Exploring the ecological consequences of discarding

Marie Savina-Rolland, Sophie Leforestier, Raphael Girardin

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Discarding…

Returning unwanted catch to the sea
- too small
- no value
- no quota
- catch composition rules

Discarding => solve the by-catch issue!

© bowsawblogger

…fishing mortality…

© Brian Skerry *National Geographic*

Discarding causes mortality, due to :
- The catch process
- The time spend on deck
- Increased exposure to predation
- The incapacity to reach a suitable habitat

Uncertainty on survival rates hence on total fishing mortality

…and the Landing Obligation

"Implemented" (2015 – 2019) for all commercial species under TACs, or under minimum sizes in European waters :
- Reduction of wasteful practices to the minimum
- Promoting more selectivity
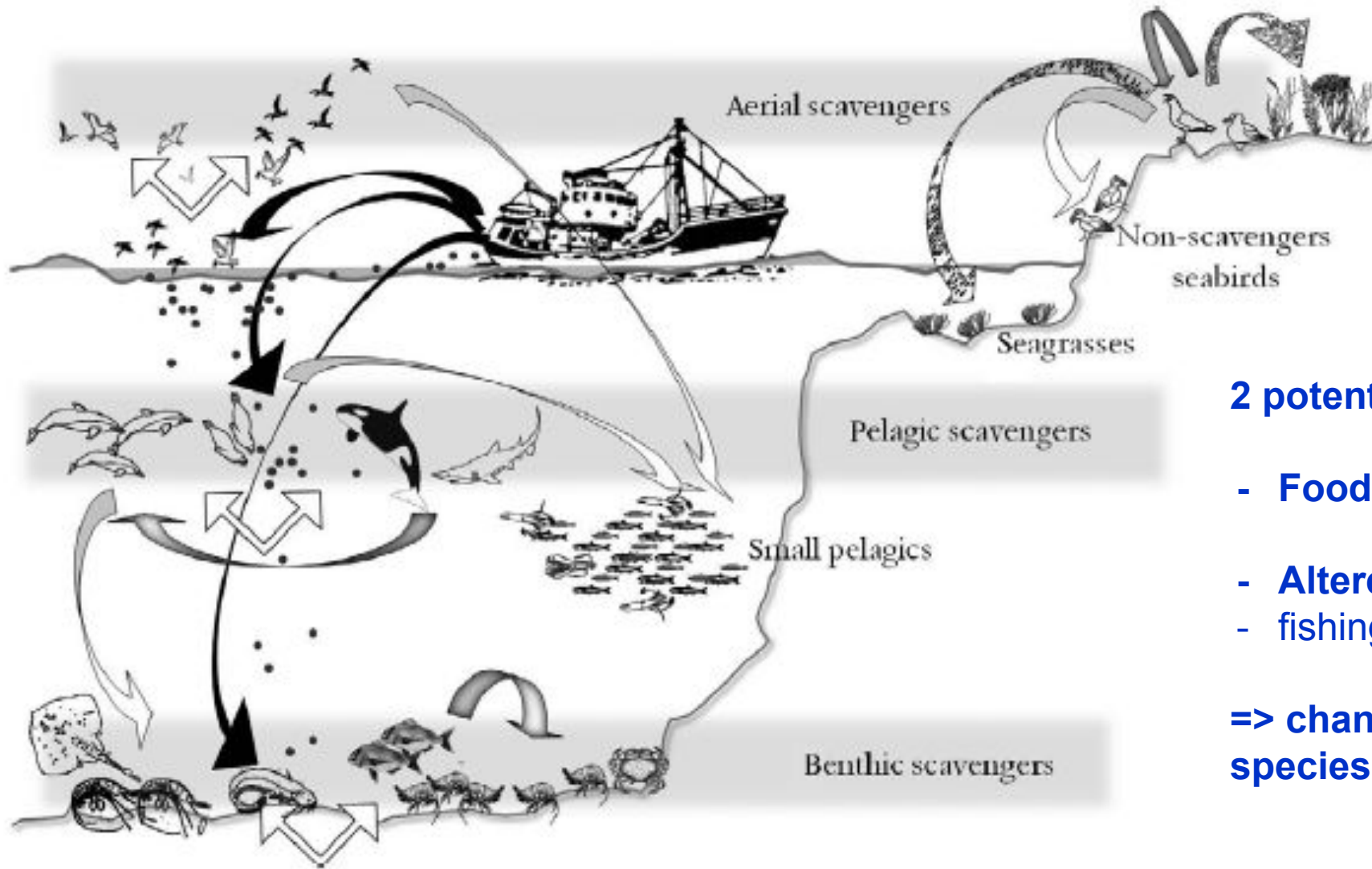- More reliable catch data

Concerns :
Mixed fishery and choked species
Artisanal fleets and the handling of unwanted catch
…
Alteration of food webs?

The fate of discards in marine ecosystems

Aerial scavengers

Non-scavengers seabirds

Seagrasses

Pelagic scavengers

Small pelagics

Benthic scavengers

From Oro et al, 2013 Ecology Letters

2 potential consequences:

- **Food shortage**

- **Altered exploitation** (through new constraints for
- fishing fleets)

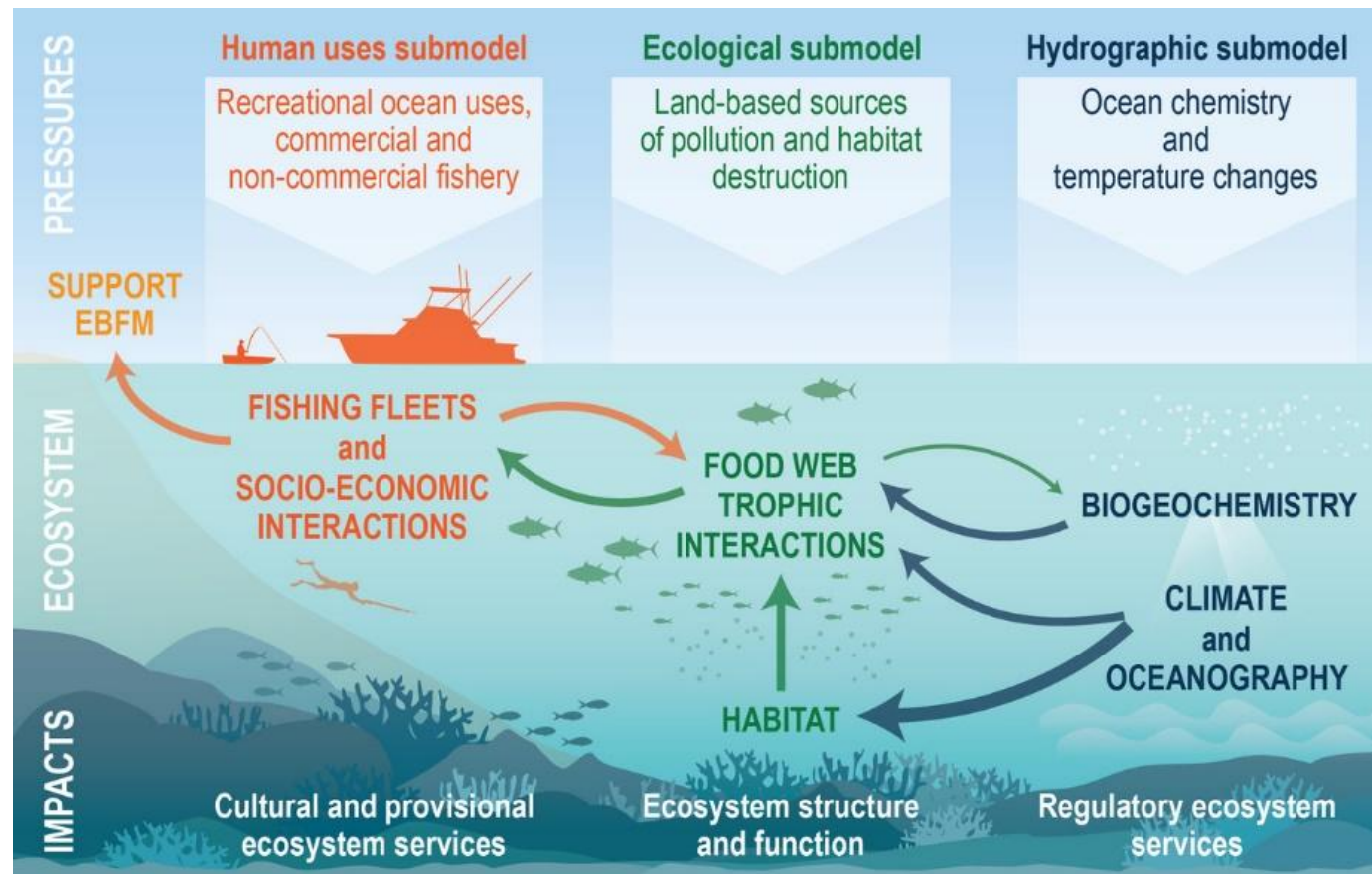**=> changes in the relative abundance of different species or group of species?**
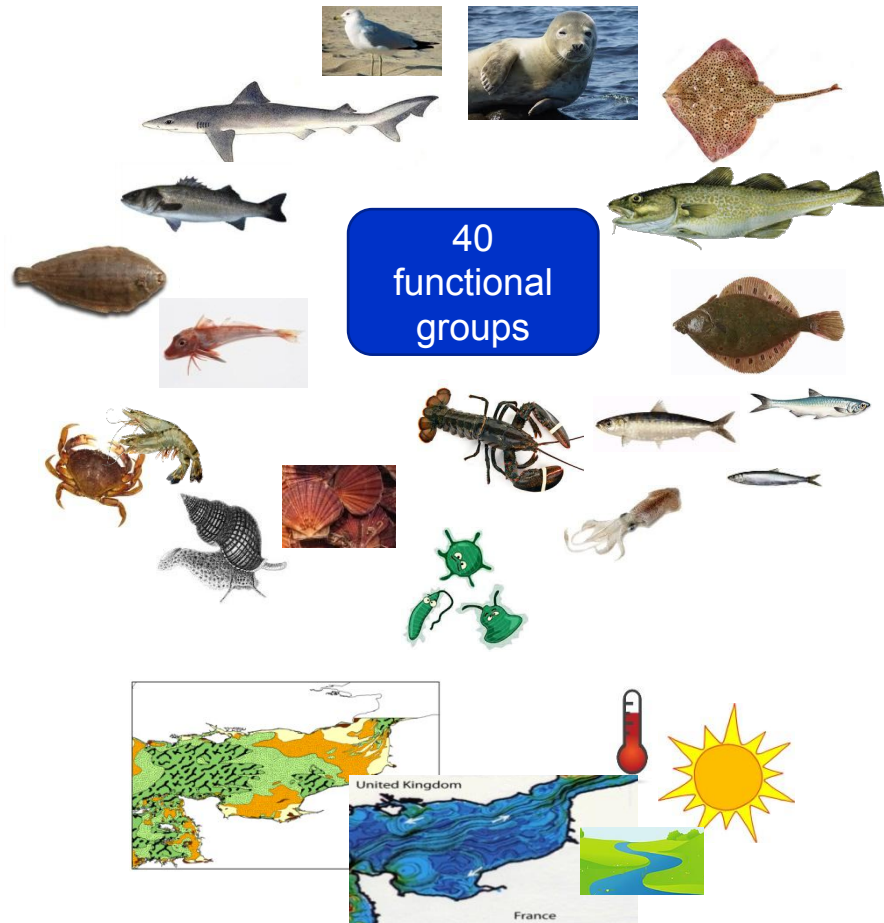
Testing those with a foodweb model

