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Evaluating ecological and economic effects of landing obligation with an ecosystem model

Igor Celić, Simone Libralato, Giuseppe Scarcella,
Saša Raicevich, Bojan Marčeta, Cosimo Solidoro



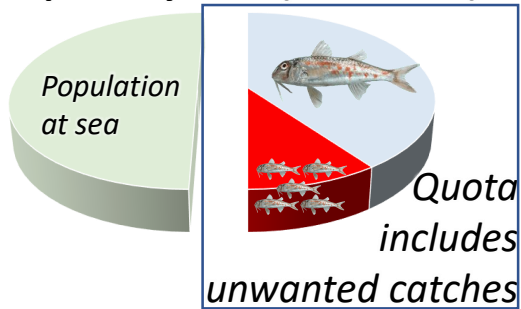
National Institute of Oceanography and Applied Geophysics (OGS)
Trieste, Italy

Thursday 20 August 2020
13:00 - 14:00 CEST

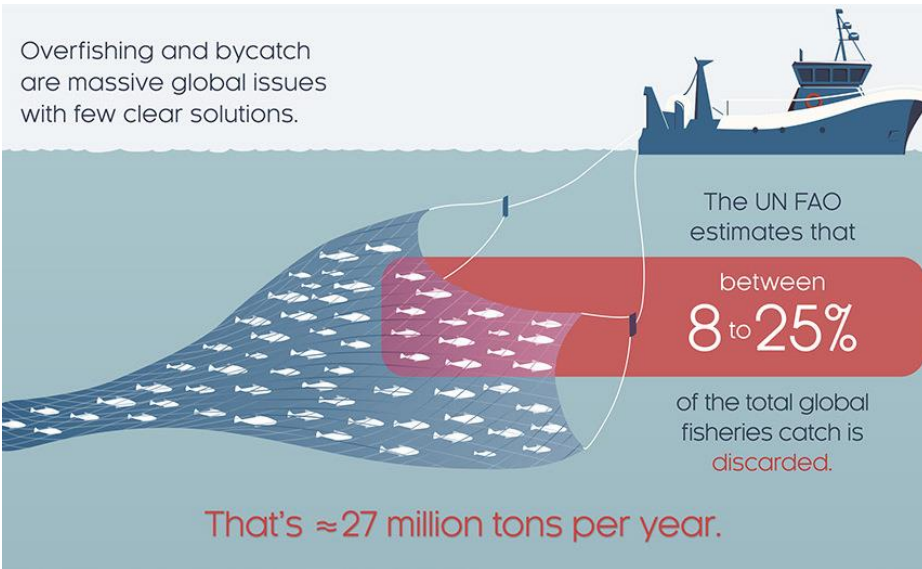
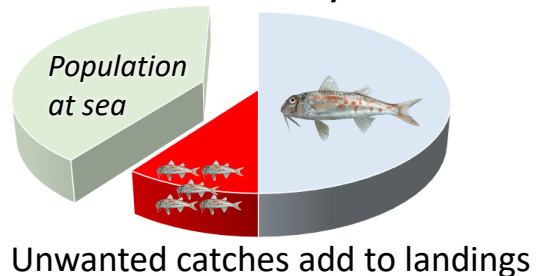
Discards represent unwanted catches of target and non-target marine species and are a management issue in fisheries worldwide.

The reformed Common Fisheries Policy (EU 1380/2013) includes measures to contrast the discarding practices by introducing landing obligation for unwanted catches of species i) regulated by quota or ii) having minimum conservation reference size.

quota system (North Sea)



effort control (Mediterranean and Black Sea)

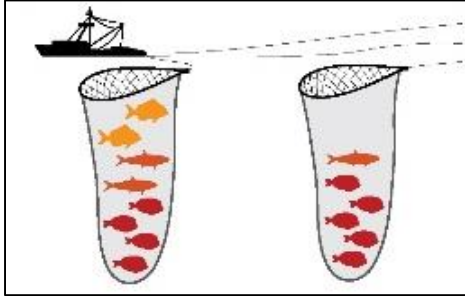


Worth to be noted: fisheries are regulated by quotas in the North Sea and by effort/technical measures in the Mediterranean and Black Seas.

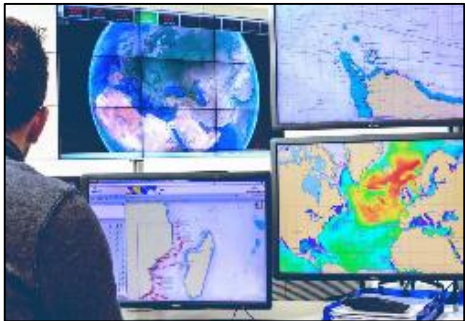
Preliminary bio-economic studies criticized the new regulation and made its application in the Mediterranean doubtful. However, few ecological studies have been conducted until now (Moutopoulos *et al.*, 2018).

Ecosystem approaches have the ability to account for a broader ecological context and interspecific interactions and can be used as tool for strategic management advices.

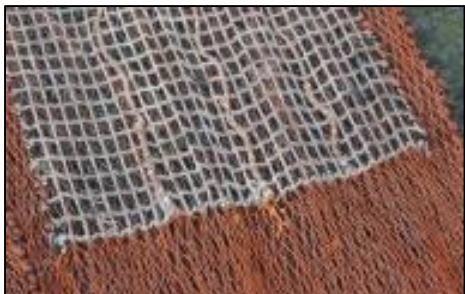




- Quantify the possible ecological and socio-economic effects of the landing obligation regulation (**LO**) in the North East Adriatic Sea area (**NEAS**), as an example of Mediterranean mixed coastal fisheries.



- Use an operational model for fisheries management in the study area.

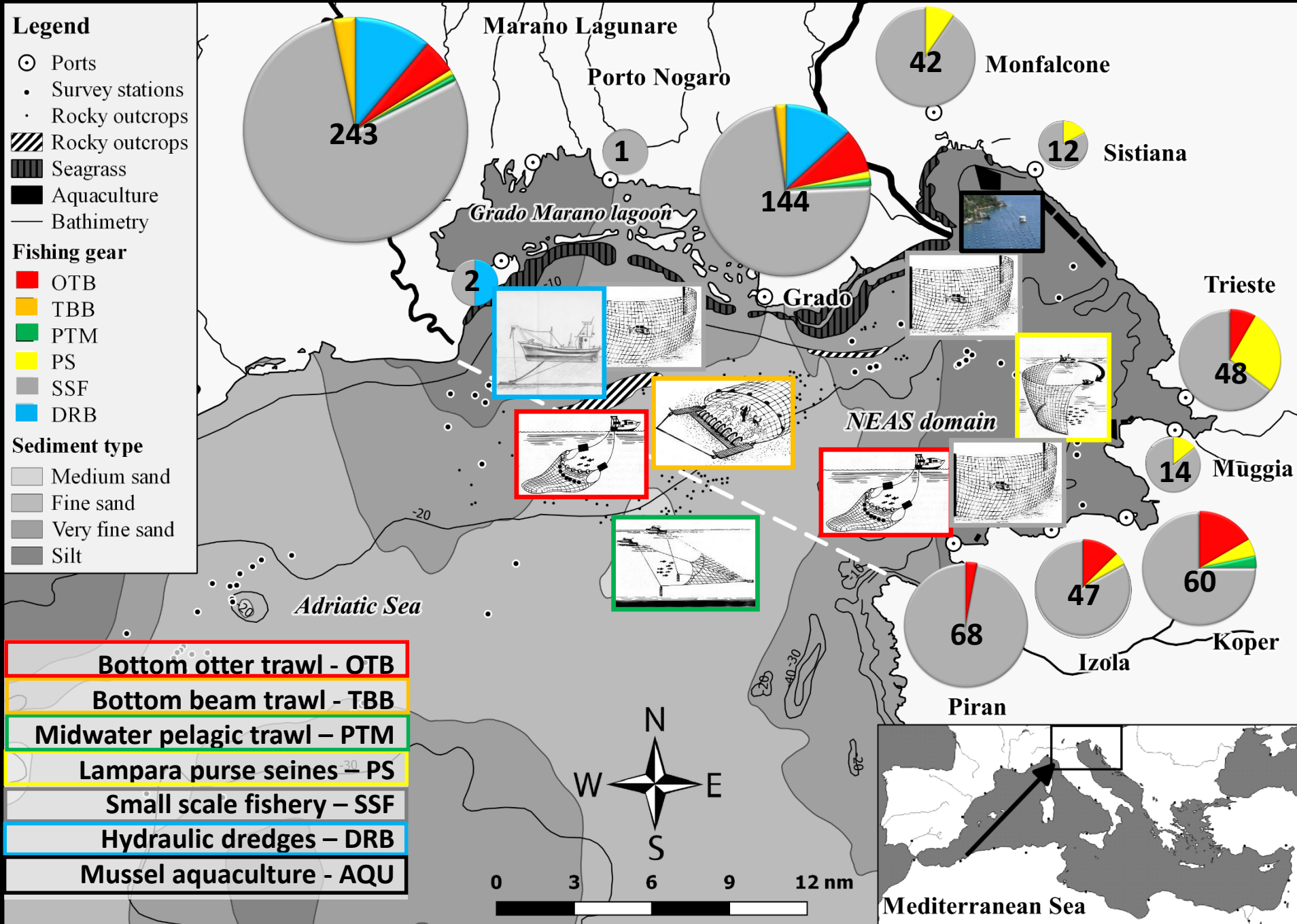


- Analyse alternative adaptation scenarios and measures that might reduce the unwanted catches.



3/11 The North-East Adriatic Sea area (NEAS)

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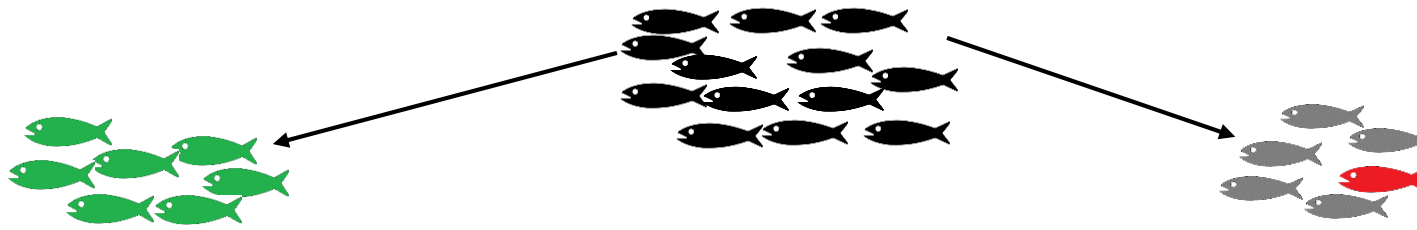
The area:

- includes Slovenia & one Italy's region,
- covers 1000 km²,
- 681 fishing vessels registered (in 2005)

4/11 The discard in the North-East Adriatic Sea (NEAS)

