Proposal to include Northern Bluefin Tuna (*Thunnus thynnus* (Linnaeus, 1758)) on Appendix I of CITES in accordance with Article II 1 of the Convention

Summary

1. The Atlantic Bluefin Tuna is found in the entire extent of the North Atlantic Ocean and its adjacent seas, particularly the Mediterranean Sea. It usually occupies the surface and subsurface waters of coastal and open-sea areas, between 0m and 200m in depth.

2. The species is managed by the International Commission for the Conservation of Atlantic Tunas (ICCAT) as two stocks (eastern and western), based on separate spawning grounds, genetic differentiation, differing ages for reaching sexual maturity, and the apparent absence of breeding in the middle of the North Atlantic. However, the migratory ranges of both stocks overlap considerably.

3. Maturity is reached at approximately 4 years of age in the East Atlantic and Mediterranean, and at 8-12 years of age in the West Atlantic. Recent studies suggest that individual spawning may only occur every two to three years. It commences in April in the Gulf of Mexico. In the Mediterranean, it occurs during May-June in the east, and in June-July in the centre and west.

4. A virtual population analysis of the East Atlantic and the Mediterranean stock conducted in 2008 by ICCAT scientists based upon estimated catches, which addressed the period 1955-2007, yielded an estimate for spawning stock biomass in 2007 of 78,724 tons. This contrasts with the biomass peak estimated for 1958 at 305,136 tons, and with the 201,479 tons estimated for 1997. The absolute extent of decline over the 50-year historical period ranging from 1957 to 2007 is estimated at 74.2%, the bulk of which (60.9%) has happened in the last 10 years.

5. The corresponding analysis for the West Atlantic Stock yielded an estimate for spawning stock biomass in 2007 of 8,693 tons, which contrasts with the 49,482 tons estimated for 1970, implying an absolute extent of decline of 82.4% over the 38-year historical period.

6. Continued fishing at current fishing mortalities is expected to drive the spawning stock biomass in the East to very low levels; i.e. to about 18% of the 1970 level and 6% of the unfished level. This combination of high fishery mortality, low spawning stock biomass and severe fishing overcapacity results in a high risk of fisheries and stock collapse. It has been postulated that, even if a near-complete ban on all Bluefin Tuna fishing in the Northeast Atlantic and Mediterranean were implemented and enforced from 2008 to 2022, the population would still probably fall to record lows in the next few years (Mackenzie et al. 2009).

7. There is strong uncertainty about the potential recruitment for the West Atlantic stock. According to the last assessment by ICCAT scientists, under the most pessimistic scenario a closure of the fishery would not achieve the rebuilding of the stock by 2019. However, recovery is projected to occur within this timeframe under different assumptions of recruitment. Recently, there has been a decline of fishing mortality on large West Atlantic Bluefin Tuna. The TAC has not been taken primarily due to U.S. underharvest which range from 40-80 percent of quota in 20066-2008. According to the ICCAT scientist, there are two plausible explanations for the decline in U.S. harvest of large Wet Atlantic stock of Bluefin Tuna; the first is that the availability of fish to the U.S. fishery has been abnormally low due to the change in the spatial distribution of the stock; the second is that the overall size of the population in the West Atlantic has declined substantially from the level of recent years. The ICCAT scientist believe there is uncertainty about the issue and that more research need to be done (Report of the Standing Committee on Research and Statistics, October 2008) Based on the numbers and trends, some scientists suggest that the western Atlantic Bluefin Tuna is currently in danger of extinction, and suggest a moratorium on fishing the western stock should be immediately implemented.

8. Atlantic Bluefin Tuna is traditionally consumed fresh in Mediterranean countries, and it is also one of the most appreciated species for the sashimi market in Japan. Capture-based farming activities in the Mediterranean have exacerbated fishing pressure over the East Atlantic stock. There is still substantial mortality on spawners in the western stock along the coast of Canada as a result of a directed fishery. In addition, there is some mortality of the West Atlantic stock within the Gulf of Mexico due to bycatch in other fisheries.

9. In the Mediterranean, Bluefin Tuna is mostly caught by purse seine vessels and then tugged live to tuna farms where the fish are 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 generally implies an international trade. Estimated farming capacity is as much as twice the 2008 Total Allowable Catch (TAC), while estimates of fleet size indicate there is sufficient active fishing capacity to fully supply the farms to their indicated limits.

10. After slaughter, the bulk of this production is exported to Japan as frozen products where it is consumed as sushi and sashimi. The total imports of 32,356 tons of processed Bluefin Tuna reported by Japan to ICCAT for 2007 contrast with the Total Allowable Catch for that year of 29,500 tons. This mismatch between ICCAT import records and the Total Allowable Catch is all the more evident when domestic consumption in European Mediterranean countries, intra-European trade, and catches by the national Japanese fleet operating in the Atlantic and the Mediterranean Sea (provisionally reported at 2,238 tons in 2007) are taken into account. All these elements taken together suggest catches significantly higher the legal quotas, (up to 61,000 tons in 2007, according to ICCAT scientists).

11. All Bluefin Tuna fishing and farming nations in the Mediterranean are contracting parties of ICCAT and thus obliged to comply with its legislation. However, ICCAT has consistently set catch quotas for the East Atlantic and Mediterranean stock above levels recommended by its scientists and the failure of its management measures is demonstrated by the continuously decreasing population. In 1992

ICCAT first adopted a recommendation requiring reporting of tuna imports; a more comprehensive Catch Documentation Programme replaced this in 2007 and entered into force in June 2008. However, the efficiency of this programme is still doubtful since total catches reported to date are only 2,781 tons, less than 10% of the Total Allowable Catch for that year.

12. In July 2008, the new stock assessment made by ICCAT Scientists advised that the maximum Total Allowable Catch for the East Atlantic and Mediterranean stock should be between 8,500 and 15,000 tons and that fishing during the spawning season (May, June and July) should be banned. They went on to suggest the establishment of a moratorium to increase the probability of rebuilding the stock. However, in November 2008, ICCAT failed to adopt any of the measures advised. The measure adopted by ICCAT in 2008 established Total Allowable Catches for The East Atlantic and Mediterranean stock that decline annually, Specifically the measure established Total Allowable Catch of 22,000 tons, and 18,500 tons for year 2009, 2010 and 2011 respectively. The fishery was left open during the first half of the spawning season when the bulk of catches are made. The season is open from 15 April to 15 June, with the possibility of extending the season to 20 June based upon weather conditions (ICCAT Rec. 08-05).

13. It is submitted that the listing of Northern Bluefin Tuna on Appendix I of the Convention is consistent with Resolution Conf. 9.24 (Rev. CoP 14), Annex 1 C, i.e.:

*A marked decline in the population size in the wild, which has been **either**:*
observed as ongoing or as having occurred in the past (but with a potential to resume); or
inferred or projected on the basis of any one of the following:
– a decrease in area of habitat; or
– a decrease in quality of habitat; or
– levels or patterns of exploitation; or
– a high vulnerability to either intrinsic or extrinsic factors; or
– a decreasing recruitment.

Even regarding the species as being of medium productivity, the projected decline falls within the range specified in footnote (2) to the Resolution concerning the appropriate levels of decline to consider for commercially exploited aquatic species.

14. It is further submitted that the current situation regarding the status of the species is past the stage where Appendix II listing would be sufficient, even if Article XIV of the Convention and the existence of ICCAT prior to the entry into force of CITES were not an issue.

