



THE NORTHEAST ATLANTIC AND MEDITERRANEAN BLUEFIN TUNA FISHERY: BACK FROM THE BRINK

**Conference on user rights in fisheries
Copenhagen, 16th October 2023**

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Source

- This presentation is based on the following paper:
 - Bjørndal, T. (2023). The Northeast Atlantic and Mediterranean bluefin tuna fishery: Back from the brink. *Marine Policy*, 157, 105848.

Purpose

- The purpose of this paper is to analyse the transformation of the BFT-E fishery from non-cooperative to cooperative management, and, in particular, whether the current cooperative RFMO is likely to remain stable in the future

or

- to analyse the remarkable transformation of a fishery heading for demise to one that is now considered sustainable.

ALSO

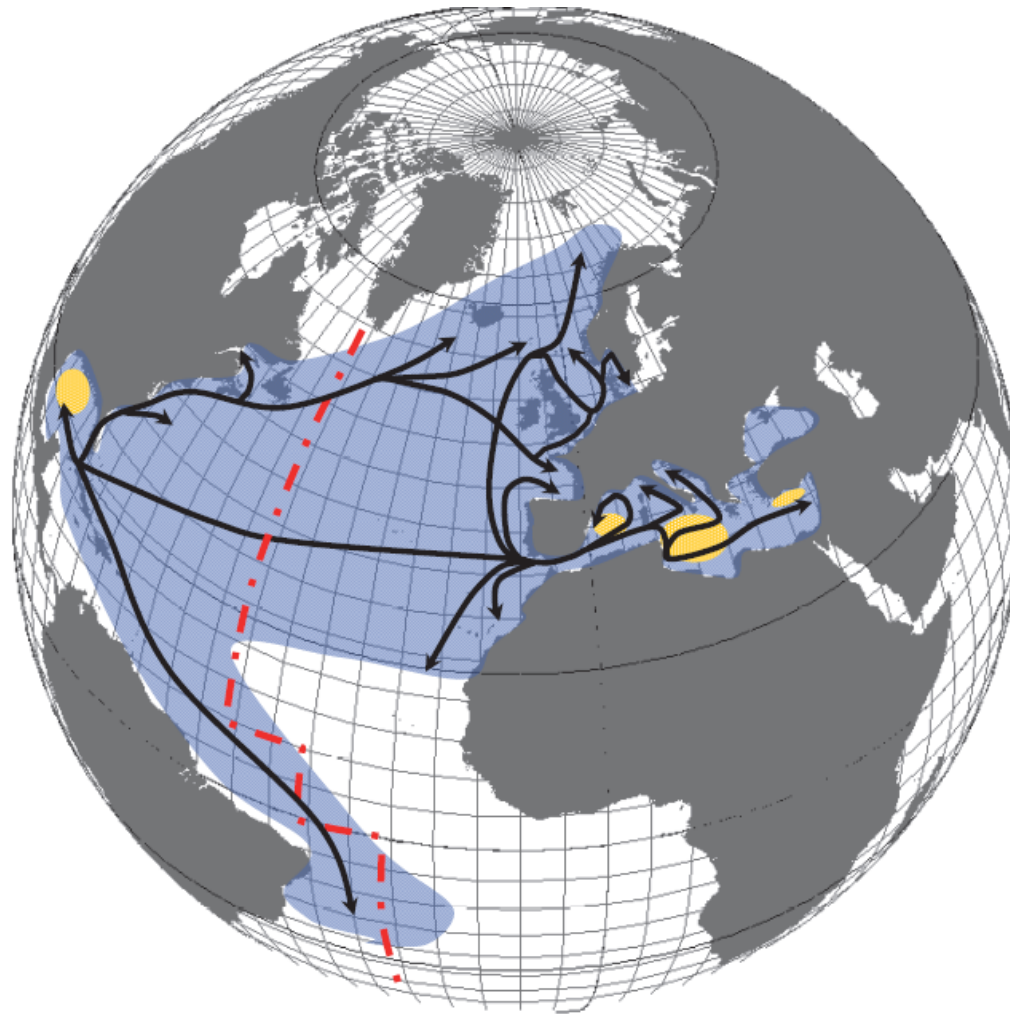
- Consider the quality of user rights in the BFT-E fishery