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Total catches

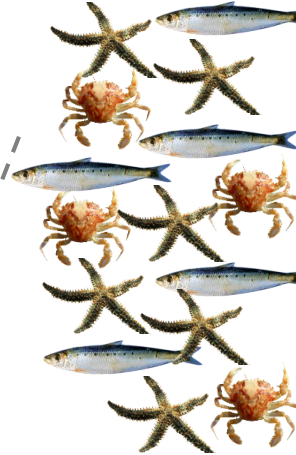
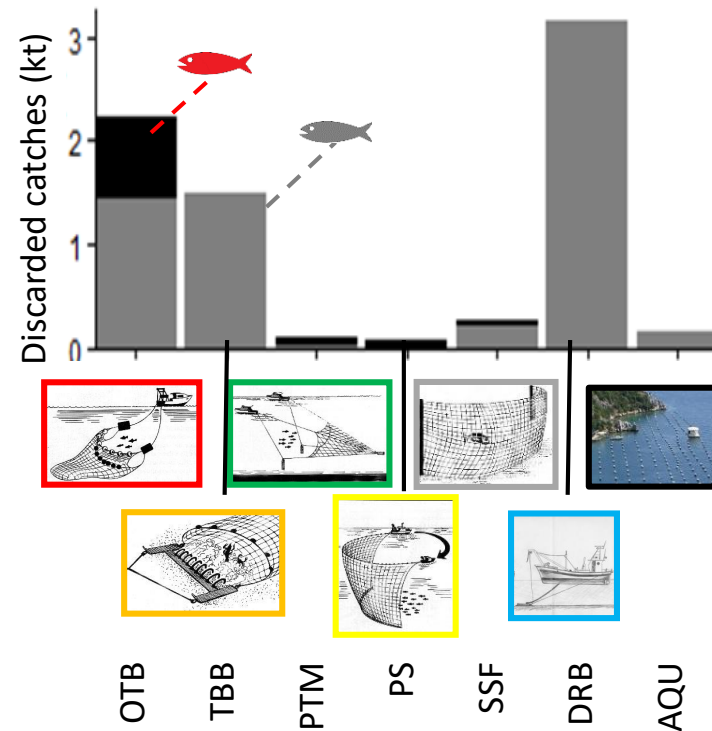
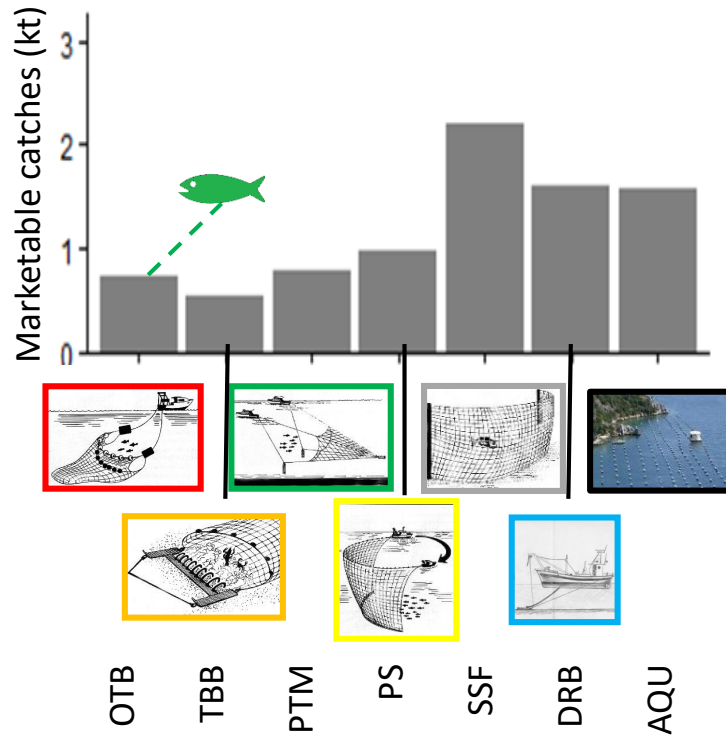
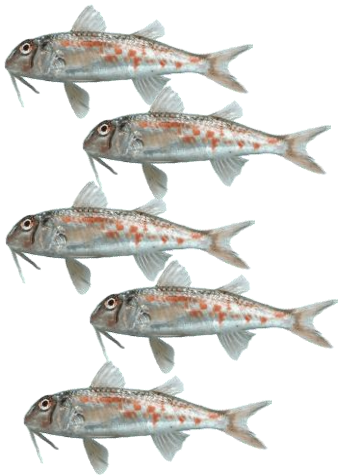


 **Commercial landings: 7320 t (2005)**

Discarded catches : 7080 t (2005)

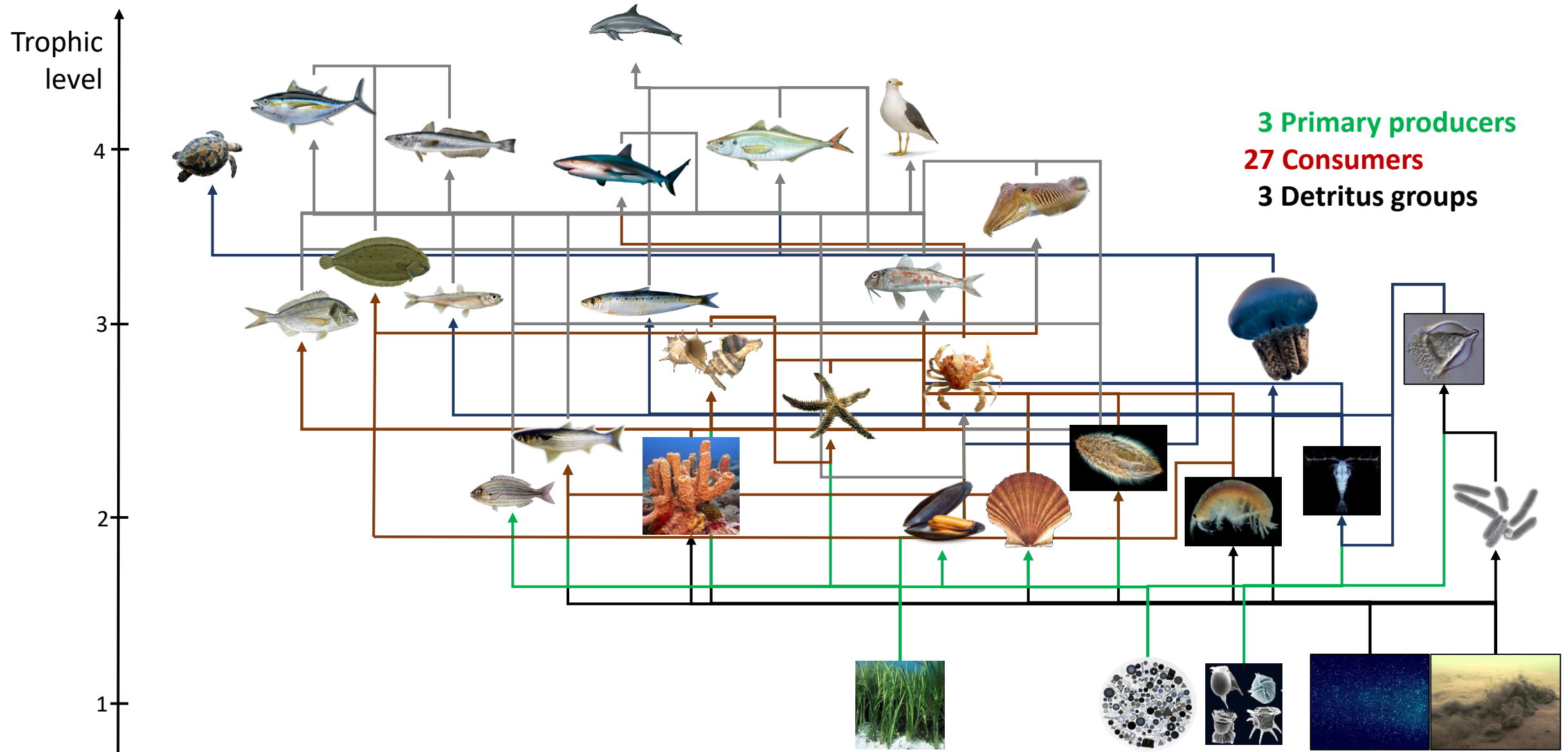
 **Not subject to landing obligation : 6160 t (87%)**

