- The worrying state of the Mediterranean Sea –

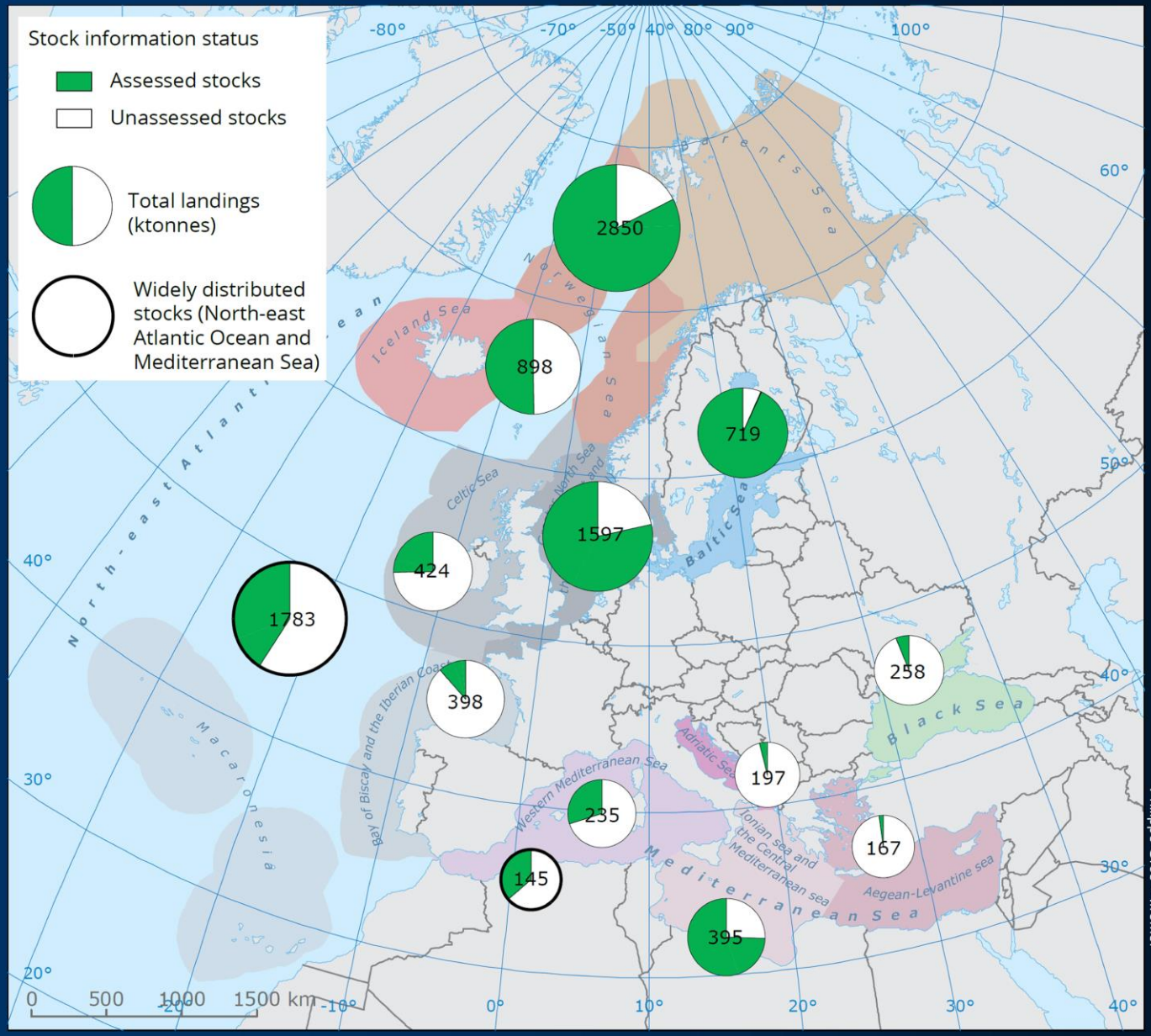
Diagnostic of the fishery stocks and possible future scenarios – pelagic stocks with a focus on small pelagics

Philippe CURY

IRD- Senior Scientist

IRD
Institut de recherche pour le développement

Reported landings (~10 Mt, FAO areas 27 and 37): 60% of landings are from assessed stocks



Source:
State of Europe's seas
EEA Report No. 2 (2015)

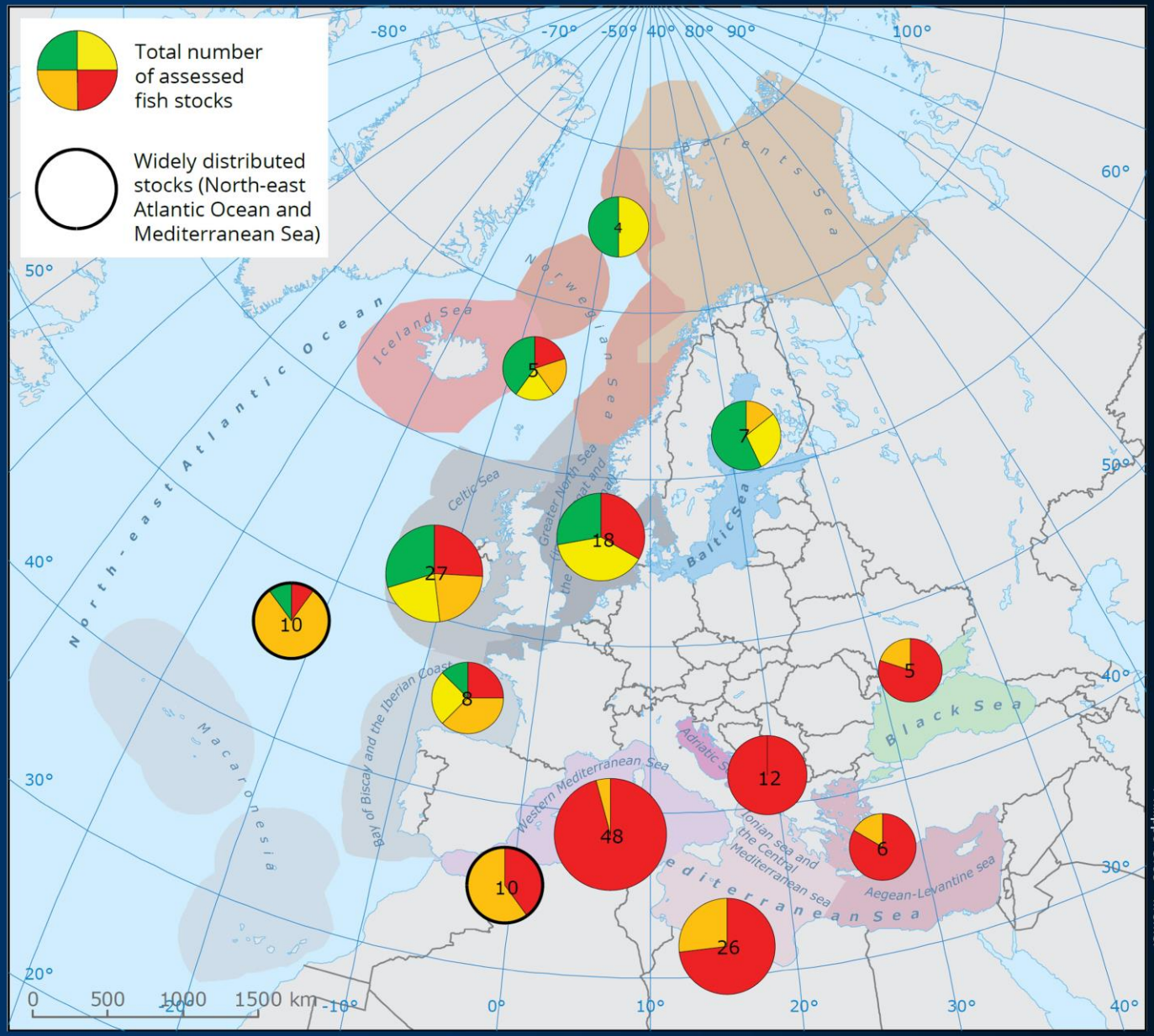
- North-eastern Atlantic and Baltic Sea stocks provide 93% of landings (of which 35% are from unassessed stocks).
- Mediterranean and Black Seas: 68% of the total regional landings are not assessed.
- Even our knowledge about commercial fish species as a subset of overall fish species remains partial.

.

European Environment Agency

Status of assessed fish stocks from regional seas around Europe

104 stocks : **F > F_{MSY} and B < B_{MSY}** ; 34 : **F < F_{MSY}** ; 20 : **B > B_{MSY}** ; 22 : **F < F_{MSY} and B > B_{MSY}**



Source:
State of Europe's seas
EEA Report No. 2 (2015)

Two additional aspects to 'good environmental status' (GES) that are crucial to understand the health of fish stocks are:

- the age,
- and size structure of the populations.

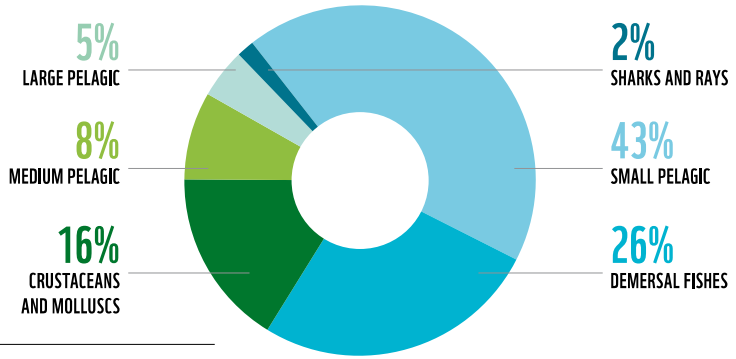
However, no threshold level for GES is currently available.

NB: In the Mediterranean and Black Sea, 84% of the regionally assessed stocks are overexploited.

European Environment Agency

Decreasing global catch trends of fish species

(WWF report 2015)



