OSPAR COMMISSION

Background Document for Atlantic Bluefin tuna

Biodiversity Series

2014

OSPAR Convention

The Convention for the Protection of the Marine Environment of the North-East Atlantic (the "OSPAR Convention") was opened for signature at the Ministerial Meeting of the former Oslo and Paris Commissions in Paris on 22 September 1992. The Convention entered into force on 25 March 1998. The Contracting Parties are Belgium, Denmark, the European Union, Finland, France, Germany, Iceland, Ireland, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Convention OSPAR

La Convention pour la protection du milieu marin de l'Atlantique du Nord-Est, dite Convention OSPAR, a été ouverte à la signature à la réunion ministérielle des anciennes Commissions d'Oslo et de Paris, à Paris le 22 septembre 1992. La Convention est entrée en vigueur le 25 mars 1998. Les Parties contractantes sont l'Allemagne, la Belgique, le Danemark, l'Espagne, la Finlande, la France, l'Irlande, l'Islande, le Luxembourg, la Norvège, les Pays-Bas, le Portugal, le Royaume-Uni de Grande Bretagne et d'Irlande du Nord, la Suède, la Suisse et l'Union européenne.

Acknowledgement

This report has was prepared by WWF as lead party in consultation with members of the Biodiversity Committee (BDC) and relevant Competent Authorities and originally published in 2011. This updated document was published in 2014 through a collective exercise under the lead of France and supported by a drafting group comprising the European Union, Germany, Norway and Oceana.

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Background Document for Atlantic Bluefin tuna *Thunnus thynnus*[1]

Executive Summary

This background document on Atlantic Bluefin tuna – *Thunnus thynnus* - has been developed by OSPAR following the inclusion of this species on the OSPAR List of threatened and/or declining species and habitats (OSPAR Agreement 2008-6). The document provides a compilation of the reviews and assessments that have been prepared concerning this species since the agreement to include it in the OSPAR List in 2003. The original evaluation used to justify the inclusion of *T.thynnus* in the OSPAR List is followed by an assessment of the most recent information on its status (distribution, population, condition) and key threats prepared during 2009-2010 and updated in 2013/14. The document provides concluding remarks on the current status of the stock indicating a stock rebuilding trend for the Eastern Atlantic Bluefin tuna following stricter conservation and management measures taken by the International Commission for the Conservation of Atlantic Tunas (ICCAT) from 2009 onwards. The status of the Western stock has also improved but remains low compared to historical levels. There are still high uncertainties regarding the speed and magnitude of the spawning stock biomass increase for both stocks.

The document provides recommendations for the actions and measures that could be taken to improve the conservation status of the species. In agreeing to the publication of this document, Contracting Parties have indicated the need to further review these proposals. Publication of this background document does not, therefore, imply any formal endorsement of these proposals by the OSPAR Commission. On the basis of the further review of these proposals, OSPAR will continue its work to ensure the protection of *T.thynnus*, where necessary in cooperation with other competent organisations. This background document was updated in 2013/14 and may be updated in the future to reflect further developments or further information on the status of the species which becomes available.

Récapitulatif

Le présent document de fond sur le thon rouge a été élaboré par OSPAR à la suite de l'inclusion de cette espèce dans la liste OSPAR des espèces et habitats menacés et/ou en déclin (Accord OSPAR 2008-6). Ce document comporte une compilation des revues et des évaluations concernant cette espèce qui ont été préparées depuis qu'il a été convenu de l'inclure dans la Liste OSPAR en 2003. L'évaluation d'origine permettant de justifier l'inclusion du thon rouge dans la Liste OSPAR est suivie d'une évaluation des informations les plus récentes sur son statut (distribution, population, condition) et des menaces clés, préparée en 2009-2010 et mise à jour en 2013/14. Ce document présente des conclusions sur l'état actuel du stock soulignant une tendance à la reconstitution du stock Atlantique Est de thon rouge suite aux mesures de gestion et de protection plus strictes prises par la Commission Internationale pour la Conservation des Thonidés de l'Atlantique (CICTA) à partir de 2009. Le statut du stock de l'Atlantique Ouest s'est également amélioré mais reste à un niveau bas par rapport à ses niveaux historiques. Un niveau élevé d'incertitude demeure pour ce qui concerne la

[1]At the meeting of OSPAR's Biodiversity Committee in 2012 Norway stated that the Norwegian study reservation on the background document on Atlantic Bluefin Tuna could be lifted. However, Norway had noted some wording regarding the role of OSPAR in relation to fisheries management in the background document and further noted that this wording differs from document to document. In Norway's view, a close look on this wording in future background documents was necessary in order to come up with precise and consistent wording which corresponds to Article 4 of Annex V of the Convention (BDC 12/8/1, paragraph 4.23).

rapidité et l'ampleur de l'augmentation de la biomasse du stock des reproducteurs pour les deux stocks.

Ce document recommande des actions et mesures à prendre éventuellement afin d'améliorer l'état de conservation de l'espèce. En se mettant d'accord sur la publication de ce document, les Parties contractantes ont indiqué la nécessité de réviser de nouveau ces propositions. La publication de ce document ne signifie pas, par conséquent que la Commission OSPAR entérine ces propositions de manière formelle. A partir de la nouvelle révision de ces propositions, OSPAR poursuivra ses travaux afin de s'assurer de la protection du thon rouge, le cas échéant avec la coopération d'autres organisations compétentes. Ce document de fond a été mis à jour en 2013/14 et pourra être actualisé ultérieurement pour tenir compte de nouvelles avancées ou de nouvelles informations qui deviendront disponibles sur l'état de l'espèce.

1. Background Information

Name of species

Thunnus thynnus, Atlantic Bluefin tuna (Linnaeus, 1758)

2. Original Evaluation against the Texel-Faial selection criteria

List of OSPAR Regions and Dinter biogeographic zones where the species occurs

OSPAR Regions: The OSPAR List recognises that Bluefin tuna occur in Region V. This assessment recommends that the listing should be amended to recognise occurrence in Regions I, II, III, IV and V.

Dinter Biogeographic zones: Cold-temperate waters, Warm-temperate waters, Warm-temperate pelagic waters, Azores shelf, Lusitanean (Cold/Warm), Lusitanean-boreal, Cold-temperate pelagic waters

List of OSPAR Regions where the species is under threat and/or in decline

All where it occurs – Depth range: 0-1000 m

Orginal (2003) Evaluation against the Texel-Faial criteria for which the species was included on the Initial OSPAR List

Atlantic Bluefin tuna was nominated for inclusion in the OSPAR List in 2001 in a joint submission by Iceland, Portugal and UK citing decline, and sensitivity. A further nomination from WWF cited Atlantic Bluefin tuna as a keystone species.

Criterion	Comments (unrevised /as published in 2003)	Evaluation
Decline	The Atlantic Bluefin tuna used to be common in the Norwegian Sea, North Sea, Skagerrak, and Kattegat, and supported major sport and commercial fisheries in these areas between the 1930s and the 1950s. Total catches reached 16 000 tonnes in the early 1950s in the North Sea and Norwegian coast together; decreased considerable in the early 1960's and almost disappeared by 1980 (see figure 7 of Cort, 2007 or ICCAT Task I database[2]). Although much reduced compared to the early part of the 20th century, the abundance of the Eastern Atlantic stock of Bluefin tuna appeared to be relatively stable in the 1980s. This has been followed by a strong decline in number and biomass of older fish since 1993. The reported catch for the East Atlantic and Mediterranean stocks in 2000 was 33 754 tonnes, about 60% of the peak catch in 1996 although this is probably an under-estimate because of increasing uncertainty about catch statistics (ICCAT, 2002). The OSPAR Case Report (OSPAR, 2008) supporting the original listing cites estimates of spawning stock biomass is 86% of the 1970 level and reports that in 2002 ICCAT considered current catch levels to be not sustainable in the long-term (ICCAT, 2002). More recent ICCAT stock assessments are reported on in Section	Qualified

