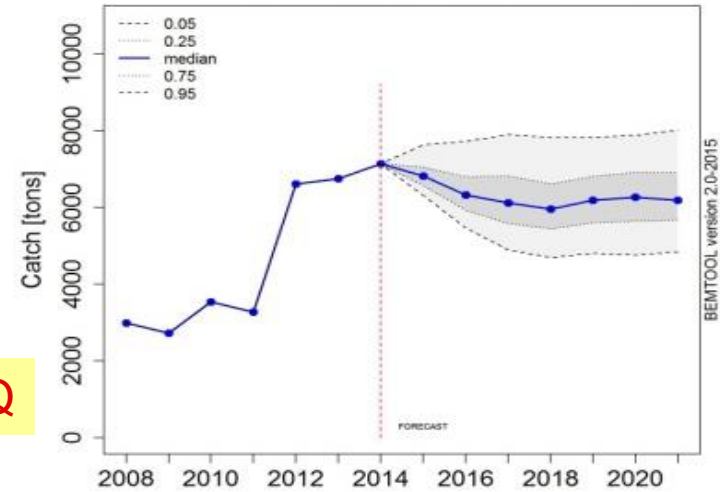


**HR2-
RED_E04pil2018**

-5.4% SQ

Catch - S. pil
ITA_TM_2440

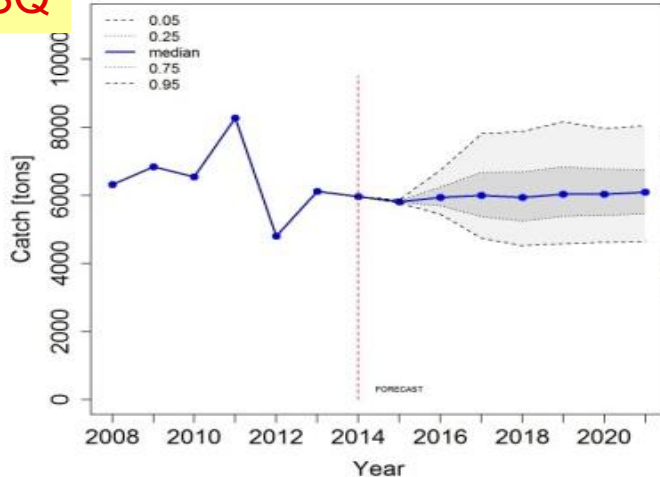
GSA17_SMALLPEL HR2-RED_E04pil2018 [2008-2021]



-5.2% SQ

Catch - E. enc
HRV_PS_2440

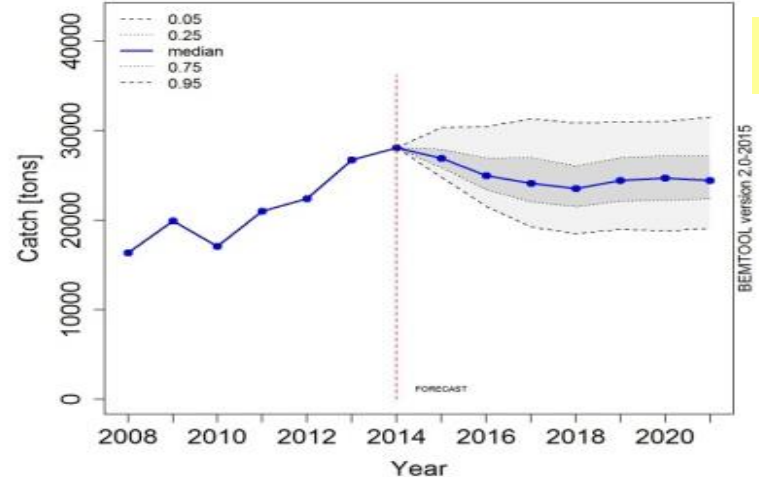
GSA17_SMALLPEL HR2-RED_E04pil2018 [2008-2021]



-6.3% SQ

Catch - S. pil
HRV_PS_2440

GSA17_SMALLPEL HR2-RED_E04pil2018 [2008-2021]

