

ICES TAC advice - Three issues

Søren Anker Pedersen and Henrik Sparholt

Three issues

1. ICES Fmsy values are underestimates;
2. ICES Management Strategy Evaluations (MSE) are biased, miss 3 out of 4 density dependent factors;
3. Precautionary considerations should not be mixed into the definition of Fmsy.

Three solutions

- a) Adopts the new F_{msy} values from the F_{msy} -project when giving advice for 2021;
- b) Develop MSE that is based on biomass production models and specific DD in all 4 factors;
- c) Return to the clean concept of F_{msy} – the F values that gives MSY.

The Fmsy-project ...www.fmsyproject.net

- 2017-2019;
- Involved some of the best-known fisheries research capacities in biology and fisheries management in the northern hemisphere;
- By far the most comprehensive analysis of Fmsy for North Atlantic fish stocks now available to science.if we have missed such a study please let me know 😊



Nordic Marine Think Tank



Nordic Council
of Ministers



Ministry of Environment
and Food of Denmark

Theme session Q
(co-sponsored by PICES) --

Sustainability thresholds and
ecosystem functioning: the selection,
calculation, and use of reference
points in fisheries management



ICES 2018
**ANNUAL
SCIENCE
CONFERENCE**

24-27 September 2018
University of Hamburg, Germany

KEYNOTES

Integrating ecological and
economic perspectives on regime
shifts in harvested marine ecosystems

Martin Quast, Kiel University, Germany &
Christian Möllmann, University of Hamburg, Germany

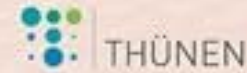
Unexpected outcomes and
unpredictable managers, fishers, and scientists

Ingrid van Putten, CSIRO Oceans and Atmosphere, Australia

Understanding deep-sea Atlantic ecosystems at ocean basin scale

Murray Roberts, University of Edinburgh, United Kingdom

#ICESASC18
WWW.ICES.DK/ASC2018





Conference 10-11 October 2018

With managers,
stakeholders and scientists



CONFERENCE ON IMPROVED FISHERIES MANAGEMENT MODELS Copenhagen 8th October 2019

Stakeholders, managers, scientists, NGOs

**Global fisheries catches
can be increased after
rebuilding of fish populations**

PROJECT: ECOSYSTEM BASED FMSY VALUES
IN FISHERIES MANAGEMENT

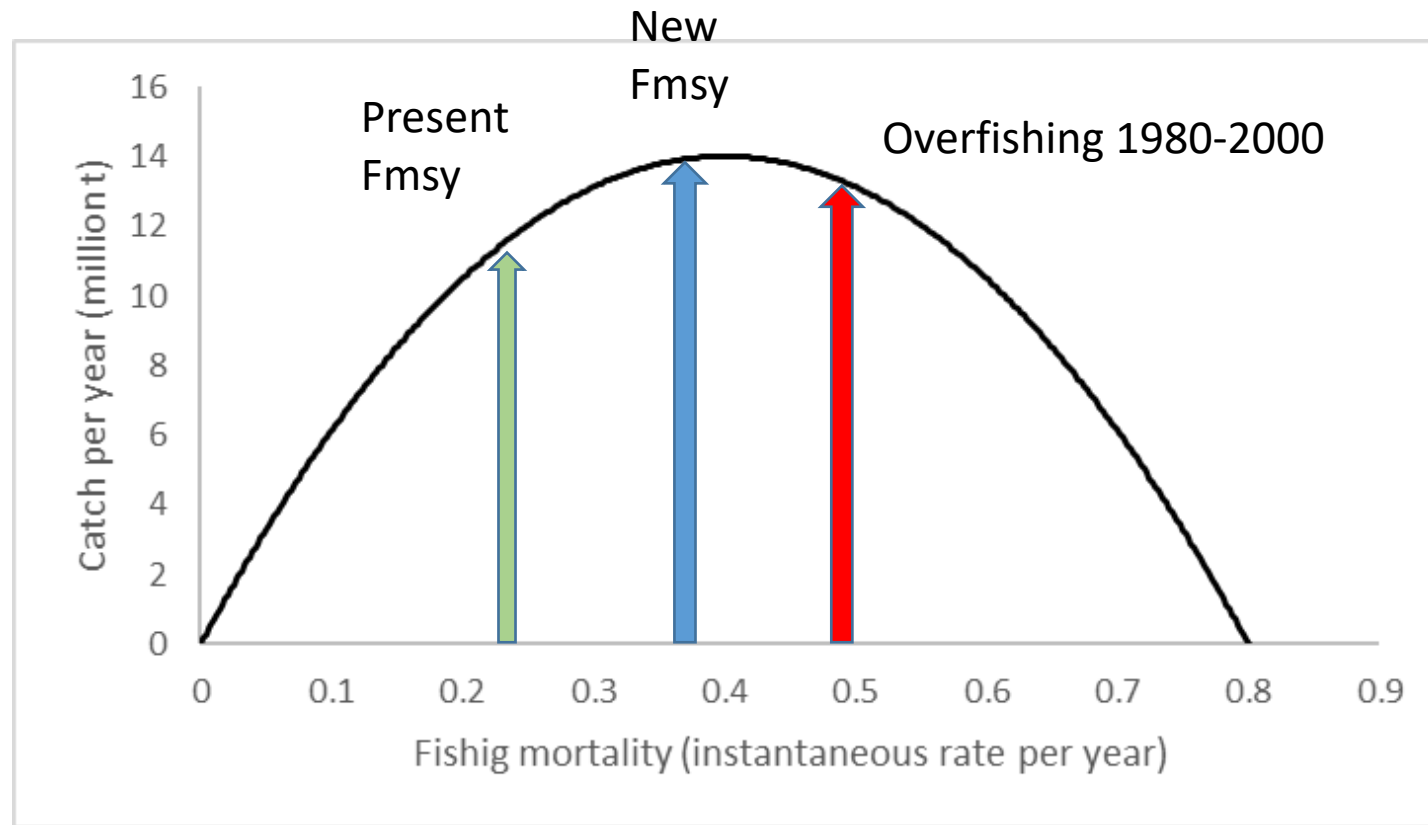
The study is published here:

