

The spectre of uncertainty in management of exploited fish stocks: The illustrative case of Atlantic bluefin tuna



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ABSTRACT

The recent overexploitation of East Atlantic and Mediterranean bluefin tuna stock has been well documented in the media where it has become the archetype of overfishing and general mismanagement. Beyond the public debate, the crisis also highlighted how the interactions between science and management can change through time according to the awareness of the public opinion. To reflect these issues, the history of Atlantic bluefin tuna overfishing is first described. Then, the major uncertainties that undermine the current scientific advice are summarized and the importance of reducing their impacts by improving knowledge and developing robust scientific framework is considered. The study also discusses how uncertainty was used by different lobbies to discredit science-based management. The recent improvement in bluefin tuna stock status following the implementation of the rebuilding plan shows that, despite uncertainty in the scientific advice, the management of a heavily exploited fish stock can be positive when there is a political will. However, optimizing long-term yields of modern fisheries implies good science. The study concludes by advocating for the implementation of a scientific quota that should be part of the management framework to support the scientific advice.

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1. An emblematic case of overfishing

A commercially exploited fish has rarely been given as much media coverage as Atlantic bluefin tuna (ABFT), especially the East Atlantic and Mediterranean stock (ABFTE) that supports the bulk of ABFT catches. During the 2000s, Non-Governmental Organizations (NGOs) publicized ABFTE as the archetype of overfishing and general mismanagement of the world fisheries see e.g. [1]. There are good reasons for this. ABFTE fisheries indeed crystallized most of the problems found in many fisheries, i.e. severe overcapacity, open access in international waters, geographical expansion of the fisheries, high market value and deficient governance at both international and national levels [2–4].

ABFTE was traditionally canned or sold to the Mediterranean fresh market and its market value was rather low. However, the rise of the sashimi market (firstly in Japan and then in USA, Europe, Korea and China) led to strong demand for fresh ABFTE, especially since the 1980s [5]. Consequently, the value of ABFTE increased in the following decades and bluefin tuna became, in the

media, the fish that was worth its own weight in gold when quoting the New Year auctions on the Tsukiji fish market in Tokyo. Unfortunately, the increasing value of ABFTE induced a sharp increase in the fishing efficiency and capacity of various fleets during the 1990s and 2000s, especially in the Mediterranean Sea. This together with new storage technologies and farming practices introduced in the late 1990s created a severe and uncontrolled overcapacity that in turn led to a critical overexploitation of the resource [6].

The scientific community, especially the scientific body of the International Commission for the Conservation of Atlantic Tunas (ICCAT, the regional fisheries organization that has in charge to monitor and manage tuna and tuna-like species in the Atlantic ocean) raised serious concern about ABFTE stock status since the early 1990s and estimated the stock to be overexploited in 1996 [7]. From 1998 onwards a Total Allowable Catches (TAC) system, together with size limit regulations and time/area closures, were progressively implemented. Furthermore, from the late 1990s to 2008, ICCAT did not follow the advice of its own scientific body and always recommended a TAC that exceeded the scientific recommendations (Fig. 1). This was partly due to the multilateral nature of ICCAT and a decision-making process based on consensus. Conflicts of interests between countries impede strong