15. However, it is acknowledged that Parties may be apprehensive about the extreme consequences of an Appendix I listing in the longer term and the difficulty in getting such a listing reversed should the management regime improve. Accordingly, the listing proposal is accompanied by a draft Resolution which would mandate the Standing Committee to advise on the sufficiency of management measures adopted by ICCAT and, if appropriate , to request the depositary Government to submit a proposal to a subsequent meeting of the Conference of the Parties to downlist the species to Appendix II.

16. Although Northern Bluefin Tuna resembles some related species, genetic techniques provide very precise tools to identify it. Consequently, the listing of the species is not anticipated to pose significant implementation difficulties with regard to confusion with similar species, especially given the value of the species relative to that of its closest relatives.

Proposal to include Northern Bluefin Tuna (*Thunnus thynnus* (Linnaeus, 1758)) on Appendix I of CITES in accordance with Article II 1 of the Convention

SUPPORTING STATEMENT

A. PROPOSAL

Inclusion of *Thunnus thynnus* (Linnaeus, 1758) in Appendix I in accordance with article II 1.

Qualifying criteria (Conf 9.24 (rev. CoP 13) annex 2a)

C . A marked decline in the population size in the wild, which has been either:

I) observed as ongoing.... (but with a potential to resume)

In the case of commercially exploited marine species, a range of 5-20% of the baseline is deemed to constitute a marked decline in most cases, with a range of 5-10% being applicable for species with high productivity, 10-15% for species with medium productivity and 15-20% for species with low productivity. However, it is accepted that some species may fall outside this range. Low productivity is correlated with low natural mortality rate and high productivity with high natural mortality. One possible guideline for indexing productivity is the natural mortality rate, with the range 0.2-0.5 per year indicating medium productivity.

A general guideline for a marked recent rate of decline is the rate of decline that would drive a population down within approximately a 10-year period from the current population level to the historical extent of decline guideline (i.e. 5-20% of baseline for exploited fish species).

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, respectively. This means an average annual M for adults in the Eastern stock (ages 3 to 10) of 0.18, and even lower for West stock adults, which have a higher age at first maturity. For the West Atlantic stock, the ICCAT scientists assume a constant natural mortality of 0.14 for all ages of the stock. These data make both the East Atlantic and Mediterranean stock and the western stock of Atlantic Bluefin Tuna qualifying as a low productivity species (to be subject to the criteria of 20% of the baseline regarding marked decline).

Absolute extent of decline for the East Atlantic and Mediterranean stock over the 50-year historical period from 1957-2007 was assessed by SCRS ICCAT at 74.2% in terms of biomass of the spawning population (meaning on 25.8% of the populations remained then). Additionally, SCRS ICCAT forecasted that current fishing mortalities were "expected to drive the spawning stock biomass to very low levels; i.e. to about 18% of the SSB (spawning stock biomass) in 1970 and 6% of the unfished SSB". The bulk of

the historical decline has happened in the last 10 years, 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 (see SCRS, 2008a: Appendix 9, Table 4 corresponding to run 14, pages 154-155). Based on independent analysis, Mackenzie et al. (2009) concluded there is moderate probability that the expected decline in biomass between 1999 and 2010 will reach 90%. In summary, the above studies point to a high probability that spawning stock biomass for the Eastern stock of Atlantic Bluefin Tuna is currently already below 20% of its historical baseline. Besides, the best scientific information available points to the almost certitude that SSB will be below the 20% historical baseline within the next 10 years, given the very high rate of decline estimated for the last years.
Concerning the West stock of Atlantic Bluefin Tuna, the stock assessment conducted by SCRS ICCAT in 2008 shows an absolute extent of decline of the spawning population of 82.4% over the 38-year historical period (meaning only 17.6% of the spawning biomass in 1970 would remain). The shark decline of the Western spawning stock biomass occurred between 1970 and 1985 (SSB in 1985 is now approximately 18.9 % of SSB in 1970). Since then, the stock has remained at relatively constant, but low levels.

Affected by trade
A species "*is or may be affected by trade*" if :
I) It is know to be in trade and trade has or may have a detrimental impact on the status of the species

The Atlantic Bluefin Tuna is subject to a massive international trade, including a high incidence of illegal trade of the East Atlantic and Mediterranean stock.. For 2007 Japan reported to ICCAT the import of 32,356 tons of processed Atlantic Bluefin Tuna (ICCAT Circulars 1951/07 and 500/08). ICCAT SCRS estimated real catches of Atlantic Bluefin Tuna in 2007 at 61,000 tons, which highly contrast with the legal quota established at 29,500 tons for that year, and the maximum annual catch recommended by ICCAT SCRS to prevent collapse and initiate rebuilding for that stock, estimated at between 8,500 tons and 15,000 tons.

Annotation
Appendix I listing would be accompanied by a Conference resolution that would mandate the Standing Committee of the Convention to rule that the conditions for sustainable fishing had been met and, in that event, to ask the Depositary Government (Switzerland) to submit a proposal to a subsequent CoP to downlist the species to Appendix II. A ruling to this effect by the Standing Committee only requires a simple majority of the Committee members and CoPs have a high rate of acceptance of proposals that are submitted by the depositary Government at the request of a relevant CITES Committee.

B. PROPONENT

Will be completed (this proposal has been prepared by the Principality of Monaco)

C. SUPPORTING STATEMENT

1. TAXONOMY

1.1 Class: Osteichthyes
1.2 Order: Perciformes
1.3 Family: Scombridae
1.4 Species: *Thunnus thynnus* (Linnaeus, 1758)
1.5 Scientific synonyms: none
1.6 Common names: Atlantic Bluefin Tuna, Northern Bluefin Tuna (English), Thon rouge de l´Atlantique (French), Atún rojo del Atlántico (Spanish)
1.7 Code numbers: none

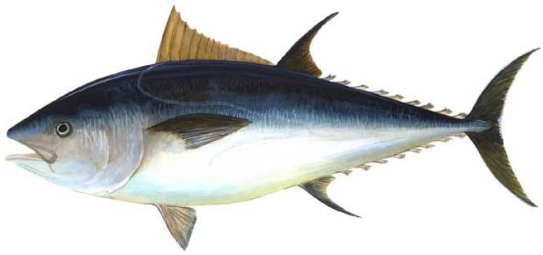

Figure 1 . *Thunnus thynnus*
From fish2056, NOAA's Fisheries Collection

2. OVERVIEW

3. SPECIES CHARACTERISTICS

3.1 Distribution:
The Atlantic Bluefin Tuna is found in the entire extent of the North Atlantic Ocean 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).

3.2 Habitat:
Bluefin tuna mostly occupy the surface and subsurface waters of the coastal and open-sea areas, between 0m and 200m depths. However, both juvenile and adult Bluefin Tuna can dive to depths of 500m to 1000m. Juvenile and adult 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).

3.3 Biological characteristics:
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.

Reproduction
Bluefin tuna is oviparous and iteroparous, as are all tuna species. It has asynchronous oocyte development and is a multiple batch spawner. Egg production is age (or size)-dependent. It had been generally assumed that Bluefin Tuna spawns every year, but electronic tagging experiments, as well as experiments in captivity, have raised questions about this assumption and have suggested that individual spawning might occur only once every two or three years. Spawning fertilization occurs directly in the water column and hatching takes place without parental care after an incubation period of 2 days (Fromentin, 2006). It is generally agreed that BFT spawning takes place in warm waters (> 24°C) of specific and restricted locations (around the Balearic Islands, Sicily, Malta, Cyprus and some areas of the Gulf of Mexico) and occurs only once a year (Fromentin, 2006). Spawning begins earlier in the Gulf of Mexico, in April. In the Mediterranean Sea, spawning occurs during May-June in the East, and June-July in the centre and the West (Rooker *et al.*, 2007).