[2] http://www.iccat.int/en/accesingdb.htm

	3 of this document	
Sensitivity	The Atlantic Bluefin tuna has a slow growth rate, long life span (up to 20 years) and late age of maturity for a fish (4-5 years for the eastern stock) resulting in a large number of juvenile classes. These characteristics make it more vulnerable to fishing pressure than rapidly growing tropical tuna species (ICCAT, 2002).	
Threat	The main threats to the Atlantic Bluefin tuna are overexploitation of older fish and a high fishing pressure on small fish that is contributing to growth over-fishing and threatening natural recruitment. Bluefin tuna are also taken as by-catch in some longline fisheries. A regulatory recommendation to limit the fishing mortality came into force in 1975 (and was subsequently extended indefinitely for the East Atlantic) yet fishing mortality rates have exceeded that of 1974 in most years. The recommended minimum sizes have also been poorly enforced and as a result the threat to this species remains high. In 2000 the level of fishing mortality was almost 2.5 times higher than that which maximises yield per recruit. ICCAT therefore repeated the advice given in their 1998 report that current catch levels cannot be sustained in the long-term under the current selectivity pattern and current fishing mortality rate for the stock. They also continue to be concerned about the intensity of fishing pressure on small fish and noted that the recent abrupt increase of catches of large fish since 1994 is of grave concern In 2009 fishing continues in excess of scientific recommendations for East Atlantic and Mediterranean Bluefin tuna, since the 2008 ICCAT meeting failed to adopt the measures advised by scientists to recover the stock. However, in 2009, in view of the SCRS assessment against the CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) criteria, ICCAT adopted a new catch limit for 2010 (13 500 tonnes), consistent with the Standing Committee on Research and Statistics (SCRS) recommendations, and decided to review the plan for the following years. In its annual meeting of 2010, ICCAT adopted a TAC of 12 900 tonnes annually for 2011 and thereafter, until such time the TAC is changed following SCRS advice. This TAC is in line with the scientific assessment and with the objective of the 2009 ICCAT Recommendation. The purse seiner fishing season has been also drastically reduced to only one month. The western stock has not recovered as expected, in spite of the low catch quotas. There is still substantial mortality on spawners as a result of a directed fishery along the coast of Canada. In addition, there is some mortality of the West Atlantic stock within the Gulf of Mexico due to bycatch in other fisheries. Atlantic Bluefin tuna *Thunnus thynnus* has recently been listed as Endangered at the Mediterranean level by the International Union for Conservation of Nature (IUCN).	Qualified

Keystone species	The Atlantic Bluefin tuna is often regarded as a quintessential predator of pelagic ecosystems (Rooker *et al.*, 2007). Juveniles and adults are opportunistic; their diet consists mainly of crustaceans, fish and cephalopods during their early years, but centres primarily on fish such as herring, anchovy, sand lance, sardine, sprat, bluefish and mackerel as adults. Their diet can also include jellyfish and salps, as well as demersal and sessile species such as, octopus, crabs and sponges (Fromentin, 2005). The ecological extinction of this species, e.g. the incapability to fulfil its functional role in the ecosystem due to a strong biomass decline, would thus have unpredictable cascading effects in the ecosystem and entail serious consequences to many other species in the food web. A similar situation had arisen after the collapse of the Newfoundland cod in the North Atlantic.	

3. Current status of the species

Distribution in the OSPAR maritime area

Distribution: The Atlantic Bluefin tuna is found in the entire extent of the North Atlantic Ocean (covering the five OSPAR regions) and its adjacent seas, particularly the Mediterranean Sea, ranging from the southern boundary of the equator to the northern boundary of the north of Norway, and from the western boundary of the Gulf of Mexico to the eastern boundary of the Black Sea. (Fromentin, 2008). It is a highly migratory species that has two separate spawning grounds on either side of the Atlantic Ocean, in the Gulf of Mexico and the Mediterranean Sea.

Habitat: Atlantic Bluefin tuna mostly occupy the surface and sub-surface waters of the coastal and open-sea areas, between 0m and 200m depths. However, both juvenile and adult Atlantic Bluefin tuna can dive to depths of 500m to 1000m. Juvenile and adult Atlantic Bluefin tuna also tend to aggregate along ocean fronts, such as upwelling areas and meso-scale oceanographic structures associated with the general circulation of the North Atlantic and adjacent seas (Rooker *et al.*, 2007; Fromentin, 2006).

Population Structure and Migration Patterns: The Atlantic Bluefin tuna is currently managed by the International Commission for the Conservation of Atlantic Tunas (ICCAT) as two separate stocks – the eastern and the western - separated in the North Atlantic Ocean by the 45^0W meridian. This separation between eastern and western populations was established from studies and observations that showed that: (1) Atlantic Bluefin tuna have two separate spawning grounds on either side of the Atlantic Ocean - in the Mediterranean Sea on the eastern side, and the Gulf of Mexico on the western side, (2) there are distinct differences in the age at sexual maturity between western and eastern populations, (3) juveniles and adults are present on both sides of the Atlantic Ocean, and (4) there is a lack of indication of breeding in the middle of the North Atlantic Ocean (Fromentin, 2008).

However, this idea of two separate stocks on either side of the North Atlantic Ocean has been challenged by the transatlantic migrations of these tuna. Recent electronic tagging and chemical signature studies have revealed a greater mixing between Eastern and Western Atlantic stocks than previously believed. Atlantic Bluefin tuna of mixed origins (both eastern and western) can be found all along the east coast of North America, as well as throughout the North Atlantic Ocean (Block *et al.*, 2005). The only regions that appear to be exclusively composed of tuna of either purely western, or purely eastern origins, are the spawning grounds in the Gulf of Mexico and the Mediterranean Sea respectively (Rooker *et al.*, 2008; Block *et al*., 2005).

Nevertheless, despite this apparently high rate of mixing, the most recent study on mitochondrial DNA has revealed a significant population subdivision among the Gulf of Mexico, the Western Mediterranean, and surprisingly, the eastern Mediterranean Sea (Boustany *et al*., 2008). These latest results indicate that although the distributions of tuna from different origins do overlap within the North Atlantic Ocean and adjacent seas, individuals show strong natal homing to their spawning grounds either in the Gulf of Mexico, or the Western or Eastern Mediterranean Sea.

After the spawning season in the Mediterranean a trophic migration across the Strait of Gibraltar into the OSPAR maritime area was widely reported (Cort, 2007; 1990; Nottestad and Graham, 2004). The migration routes described border the Iberian Peninsula entering into the Bay of Biscay, the British Islands on its Atlantic side and then the Norwegian coast until 70ºN, entering also to the North Sea (Cort, 2007). Tagging experiments also clearly show Atlantic Bluefin tuna migrating from the OSPAR area (west coast of Ireland) to the Western and Central Atlantic and to the Mediterranean Sea (Stokesbury et. al, 2007).

Population (current/trends/future prospects)

Population size

Atlantic Bluefin tuna - East

A virtual population analysis (VPA) (Murphy, 1965; Gulland, 1965; Jones, 1964) conducted in 2008 by ICCAT scientists, which was based upon reported catches for the period of 1955 to 2007, indicated a long-term rate of decline of 64% from the baseline spawning stock biomass (based upon reported catches, spawning stock biomass in 2007 was 100 047 tonnes, and the spawning stock biomass in 1955 was 281 954 tonnes). This last analysis did not account for the illegal over-quota catches, which were estimated by SCRS to roughly equal the reported catches in 2007 (real catches were estimated at 61 100 tonnes for that year and at around 50 000 tonnes per year in recent times). A second virtual population analysis conducted in 2008 by the Standing Committee on Research and Statistics (SCRS) of ICCAT, based upon estimated catches (including illegal, unregulated, and unreported (IUU)), which addressed the period of 1955-2007 and included estimates of real catches, yielded an estimate for spawning stock biomass (SSB) for the East Atlantic and Mediterranean stock in 2007 of 78 724 tonnes (ICCAT, 2008a: Appendix 9, Table 4 corresponding to run 14 of the VPA). This contrasted with the biomass peak estimated for 1958 at 309 932 tonnes, and with the 201 479 tonnes estimated for 1997. The absolute extent of decline over the 50-year historical period ranging from 1957 to 2007 is, therefore, estimated at 74.2% of the spawning population level at the start of the series, indicating that the size of the current spawning stock is only 1/4 of that in 1957. The bulk of the spawning stock biomass loss (60.9%) happened between 1997 – 2007. In 2008 ICCAT reported fishing mortality (F) to be at least 3 times the level that would result in Maximum Sustainable Yield (MSY), and spawning stock biomass to be most likely less than 20% of the level needed to support MSY; for 2007, it was estimated at only 14% of the level corresponding to maximum fishing mortality (FMAX), even assuming the high recruitment levels typical of the 1990s (ICCAT, 2008b).