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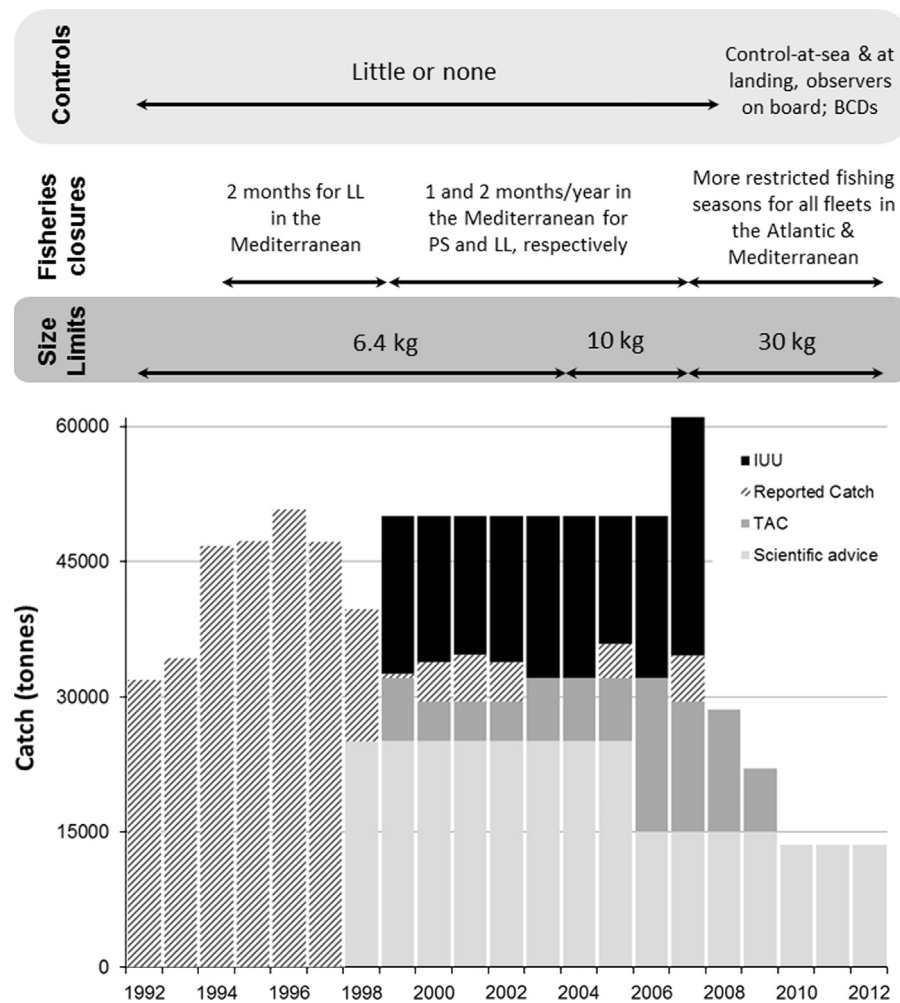


Fig. 1. Catches levels recommended by ICCAT Scientific Committee (scientific advice), Total Allowable Catches (TAC) decided by ICCAT commission, reported catches to ICCAT secretariat and the Illegal-unreported-unregulated catches estimated by ICCAT Scientific Committee (IUU) from 1992 to 2012. Main management regulations over the same period are also described.

decision-making, especially to limit catches. In addition, the ABFTE market was highly profitable and economic interests took precedence over conservation based ones an unfortunate but quite common situation for many exploited fish stocks, even for fish of lower economic value, see [8]. In such a context, uncertainties inherent in any scientific advice were often used by stakeholders and managers to argue for or against different management options (especially TAC). The only way to avoid such a deleterious process would be to agree on management measures (such as TAC) evaluated with respect to explicit and rationalized objectives, e.g. a harvest control rule developed using Management Strategy Evaluation (MSE). Unfortunately, such a procedure was not in place and needs to be implemented rapidly to avoid any reiteration of such shortcoming in near future (see also below). This has been recognized by ICCAT, which established a working group for enhancing the dialog between Fisheries Scientists and Managers in 2013 through a process that would develop MSE.

Last but not the least, management regulations were ineffective in limiting catches in the Mediterranean Sea (mostly taken in international waters) because of a lack of compliance and control, which was primarily due to a general mismanagement of ICCAT at that time. Therefore, catches by most of the fisheries (often with the approval of their governments) were significantly underreported until 2007, allowing severe overexploitation to occur. This together with illegal fishing under flags of convenience led to considerable Illegal Unreported and Unregulated (IUU) catches

from 1998 to 2007 (Fig. 1). Although these IUU were documented by ICCAT Scientific Committee and several NGOs inquiries [1,9,10], ICCAT Commission took little action to curtail them prior to 2008. Consequently, ABFTE catches were probably at or above 50,000 t per year during this decade, while ICCAT Scientific Committee recommended a TAC between 15,000 t and 25,000 t in the same period.

Following the pressure from several NGOs, which stressed the inconsistency between scientific advice and management, ICCAT implemented a rebuilding plan in 2007. This plan included more restrictive management regulations, particularly in reducing the length of the fishing season for the main fleets (purse seiners), increasing the minimum size of fish (from 10 kg to 30 kg) and started to establish a real and effective monitoring control and surveillance system. However, two key issues were not tackled and still remained: high catches levels and overcapacity [10]. The plan was reinforced in 2008, including the strengthening of the control measures and a reduction of fishing capacity over 5 years, but again the TAC remained 2 to 3 times higher than scientific advice. The procrastination of ICCAT led in 2009 to the demand by Monaco to list ABFT under Appendix 1 of the Convention of International Trade in Endangered Species of Wild Fauna and Flora (CITES), which was strongly supported by most of the NGOs. ABFE was pointed as an archetypal example of mismanagement by its responsible body (ICCAT) and another international organization (CITES) was advocated by some parties to improve the situation

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