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# Sustainable seafood production from competitive European fisheries

Friedrich W. Köster



Era-net: Cooperation in Fisheries, Aquaculture and Sea Food Processing

# How important?

Fishery, aquaculture and seafood industries:

- sustained in 2009 a production of 6.4 million tons in EU countries,
- generating an overall value output of more than 30 billion EUR,
- sustaining an employment of ca. 400,000 persons, often in rural and outermost European regions,

EU imports of fisheries and aquaculture products amounted to 16.6 billion EUR in 2010, with exports being 2.8 billion EUR.

EU landings peaked in 2001 at 6.9 million tons, and declined since then to 5.1 mio. tons in 2011.

EU fishing fleet capacity has declined in last 20 years with annual rates of nearly 2%, both in tonnage and engine power.

Still, the marine fishing sector alone sustains 137,000 full time employments, with Spain, Greece and Italy accounting for around 60%.

# Policy context

## Fisheries:

- as an economically and socially important activity
  - building the bio-economy by 2020 (**Europe 2020**)
- to be integrated into the ecosystem approach to marine management
  - implementing the revised **Common Fisheries Policy** (CFP)
- has a substantial impact on marine ecosystem
  - implementation of the **Marine Strategy Framework Directive** (MSFD), Convention on Biological Diversity (CBD) and other environmental directives
- interacts and competes with other human activities (e.g. habitat use)
  - **EU Maritime Policy, EU Sea Basin Strategies**, EU Directive establishing a framework for **maritime spatial planning** and integrated coastal management

# Common Fisheries Policy

The objectives of the CFP (Regulation (EU) No 1380/2013) are to:

... ensure that fishing (and aquaculture) activities are **environmentally sustainable** in the long term and are managed in a way that is consistent with the objectives of achieving **economic, social and employment benefits**, and of contributing to the **availability of food supplies**.

... apply the **precautionary approach** ...

... progressively restoring and maintaining populations of fish stocks above biomass levels capable of producing **maximum sustainable yield** ...

... implement the **ecosystem based approach** to fisheries management to ensure that negative impacts on the ecosystem are minimized...

# Sustainable development

*'to provide for sustainable exploitation of living aquatic resources ... taking account of the **environmental, economic and social** aspects in a balanced manner'* (Council Regulation 2371/2002).

While directly referencing the precautionary and the ecosystem approach, it is not clear how these relate to economic and social objectives.

Not perceived as obstacle: *'... the economic and social viability of fisheries can only result from restoring the productivity of fish stocks. Therefore, no conflict exists between ecological, economic and social objectives in the long term.'* (COM (2009)163).

- Expectation realistic? Not clear! Fisheries management evaluation frameworks for testing tradeoffs developed in FP7, but not yet operational.
- Conflicting ecological, economical and social objectives occur and need to be addressed with a clear hierarchy of objectives,
  - also in partner countries outside the EU,
  - steps made with focus on small-scale, artisanal or coastal fisheries.
- Demand for methodology development and implementation of integrated impact assessments (H2020, Era-Nets, European Maritime Fisheries Fund – EMFF).

# Precautionary approach

Based on FAO Code of Conduct for Responsible Fisheries (1995).

Requires inclusion of uncertainty in assessments and presenting outputs as probabilities of and risks against not achieving management objectives.

Development of methodology made progress in FP7.