 **Subject to landing obligation : 920 t (13%)**

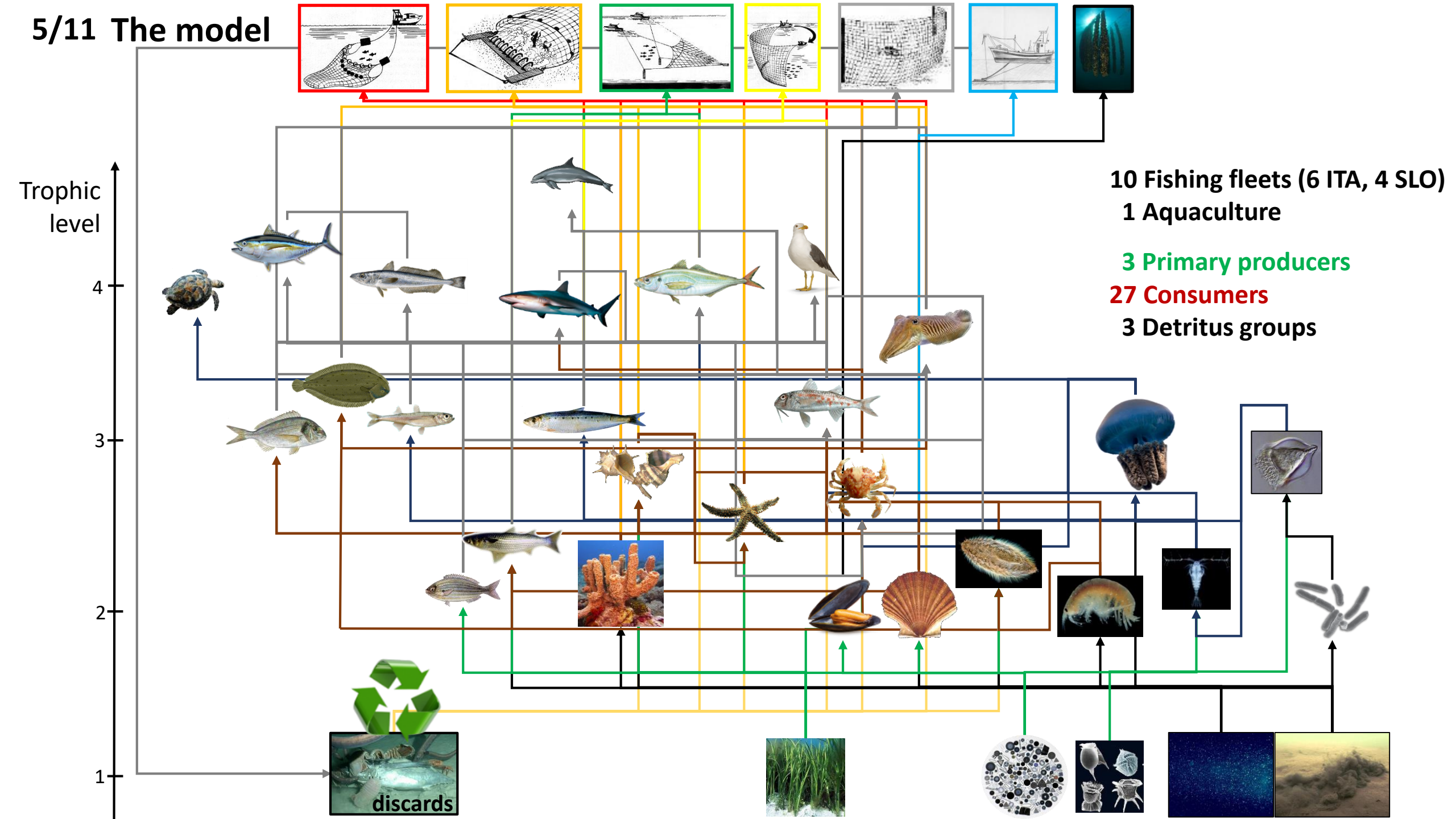


5/11 The model

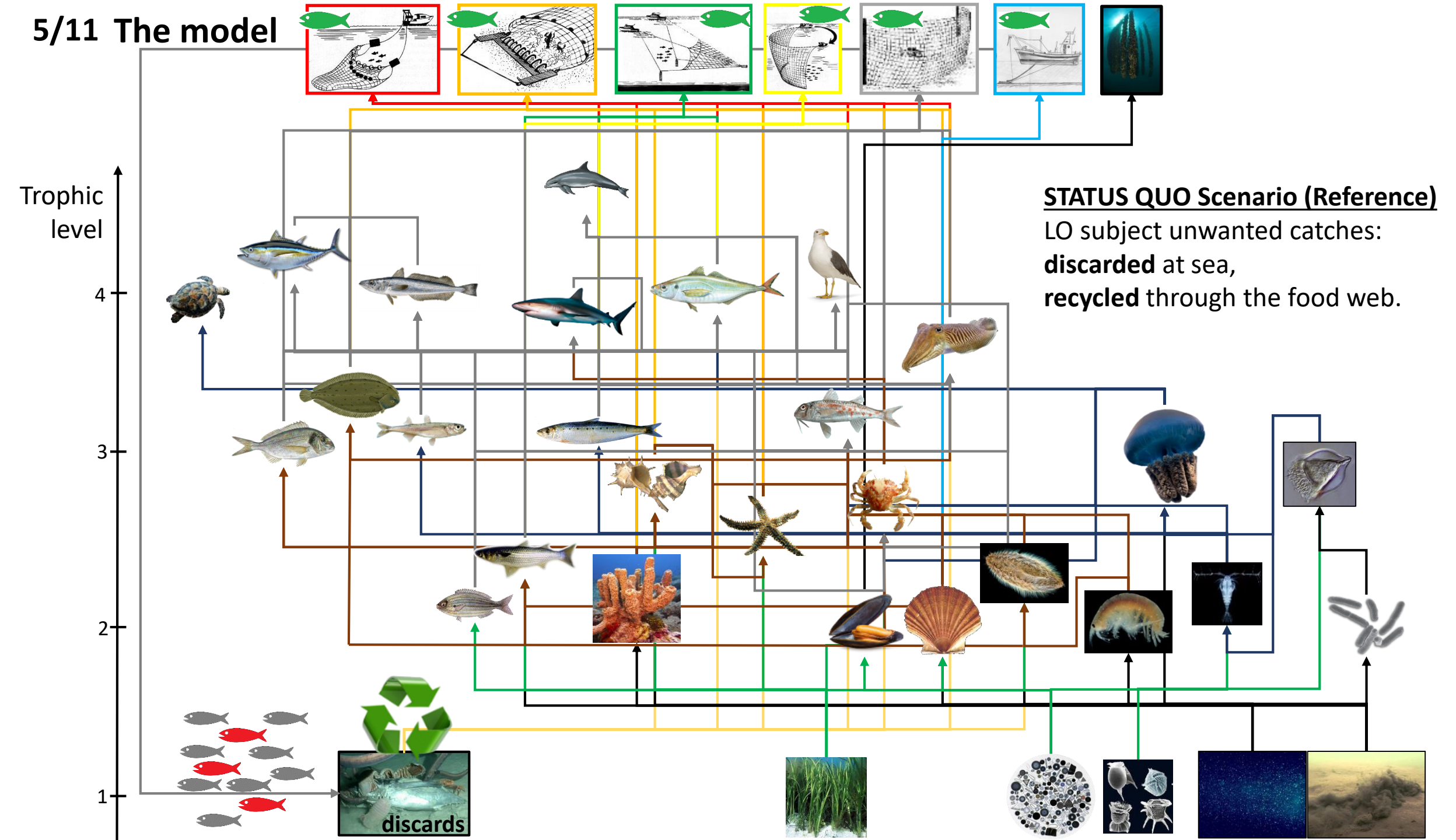
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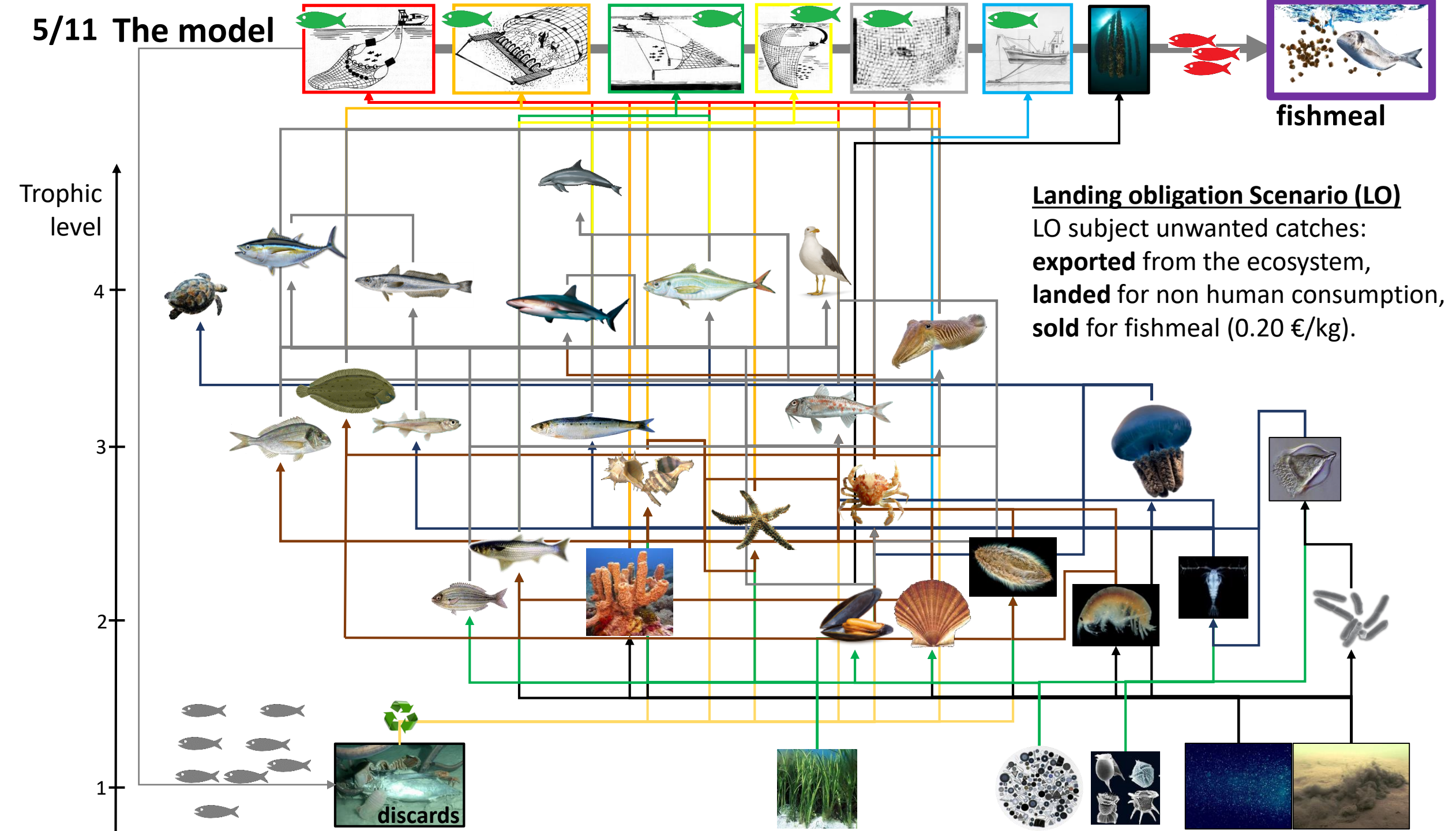
5/11 The model



5/11 The model

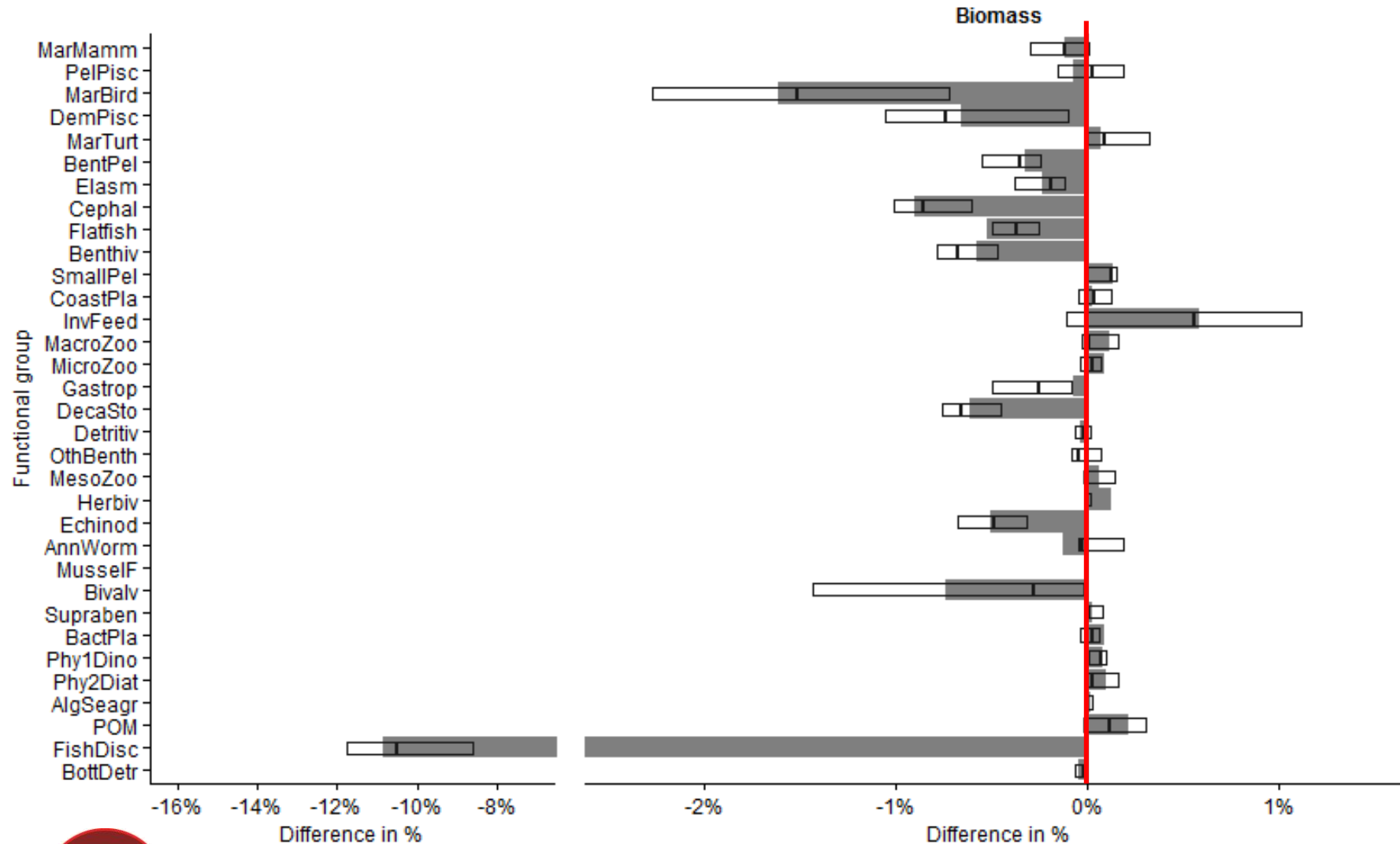


5/11 The model



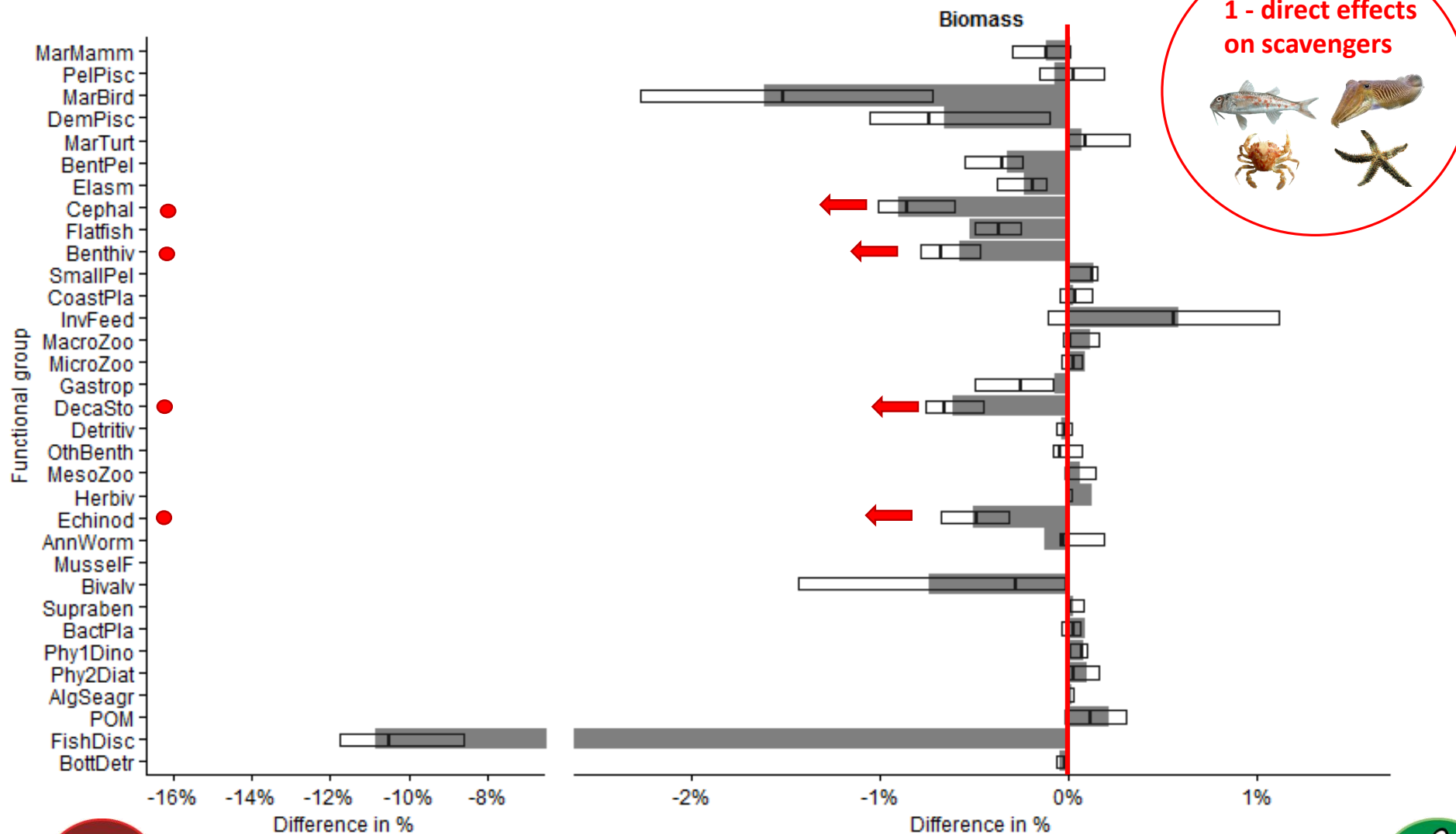
6/11 Results 1: effects on the community