- <http://norden.diva-portal.org/smash/get/diva2:1316583/FULLTEXT02.pdf>
- ...and detailed data and analysis here: www.fmsyproject.net and here:
- www.norden.org/en/publication/report-1st-working-group-meeting-optimization-fishing-pressure-northeast-atlantic
- www.norden.org/en/publication/report-2nd-working-group-meeting-optimization-fishing-pressure-northeast-atlantic
- www.norden.org/en/publication/report-3rd-working-group-meeting-optimization-fishing-pressure-northeast-atlantic-rhode

Three basic ideas in the Fmsy-project

- Use of well established Surplus Production Models - they implicitly includes all 4 density dependent elements - on the existing stock assessment time series of catch, F and SSB
- Direct calculations based on established density dependent effects for 9 of stocks
- Multi-variate statistical approach to increase precision of the new Fmsy values by relating Fmsy to life history parameters like growth rate and age-at-50%-maturity

What is Fmsy?



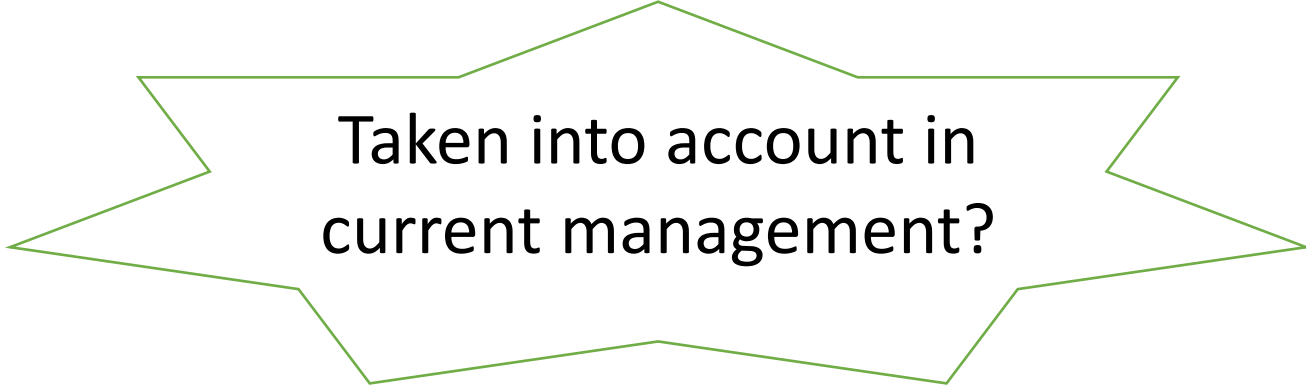
Basic ecosystem concepts

1. The production in an ecosystem is based on algae production.
2. This production is moving up the food web.
3. If fishing is too light: the fish stocks will be too large and burn too much production in metabolic maintenance (convert production to CO_2) - production which could otherwise have been harvested as fish meat.
4. If the fishing is too hard: the fish stocks will be too small and not produce enough juveniles.

