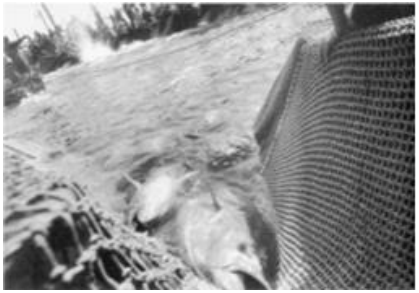
Vulnerabilities *versus* resilience in international bluefin tuna management



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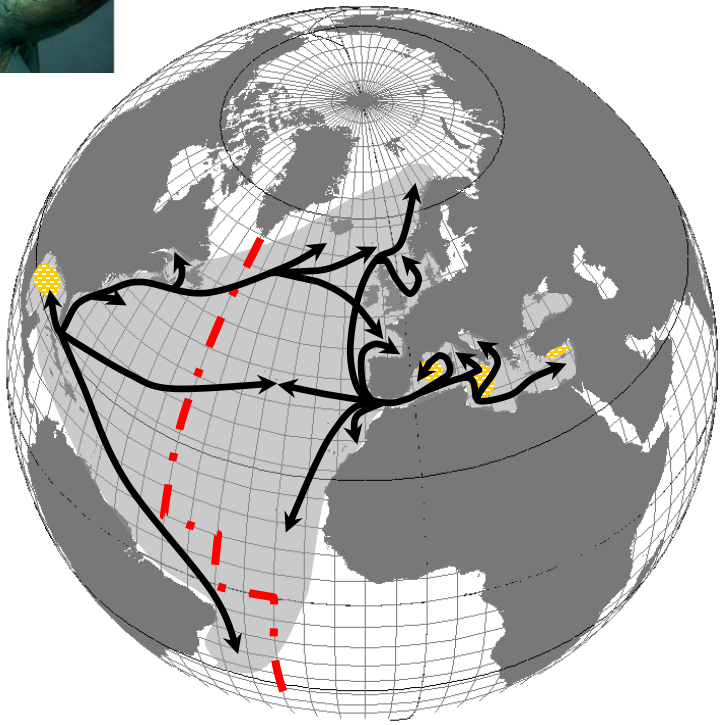
Identity Card

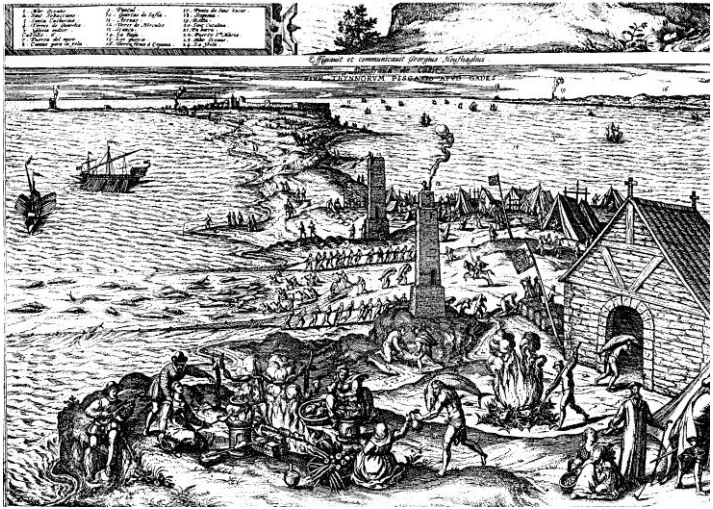
- Spatial distribution over the whole North Atlantic and Mediterranean
- **Highly migratory** fish with complex spatial dynamics

- **Spawning** in a small spatial and temporal window (in June in restricted areas)
- Highly fecund, but long-lived species (40 years)
- Assumed to mature at 4 years (~ 25 kg) in the Mediterranean (later in the GoM)
- **Population structure unknown**: 1, 2, more sub-populations?