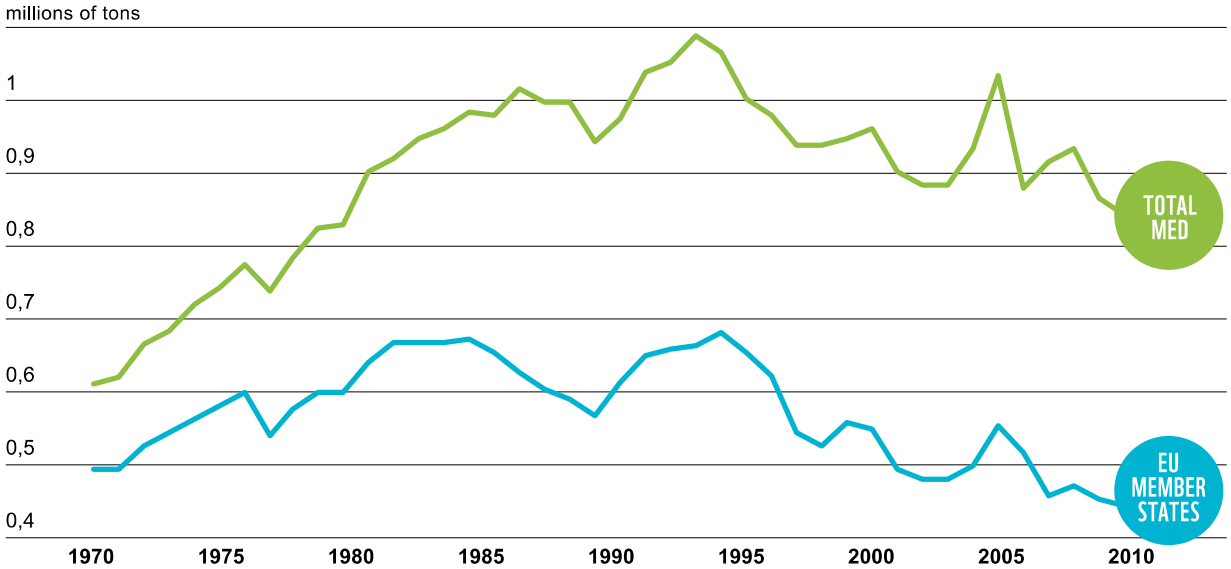
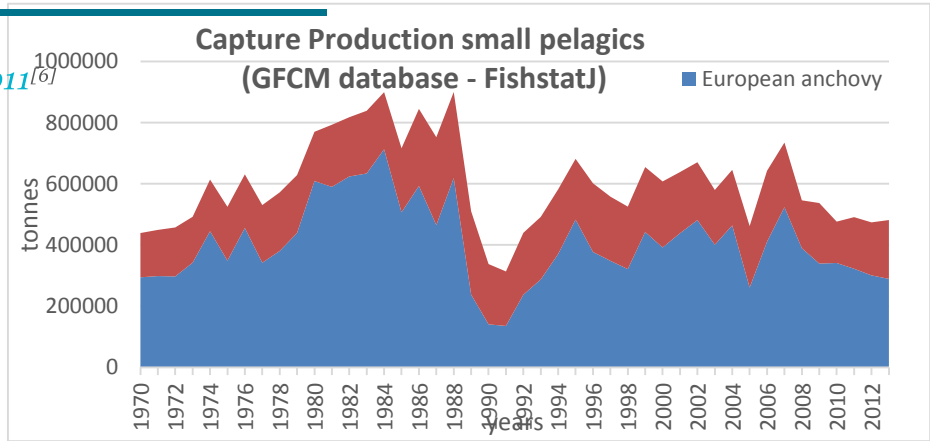


Figure 6. Evolution of Mediterranean landings from 1970 to 2011[6]

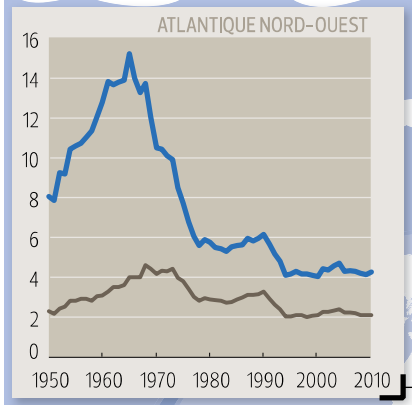


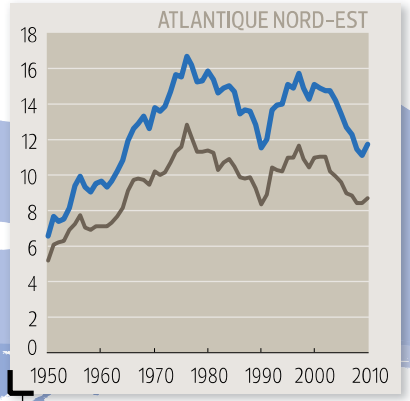
Re-evaluating world catch (Pauly and Zeller Nature 2016)

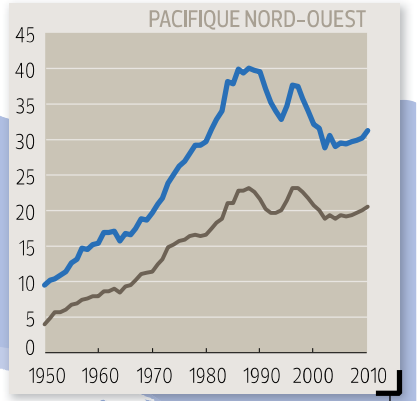
Des millions de tonnes de poisson non répertoriées

QUANTITÉ DE POISSONS PÊCHÉS ENTRE 1950 ET 2010 **PAR ZONES DE PÊCHE**, en millions de tonnes

— **Données officielles** recueillies par la FAO — **Données reconstituées** par Pauly et Zeller







NOTE DE LECTURE : La courbe grise représente la quantité de poissons officiellement pêchée, alors que la courbe bleue représente la quantité réellement pêchée selon Pauly et Zeller. On constate ces dernières décennies une baisse des rendements, ce qui signifie une chute des stocks de poissons due notamment à la surpêche industrielle.

Arctique

Atlantique Nord-Est

Atlantique Nord-Ouest

Méditerranée Mer Noire

Pacifique Nord-Ouest

Atlantique Centre-Ouest

Pacifique Centre-Est

Pacifique Centre-Ouest

Atlantique Centre-Est

Indien Ouest

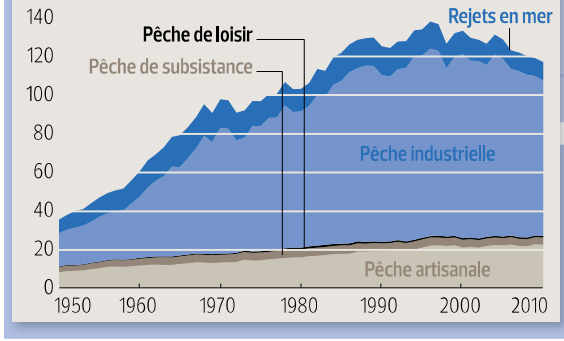
Pacifique Sud-Est

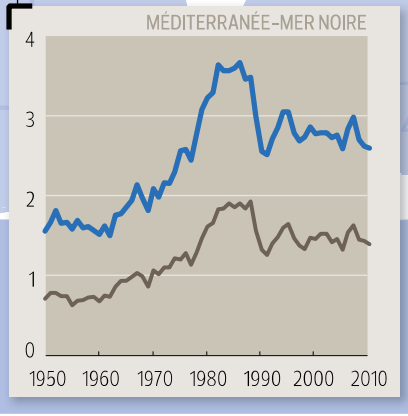
Atlantique Sud-Est

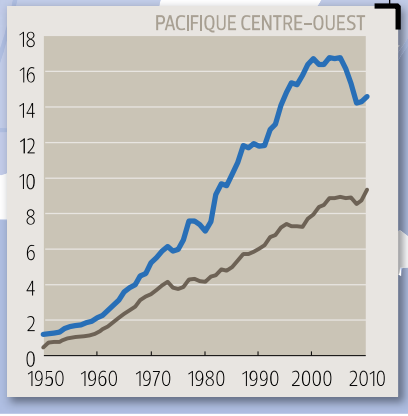
Indien Est

Atlantique Sud Ouest

RECONSTITUTION DE LA QUANTITÉ DE POISSONS PÊCHÉS PAR TYPES DE PÊCHE **DANS LE MONDE**, en millions de tonnes

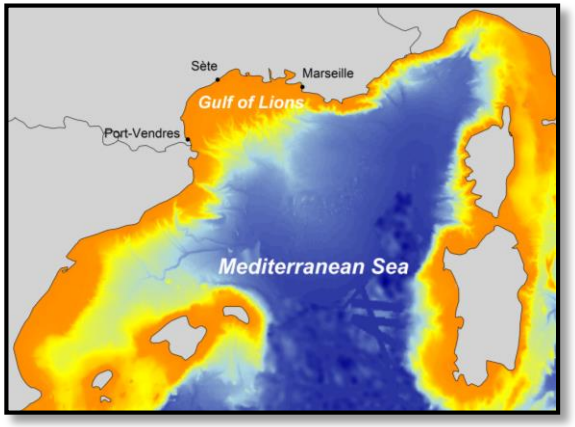






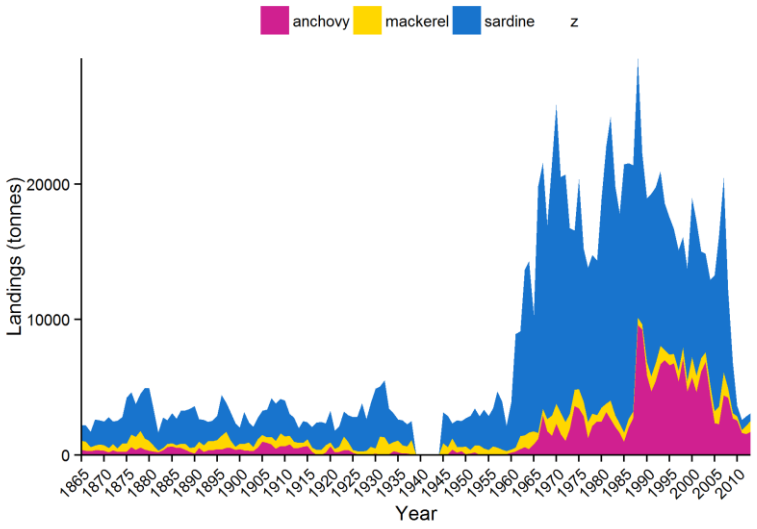
Infographie LE FIGARO
Sources : Daniel Pauly et Dirk Zeller (*Nature*), FAO

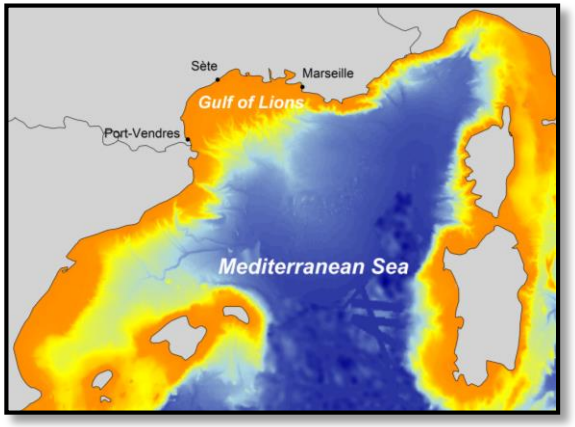
Small pelagics



Sardine and anchovy in the Gulf of Lions declining trends

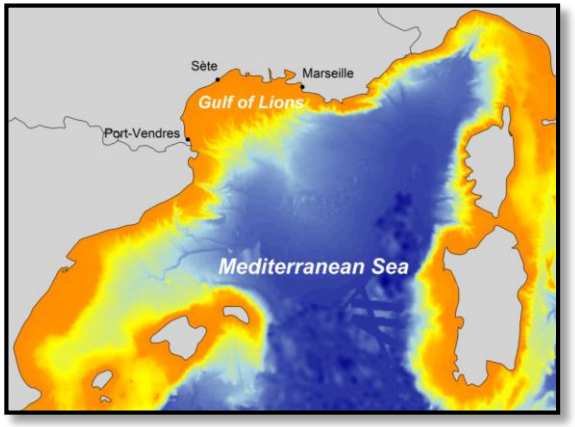
Elisabeth Van Beveren PhD Ifremer 2015





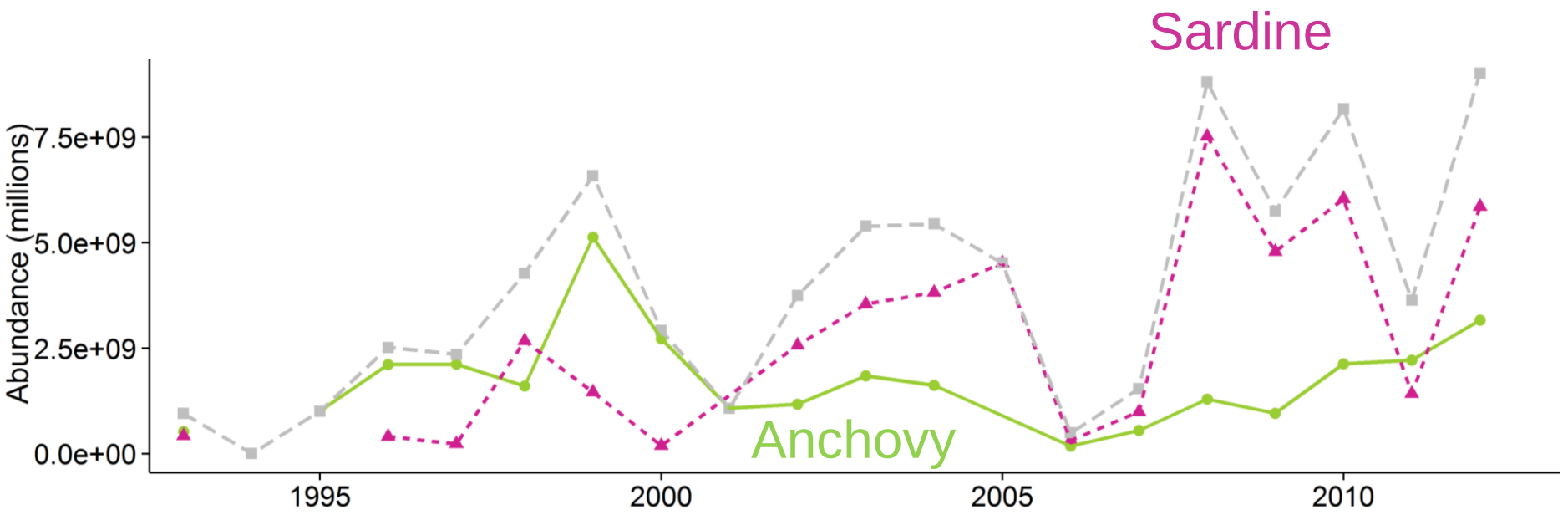
Exploitation rate (C/B) is low for Sardine and anchovy in the Gulf of Lions