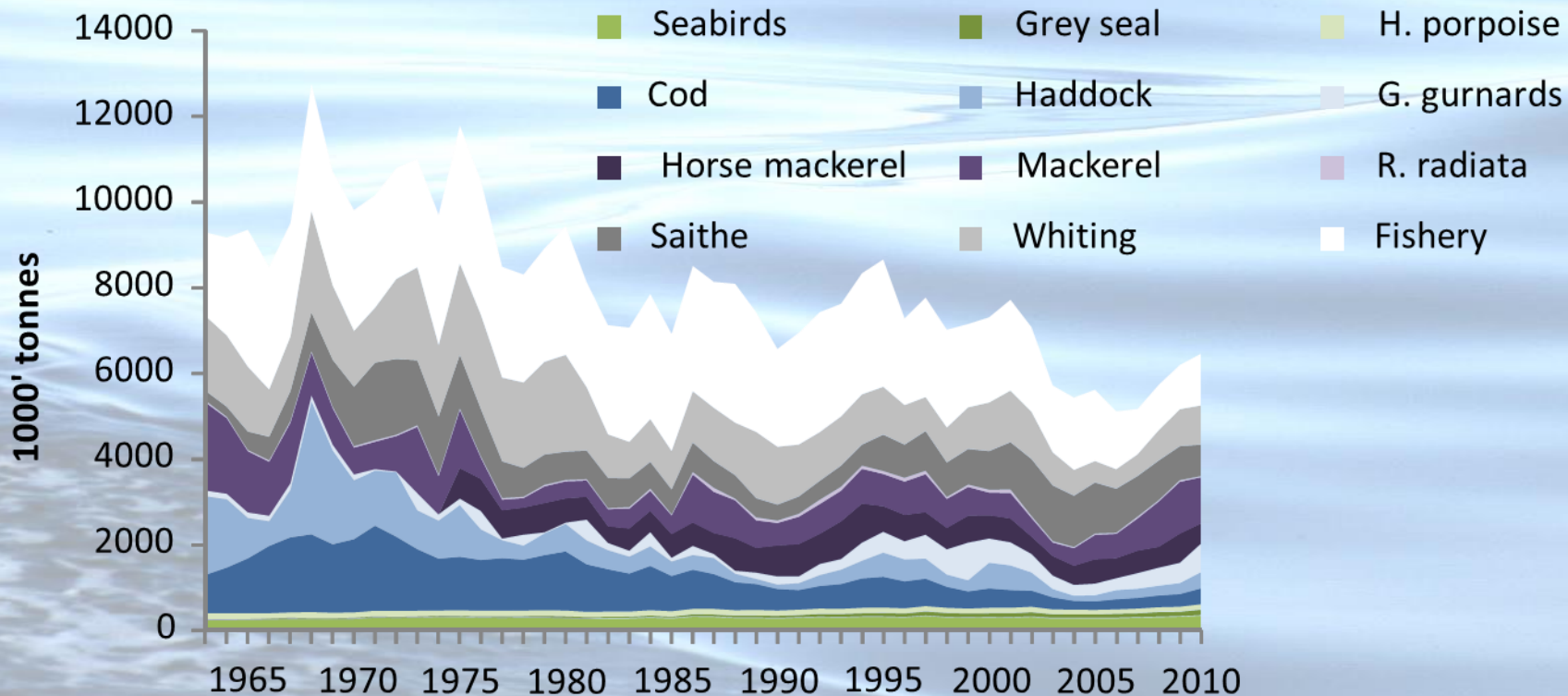
- but, stock assessments are still often deterministic not providing estimates of uncertainty and hence creating problems for evaluation of management measures,
- output is not communicated adequately to stakeholders, although progress through Regional Advisory Councils.

# Maximum Sustainable Yield (MSY) concept

CFP: The MSY exploitation rate shall be achieved by 2015 where possible and, on a progressive, incremental basis at the latest by 2020 for all stocks.

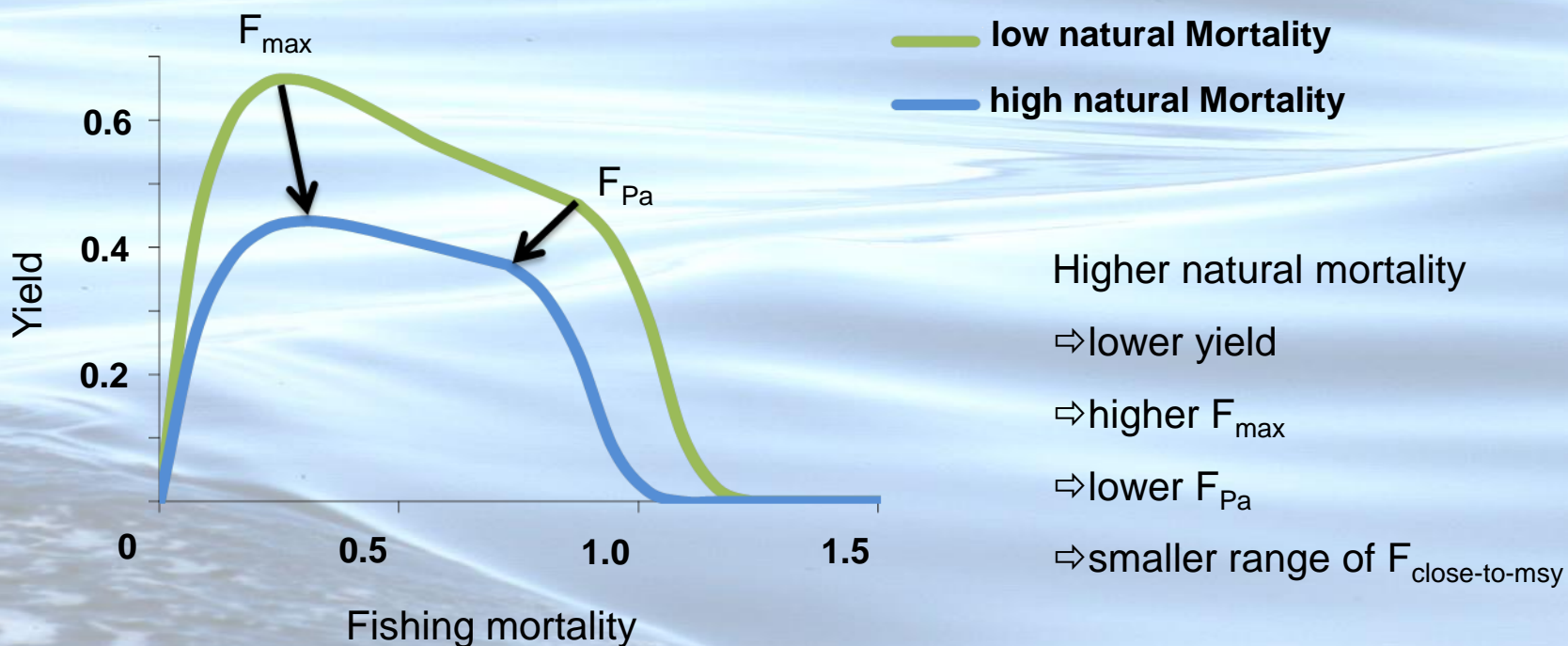
However, productivity of fish stocks depend on drivers partly out of human control, e.g. interactions between species.