The main pattern recorded by SCRS consisted of the rapid decline in abundance of older spawners (8+) due to the dramatic increase of fishery mortality since 2000 in this segment of the population, driven by the booming demand from tuna farms in the Mediterranean. This fact has led to the strong overall decrease in spawning stock biomass (ICCAT, 2008 a,b). According to Mackenzie *et al.* (2009), who used an age-structured stochastic modelling approach similar to that used in working groups of the International Council for the Exploration of the Sea (ICES), the mean age of mature Atlantic Bluefin tuna declined from the mid-1980s to the late 2000s, and the proportion of large spawners (age 8+) declined especially from the late 1970s to the late 2000s. The share of repeat spawners in the population also declined and remained generally low from the mid- to late 1980s to late 2000s. Based on these considerations, the authors concluded at the time that “age structure and reproductive demographics for the population have shifted to configurations which likely reduce

reproductive potential and increase vulnerability of the remaining population to additional stressors". In 2013, ICCAT SCRS indicated that recent analyses from the reported catch-at-size and catch-at-age displayed important changes in selectivity patterns over the last years for several fleets operating in the Mediterranean Sea or the East Atlantic. The enforcement of minimum size regulations adopted in 2006 led to much lower reported catch of younger fish and subsequently a significant increase in the annual mean-weight in the catch-at-size since 2007. Additionally, higher abundance or higher concentration of small Bluefin tuna in the North-western Mediterranean detected from aerial surveys could also reflect positive outcomes from increase minimum size regulation. This regulation also resulted in improved yield-per-recruit levels in comparison to the early 2000s as well as to a greater recruitment to the spawning stock biomass due to higher survival of juvenile fish (SCRS, 2013).

The 2012 stock assessment carried out by the SCRS indicates that the rebuilding of eastern Bluefin tuna at SSBF0.1 level with a probability of at least 60% could be achieved before 2022 with catch at around recent TACs (Note : SSBF0.1 level is used as equivalent to BMSY). However, projections are known to be impaired by various sources of uncertainties that have not yet been fully quantified. The results from the projections thus need to be further confirmed by future data and analyses (ICCAT 2013)

In 2014, the SCRS will conduct an update of the Eastern Atlantic Bluefin tuna stock assessment. A new assessment will also be undertaken in 2015, based on a new model.

Atlantic Bluefin tuna - West

The virtual population analysis (VPA) conducted by SCRS ICCAT in 2008 yielded an estimate for spawning stock biomass in 2007 of 8 693 tonnes which contrasted sharply with the 49 482 tonnes estimated for 1970, meaning an absolute extent of decline over the 38-year historical period estimated at 82.4% of the spawning population level at the start of the series, meaning only 17.6% of the spawning biomass in 1970 would remain (ICCAT, 2008a: Appendix 9, Table 4, pages 167-168). The sharp decline of the Western spawning stock biomass occurred between 1970 and 1985 as a result of overfishing (SSB in 1985 was approximately 18.9 % of SSB in 1970). In 1998, ICCAT adopted a rebuilding programme for the West Atlantic stock that called for rebuilding the spawning stock biomass to the levels needed to achieve maximum sustainable yield (MSY) with at least 50% probability.

Since 1998, when the rebuilding plan was adopted, the spawning stock biomass (SSB) has increased by 19% (ICCAT 2013). Assuming that average recruitment cannot reach the high levels recorded in the early 1970s, recent fishing mortality (2004-2006) is about 30% to 50% higher than the level required to achieve MSY and the spawning stock biomass is about half of the biomass level required to support MSY (ICCAT, 2008b). Based on one assumption of recruitment, under more restrictive quota limits set in 2008 overfishing could end by 2010 and the west stock could be rebuilt by 2019 with greater than 75% probability.

The 2012 assessment estimated trends that are consistent with previous analyses in that spawning stock biomass (SSB) declined steadily from 1970 to 1992 and has since fluctuated between 25% and 36% of the 1970 level.

The stock has experienced different levels of fishing mortality (F) over time, depending on the size of fish targeted by various fleets (ICCAT 2013) Fishing mortality on spawners (ages 9 and older) declined markedly after 2003 (ICCAT 2013).

In recent years, however, there appears to have been a gradual increase in SSB from 27% in 2003 to an estimated 36% in 2011.

Estimates of decline by the SCRS against CITES appendix I criteria

A SCRS ICCAT *ad hoc* meeting took place in October 2009 to assess current stock status of Atlantic Bluefin tuna against CITES appendix I criteria. Following CITES guidance[3] the SCRS computed the probability that the decline criteria is met by comparing current (2009) population size relative to various percentages (10/15/20%) of an historical baseline. Population size was expressed in terms of spawning stock biomass (SSB) as is standard practice in fish stock assessment work. For each case, two alternative historical baselines were used: (1) the estimated unfished SSB (SSB0); and (2) the highest estimated SSB over the time period (1970-2007) of the assessment (SSBmax).

The resulting probabilities for meeting the historic decline criterion for the western stock (to 15-20% of baseline) are 93-100% using the SSB0 baseline and 30-54% using the SSBmax baseline (Table 1 in ICCAT 2009b). The probabilities of meeting the historical decline criterion for the eastern stock range from 96-99% using the SSB0 baseline, and 21-34% using the SSBmax baseline (Table 1 in SCRS 2009). As noted in the SCRS report, the highest estimated biomass over the period 1970-2007 may be considerably lower than the historical biomass, due to substantial catches prior to 1970. The report also notes that the estimates of long term potential spawning biomass are not estimates of historical biomass *per se*, but what the stock size might be if there were no fishing. So it might be also overestimated. Prior to 1970, the western stock has a short history of very high catches in the 1960s, while the eastern stock has a long history of moderate catches back into historical times, and a period of high catches in the 1950s when the range of the stock extended further into the North-east Atlantic. The outcome of the calculations made by the group, following CITES guidelines which specifies that the data used to estimate or infer a baseline for extent of decline should extend as far back into the past as possible, is that the probability that the population of Atlantic Bluefin tuna (both western and eastern stocks) is at a level below 15% of the historical baseline is virtually 100%.

Population trends

Atlantic Bluefin tuna - East

The population assessment conducted by the ICCAT SCRS in 2008 was based on virtual population analysis (VPA) and showed that spawning stock biomass (SSB) had been declining rapidly in the previous several years while fishing mortality (F) had been increasing rapidly, especially for large individuals (ages 8+; a 3 to 4-fold increase in F since 2000). Analyses showed that 2003 to 2007 spawning stock biomass was less than 40% of the highest estimated levels (at the start of the time series 1970-1974 or 1955-1959, depending on the analysis). The decline in spawning stock biomass appeared to be more pronounced after the year 2000 with a linear trend from 2003 to 2007 suggesting a rapid decline of biomass well below the 20% baseline within much less than 10 years, at that time (see ICCAT 2008a: Appendix 9, Table 4 corresponding to run 14 of the VPA). All the analyses indicated a general increase at that time in fishing mortality for large fish and, consequently, a decline in spawning stock biomass (SCRS, 2008b). In 2008, the ICCAT SCRS stated that fishing mortalities were expected to drive the spawning stock biomass to very low levels; i.e. about 18% of the SSB in 1970 and 6% of the unfished SSB. Such a combination of high fishing mortality, low spawning stock biomass and severe fishing overcapacity would have resulted in a high risk of fisheries and stock collapse (ICCAT, 2008a,b).

