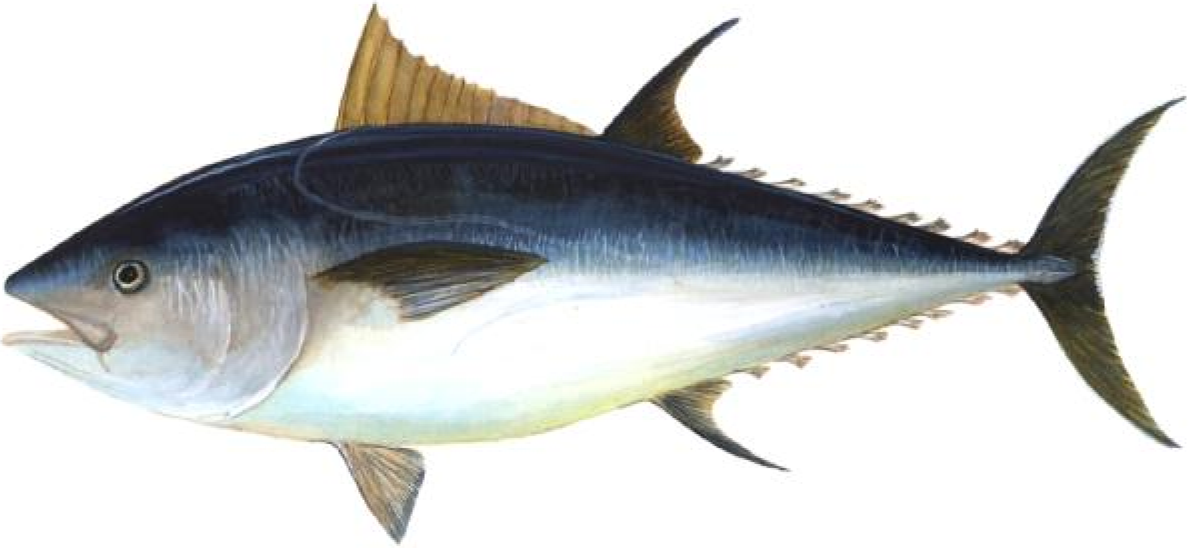

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BEFORE THE SECRETARY OF COMMERCE

PETITION TO LIST THE ATLANTIC BLUEFIN TUNA (*Thunnus thynnus*) AS ENDANGERED UNDER THE UNITED STATES ENDANGERED SPECIES ACT

Center for Biological Diversity

May 24, 2010

CENTER for
BIOLOGICAL
DIVERSITY
Because life is good.

EXECUTIVE SUMMARY

The Center for Biological Diversity ("Center") formally requests that the Secretary of Commerce, through the National Marine Fisheries Service ("NMFS"), list the Atlantic bluefin tuna (*Thunnus thynnus*) as endangered, or in the alternative list the species as threatened, under the federal Endangered Species Act ("ESA"), 16 U.S.C. §§ 1531 – 1544. Atlantic bluefin tuna meet the criteria for listing and urgently need the protections afforded by the ESA.

Already on a path toward extinction, the western Atlantic bluefin tuna population will be devastated by the ongoing oil spill in the Gulf of Mexico. The disastrous BP *Deepwater Horizon* spill further exemplifies the urgency of ESA protections. The Gulf provides the only spawning ground known to the western Atlantic bluefin tuna, but inadequate protections of this essential habitat for the Atlantic bluefin tuna have resulted in severe degradation. The oil spill occurred in the midst of the Atlantic bluefin tuna's spawning season, guaranteeing devastating impacts on eggs, larvae and adults.

Even prior to this catastrophic spill, the Atlantic bluefin tuna was in severe decline and on a path toward extinction. The Atlantic bluefin tuna, a pelagic teleost fish in the temperate Atlantic Ocean, has declined by at least 60% *in the past ten years* in the eastern Atlantic stock, and by at least 82% since 1970 in the western Atlantic stock; both stocks are below 15% of their baseline populations. The trends of recent decline, although shocking, do not even reflect historical exploitation and likely underestimate the fish's troubled status. A target of fisheries since the seventh millennium B.C., tuna has been unsustainably exploited since the beginning of the twentieth century. Despite international concern, exploitation of Atlantic bluefin tuna consistently exceeds quotas and the tuna populations continue to decline.

Commercial fishing for Atlantic bluefin tuna populations, in combination with a rapidly changing ocean environment, is likely to drive bluefin tuna to extinction. Soon these majestic fish will disappear completely from the Atlantic. In a foreboding sign, in recent years United States fishermen have caught less than 25% of their quota for bluefin primarily due to reduced population levels. Given the critically imperiled nature of Atlantic bluefin tuna populations, these changes in regional availability indicate that current exploitation and environmental processes are leading to extreme depletion and extinction.

This Petition summarizes the natural history of the Atlantic bluefin tuna, the population information available on the species, and the threats to the species and its habitat. The Petition then shows that, in the context of the ESA's five statutory listing factors, the severely depleted population status of the species and the ongoing threats to its continued existence leave NMFS with no choice but to list the species as endangered or threatened under the ESA. The Center requests that NMFS analyze the eastern and western populations of Atlantic bluefin tuna as distinct population segments ("DPS"), because listing is warranted for each. Lastly, the Center also requests that Atlantic bluefin tuna critical habitat be designated concurrently with its listing.

NOTICE OF PETITION

Mr. Gary F. Locke
Secretary of Commerce
U.S. Department of Commerce
1401 Constitution Avenue, NW, Rm. 5516
Washington, D.C. 20230
Email: TheSec@doc.gov

Mr. Eric Schwaab
Assistant Administrator for Fisheries
National Oceanographic and Atmospheric Administration
1315 East-West Highway
Silver Spring, MD 20910
Email: eric.schwaab@noaa.gov

PETITIONER

Center for Biological Diversity
351 California St., Ste 600
San Francisco, CA 94104
Tel: (415) 436-9682

Catherine Kilduff

Date: this 24th day of May, 2010

Catherine Ware Kilduff
Center for Biological Diversity

Pursuant to section 4(b) of the Endangered Species Act ("ESA"), 16 U.S.C. § 1533(b), section 553(3) of the Administrative Procedure Act, 5 U.S.C. § 553(e), and 50 C.F.R. § 424.14(a), the Center for Biological Diversity ("Center") hereby petitions the Secretary of Commerce, through the National Marine Fisheries Service ("NMFS"), to list the Atlantic bluefin tuna (*Thunnus thynnus*) as an endangered species, or in the alternative as a threatened species, under the ESA, 16 U.S.C. §§ 1531 *et seq.*

The Center is a non-profit, public interest environmental organization dedicated to the protection of imperiled species and their habitats through science, policy, and environmental law. The Center has 255,000 members and online activists throughout the United States.

In analyzing whether Atlantic bluefin tuna warrants listing under the ESA, NMFS must examine whether the species is endangered or threatened throughout all or a significant portion of its range. In the event NMFS determines that the Petition fails to demonstrate that listing of the Atlantic bluefin tuna may be warranted in all of its range, we request that, in the alternative, NMFS consider whether the species is imperiled in "a significant portion of its range." Petitioners specifically request that NMFS analyze the eastern and western populations of

Atlantic bluefin tuna as DPSs; listing is warranted for each DPS. In the alternative, we request that NMFS conduct its own DPS analysis and list the DPSs that meet the criteria.

NMFS has jurisdiction over this Petition. This Petition sets in motion a specific process, placing definite response requirements on NMFS. Specifically, NMFS must issue an initial finding as to whether the Petition "presents substantial scientific or commercial information indicating that the petitioned action may be warranted." 16 U.S.C. § 1533(b)(3)(A). NMFS must make this initial finding "[t]o the maximum extent practicable, within 90 days after receiving the petition." *Id*. Petitioners need not demonstrate that listing of the Atlantic bluefin tuna is warranted, rather, Petitioners must only present information demonstrating that such listing may be warranted. While Petitioners believe that the best available science demonstrates that listing of the Atlantic bluefin tuna as endangered is in fact warranted, there can be no reasonable dispute that the available information indicates that listing the species as either endangered or threatened may be warranted. As such, NMFS must promptly make a positive initial finding on the petition and commence and complete a status review as required by 16 U.S.C. § 1533(b)(3)(B).