### Removal by fishery and predators in the North Sea



# Maximum Sustainable Yield (MSY) concept

MSY 'is not necessarily constant over time, even when implemented as fishing mortality' (COM (2006) 360).

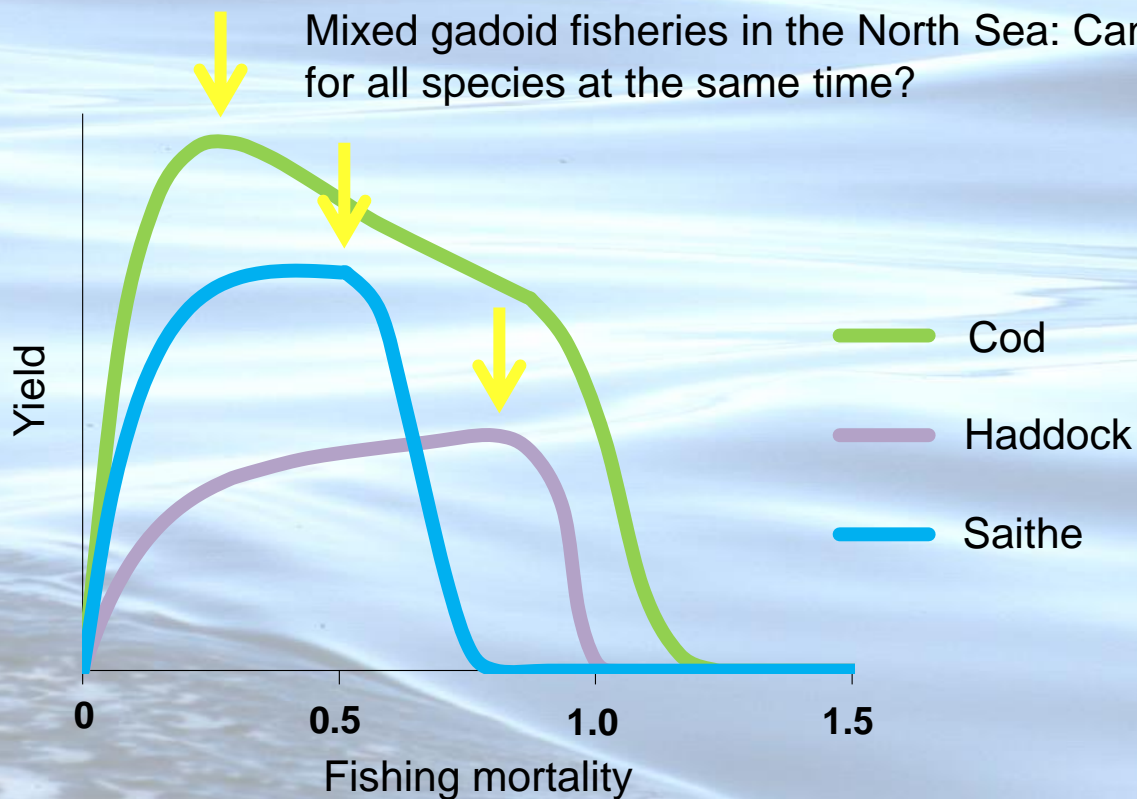




# Maximum Sustainable Yield (MSY) concept

Fisheries target often more than one species, making it difficult to achieve MSY targets simultaneously for different stocks.