According to independent analyses by Mackenzie *et al.* (2009), even if a near-complete ban on all Atlantic Bluefin tuna fishing in the NE Atlantic and Mediterranean were implemented and enforced from 2008 to 2022, the population would probably fall to record lows in the next few years, unless

[3] The CITES criteria (CITES resolution Conf. 9.24 (Rev. CoP14)) allow a population decline to be expressed in two different ways: (i) overall long-term extent of decline; or (ii) recent rate of decline from a baseline level of abundance or area of distribution. The data used to estimate or infer a baseline for extent of decline should extend as far back into the past as possible. The specific guidelines for the commercially exploited marine species specify that the historical rate of decline should be the primary criterion for consideration of listing of species in Appendix I, but that the recent rate of decline can also be considered. The guideline for the recent rate of decline is that which would drive the population down from the current level to historical extent of decline guideline (i.e. 5-20% of baseline for exploited fish species).

environmental conditions promote exceptionally high recruitment. The same authors estimated that there was moderate probability (25%) that the expected decline in biomass between 1999 and 2010 would reach 90%.

In October 2008 the SCRS advised ICCAT to adopt one of the following management approaches in its meeting of November 2008 in order to rebuild the East Atlantic Bluefin tuna stock according to the objectives of the ICCAT Convention: (i) F0.1 or Fmax strategies (implying short-term real catches at between 8 500 t and 15 000 t, or less), (ii) a closure of the entire Mediterranean in May-June-July, or (iii) a moratorium over the East Atlantic and Mediterranean Sea during 1, 3 or 5 years followed by an F0.1 strategy (ICCAT, 2008b).

In 2008, Total Allowable Catch limits were adopted by ICCAT for 2009 and 2010 at 22 000 tonnes and 19 950 tonnes respectively; in other words, between 2.34 and 2.58 times the precautionary $F_{0.1}$ quota advised by SCRS ICCAT.

In 2009, in view of the SCRS assessment against the CITES criteria, ICCAT adopted a new catch limit for 2010 (13 500 tonnes) and decided to review the plan for the following years.

The Bluefin tuna stock assessment carried out by the SCRS in 2010 pointed out that, although the recent Fs had probably declined, these values remained too high and recent spawning stock biomass too low to be consistent with the Convention (ICCAT) objectives (ICCAT, 2010). The assessment reported that while several fishery indicators had shown some positive tendency in the most recent fishing seasons, the available catch effort statistics were not sufficient to permit the SCRS to quantify the extent of impact of the recent regulations on the overall stock with precision. The SCRS view was that it would take additional years under constrained fishing in order to measure it more precisely.

Following ICCAT's request to present a Kobe II strategy matrix reflecting recovery scenarios, the SCRS adopted the following table for their report in 2013:

Table 1. The probabilities of Eastern Atlantic and Mediterranean Bluefin tuna's Spawning Stock Biomass (SSB) > SSB_{MSY} for quotas from 0 to 30 000 tonnes from 2013 through 2022. Shading corresponds to the probabilities of being in the ranges of 50-59, 60-69, 70-79, 80-89 per cent and greater or equal to 90 per cent. (Source: 2013 ICCAT SCRS Report; Executive Summary on BFT – Atlantic Bluefin tuna)

TAC	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
0	36	46	54	63	72	82	92	97	100	100
2000	36	45	54	62	70	81	90	97	99	100
4000	36	45	53	61	69	79	89	96	99	100
6000	36	44	52	59	67	77	87	94	98	100
8000	36	43	51	58	66	75	85	92	97	99
10000	35	43	50	56	64	73	83	91	96	99
12000	35	42	48	55	63	70	80	88	95	98
12900	35	42	48	55	62	69	79	87	93	98
13500	35	42	48	54	61	69	78	87	93	97
14000	35	42	47	54	60	68	77	86	92	97
16000	35	41	46	52	58	66	74	83	90	94
18000	34	40	45	51	56	63	71	79	86	92
20000	34	39	44	49	54	60	68	75	83	88
22000	34	39	43	47	52	57	63	71	77	83
24000	34	38	42	46	50	55	60	67	73	78
26000	34	37	41	44	48	52	57	62	67	73
28000	33	36	40	43	45	49	53	58	63	66
30000	33	36	38	41	43	46	50	54	58	62

As indicated by Table 1, a 62 to 97 % probability rate of stock rebuilding by 2022 is obtained with TAC set at 13 500 tonnes or even with much more significant TACs (30 000 tonnes).

Although the situation regarding the quantification on the different sources of uncertainties has improved the SCRS 2013 noted that there are still uncertainties in the Kobe matrices about the speed and magnitude of the SSB increase, key modelling parameters for Bluefin tuna productivity, the current and future recruitment levels, the stock structure and the level of IUU catch (although SCRS believed that the level of IUU has strongly decreased since 2008).

ICCAT committed to adopt in 2010 a three years recovery plan for 2011-2013 with the goal of achieving BMSY through 2022 with at least 60% of probability. According to the SCRS, the spawning stock biomass would be equal or greater than SSBMSY by the end of 2022 for a catch = 0 to 13 500 tonnes (i.e. 2010 level of TAC) or for more significant level of catches as shown in Table 1.

In its annual meeting of 2010 ICCAT adopted a TAC of 12 900 tonnes annually for 2011 and thereafter, until such time as the TAC is changed following SCRS advice. This TAC falls within the range advised by the scientific committee and meets the objectives of the 2009 ICCAT Recommendation.

In 2012, SCRS indicated that the implementation of TAC levels and regulations adopted in 2009, 2010 and previously, has clearly resulted in reductions in catch and fishing mortality rates. All CPUE indices showed increasing tendencies in most recent years. SCRS noted that maintaining catches at the 2011 TAC (12 900 t) or at the 2010 TAC (13 500 t) under the current management scheme was likely to allow the stock to increase during that period and is consistent with the goal of achieving FMSY and BMSY through 2022 with at least 60% of probability, given the unquantified uncertainties. It recommended a period of stabilization in the main management regulations of the rebuilding plan,

that would allow the SCRS to better estimate the magnitude and speed of recent trends in F and SSB in the coming years. (SCRS, 2012). Following SCRS advice, ICCAT meeting set the 2013 and 2014 TAC at 13 400 tonnes annually.

Atlantic Bluefin tuna - West

The total catch for the West Atlantic Bluefin tuna stock peaked at nearly 20 000 tonnes in 1964. Catches dropped sharply thereafter and after reaching a small peak in 2002, at 3 319 tonnes, they steadily declined to only 1 624 tonnes in 2007. The United States was unable to catch its quota in 2004-2007 due to the scarcity of fish available to the fleet. The SCRS assessment made in 2008 showed that spawning stock biomass declined steadily from 1970s to 1992. The stock has since then fluctuated between 25% and 36% of the 1970 level. However, in recent years, there appears to have been a gradual increase in the spawning stock biomass (SSB) from 27% in 2003 to an estimated 36% in 2011. Since 1998, when the rebuilding plan was adopted, SSB has increased by 19%.

Fishing mortality on spawners (ages 9 and older) declined markedly after 2003. The stock has experienced different levels of fishing mortality (F) over time, depending on the size of fish targeted by various fleets. There is strong uncertainty about the potential recruitment for this stock. According to the last assessment by the SCRS in 2012 as in the previous assessment, future recruitment was assumed to fluctuate under two scenarios: a low recruitment scenario and a high recruitment scenario. Under the assumption of a low recruitment scenario, total catches of 2 500 tonnes or lower are predicted to have at least 60% probability of achieving the convention objectives of preventing overfishing and maintaining the stock above the MSY level. Constant catches of 2 000 t would result in 2019 SSB being almost at the same level as SSB in 2012.

If the high recruitment scenario is correct, then the western stock will not rebuild by 2019 even with no catch, although catches of 1 200 t or less are predicted to have a 60% chance to immediately end overfishing and initiate rebuilding (ICCAT 2012)[4].

The SCRS (2013) noted that considerable uncertainties remain for the outlook of the western stock, including the effects of mixing and management measures on the eastern stock.