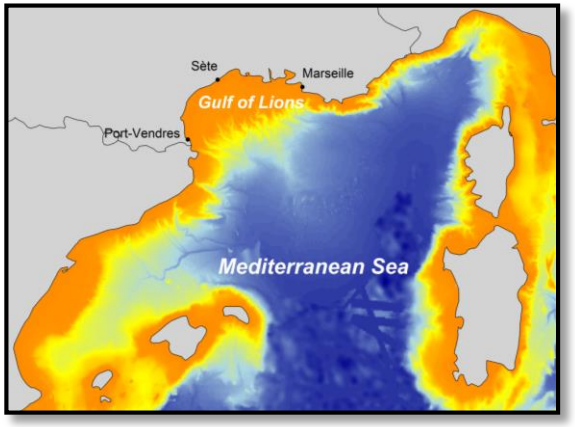
Elisabeth Van Beveren PhD Ifremer



Recruitment is high for Sardine and anchovy in the Gulf of Lions

Elisabeth Van Beveren PhD Ifremer





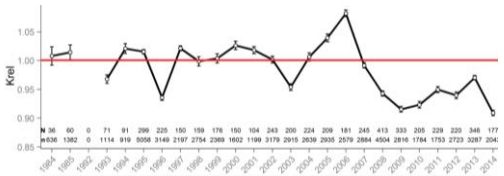
Effect of environemental change on sardine and anchovy

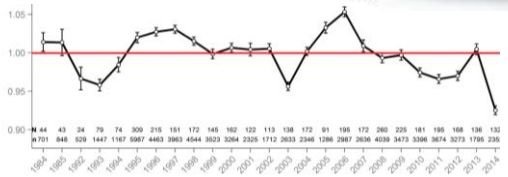
Elisabeth Van Beveren PhD Ifremer
Saraux et al 2014

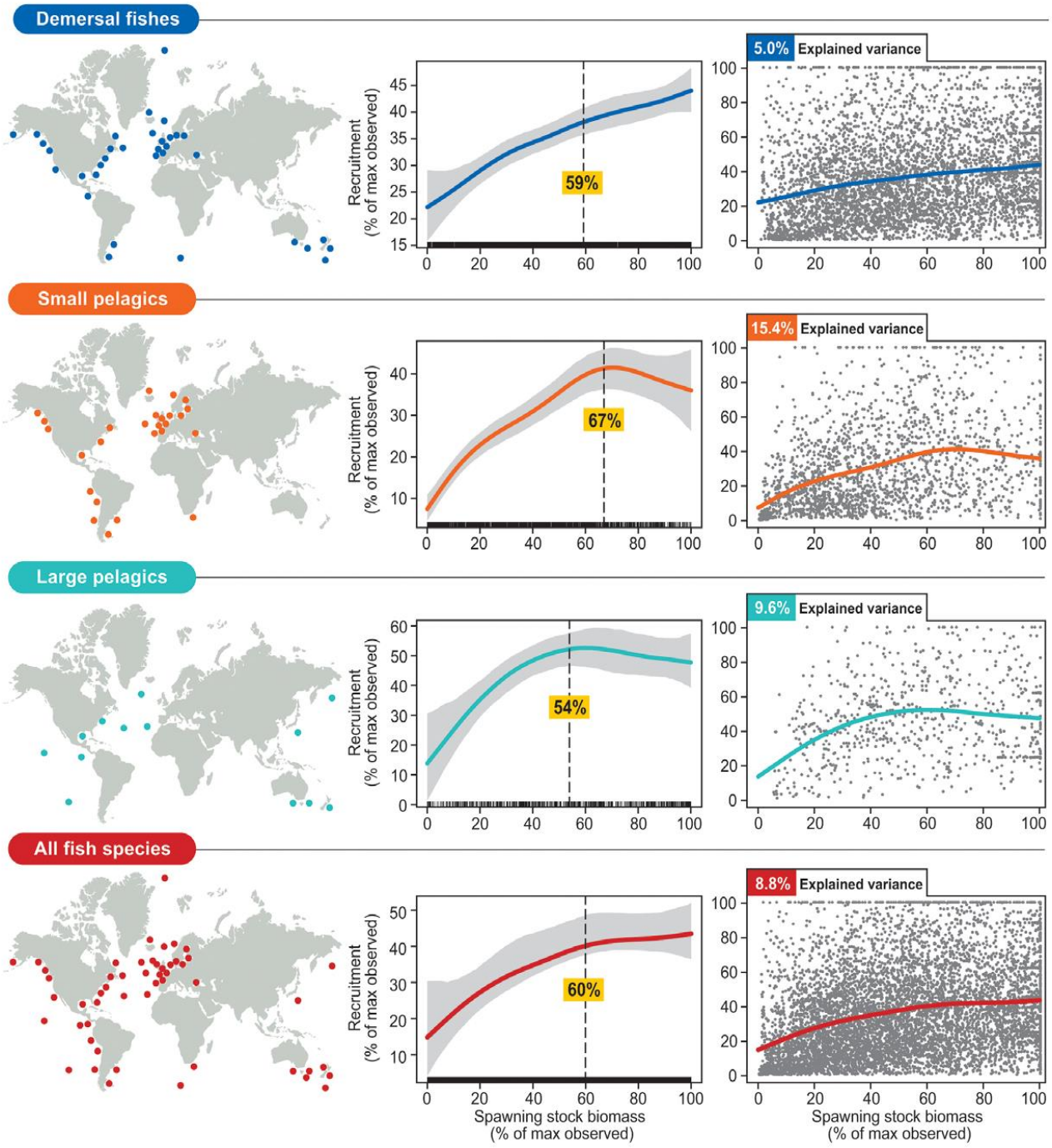
Change in plankton productivity:

- No parasite, viral, bacterial effects
- No F or Predation by bluefin tuna

❖ Change quantity/quality zooplankton/condition factor (related to Climate change)