Mixed gadoid fisheries in the North Sea: Can we get MSY for all species at the same time?



# Maximum Sustainable Yield (MSY) concept

What to maximise? food supply, economics, social stability, good environmental status?

An FP7 project identified acceptable and feasible MSY variants (with involvement of scientists, industry and NGO's).

Best ratings with respect to impact and implementation feasibility:

- inclusive governance: engaging an appropriate range of stakeholders in decision making processes,
- yield in value of key commercial species,
- followed by other values based variants.

None of present MSY variants, e.g. yield or catch in tons was rated high and environmental variants, such as community biomass, stability etc. were rated low.

→ Underpins the need to agree on objectives!

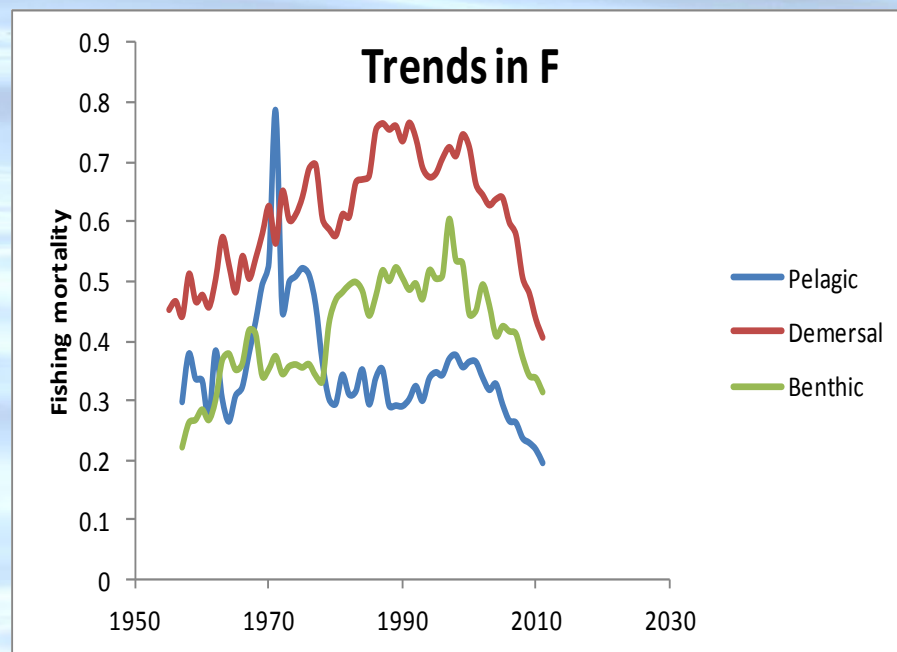
# MSY implementation

Fishing mortality resulting in MSY ( $F_{MSY}$ ) as presently determined by the International Council for the Exploration of the Sea (ICES) considers:

1. trends in productivity of fish stocks (e.g. caused by climate change),
2. trends in natural mortality (e.g. species interactions),
3. but not that different species are caught together (mixed fisheries),
4. neither any variants other than quantity of catch.

# MSY implementation: where are we?

Analysis by ICES (2012): based on 46 of the assessed stocks



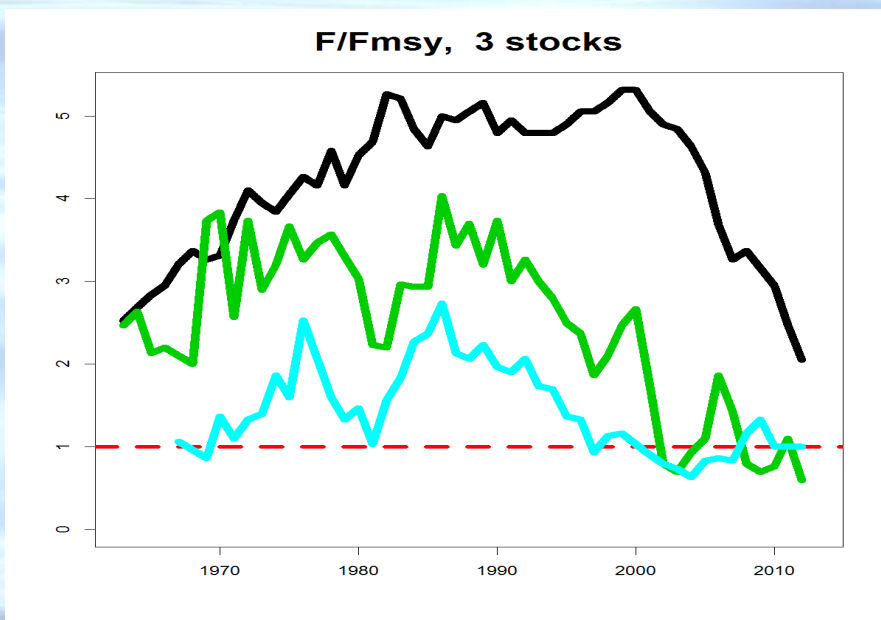
Fishing mortality (F) has strongly declined in groundfish and mid-water fish stocks.