Petitioners also request that critical habitat be designated for the Atlantic bluefin tuna concurrently with the species being listed as endangered or threatened, pursuant to 16 U.S.C. § 1533(a)(3)(A) and 50 C.F.R. § 424.12.

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I. INTRODUCTION

The Atlantic bluefin tuna (*Thunnus thynnus*), once an iconic pelagic fish, has been plagued by circumstances that have led it to become one of the most imperiled of all marine fish. Atlantic bluefin tuna have been fished nearly to extinction. The Atlantic bluefin tuna suffers from mismanagement by an ineffective international organization, rampant illegal fishing as a consequence of extraordinary market demand, complicated and poorly understood population dynamics, and a diversity of habitat threats. The ESA provides a means to recover species such as the Atlantic bluefin tuna by limiting threats, protecting habitat, conserving ecosystems upon which the species depends, providing a conservation program, and taking other appropriate steps. Without protections under the ESA, the drastic declines in populations of Atlantic bluefin tuna are potentially irreversible.

II. NATURAL HISTORY OF THE ATLANTIC BLUEFIN TUNA

A. TAXONOMY

Common Name:	Atlantic bluefin tuna
Other Common Names:	bluefin tuna, northern bluefin tuna, bluefin tunny, horse mackerel, squid hound
Scientific Name:	*Thunnus thynnus*
Authority:	Linnaeus 1758
Class:	*Actinopterygii* (ray-finned fishes)
Order:	*Perciformes* (perch-like fishes)
Family:	*Scombridae*
Genus:	*Thunnus*
Species:	*thynnus*

B. DISTRIBUTION AND HABITAT

Atlantic bluefin tuna historically have ranged throughout the Atlantic Ocean, but now exist primarily in the North Atlantic Ocean and associated seas, such as the Mediterranean Sea. Atlantic bluefin tuna are a highly migratory species, able to swim at over 90 km h^{-1} (Porch 2005). They are the largest members of the family *Scombridae*, attaining body sizes of as much as 700 kg (Porch 2005). Atlantic bluefin tuna are unique among teleosts for their endothermic capacity and cardiovascular physiology, allowing them to sustain cold as well as warm temperatures while maintaining a stable internal body temperature (Block *et al.* 2005). Archival tagging and ultrasonic telemetry data indicate that Atlantic bluefin tuna frequently dive to depths of 500m to 1,000m.

The International Commission for the Conservation of Atlantic Tunas (“ICCAT”)[1] manages Atlantic bluefin tuna as distinct western and eastern stocks separated by a management

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[1] ICCAT is an inter-governmental fishery organization responsible for the conservation of tunas and tuna-like species in the Atlantic Ocean and its adjacent seas. ICCAT compiles fishery statistics from its members and from all

boundary at the 45°W meridian. Electronic tagging research indicates that the western and eastern management units overlap on foraging grounds in the western and central Atlantic. The populations sort to spawn in the Gulf of Mexico and the Mediterranean Sea, the two main spawning areas identified today (Block *et al.* 2005).

Block *et al.* (2005) hypothesized that western Atlantic bluefin tuna can move to the eastern Atlantic and back, crossing the 45°W meridian several times over the course of one or more years. Mixing between the eastern and western stocks is very important in the management of the Atlantic bluefin tuna stocks, yet the impacts are not entirely understood. For example, management actions taken in the eastern Atlantic and Mediterranean are likely to impact the recovery in the western Atlantic. This is because even small rates of mixing from East to West can have significant effects on the western stock due to the due to the fact that the eastern Atlantic bluefin tuna resource is much larger than that of the western stock (SCRS 2008).

C. BIOLOGICAL CHARACTERISTICS

Currently, bluefin tuna is assumed to mature at four years of age (approximately 25 kg) in the Mediterranean and at eight years of age (approximately 140 kg) in the Gulf of Mexico. Juvenile and adult bluefin tuna are opportunistic feeders (as are most predators) and their diet can include jellyfish and salps, as well as demersal and sessile species such as, octopus, crabs and sponges. However, in general, juveniles feed on crustaceans, fish and cephalopods, while adults primarily feed on fish such as herring, anchovy, sand lance, sardine, sprat, bluefish and mackerel. Juvenile growth is rapid for a teleost fish (about 30cm/year), but slower than other tuna and billfish species. Fish born in June attain a length of about 30-40cm long and a weight of about 1 kg by October. After one year, fish reach about 4 kg and 60cm long. Growth in length tends to be lower for adults than juveniles, but growth in weight increases. At 10 years old, a bluefin tuna is about 200cm and 150 kg and reaches about 300cm and 400 kg at 20 years. Bluefin tuna is a long lived species, with a lifespan of about 40 years, as indicated by recent studies from radiocarbon deposition.

D. EASTERN ATLANTIC DISTRIBUTION AND STATUS

The eastern Atlantic bluefin tuna population is critically imperiled and faces an imminent risk of extinction. Even conservative estimates show that this population had declined upwards of 80 percent since 1970, with even more drastic declines in the last decade (CITES CoP15 Prop. 19).

The 2008 Standing Committee on Research and Statistics[2] ("SCRS") concluded that fishing mortality is too high and spawning stock biomass too low to be consistent with the

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entities fishing for these species in the Atlantic Ocean, coordinates research, including stock assessment, on behalf of its members, develops scientific-based management advice, provides a mechanism for Contracting Parties to agree on management measures, and produces relevant publications. Thus, ICCAT is one of the leading authorities on Atlantic bluefin tuna management and research.

[2] The SCRS, on which each member of the Commission may be represented, is responsible for developing and recommending to the Commission all policy and procedures for the collection, compilation, analysis and dissemination of fishery statistics. It is the SCRS' task to ensure that the Commission has available at all times the

Convention objectives of a sustainable catch.[3] The current fishing mortality is likely at least three times that which would result in maximum sustainable yield and spawning stock biomass is likely less than 20% of the level needed to sustainably support maximum sustainable yield (SCRS 2008).

A ICCAT virtual population analysis of the eastern Atlantic bluefin tuna stock conducted in 2008 based upon estimated catches, which addressed the period 1955-2007, yielded an estimate for spawning stock biomass in 2007 of 78,724 t (CITES CoP15 Prop. 19. 2010). This contrasts with the biomass peak estimated for 1958 at 305,136 t, and with the 201,479 t 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%) was in the last 10 years (CITES CoP15 Prop. 19. 2010).

Even considering uncertainties in the assessment, continuing fishing at the 2007 fishing mortality rates is expected to drive the spawning stock biomass to very low levels; i.e. to about 18% of the spawning stock biomass in 1970 and 6% of the unfished SSB (ICCAT 2010). This combination of high fishing mortality, low spawning stock biomass and severe overcapacity, as was estimated in the 2008 assessment, results in a high risk of fisheries and stock collapse (ICCAT 2010). The ICCAT SCRS advised that unless fishing mortality rates are substantially reduced in the near future, further reduction in spawning stock biomass is likely, leading to a risk of fisheries and stock collapse (ICCAT 2010).

Scientists, aware of the problems stated above, have predicted that that the adult eastern Atlantic bluefin tuna population in 2011 will be 75 percent lower than in 2005, and that fishing quotas will permit the capture of all the remaining adult fish (MacKenzie *et al.* 2009). The scientists based this conclusion on the fact that eastern Atlantic bluefin tuna have been in decline for many years and that the biomass of adults is at its lowest on record, with the steepest decline in the last five to ten years (MacKenzie *et al*. 2009). The authors note that at these low population sizes, the reproduction of Atlantic bluefin becomes increasingly uncertain and may be limited by spawner biomass (see Figure 1 showing the decline in adult biomass (top) and the fact that in recent years adult biomass has neared the point at which recruitment will decline rapidly (bottom); MacKenzie *et al*. 2009). The paper concludes that the population is at risk of "collapse" in the next few years, meaning a 90% decline in adult biomass within three generations.

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most complete and current statistics concerning fishing activities in the Convention area as well as biological information on the stocks that are fished. The SCRS also coordinates various national research activities, develops plans for special international cooperative research programs, carries out stock assessments, and advises the Commission on the need for specific conservation and management measures. http://www.iccat.int/en/SCRS.htm.

[3] ICCAT's objective, in the preamble of its 1966 convention: "The Governments . . . considering their mutual interest in the populations of tuna and tuna like fishes found in the Atlantic ocean, and desiring to cooperate in maintaining the populations of these fishes at levels which will permit the maximum sustainable catch for food and other purposes."