The Atlantis modelling framework

The Atlantis Eastern English Channel model
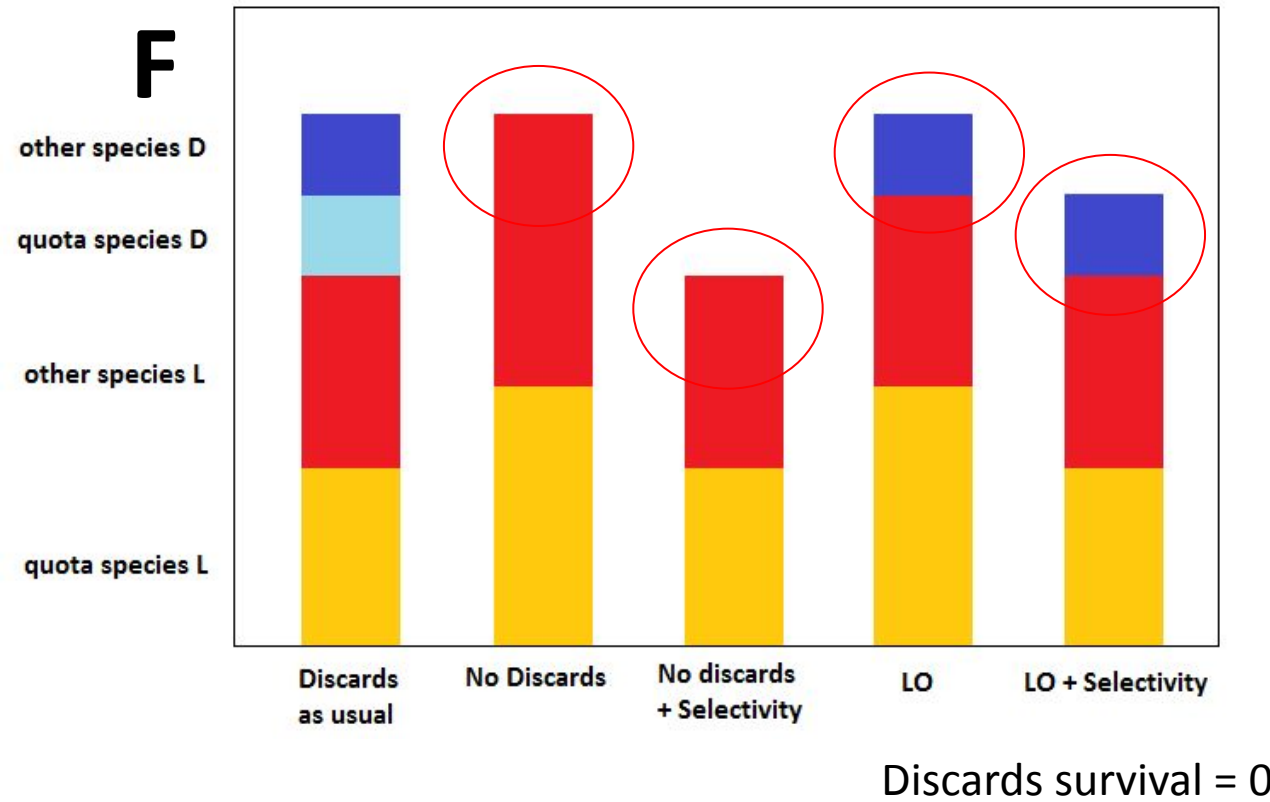