SCRS noted that both the productivity of Western Atlantic Bluefin tuna and Western Atlantic Bluefin tuna fisheries are linked to the Eastern Atlantic and Mediterranean stock. Therefore, management actions taken in the Eastern Atlantic and Mediterranean are likely to influence the recovery in the Western Atlantic, because even small rates of mixing from east to west can have considerable effects on the West due to the fact that eastern plus Mediterranean resource is much larger than that of the west.

The most recent (2012) assessment indicated similar historical trends in abundance as in previous assessments. The strong 2003 year class has contributed to stock productivity and has led to an increase in the total biomass in recent years.

Habitat extent and trends: Historical analysis of Atlantic Bluefin fisheries showed that it dates back to ancient times. The species has been exploited for centuries in the Mediterranean Sea and at the entrance of the Gibraltar Straits. Since the 1920s, it has been increasingly exploited in the northeast Atlantic. Large changes have been observed since then and there were several extinctions/discoveries of important fishing grounds in the Mediterranean as well as in the East Atlantic during the 20th century. Atlantic Bluefin tuna are now absent or rare from formerly occupied habitats, such as the North Sea, Norwegian Sea, Black Sea, Sea of Marmara, off the coast of Brazil and Bermuda, and certain locations off the north-eastern American coasts, while high catches have been recently made in new areas, such as the Eastern Mediterranean, the Gulf of Sirte and the

[4] The reader is referred to the Kobe II matrices presented in Table 1 ICCAT (2013) http://www.iccat.int/Documents/Meetings/Docs/2013-SCRS-REP_ENG.pdf

central North Atlantic. The reasons for these changes in spatial and temporal patterns remain unclear and are likely to result from interactions between biological, environmental, trophic and fishing processes (ICCAT, 2008a).

In the Mediterranean, while traditional Atlantic Bluefin tuna fisheries mostly operated along specific areas of the coasts until the mid-1980s (e.g., the Gulf of Lions, the Ligurian, Ionian and Adriatic Seas), the fisheries rapidly expanded over the whole western basin during the late 1980s and early 1990s, and, more recently, over the central and eastern basins, so that Atlantic Bluefin tuna is now exploited over the whole Mediterranean Sea for the first time in the millennia of its fisheries history (Fromentin, 2006). The SCRS expresses concern because this situation means that no refuge appears to exist anymore for Atlantic Bluefin tuna in the Mediterranean during the spawning season (ICCAT, 2008a). Since 2008, the purse seiners fishing season has been reduced to one month.

Condition (current/trends/future prospects)

Stock assessments made by the Standing Committee on Research and Statistics (SCRS) of ICCAT consider a range of natural mortality (M) for East Atlantic and Mediterranean Bluefin tuna of 0.49, 0.24, 0.24, 0.24, 0.24, 0.20, 0.175, 0.15, 0.125, 0.10 for the years 1 to 10+ (age 10 and older), respectively (ICCAT 2008a). This means an average annual M for adults in the eastern stock (ages 4 to 15, well represented in the fishery and the population) of 0.14. The same calculation for ages 1-15 yields a value of 0.18. For the West Atlantic stock, which is characterized by a higher age at first maturity, the ICCAT scientists assume a constant natural mortality of 0.14 for all ages of the stock.

The ICCAT SCRS special session to consider the status of Atlantic Bluefin tuna with respect to CITES Biological Listing Criteria held in October 2009, reviewed three studies relating to the species productivity. Results of these different studies concluded that the Atlantic Bluefin tuna should be considered as a low productivity species or in the boundary of low/medium productivity (ICCAT 2009b). More precisely, that Eastern Atlantic Bluefin tuna is considered as a medium productivity stock[5] while Western Atlantic Bluefin tuna can be considered as a low productivity stock (ICCAT 2009b, p.1). This characteristic makes it more sensitive to fishing pressure than rapidly growing tropical tuna species. The strong aggregatory behaviour of the Atlantic Bluefin tuna during the spawning season heavily increases the vulnerability of the stocks in front of fishing fleets, particularly large-scale purse seines operating in the main spawning grounds. In this regard, according to ICCAT (2008a: page 8) the expansion of the purse seine fleet in the Mediterranean that occurred in 2007-2008 "*has further led to a quick and spatial expansion of the PS* (purse seine) *fleets in the Mediterranean … Consequently, the vast area of the Mediterranean nowadays were covered by BFT* (Bluefin tuna) *fishing over its entire surface, a situation that has never been encountered in the past and that is of high concern since it appears to no longer exist any refuge for BFT in the Mediterranean during the spawning season*".

In 2011 Atlantic Bluefin tuna *Thunnus thynnus* was listed as "Endangered" at the Mediterranean level by IUCN (IUCN, 2011).

Limitations in knowledge

See section 5.

4. Evaluation of threats and impacts

The main threat for *Thunnus thynnus* is too high fishing pressure (commercial and recreational fisheries) including illegal, unregulated, and unreported (IUU) fishing. Up to 2009, when ICCAT adopted certain conservation and management measures, the Eastern Atlantic and Mediterranean stock of *Thunnus thynnus* was strongly threatened by legal overfishing – meaning unsustainable

[5] There are scientific uncertainties whether the Eastern Atlantic Bluefin tuna is a medium or low productive stock (eg., Schirripa 2011, Knapp et al, 2013).

catch limits set in general well above levels recommended by scientists - and illegal, unregulated, and unreported (IUU) fishing activities.

In the OSPAR maritime area fisheries are currently particularly important near the Strait of Gibraltar, the Bay of Biscay, the Iberian Coast and in Region V south of Iceland. It was noted that in the North Sea and along the Norwegian coast the fishery had collapsed before 1970 (See Figures 7 and 8 in Cort, 2007). The abundance of tuna in Norwegian waters has recovered to the extent that ICCAT adopted a measure in 2013 allowing fisheries to take place in Norway's EEZ from late June to late October. However, overfishing of both stocks and particularly in the Mediterranean is likely to have a strong impact on the distribution and abundance of Atlantic Bluefin tuna in the OSPAR Regions (see Cort, 2007). Atlantic Bluefin tuna is traditionally consumed fresh in Mediterranean countries, and it is also one of the most sought after species for the sashimi market in Japan. The booming capture based farming activities that started in the Mediterranean (the main spawning and fishing ground for the species) in 1996 exacerbated fishing pressure over the East Atlantic stock, to the point that 61% of the spawning biomass had disappeared between 1997 and 2007 (ICCAT, 2008b).In 2009 fishing continued in excess of scientific recommendations for East Atlantic and Mediterranean Bluefin tuna, since the 2008 ICCAT meeting failed to adopt the measures advised by scientists to recover the stock.

Regarding the Western Atlantic stock, the ICCAT SCRS 2013 report indicated that the implementation of recent regulations (Recs 12-02, 10-03, 08-04) was expected to result in a rebuilding of the stock towards the Convention objective but there has not yet been sufficient time to detect with confidence the population response to the measure. Nevertheless, the available fishery indicators, as well as the 2012 assessment suggest the spawning biomass of western Bluefin tuna continues to increase.

Regarding the Eastern Atlantic stock the implementation of recent regulations (Recs.12-03, 10-04, 09-06, and previous Recommendations) has clearly resulted in reductions in catch and fishing mortality rates. All CPUE indices showed increasing tendencies in most recent years (ICCAT 2013).

Exploitation patterns and trade: Bluefin tuna in the Mediterranean is mostly caught by purse seine vessels (nearly 70% of the catch – ICCAT, 2008b). Fish caught by purse seine vessels are then tugged live to tuna farms where they are then fattened during a period of 6 to 8 months. Fishing vessels are usually from different countries than those where the tuna are later farmed, so this transfer of live fish to farms constitutes international trade. After slaughter, the bulk of this production is exported to Japan as frozen products where it is consumed as sushi and sashimi. The main types of products exported are belly meat, dressed fish (headless, whole), fillets, loins, and gilled and gutted fish. Tuna farming in the Mediterranean started in 1997. Farming capacity abruptly increased from a few hundred tonnes in 1997 to 30 000 tonnes in 2003 (WWF, 2006) and around 64 000 tonnes in 2008, representing approximately 51 000-57 000 tonnes round weight of (large) fish at time of capture (ICCAT, 2008a). This estimated farming capacity represents a capacity excess of more than 32 000 tonnes - as much as twice the 2008 Total Allowable Catch (TAC). In addition, the estimates of fleet size indicated there was sufficient active fishing capacity to fully supply the farms to their indicated limits (ICCAT, 2008a). In addition, an array of Japanese restaurants in Europe have also contributed to the demand of this farmed Bluefin tuna. Catches by longliners and tuna traps are also partly exported to Japan as wild fish products. The rest of their catch, together with tuna caught by handlines and other gears, is consumed domestically in the main producer countries (Spain, France and Italy) as a fresh product, usually from small size fish.