ICES (2012). Report of the ICES Advisory Committee. Book 1, 140 pp.

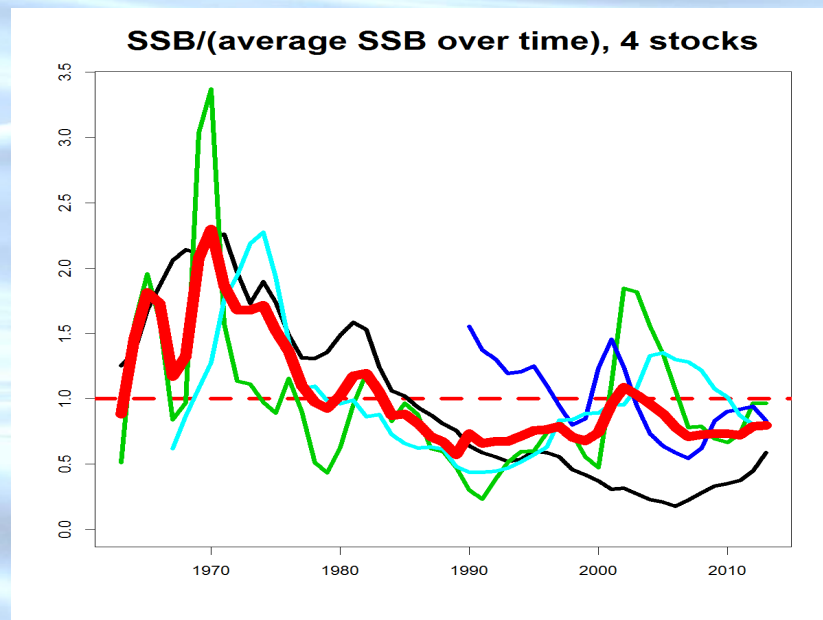
# North Sea gadoids

Updated analysis by ICES (2013) based on 85 stocks grouped according to eco-region

Trends in fishing mortality relative to  $F_{MSY}$  ( $F/F_{MSY}$ ) and spawning stock biomass development (SSB)