INTRODUCTION

- At the turn of the century, the BFT-E stock appeared to be severely overexploited. BFT-E is classified as a highly migratory stock which is managed by the ICCAT, an RFMO with 52 contracting parties.
- Management was ineffective, with the fishery bordering on pure open access (Bjørndal & Brasao, 2006). Unless effective management was introduced, the demise of the stock could be imminent (ICCAT, 2007).
- In 2006, a 15-year recovery plan was introduced.
- It is of great interest to learn how cooperation has been achieved for BFT-E and to see what lessons it holds for management by RFMOs.

BACKGROUND

- BFT-E (*Thunnus thynnus*) is a large oceanic pelagic fish and is also the largest of the tunas. It can grow to a length of over three metres, weighs up to 725 kg and lives up to 40 years.
- In 1982, ICCAT established a dividing line between the east and west Atlantic. The stocks are managed separately.
- This analysis is of the eastern stock –the BFT-E.
- BFT-E is highly prized in the sushi market. Japan is by far most important, but over time, sushi has changed from an exclusive Japanese product to a global one.



Map of the spatial distribution of Atlantic bluefin tuna (blue), main migration routes (black arrows) and main spawning grounds (yellow areas). The vertical dashed line depicts the stock delimitation between the two current ICCAT management units.

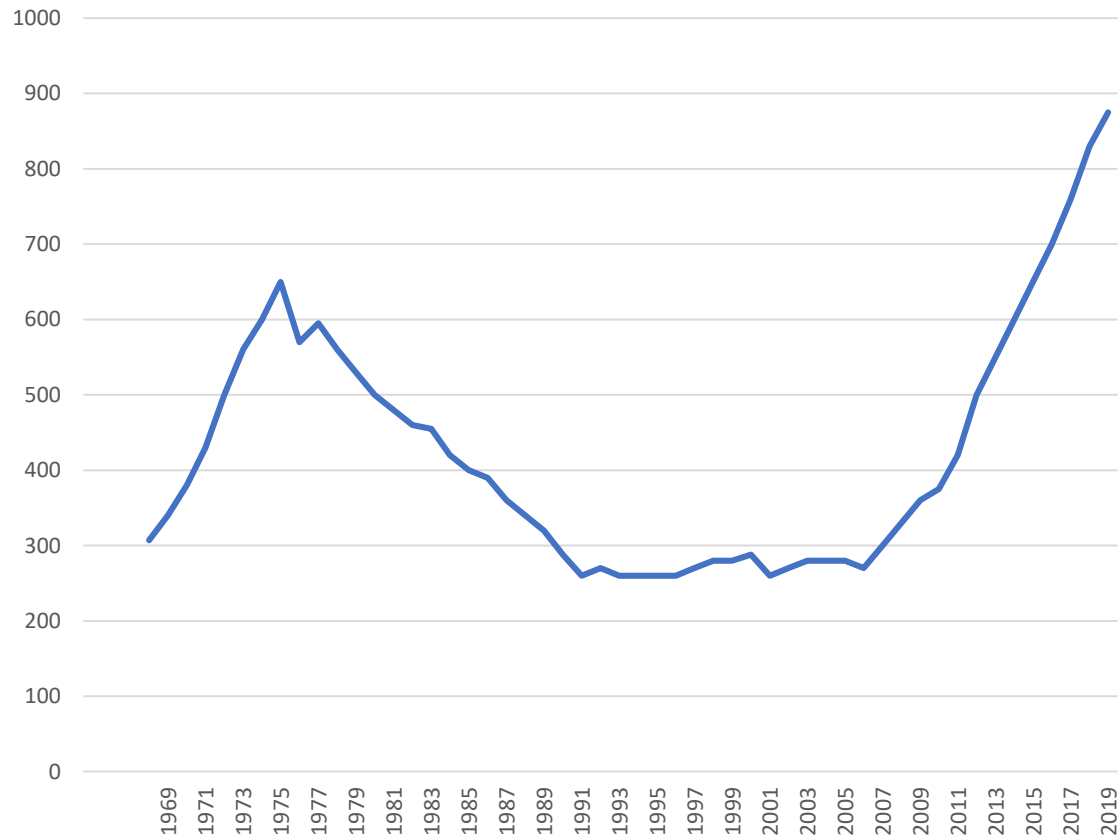
-BFT-E is harvested by both coastal states and DWFSs.