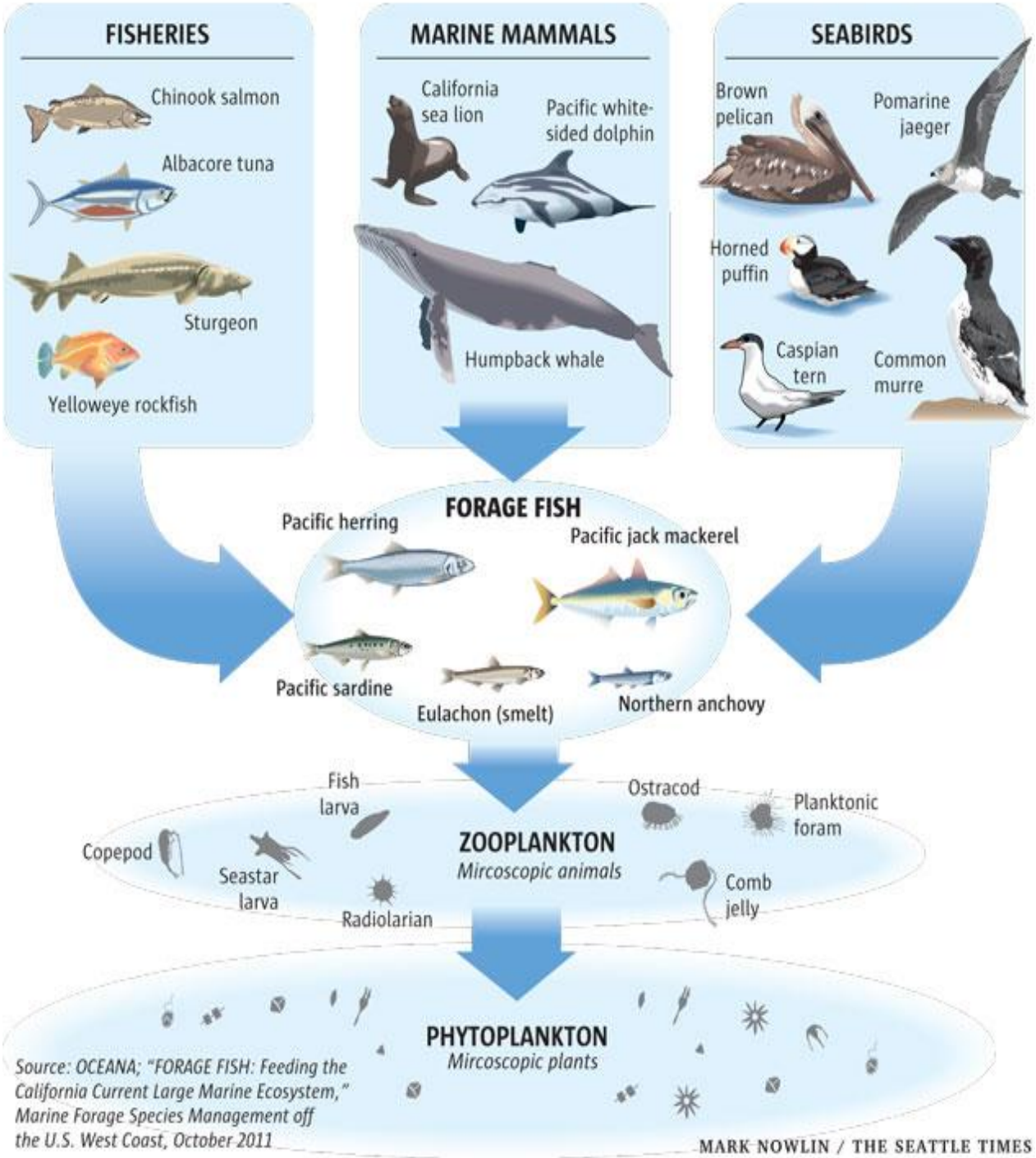






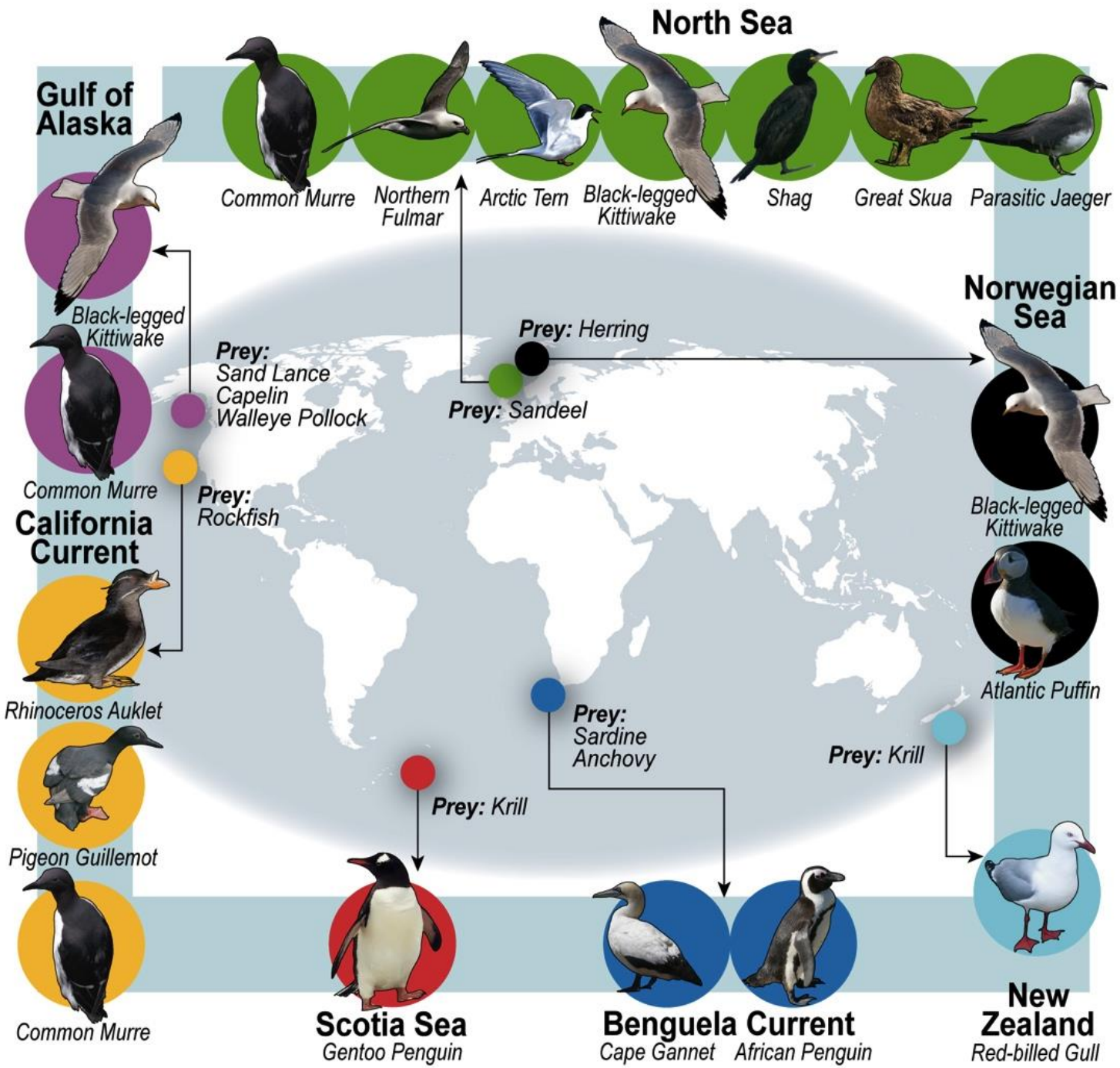
For small pelagics only 15% of the variability in recruitment is due to parental stock biomass

(Cury et al Oceanography 2014)



Pelagics and food webs in wasp-waist ecosystems

(Cury et al 2000)



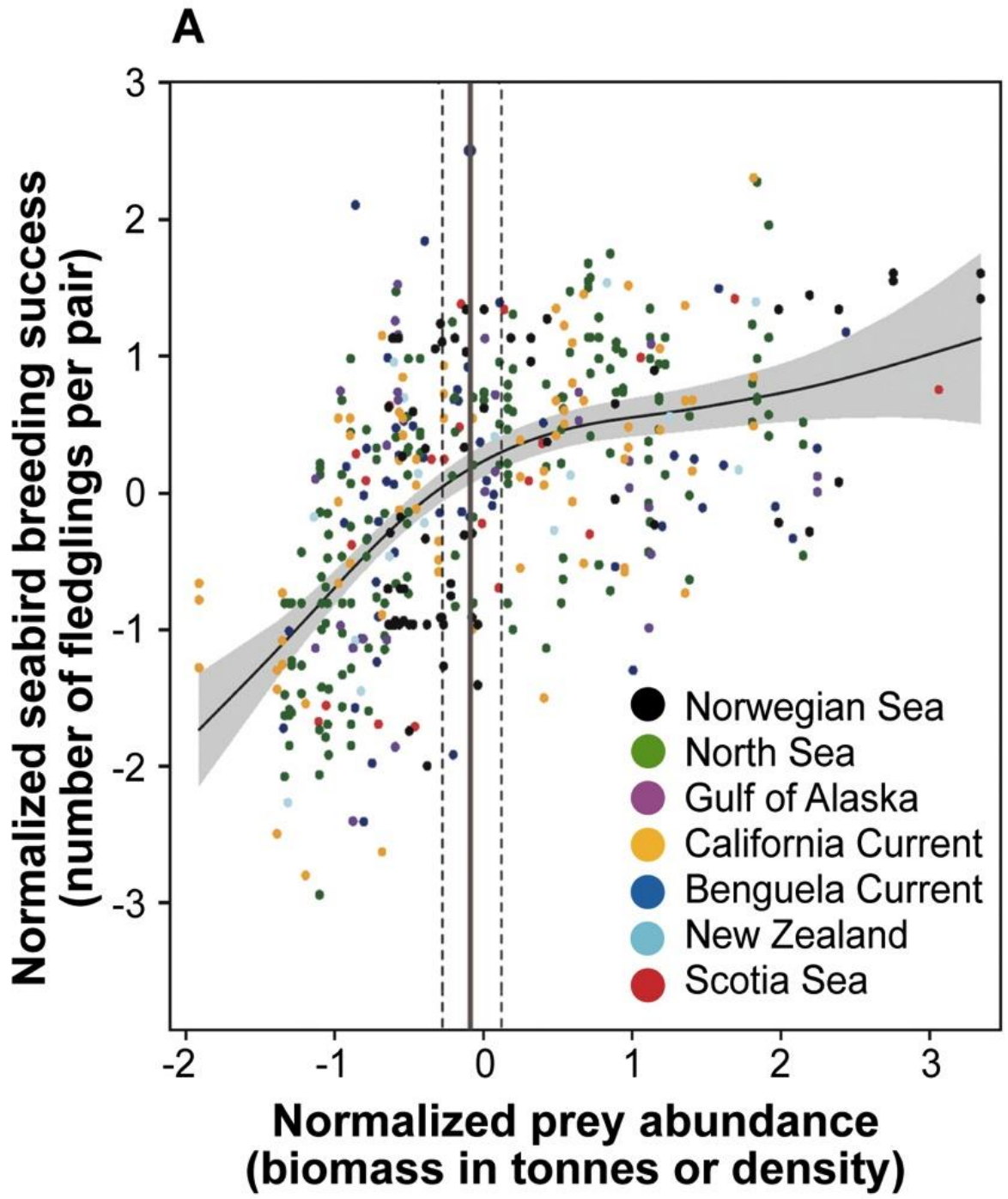
Meta-analysis:

7 marine ecosystems

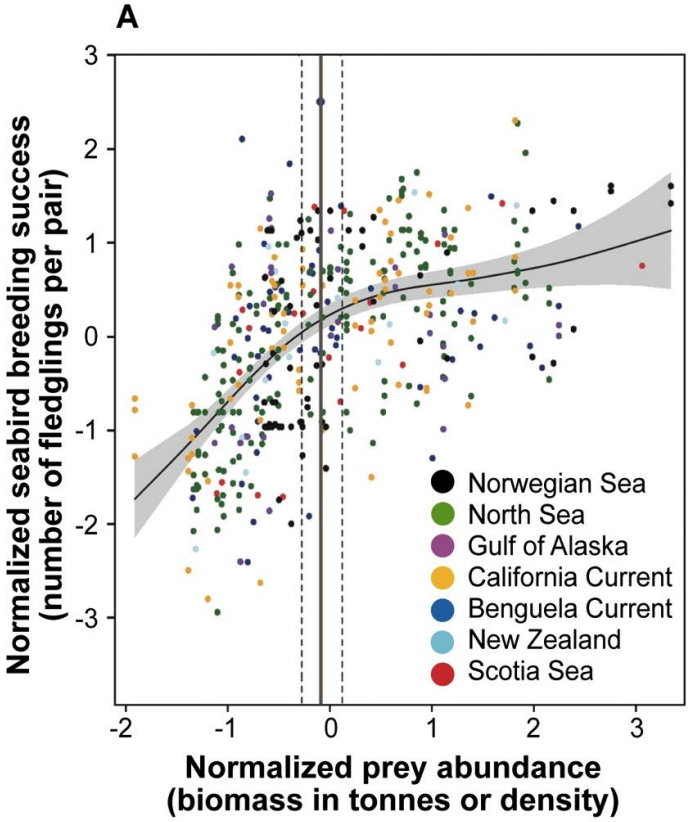
14 seabird species

438 years of observation

Cury et al Science 2011


A
Normalized seabird breeding success
(number of fledglings per pair)
3
2
1
0
-1
-2
-3
-2
-1
0
1
2
3
Normalized prey abundance
(biomass in tonnes or density)
Norwegian Sea
North Sea
Gulf of Alaska
California Current
Benguela Current
New Zealand
Scotia Sea

‘One third for the birds’ as a limit reference –threshold- point for Ecosystem Approach to Fisheries



From target reference points towards limit reference points

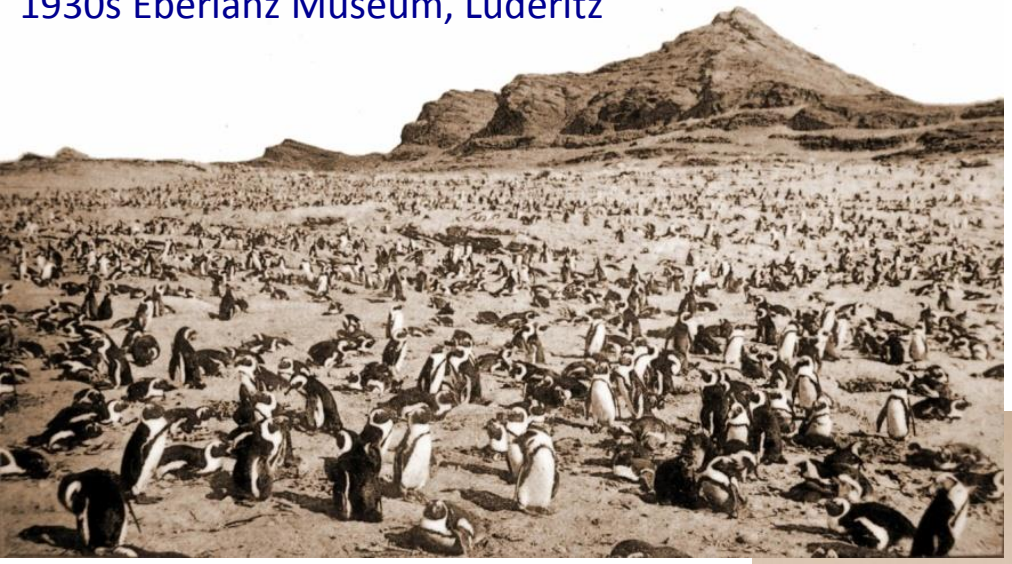
1/3 to be implemented in several countries (USA, Australia, New Zealand, South Africa)