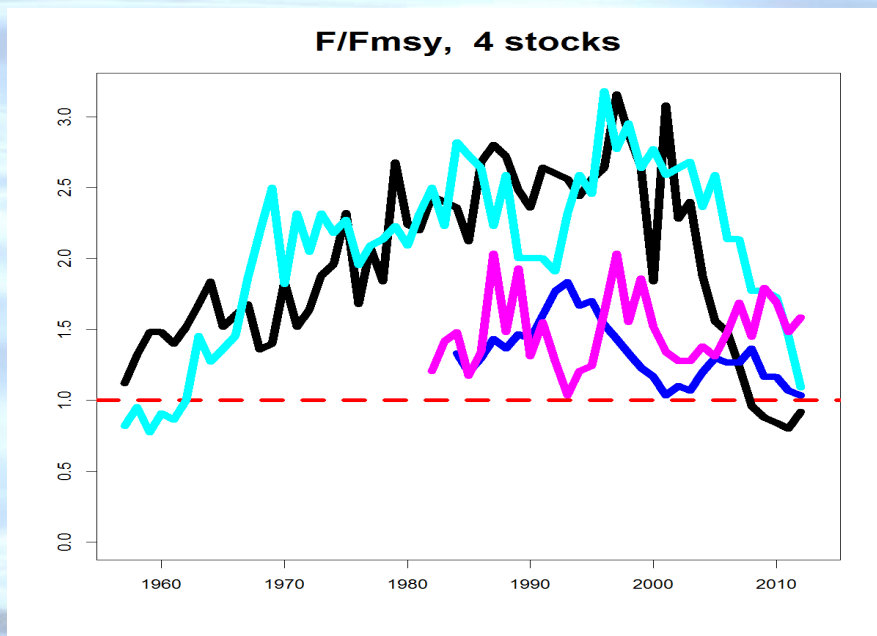
2 of 3 stocks at  $F_{MSY}$  or less



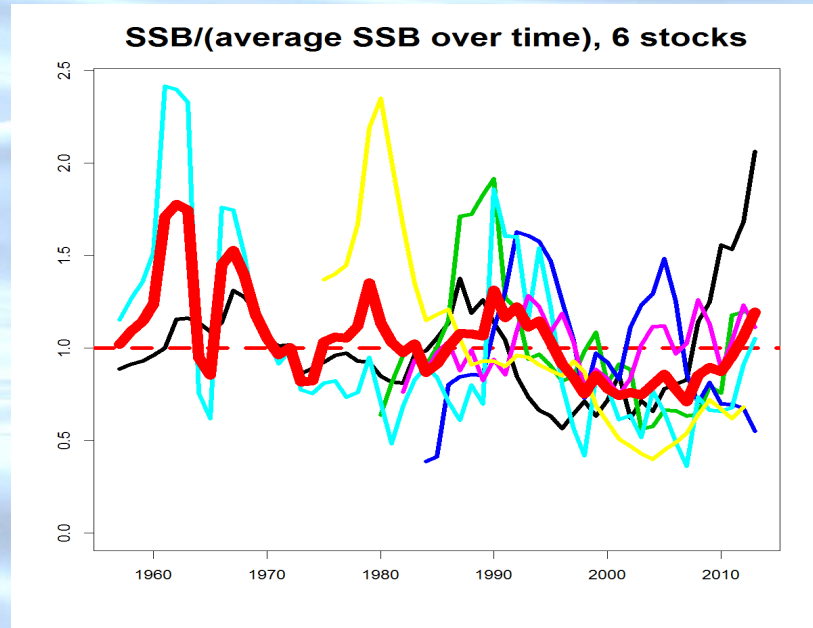
Hardly an recovery in stock size  
(in bold-red: average)

# North Sea flatfishes

Trends in fishing mortality relative to  $F_{MSY}$  ( $F/F_{MSY}$ ) and spawning stock biomass development (SSB)



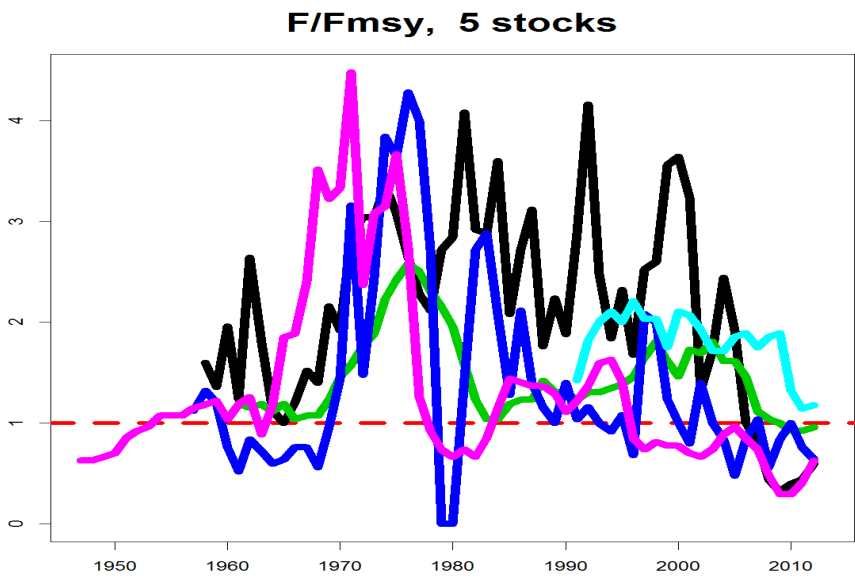
3 of 4 stocks at  $F_{MSY}$



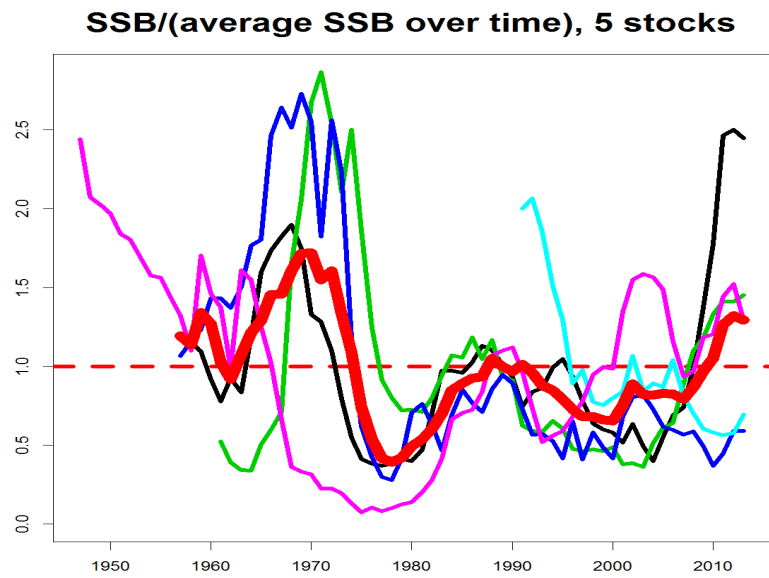
Recently positive trend in stock size  
(in bold-red: average)