When humans fish on a fish stock the stock reacts with compensatory mechanisms

- this is why fishery can be sustainable!

Four compensatory mechanisms –



Taken into account in
current management?

- Density dependent recruitment
- Density dependent individual fish growth
- Density dependent natural mortality
- Density dependent maturity

✓

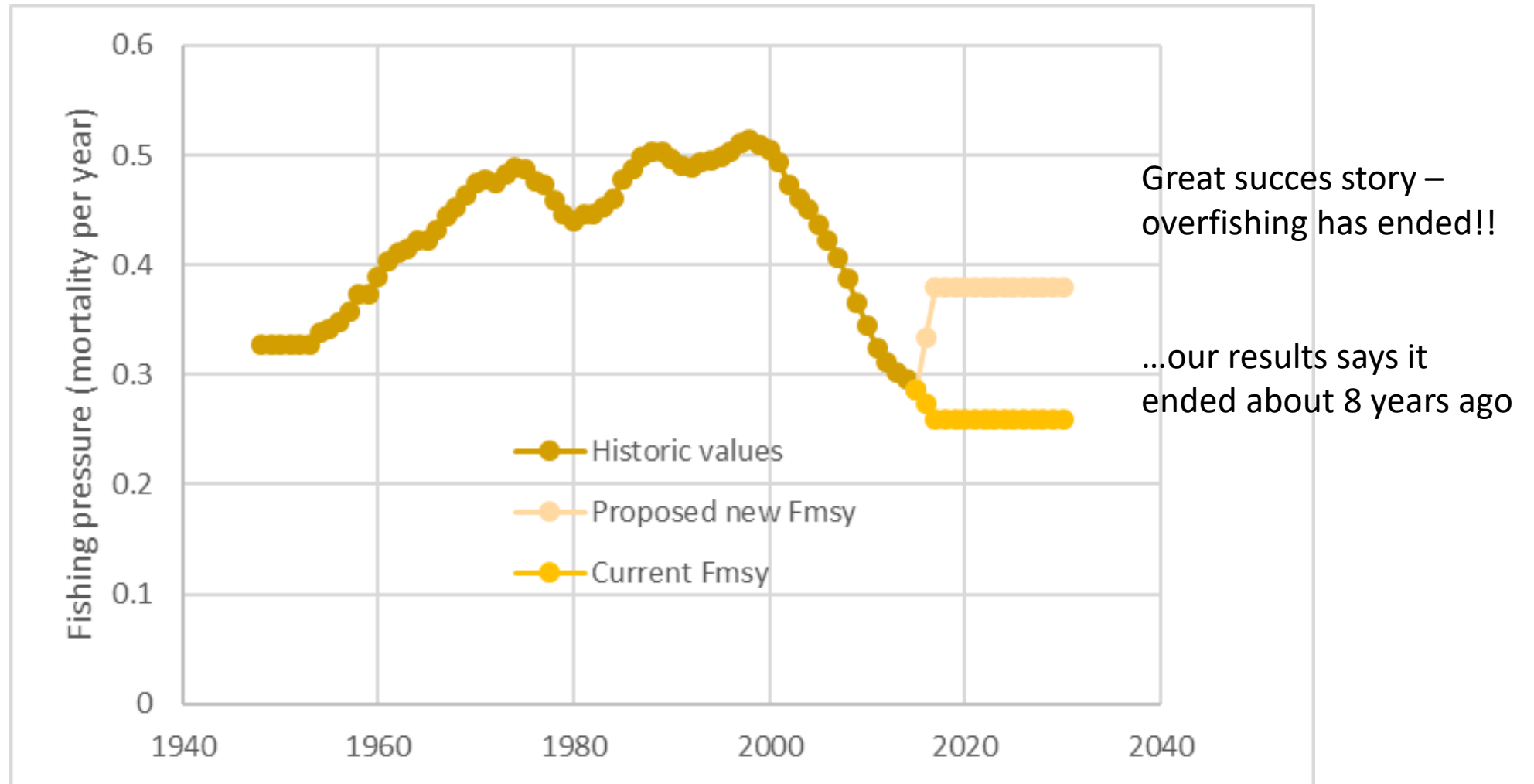
Not yet

Not yet

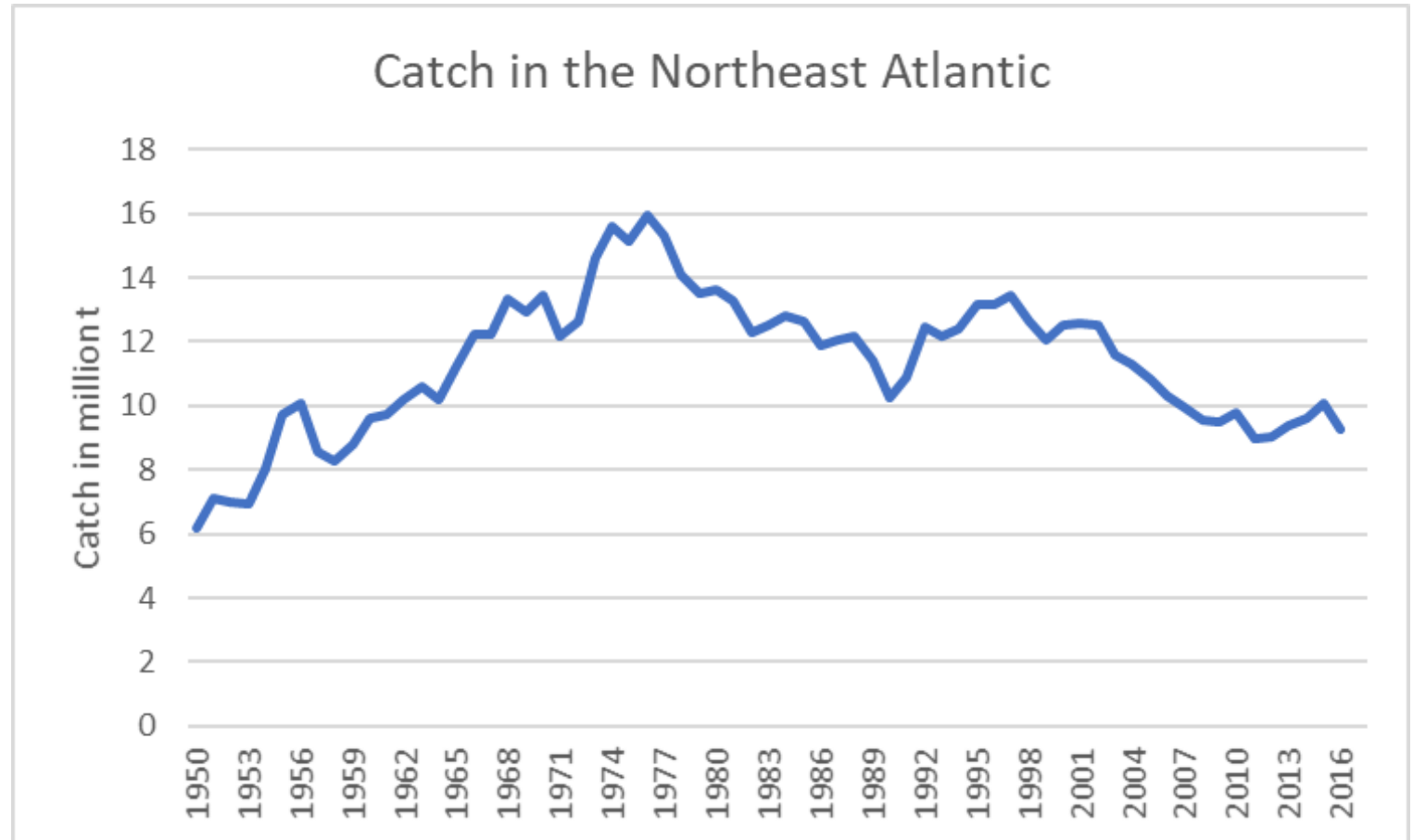
Not yet

It is a mathematical fact:
missing any of these in Fmsy calculations will give a downward bias!