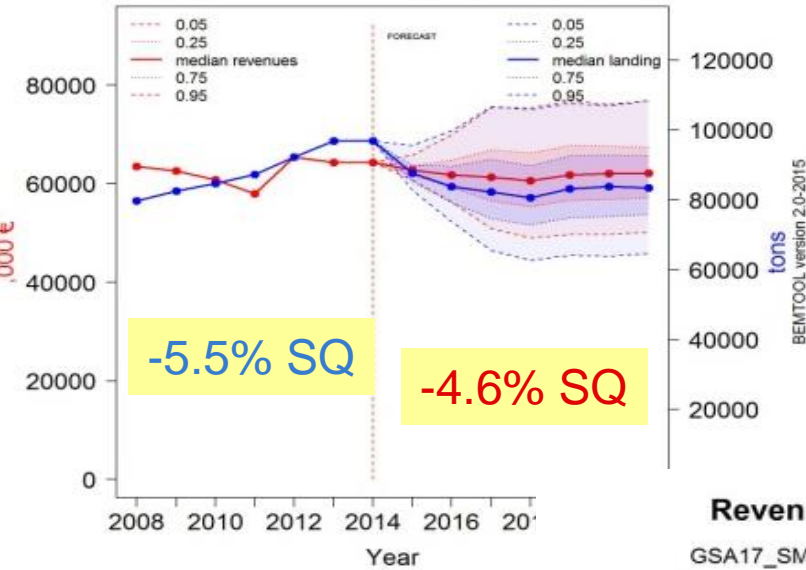


-5.4% SQ

SIMULATION RESULTS SMALL PELAGICS GSA17

Revenues-Landing - Overall

GSA17_SMALLPEL HR2-RED_E04pil2018 [2008-2021]



**HR2-
RED_E04pil
2018**

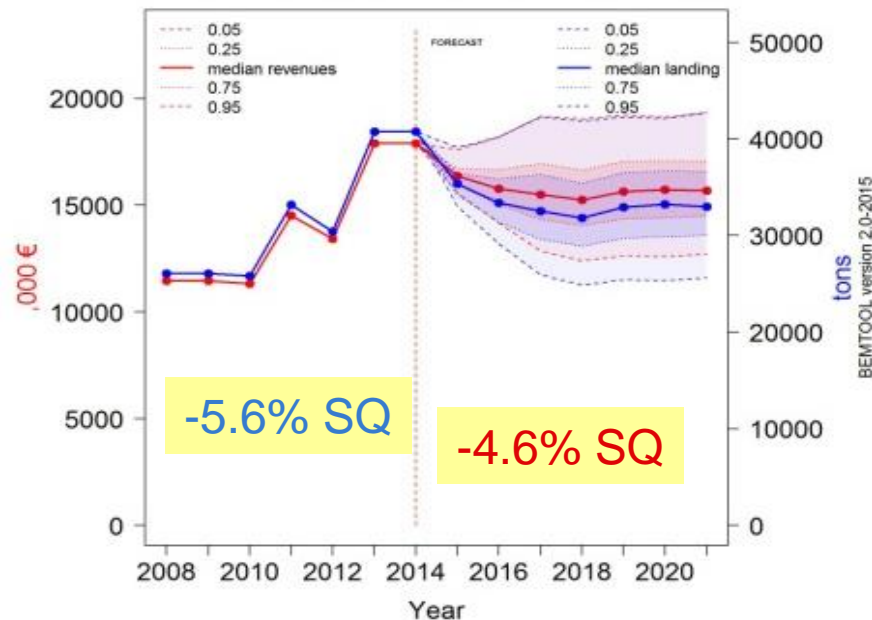
Revenues-Landing - ITA_TM_2440

GSA17_SMALLPEL HR2-RED_E04pil2018 [2008-2021]