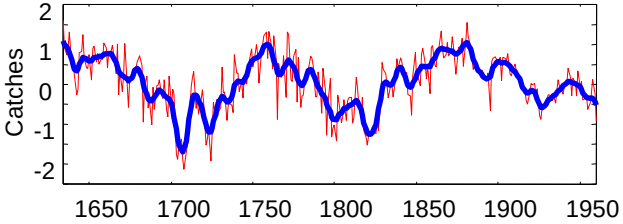


A brief history of bluefin tuna fisheries

- Important fisheries since Antiquity
- Still active in the Middle Ages, new development in the 16th century (beach seine, trap)



- Harvesting over two millennia: a nice example of sustainable fisheries, albeit long-term fluctuations



- Appearance of longlines and purse seines fisheries during the 1950s

The main ingredients of overexploitation

1. A fish of high value

- Low value until the early 1980s (canning)
- Sudden and strong demand from the Japanese **sushi-sashimi market** (decline of southern BFT population)
- High increase in the value and demand of Atlantic BFT (up to 2,7M€ for a single fish at the Tsukiji market auction in Tokyo)

The gold rush: impressive increase in fishing capacity (number of boats)

The main ingredients of overexploitation

2. An important overcapacity in the early 2000s

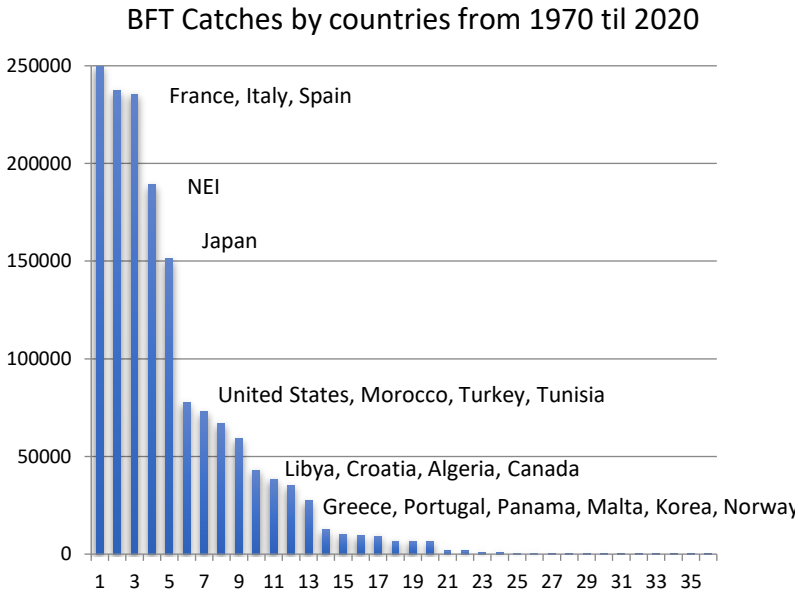
- **1700 fishing boats** in the Mediterranean sea targeting BFT (250 large boats, 1350 artisanal boats)

- Improvment in fishing techniques ; development of new technologies, e.g., farming in cages, deep-freezing vessels
- Strong spatial expansion of the fisheries
- **Strong increase in fishing effort**

The main ingredients of overexploitation

3. A resource shared by many countries

- **Conflicts** of interest between countries and fisheries
- Fishing in national and mostly in international waters
- Scientific advice and management regulations given by **ICCAT**