-Historically, more than 50 countries have participated in the fishery; currently (2018), close to 30 (ICCAT, 2020).

-BFT-E is harvested in both the Atlantic and the Mediterranean. Up to the early 1960s, catches in the Atlantic exceeded those in the Mediterranean. Substantial overfishing is regarded as a major reason for the decline in the North Atlantic, where harvesting collapsed in the early 1960s.

-Many species expand (or contract) their geographic ranges when abundant (or rare). A population that is rebuilding could reoccupy former areas of the distributional range.

-At the end of the 1990s and the early 2000s, there was concern about the state of the stock. As the fishery was characterised by open access, further stock depletion might be anticipated.



Spawning Stock Biomass Northeast Atlantic and Mediterranean bluefin Tuna 1968-2019. '000 tonnes.

-TACs were set at levels that were too high, and there was a failure to enforce regulations allowing widespread IUU fishing. The control of fishing on the high seas has been particularly problematic.

-The efforts of ICCAT to limit fishing capacity were mostly in the form of recommendations to members that they do not increase their fleet capacities and/or catches.

-After the collapse of the fishery in the North Atlantic, tuna was absent from these waters for almost 50 years. However, since the 2010s, catches have been recorded by several countries. There have also been catches in the Black Sea and the Marmara Sea, where the tuna disappeared early in the 1980s.

-Some authors have questioned the ability of RFMOs to achieve sustainable management.

-Cullis-Suzuki & Pauly (2010) conclude that RFMO management is inadequate. Of the stocks assessed, they find that *circa* 2007 two-thirds were depleted, overfished or both. The authors point out that the lack of framework for dealing with the 'new member problem' is a real impediment to successful management. Finally, as the establishment of some RFMOs preceded severe stock declines, they call into question the very existence of these organisations.

-Brooks *et al.* (2014) are also very dismissive of the effectiveness of RFMOs, stating that the management of BFT-E "... is widely regarded as an international disgrace".

THE BLUEFIN TUNA RECOVERY PLAN

- The ICCAT Commission meeting in Dubrovnik in 2006 appears to have been a watershed when it comes to management of BFT-E.
- ICCAT's science committee indicated there might be a possible collapse of the stock "in the near future" unless adequate management measures were implemented: "[U]rgent and strict conservation and management measures are needed to avoid the collapse of this stock".

The multi-annual recovery plan 2007-22

- A precautionary approach was adopted, with the goal of achieving Bmsy with greater than 50% probability, later 60%.
- Measures include (ICCAT, 2020):
 - 1) Each fishing gear is regulated w.r.t. to season and area.
 - 2) Catching of undersize tunas is prohibited.
 - 3) Fishing capacity must be commensurate with quotas.

4) A vessel monitoring system and an observer programme was introduced.

5) Transshipment of tuna only in designated ports.

6) Market measures require documentation that the traded product conforms with regulations. Each tuna harvested is issued with a “certificate” that will accompany it until the point of final consumption or trade.

-Any ICCAT member that does not abide by regulations will be deemed to undertake IUU fishing.

USER RIGHTS

In international fisheries, secure national quotas are a precondition for secure individual quotas at the vessel level.

- Quota sharing for BFT-E is based on three principles:
 - historical catches and rightsa,
 - stock distribution (Zonal Attachment - ZA), and
 - research activity;but is also affected by
 - bargaining power.