40 functional groups

F

Girardin, 2015

The scenarios

Discards survival = 0
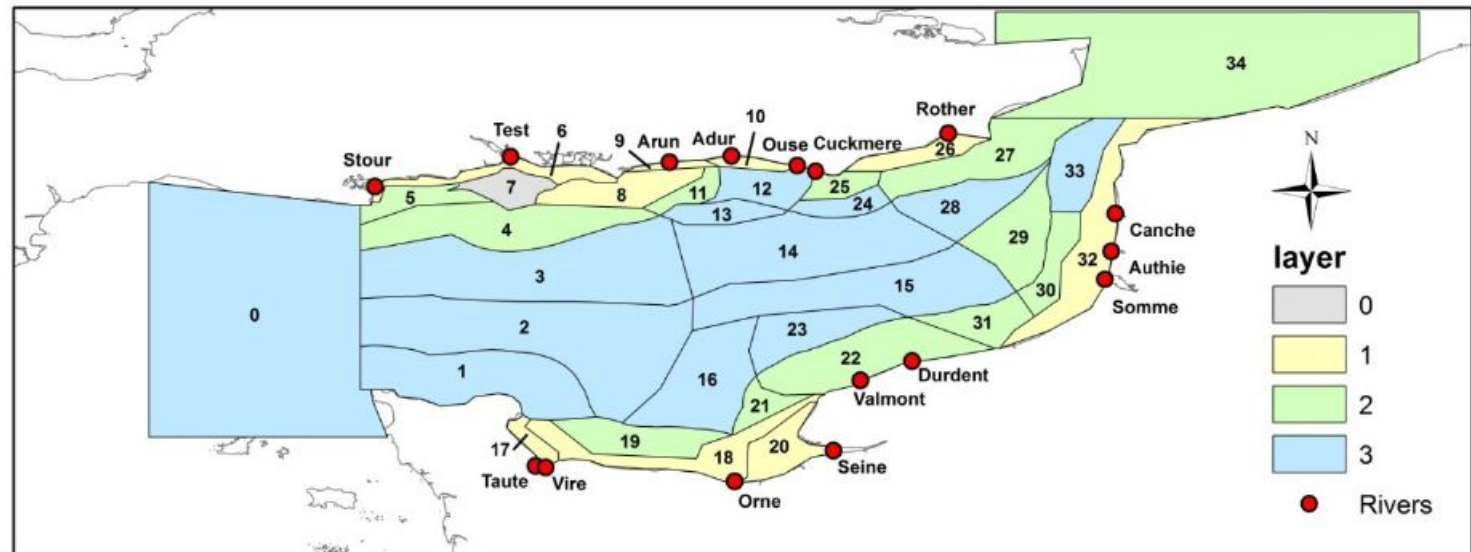
Results

Not discarding vs Discarding
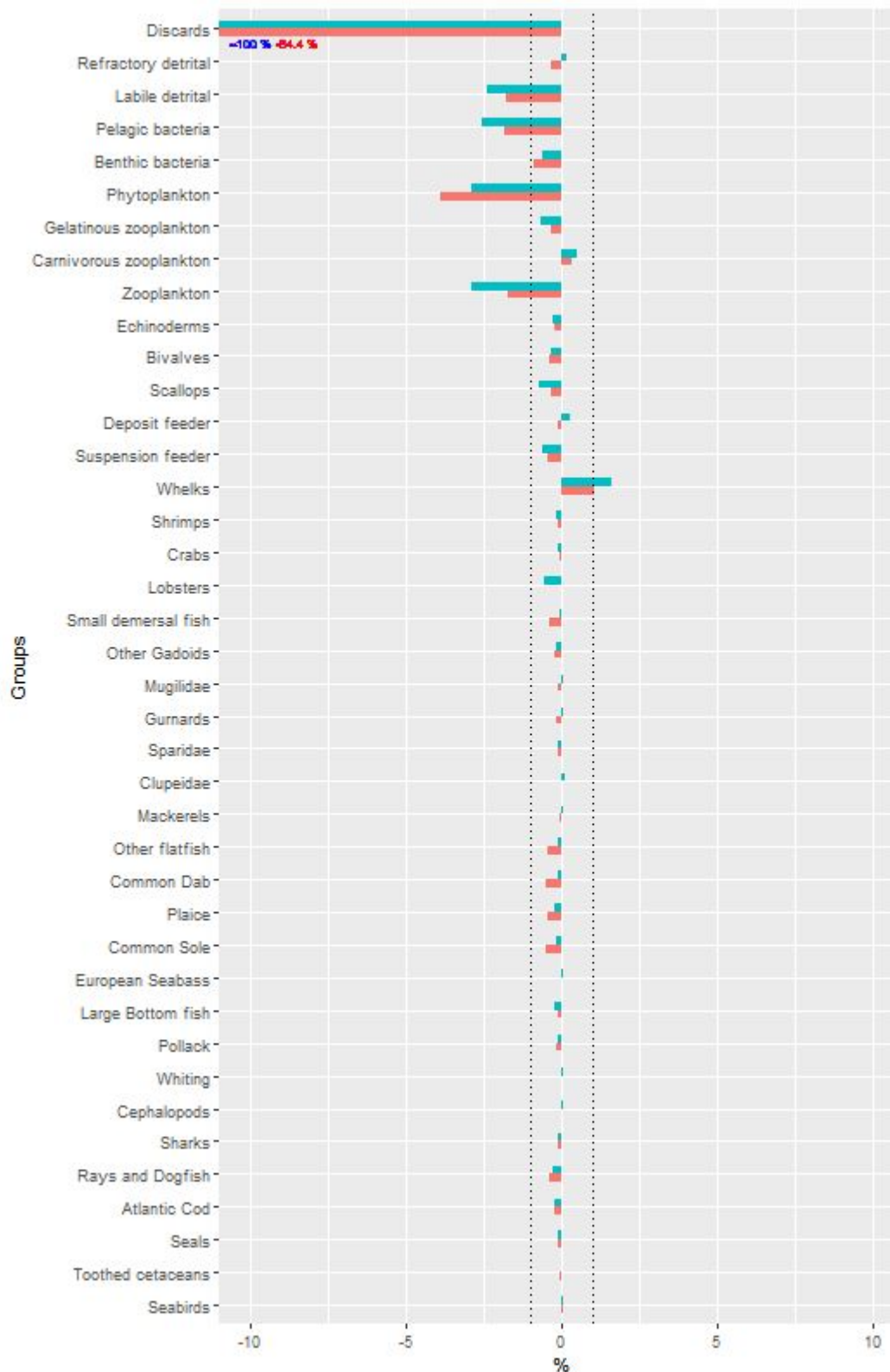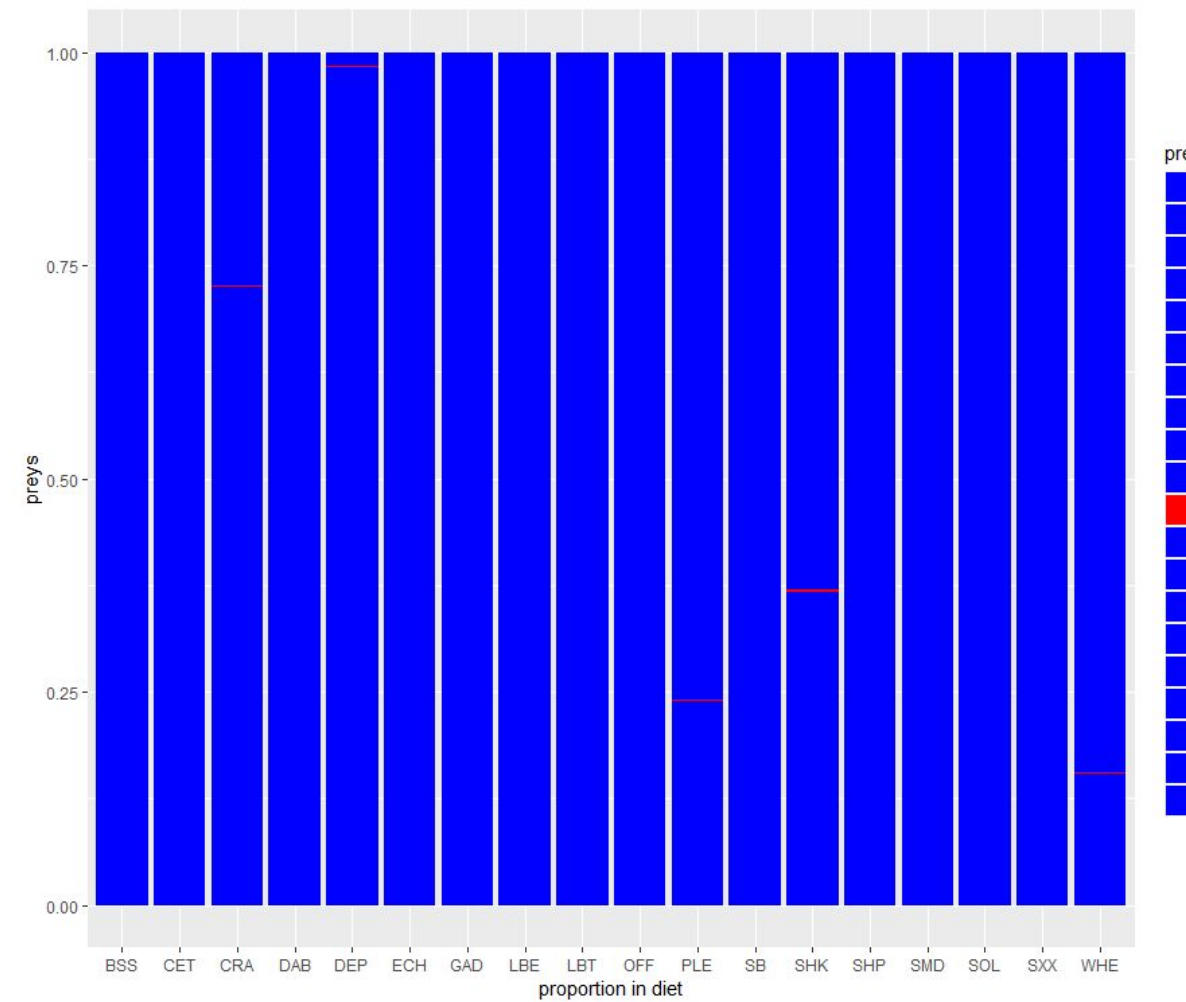
Realised diet in the baseline run