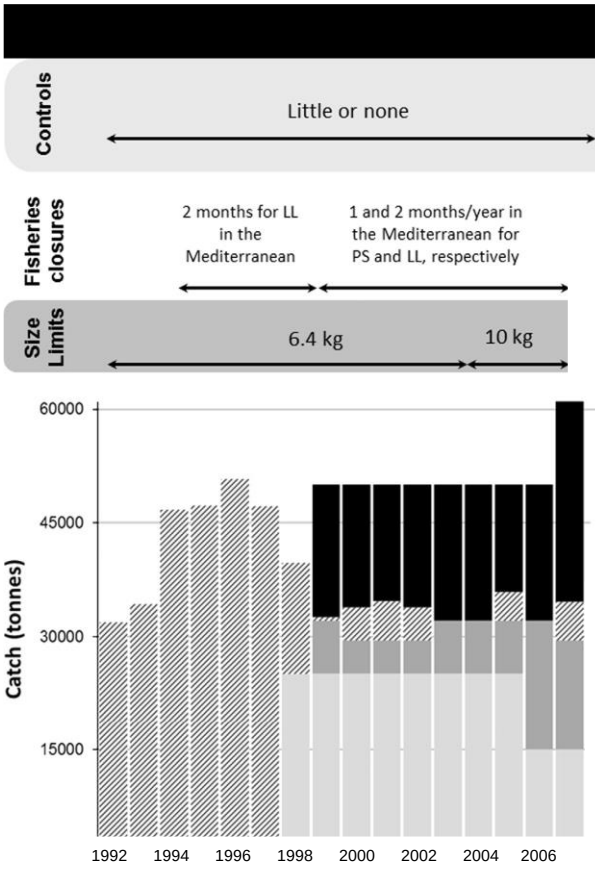


Governance at the international level remains difficult

The main ingredients of overexploitation

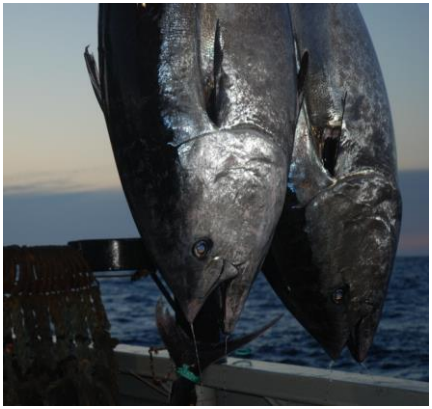
4. A poor Governance

- **Few management regulations** before 2000
- The catches tripled between 1970 and 1995
- Scientific advice of overexploitation in 1996
- Setting **quotas in 1999**, but lack of compliance and control
- Scientific advice not followed by ICCAT political body
- Strong increase in **illegal fishing** due to under-declaration by member states, flag of convenience, transshipment at sea...



The main ingredients of overexploitation

4. A poor Governance

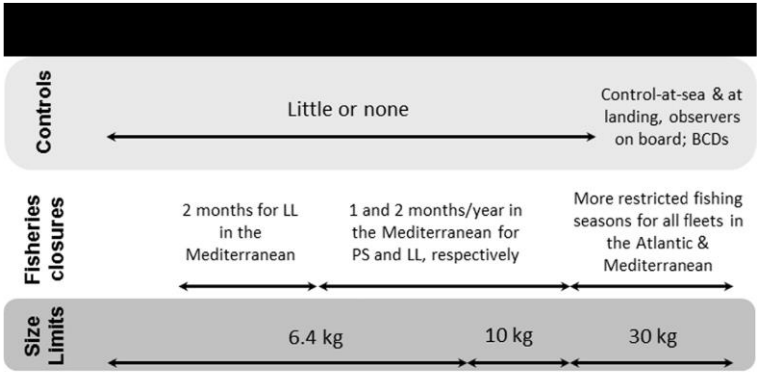


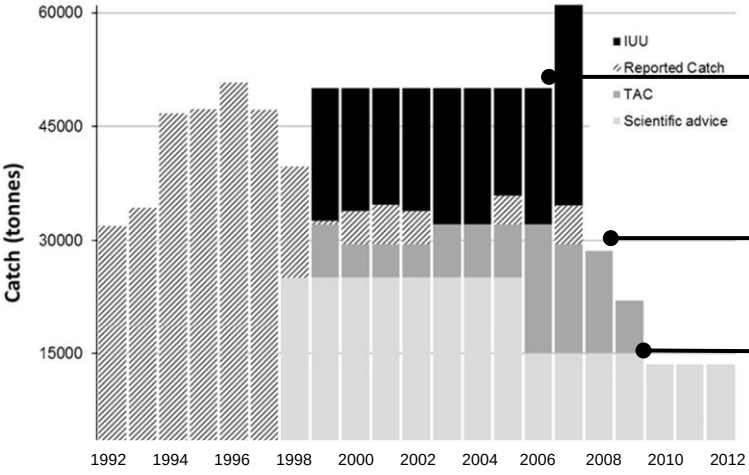
- From 1994 to 2007, catches records at ~**50 000 t/year**
- BFT stock status is getting worse and worse