In 2008, it was reported that stockpiles of frozen Bluefin tuna existed in Japan and some other Asian countries. The amount of the Japanese cold store of Bluefin tuna reported by the National Oceanic

and Atmospheric Administration (NOAA) in November of 2008 was 21 783 tonnes[6]. Additional stores of frozen Bluefin tuna was known to exist in other Southeast Asian nations and in reefer vessels[7].

In 2007, total imports of 32 356 tonnes of processed Bluefin tuna reported by Japan to ICCAT for 2007, (see ICCAT Circulars 1951/07 and 500/08) contrasted sharply with the legal Total Allowable Catch for that year (29 500 tonnes). This mismatch between ICCAT import records (Bluefin tuna statistical documents (BFTSD)) and the TAC was all the more evident when the unquantified levels of domestic consumption in European Mediterranean countries were taken into account, together with the real magnitude of the intra-European trade and the catches by the national Japanese fleet operating in the Atlantic and the Mediterranean Sea (provisionally reported at 2 238 tonnes in 2007). All these elements taken together suggested significant catches over the legal quotas (IUU), in line with ICCAT SCRS estimates of real catches (61 000 in 2007). These comparisons, however, should be made with caution since trade data for 2007 includes some farmed fish caught in 2006, and trade information referred to processed presentations (to which adequate conversion factors need to be applied -including appropriate growth rates during the farming period - in order to yield estimates of round weight at the moment of catch). Indeed, Bluefin tuna import records available at the ICCAT BFTSD database include the following: dressed, gilled and gutted, filleted, round and others (such as belly meat), which can bias the original round weight of the fish at the moment of harvesting.

A catch assessment produced by Advanced Tuna Ranching Technologies (ATRT) for WWF, based on 2007 trade statistics of Bluefin tuna products was presented by WWF scientists in the 2008 SCRS meeting (ICCAT, 2008a). For 2006, the study relied on complete official statistics on international trade for the year, including ICCAT Bluefin tuna statistical documents (BFTSD) supplemented with Eurostat trade data. Trade figures were cross-checked against databases from national trade and custom agencies in Spain, France, Malta, Italy, United States, Japan, Korea and Tunisia, and fine-tuned with reliable catch and caging data when appropriate. Total estimated catches of Atlantic Bluefin tuna (wild round weight) in the East Atlantic and the Mediterranean amounted to 58 681 tonnes. For 2007, this study was based on direct field assessments of Mediterranean tuna farms in 2006 and 2007, supplemented with Eurostat trade data (from January to July 2007) and official reports of catches and industry estimates collected until August 30, 2007. Total estimated catches of Atlantic Bluefin tuna (wild round weight) in the East Atlantic and Mediterranean amounted to 56 149 tonnes for the year 2007. Spreadsheets supporting these calculations are held at the ICCAT Secretariat as part of the record of the 2008 Bluefin tuna stock assessment. The results of this study were endorsed by the SCRS and coincided in general with that made by the Group[8] on the basis of active capacity (ICCAT, 2008a) – i.e. 61 000 tonnes (ICCAT, 2008b). Consequently, the difference between the estimated catch of 61 000 tonnes and the legal quota of 29 500 tonnes for 2007 can be attributed to illegal trade, most of which is happening at the international level.

However, the SCRS reports that in 2008 and 2009 a substantial decrease in the catch would have occurred in the Eastern Atlantic and Mediterranean (ICCAT, 2010). In 2012, the SCRS concluded that a substantial decrease in the catch occurred in the Eastern Atlantic and Mediterranean Sea through implementation of the rebuilding plan and through monitoring and enforcement controls.

As explained in the SCRS 2012 report, during the last decade, there has been an overall shift in targeting towards large Bluefin tuna, mostly in the Mediterranean. As the majority of these fish are destined for fattening and/or farming operations, it is important to get precise information about the total catch, the size composition, the area and flag of capture.

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[6] National Marine Fisheries Service, Southwest Regional Office, NOAA
http://swr.nmfs.noaa.gov/fmd/sunee/coldstor/jcsnov08.htm

[7] El triunfo de la barbarie, published in Ruta Pesquera (Spain), January 2009

[8] Participants at the Atlantic Bluefin Tuna Stock Assessment Session. Madrid 2008

Progress has been made over recent years and therefore the SCRS investigated in 2013 the size data retrieved from the observer on board of cages programmes (see ICCAT 2013/014). There was a considerable amount of information that was analysed and compared to current catch-at-size. These data appeared to be of good quality and the SCRS recommended the integration of this new valuable source of information in the Task II database prior to the next stock assessment (work to be completed during the 2014 Bluefin tuna data Working Group).

Furthermore, pilot studies using dual camera system or acoustic coupled with video system have been presented at the SCRS since 2010. The results are encouraging and the latest studies showed that this technique can provide precise catch composition when it is used with a proper and well defined protocol (see ICCAT 2013/182).

The Atlantic-wide Research Programme for Bluefin tuna (Grande Bluefin tuna year programme: GBYP) research plan was set up in 2010. Over the last four years, the GBYP has been instrumental in providing fisheries-independent indices of stock size.

5. Existing Management measures

In July 2008, the new stock assessment for the East Atlantic and Mediterranean stock made by the SCRS (ICCAT, 2008a) indicated that the spawning stock biomass continued to decline (calculated as 30-40% of the levels in the 1970s), while fishing mortality was increasing rapidly, especially for large fish. Again scientists warned that continuing fishing at this level is expected to drive the spawning stock biomass to 18% of that in 1970, which, combined with the current high fishing mortality and severe overcapacity, results in a high risk of fisheries and stock collapse (ICCAT, 2008a). At this time the SCRS advised that the maximum Total Allowable Catch should be between 8 500 and 15 000 tonnes, and that fishing should be banned during the spawning season (May, June and July). They went on to suggest the benefits of establishing a moratorium to increase the probability to rebuild the stock - an option that was reinforced during the meeting by the estimate of catches for 2007 of 61 000 tonnes (more than double of the TAC).

In September of the same year, the ICCAT performance review (see 7.2) (Hurry *et al*., 2008) stated:

> *"…the Panel (to) recommend to ICCAT the suspension of fishing on Bluefin tuna in the Eastern Atlantic and Mediterranean until the CPCs fully comply with ICCAT recommendations on Bluefin." "The Panel further recommends that ICCAT consider an immediate closure of all known Bluefin tuna spawning grounds at least during known spawning periods."*

In October 2008 the IUCN World Conservation Congress adopted, by majority, a recommendation on the species. Those voting in favour included Spain, a key fishing nation, and Japan, the most important market country. In the recommendation, IUCN asked ICCAT, at its next meeting of November 2008, to establish a science-based recovery plan according to SCRS advice, including the closure of the fishery during the crucial months of May and June and a Total Allowable Catch of less than 15 000 tonnes. It also asked ICCAT to establish immediately a suspension of the fishery until it can be brought under control, and to establish protected areas in main spawning grounds[9].

In his introductory remarks to the ICCAT plenary session in November 2008, ICCAT's chairman emphasised that ICCAT credibility was at stake, and insisted that ICCAT should abide by the scientific advice and that all the Contracting Parties should implement the management and conservation measures adopted by the Commission (ICCAT, 2009a).