-In many fisheries, ZA is considered an important part of the foundations for determining national user rights.

-ZA of a stock is the share of the stock residing within a particular country's EEZ, weighted by the time it spends in the zone over a year, if necessary. This may determine, or at least influence, the share that each country gets of the TAC for that stock.

-Although this principle might appear easy to apply, this is not necessarily the case.

-Which stock – juvenile, spawning, total or fishable stock?

Other qualifications:

- Where the stock is most easily fishable?
- Where the fish gain most of their weight?
- The location of spawning grounds.
- Closeness to landing ports.
- ZA is based solely on quantity, not value.

Sources of instability:

- Stock distribution and migration may change due to climate, environmental and oceanographic changes. This impact is expected to become even greater in the future (Barange, 2018).
- Many species expand (or contract) their geographic ranges when abundant (or rare).
- Pelagic fisheries in the North East Atlantic are prime examples of not well defined user rights (quota shares) due to (continuous) changes in ZA.

Shepherd and Horwood (2019) point out ZA ignores several complicating factors. Fish migrate, and there are shifts in their distributions. The reality is that one does not know where the fish are with any accuracy most of the time and there is no obvious basis for deciding how to assess and combine whatever information is available. Furthermore, any “objectively” determined percentages would inevitably fail to match historic shares, and thus generate conflict.

All these circumstances have an impact on the determination of user rights for BFT-E.

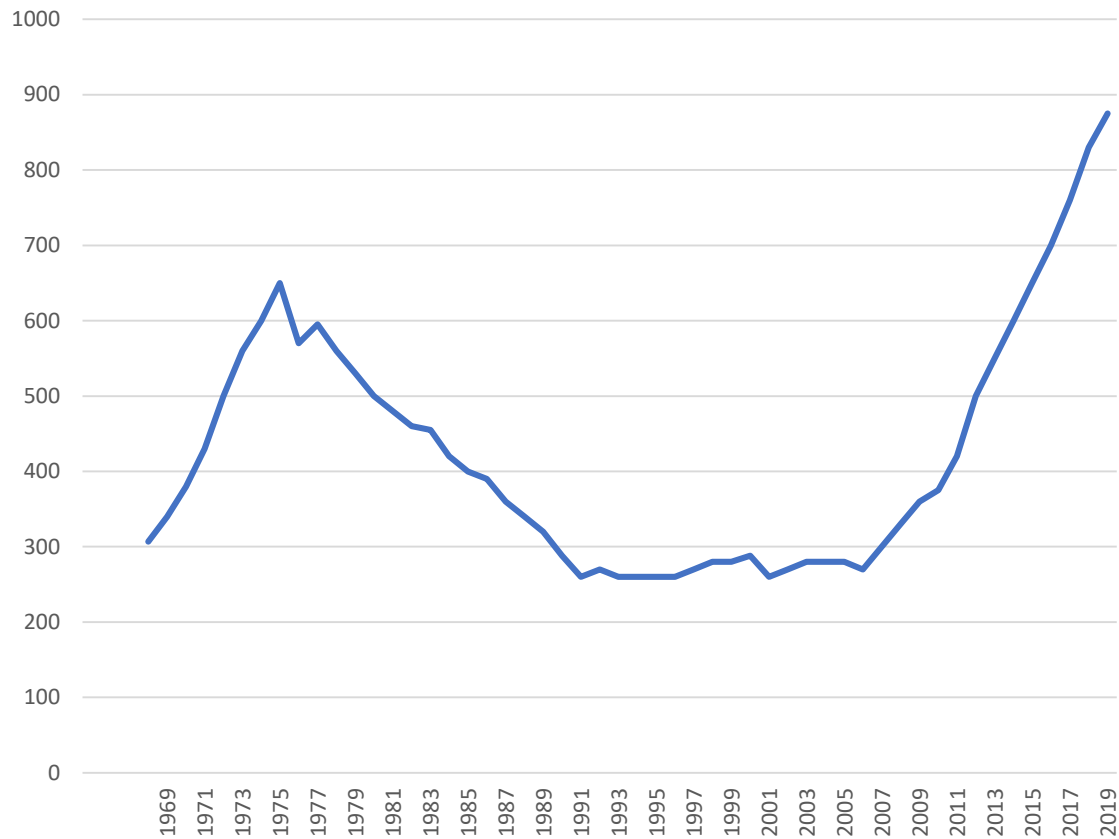
For BFT-E, initially the quota share of the EU was 57%, followed by Morocco (9.5%), Japan (8.5%) and Tunisia (7.9%).