# Pelagic stocks in the North Sea/west of British Isles

Trends in fishing mortality relative to  $F_{MSY}$  ( $F/F_{MSY}$ ) and spawning stock biomass development (SSB)



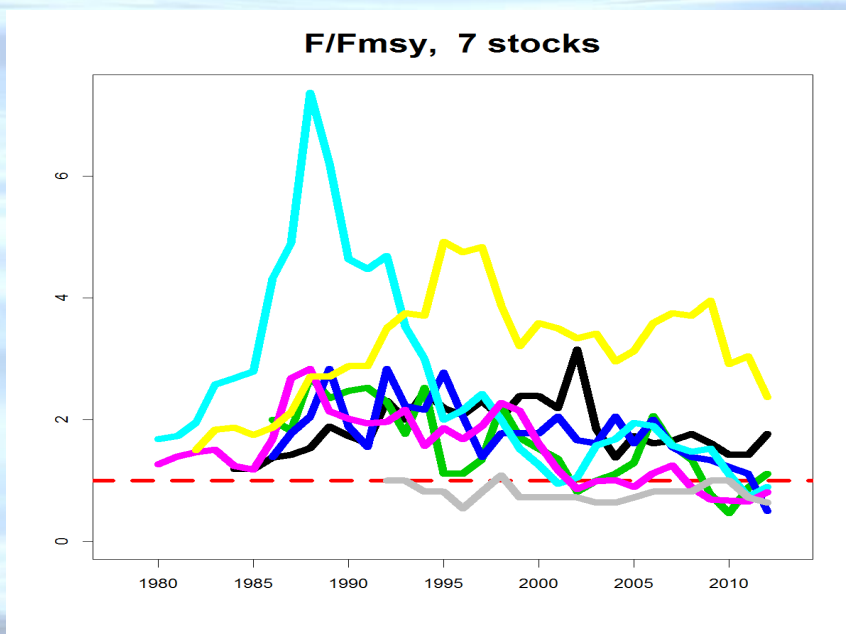
4 of 5 stocks at  $F_{MSY}$  or less



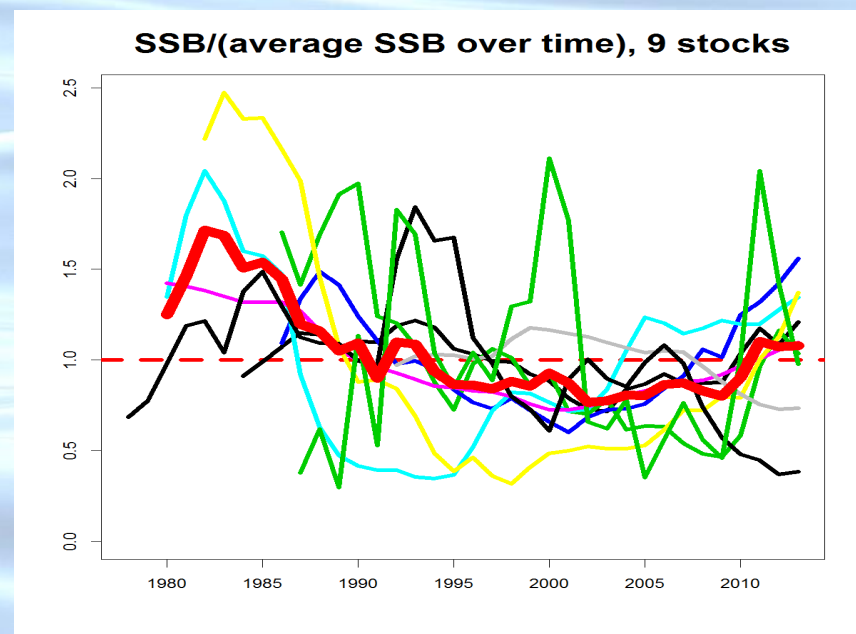
Positive trend in stock size  
(in bold-red: average)

# Bay of Biscay/Iberian Peninsula stocks

Trends in fishing mortality relative to  $F_{MSY}$  ( $F/F_{MSY}$ ) and spawning stock biomass development (SSB)



5 of 7 stocks at  $F_{MSY}$  or less



Limited positive trend in stock size  
(in bold-red: average)



# Summary on MSY implementation

Improved situation in most recent years!

Spawning stock biomass is increasing, but more slowly than fishing mortality declines.