Recruitment
Fish larvae (around 3-4 mm) are typically pelagic with a yolk sac and relatively undeveloped body form. The yolk sac is re-absorbed within a few days. Little is known about the effects of the age-structure of the spawning stock, as well as the condition of the spawners, on the viability of the offsprings. It was suggested that the North Atlantic Oscillation (NAO) might affect Bluefin Tuna recruitment success in the East Atlantic, but further statistical analyses did not confirm such hypothesis. The identification of the major abiotic and biotic forces controlling Bluefin Tuna recruitment thus remains obscure (Fromentin, 2006).

Sex ratio and age at first maturity

The proportion of males appears to be higher in catch samples of large individuals, which could be due to a higher natural mortality or lower growth for females (SCRS, 1997). In contrast, higher or equal (depending on the year) proportions of females have been found for all size classes in the catches of purse seiners operating in the central Mediterranean (Hattour, 2003).

Various past studies showed that Atlantic Bluefin Tuna mature at 110-120cm (25-30kg) in the East Atlantic and Mediterranean Sea, so at approximately 4 years old (according to the East Atlantic and Mediterranean growth curve). The size of the fish spawning in the Gulf of Mexico has always been greater than 190cm, which would correspond to about 8 to 12 years of age (Fromentin, 2005). This disparity in age-at-maturity between West Atlantic and Mediterranean Bluefin Tuna has been used as a major argument for separation into two stocks (Fromentin, 2006).

3.4 Morphological characteristics:
Atlantic Bluefin Tuna is the largest tuna species. It has an elongated fusiform body, being more robust at the front. Its maximum length can exceed 4 m long. Its official maximum weight is 726 kg, but weights of up to 900 kg have been reported in various fisheries of the West Atlantic and Mediterranean Sea. The body of the Atlantic Bluefin Tuna is deepest near the middle of the first dorsal fin base. The back is dark blue, while lower sides and belly are silvery white, with colourless transverse lines alternated with rows of colorless dots. Bluefin tuna have 39 vertebrae, with 12 to 14 dorsal spines and 13 to 15 dorsal soft rays. The first dorsal fin is yellow or bluish; the second dorsal fin, which is higher than the first, is reddish-brown. The anal fin and finlets are dusky yellow and edged with black; the median caudal keel is black in adults. Swim bladders are present and the pectoral fins are very short, less than 80% of head length (Fromentin, 2006).

3.5 Role of the species in the ecosystem:
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 would thus have unpredictable cascading effects in the Mediterranean ecosystem and entail serious consequences to many other species in the food web.

4. STATUS AND TRENDS

4.1. Habitat trends
Not applicable.

4.2. Population size
Atlantic Bluefin Tuna - East
A virtual population analysis (VPA; Murphy, 1965; Gulland, 1965; Jones, 1964) conducted in 2008 by the Standing Committee on Research and Statistics (SCRS) of ICCAT, based upon estimated catches (including 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 tons (SCRS, 2008a: Appendix 9, Table 4 corresponding to run 14, pages 154-155). This contrasts with the biomass peak estimated for 1958 at 305,136 tons, and with the 201,479 tons 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 has happened in the last 10 years. Indeed, the rate of decline in the last 10 years (1997-2007) is estimated at 60.9%, with a total loss of spawning biomass of 122,750 tons from the 1997 estimate. Current fishing mortality (F) is at least 3 times the level that would result in Maximum Sustainable Yield (MSY), and spawning stock biomass is most likely to be less than 20% of the level needed to support MSY; for 2007, it is estimated at only 14% of the level corresponding to maximum fishing mortality (F_{MAX}), even assuming the high recruitment levels typical of the 1990s (SCRS, 2008b).

A second virtual population analysis 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 tons, and the spawning stock biomass in 1955 was 281,954 tons). This last analysis didn't 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 t for that year and at around 50,000 tons per year in recent times).

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 tons which contrasts sharply with the 49,482 tons 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 (SCRS, 2008a: Appendix 9, Table 4, pages 167-168). Overfishing during the 1970s and 1980s lead to decline of the West Atlantic stock. Since then, the spawning stock biomass has remained relatively stable at approximately 15-18 % of its pre-exploitation level biomass.

Assuming that average recruitment cannot reach the high levels recorded in the early 1970s, recent fishery mortality (2004-2006) is about 30% to 50% higher than the level required to achieve maximum sustainable yield (MSY) and the spawning stock biomass is about half of the biomass level required to support MSY (SCRS, 2008b).

4.3. Population structure

Atlantic Bluefin Tuna - East.

See also sections 4.2. and 4.4.

The main pattern recorded by SCRS consists 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 (SCRS, 2008 a,b). According to Mackenzie *et al.* (2009), who used an age-structured stochastic modeling approach similar to that used in working groups of the International Council for the Exploration of the Sea (ICES), the mean age of mature Bluefin Tuna has declined since the mid-1980s, and the proportion of large spawners (age 8+) has declined especially since the late 1970s. The share of repeat spawners in

the population has also declined and has remained generally low since the mid- to late 1980s. Based on these considerations, the authors conclude 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".

4.4. Population trends

Atlantic Bluefin Tuna - East.

The last population assessment conducted by the ICCAT SCRS in 2008 was based on virtual population analysis (VPA) and shows that spawning stock biomass (SSB) has been declining rapidly in the last several years while fishing mortality (F) has been increasing rapidly, especially for large individuals (ages 8+; a 3 to 4-fold increase in F since 2000). Analyses show that recent (2003-2007) spawning stock biomass is less than 40% of the highest estimated levels (at the start of the times series 1970-1974 or 1955-1959, depending on the analysis). The decline in spawning stock biomass appears to be more pronounced after the year 2000. All the analyses indicate a general recent increase in fishing mortality for large fish and, consequently, a decline in spawning stock biomass (SCRS, 2008b). Continued fishing at the current fishing mortalities is expected to drive the spawning stock biomass to very low levels; i.e. to about 18% of the SSB in 1970 and 6% of the unfished SSB. This combination of high fishing mortality, low spawning stock biomass and severe fishing overcapacity results in a high risk of fisheries and stock collapse. (SCRS, 2008a,b).

According to Mackenzie *et al.* (2009), even if a near-complete ban on all 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 environmental conditions promote exceptionally high recruitment. The same authors estimate that there is moderate probability (25%) that the expected decline in biomass between 1999 and 2010 will 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) $F_{0.1}$ or F_{MAX} strategies (implying short-term real catches at between 8,500 t and 15,000 t, or less),

(ii) (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 $F_{0.1}$ strategy (SCRS, 2008b).

Instead, total allowable catches were adopted by ICCAT for 2009 and 2010 at 22,000 and 19,950 tons respectively; in other words, between 2.34 and 2.58 times the precautionary $F_{0.1}$ quota advised by SCRS ICCAT.

Atlantic Bluefin Tuna - West.

The total catch for the West Atlantic BFT stock peaked at nearly 20,000 tons in 1964. Catches dropped sharply thereafter and after reaching a small peak in 2002, at 3,319 tons, they steadily declined to only 1,624 tons 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 between the early 1970s and 1992; since then, it has fluctuated between 18% and 27%

of the 1975 level. Even though fishing mortality on spawners (age 8+) declined since 2002, the stock does not show any signs of population recovery (SCRS,2008b).