Revenues-Landing - HRV_PS_2440

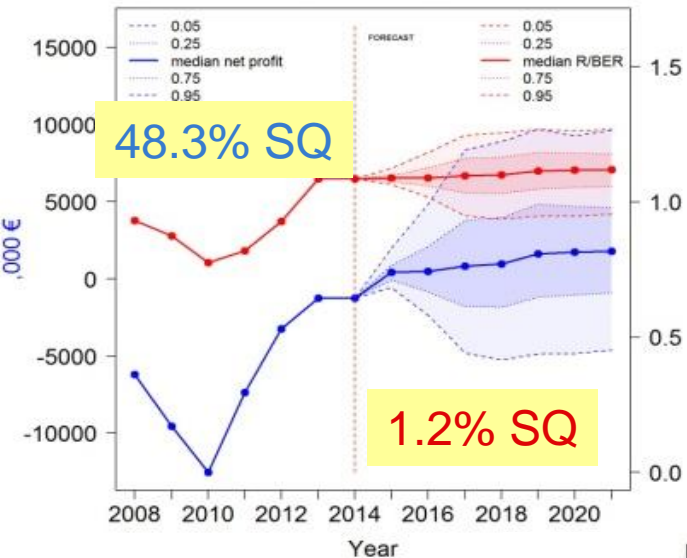
GSA17_SMALLPEL HR2-RED_E04pil2018 [2008-2021]



SIMULATION RESULTS SMALL PELAGICS GSA17

Net profit-R/BER - Overall

GSA17_SMALLPEL HR2-RED_E04pil2018 [2008-2021]

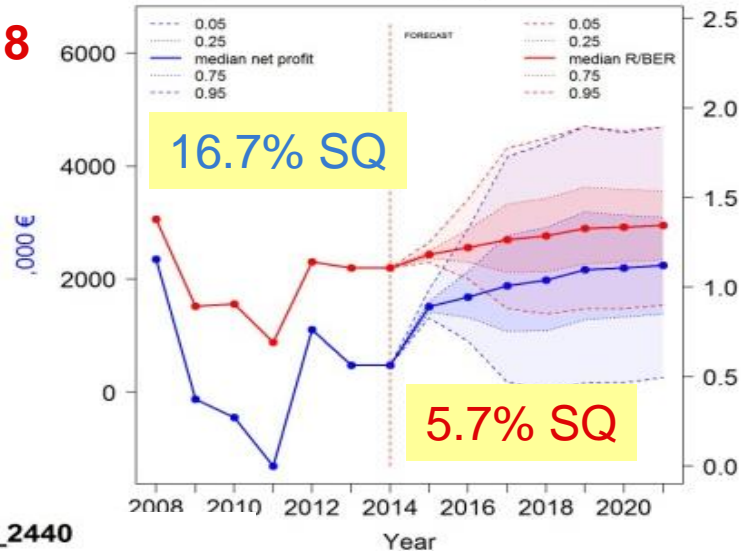


**HR2-
RED_E04pil2018**

R/BER
BEMTOOL version 2.0-2015

Net profit-R/BER - ITA_TM_2440

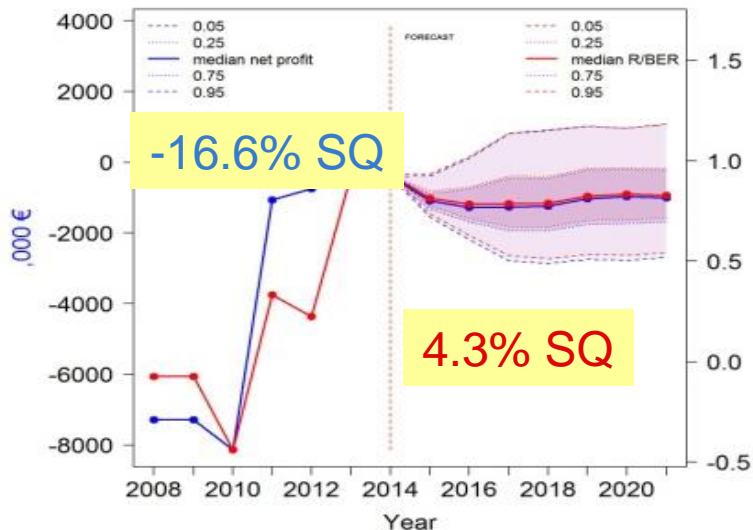
GSA17_SMALLPEL HR2-RED_E04pil2018 [2008-2021]