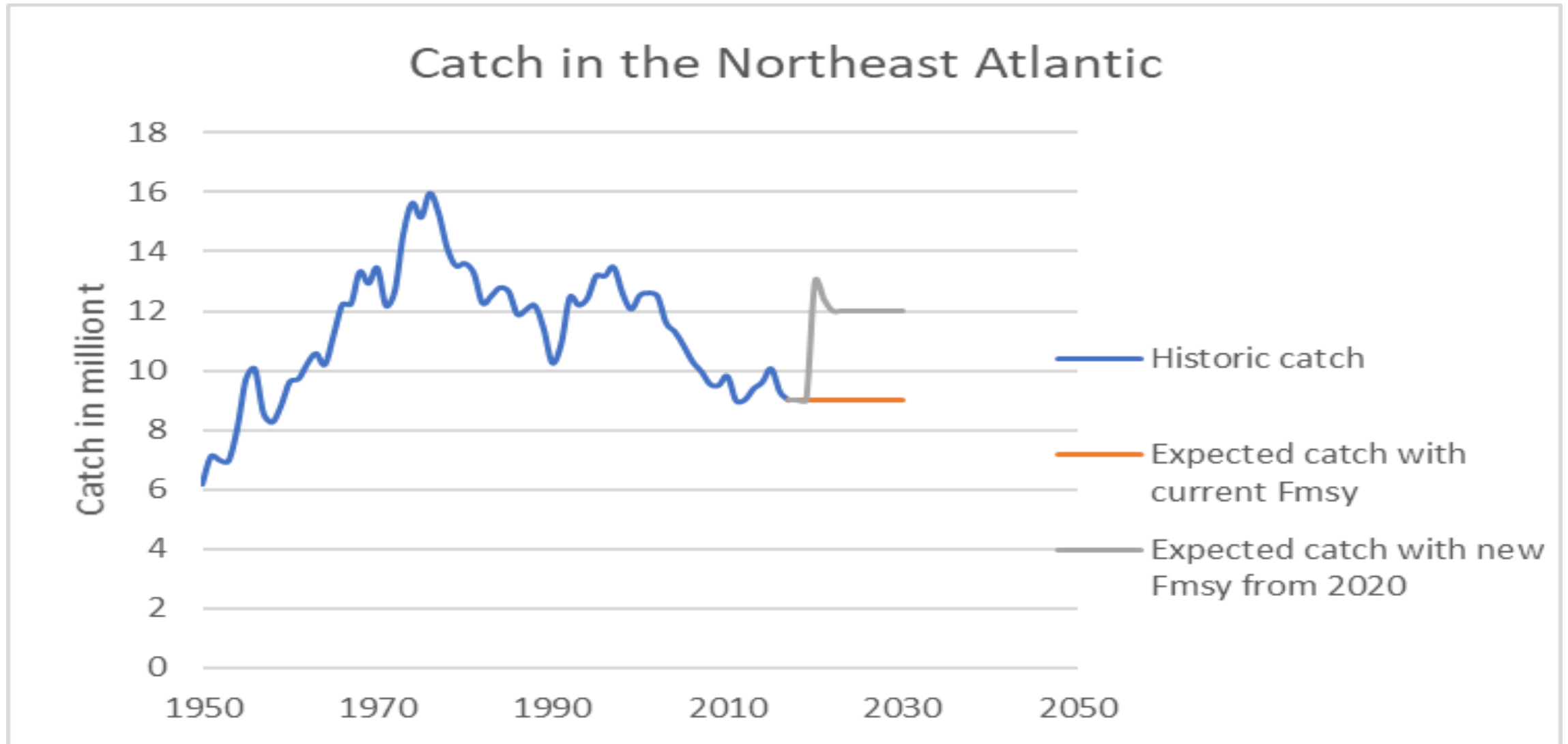
Mean fishing pressure in the Northeast Atlantic — indexed by the 53 ICES stocks in the Fmsy project.