The African penguin and Cape gannets in Namibia have declined by 77% and 94% respectively because of lack of pelagic fish

(Ludvnia et al. 2010)

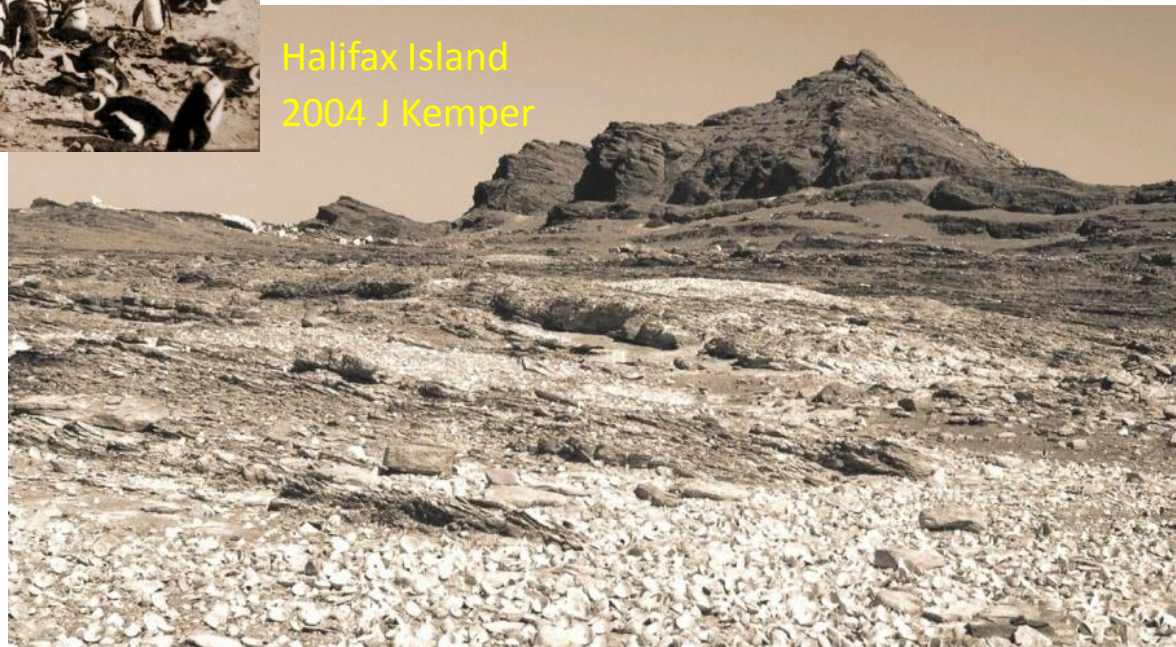
Halifax Island

1930s Eberlanz Museum, Lüderitz



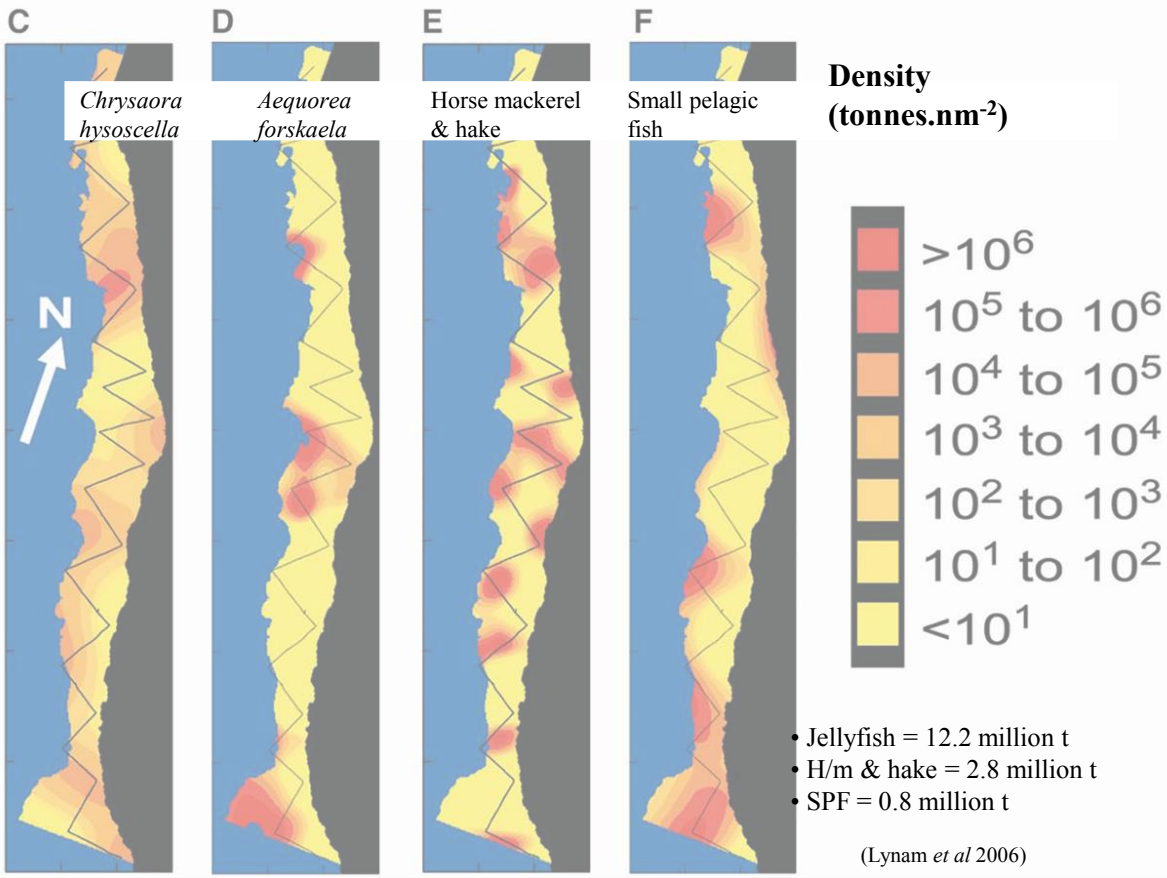
Halifax Island

2004 J Kemper



‘Jellification’ of the Namibian ecosystem!

jellyfish (*Cnidaria, Medusozoa*), negligible before 1970s, reached 40 MMT in the 1980s and 12.2 MMT in the 2000s (Lynam et al. 2006), approximating 2.5 times the combined biomass of present exploited fish populations.



- Jellyfish = 12.2 million t
- H/m & hake = 2.8 million t
- SPF = 0.8 million t

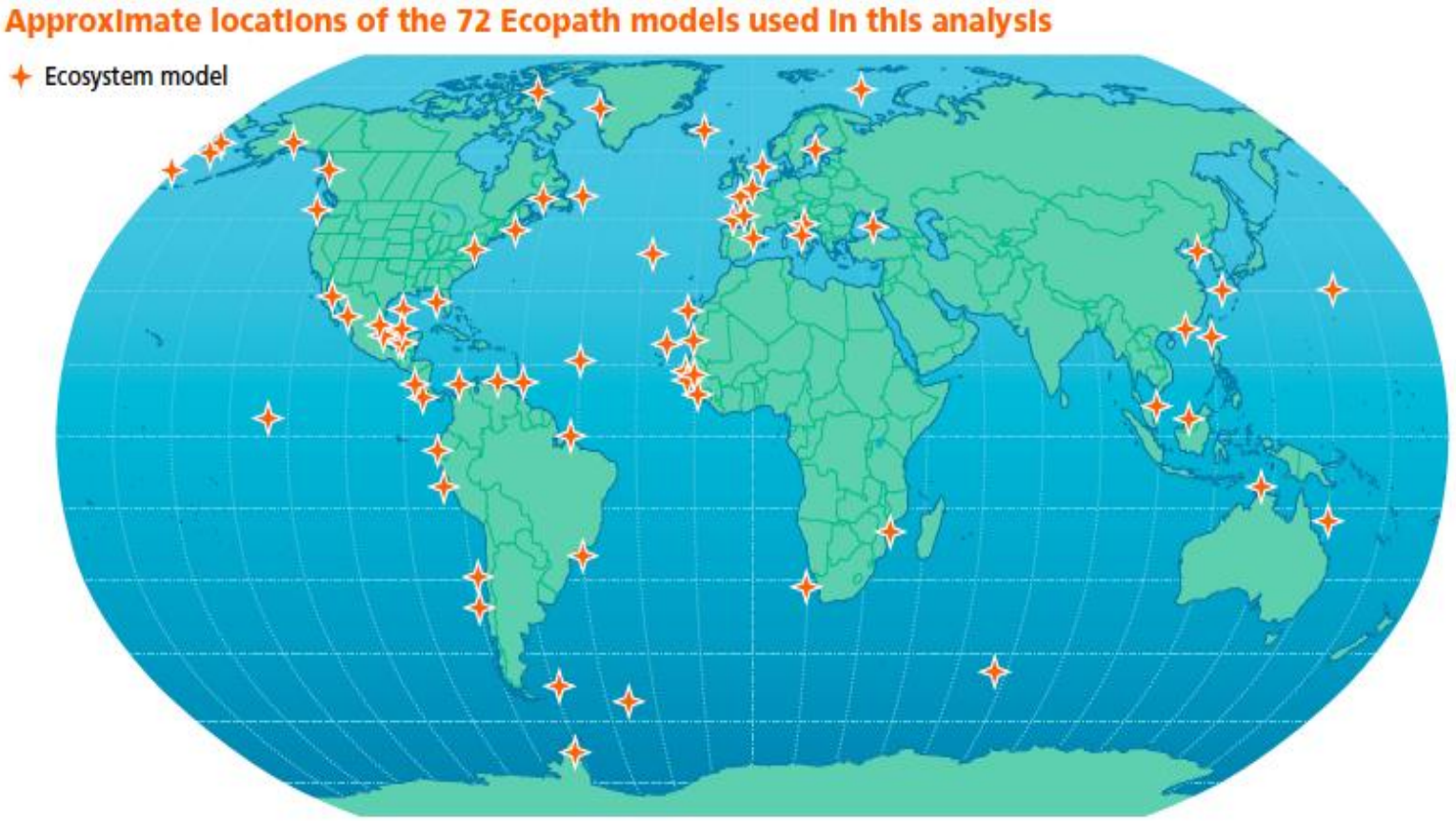
(Lynam *et al* 2006)

Today between 12 to 40 mt of jellyfish in the Namibian ecosystem

“for these fishermen [jellyfish] have become an increasingly irritating nuisance”