R/BER
BEMTOOL version 2.0-2015

Net profit-R/BER - HRV_PS_2440

GSA17_SMALLPEL HR2-RED_E04pil2018 [2008-2021]

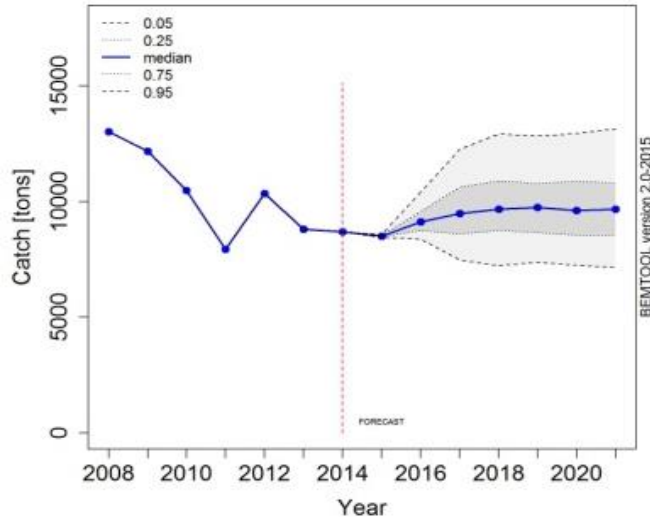


R/BER
BEMTOOL version 2.0-2015

SIMULATION RESULTS SMALL PELAGICS GSA17

Catch - E. enc
ITA_TM_2440

GSA17_SMALLPEL HR2-RED_Fprop_FB [2008-2021]

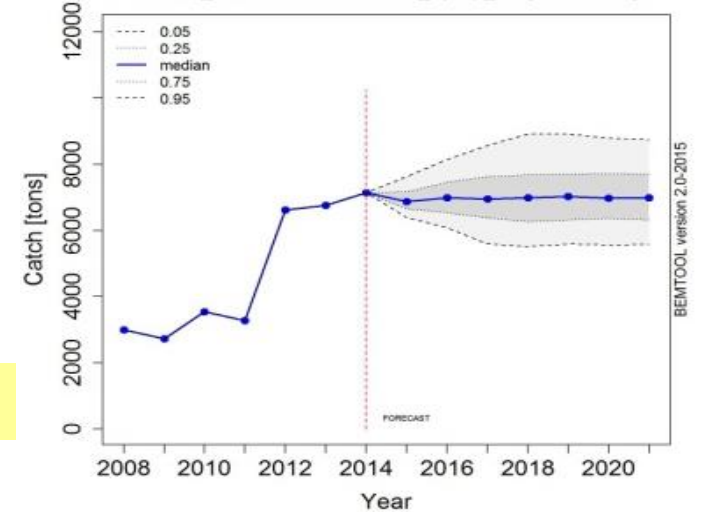


**HR2-
RED_Fprop_FB**

2.9% SQ

Catch - S. pil
ITA_TM_2440

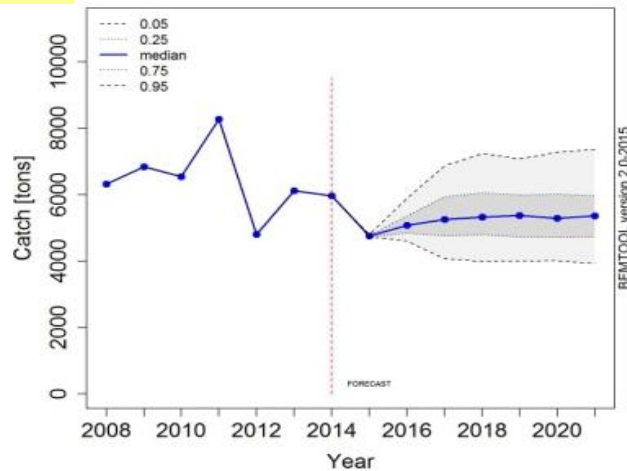
GSA17_SMALLPEL HR2-RED_Fprop_FB [2008-2021]