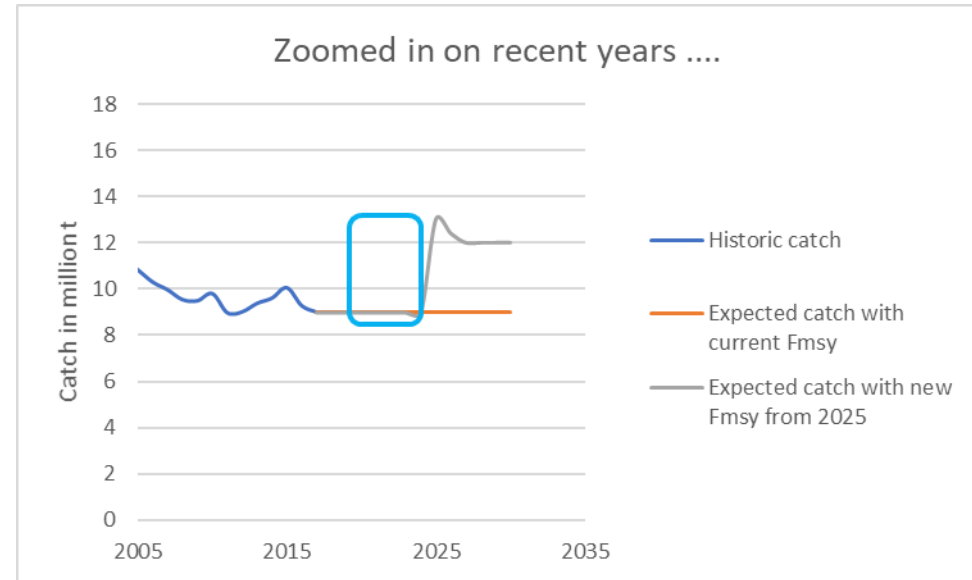
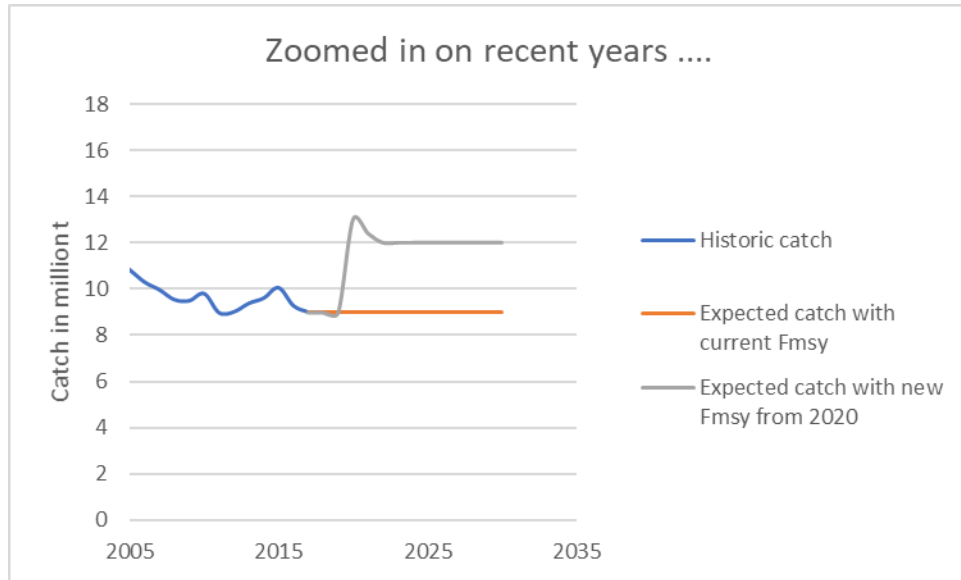
...missing
several
million t per
year at
present



All species



Urgent – loosing 3 million t per year!



Urgently need to change

– loosing 2 -3 million t in foregone catch per year!

Catch which cannot be taken the following years because:

- the fish have been eaten by larger fish;
- reduced individual fish growth due to food competition cannot be compensated in later years because wild fish are on average always semi-starving (eat on average only 30%-40% of what they can eat).

With an average price of about 1 Euro per kg, 2-3 million t is equal to 2-3 billion Euros

...the price tag for inertia in reacting is large.

Conclusion

1. The new Fmsy values are without any bias known to science.
2. More ecosystem functions are included
3. It can be implemented now.
4. There is a longterm gain for yield.
5. There is also a shortterm gain for yield.

General:

Avoid 2-3 million t of foregone catch per year by applying the new Fmsy values.

Implementation – suggested fast track:

For the 2021 TACs:

1. use the Fmsy from the Fmsy-project because they are:
 - a) without any bias known to science;
 - b) consistent with available science on ecosystem functioning and multispecies interactions;
 - c) based on a “clean” definition of the scientific concept of Fmsy, without any precautionary elements. Precaution will be dealt with in point 3 below.
2. The default Harvest Control Rule with the present MSY Btrigger values should still apply.
3. For those stocks where the risk level is more than 5% for SSB to get below Blim at the end of the TAC-year, reduce the TAC so that it is 5%, although at most a 50% reduction in TAC from past year if $SSB > Blim$.

Three solutions

- a) Adopts the new F_{msy} values from the F_{msy} -project when giving advice for 2021;
- b) Develop MSE that is based on biomass production models and specific DD in all 4 factors;
- c) Return to the clean concept of F_{msy} – the F values that gives MSY.

An aerial photograph showing a large-scale fishing operation. A massive, rectangular fishing net is deployed in the ocean, filled with a dense school of small, silvery fish. The net is bordered by a line of bright yellow floats. A person in an orange safety vest is visible on the deck of the fishing vessel in the lower-left corner. The surrounding water is a deep blue-green.

Thank you !