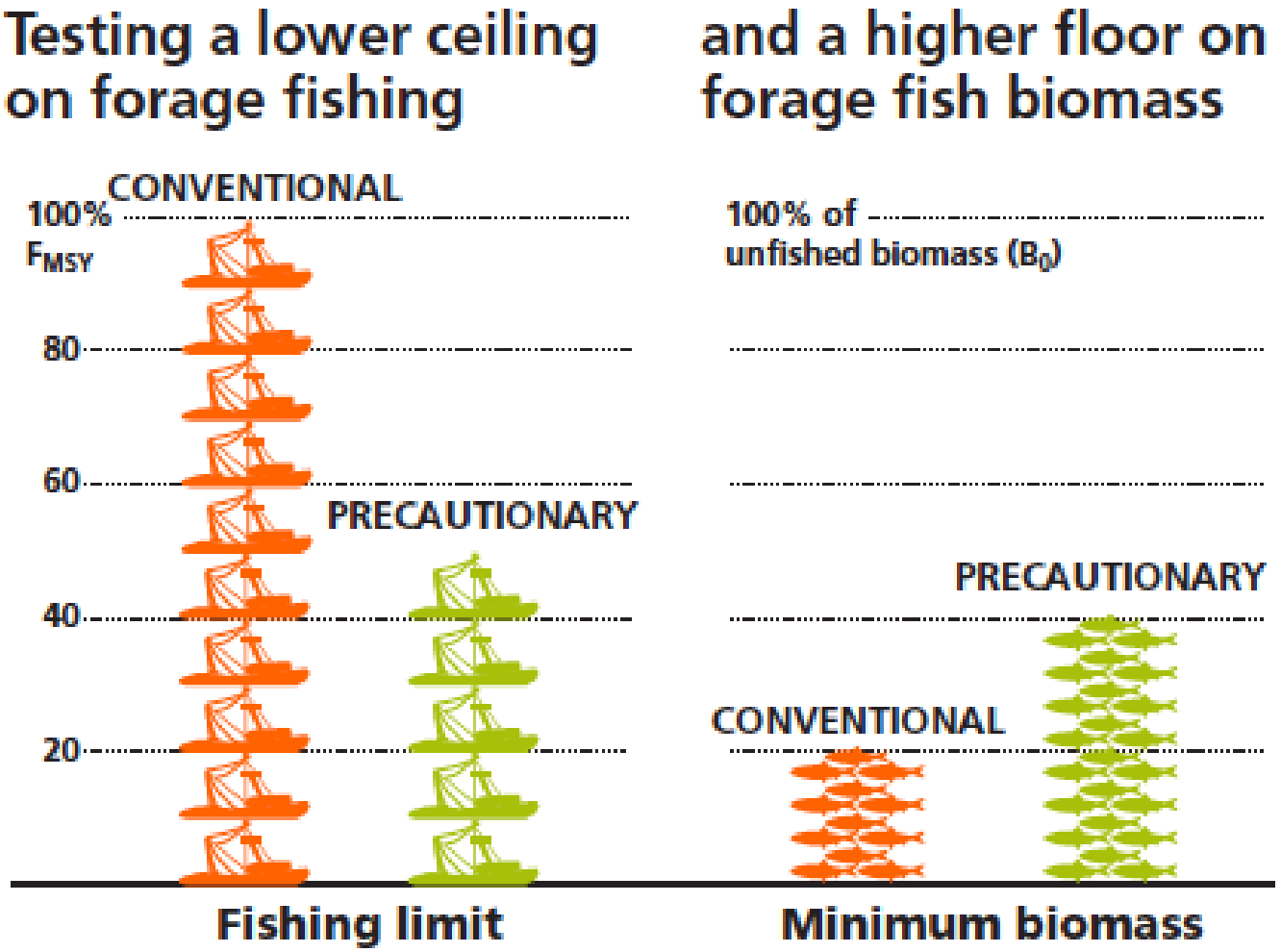
(Venter 1988)

Lenfest WG : Exploring ecosystem resilience under different forage fish exploitation patterns (Pikich et al. 2012)



Conventional & EAF approach

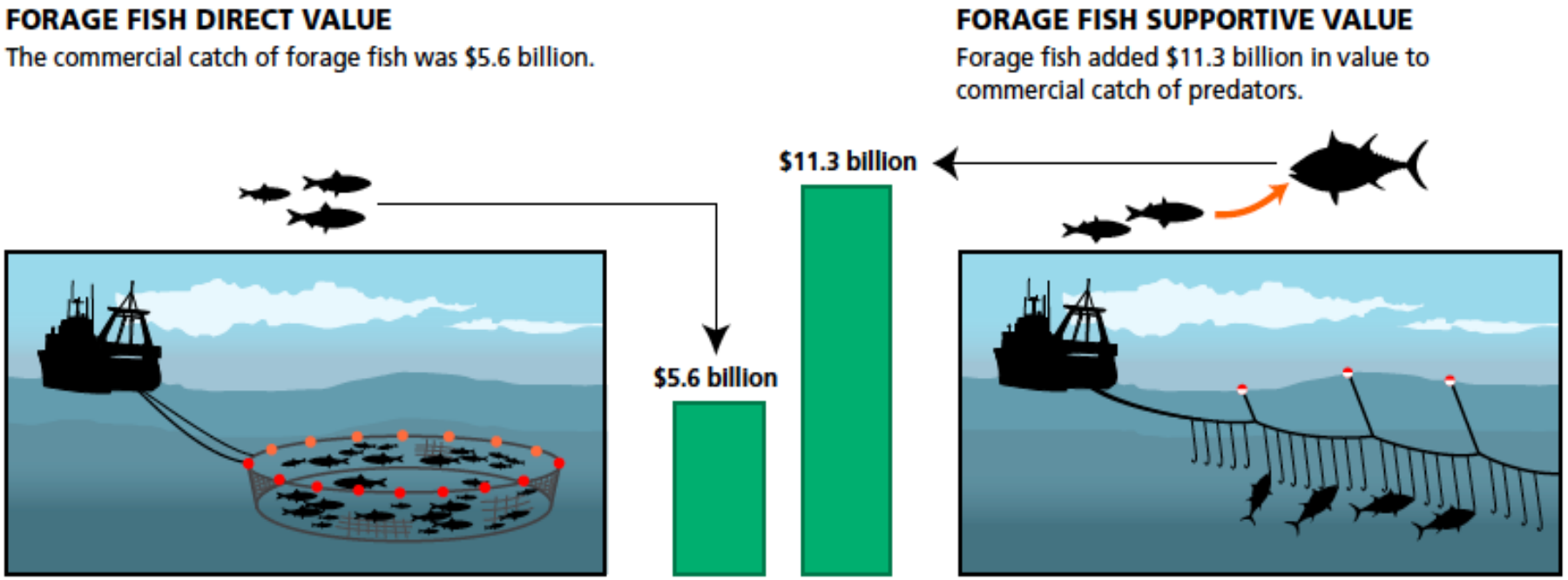
(Pikitch et al 2012)



Forage fish (Lenfest report)

Direct value = 5.6 b$

Supportive value = 11.3 b$



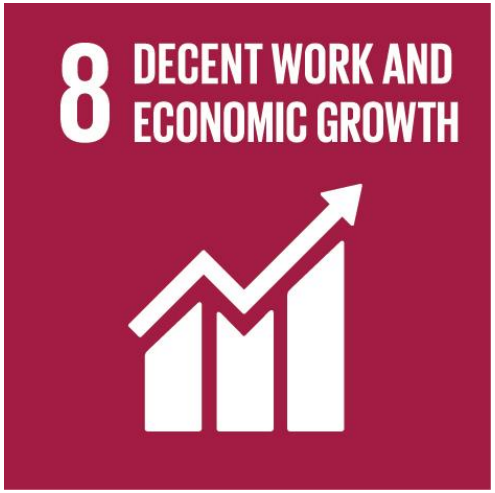
THE LENFEST FORAGE FISH TASK FORCE REPORT (PIKITSCH ET AL 2012)

- Forage fisheries should be **managed to sustain both forage fish and predators**. Managers should set catch levels that protect forage populations from collapse and, with high probability, do not make predator species vulnerable to extinction.
- The Task Force recommends that, in most ecosystems, **fishing should be half the conventional rate and twice the amount of forage fish should be left in the ocean (0.4B0)**.
- Use **greater caution when there is less information** on forage fish and their interactions with predators and the environment.

Future Direction for fisheries management in the Mediterranean Sea

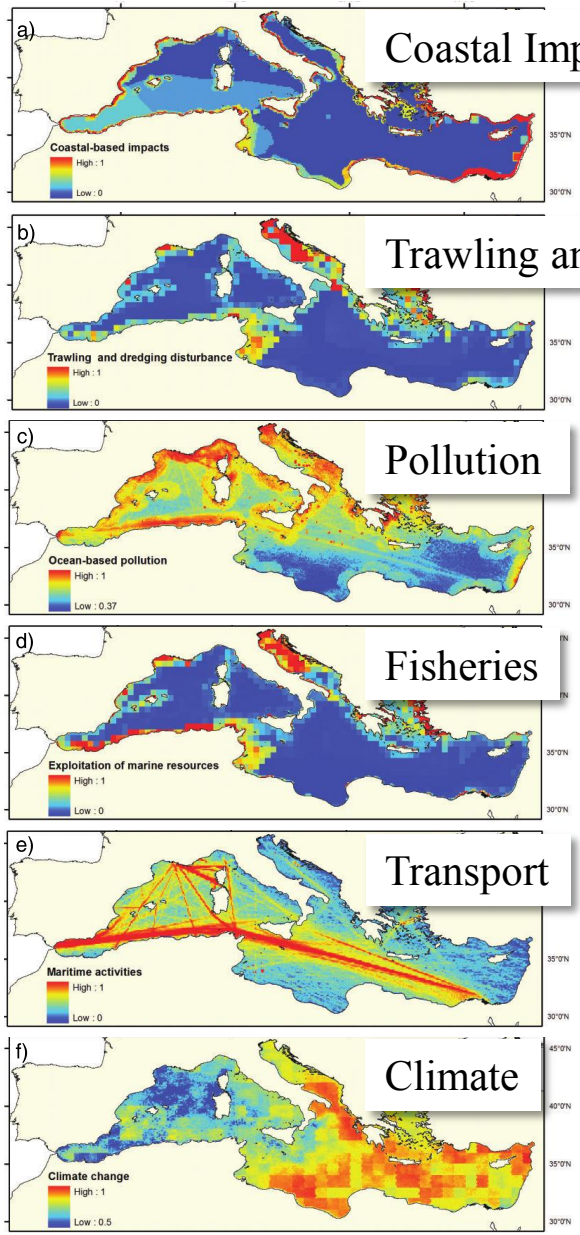
What to do in order to improve a worrying situation ?

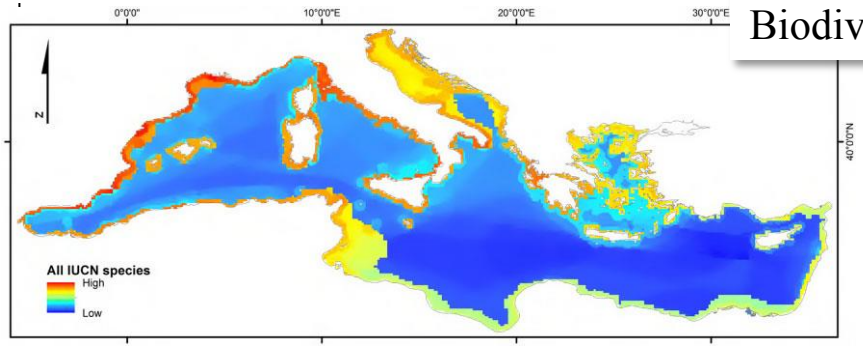
Reconciling Sustainable Development Goals of the Agenda 2030



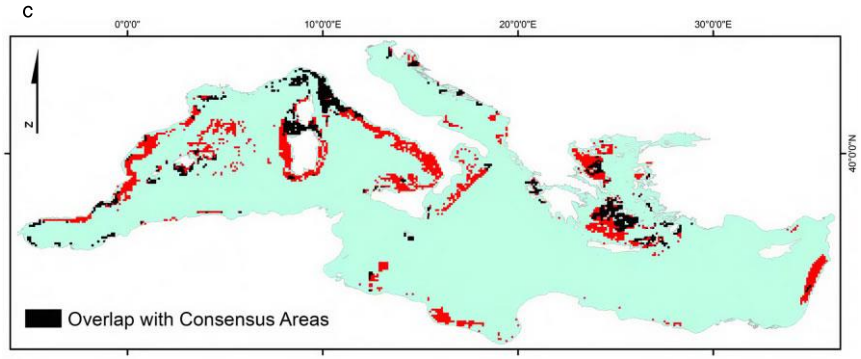
1. Promoting integrated and multidisciplinary scientific studies at the scale of the whole basin