7.0% SQ

Catch - E. enc
HRV_PS_2440

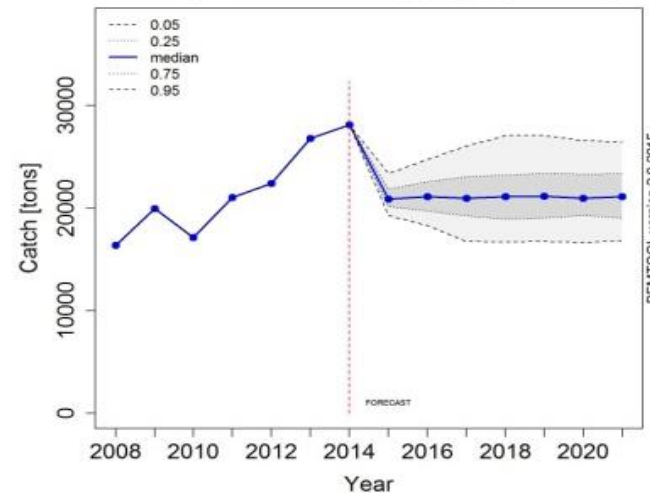
GSA17_SMALLPEL HR2-RED_Fprop_FB [2008-2021]



-17.7% SQ

Catch - S. pil
HRV_PS_2440

GSA17_SMALLPEL HR2-RED_Fprop_FB [2008-2021]