In spite of the overall negative status of the population, catch per unit effort (CPUE) values in the Gulf of Lawrence have increased from 1997 to 2004, and have remained high since then. However, SCRS Atlantic Bluefin Tuna experts have hypothesized that this might reflect the passage of a single year class (SCRS, 2008a: pg. 14). There is strong uncertainty about the potential recruitment for this stock. According to the last assessment by the SCRS (SCRS. 2008a,b) under the most pessimistic recruitment scenario, closing the fishery would not achieve the rebuilding of the stock by 2019. However, recovery is projected to occur within this timeframe under different assumptions of recruitment.

4.5. Geographic 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. 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 northeastern American coasts, while high catches have been recently made in new areas, such as the eastern Mediterranean, the Gulf of Sirte and the 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 (SCRS, 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 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 any more for Atlantic Bluefin Tuna in the Mediterranean during the spawning season (SCRS, 2008a).

5. THREATS

The main threat for the Eastern Atlantic and Mediterranean stock species is overfishing including both legal overfishing – meaning unsustainable catch limits set well above levels recommended by scientists; and illegal, unregulated, and unreported (IUU) fishing activities. This threat may also be impacting the West Atlantic Stock. 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 have exacerbated fishing pressure over the East Atlantic stock, to the point that 61% of the spawning biomass has disappeared in the last 10 years (see section 4.2.). 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. The Western stock is not recovering, in spite of the low catch quotas. There is still substantial mortality on spawners, due to by-catch within the Gulf of Mexico breeding ground and 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.

6. UTILIZATION AND TRENDS

6.1 National utilization

Bluefin tuna in the Mediterranean is mostly caught by purse seine vessels (nearly 70 % of the catch – SCRS, 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 tons in 1997 to 30,000 tons in 2003 (WWF, 2006) and around 64,000 tons in 2008, representing approximately 51,000-57,000 tons round weight of (large) fish at time of capture (SCRS, 2008a). This estimated farming capacity represents a capacity excess of more than 32,000 tons - as much as twice the 2008 Total Allowable Catch (TAC). In addition, the estimates of fleet size indicate there is sufficient active fishing capacity to fully supply the farms to their indicated limits (SCRS, 2008a). In recent years 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 gear, is consumed domestically in the main producer countries (Spain, France and Italy) as a fresh product, usually from small size fish.

Stockpiles of frozen Bluefin Tuna are known to exist in Japan and some other Asian countries. The amount of the Japanese cold store of Bluefin Tuna reported by NOAA in November of 2008 was 21,783 tons[1]. Additional stores of frozen Bluefin Tuna are known to exist in other Southeast Asian nations and in reefer vessels[2].

6.2. Legal trade

The most comprehensive sources of information on international trade of Atlantic Bluefin Tuna are the Eurostat database (Statistical Office of the European Communities) and the ICCAT database of the Bluefin Tuna Statistical Document (BFTSD) Program. While Eurostat provides information on all trade flows legally recorded on Bluefin Tuna involving the 27 member states of the European Union (the main quota holder of Atlantic Bluefin Tuna and the entity concentrating the bulk of capture-based farming production of this species), the ICCAT BFTSD (which lasted until 2008, when it was replaced by the new Bluefin Tuna Catch Document scheme)

[1] National Marine Fisheries Service, Southwest Regional Office, NOAA
http://swr.nmfs.noaa.gov/fmd/sunee/coldstor/jcsnov08.htm
[2] El triunfo de la barbarie, published in Ruta Pesquera (Spain), January 2009

records all imports of processed Bluefin Tuna into ICCAT contracting parties, which include all major producers and consumers of the species.

Tables 1 and 2 summarize the information available on the Eurostat database on external trade for 2007 (Eurostat Traditional external trade database access, ComExt; Eurostat id. Code of extraction: k2832469.xls 1), referring to the following CN8 TARIC codes identifying Atlantic Bluefin Tuna products:

03019400	LIVE BLUEFIN TUNAS "THUNNUS THYNNUS"
03023510	FRESH OR CHILLED BLUEFIN TUNAS "THUNNUS THYNNUS", FOR INDUSTRIAL PROCESSING OR PRESERVATION
03023590	FRESH OR CHILLED BLUEFIN TUNAS "THUNNUS THYNNUS" (EXCL. TUNAS FOR INDUSTRIAL PROCESSING OR PRESERVATION)
03023911	BLUEFIN TUNAS "THUNNUS THYNNUS", FRESH OR CHILLED, FOR INDUSTRIAL PROCESSING OR PRESERVATION
03023991	BLUEFIN TUNAS "THUNNUS THYNNUS", FRESH OR CHILLED (EXCL. TUNAS FOR INDUSTRIAL PROCESSING OR PRESERVATION)
03034511	FROZEN BLUEFIN TUNAS "THUNNUS THYNNUS" FOR INDUSTRIAL PROCESSING OR PRESERVATION, WHOLE
03034513	FROZEN BLUEFIN TUNAS "THUNNUS THYNNUS" FOR INDUSTRIAL PROCESSING OR PRESERVATION, GILLED AND GUTTED
03034519	FROZEN BLUEFIN TUNAS "THUNNUS THYNNUS" FOR INDUSTRIAL PROCESSING OR PRESERVATION, WITHOUT HEAD AND GILLS, BUT STILL TO BE GUTTED
03034590	FROZEN BLUEFIN TUNAS "THUNNUS THYNNUS" (EXCL. FOR INDUSTRIAL PROCESSING OR PRESERVATION)
03034921	BLUEFIN TUNAS "THUNNUS THYNNUS", FROZEN, FOR INDUSTRIAL PROCESSING OR PRESERVATION, WHOLE
03034923	BLUEFIN TUNAS "THUNNUS THYNNUS", FROZEN, FOR INDUSTRIAL PROCESSING OR PRESERVATION, GILLED AND GUTTED
03034929	BLUEFIN TUNAS "THUNNUS THYNNUS", FROZEN, FOR INDUSTRIAL PROCESSING OR PRESERVATION (EXCL. WHOLE AND GILLED AND GUTTED)

Data on live Atlantic Bluefin Tuna in Tables 1 and 2 refer to trade on live specimens caught by industrial purse seine fleets for farming purposes. Information on EU countries is segregated between those member states involved in the catch and farming of Bluefin Tuna (Spain, France, Italy, Cyprus, Greece and Malta), and the rest, which are net consumers. Eurostat information mainly refers to external trade involving EU member states and third countries, which means that data on intra-EU trade might be incomplete.

It should be pointed out, however, that the main domestic markets for Bluefin Tuna at EU level are found in the main harvesting nations - notably Spain, France and Italy. No information is available on the size of this domestic market for Atlantic Bluefin Tuna, although it is thought to be very important, given the long tradition of Bluefin Tuna consumption in those countries. The lack of information on the magnitude of domestic markets in the Mediterranean means that the picture provided by the available official data on international trade presented here only provides a partial overview of the European market (and this without considering the huge estimates of Illegal, Unreported and unregulated, or IUU, fishing described in section 6.4).

Table 3 shows the information on imports of processed Atlantic Bluefin Tuna during 2007 by ICCAT Contracting Parties (East Atlantic stock), as available on the ICCAT register of the Bluefin Tuna Statistical Document (BFTSD) Program. Total imports of 32,356 tons of processed Bluefin Tuna reported by Japan to ICCAT for 2007, (total Japanese imports in Table 3 from East Atlantic and Mediterranean; see ICCAT Circulars 1951/07 and 500/08), contrast sharply with the legal Total Allowable Catch for that year (29,500 tons). This mismatch between ICCAT import records (BFTSD) and the TAC is all the more evident when the unquantified levels of domestic consumption in European Mediterranean countries are 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 tons in 2007). All these elements taken together suggest 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 refers 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, filletted, round and others (such as belly meat) - all of which usually underestimate the original round weight of the fish at the moment of harvesting.