The measure adopted by ICCAT in November 2008 established Total Allowable Catches for the East Atlantic and Mediterranean stock that decline annually. Specifically, the measure established Total Allowable Catch limits of 22 000 tonnes, 19 950 tonnes, and 18 500 tonnes for years 2009, 2010, and

[9] See resolution 4.028 in http://www.iucn.org/congress_08/assembly/policy/index.cfm

2011 respectively. The purse seine fishery was left open during the first half of the spawning season, when the bulk of catches are made. The season was open from 15 April to 15 June, with the possibility of extending the season to 20 June based upon weather conditions.

In 2009 and 2010, after new assessment by the SCRS, ICCAT adopted a new catch limit for 2010 and 2011 of 13 500 and 12 900 tonnes, respectively. In 2012, the TAC was identical to 2011. The catch limit for 2013 and 2014 was set at 13 400 tonnes annually.

In 2009, a new seasonal closure for purse seiners was adopted: the fishing season was reduced to one month, from 15 May to 15 June.

The first ever real estimate of the actual catch capability of the Mediterranean purse seine fleet targeting Bluefin tuna revealed that this fleet alone has a yearly catch potential of 54 783 tonnes, almost double than the annual total TAC set for 2008 and more than three and a half times the maximum catch level advised by scientists to avoid stock collapse (between 8 500 to 15 000 tonnes) (WWF, 2008). This figure did not take into account the catch potential of the rest of the Bluefin tuna fleet, such as longliners, traps, bait boats, pelagic trawlers, hand line boats, etc. This result was then publicly endorsed by the European Commission who welcomed the report and shared the analysis highlighting that "…the whole fishery is plagued by overfishing by a fleet that keeps growing in size and efficiency..."[10]. The SCRS, in its stock assessment meeting of 2008, found similar results: **"**In view of the assessment of stock status, this level of *active* capacity, leading to estimates of 2007 catch level on the order of 60 000 t, is at least 3 times the level needed to fish at a level consistent with the Convention objective." (ICCAT, 2008a). However, the 2008 ICCAT meeting agreed to "freeze" the Bluefin tuna fishing capacity at the 2007 level through 2008 with reductions in the ensuing years. In 2009, it was decided to set targets to reduce the overcapacity, accordingly each country should reduce the discrepancy between the existing fishing capacity and the fishing capacity commensurate with their allocated quota in the years 2011, 2012 and 2013, by: a) at least 50% in 2011, b) 20% in 2012 c) 5% in 2013. The implementation of recent regulations through (Recs. 12-03, 10-04, 09-06, and previous recommendations) has clearly resulted in reductions in catch and fishing mortality rates. All CPUE indices showed increasing tendencies in most recent years. , With a view to achieve a period of stabilisation of the management regulations and their effect on the stocks and keeping in mind remaining scientific uncertainties, the 2013 ICCAT meeting, noting the SCRS advice to maintain the TAC at the level of the previous year kept the TAC at 13 400 tonnes.

ICCAT requests statistical information from its Contracting Parties strictly for scientific purposes. This information allows the SCRS to perform the Bluefin tuna stock assessment when required by the Commission. This information includes detailed data on fleets, catches, temporal and spatial distribution of catches by fishing gear, and size frequencies of the catches. Although this requirement is binding for ICCAT Contracting Parties, scientists carrying out the stock assessment repeatedly complain of data limitations due to substantial under-reporting of catches and other relevant information. Moreover, in June 2008 during the session dedicated to the assessment of the stock, the chairman of the SCRS wrote a letter to the ICCAT Commission explaining the difficulties of carrying out the stock assessment with the scarce data reported up to the start of the meeting for the East Atlantic and Mediterranean stock; only 15% of the total TAC for that stock (ICCAT, 2008a: Appendix 6). The letter added that:

"It is also disappointing that such a large group of scientists and international experts meets during two weeks at a considerable expense to their organizations and is unable to complete the work required because of a (chronic) lack of data being transmitted in time. This situation is even more

[10] Press release from the European Commission, March 2008:
http://ec.europa.eu/fisheries/press_corner/press_releases/2008/com08_27_en.htm

incomprehensible given the high international concern about Bluefin Tuna stock status" (ICCAT, 2008a: Appendix 6).

The traceability of Bluefin tuna products across international borders is carried out through the ICCAT Bluefin tuna Catch Documentation Programme (BCD programme, Recommendation 07-10[11]) which includes catch, transfer, transhipment, farming and trade information. This recommendation was adopted in 2007 and entered into force in June 2008. Each tuna shall be accompanied by a BCD throughout the chain, from the catch to the final trade. BCDs must be validated by recognized CPC[12] authorities, unless the fish is tagged. This constitutes a major step towards international traceability of Bluefin tuna. The programme has limitations. It addresses the tagging of the fish, but the use of the tags is left optional for the contracting Parties. It shall be noted that tagging is compulsory for the fleets allowed to catch 8-30 kg Bluefin tuna, which increases traceability for this specific and sensitive part of the catch. The timing of their application to Bluefin tuna is specified as "preferably at the time of kill". Since most of the East Atlantic and Mediterranean harvested Bluefin tuna is transferred live to tuna farms (usually located in a different country) for fattening and then, after slaughter, to reefer vessels to be immediately processed and frozen, this measure is a step forward in reinforced control even if does not have full effect on verification of Bluefin tuna movement across international borders.

Compliance with the rules in Mediterranean waters was initially considered poor. The EU, which holds nearly 60% of the TAC of the eastern stock of Bluefin tuna, carried out an unprecedented verification scheme in 2008 through the European Fisheries Control Agency (EFCA) – previously called Community fisheries control agency (CFCA), whose role is to organize operational coordination of fisheries control and inspection activities by the Member States. The Joint Deployment Plan for the Bluefin tuna fishery carried out by the EFCA revealed that purse seiners and tug boats, that together are responsible for the bulk of the catches, were involved in a considerable number of infringements. Most infringements were related to catch documentation and the Vessel Monitoring System (VMS). The use of spotter planes searching for Bluefin tuna, forbidden by ICCAT, was found to be "quite widespread" and infringements related to the Bluefin tuna minimum landing size were also discovered. Finally, the report of the CFCA stated in 2008:

> "*It can be concluded that despite all meetings with the stakeholders convened by the Commission and Members States before the start of the season, it has not been a priority of most operators in the fishery to comply with the ICCAT legal requirements. As regards the recording and reporting of Bluefin tuna catches and the use of tugs and spotter planes the ICCAT rules have not been generally respected*."[13]

Canada, in the Compliance Committee session of the ICCAT meeting in November 2008, reported cases of alleged non-compliance in ICCAT fisheries. Of the 44 reported cases of alleged non-compliance by ICCAT contracting Parties, 40 were related to the Bluefin tuna fisheries in the Mediterranean[14].

In January 2009, NOAA reported to the U.S. Congress on the "Implementation of Title IV of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006"[15]. In the

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[11] http://www.iccat.int/en/RecsRegs.asp

[12] Contracting Party, Cooperating non-Contracting Party, Entity and Fishing Entity

[13] Specific Report regarding the implementation of the Joint Deployment Plan for Bluefin tuna fishing activities in 2008 in the Mediterranean Sea and Atlantic (preliminary version, November 2008) submitted by the CFCA to the Fisheries Commission of the European Parliament.

[14] ICCAT document Doc. COC-318/2008

[15] http://www.nmfs.noaa.gov/msa2007/intlprovisions.html

report NOAA identified 6 nations whose fishing vessels were engaged in illegal, unreported, and unregulated fishing in 2007 or 2008. Vessels from 4 of those nations were committing infringements in relation to the Bluefin tuna fishery in the Mediterranean.

These examples corroborate the limited control and compliance which was related at that time to the Mediterranean Bluefin tuna fishery already mentioned by several independent reports.

In 2009 and 2010 ICCAT adopted further stringent measures in relation to the reduction of fishing capacity and the implementation of the Catch Document Scheme, which fall within the range advised by the SCRS.

In 2010 ICCAT committed to adopt a three year recovery plan for 2011-2013 with the goal of achieving B_{MSY} by 2022 with at least 60% probability. According to the SCRS 2010 and 2012 reports, the spawning stock biomass would be equal to or greater than SSBF0.1 by the end of 2022 for a catch between 0 and 13 500 tonnes. The SCRS 2012 report added that bigger TACs would not threaten the goal of achieving BMSY by 2022.