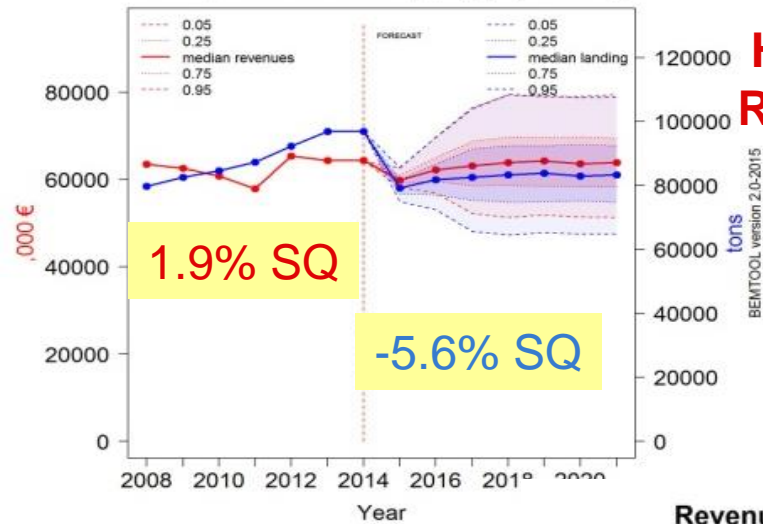


-18.3% SQ

SIMULATION RESULTS SMALL PELAGICS GSA17

Revenues-Landing - Overall

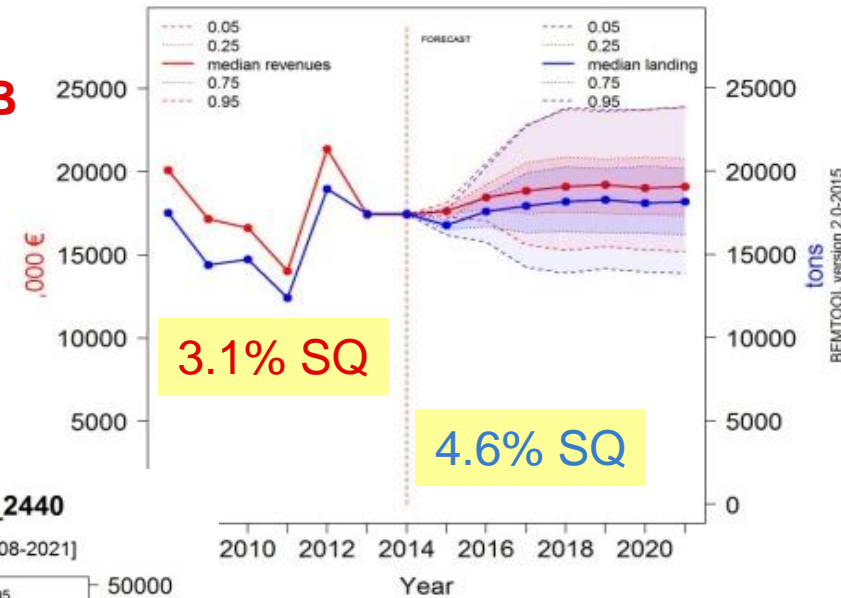
GSA17_SMALLPEL HR2-RED_Fprop_FB [2008-2021]



**HR2-
RED_Fprop_FB**

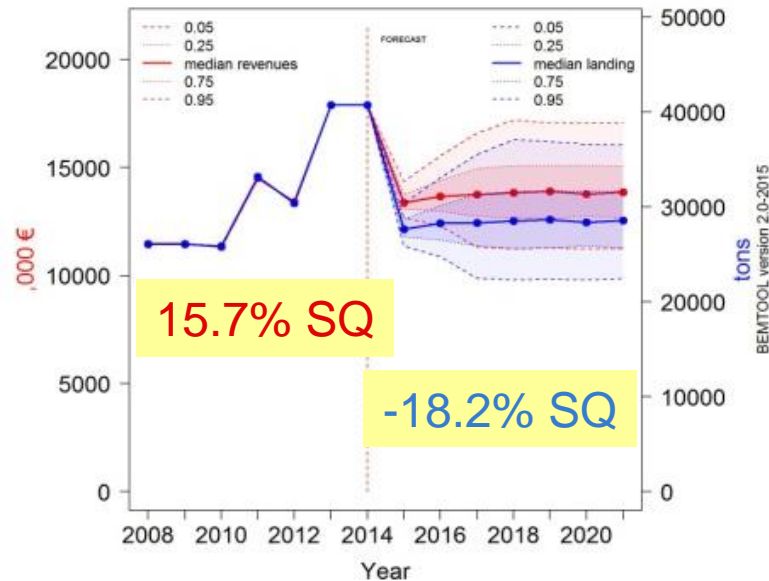
Revenues-Landing - ITA_TM_2440

GSA17_SMALLPEL HR2-RED_Fprop_FB [2008-2021]



Revenues-Landing - HRV_PS_2440

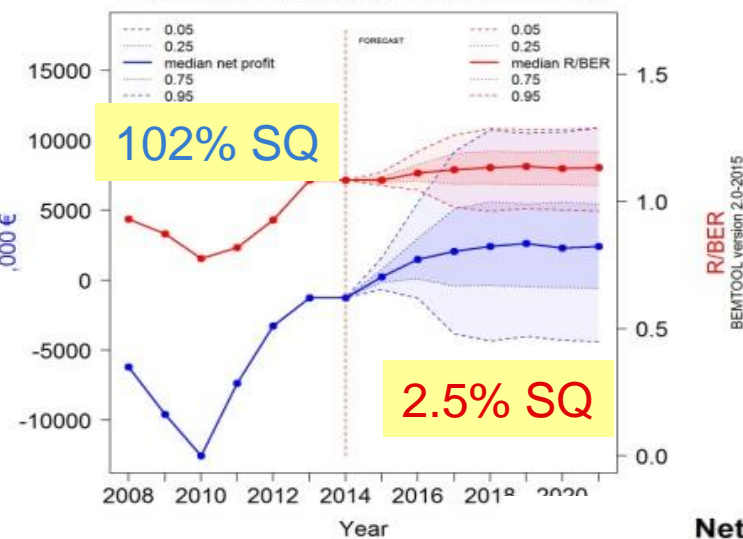
GSA17_SMALLPEL HR2-RED_Fprop_FB [2008-2021]