Differences = Landing obligation scenario – Status quo scenario



6/11 Results 1: effects on the community

Differences = Landing obligation scenario – Status quo scenario

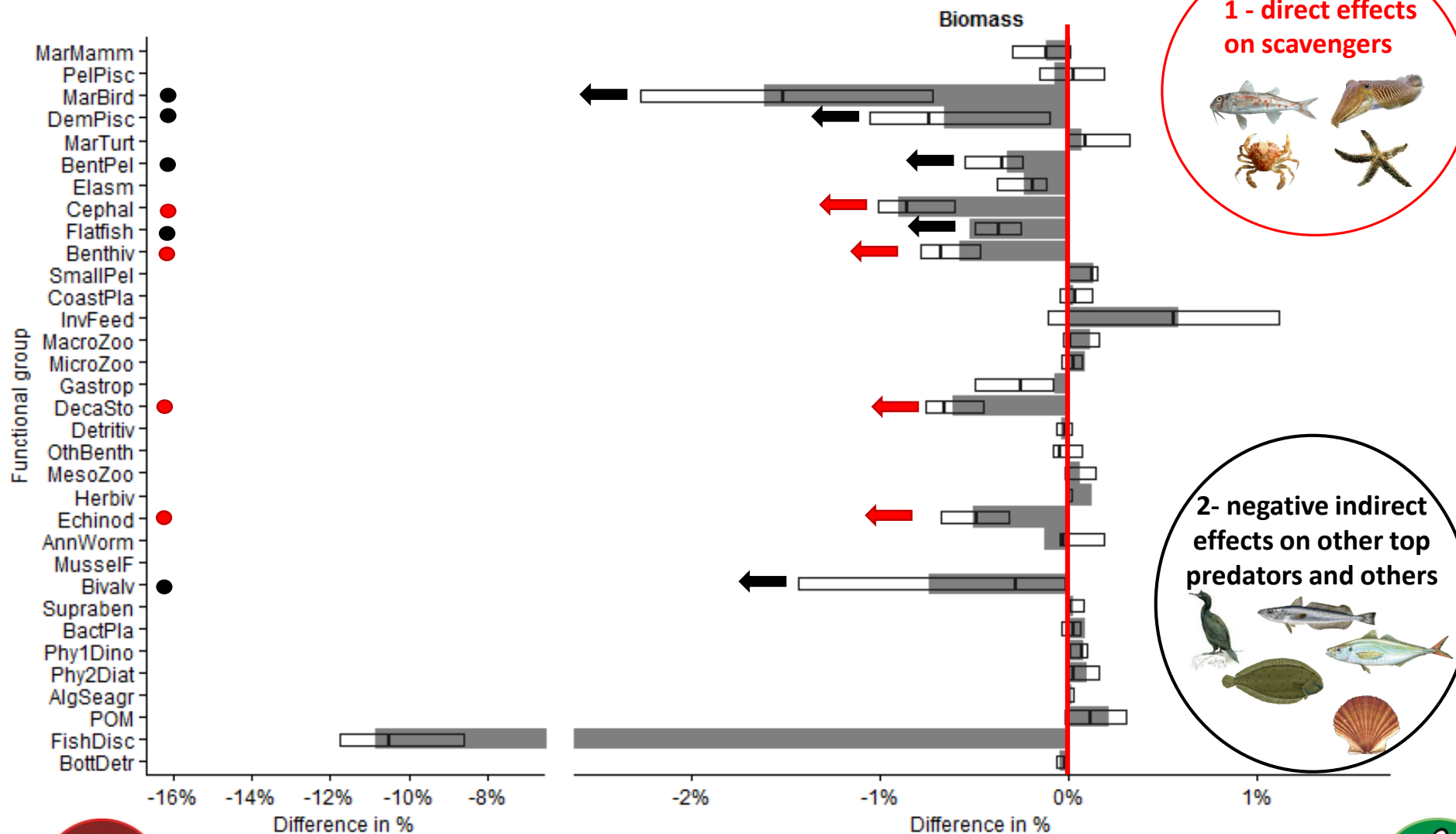


Reduced resources for scavengers (e.g. decapods)



6/11 Results 1: effects on the community

Differences = Landing obligation scenario – Status quo scenario



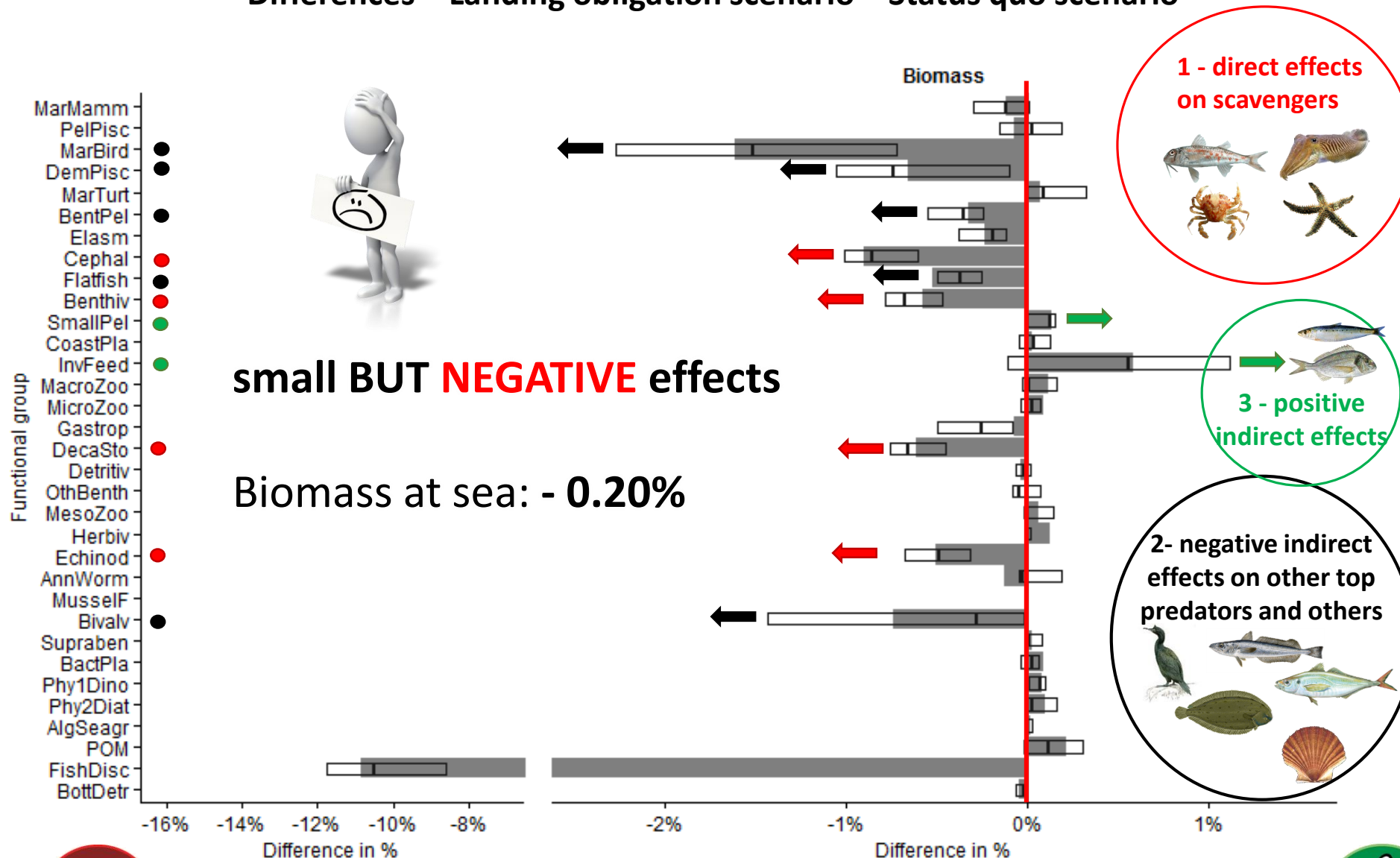
Reduced resources for scavengers (e.g. decapods)

Cascading effects up to their predators (e.g. cephalopods)



6/11 Results 1: effects on the community

Differences = Landing obligation scenario – Status quo scenario



Reduced resources for scavengers (e.g. decapods)

Less predators = less predation for some other preys (e.g. invertebrate feeder fish)

Cascading effects up to their predators (e.g. cephalopods)



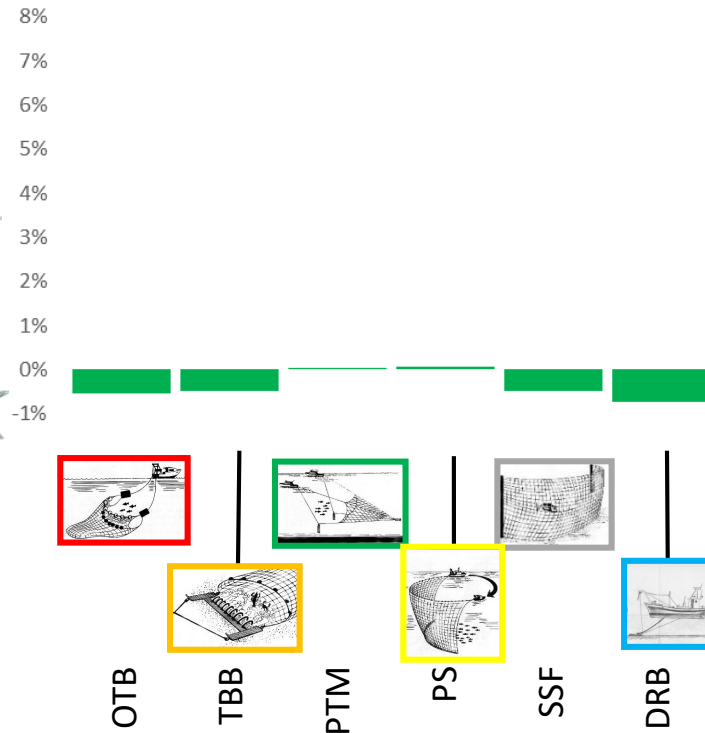
7/11 Results 2: effects on the fishery landings

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Differences = Landing obligation scenario – Status quo scenario