Table 1. Exports of processed and live Atlantic bluefin tuna from EU27 countries in 2007 based on Eurostat database. Shaded cells indicate intra-EU trade. EU27 BFT producers include Spain, France, Italy, Cyprus, Greece and Malta. Volume of trade is given in tonnes.

	IMPORTING ENTITIES											
	EU27 BFT producers	**EU27 others**	**Croatia**	**Israel**	**Japan**	**Korea**	**Switzerland**	**Thailand**	**Tunisia**	**Turkey**	**USA**	**Others***
processed												
EU27 BFT producers	3937.55	300.3		31.3	13837.1	203.9	34.3	49.8			492.1	11.2
EU27 others	3.4	46.1	0.05		0.1					1		0.1
live												
EU27 BFT producers	1571.25	10.65	557.8		900				229			1
EU27 others	53.5	1.3										0.8

* includes Bahrain, Kuwait, Russia, UAE, Canada and Norway

Table 2. Imports of processed and live Atlantic bluefin tuna into EU27 countries in 2007 based on Eurostat database. Shaded cells indicate intra-EU trade. EU27 BFT producers include Spain, France, Italy, Cyprus, Greece and Malta. Volume of trade is given in tonnes.

	EXPORTING ENTITIES								
	EU27 BFT producers	**EU27 others**	**Croatia**	**Libya**	**Morocco**	**Tunisia**	**Turkey**	**USA**	**Oman**
processed									
EU27 BFT producers	5784.7	329	19.8		413	70.1	18.6	1.9	0.5
EU27 others	88.4	86.05				1.7			
live									
EU27 BFT producers	10345.9	1		340	210				
EU27 others	3.3	56.25				1.4	1.9		

Table 3. Imports of processed Atlantic bluefin tuna (East Atlantic stock) in 2007 based on ICCAT database (records of the Bluefin Tuna Statistical Document –BFTSD- Program). EU27 BFT producers include Spain, France, Italy, Cyprus, Greece and Malta. Volume of trade is given in tonnes.

	Fishing and primary exporting country										
	EU27 BFT producers	**Algeria**	**China**	**Croatia**	**Guinea**	**Korea**	**Libya**	**Morocco**	**Taiwan**	**Tunisia**	**Turkey**
EU27 BFT producers		14.92		16.07		345	771.19	416.9		10.29	37.18
China	39.36										9.04
Japan	21711.70		88	2853.16	12	724.81	1010.95	2025.67	14.38	2702.76	1203.17
USA	99.23							38.75		2.08	

6.3. Parts and derivatives in trade
See section 6.2 above.

6.4 Illegal trade
A catch assessment produced by Advanced Tuna Ranching Technologies (ATRT)WF, based on trade statistics of Bluefin Tuna products was presented by WWF scientists in the last SCRS meeting (SCRS, 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 tons. 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 tons 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 on the basis of active capacity (SCRS, 2008a) – i.e. 61,000 tons (SCRS, 2008b). Consequently, the difference between the estimated catch of 61,000 tons and the legal quota of 29,500 tons for 2007 can be attributed to illegal trade, most of which is happening at the international level.

6.5 Actual or potential trade impacts
The current exploitation of Bluefin Tuna in the Mediterranean is mainly driven by the Japanese market of sushi and sashimi. This Japanese market is responsible for the growth of Bluefin Tuna farming activities and the associated purse seine catches in recent years in the Mediterranean. This use of Bluefin Tuna production has become the main threat for its sustainable exploitation, since it is responsible for the bulk of the catch. The inclusion of Bluefin Tuna in Appendix I of CITES would allow only domestic consumption or consumption within the European Union, which could, in all likelihood, result in harvest levels that are consistent with the Total Allowable Catch advised by SCRS scientists for the East Atlantic and Mediterranean stock - i.e. between 8,500 to 15,000 tons.

7. LEGAL INSTRUMENTS

7.1 National
It has already been noted that management of the Atlantic Bluefin Tuna is under the competence of ICCAT (see 7.2), the international Regional Fisheries Management Organization in charge of the conservation of tuna and tuna-like fishes in the Atlantic Ocean (ICCAT, 2007). ICCAT, in its annual meeting, adopts legislation with management measures that are binding for its 48 contracting parties. All Bluefin Tuna fishing and farming nations in the Mediterranean are contracting parties of ICCAT and thus obliged to comply with its legislation. The legislation is, therefore, then adopted by the GFCM (General Fisheries Commission for the Mediterranean), the Regional Fisheries Management Organization managing the fisheries in the Mediterranean, where

the East Atlantic Bluefin Tuna stock is heavily exploited. The European Union (EU), a contracting party of ICCAT, makes a transposition annually of the ICCAT management measures into the EU legislation, which then become binding for its member States. The main tuna producing countries in the Mediterranean are members of the EU, which holds nearly 60 % of the annual TAC for Bluefin Tuna established by ICCAT.

In 2009, Monaco has totally banned trade and use of Bluefin Tuna on its territory.

7.2 International

ICCAT was established at a Conference of Plenipotentiaries, which prepared and adopted the International Convention for the Conservation of Atlantic Tunas signed in Rio de Janeiro, Brazil, in 1966. After a ratification process, the Convention entered formally into force in 1969.

As already stated, ICCAT currently manages Atlantic Bluefin Tuna as two stocks, the western and the eastern stocks, with the boundary between the two spatial units being the 45°W meridian. This delimitation was established for management convenience (SCRS, 2002). Starting in 1974 ICCAT adopted a series of recommendations on management measures concerning both stocks. Initially, the main measures were related to a minimum landing size and fixing of a catch quota. More recently, recovery plans were adopted for the species. However, ICCAT has consistently set catch quotas for the East Atlantic and Mediterranean stock above levels recommended by its scientists (SCRS). The continuously decreasing population trends of the East Atlantic and Mediterranean stock are evidence of the failure of ICCAT's management measures to date. ICCAT´s own scientific committee (SCRS) estimated that the eastern Bluefin Tuna catch in 2007 was twice the current total allowable catch (TAC), and four times the sustainable level, and highlighted the ineffectiveness of the adopted TAC in controlling the catch (SCRS, 2008). SCRS' scientists continually advise that the current management measures will lead to a further reduction in spawning stock biomass of the eastern stock, with a high risk of stock collapse.

In 2007 ICCAT, in common with many other regional fisheries bodies, agreed to conduct an independent review of its own performance against its objectives (Hurry *et al.*, 2008). For this purpose, it appointed an independent panel consisting of Glenn Hurry, Chief Executive Officer of the Australian Fisheries Management Authority (AFMA) and the current Chairman of the Western and Central Pacific Fisheries Commission, Moritaka Hayashi, Professor (now *emeritus*) of International Law, Waseda University in Japan, and Jean-Jacques Maguire, a well known and respected international fisheries scientist from Canada. The review, delivered in September 2008, stated that:

> "ICCAT contracting parties' performance in managing fisheries on Bluefin Tuna particularly in the eastern Atlantic and Mediterranean Sea is widely regarded as an international disgrace …".
>
> "The Panel found the management of fisheries on Bluefin Tuna in the eastern Atlantic and Mediterranean and the regulation of bluefin farming to be unacceptable and not consistent with the objectives of ICCAT. This finding coupled with the published statements from the European Community (EC) has prompted 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. Referring to illegal fishing pushing annual catches to twice the quota levels and four times scientific recommendations."
>
> The report concluded that "It is difficult to describe this as responsible fisheries management."