Results

Left panel: Not discarding vs Discarding
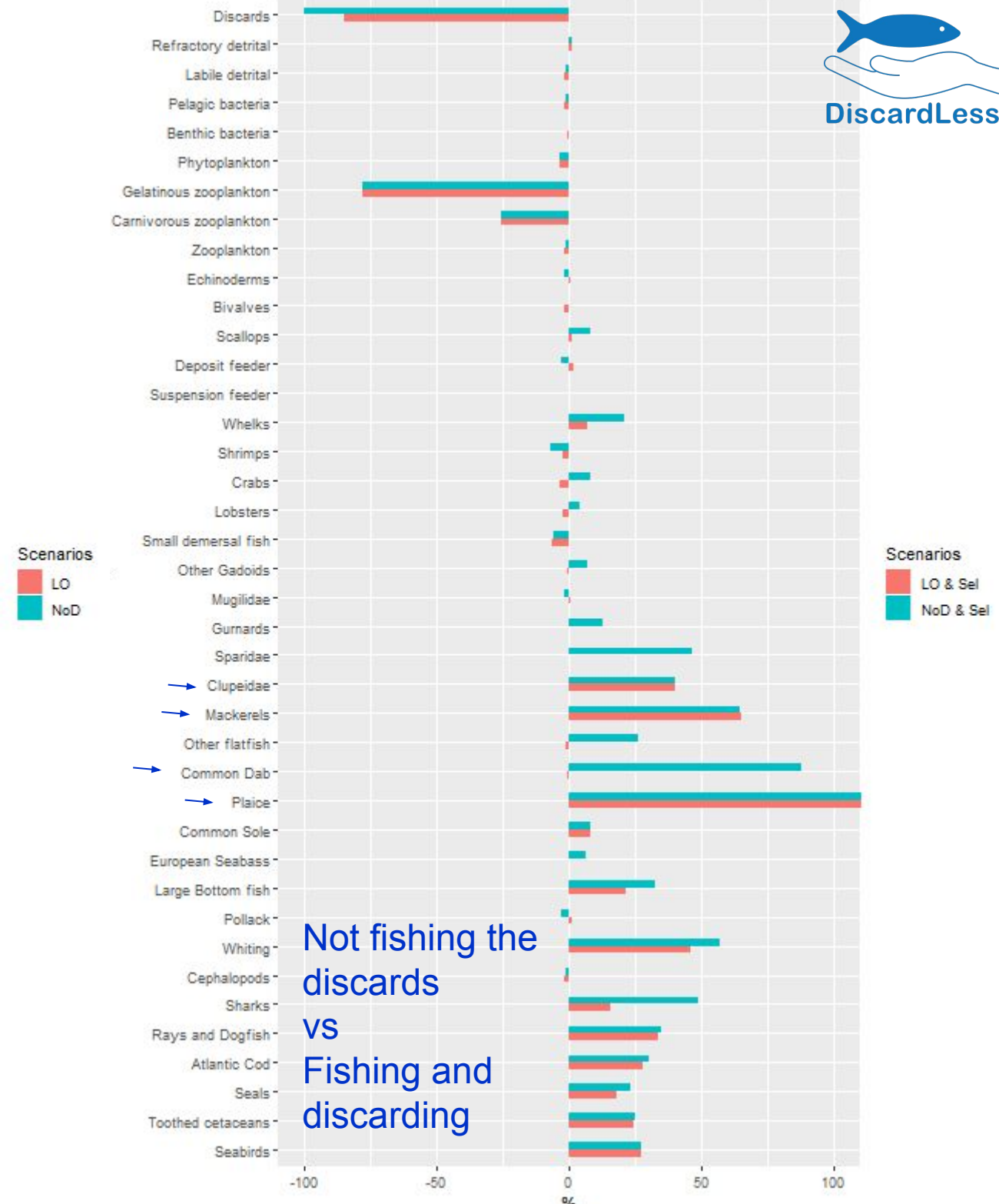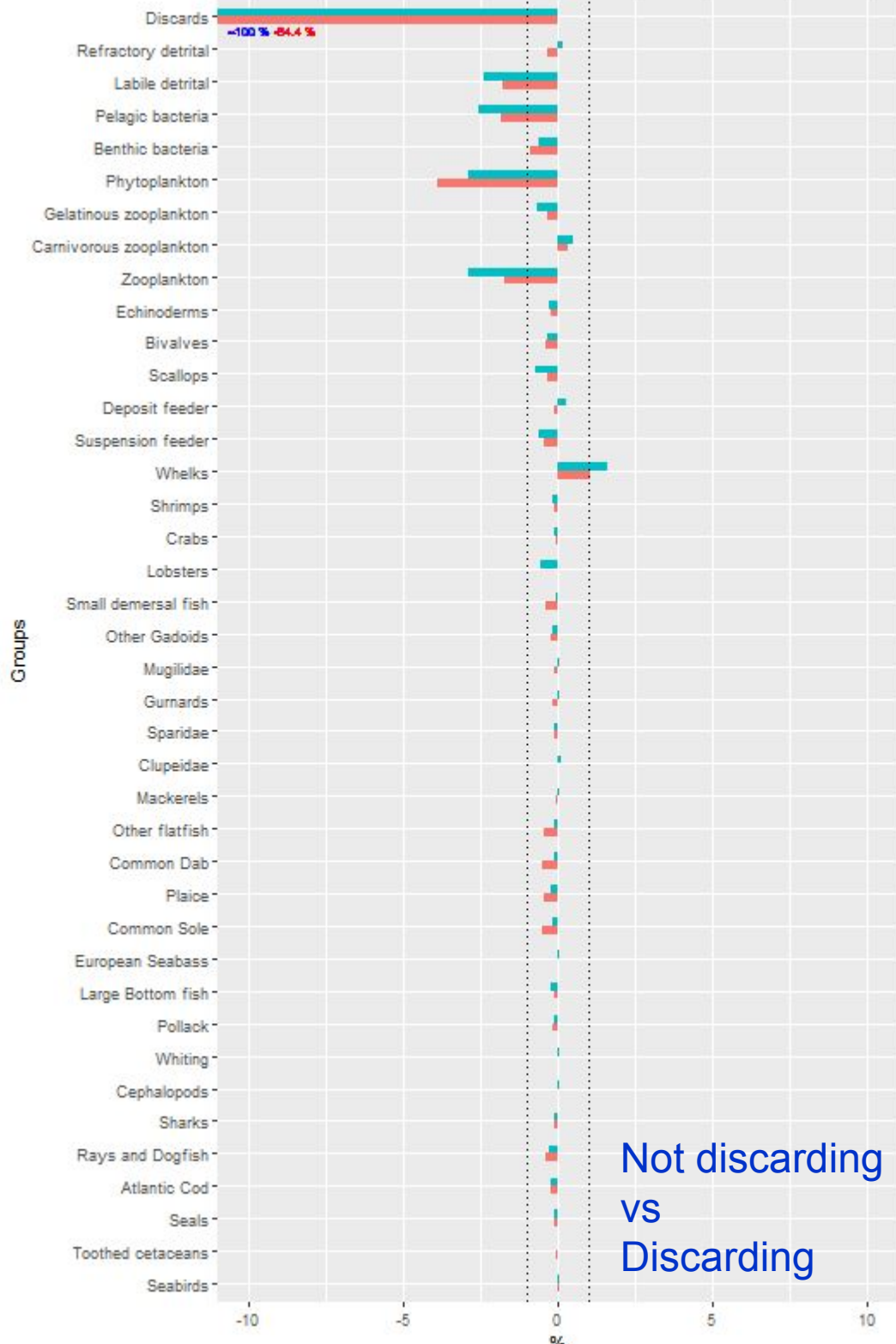
Right panel: Not fishing the discards vs Fishing and discarding

DiscardLess

Multi-model approach

Also Toni Quetglas (IEO), Robin Cook, Michael Heath (Strathclyde Uni), George Triantaphyllidis, Athanassios Tsikliras (Nays Ltd), Telmo Morato, Ambre Soszynski (UAz), Eider Andonegi (AZTI), Didier Gascuel (Institut Agro)
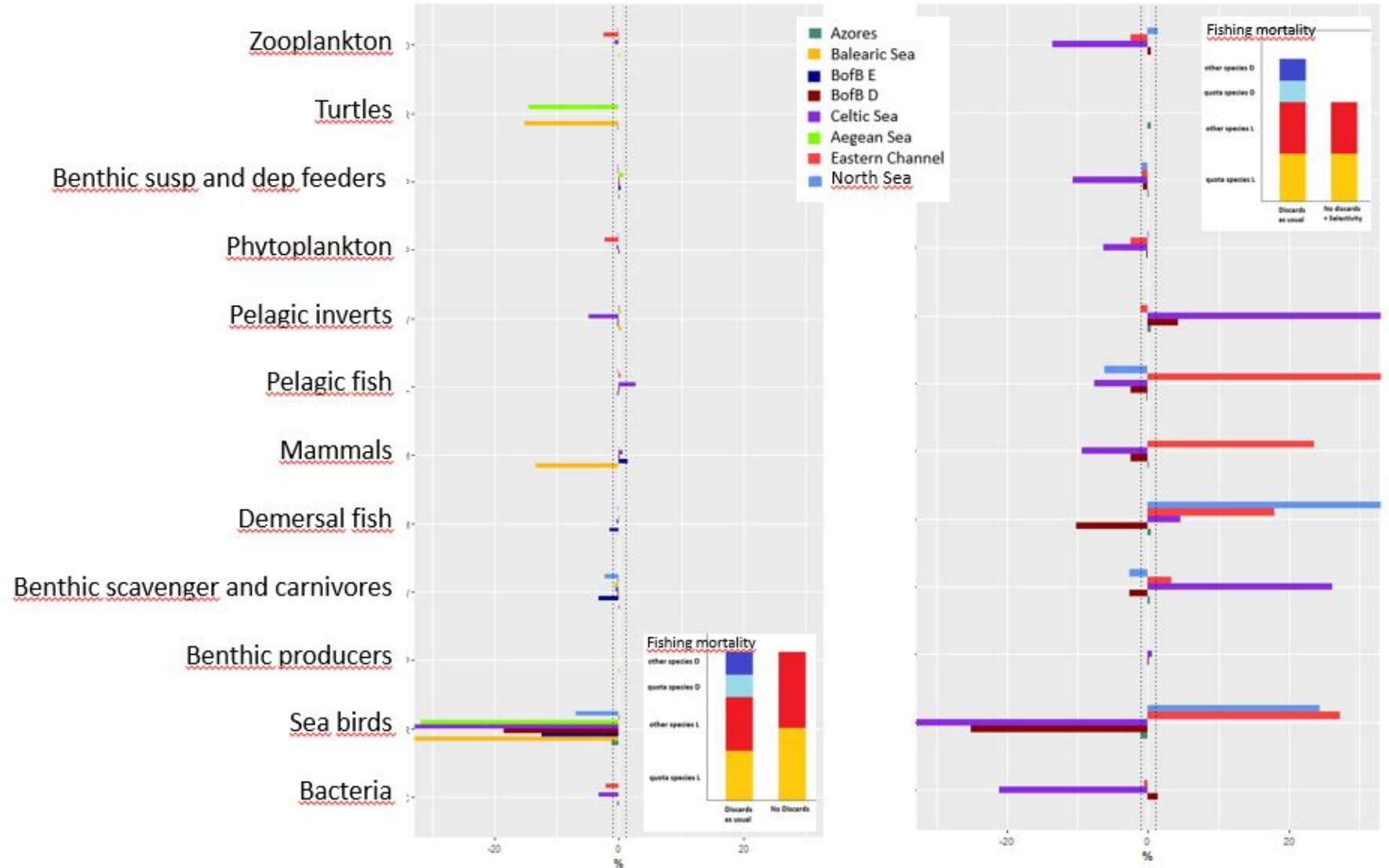
8 ecosystem models

Azores

What about it?