Integration the impacts in the Mediterranean basin
(Coll et al 2013 & WWF report 2015)





Quantifiying anthopogenic impacts to protect marine biodiversity
- eg. Low hanging fruit -
(Coll et al. 2014)

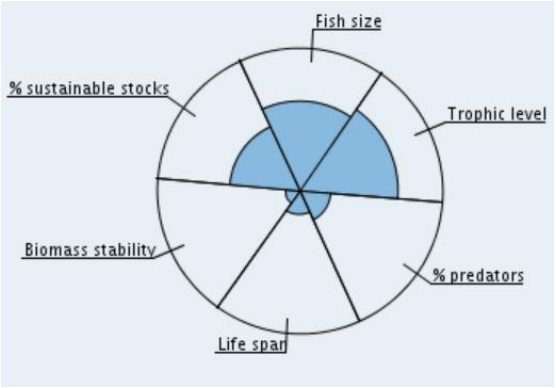


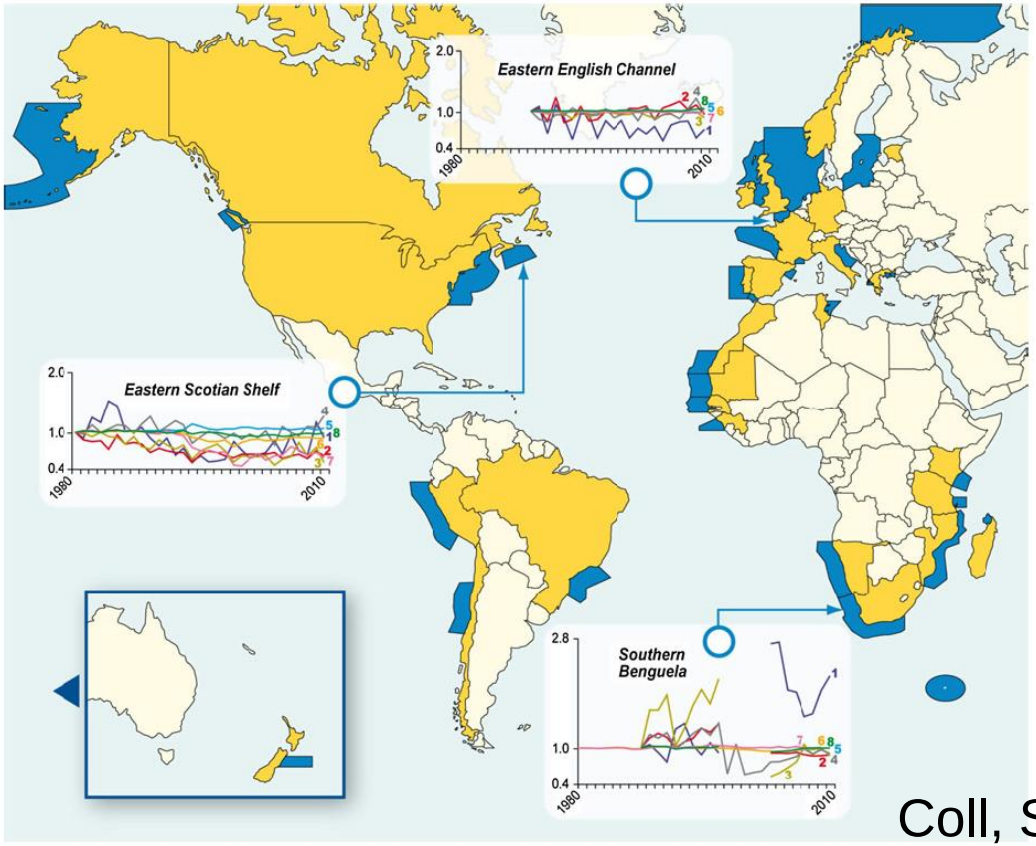
2. Promoting scientific networks for the Mediterranean Sea at an international level

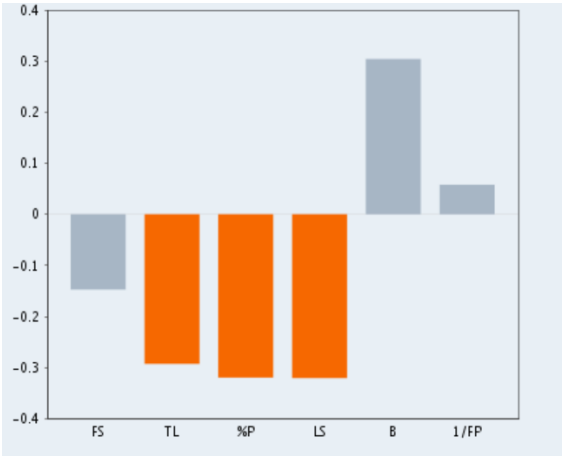
The IndiSeas international initiative

The role of indicators and reference values is fundamental to an EAF:
can be of a bio-ecological, techno-ecological and socio-cultural nature.
References points as targets, limits and thresholds

www.indiseas.org



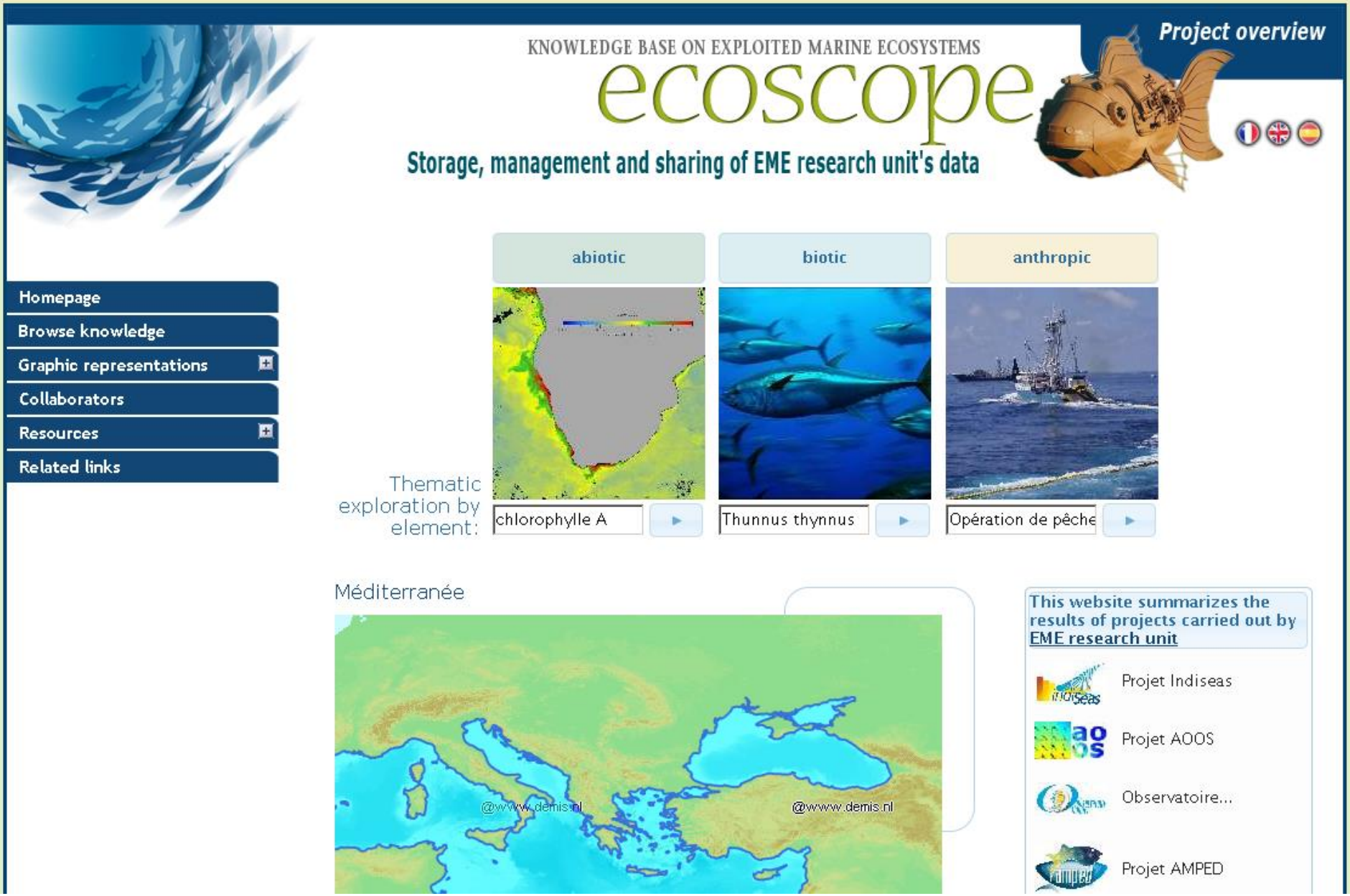




Coll, Shin et al. 2010, 2012, 2015

3. Promoting open and free access data bases

Promoting open access to marine data bases (e.g.,MedPan)



4. Promoting the EAF and build integrated framework using scenarios building (sensu IPBES)

Marine Strategy Framework Directive MSFD

KISS keep it simple stupid !

Qualitative descriptors for determining Good Environmental Status (GES)

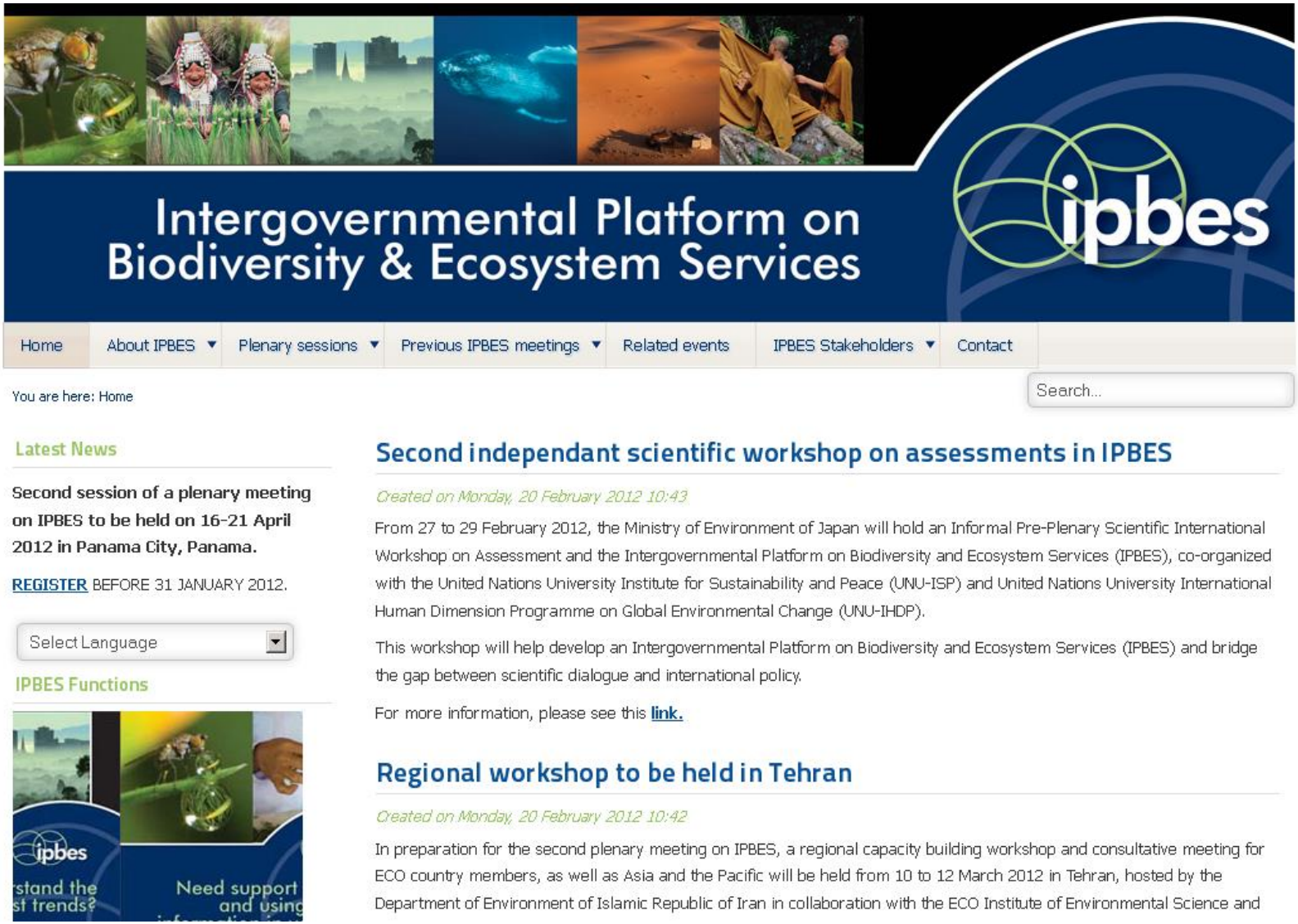
Descriptor 1: Biological diversity
Descriptor 2: Non-indigenous species
Descriptor 3: Population of commercial fish / shell fish
Descriptor 4: Elements of marine food webs
Descriptor 5: Eutrophication
Descriptor 6: Sea floor integrity
Descriptor 7: Alteration of hydrographical conditions
Descriptor 8: Contaminants
Descriptor 9: Contaminants in fish and seafood for human consumption
Descriptor 10: Marine litter*
Descriptor 11: Introduction of energy, including underwater noise