The introduction of Bluefin Tuna farming activities in the Mediterranean in 1997 exacerbated the problems with management of the fisheries. The first recommendation related to farming activities was adopted in 2002 and subsequent recommendations were adopted in the following years. However, the resulting reported information is unreliable, due to non-compliance, misreporting, and doubtful growth rates for the fish. As previously noted, the current farming capacity in the Mediterranean is estimated by the SCRS to be around 64,000 tons (SCRS, 2008a), more than double the Total Allowable Catch adopted for past years.

In 1992 ICCAT first adopted a recommendation requiring trade information. Following this recommendation, all Bluefin Tuna imported into the territory of a Contracting Party or at the first entry into a regional economic organization, had to be accompanied by an ICCAT Bluefin Tuna Statistical Document. The information required in the document included the name of the exporter country, the area of harvest, the type of product and weight, and the point of export. As proven by the high estimates of illegally caught Bluefin Tuna, this recommendation failed to quantify the real amount of traded Bluefin Tuna.
In 2007, ICCAT adopted a more complete programme, the Bluefin Tuna Catch Documentation Programme, which entered into force in June 2008. This included not only trade information but also catch, transfer, transhipment, and farming information. Although the program just entered into force, its efficiency is open to discussion, since total reported catches for 2008, as shown on the ICCAT webpage, are to date 2,781 tons, less than 10% of the Total Allowable Catch for that year.[3]

8. SPECIES MANAGEMENT

8.1 Management measures

In October 2006 the SCRS stock assessment revealed that the fishing mortality for the eastern stock of Atlantic Bluefin Tuna was more than three times the level that the stock could sustain, and that this trend was expected to drive the spawning biomass to very low levels, giving rise to a high risk of fishery and stock collapse (SCRS, 2006). Scientists advised that the only scenarios which have the potential to address the decline and initiate recovery are those which include, among other measures, the closure of the Mediterranean to fishing during the spawning months (May, June, and July) and a Total Allowable Catch of 15,000 tons or less. The SCRS estimated that catches were 56% over the legal TAC. However, in November of the same year, ICCAT, in its plenary session, adopted the first "Recovery plan for Bluefin Tuna in the Eastern Atlantic and Mediterranean" which did not take into account any of the mentioned essential requirements for rebuilding the stock. The TAC was fixed at 29,500 tons for 2007,

[3] http://www.iccat.int/en/BCD.htm

decreasing gradually to 25,500 tons by 2010; and the seasonal closure included only one month of the three month spawning season advised.

In July 2008, the new stock assessment for the East Atlantic and Mediterranean stock made by the SCRS (SCRS, 2008a) indicated that the spawning stock biomass is continuing to decline (calculated as 30-40% of the levels in the 1970's), 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 (SCRS, 2008a). At this time the SCRS advised that the maximum Total Allowable Catch should be between 8,500 and 15,000 tons, 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 tons (more than double of the TAC - see 8.3).

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. Only some members voted against. In the recommendation, which 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 tons. 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[4].

Two weeks before the ICCAT plenary session in November 2008, ICCAT's chairman sent a letter[5] to the head delegates of ICCAT contracting parties urging to take science seriously into account, stating that:

> "…there will be no future for ICCAT if we do not fully respect and abide by the scientific advice. If we do not follow the instructions science is giving us, our credibility will be irreversibly jeopardized and the mandate to manage tuna stocks will be surely taken out of our hands".

Despite all these recommendations, ICCAT again failed in November 2008 to adopt any of the measures advised, and, therefore, to bring about a change in the current rapid deterioration of the stock, or forestall prevent its imminent collapse. The measure adopted by ICCAT established Total Allowable Catches for the East Atlantic and Mediterranean stock that decline annually. Specifically, the measure establishes total

[4] See resolution 4.028 in http://www.iucn.org/congress_08/assembly/policy/index.cfm
[5] ICCAT circular #2146/08

Allowable Catches of 22,000 tons, 19,950 tons, and 18,500 tons for years 2009, 2010, and 2011 respectively. The fishery was left open during the first half of the spawning season, when the bulk of catches are made. The season is open from 15 April to 15 June, with the possibility of extending the season to 20 June based upon weather conditions.
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 tons, 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 tons) (WWF, 2008). This figure does 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..."[6]. 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." (SCRS, 2008a). However, despite these figures, the 2008 ICCAT meeting could only agree to "freeze" the Bluefin Tuna fishing capacity at the 2007 level through 2008 with reductions in the ensuing years.

8.2 Population monitoring

ICCAT requests statistical information from its contracting parties strictly for scientific purposes. This information allows its scientific committee (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 (SCRS, 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 incomprehensible given the high international concern about Bluefin Tuna stock status" (SCRS, 2008a: Appendix 6).

8.3 Control measures

8.3.1 International

The only existing control of movement of Bluefin Tuna products across international borders is carried out by ICCAT through the new Bluefin tuna Catch Documentation Programme (Recommendation 07-10[7]) which includes trade information and also catch, transfer, transhipment, and farming information. This recommendation was adopted in

[6] Press Released from the European Commission, March 2008:
http://ec.europa.eu/fisheries/press_corner/press_releases/2008/com08_27_en.htm
[7] http://www.iccat.int/en/RecsRegs.asp

2007 and entered into force in June 2008. Its implementation is still flawed. It addresses the tagging of the fish, but it is left optional to the contracting parties and "preferably at the time of kill". Since most of the 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, even if applied, would have very little effect on verification of Bluefin Tuna movement across international borders.

8.3.2 Domestic

Different control schemes are applied in ICCAT contracting parties with different degrees of success. Canada, for instance, has a comprehensive management, monitoring, control and surveillance program on its Atlantic Bluefin Tuna fishery on the western stock, with high level of compliance. In this fishery tuna is caught through tended line or rod and reel and every fish is tagged on board. All tags are individually numbered and are entered into a computer tracking system, so at any given moment is possible to know the tags that have been issued, their numbers and owners. When the fish is landed it has a tag affixed to it which allows tracking of the fish to the marketplace. Then, every single Bluefin Tuna landed in Canadian waters is verified by an independent dockside monitor, who checks the number of fish, individual weight, tag number and other vital statistics. All this information is entered into a database that is accessible in real time to fisheries managers, scientists and enforcement officers. Verification is undertaken by an at-sea surveillance program, which patrols the waters 120 days per year, and from the air about 300 missions per year. Strong penalties are also in place[8]The United States has a tagging program that is similar to Canada's.

On the other hand, compliance of the rules in Mediterranean waters is 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 newly established 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 CFCA revealed that purse seiners and tug boats, that together are responsible for the bulk of the catches, were involved in a considerable level 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 states

> "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."[9]

[8] Fisheries and Oceans Canada, http://www.dfo-mpo.gc.ca/tuna-thon-video-eng.htm

[9] 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.

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[10].

In January 2009, NOAA (the US National Oceanic and Atmospheric Administration) reported to the congress on the "Implementation of Title IV of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006"[11]. In the 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 poor control and compliance in relation to the Mediterranean Bluefin Tuna fishery already mentioned by several independent reports.