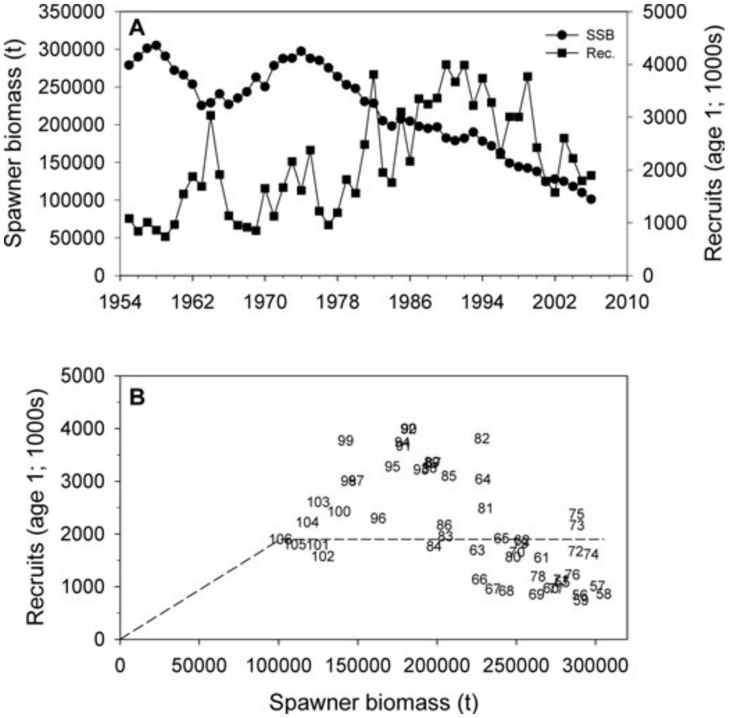

Figure 1. Temporal trends in spawner biomass and recruitment of the bluefin tuna population in the eastern Atlantic and Mediterranean, and the relationship between spawner biomass and recruitment.
(A) Spawner biomass and recruitment (numbers of fish born in a given year and surviving to age 1).
(B) Recruitment produced by different levels of spawner biomass. Symbols depict years corresponding to last 2 digits of birth years of recruits. Dashed line: the assumed spawner–recruit relationship. The breakpoint was estimated as the lowest observed spawner biomass (ICES 2003) (101,000 t), which occurred in 2006.

Source: MacKenzie *et al*. 2009, Fig. 1

E. WESTERN ATLANTIC DISTRIBUTION AND STATUS

The western Atlantic bluefin tuna is also in imminent danger of extinction due severe population declines and ongoing fishing pressures. A history of intense fishing pressure has led to declines over 80 percent since1970 (CITES CoP15 Prop. 19. 2010).

The western Atlantic bluefin tuna stock has been below convention objectives for a sustainable catch since the mid 1970s and fishing mortality rates have been above sustainable levels throughout the time series (1970 to current) (SCRS 2008). These results reflect the enormous fishing pressure that western Atlantic bluefin tuna have experienced throughout the past 40 years. Now the stock is unable to continue to withstand such pressure and the potential for extinction is imminent.

A virtual population analysis of the western Atlantic bluefin tuna stock yielded an estimate for spawning stock biomass in 2007 of 8,693 t, which contrasts with the 49,482 t estimated for 1970, implying an absolute extent of decline of 82.4% over the 38-year historical period (CITES CoP15 Prop. 19. 2010). Overfishing during the 1970s and 1980s led to the decline of the western Atlantic stock. Since then, the spawning stock biomass has remained relatively stable at approximately 15-18% of its pre-exploitation biomass. Management efforts have yet to result in stock recovery. In fact, ten years after initiation of the rebuilding plan (half way through the 20-year plan), the SCRS estimated the 2007 spawning stock biomass to be 7% below the level of the rebuilding plan's first year (SCRS 2008).

The total catch for the West Atlantic peaked at nearly 20,000 t in 1964, mostly due to the Japanese longline fishery for large fish off Brazil and the United States purse seine fishery for juvenile fish. Catches dropped sharply thereafter with the collapse of the longline fishery off Brazil and decline in purse seine catches, but increased again to average over 5,000 t in the 1970s due to the expansion of the Japanese longline fleet into the northwest Atlantic and Gulf of Mexico and an increase in purse seine effort targeting larger fish for the sashimi market (ICCAT 2010). The total catch for the West Atlantic including discards has generally been relatively stable since 1982 due to the imposition of quotas. However, since a total catch level of 3,319 t in 2002 (the highest since 1981, with all three major fishing nations indicating higher catches), total catch in the West Atlantic declined steadily to a low of 1,638 t in 2007 and then increased in 2008 to 2,015 t (ICCAT 2010).

The decline through 2007 was primarily due to considerable reductions in catch levels for United States fisheries. Since 2002, the Canadian annual catches have been relatively stable at about 500-600 t (733 t in 2006); the 2006 catch was the highest recorded since 1977. The 2008 Canadian catch was 576 t (ICCAT 2010). Japanese catches have generally fluctuated between 300-500 t, with the exception of 2003 (57 t), which was low for regulatory reasons (ICCAT 2010). After reaching 2,014 t in 2002 (the highest level since 1979), the catches (landings and discards) of U.S. vessels fishing in the northwest Atlantic (including the Gulf of Mexico) declined precipitously during 2003-2007 (see Figure 2). The United States did not catch its quota in 2004-2008 with catches of 1,066, 848, 615, 858 and 937 t, respectively (ICCAT 2010).

The declining U.S. catch is due in large part this is due to the inability of U.S. commercial fishermen to catch their quota despite, effort remaining strong. The reduced catches result from the unavailability of fish due to a substantial decline in the overall size of the western Atlantic bluefin tuna population and/or a change in migration patterns (Safina and Klinger 2008; SCRS 2008). Safina and Klinger (2008) conclude that based on the numbers and trends, “western Atlantic bluefin tuna is now in danger of extinction.” The population simply cannot keep up with current fishing pressure.

Despite the lack of success of recovery efforts for western Atlantic bluefin, NMFS recently proposed a rule to increase the maximum daily retention limit and lengthen the season of the General category fishery and increase the Harpoon category daily incidental retention limit.[4] NMFS’ justification for the increased harvest is “to enable more thorough utilization” of the available ICCAT quota. NMFS asserts this could be completed while ending overfishing and rebuilding the stock. Efforts to date to rebuild the stock have been unsuccessful, as mentioned above, so this claim is unjustifiable. Pressure for the U.S. to catch its quota (and therefore be able to retain a high quota) is immense and apparently trumps the scientific evidence that western Atlantic bluefin tuna is verging on collapse.