Uncertainties remain about :
- discards flows into the system (flows from quota species are best known, but sampling is still quite low)
- Models ability to capture discards – scavengers interactions

Exploratory runs

Run number	Short title	Description
1	Baseline	
Availability of discards to consumers		
2	Full access	Availability values ($P_{dis, cons}$) set to 1 for identified discards consumers
3	Less consumers	Number of discard consumers reduced to 2 : crabs and deposivores
4	Specialised consumer	Crabs have reduced access to other food than discards
Discards flows		
7	Max discards	Upper range of all estimated discards flow
8	Max discards + Invert	Upper range of all estimated discards flow + invertebrate discards added
9	Invert	Invertebrate discards added
Discard compartment dynamic		
5	No breakdown	Discards accumulate instead of being degraded into detritus (table S1)
6	Reduced breakdown	Reduced degradation rate of discards into detritus

$$C_{dis,cons} = f(CR_{cons}, p_{dis,cons}, B_{dis})$$

Msc Sophie Leforestier

Availability of discards to consumers

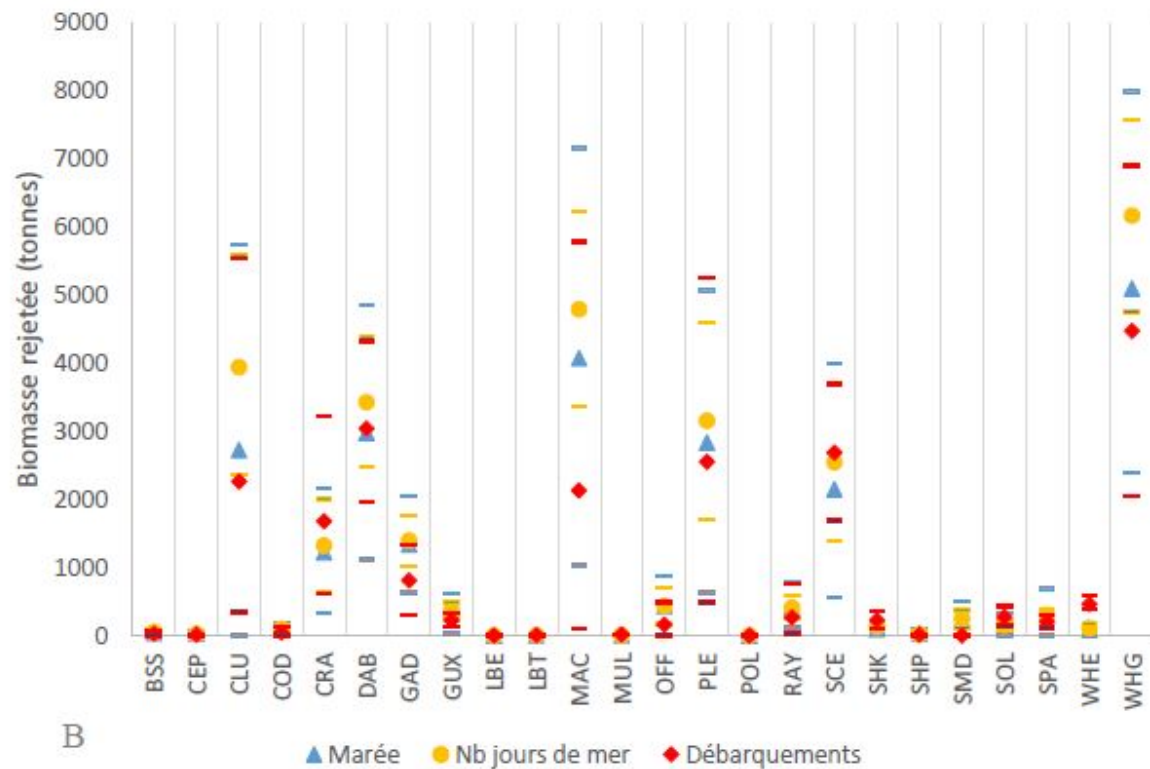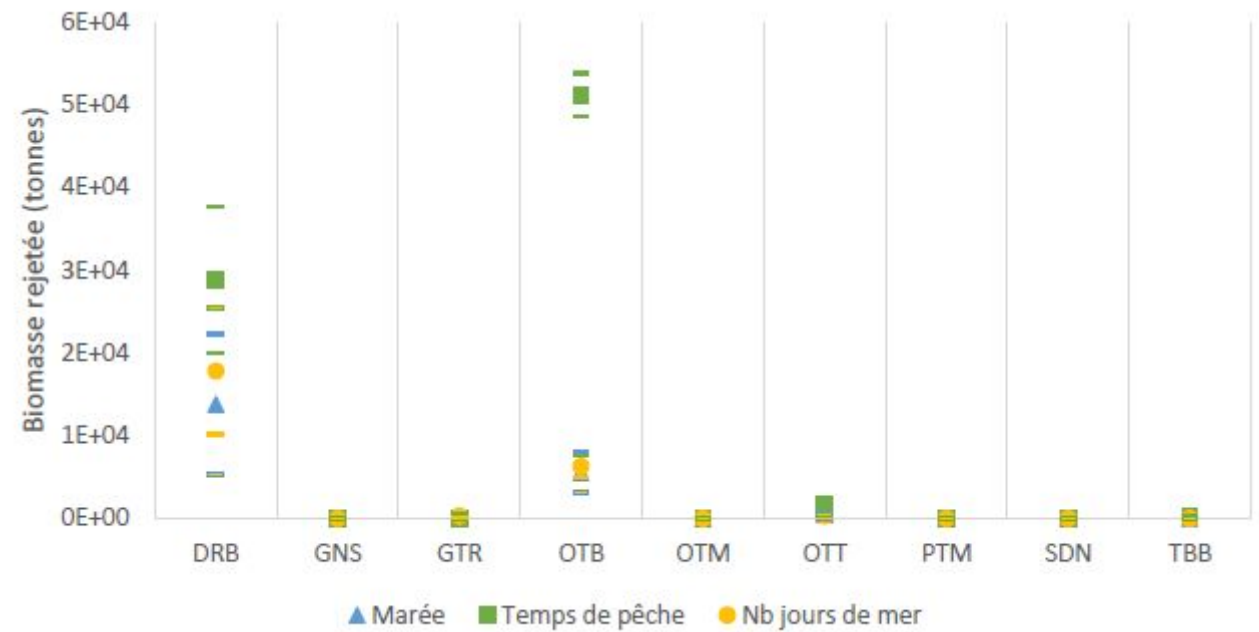| Run N°	Short title	Description
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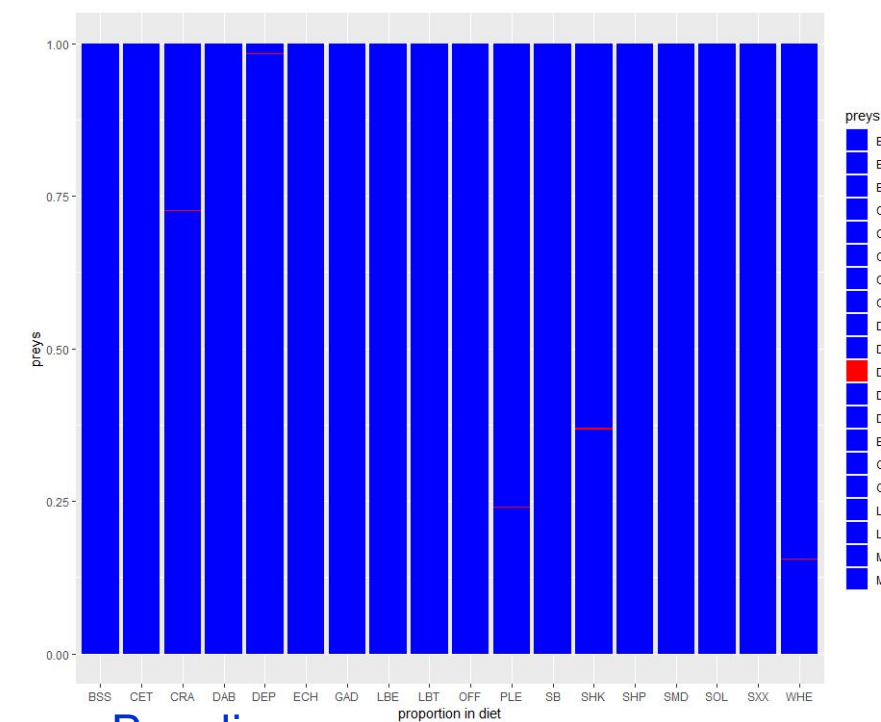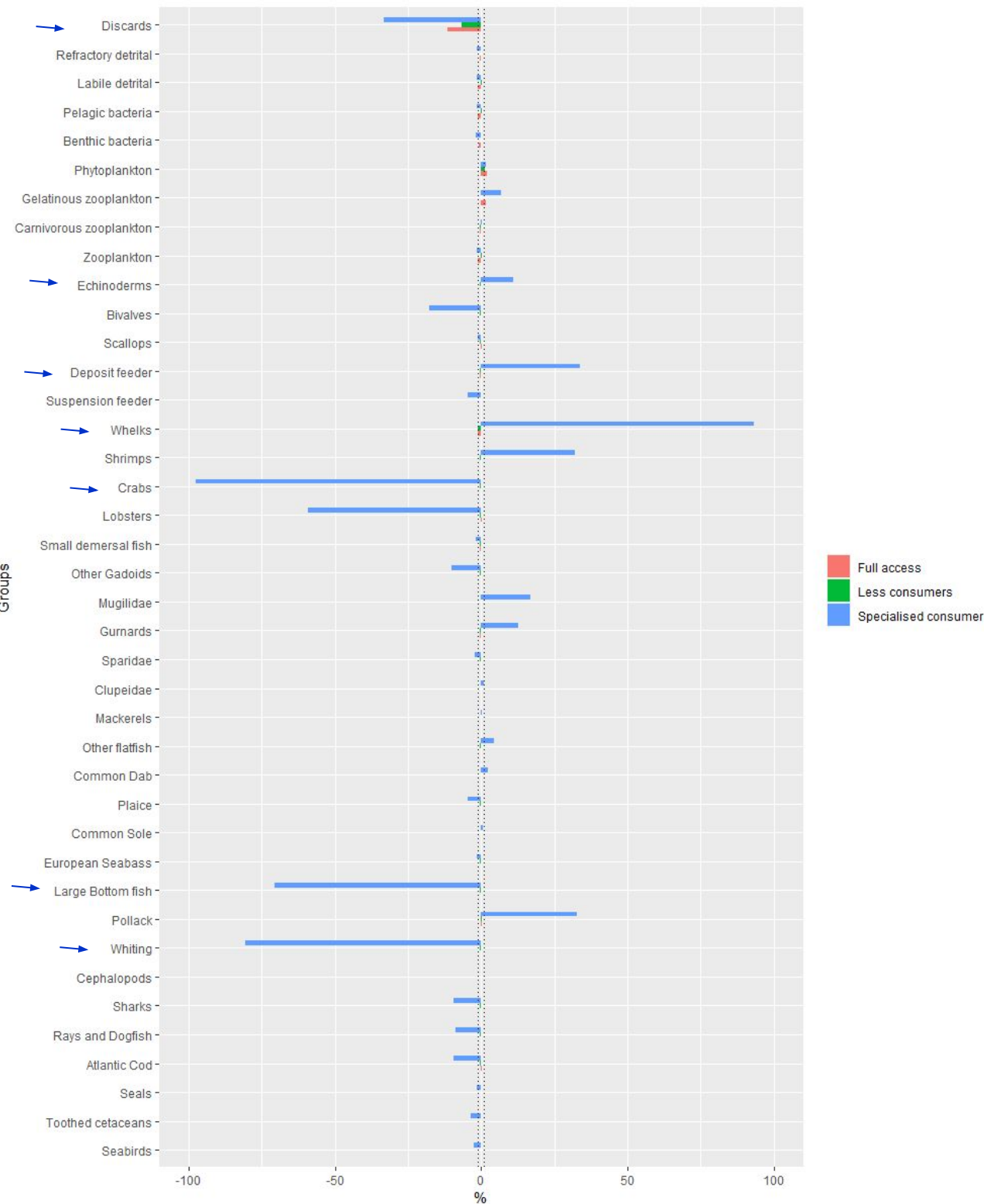
Baseline
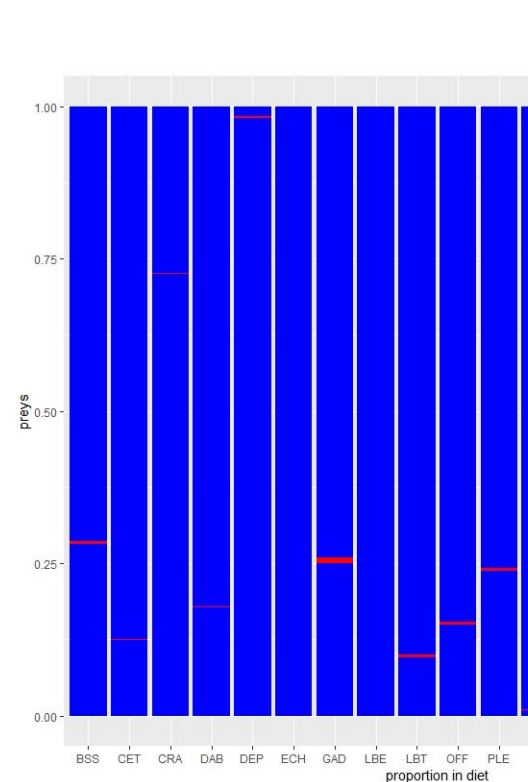
Full access