Marketable landings

-0.4%



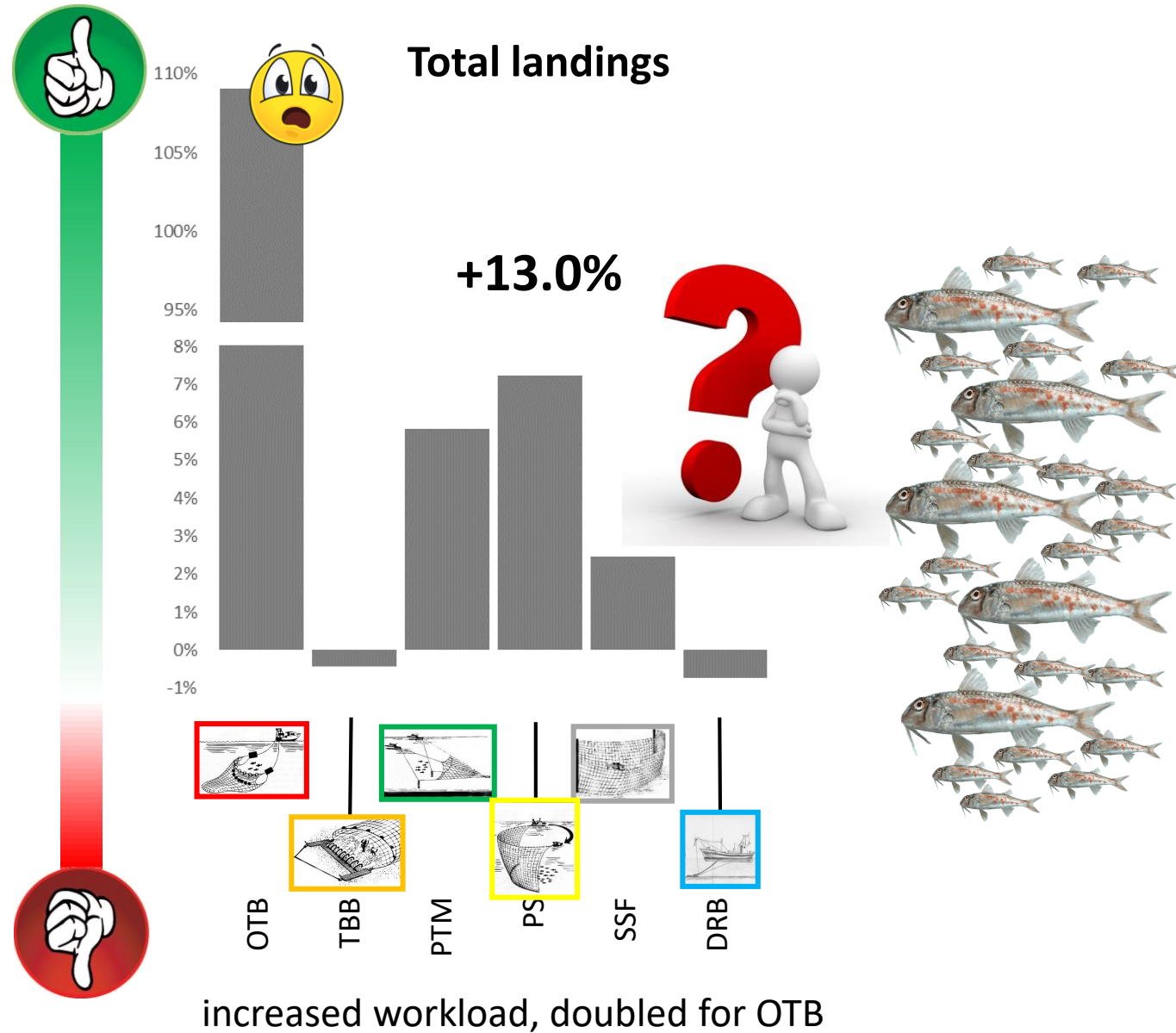
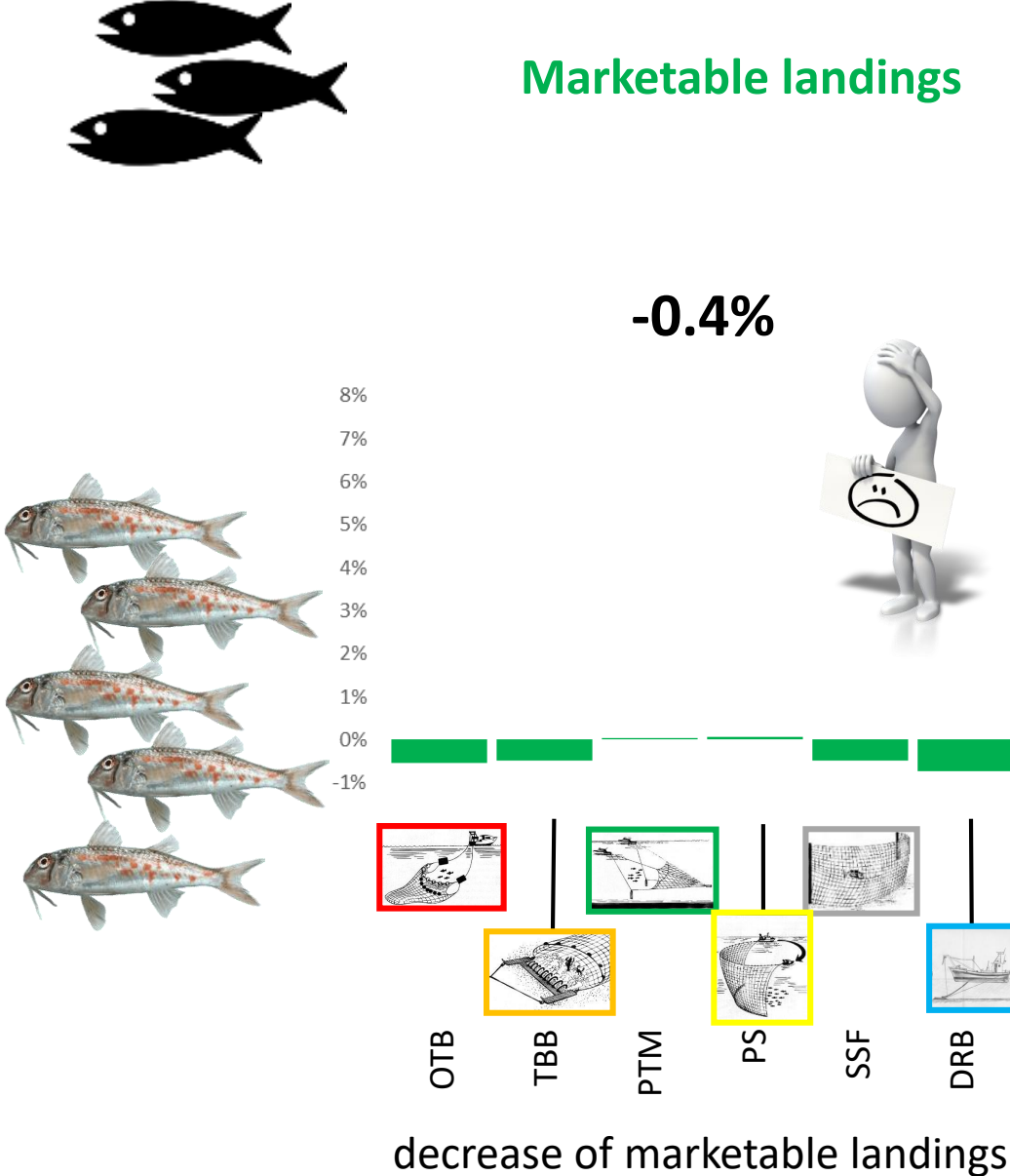
decrease of marketable landings



7/11 Results 2: effects on the fishery landings

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Differences = Landing obligation scenario – Status quo scenario



8/11 Results 3: effects on the fishery revenues

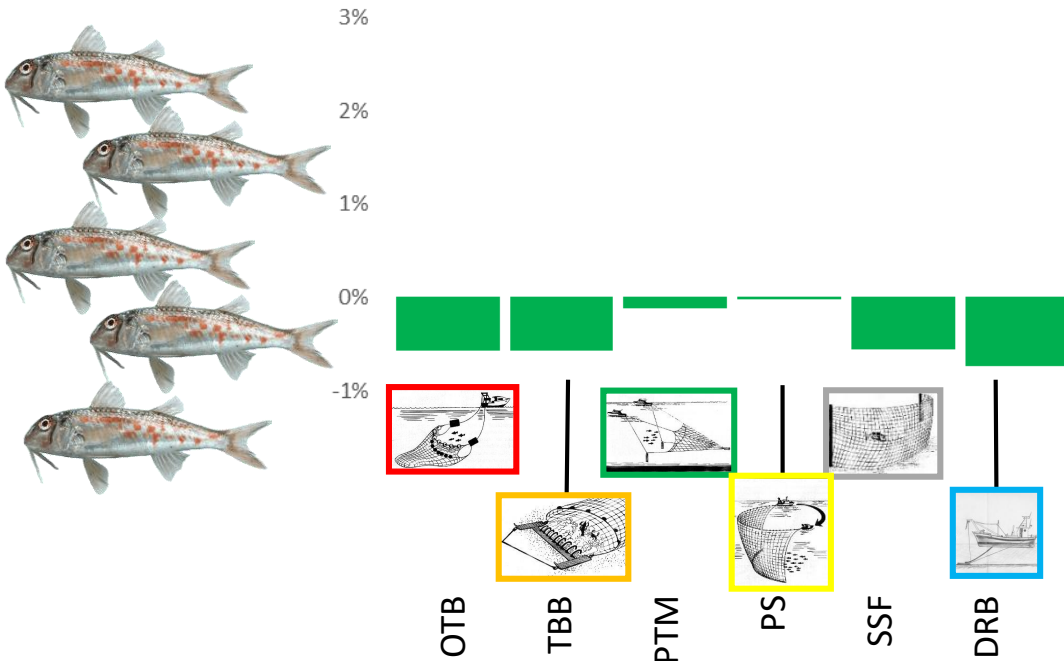
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Differences = Landing obligation scenario – Status quo scenario



Revenues from marketable landings

-0.5%



decrease of marketable revenues



8/11 Results 3: effects on the fishery revenues

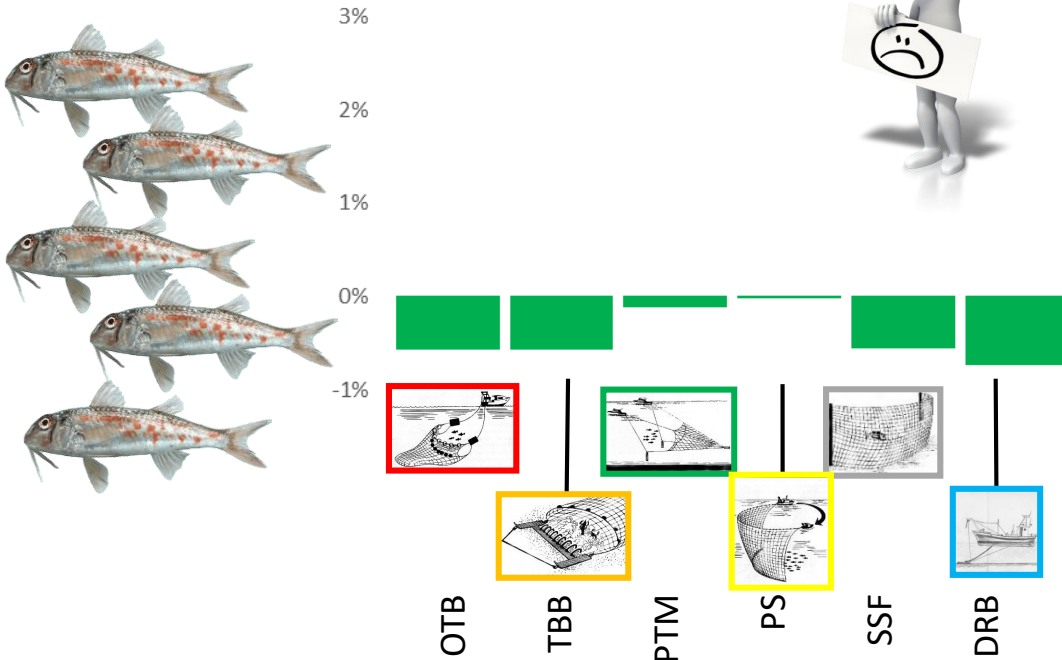
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Differences = Landing obligation scenario – Status quo scenario