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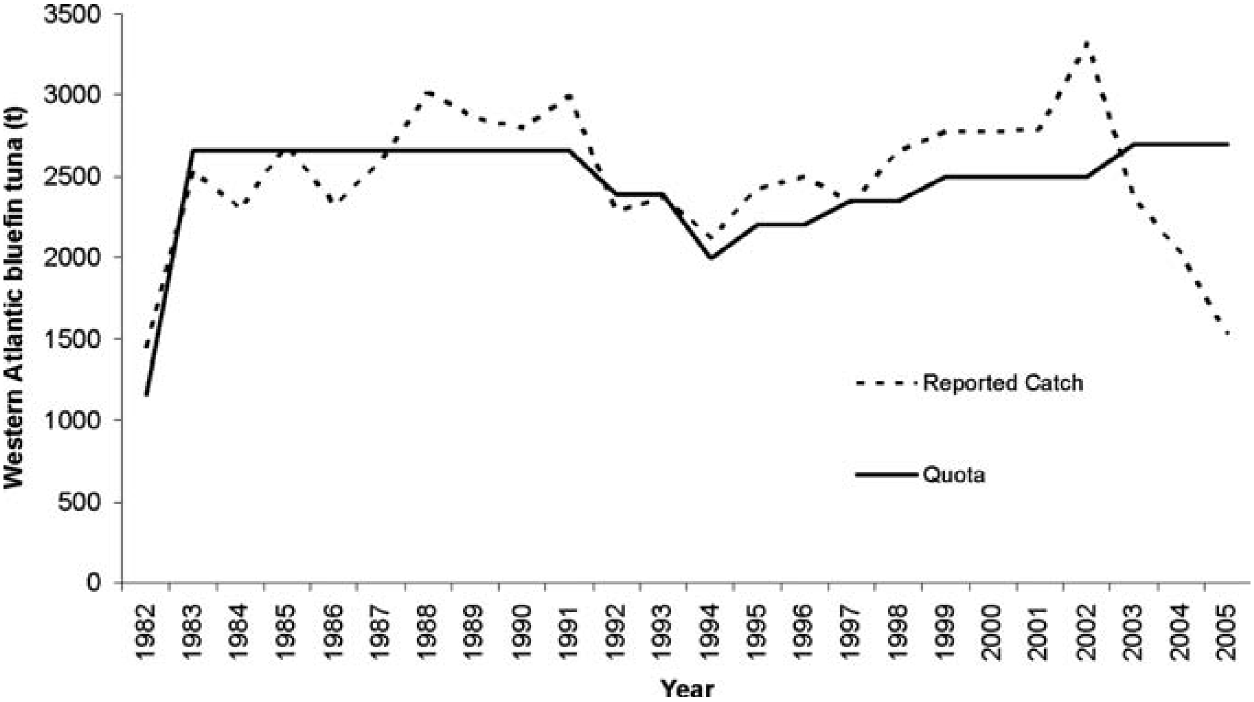
[4] Atlantic Highly Migratory Species; Atlantic Bluefin Tuna Season and Retention Limit Adjustments, 74 F.R. 57128 (Nov. 4, 2009). The “General” category encompasses commercial vessels that can only utilize a variety of hand gears (i.e., handline, rod and reel, bandit and harpoon) while the “Harpoon” category only allows the use of harpoon gear (Diaz *et al.* 2009).

Figure 2. Western Atlantic bluefin tuna reported catches and quota levels from 1982 to 2005.



Source: Safina and Klinger 2008, Figure 2.

III. EXTINCTION RISK FOR THE ATLANTIC BLUEFIN TUNA

The ESA requires the protection of a species if it is endangered or threatened. 16 U.S.C. § 1533(a)(1). A species is "endangered" if it is "in danger of extinction throughout all or a significant portion of its range," 16 U.S.C. § 1532(6), and "threatened" if it is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." 16 U.S.C. § 1532(20).

Congress passed the ESA in an effort to widen the protection for vanishing species and the ecosystems upon which they depend because existing laws were not providing the management tools necessary to save a species prior to extinction. S. Rep. No. 307, 93rd Cong., 1st Sess. 3 (1973). The Atlantic bluefin tuna is just such a species where existing laws and management tools have failed to protect it from danger of extinction. In March 2010, Tom Strickland, assistant Interior secretary for Fish and Wildlife and Parks, noted that ICCAT has failed to protect Atlantic bluefin tuna: "in light of the serious compliance problems that have plagued the eastern Atlantic and Mediterranean fishery and the fact that the 2010 quota level adopted by ICCAT is not as low as we believe is needed, the United States continues to have serious concerns about the long-term viability of either the fish or the fishery." P. Reis, *U.S. backs proposed trading ban on bluefin tuna.* Greenwire, Mar. 3, 2010 (emphasis added).

This petition sets in motion a process pursuant to section 4 of the ESA that places defined time requirements for NMFS's actions to evaluate whether or not to list a species. 16 U.S.C. § 1533. Specifically, NMFS must issue an initial finding as to whether the petition "presents substantial scientific or commercial information indicating that the petitioned action may be warranted. 16 U.S.C. § 1533(b)(3)(A). NMFS must make this initial finding to "the maximum extent practicable, within 90 days after receiving the petition." *Id*. The sole basis for this finding is "best scientific and commercial data available." 16 U.S.C. § 1533(b)(1)(A). Within one year of finding that the listing may be warranted, NMFS must complete a status review of the species and publish either a proposed listing rule or its determination that listing is not warranted. 16 U.S.C. § 1533(b)(3)(B).

Requiring reliance upon the best available scientific data, as opposed to requiring absolute scientific certainty, "is in keeping with congressional intent" that agencies "take preventive measures before a species is 'conclusively' headed for extinction." *Defenders of Wildlife v. Babbitt*, 958 F. Supp. 670, 680 (D.D.C. 1997). In a listing decision, "the best available science standard gives 'the benefit of the doubt to the species.'" *Ctr. for Biological Diversity v. Lohn*, 296 F. Supp. 2d 1223, 1239 (W.D. Wash. 2003) (other portions of case vacated as moot by *Ctr. for Biological Diversity v. Lohn*, 511 F.3d 960 (9th Cir. Wash. 2007) (citing *Conner v. Burford*, 848 F.2d 1441, 1454 (9th Cir. 1988)). NMFS has a duty to give the species the benefit of the doubt in the face of scientific uncertainty. ICCAT stock assessment models for fishery management likely underestimate Atlantic bluefin tuna's risk of extinction although they can be informative. NMFS and its status review team should not rely solely on the stock assessments for making a determination under the ESA, but also consider the best available science regarding extinction risk of marine fish, which questions the applicability of fishery management models to populations in steep decline.

The sections below set forth substantial information[5] demonstrating that Atlantic bluefin tuna is in danger of extinction through all or a significant portion of its range and should be listed as endangered; or in the alternative, Atlantic bluefin tuna is likely to become an endangered species within the foreseeable future and therefore warrants threatened status.

A. CONSERVATION STATUS

As seen from the discussion of the status of the eastern and western Atlantic bluefin tuna stocks, the extinction risk for Atlantic bluefin tuna is high due to ongoing fishing pressure in the face of drastic population declines. Even the dismal stock status reports probably do not paint an accurate picture of the precarious position of the Atlantic bluefin tuna. This is because fishery dependent data collection for the most part began well after years of harvest occurred. Therefore, most scientists and managers may not be aware of the true magnitude of change in marine ecosystems, because the majority of declines occurred during the first years of exploitation, typically before surveys were undertaken (Myers and Worm 2003). This is especially true for Atlantic bluefin tuna, for which there is scientific and anecdotal evidence of declines and changes in spatial distributions in the early to mid-1900s.

The specific statutory language of the ESA governs the determination of the status of Atlantic bluefin tuna, requiring that listing determinations under the ESA use the "best scientific

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[5] Petitioners need not demonstrate that listing is warranted; rather, Petitioners must only present substantial information demonstrating that such listing *may* be warranted. 50 C.F.R. § 424.14(b)(1) (defining "substantial information" as "that amount of information that would lead a reasonable person to believe that the measure proposed in the petition may be warranted.").

and commercial data available." 16 U.S.C. § 1533(b)(1)(A). This requires consideration of the most recent scientific literature regarding the risk of extinction for marine species in combination with information about the population dynamics of Atlantic bluefin tuna populations. Other conservation status determinations may provide context for NMFS's status determination, however some may be inadequate to assess extinction risk for Atlantic bluefin tuna. These classification standards and their merits are discussed below.

a. International Union for Conservation of Nature ("IUCN")

The International Union for the Conservation of Nature ("IUCN") is the world's foremost authority on the status of threatened species. The IUCN Redlist classification system is widely regarded as the most authoritative list of globally threatened species (IUCN 2001). It is intended to be an easily and widely understood system for classifying species at high risk of global extinction (IUCN 2001). The general aim of the system is to provide an explicit, objective framework for the classification of the broadest range of species according to their extinction risk (IUCN 2001). The IUCN Red List of Threatened Species specifies quantitative criteria for listing species in three categories of threat: critically endangered, endangered, and vulnerable.

IUCN classifies the western Atlantic bluefin tuna population as critically endangered with an extremely high risk of extinction in the wild in the immediate future (*Thunnus thynnus* (western Atlantic stock) available at http://www.iucnredlist.org/apps/redlist/details/21864/0). This population meets the critically endangered criteria of having declined in excess of 80 percent over the last 10 years or three generations, whichever is the longer, based on abundance and levels of exploitation. IUCN classifies eastern Atlantic bluefin tuna as endangered, meaning that it faces a very high risk of extinction in the wild in the near future based on a reduction of at least 50% over the last 10 years or three generations (*Thunnus thynnus* (eastern Atlantic stock) available at http://www.iucnredlist.org/apps/redlist/details/21865/0). While these assessments were conducted in 1996 and need updating, as described in this petition the most recent science confirms that Atlantic bluefin tuna continue to be endangered.