Discards flows

Run N°	Short title	Description
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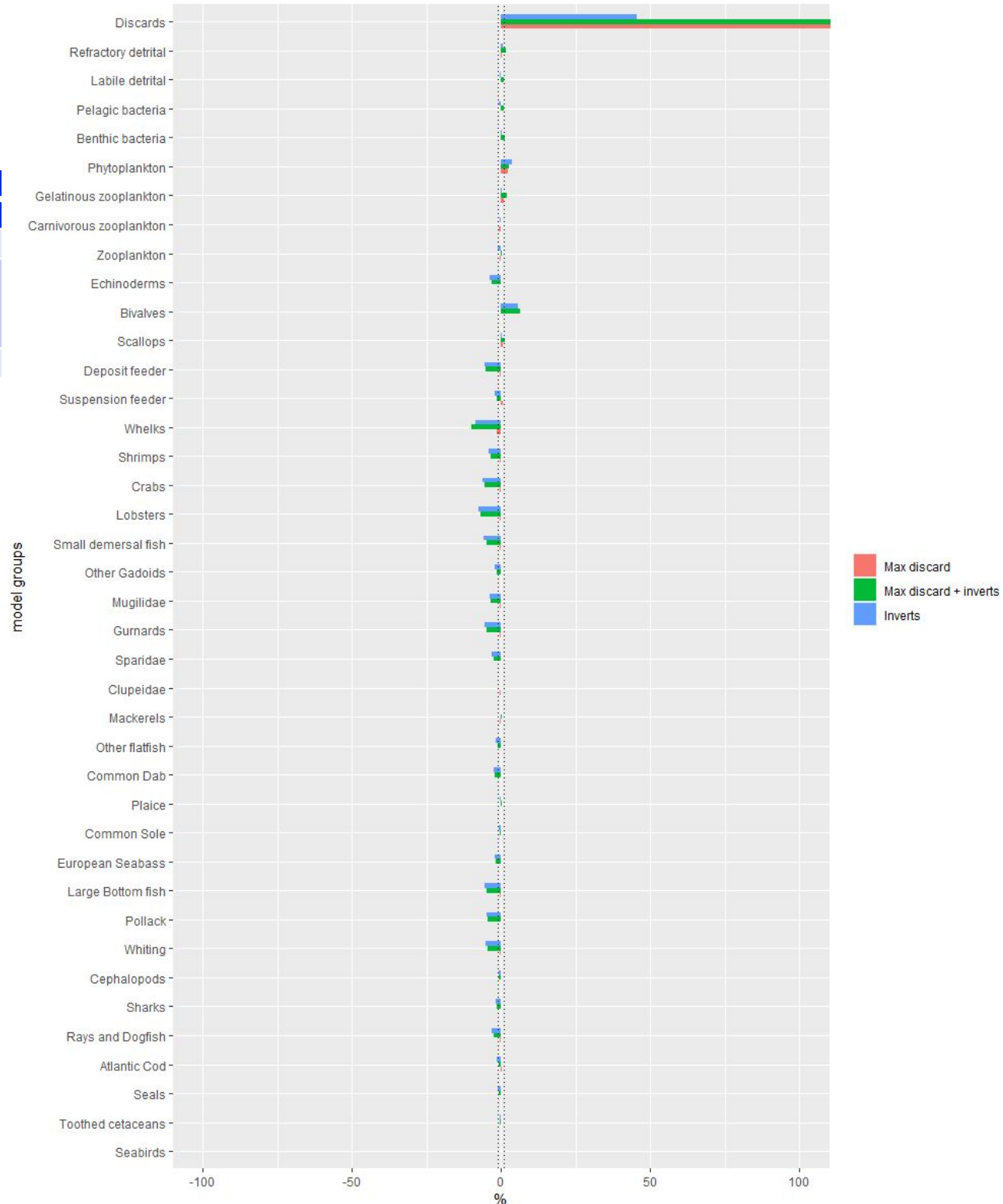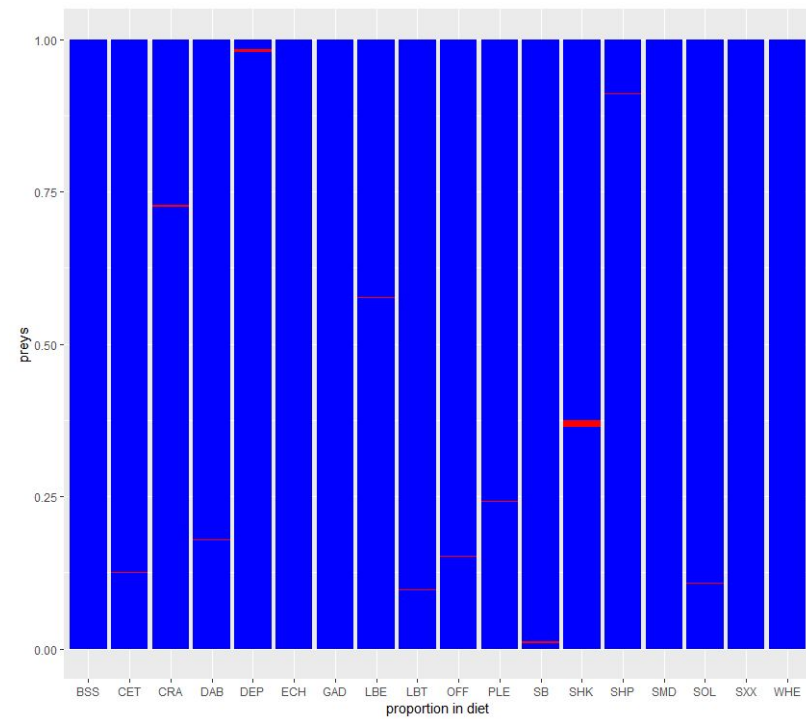Raising discards for fish and commercial invertebrates