There have been later adjustments:

- Norway's from 0.23% to 0.83%.
- Turkey from 4.15% to 6.4%.
- Libya and Algeria each from 0.25% to 4.6%.

These shares have been increased to better reflect ZA and historical rights.

- The EU quota is now 54.06% while that of Japan is 7.8%.
- There are also quota exchanges (trades) among (some) countries.
- Several countries have IVQs in their BFT-E fisheries.

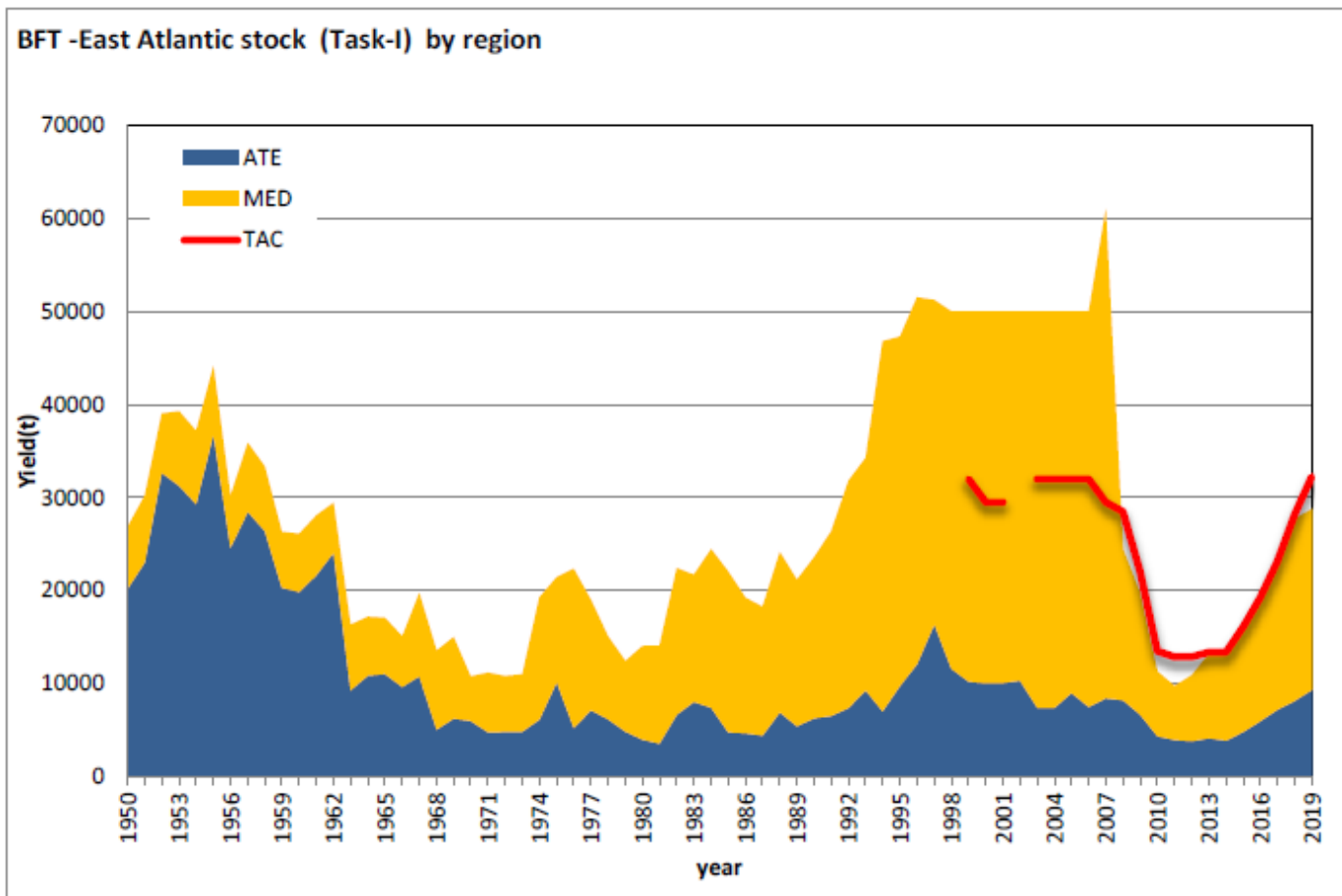


Spawning Stock Biomass Northeast Atlantic and Mediterranean bluefin Tuna 1968-2019. '000 tonnes.

Even if the stock is increasing, much uncertainty is involved.

Re stock assessments: “The current perception of the stock depends on recruitment estimates which are highly unstable and is also closely related to the assumptions made about stock structure and migratory behaviour, which remain poorly known” (ICCAT, 2020).

Thus, although the stock appears to be in good health, there is no room for complacency.



Bluefin tuna catches, Atlantic and Mediterranean, 1950-2017. TAC 1995-2019. Tonnes.

- Tuna fisheries worldwide have been characterised by tremendous overcapacity.
- Each country is now obliged to adjust its fishing capacity to ensure that it is commensurate with its allocated quota.
- From 2008-12, EU reduced its capacity by 63%, Japan by 59%.
- While capacity is now increasing, both the EU and Japan have IVQs.

-When it comes to the market, in Japan, bluefin tuna can only be delivered to designated ports where it is subject to inspection. Business operators in the value chain are prohibited from dealing with fish unless it has an official tag. In the EU, since 2010 a catch certificate validated by ICCAT is mandatory for both exports and imports.

-Another important development is the change in the relative importance of the two main fishing areas. The reappearance of BFT-E in historical fishing areas suggests that important changes in the spatial dynamics of BFT-E may have resulted from interactions between biological factors, environmental variations, and the reduction in fishing effort.