The classification by the IUCN provides evidence that the petitioned species warrants endangered protection under the ESA.

b. American Fisheries Society ("AFS")

In 1999, the American Fisheries Society ("AFS") developed criteria to define extinction risk in marine species (Musick 1999). The AFS method, however, has limitations and should be considered cautiously. The basis for the criteria is the IUCN guidelines, ostensibly modified to better reflect population resilience; arguably the IUCN model does not fit harvested species, which have higher productivity (Musick 1999). These criteria are widely used to evaluate the status of marine fishes. The AFS method uses productivity estimates to assess threshold population levels for extinction (Musick 1999). This technique assumes that productivity is the inverse of vulnerability of fishes, and determines productivity level (high, medium, low, very low) from pre-defined categories of life history and population characters such as intrinsic rate of increase, longevity, age at first maturity, fecundity and the von Bertalanffy growth parameter, *K* (Musick 1999). As stated, this model assumes that productivity can be considered a reasonable surrogate for resilience, however this may be incorrect in certain circumstances. The AFS method cannot account for external factors that contribute significantly to species' extinction risk, such as fishing intensity, degradation of essential habitat and climate change (Cheung *et al*. 2004). In addition, evidence suggests that high fecundity does not intrinsically protect fishes from extinctions (Cheung *et al*. 2004; Dulvy *et al.* 2003). Nevertheless, keeping in mind these limitations, the AFS criteria can be helpful for evaluating the significance of the decline of a species.

Using the AFS scoring scheme for productivity, the Atlantic bluefin tuna would be classified as a Low Productivity species on 4 out of 5 accounts (Table 1, CITES 15 Prop. 19 2010, Annex I). The AFS sets decline thresholds for each level of productivity. If a low productivity population reaches a decline of 85 percent over the longer of 10 years or 3 generations, the population would be listed as "vulnerable" and subjected to close scrutiny for further listing (Musick 1999). Atlantic bluefin tuna have declined rapidly in recent years and ought to be subjected to close scrutiny in light of its low productivity.

Table 1. AFS values for productivity index parameters and the Atlantic bluefin tuna parameters.

	High	*Medium*	*Low*	*Very Low*	***Atlantic bluefin tuna***	*Score*
r (yr^{-1})	>0.50	0.16-0.50	0.50-0.15	<0.05	**0.03-0.06**	Low
K	>0.30	0.16-0.30	0.05-0.15	<0.05	**0.081**	Low
Fec. (yr^{-1})	> 10^4	10^2-10^3	10^1<10^2	<10^1	**>10^7**	High
Tmat	< 1 yr	2-4 yr	5-10 yr	>10 yr	**4-12 yr**	Low
Tmax	1-3 yr	4-10 yr	11-30 yr	>30 yr	**>20**	Low

Source: (CITES 15 Prop. 19 2010, Annex I)

c. CITES Analysis of Atlantic Bluefin Tuna Status

Recently, limits on international trade of Atlantic bluefin tuna were rejected despite overwhelming evidence that the fish met the criteria for protection under the Convention on International Trade in Endangered Species of Wild Fauna and Flora ("CITES"). At the 15th Conference of the Parties ("COP15") of CITES (Doha, 13-25 March 2010), the Principality of Monaco proposed to include Atlantic bluefin tuna in Appendix I, which is the most protective classification and prohibits international trade in species considered most in danger of extinction. To its credit, the U.S. government supported this proposal, noting that the species met the biological criteria for listing under Appendix I and that the U.S. "continues to have serious concerns about the ability of ICCAT and its members to fully implement their commitments to strengthen compliance and bring catches in line with scientific advice."[6] Unfortunately, short-

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[6] Announcement of tentative U.S. negotiating positions for agenda items and species proposals submitted by foreign governments and the CITES Secretariat, *available at* http://www.fws.gov/international/pdf/CoP15notice4-CLEAN%20WEB%20tentative%20U.S.%20positions_final.pdf (last visited May 18, 2010); *see also* Conference of the Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); Fifteenth Regular Meeting; Tentative U.S. Negotiating Positions for Agenda Items and Species Proposals Submitted by Foreign Governments and the CITES Secretariat, 75 Fed. Reg. 11556 (March 11, 2010).

sighted commercial interests prevailed over scientific reality during the recent Conference of the Parties in Doha, Qatar, and the listing proposal was voted down.

In preparation for COP15, both ICCAT and the Food and Agriculture Organization of the United Nations ("FAO") convened panels to evaluate whether the Atlantic bluefin tuna met CITES listing criteria. In brief, a species is to be considered for listing under Appendix I if one of the following criteria is met: (1) the wild population is small, and is characterized by another size-related factor making it vulnerable; (2) the wild population has a restricted area of distribution, and is characterized by another habitat-related factor making it vulnerable; and (3) a marked decline in the population size in the wild observed as ongoing or having occurred in the past or a decline is inferred or projected. For Atlantic bluefin tuna, the majority of discussion focused on the third criterion, with respect to the ongoing marked decline in population size. The findings of the ICCAT SCRS and the FAO panel are discussed below, along with the U.S. negotiating position at CITES.

i. ICCAT

ICCAT's SCRS met in 2009 to consider the status of Atlantic bluefin tuna populations with respect to the CITES listing criteria, discussed above. The SCRS primarily analyzed whether the Atlantic bluefin tuna populations were undergoing or are projected to undergo a marked decline in population size. Although ICCAT calculated decline in populations using three methods, in order to evaluate extinction risk the "high recruitment" model arguably best estimates the decline of Atlantic bluefin tuna since populations were at levels of unfished biomass. Under that model, there is an extremely high probability that the western Atlantic bluefin tuna is below 10% of the unfished biomass and near certainty that the eastern population is also below 10% of the unfished biomass (see Tables 2 and 3).

Atlantic bluefin tuna management varies depending on the choice of spawner-recruitment biomass models. As a result, scientists often provide biomass estimates from multiple equally plausible models (SCRS 2008). These models are important for extinction risk analysis because they determine SSB_0, the unfished spawning stock biomass projection, which serves as a baseline from which relative decline in population can be estimated. All the models show a decline of over 85% in Atlantic bluefin tuna populations as compared to the unfished populations (see Tables 2 and 3).

The two models that ICCAT uses to project western Atlantic bluefin tuna populations are: (1) the "high recruitment" model, a Beverton-Holt function fit to the full time series of stock-recruit data, starting in 1970, and (2) the "low recruitment" model fit to stock-recruit data since 1976. The low recruitment model presumes that a regime shift occurred circa the late 1970s which has since resulted in low recruitment (SCRS 2008). Therefore, arguably the high recruitment model better takes into account the recruitment of the stock prior to 1976, and prior to the purported regime shift, and should be used when estimating the unfished biomass of Atlantic bluefin tuna for purposes of extinction risk analysis under the ESA.

Arguably, the low recruitment model is an effort by fishermen to justify higher catches and should not be used even for management purposes. The implication of use of the low recruitment model is that Atlantic bluefin tuna populations have a lower potential yield due to less favorable environmental conditions since the 1970s. Therefore, population targets such as the biomass supporting maximum sustainable yield (B_{MSY}) are lower, and quotas will be higher. Safina and Klinger (2008) state that no data supported the existence of a regime shift or indicated that the ocean's bluefin carrying capacity had changed. Nonetheless, beginning in 2002, managers of the western Atlantic bluefin tuna stock chose to emphasize the "regime shift," or low recruitment model that permits higher catch quotas.

In the 2008 Atlantic bluefin tuna stock assessment report, the ICCAT SCRS addressed the fact that science does not support management decisions based on the low recruitment model alone. In 2002, ICCAT Commissioners decided to emphasize the regime shift hypothesis despite the lack of data showing this model to be preferential (SCRS 2008). In 2008 the SCRS sought to correct this reliance on the low recruitment model by clarifying that both the high recruitment and regime-shift (or "low") recruitment hypotheses should continue to be reported and conveyed in management advice (SCRS 2008). Even though both models may be equally plausible for purposes of determining fisheries management actions, NMFS should evaluate whether the high recruitment model (which does not adjust estimates of baseline populations to take account of a recent regime shift) reflects the best available science in the ESA's extinction risk context because it will more accurately estimate the unfished biomass.