Revenues from marketable landings

-0.5%



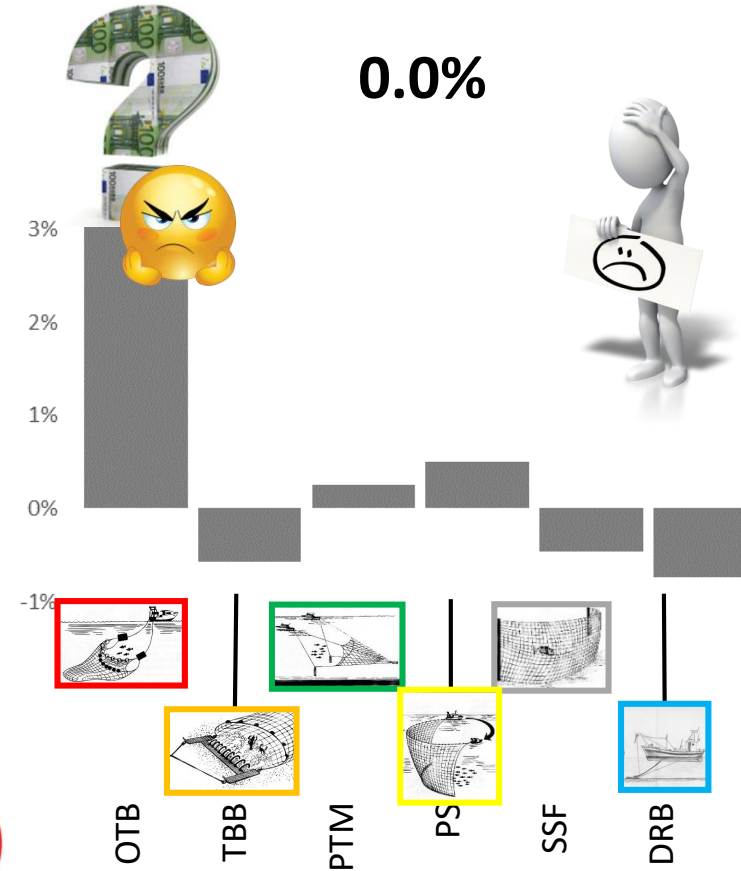
decrease of marketable revenues



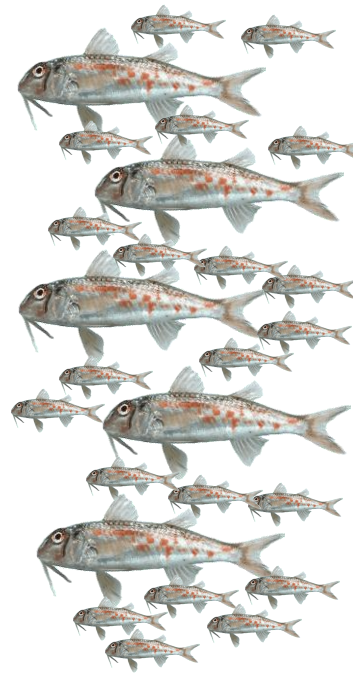
Total revenues

- hypothesis:
discard sold for fishmeal 0.20 €/kg

0.0%

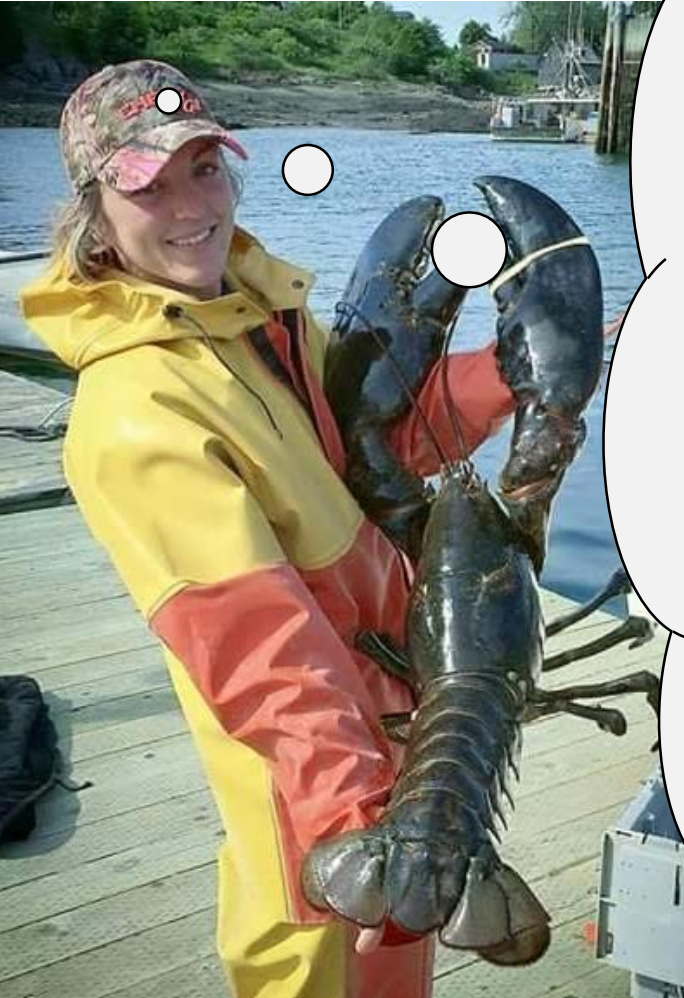


only OTB total revenues increase



9/11 What is the desired outcome? The happy fishermen's perspective

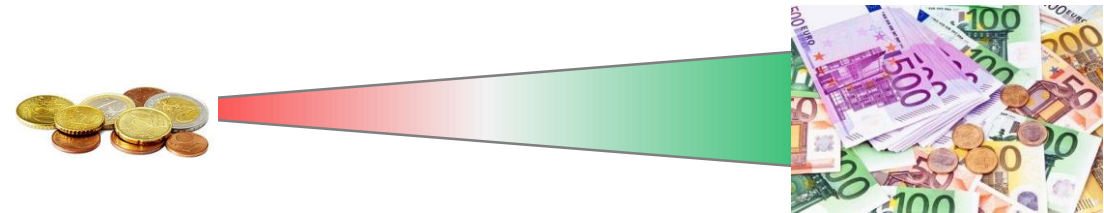
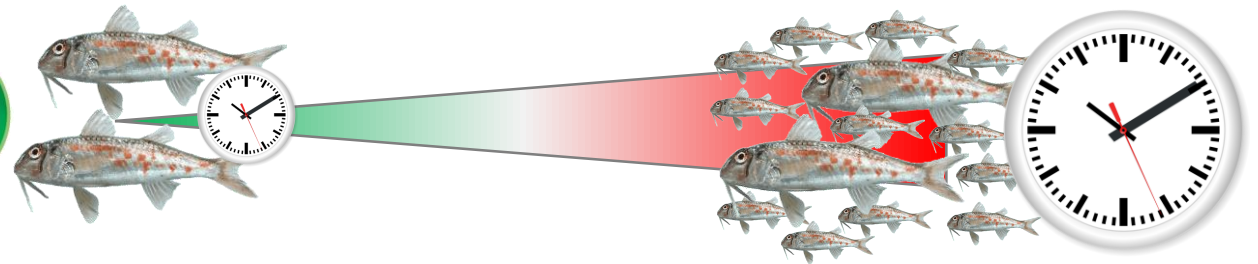
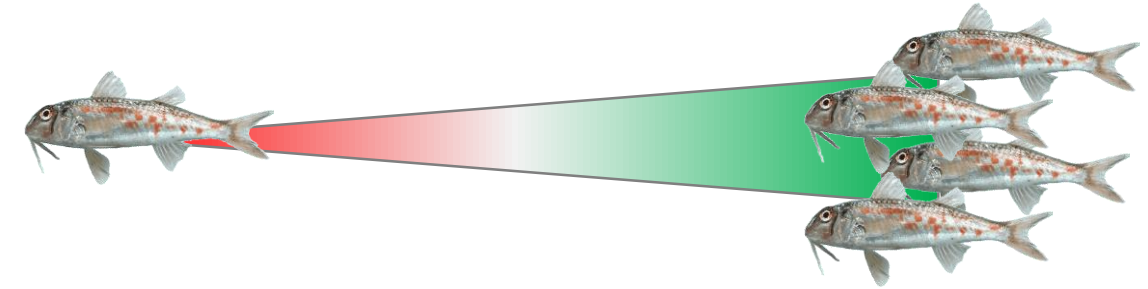
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MORE
resources

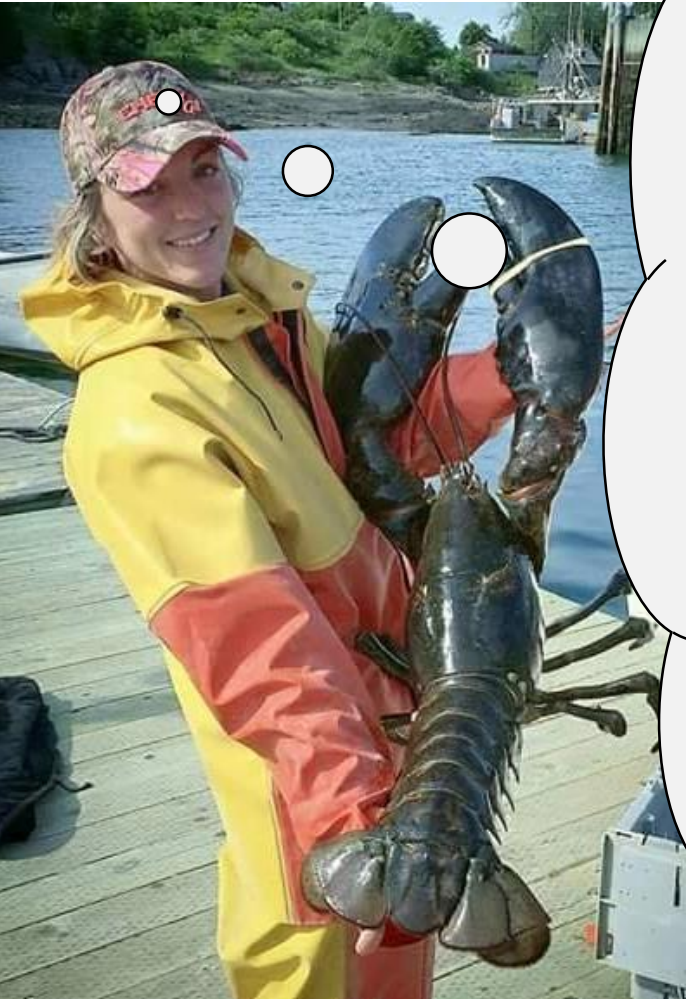
LESS
workload
LESS
processing

MORE
revenues



9/11 What is the desired outcome? The happy fishermen's perspective

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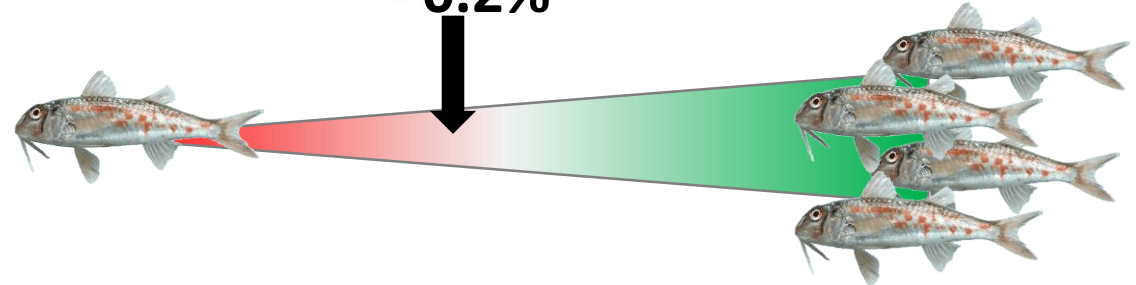
MORE
resources