8.4. Captive breeding and artificial propagation

Most tuna caught by the industrial purse seine fleets operating in the Mediterranean are transferred live to farms for farming/fattening purposes (usually for a period of a few months). This activity qualifies as capture-based aquaculture according to FAO standards (Ottolenghi *et al.*, 2004), but does not involve the breeding in captivity of the animals. A similar species, Pacific Bluefin Tuna (*Thunnus orientalis*), is subject to true captive breeding in Japan, where a small production is entering the local market and known as *kindai*. The EU-funded project SELFDOTT is currently investigating the breeding of Atlantic Bluefin tuna in captivity.

8.5. Habitat conservation

There are no protected areas within the Mediterranean of relevance for the protection of Atlantic Bluefin Tuna. The report of the independent review of ICCAT of September 2008 (Hurry *et al.*, 2008) recommended that ICCAT "consider an immediate closure of all known Bluefin Tuna spawning grounds at least during known spawning period". Furthermore, in October 2008, the World Conservation Congress (WCC), through CGR4.MOT038 "Action for recovery of the East Atlantic and Mediterranean population of Atlantic Bluefin Tuna" requested ICCAT "to set up protection zones for spawning grounds in the Mediterranean including the waters within the Balearic Sea, Central Mediterranean, and Levant Sea, during the spawning season." The ICCAT meeting of November 2008 failed to implement the above requests and postponed for any decision on this issue two more years, to the annual meeting of the ICCAT in 2010 (ICCAT Recommendation 08-05).

In October 2008, the Meeting of the Working Group on Marine Protected Areas, Species and Habitats (MASH) of the OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic formally identified Atlantic Bluefin Tuna as a species "requiring urgent action". The species is listed in the OSPAR List of Threatened and/or Declining Species and Habitats.

[10] ICCAT document Doc. COC-318/2008
[11] http://www.nmfs.noaa.gov/msa2007/intlprovisions.html

In the Western Atlantic, ICCAT adopted a prohibition on the direct catch of Bluefin Tuna in the main spawning area of the Gulf of Mexico in 1982 (ICCAT Rec. 1982-01), which has been implemented by the United States and Mexico. In addition, fishermen reported a harvest of approximately 48 tons of bycatch in 2007 from the western stock in the Gulf of Mexico due to bycatch in other fisheries.

9. Information on similar species

Different tuna species are widely traded at the international level, including Atlantic Bluefin Tuna *Thunnus thynnus*, Pacific Bluefin Tuna, *Thunnus orientalis*, Southern Bluefin Tuna, *Thunnus maccoyii*, bigeye tuna, *Thunnus obesus*, yellowfin tuna, *Thunnus albacares*, albacore, *Thunnus alalunga*, and skipjack, *Katsuwonus pelamis*. Trade in these species involve different kinds of presentation:, typically dressed, gilled and gutted, or transformed into loins or belly meat. All of these might be fresh/chilled or frozen. Morphologically, all 3 Bluefin Tuna species look very similar, particularly Atlantic and Pacific Bluefin Tuna. As whole adult fish, bigeye, yellowfin, albacore and skipjack are easily identifiable from bluefins based on external attributes (body shape and other morphometrics, characteristics of the fins, etc.), but, depending on the type of presentation (i.e. dressed, or deep frozen), this might not always be so easy. Once transformed into loins or belly meat, the 3 bluefin species, bigeye and yellowfin are very difficult, if not impossible, to distinguish from each other visually.

However, Atlantic Bluefin Tuna is usually marketed as such in order to obtain a higher price so the identification difficulties associated with a CITES listing should not be overstated.

Furthermore, in cases of doubt, genetic techniques provide very precise tools to identify Atlantic Bluefin Tuna from any other tuna species, including the other two Bluefin Tuna species, that are morphologically very similar. In addition, one of the advantages of using genetic markers is that the species identification can be undertaken with almost any kind of samples, including tissue from fresh or frozen whole individuals, fin clips and even dried tissue and larvae. Several approaches have been used to identify species of processed tissue but in uncertain cases the final verification should be always validated afterwards by DNA sequencing (Chow *et al.*, 2003, Lin and Hwang, 2007, Infante *et al.*, 2006). Genetic identification of tuna species can be undertaken using several genetic markers that have been used in species relationships studies (Alvarado Bremer *et al.*, 1997, Block and Finnerty, 1994, Chow and Kishino, 1995, Chow *et al.*, 2006, Ward *et al.*, 2005). However, misidentification can result if the genetic marker is not appropriate. For instance, species identification based on nuclear gene markers cannot distinguish between Atlantic and Pacific Bluefin Tuna (Chow *et al.*, 2006). Another problem associated with nuclear markers is the low genetic distance among the species belonging to the Neothunnus tribe (*T. albacares*, *T. atlanticus*, *T. tonggol*) and, in consequence, these markers provide very low resolution to distinguish any of these species. In contrast, mitochondrial DNA (mtDNA) based methodology results in a better specificity and resolution since this kind of markers can fully distinguish any species of the eight species of the genus *Thunnus (*Alvarado Bremer *et al.*, 1997, Ward *et al.*, 2005*)*. Recently, sequencing part of the highly polymorphic mtDNA control region has been proven as an excellent methodology to assess the presence of Atlantic Bluefin Tuna in processed tissue from the Japanese market (Viñas *et al*., 2009). However, it should be mentioned that about 3-4% of Atlantic Bluefin Tuna mtDNA is undistinguishable from albacore (Alvarado Bremer *et al.*, 2005). Nevertheless, sequencing a fragment of the

mtDNA genome (particularly combining the analysis of the control region and the cytochrome-oxidase – COX I; see Viñas *et al*., 2009) emerges as the best technology available to identify tuna species.

10. CONSULTATIONS

11. ADDITIONAL REMARKS

12. REFERENCES

Alvarado Bremer, J. R., Naseri, I. and Ely, B. (1997) Orthodox and unorthodox phylogenetic relationships among tunas revealed by the nucleotide sequence analysis of the mitochondrial control region. *Journal of Fish Biology, 50: 540-554*

Alvarado Bremer, J. R., Viñas, J., Mejuto, J., Ely, B. and Pla, C. (2005) Comparative phylogeography of Atlantic bluefin tuna and swordfish: the combined effects of vicariance, secondary contact, introgression, and population expansion on the regional phylogenies of two highly migratory pelagic fishes. *Molecular Phylogenetics and Evolution, 36: 169-187*

Block, B.A., Teo, S.L.H., Wall, A., Boustany, A., Stokesbury, M.J.W., Farwell, C.J., Weng, K.C., Dewar, H., Williams, T:D. (2005) *Nature 434: 1121-1127*

Block, B. A. and Finnerty, J. R. (1994) Endothermy in Fishes - a Phylogenetic Analysis of Constraints, Predispositions, and Selection Pressures. *Environmental Biology of Fishes, 40: 283-302*

Boustany, A.M., Reeb, C.A., Block, B.A. (2008) Mitochondrial DNA and electronic traching reveal population structure of Atlantic bluefin tuna (*Thunnus thynnus). Marine Biology.* DOI 10.1007/s00227-008-1058-0
http://tagagiant.org/media/Boustany%20et%20al_Marine%20Biol_genetics.pdf

Chow, S. and Kishino, H. (1995) Phylogenetic relationships between tuna species of the genus *Thunnus* (Scombridae: Teleostei): inconsistent implications from morphology, nuclear and mitochondrial genomes. *Journal of Molecular Evolution, 41: 741-748*

Chow, S., Nakagawa, T., Suzuki, N., Takeyama, H. and Matsunaga, T. (2006) Phylogenetic relationships among *Thunnus* species inferred from rDNA ITS1 sequence. *Journal of Fish Biology, 68: 24-35*