- **Stakeholders' excuses for inaction**: the uncertainties in the scientific advice
- Conflicts of interests between countries AND highly profitable fisheries
- In 2006 and 2008, the scientific advice pointed to a risk of collapse of fisheries and stock
- **NGOs** have become very active

NGOs have alerted public opinion, which forced ICCAT to sep up a rebuilding plan

The rebuilding Plan





Plan (1st release)

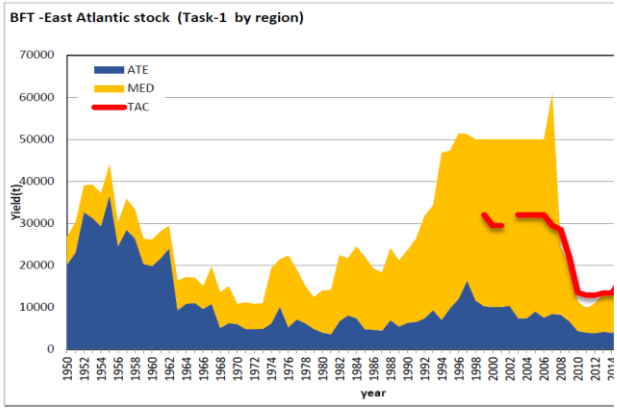
Plan (2nd release)

Plan (last version)

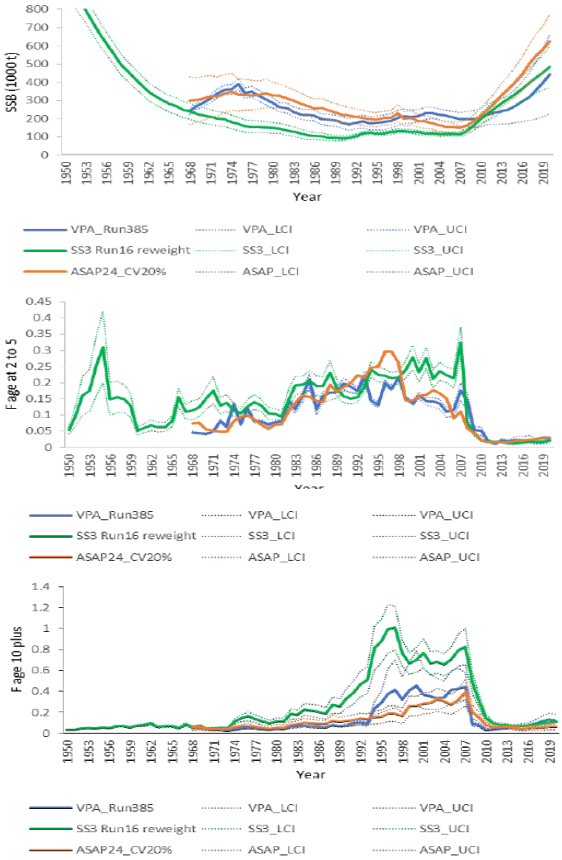
The rebuilding Plan

The rebuilding plan has been successful so far

- Historically low catches in 2009-2015



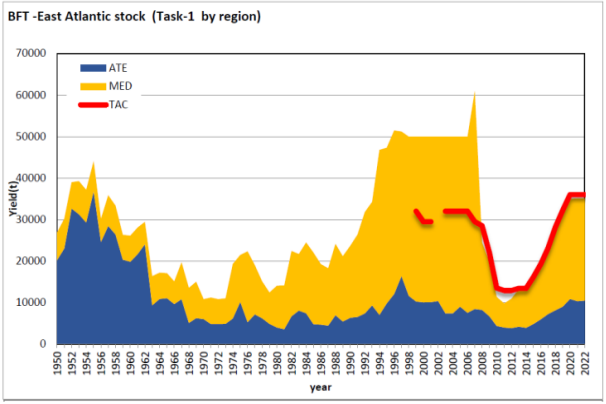
- The **stock has been on the rise** since the late 2000s
- Fishing mortality has fallen sharply