-The increase in overall abundance of BFT-E may explain the expansion of its distribution towards northern waters.

-According to Faillettaz *et al.* (2019), in the future the Atlantic may become more important for the BFT-E fishery than the Mediterranean, as was the case in the 1950s.

ANALYSIS

- The BFT fishery up to 2007 is a prime example of non-cooperation.
- The tuna recovery plan has been very successful to the degree that the fishery is now considered sustainable.
- Costa Duarte *et al.* (2000) and Bjørndal & Brasao (2006) both demonstrate that cooperative management involves substantial payoffs to the Grand Coalition. This gives rise to two questions:
 - First, how is the cooperative surplus divided among the members of the Grand Coalition?
 - And second, are there incentives for any of the parties to break away from this cooperative solution?

-As there may be an incentive to not join the RFMO, we must consider IUU fishing.

-If by forming an RFMO the management of the fishery improves, this will create a *positive externality* to the benefit of outsiders as well as those within the RFMO. Each player must then look to its potential payoff as a bona fide member of the RFMO and the payoff it would enjoy as an outsider. Moreover, the RFMO will be stable if and only if the total payoff from the Grand Coalition exceeds the sum of the payoffs to the players acting as singleton free riders, in which case a sharing rule can be devised that will give every player an incentive to remain within the RFMO.

-Pintassilgo *et al.* (2010) find that the larger the number of players, the higher the relative gains from full cooperation, but the lower is the likelihood that large RFMOs are stable. Generally, in order to guarantee the stability of the cooperative agreements, it is not sufficient to implement a fair sharing rule for the distribution of the returns. Stability requires a legal regime preventing the players that engage in noncooperative behaviour from having access to the resource.