62% of the stocks assessed by ICES are fished at or below  $F_{MSY}$  (ICES 2013), but only 12% in the Mediterranean Sea and the Black Sea (EU 2013).

- more estimates of MSY for "minor stocks" and Mediterranean/Black Sea species are needed.
- works best for longer-living species, short-living species affected more by species interaction and environment (reproductive success) than fisheries.
- multiannual management plans are a priority instrument in the revised CFP:
  - should address MSY considering mixed fisheries aspects,
  - should account for economic/social impact.

Progress requires closer cooperation between:

- Advice providing organisations (e.g. ICES),
- EU Commission services (Joint Research Center and Scientific, Technical and Economic Committee for Fisheries),
- Stakeholders.

# Ecosystem approach

The revised CFP defines

*‘... an integrated approach to managing fisheries within ecologically meaningful boundaries which seeks to .... preserving ... the composition, structure and functioning of the habitats of the ecosystem affected, ....’*

*‘... contribute to the protection of the marine environment, ... and in particular to the achievement of good environmental status by 2020, as set out in Article 1(1) of Directive 2008/56/EC....’* , the Marine Strategy Framework Directive (MSFD)

→ National implementation of MSFD causes problems with respect to coherence, but revised CFP opens for regionalisation and thus enhanced member state coordination.

# Impact of fisheries on ecosystems

Fisheries catch both valuable target/by-catch species and unwanted by-catch consisting of undersized/protected valuable as well as non-commercial species:

- catch compositions not sufficiently documented: enhanced monitoring programs (EMFF) also in cooperation with industry,
- assessments of population dynamics for non-commercial species (H2020, regional programs such as Article 185 BONUS in the Baltic).

Fisheries change genetic, spatial structures, life history traits of populations:

- quantify and predict long-term impact (H2020, Era-Nets).

Certain fishing methods change habitat structure and alter benthic communities:

- greener, also more energy efficient fishing gears (European Fisheries Technology Platform, Era-Nets)

Fisheries affect entire food webs:

- impacts on upper trophic ecosystem levels, e.g. effects on food supply of birds/marine mammals (Era-Nets, EMFF),
- top-down control on lower trophic ecosystem levels, e.g. impact on nutrient and contaminant recycling (H2020, regional programs).

# Landing obligation

CFP envisages a gradual elimination of discards reducing unwanted catches ensuring that all catches are landed.

- Considerable consequences on fisheries, their monitoring, assessment and management as well as ecosystems, requires:
- design and implement selective fishing gears and fishing performance,
  - improve sorting and storage facilities onboard fishing vessels,
  - foster utilisation and valorization of discards for high quality products,
  - improve monitoring and stock assessment, as considerable changes in fishing behaviour/exploitation pattern can be expected,
  - ascertain the role of discards in ecosystems, i.e. positive and negative impacts, e.g. on production of exploited stocks,
  - environmental, economic and social impact assessment of measures enforcing landing obligations.
- addressed in H2020, but needs also regional and local follow-up!

# Conclusions

Fisheries management need clear hierarchies of ecological, economical and social objectives on regional, European and global scales.

Precautionary approach requires inclusion of uncertainty and presenting outputs as probabilities of and risks, also to stakeholders.

The MSY concept is a methodological challenge:

- Productivity of stocks depend on drivers partly out of human control, requiring science, monitoring, assessment and management systems considering this.
- As MSY is not constant over time, regular updates of MSY targets are required.
- Fisheries catch often more than one species, requires MSY targets to be reached simultaneously for different stocks.
- What to maximise? food supply, economics, good environment, social stability? Likely a combination, impact assessments evaluating trade-offs needed!

However it works:

- Fishing mortality has come down in many fish stocks and stock biomass increases, but slower.
- 62% of the stocks assessed by ICES are fished at or below  $F_{MSY}$ , but only 12% in the Mediterranean Sea and Black Sea.

# Conclusions

Mitigating impact of fisheries on ecosystems requires:

- data on none commercial by-catch species and fishing impact on communities/habitats → integrated fisheries/environmental monitoring program,
- knowledge on population dynamics of by-catch species,
- understanding of food web structure/functioning, e.g. role of discards in ecosystems,
- greener, efficient fishing gears allowing to catch high quality raw products → more innovation projects,
- adequately designed impact assessments to make technical measures effective, including protected areas as a priority measure in the revised CFP,

Largest single technical problem in implementing the revised CFP is the landing obligation (discard ban).

Regional implementation of CFP gives member states more freedom in establishing efficient management:

- enhanced cooperation/coordination also in relation to MSFD,
- prerequisite for maritime spatial planning.

Revised CFP ensures that industry takes more responsibility, but progress towards co- and self management or rights based managements is limited.

Thanks' for listening !