The rebuilding Plan

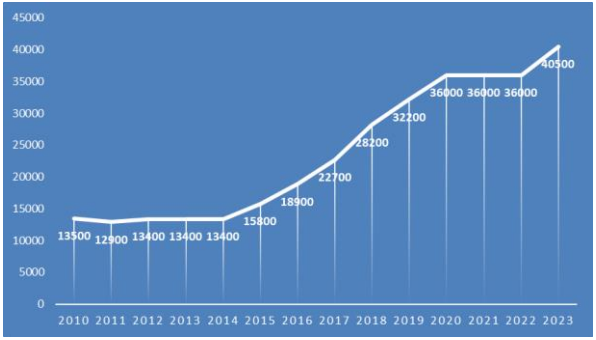
But for how long ???

TACs has been following the scientific advice, reviewed every 3 years and strongly increased since 2015



Last TAC at ~ 40,000T, too optimistic ??

- Still a **lot of uncertainties** in the scientific advice
- Risk of **rebuilding an overcapacity**
- Lower controls / **IUU** re-emerging issue
- Breaking the virtuous circle ???



The Management Strategy Evaluation

Uncertainties in the scientific advice mostly come from:

- The **poor quality of catch and effort data** for some Mediterranean fisheries in some years (particularly between 1994 and 2007)
- **Difficulty in tracking changes** in population abundance through fishing data: need for scientific surveys
- **Lack of knowledge** on key biological and ecological processes: productivity (recruitment success, natural mortality), migrations and population structure

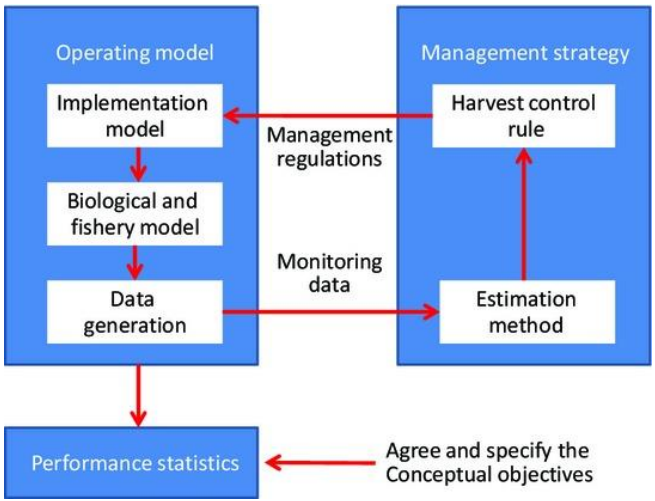
Getting more and better catch and scientific data

Setting up a **Management Strategy Evaluation, i.e.** an inclusive, interactive and iterative process for evaluating the performance of harvest control rules and reference points in relation to management objectives

The Management Strategy Evaluation

Developing a MSE is a non-trivial modelling exercise

- Identification of the management objectives
- Identification of the main uncertainties in biology, environment, fishery and management system to which the management strategy should be robust
- Development of the mathematical representations of the system to be managed (**operating models**), which include the biological components, the fishery, the data collection (including measurement noise) and an implementation model (how management regulations are applied)
- Identification of candidate **management strategies** to be implemented (HCR)
- Simulation of the application of each management strategy for each operating model
- Interpretation of the performance statistics



Conclusive Remarks

- Despite uncertainties in the scientific advice, the overexploitation of wild populations with a high market value can be stopped if there is a **real political will** to do so, but this political will must be sustained over the long-term
- **Civil society** plays a crucial role in changing the public opinion, which put pressure on stakeholders and politicians
- Overexploitation of living resources is not inevitable

- Monitoring, surveys, modeling are costly, but necessary to **reduce uncertainties** in the scientific advice: the more uncertain the scientific advice, the more precautionary the management