When the SCRS calculated the decline in reference to the maximum population size since 1970, there was only a 54% probability that western Atlantic bluefin tuna was below 20% of that maximum. When the SCRS calculated the decline using the high recruitment model, which takes into account declines in population predating 1970, there was a 99.6% probability that the stock was below 10% of the unfished biomass. The medium and high recruitment models yielded similar results for the eastern Atlantic bluefin tuna stock (see Table 3). As discussed in more detail below, the majority of the FAO Expert Advisory Panel concluded that for purposes of evaluating extinction risk, using a model is more appropriate than comparing the current population estimates to the maximum populations of the past 40 years (FAO 2010a). This holds true for evaluation of population declines under the ESA as well.

Table 2. Probability of western Atlantic bluefin tuna spawning biomass (SSB) in 2009 being less than 10%, 15% or 20% of the historical baseline population. In A), the baseline is the maximum historical population size ("max SSB") in the time series 1970-2007, and in B) the baseline is the unexploited population size (SSB_0), estimated using both the low recruitment model and high recruitment model, which the ICCAT SCRS considers equally plausible (see above discussion of the models).

A) Western Atlantic Bluefin Tuna

Historical Decline (probability)		
<0.10 max SSB	**<0.15 max SSB**	**<0.20 max SSB**
0.088	0.298	0.542

B) Western Atlantic Bluefin Tuna

	Historical Decline (probability)		
Recruitment Model	**<0.10 SSB_0**	**<0.15 SSB_0**	**<0.20 SSB_0**
Low	0.302	0.926	0.996
High	0.996	1.000	1.000

Source: SCRS 2009, Table 1.

Table 3. Probability of eastern Atlantic bluefin tuna spawning biomass (SSB) in 2009 being less than 10%, 15% or 20% of the historical baseline population. In A), the baseline is the maximum historical population size ("max SSB") in the time series 1970-2007, and in B) the baseline is the unexploited population size (SSB_0), estimated using the low recruitment model (observed recruitment 1970-1980), medium recruitment model (1970-2002) and high recruitment model (1990-2002).

A) Eastern Atlantic Bluefin Tuna

Historical Decline (probability)		
<0.10 max SSB	**<0.15 max SSB**	**<0.20 max SSB**
0.09	0.23	0.35

B) Eastern Atlantic Bluefin Tuna

	Historical Decline (probability)		
Recruitment Model	**<0.10 SSB_0**	**<0.15 SSB_0**	**<0.20 SSB_0**
Low	0.66	0.88	0.96
Medium	0.99	1.00	1.00
High	1.00	1.00	1.00

Source: SCRS 2009, Table 2.

ii. FAO

The 2009 FAO Expert Advisory Panel's evaluation of the proposal concluded that available evidence supported the proposal to include Atlantic bluefin tuna in Appendix I and that overall the rebuilding of the stock would be likely to benefit from an Appendix I listing (FAO 2010a). The bases for this conclusion were the estimates from ICCAT data that both eastern and western populations of Atlantic bluefin tuna are below the threshold of 15% of baseline and therefore meet the relevant decline criterion for inclusion in Appendix I (see Tables 2 and 3).

This estimate reflects the fact that the majority of the members of the Panel preferred to use estimates of pre-exploitation spawning biomasses (SSB_0) for the baseline from which to calculate decline, rather than using the maximum spawning biomasses (max SSB) in the period from 1970-2007 (FAO 2010a). The majority preferred SSB_0 estimates because these take into account population decreases due to fishing prior to 1970,[7] including catches off Brazil in the early history of the fishery, which should be taken into account in the assessment (FAO 2010a).

The panel also identified risk factors to the stock, including (1) the combination of high fishing mortality, low stock biomass and overcapacity of the fleet for both the eastern and western stocks; and (2) substantial illegal catches of Atlantic bluefin tuna (FAO 2010a).

iii. U.S. Negotiating Position

The U.S. supported Monaco's proposal to list in Appendix I Atlantic bluefin tuna, as a species that has experienced a marked decline in population size in the wild. The U.S. cited the following statistics to support its position[8]:

- Precipitous decline of the eastern Atlantic bluefin tuna stock during the last 10 years – the decline over the 50-year period from 1955 (305,136 metric tons) to 2007 (78,724 metric tons) is estimated at 74.2 percent, the bulk of which (60.9 percent) took place during the last 10 years;
- Threats to the eastern Atlantic bluefin tuna stock – including overharvesting and illegal, unregulated and unreported fishing by European and Mediterranean fishing fleets;
- Marked decline of the western Atlantic bluefin tuna stock from 1970 to 2007 – the decline in 37 years is 82.4 percent (from 49,482 metric tons to 8,693 metric tons).

In addition to citing these figures, the U.S. has "serious concerns" about implementation of ICCAT commitments to strengthen compliance and bring catches in line with scientific advice.

In sum, these various classification systems support the conclusion that Atlantic bluefin tuna is threatened or endangered.

IV. EASTERN AND WESTERN NORTH ATLANTIC BLUEFIN TUNA EACH COMPRISE A DISTINCT POPULATION SEGMENT

A. INTRODUCTION

Under the ESA, 16 U.S.C. § 1533(a)(1), NMFS is required to list a species for protection if it is in danger of extinction or threatened by possible extinction in all or a significant portion of its range. The ESA defines the term "species" broadly to include "any subspecies of fish or wildlife or plants and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature." 16 U.S.C. § 1532 (16).

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[7] CITES Resolution Conf. 9.24 (Rev. COP14) states that data used to estimate or infer a baseline for extent of decline of a commercially-exploited aquatic species should extend as far back into the past as possible.

[8] Announcement of tentative U.S. negotiating positions for agenda items and species proposals submitted by foreign governments and the CITES Secretariat, *available at* http://www.fws.gov/international/pdf/CoP15notice4-CLEAN%20WEB%20tentative%20U.S.%20positions_final.pdf (last visited May 18, 2010).

ESA listing is warranted for the entire North Atlantic bluefin tuna (*Thunnus thynnus*) species. Additionally, the western and eastern populations of Atlantic bluefin tuna are distinct population segments ("DPS"), each of which also qualifies for separate protection. In the alternative, NMFS should conduct its own DPS analysis of Atlantic bluefin tuna populations.

NMFS and FWS are guided by a joint policy to define a "distinct population segment" for the purposes of listing, delisting, and reclassifying species under the ESA. Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act ("DPS Policy"). 61 Fed. Reg. 4722, 4725 (Feb. 7, 1996). Under this policy, once a population segment is found to be both "discrete" and "significant," then it should be considered for listing under the Act. *Id.* First a population is classified as discrete "in relation to the remainder of the species to which it belongs." *Id*. at 4725. Second, NMFS must find that the population is significant "to the species to which it belongs." *Id*. Finally, after NMFS determines the population is both discrete and significant, NMFS must evaluate whether the petition presents substantial scientific or commercial information in the petition with respect to the DPS population that may warrant potentially listing of the DPS as endangered or threatened based on the conservation status of the species "in relation to the Act's standards for listing." *Id*.; 50 C.F.R. § 424.14(b)(1)&(2).

B. EASTERN AND WESTERN POPULATIONS OF ATLANTIC BLUEFIN TUNA ARE DISCRETE

Under the DPS Policy, a distinct population segment of a vertebrate species is discrete if it satisfies either of the following conditions:

1. It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation; or

2. It is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act.

61 Fed. Reg. at 4725. The discreteness analysis is a means of examining the extent to which the population in question is distinct from other representatives of its species. *Id*. at 4724. This element reflects the Services' joint understanding of the ESA's interrelated goals of "conserving genetic resources and maintaining biodiversity over a representative portion of their historic occurrence." *Id*. at 4723. The discreteness standard does not require complete reproductive isolation or genetic proof of the population's distinctness. *Id*. Nor does the standard require absolute separation of a DPS from other members of its species, "because this can rarely be demonstrated in nature for any population of organisms." *Id*. at 4724.

To recognize a population as discrete under the DPS Policy, the Services require one of two tests to be met. *Id*. at 4725. The first test of discreteness requires marked separation from other populations of the same taxon due to physical, physiological, ecological or behavioral factors. *Id*. Specifically, this provision seeks to identify and protect separated populations in order to preserve the genetic diversity that such separation might represent. *Id*. at 4724.