The measures that have been introduced are having positive effects on the status of the stock. One of the key messages of the 2013 SCRS report regarding Eastern Atlantic and Mediterranean Bluefin tuna is that the rebuilding of eastern Bluefin tuna at SSBF0.1 level (equivalent to BMSY) with a probability of at least 60% could be achieved before 2022 with catch at around recent TACs. Current estimates also indicate that the rebuilding could be achieved by 2022 with higher TAC (up to 28 000 t). Given the unquantified uncertainties of the projection, the 2013 ICCAT meeting followed the SCRS advice not to change the TAC substantially and left the TAC unchanged for 2013-2014.

The three year recovery plan included drastic management measures, as well as an international inspection scheme, giving the means to all ICCAT Contracting Parties to enforce the recommendations, including on foreign vessels in international waters. Control and compliance, as well as the associated reporting mechanism, have markedly improved.

Since 2006, recommendations have prohibited catching and retaining on board Bluefin tuna weighing less than 30 kgs. According to the 2012 SCRS report, recent analyses from the reported catch-at-size and catch-at-age displayed important changes in selectivity patterns over recent years for several fleets operating in the Mediterranean Sea or the East Atlantic. This partly results from the enforcement of minimum size regulations (under Rec. 06-05), which led to much lower reported catch of younger fish and subsequently a significant increase in the annual mean-weight in the catch-at-size since 2007 (ICCAT 2012). Additionally, higher abundance or higher concentration of small Bluefin tuna in the North-western Mediterranean detected from aerial surveys could also reflect positive outcomes from increase minimum size regulation. (Rec. 06-05: Recommendation by ICCAT to establish a multi-annual recovery plan for Bluefin tuna in the Eastern Atlantic and Mediterranean) also resulted in improved yield-per-recruit levels in comparison to the early 2000s as well as to a greater recruitment to the spawning stock biomass due to higher survival of juvenile fish.

6. Conclusion on overall status

The main threat for *Thunnus thynnus* is too high fishing pressure (commercial and recreational fisheries) including illegal, unregulated, and unreported (IUU) fishing. Up to 2009, when ICCAT adopted certain conservation and management measures, the Eastern Atlantic and Mediterranean stock of *Thunnus thynnus* was strongly threatened by legal overfishing – meaning unsustainable catch limits set in general well above levels recommended by scientists and illegal, unregulated, and unreported (IUU) fishing activities.

An extension of the 2009 SCRS meeting to consider the status of Atlantic Bluefin tuna populations with respect to CITES Biological Listing Criteria concluded at that time that there was a 100% probability that the population of Atlantic Bluefin tuna (both western and eastern stocks) was at a

level below 15% of the historical baseline. According to the experts, the results showed that a zero catch would be required in order to allow a potential recovery of the East Atlantic stock within a period of ten years.

From 2009 onwards, regarding the eastern stock, the implementation of stricter regulations through ICCAT Recs. 12-03, 10-04, 09-06, has clearly resulted in reductions in catch and fishing mortality rates. All CPUE indices showed increasing tendencies in most recent years. TACs have been set at 13 400 tonnes for 2013 and 2014.

What needs to be emphasized is the positive information given by the last two reports of ICCAT Scientific Committee (2012-2013) that a stock-rebuilding trend has been initiated and is continuing for the Atlantic Bluefin tuna in the eastern stocks. While the updated fisheries indicators are consistent with the estimation of stock rebuilding, there still remain key uncertainties regarding current and future recruitment levels and the speed and magnitude of the rebuilding of the SSB. The results from the projections thus need to be further confirmed by future data and analyses.

The 2012 SCRS stock assessment indicated that the rebuilding of eastern Bluefin tuna at SSBF0.1 level (*i.e.* the equilibrium SSB resulting in fishing at F0.1) with a probability of at least 60% could be achieved before 2022 with catch at around recent TACs. Current estimates also indicate that the rebuilding could be achieved by 2022 with higher TAC (up to 28 000 tonnes). Given the unquantified uncertainties of the projection, the 2013 ICCAT meeting followed the SCRS advice not to change the TAC substantially and left the TAC unchanged for 2013-2014.

The 2012 assessment of the western stock estimated trends are consistent with previous analysis, both in abundance and SSB, which declined steadily from 1970 to 1992 and has since fluctuated between 25% and 36% of the 1970 level (ICCAT 2013). In recent years however, there appears to have been a gradual increase in SSB from 27% in 2003 to an estimated 36% in 2011 (ICCAT 2013). The SCRS cautions that the conclusions of that assessment do not capture the full degree of uncertainty in the assessments and projections. The strong 2003 year class has contributed to stock productivity such that total biomass has been increasing in recent years (ICCAT 2013).

The leading role of ICCAT in the improvement of the status of Bluefin tuna stocks through the implementation of strict management and conservation measures should be highlighted.

7. Actions to be taken by OSPAR

Action/measures that OSPAR could take, subject to OSPAR agreement

At the 2002 World Summit on Sustainable Development (WSSD) OSPAR Contracting Parties committed themselves to maintaining or restoring stocks to levels that can produce the maximum sustainable yield (MSY) with the aim of achieving these goals for depleted stocks on an urgent basis and where possible not later than 2015. Although OSPAR has no competence in managing the fishery (Annex V, Article 4), it is nonetheless the steward of the overall marine ecosystem, including commercially exploited fish species. In the case of Atlantic Bluefin tuna (*Thunnus thynnus*), it is proposed that OSPAR's role could be to:

- encourage Contracting Parties of OSPAR to work together with ICCAT to ensure a proper conservation scheme for the Atlantic Bluefin tuna, that will accelerate stock rebuilding;
- support the implementation of the revised management measures agreed during the last ICCAT Commission in 2013,;
- support that stringent management and control measures are complied with by all Contracting Parties avoiding TAC overshooting and combatting any IUU activities;

- coordinate with ICCAT, fisheries research and funding agencies to establish a long-term monitoring programme that will be able to track stock recoveries and regularly review the progress of recovery by assessing the status based on new fishery survey data in cooperation with ICCAT;
- Integrate the assessment under the Joint Assessment and Monitoring Programme (JAMP) with monitoring strategies by fisheries management bodies
- Encourage the continuation of the Atlantic-wide Research Programme for Bluefin tuna (GBYP) that was launched in 2010

Summary of the key priority actions and measures which should be encouraged for Contracting Parties and OSPAR to undertake for Atlantic Bluefin tuna (*Thunnus thynnus*).		
Key threats	Unsustainable fishing mortality rates.	
Other responsible authorities	ICCAT OSPAR Contracting Parties with Atlantic Bluefin tuna quota and/or members of the EU	
Already protected? Measures adequate?	ICCAT	There is a current multiannual recovery plan for Bluefin tuna in the Eastern Atlantic, and the Mediterranean (ICCAT Recommendation 13-07) and work continues to improve the implementation of this plan.
	Contracting Parties to OSPAR	
Recommended Actions and Measures	OSPAR Commission	Monitor information and scientific advice from ICCAT and bring this to the attention of CPs.
	Contracting Parties	• Support scientific recommendations from ICCAT in the Council of Ministers (EU); • work together with ICCAT to ensure a proper conservation scheme for the Atlantic Bluefin tuna that will accelerate stock rebuilding ; • support the implementation of the revised management measures agreed during the last ICCAT Conference of Parties in 2013, and contribute, as appropriate, to the 2014 review of the management plan; • comply with management and control measures avoiding TAC overshooting and combatting any IUU activities; • Improve surveillance; • Improve funding for research; • Coordinate JAMP monitoring with fisheries surveys.
	Research needs	Age distribution, migration and trends in the OSPAR region

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Victoria House
37-63 Southampton Row
London WC1B 4DA
United Kingdom

t: +44 (0)20 7430 5200
e: secretariat@ospar.org
www.ospar.org

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ISBN 978-1-909159-57-0
Publication Number: 624/2014