-Even if all states with a “real” interest in a fishery join ICCAT, conditions may change and “new” countries may wish to join the fishery. This is what is known as the “new member” problem.

The stability of ICCAT management of BFT-E

- The first condition for stability is that each and every player must anticipate a “payoff” at least as great as one would receive under non-cooperation - the “individual rationality” condition.
- The investment in the resource post 2007 is now paying off. The evidence clearly suggests that the individual rationality condition has been met.
- The solution to the cooperative game must also be collectively rational, i.e., Pareto Optimal. It appears that this is satisfied for BFT-E.

-The third condition is that the cooperative management agreement must be resilient. BFT-E has been subjected to several shocks. This kind of unpredictable shock has put strain on numerous international management agreements (Ellefsen *et al.*, 2017).

-Extended migration will allow “new” countries to harvest the resource and may put a strain on the user rights of existing countries.

-Although there is now cooperation, a potential entrant may in principle decide to stay outside ICCAT to enjoy the positive externality as a free rider.

A final complication is that the number of players matters (Bjørndal & Martin, 2007).

The «new» member problem

- For BFT-E, “new” DWFSs would not be able to get quotas as part of ICCAT management unless they would be able to claim a “real interest” in the fishery. If not, such entry would be illegal.
- In an early report, Kurien (2005) discussed the profound impact markets may have on sustainable fisheries management. BFT-E is a very interesting case study in this regard in the sense that the market – primarily the EU and Japan – ensure compliance with quotas and to a very large extent eliminate IUU fishing.
- Adolf (2019, p. 274) points to the fact that sustainability is increasingly demanded by the consumer market.

- Should the BFT-E stock continue to improve, and the distribution area be farther extended, more coastal states are likely to join the fishery. They would be entitled to quotas according to UNCLOS.
- So far, the cooperative agreement has proved to be resilient. As for the future, the resilience will depend on how new entrants are given quotas.
- Hitherto, there has been flexibility in quota sharing, which is important for the resilience of the management agreement.

DISCUSSION

Despite several challenges, RFMO management has remained remarkably stable. Secure user rights are necessary for efficient harvesting. There appears to be three main challenges to the stability of the cooperative agreement:

- First, (unexpected) changes in the environment.
- Second, IUU fishing. Harvesting on the high seas represents a particular challenge. According to Kohler (2021), monitoring of longlining is “deficient”. Transshipment at sea is illegal but also hard to monitor.
- Third, the new member problem, in particular, accommodating new coastal states into the fishery.

All these may put strains on user rights.

-A very important result of this analysis is that the BFT-E does not conform with “received” wisdom when it comes to RFMO management.

-Moreover, the case study also appears not to conform with parts of the game theoretic literature, in particular when it comes to how the number of players influences the outcome of cooperative games. ICCAT has a large number of players. Although this might make it difficult to arrive at a cooperative agreement, this has nevertheless been possible, as the parties have engaged in cooperation because it is in their interest to do so.

-It is important to realise that market measures have had a great impact on the stability of the RFMO agreement. These measures sharply reduce, if not eliminate, potential payoffs to free riders.