Raising discards for non-commercial invertebrates

Discards flows

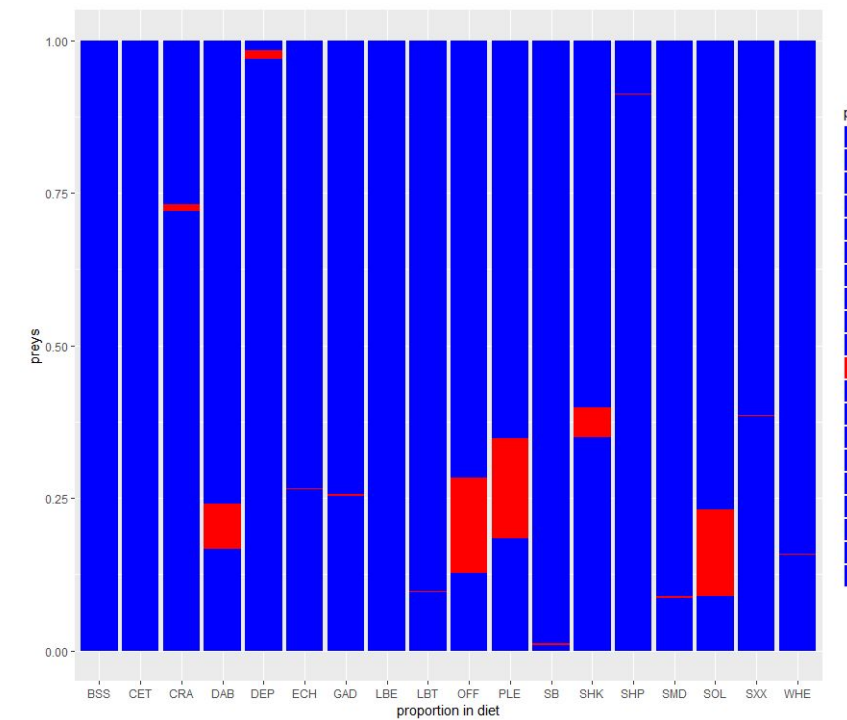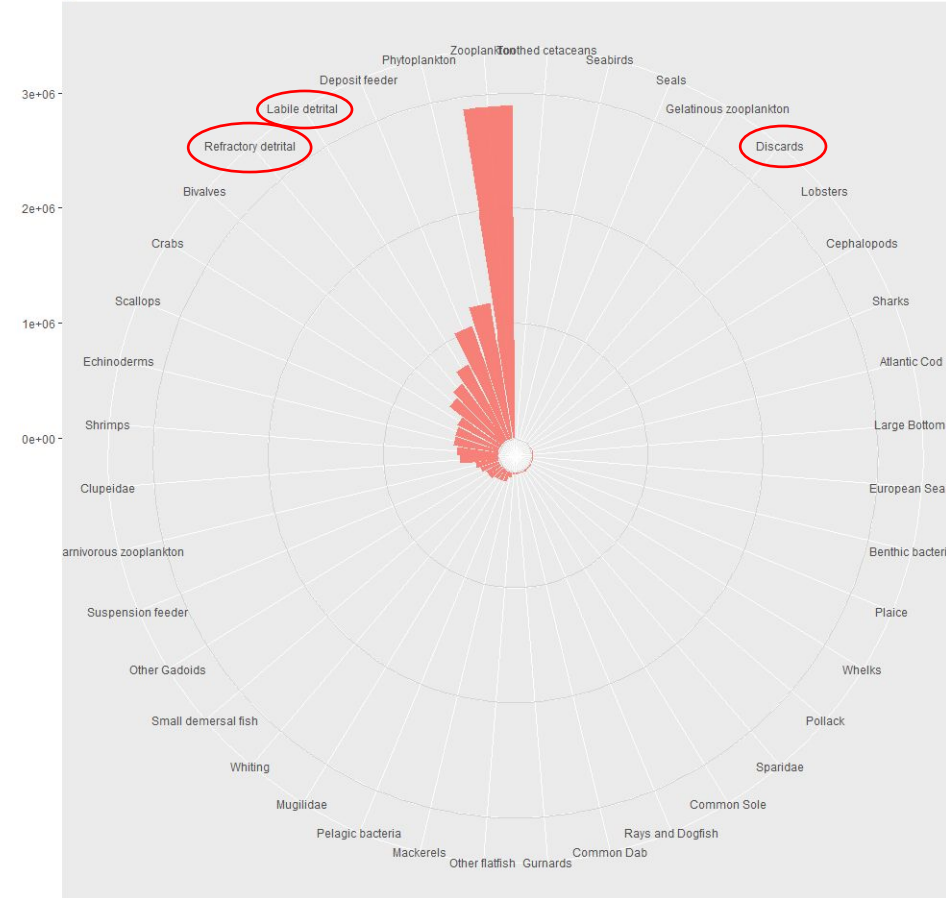| Run N°	Short title	Description
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Max discards

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Discards compartment dynamics

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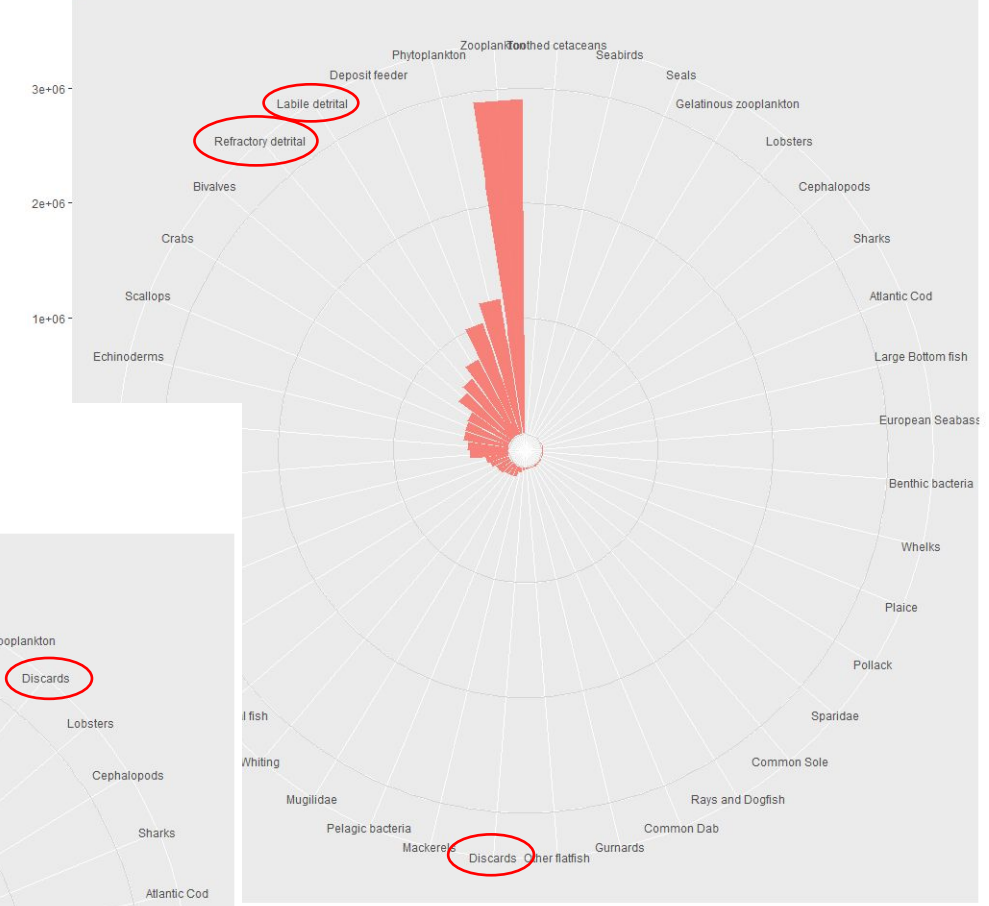
Discards compartment dynamics