The second test of discreteness is a legal rather than a biological or physical inquiry; it uses an international governmental boundary to define a DPS. *Id*. at 4725. The DPS Policy requires that a DPS delimited by an international boundary be exposed to significant differences in exploitation, management of habitat, or regulatory mechanisms across the border that are relevant to the inadequacy of existing regulatory mechanisms as a basis for considering the DPS as a species for purposes of the listing determination. *Id*. (citing 16 U.S.C. § 1533(a)(1)(D)). The driving force for using an international boundary as a way of delimiting a DPS arises from the congressional concern to protect U.S. populations via the Endangered Species Act.[9] 61 Fed. Reg. at 4723.

The eastern and western populations of Atlantic bluefin tuna meet at least one, if not both, of the criteria for discreteness. ICCAT and its SCRS manage the eastern and western Atlantic bluefin tuna as separate stocks using the boundary of the 45^{o}W meridian. The stocks have been separated based on spawning grounds, genetic differences, and unique ages for reaching sexual maturity.

a. Eastern and Western Atlantic bluefin tuna populations are markedly separate

The western Atlantic bluefin tuna biologically differs from the eastern Atlantic bluefin tuna. The two stocks have different spawning grounds, one in the Gulf of Mexico and one in the Mediterranean Sea (Carlsson *et al.* 2007). Bluefin spawning in the Mediterranean mature at 4-5 years of age, whereas those spawning in the Gulf of Mexico mature at 8 years or older, and at a considerably larger size (Hurry *et al*. 2008). Although bluefin tuna are a highly migratory species, they have a homing behavior and spawning site fidelity (Frometin *et al*. 2005).

The eastern and western Atlantic bluefin tuna stocks are genetically distinct populations with spawning grounds in the Gulf of Mexico and in the Mediterranean Sea (Carlsson *et al.* 2007). The genetic divergence among spawning populations, combined with the extensive trans-Atlantic movements reported for juvenile and adult Atlantic bluefin tuna, indicates a high degree of spawning site fidelity (Carlsson *et al.* 2007).

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[9] In marine fish, there is precedent for this use of an international governmental boundary as a measure of discreteness. NMFS relied almost exclusively upon the international boundary as the discreteness factor when listing the smalltooth sawfish as endangered under the ESA. Endangered and Threatened Species; Final Endangered Status for a Distinct Population Segment of Smalltooth Sawfish (*Pristis pectinata*) in the United States, 68 Fed. Reg. 15674, 15675 (Apr. 1, 2003); *see also* Katherine Hausrath, *The Designation of "Distinct Population Segments" Under the Endangered Species Act in Light of National Association of Homebuilders v. Norton*, 80 Chi.-Kent L.Rev. 449, 461 (2005) (hereinafter "Hausrath") (listing other instances in which the government considered an international boundary to find a discrete population for the purposes of a DPS).

b. Eastern and Western Atlantic bluefin tuna populations are delimited by international governmental boundaries.

The management, status, conservation, and exploitation of eastern and western Atlantic bluefin tuna are separated by international boundaries. ICCAT and its SCRS have long used a stock definition in which the management boundary of the 45°W meridian separates the western Atlantic bluefin from the eastern Atlantic bluefin tuna. These stock definitions are driven in part because of international boundaries because the western Atlantic bluefin tuna spawns solely in the U.S. waters of the Gulf of Mexico while the eastern Atlantic bluefin tuna spawns in the Mediterranean Sea.

ICCAT prescribes varying exploitation and management schemes based on international boundaries for the eastern and western Atlantic bluefin tuna. ICCAT's quota for the western Atlantic bluefin tuna is shared between the United States, Japan, Canada, the United Kingdom territory of Bermuda, the French territories of St. Pierre and Miquelon, and Mexico. Meanwhile, the eastern Atlantic bluefin tuna total allowable catch is shared by other European and Asian nations, as well as Japan. The U.S. manages a fishery for the western Atlantic bluefin tuna through its Consolidated Atlantic Highly Migratory Species Fishery Management Plan, which implements the U.S.'s proportion of ICCAT's total allowable catch of western Atlantic bluefin tuna. The core of the tuna's spawning ground in the Gulf of Mexico is also managed by the U.S. as essential fish habitat under the Magnuson-Stevens Act. Therefore, the western and eastern populations of Atlantic bluefin tuna are separated by international boundaries with differing exploitation levels, management practices, and conservation practices.

C. THE DISCRETE POPULATIONS ARE SIGNIFICANT

Once a population is established as discrete under one or both of the above criteria, NMFS must then assess the biological and ecological significance of that population. 61 Fed. Reg. at 4725. This consideration may include, but is not limited to, one or more of the following factors:

> 1. Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon;
>
> 2. Evidence that loss of the discrete population would result in a significant gap in the range of the taxon;
>
> 3. Evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historical range; or
>
> 4. Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

Id. The eastern and western Atlantic bluefin tuna populations satisfy the first, second and fourth significance factors. The second factor focuses on a "significant gap in the range of the taxon" and is the factor most often relied upon by the government to find significance. *See* Hausrath, 80 Chi.-Kent L.Rev. at 460 ("significant gap" finding used in twelve of the seventeen final ESA rules analyzed). This second factor fully supports listing the western and eastern Atlantic bluefin tuna populations as DPSs. The loss of either Atlantic bluefin tuna population would result in a significant gap in the range of the Atlantic bluefin tuna. The western Atlantic bluefin tuna population also satisfies the fourth factor for significance. As discussed more fully below, this population exhibits certain behavioral and physiological differences that suggest there are underlying genetic differences.

a. The eastern and western Atlantic bluefin tuna exist in unique ecological settings.

Although Atlantic bluefin tuna are highly migratory species, their spawning site fidelity and core habitat use indicate that both the eastern and western Atlantic populations are significant. The western bluefin tuna spawns in the Gulf of Mexico, a unique ecological setting; while the eastern population spawns in the Mediterranean, a setting distinctly unique from the Gulf of Mexico.

b. The eastern and western Atlantic bluefin tuna are significant because each displays differing physical and behavioral characteristics and genetic differences.

As stated above, the western Atlantic bluefin tuna biologically differs from the eastern Atlantic bluefin tuna. The two stocks have different spawning grounds, one in the Gulf of Mexico and one in the Mediterranean Sea (Carlsson *et al.* 2007). Bluefin spawning in the Mediterranean mature at 4-5 years of age, whereas those spawning in the Gulf of Mexico mature at 8 years or older, and at a considerably larger size (Hurry *et al*. 2008).

The eastern and western Atlantic bluefin tuna stocks are genetically distinct populations with spawning grounds in the Gulf of Mexico and in the Mediterranean Sea (Carlsson *et al.* 2007). The genetic divergence among spawning populations, combined with the extensive trans-Atlantic movements reported for juvenile and adult Atlantic bluefin tuna, indicates a high degree of spawning site fidelity (Carlsson *et al.* 2007).

c. The eastern and western Atlantic bluefin tuna are significant because loss of either population would create a significant gap in the range of the taxon.

As discussed below, the spatial distribution of the Atlantic bluefin tuna has changed dramatically since the 1900s. Fisheries have collapsed because where Atlantic bluefin tuna were once common, they are now rare. The loss of either the eastern or western Atlantic bluefin tuna would create a significant gap in the range of the taxon. During spawning season the stocks sort each to their respective spawning grounds. The genetic separation between the stocks means that wiping out either population would be a significant loss of genetic diversity as well.

V. THE ATLANTIC BLUEFIN TUNA IS ENDANGERED UNDER THE ESA

A. CRITERIA FOR LISTING SPECIES AS ENDANGERED OR THREATENED UNDER THE ENDANGERED SPECIES ACT

Under the ESA, 16 U.S.C. § 1533(a)(1), NMFS is required to list a species for protection if it is in danger of extinction or threatened by possible extinction in all or a significant portion of its range. In making such a determination, NMFS must analyze the species' status in light of five statutory listing factors, relying "solely on the best scientific and commercial data available," 16 U.S.C. § 1533(b)(1)(A):

> (A) the present or threatened destruction, modification, or curtailment of its habitat or range;
> (B) overutilization for commercial, recreational, scientific, or educational purposes;
> (C) disease or predation;
> (D) the inadequacy of existing regulatory mechanisms;
> (E) other natural or manmade factors affecting its continued existence.

16 U.S.C. § 1533(a)(1)(A)-(E); 50 C.F.R. § 424.11(c)(1) - (5).

A species is "endangered" if it is "in danger of extinction throughout all or a significant portion of its range" due to one or more of the five listing factors. 16 U.S.C. § 1531(6). A species is "threatened" if it is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." 16 U.S.C. § 1531(20).