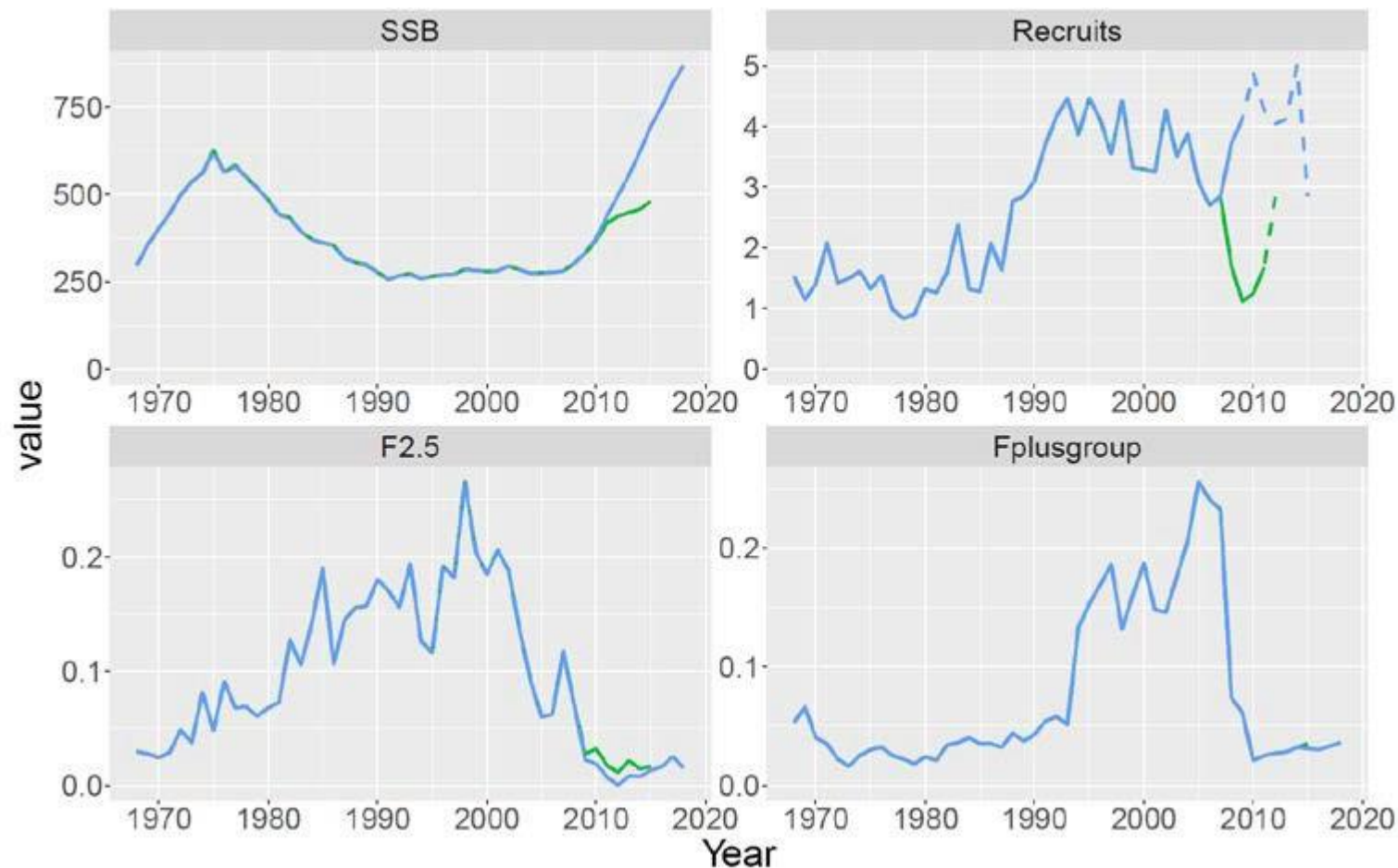
-Tunas are very valuable species. Adolf (2019) makes the point that BTF-E has set a precedent when it comes to management of tunas worldwide.

-This study reveals that, if free riding can be effectively curbed, RFMO management can be very effective, even though the number of players may be very large. This result brings hope for the management of highly migratory stocks in general.

This research has also highlighted several avenues for further research.

- An update of Bjørndal and Brasao (2006), analysing optimal policies, would be very interesting, in particular if incorporating a spatial variable to distinguish between the North Atlantic and the Mediterranean.

- A comparative study of management of bluefin tuna stocks across the world would also be very interesting.



Spawning stock biomass (in '000 tonnes), recruitment (in million), and fishing mortality (average over ages 2 to 5, and 10+) estimates from VPA base run in the 2020 stock assessment (blue) compared to the 2017 stock assessment (green) for the period between 1968 and 2015. The most recent years' recruitments (dashed line: 2012-2013 for the 2017 stock assessment, and 2010-2015 for the 2020 stock assessment) were poorly estimated.