LESS
workload
LESS
processing

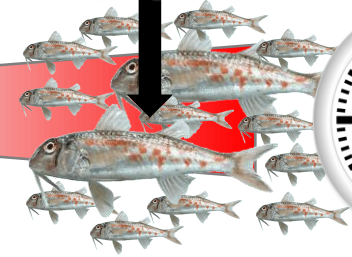
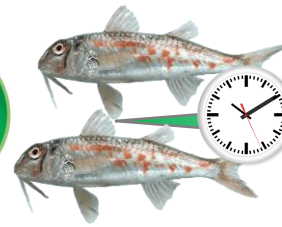
MORE
revenues

landing obligation in a nutshell

- 0.2%



+13.0%



-0.5%

0.0%

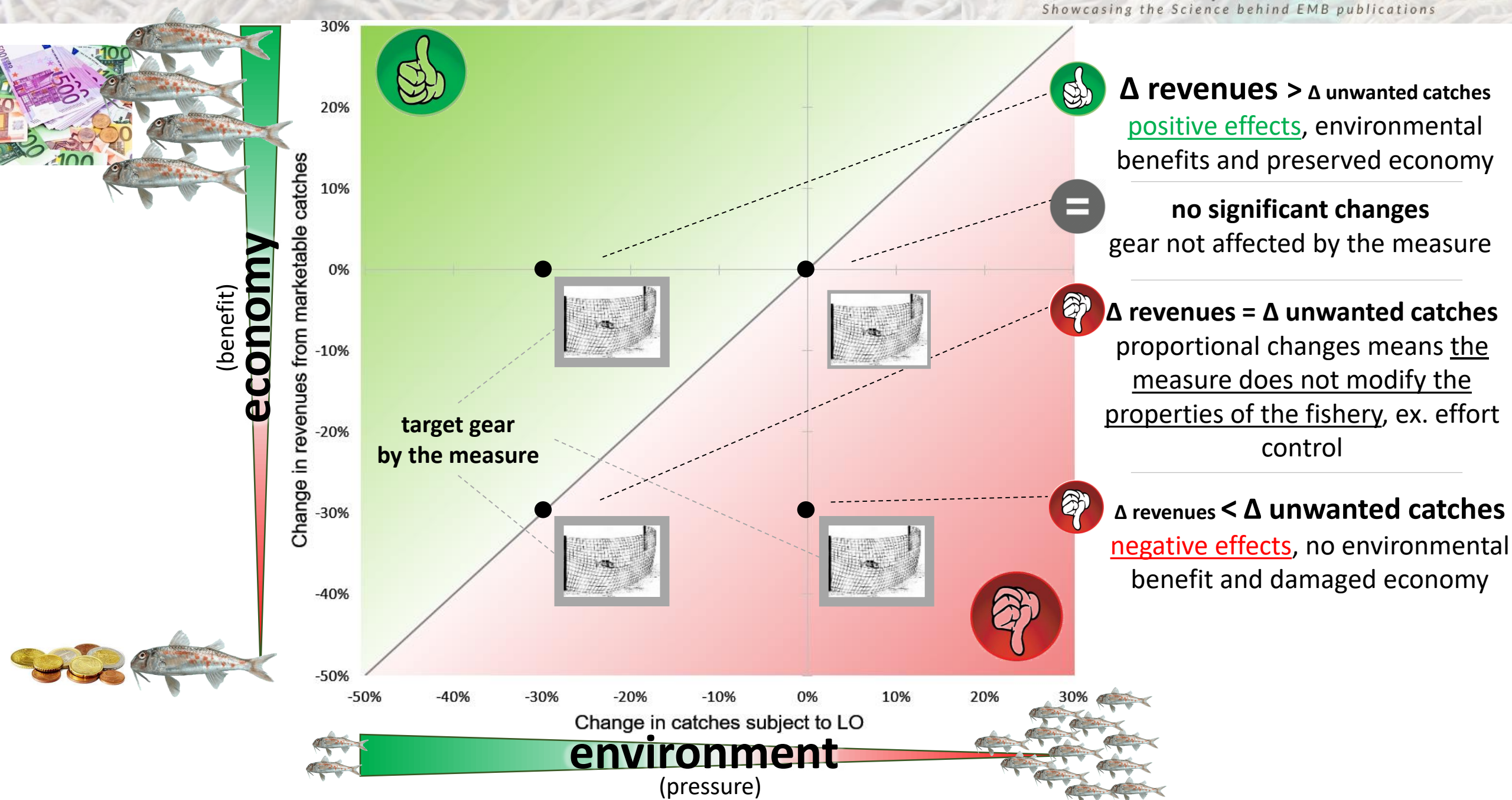


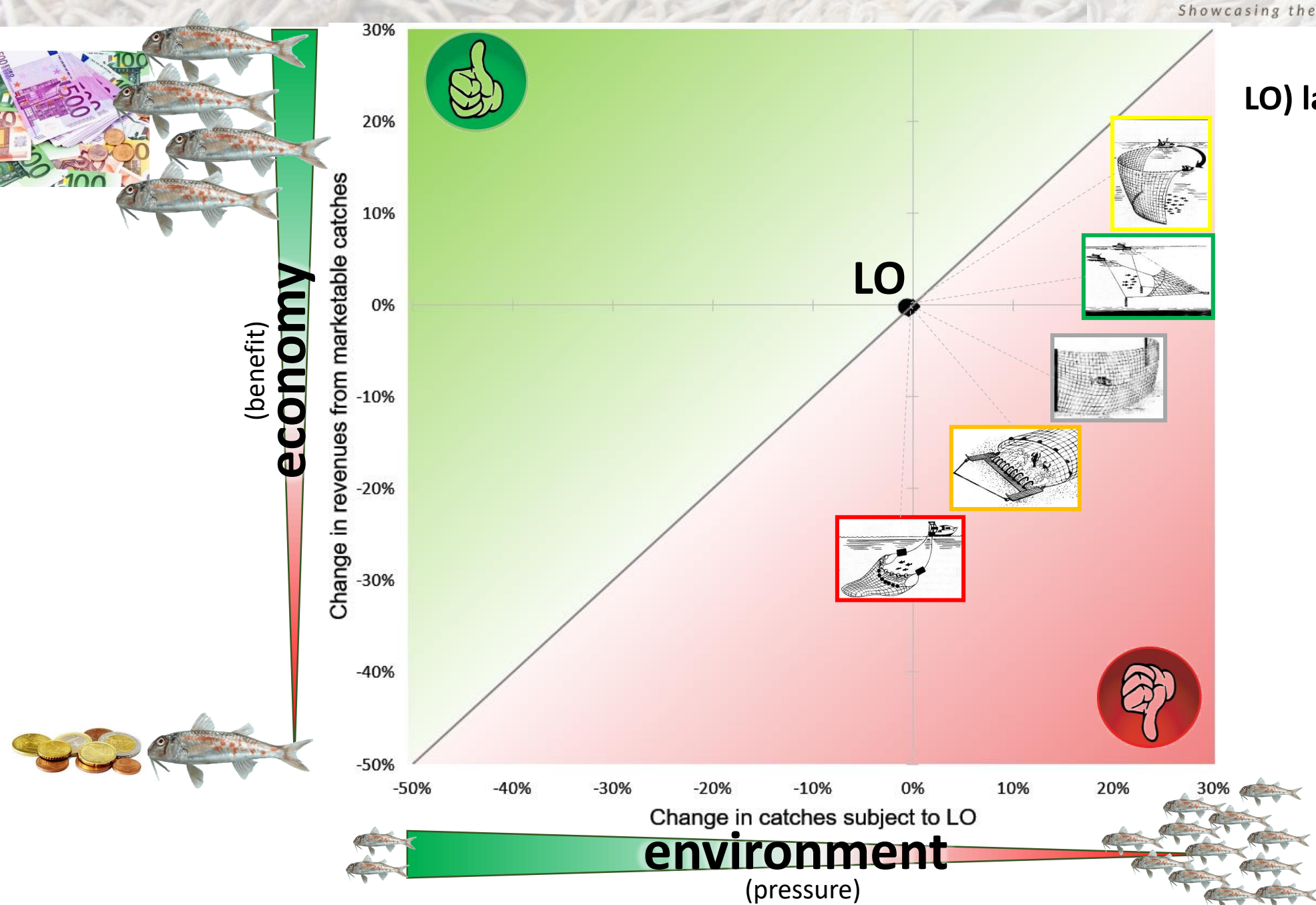
only marketable



marketable + fishmeal

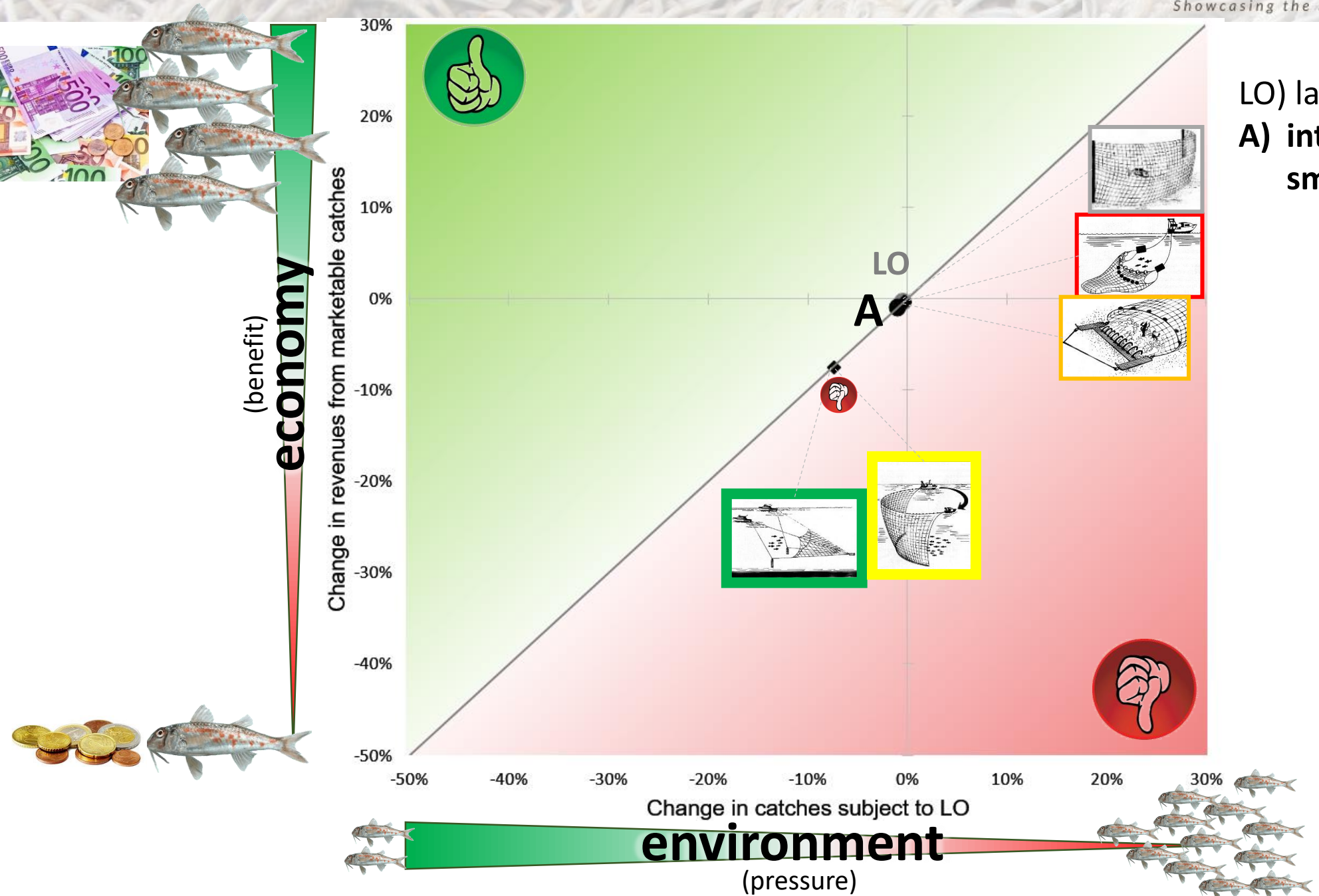
10/11 Alternative scenarios: How to read the results?