EAF Successful implementation

(Augustyn et al 2013)

1. **Stakeholder participation is critical** to the successful implementation of an EAF. Complexity creates confusion, frustration and reduces the chances of success.
2. **A structured approach** provides a platform for views to be aired, broadens perspectives, improves understanding of the issues. the EAF tracking tool is simply a means to structure and facilitate discussion
3. **All views must be represented and no group or individual allowed to dominate.**
4. **The advantage of a generic approach is that it allows for comparison, interrogation and reporting at any leve**l. operational managers can track progress of management actions in a participatory and transparent manner to develop a work plan to address issues.
5. **NGOs such as WWF have played an important role** in assisting the implementation of EAF and environmental initiatives.

Ipbes: the future of marine ecosystems in a global change context (Building scenarios)



Building scenarios sensu IPBES Involving stakeholders

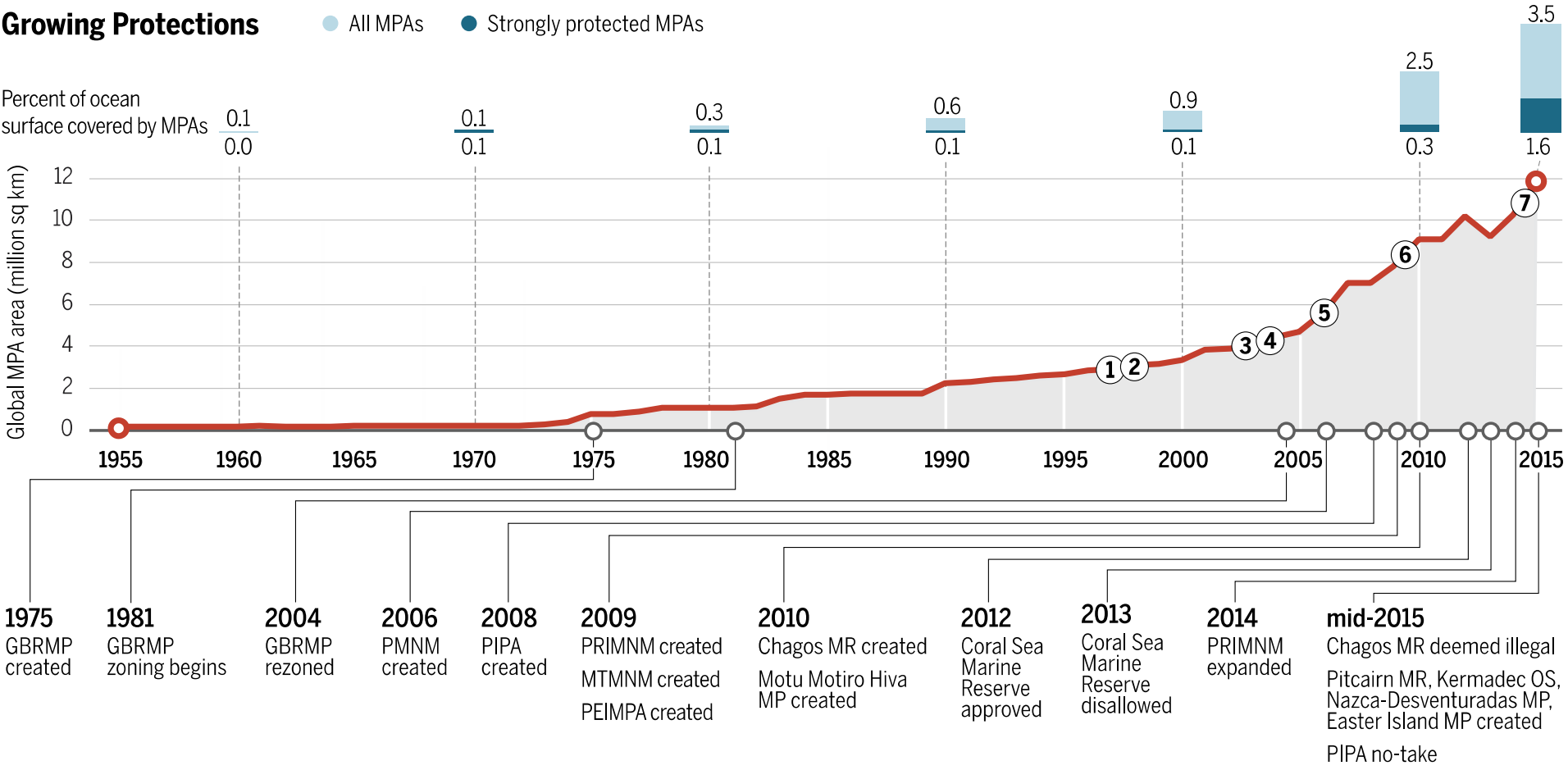
Scenarios Laboratory

- Ocean Futures Project by Villy Christensen (Fisheries Center , Vancouver)

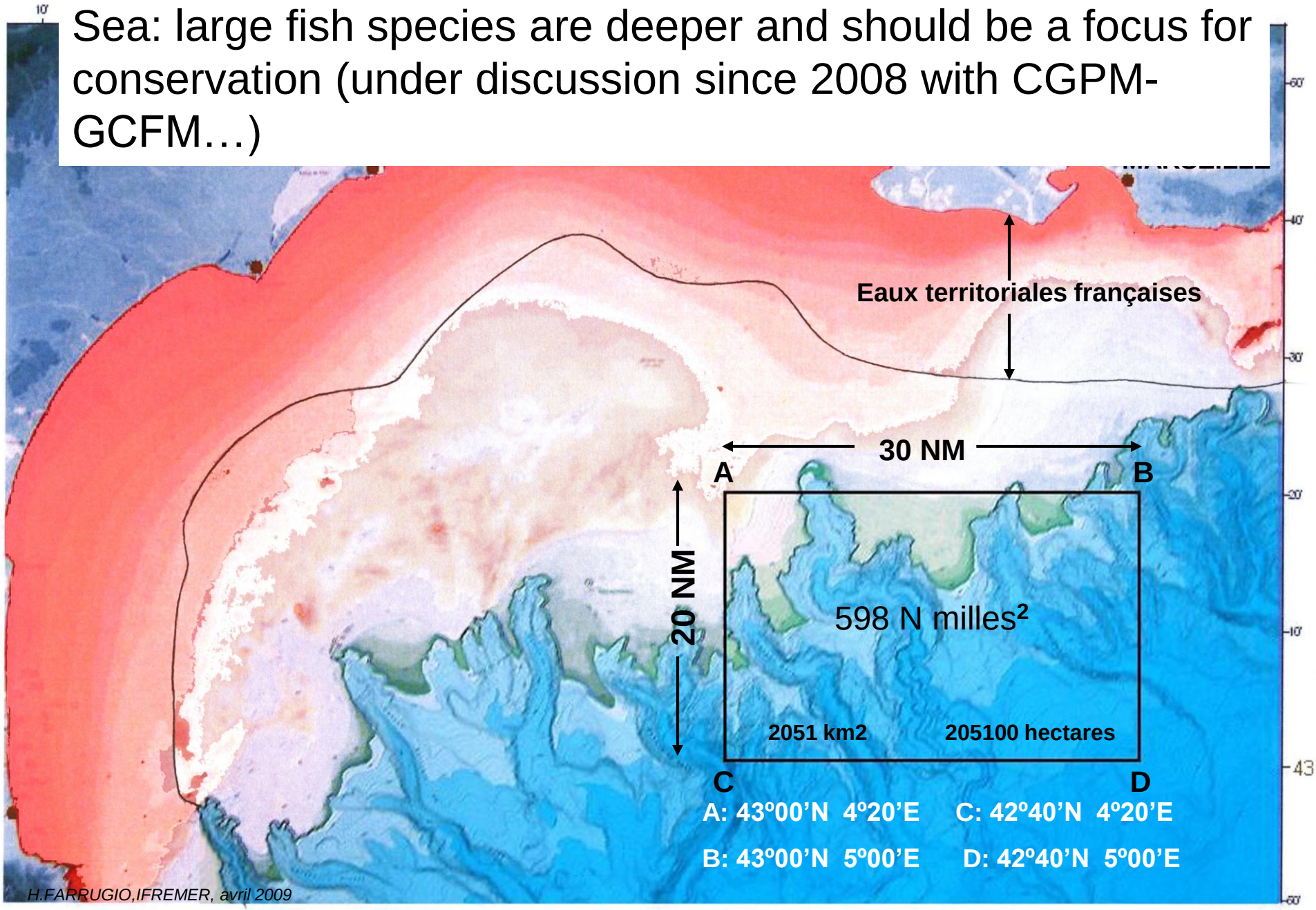
5. Promote (large) and well managed MPAs for conservation

Spatial planning and MPAs as a tool to protect biodiversity

(Lubchenco Science 2015)



Protection of canyons and the ‘miracle’ of the Mediterranean Sea: large fish species are deeper and should be a focus for conservation (under discussion since 2008 with CGPM-GCFM…)



Discussion

1. Science issues:

- integrated and multidisciplinary scientific studies at the scale of the whole basin (to respond to the global change challenges)
- Promoting scientific networks for the Mediterranean Sea at the international level
- Promoting open access data bases
- Promote research on indicators and identification of thresholds and Limit Reference Points
- Promote research on spatial planning

1. Integrated governance for management:

- Implementing GES/MSFD and ecosystem indicators (KISS, analogy with blood)
- An integrated framework using scenarios building (sensu IPBES) with stakeholders
- Promoting spatial planning large MPAs networks for conservation to buffer climate effects
- Promoting sustainable and well-managed small scale fisheries with short circuit market (co-management, use tracking systems,….
- Promoting case studies that produced positive results