SIMULATION RESULTS SMALL PELAGICS GSA17

Net profit-R/BER - Overall

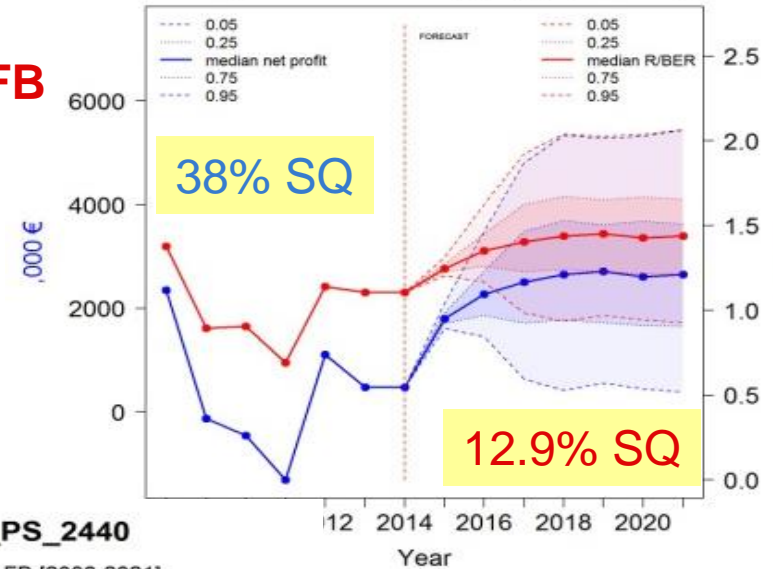
GSA17_SMALLPEL HR2-RED_Fprop_FB [2008-2021]



**HR2-
RED_Fprop_FB**

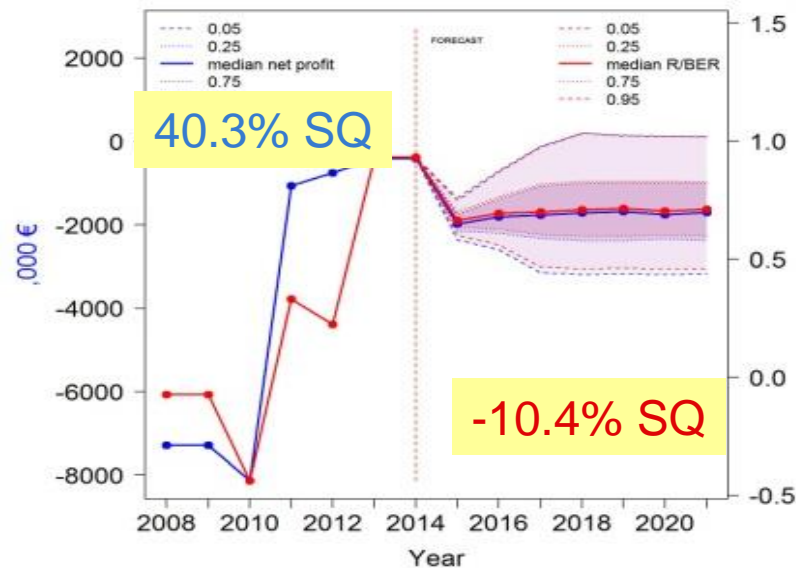
Net profit-R/BER - ITA_TM_2440

GSA17_SMALLPEL HR2-RED_Fprop_FB [2008-2021]



Net profit-R/BER - HRV_PS_2440

GSA17_SMALLPEL HR2-RED_Fprop_FB [2008-2021]



SUMMARY OF PREDICTIONS - MCDA SMALL PELAGICS GSA17

The BEMTOOL options aim at comparing the outputs of the different scenarios, by the Multi-Criteria Decision Analysis to assess the performances of the alternative fisheries management policies