LO) landing obligation

Measures	Fishing effort		
	Fishing gear		50 mm
	Quota		
Indicators	Resources		
	Employment		
	Revenues		

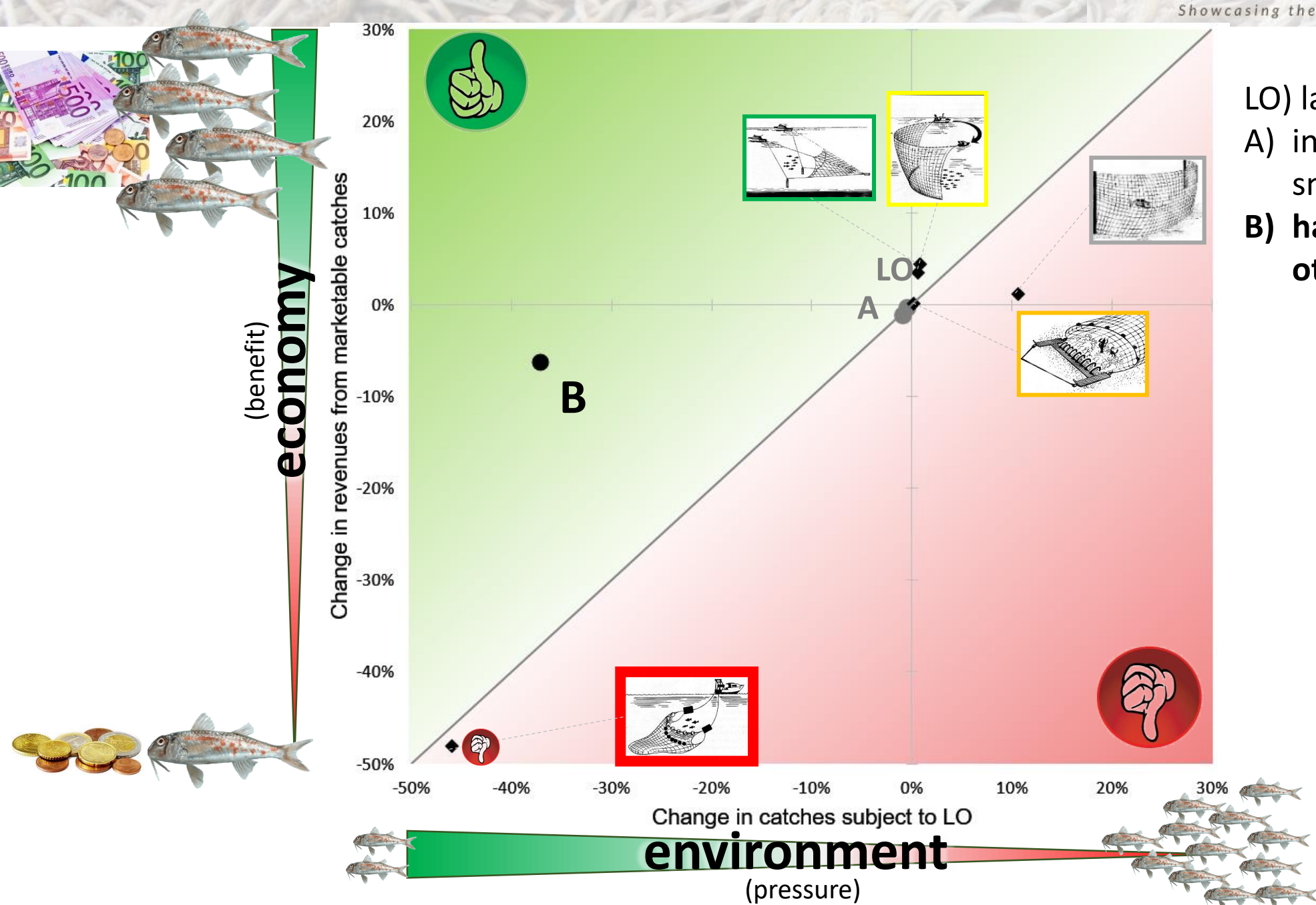


LO) landing obligation
A) introduction of quotas for small pelagic fish

Measures	
Fishing effort	
Fishing gear	
Quota	

Indicators	
Resources	
Employment	
Revenues	

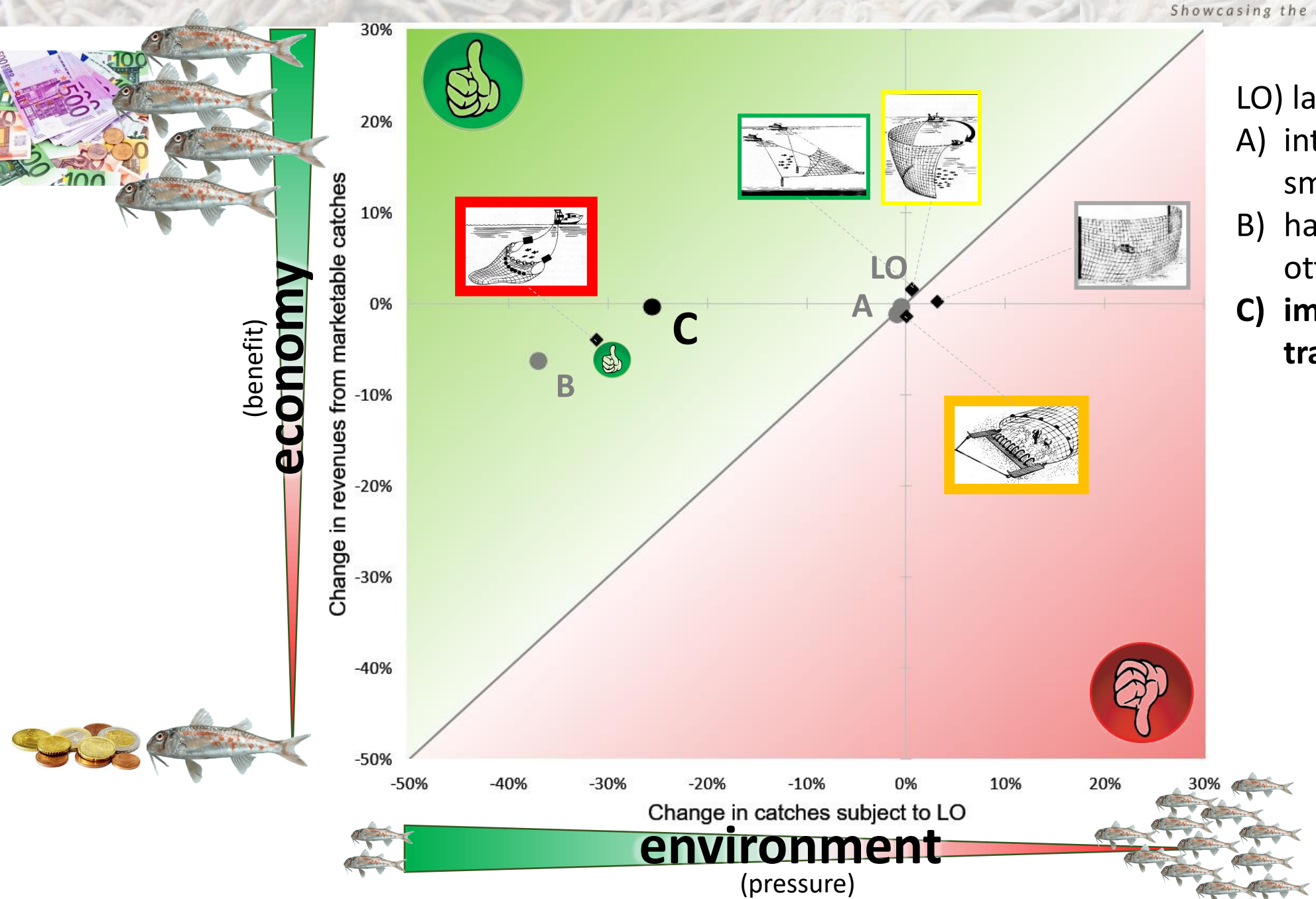
10/11 Alternative scenarios: B – LO w OTB reduction



- LO) landing obligation
- A) introduction of quotas for small pelagic fish
- B) halving the fishing effort of otter trawl fisheries

Measures	Indicators
Fishing effort	Resources
Fishing gear	Employment
Quota	Revenues

10/11 Alternative scenarios: C – LO w improved OTB TBB gear selectivity

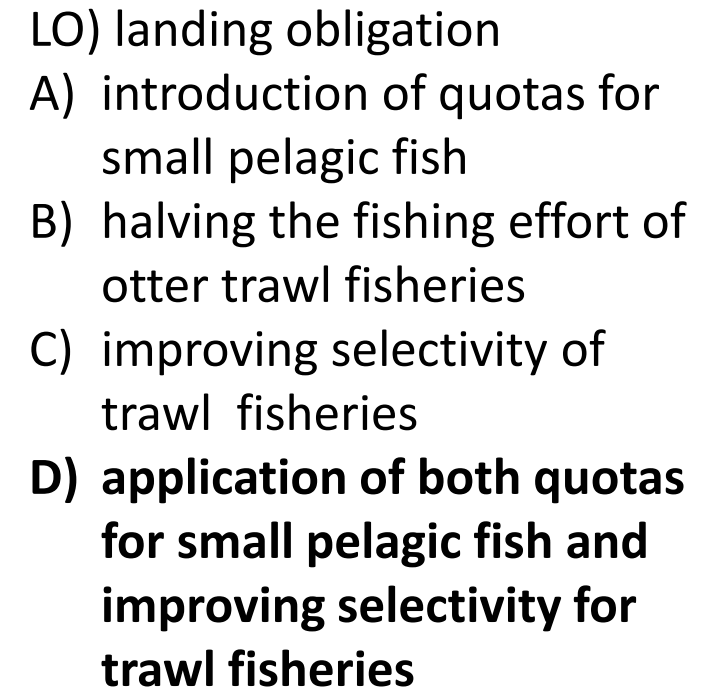


- LO) landing obligation
- A) introduction of quotas for small pelagic fish
- B) halving the fishing effort of otter trawl fisheries
- C) improving selectivity of trawl fisheries

Measures	
Fishing effort	
Fishing gear	
Quota	

Indicators	
Resources	
Employment	
Revenues	





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Measures

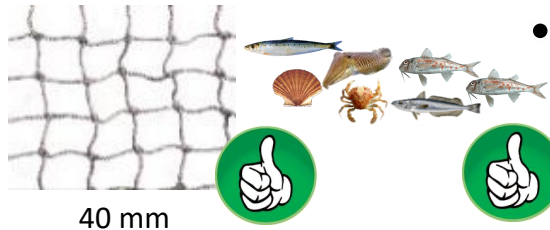
- Fishing effort
- Fishing gear
- Quota



Indicators	Resources	Employment	Revenues
			
			



- Identified both direct and indirect effects of the landing obligation.
- Top predators suffered the most **negative** impacts due to the regulation.
- Effects of the landing obligation:
 - MORE** workload for fishermen,
 - LESS** ecosystem biomasses at sea,
 - LESS** fisheries revenues from marketable landings.
- Landed unwanted catch sold for fishmeal production **WILL NOT COMPENSATE** the economic losses.



- The combination of improving the fishing gear selectivity and quota result the best alternative, but none of the adaptation scenarios compensated the adverse effects of the landing obligation.

The landing obligation has **negative** ecological and economic effects in systems where fisheries are not regulated by quota, such as the Mediterranean Sea.



More details:

ICES Journal of Marine Science



ICES Journal of Marine Science (2018), doi:10.1093/icesjms/fsy069

Ecological and economic effects of the landing obligation evaluated using a quantitative ecosystem approach: a Mediterranean case study

Igor Celić^{1,2}, Simone Libralato^{1*}, Giuseppe Scarcella³, Saša Raicevich^{3,4}, Bojan Marčeta⁵, and
Cosimo Solidoro¹

Acknowledgments:

Enrico Arneri (FAO Adriamed Project)
Iole Leonori (CNR-ISMAR)
Alessandro Luchetti (CNR-ISMAR)
Antonello Sala (CNR-ISMAR)
Elisabetta Betulla Morello (GFCM-FAO)

Supported by:



FIMAPS project
MANTIS project
EU Copernicus Marine Service



Thank you for the attention !!! Questions ???



Igor Celić - icelic@inogs.it
Simone Libralato - slibralato@inogs.it



ISPRA