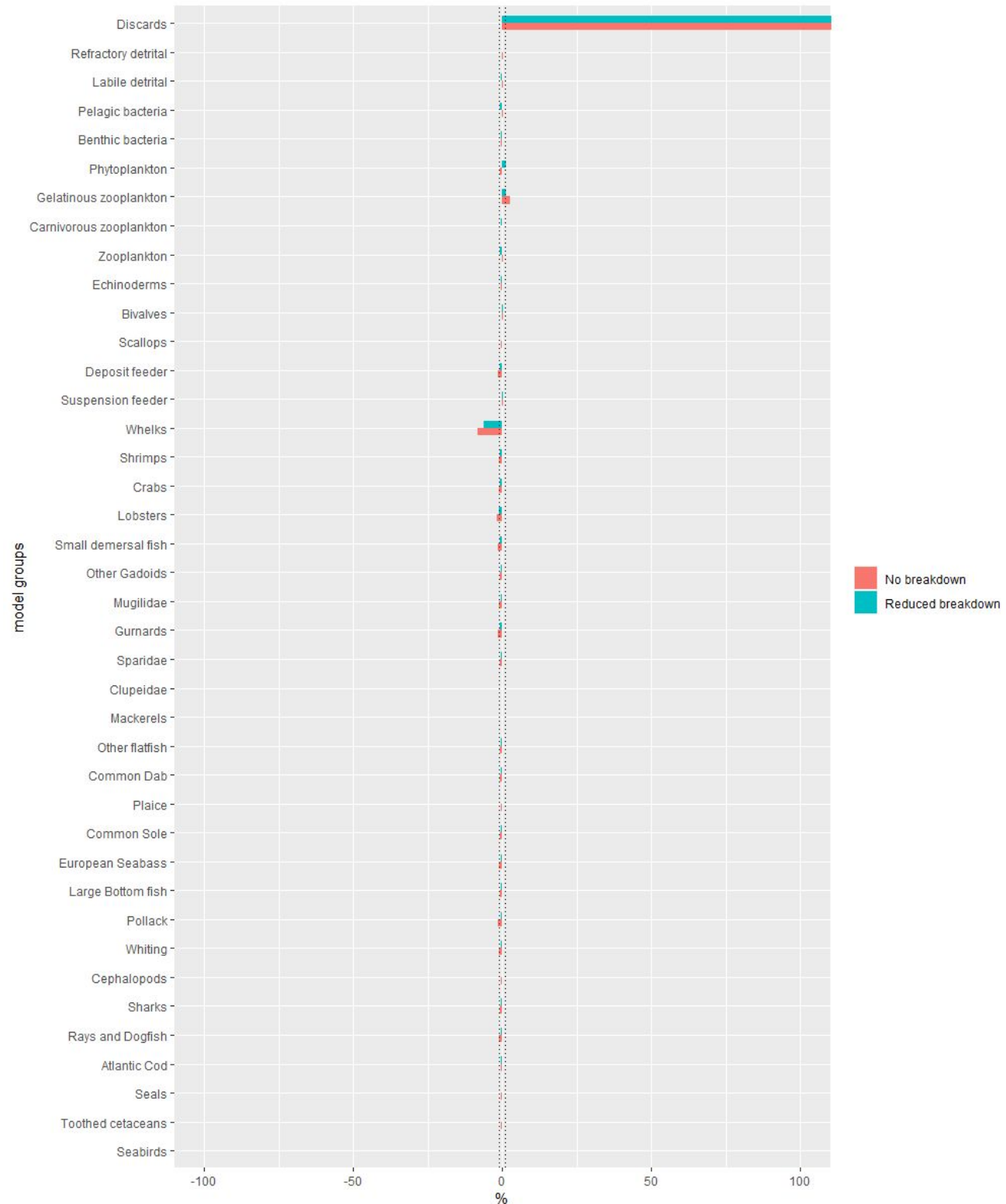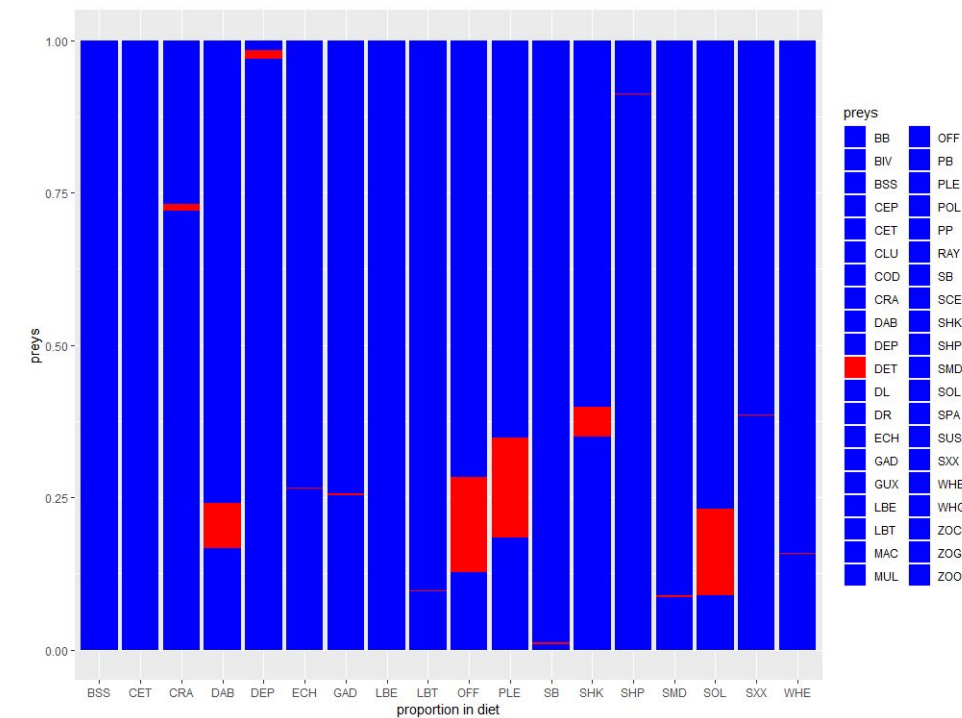| Run N°	Short title	Description
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Conclusions and perspectives

On the importance of discards as a food source and the likelihood of food shortages

Unlikely at the scale studies   (seabirds)

Corroborated by results from complementary approaches

Conclusions and perspectives

The nature and role of detritus

Discards = 1 group
Detritus = 2 groups

Illustration : Bénédicte VOILE

Ecosystem based management
Detrital pathways!

Ifremer

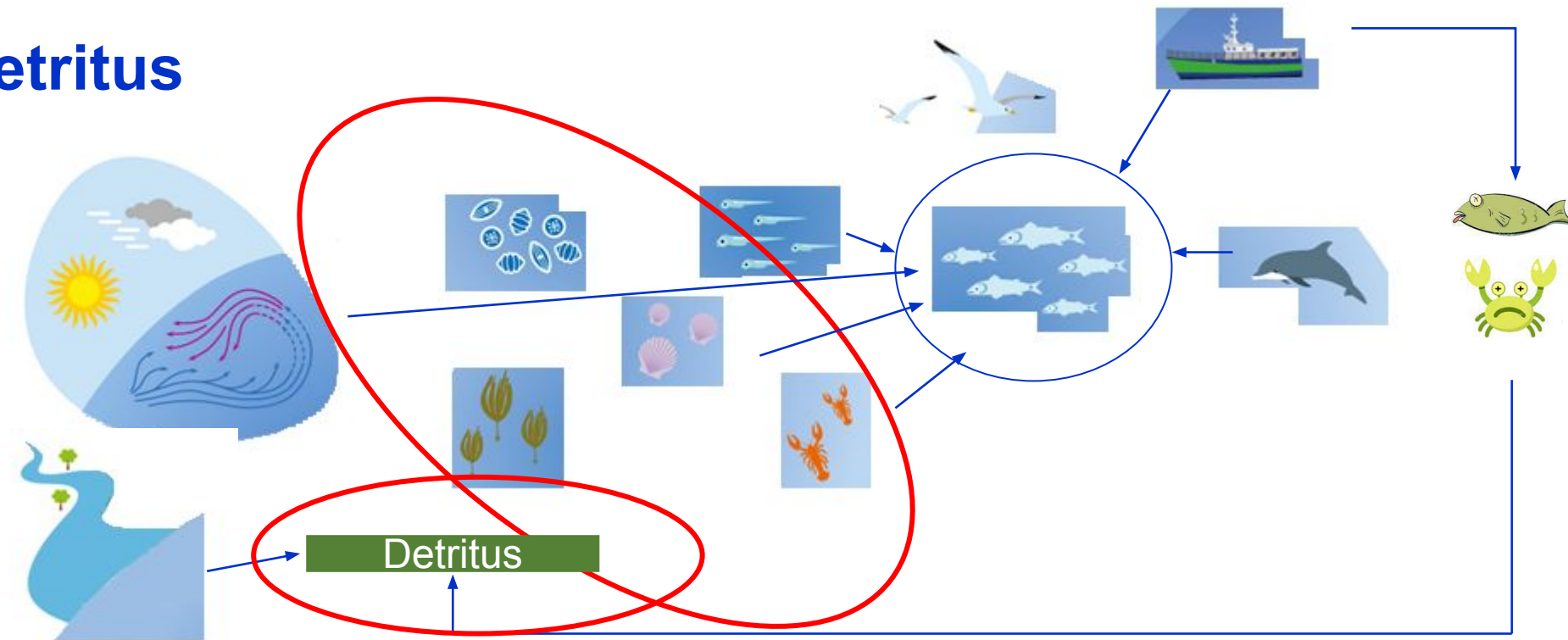# Conclusions and perspectives

The nature and role of detritus

Detrital pathway

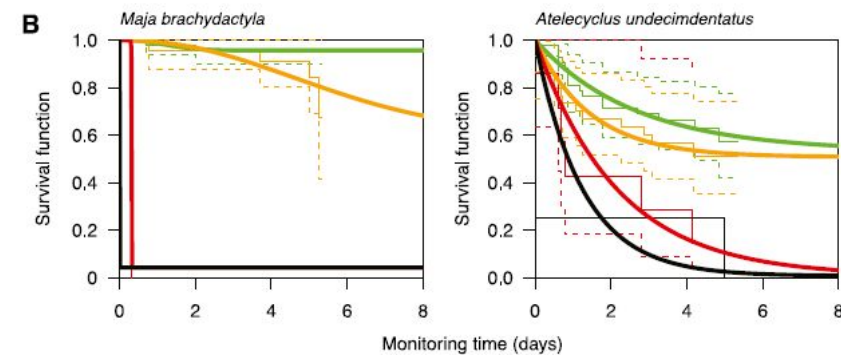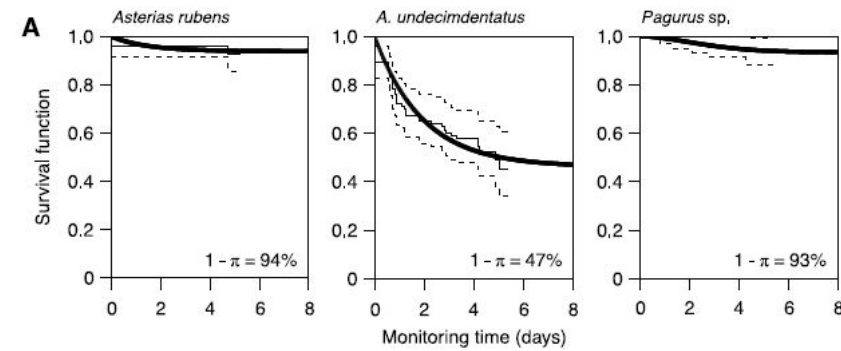 - Discard but also other colateral fishing mortalities

- Dynamic and productivity of benthic invertebrates

- Importance of terrestrial inputs

Detritus

Conclusions and perspectives

Impact of fishing on non-commercial benthic invertebrates

Lakshmannan et al 2021

Boussarie et al 2020

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Thank you

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