Chow, S., Nohara, K., Tanabe, T., Itoh, T., Tsuji, S., Nishikawa, Y., Uyeyanagi, S. (2003) Genetic and morphological identification of larval and small juvenile tunas (Pisces: Scombridae) caught by a mid-water trawl in the western Pacific. *Bulletin of Fisheries Research Agency, 8: 1-14*

Fromentin, J.M. (2008) Le thon rouge, une espèce surexploitée. Ifremer, Paris
http://wwz.ifremer.fr/institut/content/download/35340/290161/file/08_10_20_DP%20thon%20rouge.pdf

Fromentin, J.M. (2006) Chapter 2.1.5 : Atlantic Bluefin. In: ICCAT Field Manual
http://www.iccat.int/Documents/SCRS/Manual/CH2/2_1_5_BFT_ENG.pdf

Fromentin, J.M. and Powers, J. E. (2005) Atlantic bluefin tuna**:** population dynamics, ecology**,** fisheries and management. *Fish and Fisheries 6(4): 281-306*

Gulland, J.A. (1965) Estimation of mortality rates. Annex to Report of Artic Fisheries Working Group, International Council of the Exploration of the Sea. C. M. 1965(3): 9 pp. (mimeo)

Hattour, A. (2003) Analyse du sex ratio per classe de taille du thon rouge (*Thunnus thynnus*) capturé par les senneurs tunisiens. *Collective Volume of Scientific Papers, ICCAT, 55: 232-237*
http://www.iccat.int/Documents/CVSP/CV055_2003/no_1/CV055010232.pdf

Hurry, G.D., Hayashi, M. and Maguire, J.J. (2008) Report of the independent review, Internation Commission for the Conservation of Atlantic Tunas (ICCAT).
http://www.iccat.int/com2008/ENG/PLE-106.pdf

ICCAT (2007) Basic Text.
http://www.iccat.int/Documents/Commission/BasicTexts.pdf

Infante, C., Crespo, A., Zuasti, E., Ponce, M., Perez, L., Funes, V., Catanase, G. (2006) PCR-based methodology for the authentication of the Atlantic mackerel Scomber scombrus in commercial canned products. *Food Research International, 39: 1023-1028*

Jones, R. (1964) Estimating population size from commercial statistics when fishing mortality varies wiht age. *Rapp. P.-V. Reun. CIEM, 155: 210-214*

Lin, W. F. and Hwang, D. F. (2007) Application of PCR-RFLP analysis on species identification of canned tuna. *Food Control, 18: 1050-1057*

MacKenzie, B.R., Mosegaard, H. and Rosenberg, A.A. (2009) Impending collapse of bluefin tuna in the northeast Atlantic and Mediterranean. *Conservation Letters (in press)*
DOI: 10.1111/j.1755-263X.2008.00039.x

Murphy, G.I. (1965) A solution to the catch equation. *J. Fish. Res. Board. Can. 22(1): 191-202*

Ottolenghi, F., Silvestri, C., Giordano, P., Lovatelli, A., New, M.B. (2004) Capture-based aquaculture. The fattening of eels, groupers, tunas and yellowtails. Rome, FAO

Rooker, J.R., Secor, D.H., De Metrio, G., Schloesser, R., Block, B.A., Neilson, J.D. (2008) Natal homing and connectivity in Atlantic blufin tuna populations. *Science 322: 742-744*

Rooker, J.R., Alvarado Bremer, J.R., Block, B.A., Dewar, H., De Metrio, G., Corriero, A., Kraus, R.T., Prince, E.D., Rodriguez-Marin, E., Secor, D.H. (2007) Life History and Stock Structure of Atlantic bluefin tuna (*Thunnus thynnus*). *Reviews in Fisheries Science 15: 265-310*

Safina, C. and Klinger, D.H. (2008). Collapse of Bluefin Tuna in the Western Atlantic. *Conservation Biology 22: 243-246*

SCRS (2008a) Report of the 2008 Atlantic bluefin tuna stock assessment session. *ICCAT stock assessment reports:*
http://www.iccat.int/Documents/Meetings/Docs/2008_BFT_STOCK_ASSESS_REP.pdf

SCRS (2008b) Executive summary of the 2008 Atlantic bluefin tuna stock assessment session. *ICCAT stock assessment executive summaries:*
http://www.iccat.int/Documents/SCRS/ExecSum/BFT_EN.pdf

SCRS (2006) Report of the 2006 Atlantic bluefin tuna stock assessment session. *ICCAT stock assessment reports:*
http://www.iccat.int/Documents/SCRS/DetRep/Drafts/SCRS-2006-013%20Draft.pdf

SCRS (2002) ICCAT workshop on bluefin tuna mixing. *Collective Volume of Scientific Papers, ICCAT, 54:261-352*
http://www.iccat.int/Documents/CVSP/CV054_2002/no_2/CV054020261.pdf

SCRS (1997) 1996 SCRS detailed report on bluefin tuna. *Collective Volume of Scientific Papers, ICCAT, 46: 1-301*
http://www.iccat.int/Documents/CVSP/CV046_1997/no_1/CV046010001.pdf

Viñas, J., Tudela, S and Yamauchi, A. (2009) Identification of Atlantic bluefin tuna by mitochondrial DNA in the transformed tissue from the Japanese Market. WWF report.

Ward, R. D., Zemlak, T. S., Innes, B. H., Last, P. R. and Hebert, P. D. N. (2005) DNA barcoding Australia's fish species. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences, 360: 1847-1857*

WWF (2006) The plunder of bluefin tuna in the Mediterranean and East Atlantic in 2004 and 2005, uncovering the real story. The collapse of fisheries management.
http://assets.panda.org/downloads/wwfbftreportfinaleditionreducido_final.pdf

WWF (2008) Race for the last bluefin – Fishing capacity of the bluefin tuna purse-seine fleet inside the Mediterranean Sea.
http://www.panda.org/about_wwf/where_we_work/europe/what_we_do/mediterranean/about/marine/bluefin_tuna/bluefin_tuna_news/?126820

13. RANGE STATES

The following countries are those who have reported Bluefin Tuna catches after 1983 (source: http://www.iccat.int/Documents/SCRS/ExecSum/BFT_EN.pdf) and/or whose territory (EEZ or territorial waters) are within the natural range of distribution of the species, according to ICCAT maps on distribution range of the species.

Albania
Algeria
Antigua and Barbuda
Argentina
Barbados
Belize
Brazil
Canada
Cape Verde
Colombia
Costa Rica
Croatia
Cuba
China P.R.
Chinese Taipei
Dominica
Dominican Republic
EC. Belgium
EC. Germany
EC. Netherlands
EC. Cyprus
EC. Denmark
EC. Spain
EC. France
EC. Greece
EC. Ireland
EC. Italy
EC. Malta
EC. Portugal
EC. Sweden
EC. United Kingdom
Egypt
Faeroe Islands
FR. St Pierre et Miquelon
Grenada
Guatemala
Guinée Conakry
Guyana
Haiti
Honduras
Iceland
Israel
Jamaica
Japan
Korea Rep.
Lebanon
Libya
Morocco
Mexico
Monaco
Montenegro
Nicaragua
Norway
Panama
Serbia
Sierra Leone
Slovenia
St. Kitts and Nevis
St. Vincent and the Grenadines
Sta. Lucia
Syria
Trinidad and Tobago
Tunisia
Turkey
U.S.A.
UK. Bermuda
Uruguay
Venezuela