Under the ESA, a "species" includes any species, subspecies, or a "distinct population segment" of a vertebrate species. 16 U.S.C. § 1532(16). As explained in the species description above, the petitioned taxon is recognized as a distinct species or subspecies, and therefore qualifies as a "species" under the ESA.

While the ESA does not define the "foreseeable future," NMFS must use a definition that is reasonable, that ensures protection of the petitioned species, and that gives the benefit of the doubt regarding any scientific uncertainty to the species. Perhaps most importantly, the time period NMFS uses in its listing decision must be long enough so that actions can be taken to ameliorate the threats to the petitioned species and prevent extinction. *See Defenders of Wildlife v. Norton*, 258 F.3d 1136, 1142 (9th Cir. 2001) (quoting legislative history noting that the purpose of the ESA is "not only to protect the last remaining members of [a listed] species but to take steps to insure that species which are likely to be threatened with extinction never reach the state of being presently endangered"). Slowing and reversing impacts from decades of overfishing and anthropogenic greenhouse gas emissions, will be a long-term process and NMFS must include these considerations in its listing decision.[10]

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[10] In considering climate change and ocean acidification's impacts on Atlantic bluefin tuna, it is important to note that it is typical to use a 100-year timeframe in the best available climate science (IPCC 2007). Moreover, NMFS has routinely considered long-term timeframes in its recovery plans.

The survival of Atlantic bluefin tuna is threatened by one or more of the Endangered Species Act listing factors.

B. OVERUTILIZATION FOR COMMERCIAL, RECREATIONAL, SCIENTIFIC OR EDUCATIONAL PURPOSES

Commercial harvest, including both legal overfishing (i.e., unsustainable catch limits set well above levels recommended by scientists) and illegal, unregulated, and unreported fishing, of Atlantic bluefin tuna is the primary threat driving the species to extinction. Atlantic bluefin tuna have been overfished for decades and their populations have been decimated. The best available science shows that fishing pressure has caused western Atlantic bluefin tuna populations to decline by at least 82 percent since 1970, and that the eastern population has declined by 74.2% from 1957 to 2007, the bulk of which (at least 60 percent) was since 2000. Both populations are below 15% of estimates of what their numbers would be without fishing. Efforts to curb overfishing and manage the tuna fishery have been completely ineffective at reducing fishing pressures. The decline of the species has even accelerated in recent years in the eastern Atlantic. At this rate, Atlantic bluefin tuna have a high probability of extinction in the foreseeable future.

In 2009 fishing continued in excess of scientific recommendations for eastern Atlantic bluefin tuna, since the 2008 ICCAT meeting failed to adopt the measures advised by scientists to recover the stock. In July 2008 the ICCAT SCRS warned that continuing fishing at current levels is expected to drive spawning stock biomass to 18% of that in 1970 (an already exploited population). The SCRS advised that the maximum total allowable catch should be between 8,500 and 15,000 t, and that fishing should be banned during the spawning season (May, June, and July).

In addition to the SCRS advice, in October 2008 the IUCN World Conservation Congress adopted by a majority a recommendation on Atlantic bluefin tuna[11] (IUCN World Conservation Congress 2008). In the recommendation IUCN World Conservation Congress 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 t. It also asked ICCAT to establish immediately a suspension of the fishery until it can be brought under control, and to establish protected areas on the main spawning grounds (IUCN World Conservation Congress 2008).

Despite these recommendations, ICCAT failed in November 2008 to adopt science-based management measures necessary to forestall the stock’s imminent collapse. The adopted measure established total allowable catches for the eastern stock that decline annually (22,000 t, 19,500 t, and 18,500 t for the years 2009, 2010, and 2011, respectively). ICCAT’s estimate of eastern Atlantic bluefin tuna spawning stock biomass in 2007 was 78,724 t. This contrasts with the biomass peak estimated for 1958 at 305,136 t and with 201,479 t estimated for 1997. In 2008 the SCRS “adjusted” catch, which includes estimated illegal and unreported catches, was 61,000 t. MacKenzie *et al*. (2009) estimates that even if a near-complete ban on all fishing on the eastern Atlantic bluefin tuna were implemented from 2008 to 2022, the population would fall to record lows in the next few years.

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[11] Those voting in favor included Spain, a key fishing nation, and Japan, the most important market country.

The catch of western Atlantic bluefin tuna peaked at 20,000 t in 1964 and declined to only 1,624 t in 2007 (CITES CoP15 Prop. 19 2010). The United States has been unable to catch its quota from 2004 to 2008 because of the scarcity of fish available. Even though fishing mortality on spawners declined since 2002, the stock does not show any signs of population recovery (CITES CoP15 Prop. 19 2010). There is still substantial mortality on spawners as a result of a directed fishery along the coast of Canada. In addition, there is mortality of the western stock within the Gulf of Mexico spawning grounds due to bycatch in other fisheries.

According to NMFS' evaluation under the Magnuson-Stevens Fishery Conservation and Management Act, Atlantic bluefin tuna are overfished and overfishing is occurring.[12] In U.S. fisheries, Atlantic bluefin tuna are caught with purse seines, trap nets, handgear (handline, rod and reel, bandit, and harpoon), and longlines[13] (Diaz *et al.* 2009). The pelagic longline fleet is not allowed to target bluefin tuna, and landings are incidental. This is the case particularly in the Gulf of Mexico, where NMFS prohibits targeting Atlantic bluefin tuna for all commercial gear types and landings from incidental catches are subject to strict regulations[14] (Diaz *et al.* 2009). Of U.S. permitted recreational vessels, the portion that landed bluefin tuna in 2007 was a negligible 0.3% (Diaz *et al.* 2009). This means the great majority of recreational vessels were either fishing in areas where bluefin were not available or were not targeting bluefin tuna. In the case of the commercial fleet (i.e. harpoon, traps, purse seines or hand gears - handline, rod and reel, bandit, and harpoon), only 5% of vessels with commercial permits reported landings of bluefin tuna (Diaz *et al.* 2009). The majority of this fleet is not targeting bluefin tuna either. As mentioned above, after reaching 2,014 t in 2002 (the highest level since 1979), the catches (landings and discards) of U.S. vessels fishing in the northwest Atlantic (including the Gulf of Mexico) declined precipitously during 2003-2007 (see Figure 2). The United States did not catch its quota from 2004 through 2008 with catches of 1,066, 848, 615, 858 and 937 t, respectively (ICCAT 2010).

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[12] *See* FishWatch website, National Marine Fisheries Service, *at* http://www.nmfs.noaa.gov/fishwatch/species/atl_bluefin_tuna.htm (last visited May 18, 2010).

[13] Commercial pelagic longline fishing is an industrial fishing method whereby each vessel, typically seeking tuna or swordfish, reels out up to 60 miles of monofilament line bearing up to several thousand baited hooks on shorter branch lines. The line (or "set") is suspended in the water by floats. Tuna longlines are fished up to 1,200 feet beneath the surface, soaking for hours before being hauled in. In addition to the target fish, they routinely hook a large number and variety of non-target fish, marine mammals, turtles, birds, and sharks (collectively known as "bycatch"). Purse seines are large floated and weighted nets that encircle the target species. The net is set around the fish and then the bottom is secured shut ("pursed") by means of a purse line threaded through rings attached to the bottom of the net. Depending on the size of vessels, nets are generally 1/4 mile to one mile in circumference, and from 300 to 700 feet in depth. Bandit gear is a vertical hook and line gear with rods attached to the vessel when in used. Lines are retrieved by manual, electric, or hydraulic reels.

[14] In the case of longline vessels, one large medium or giant bluefin tuna per vessel per trip may be landed, provided that at least 2,000 lb (907 kg) of species other than bluefin tuna are legally caught, retained, and offloaded from the same trip and are recorded on the dealer weighout slip as sold. Two large medium or giant bluefin tuna per vessel per trip may be landed, provided that at least 6,000 lb (2,727 kg) of species other than bluefin tuna are legally caught, retained, and offloaded from the same trip and are recorded on the dealer weighout slip as sold. Three large medium or giant bluefin tuna per vessel per trip may be landed, provided that at least 30,000 lb (13,620 kg) of species other than bluefin tuna are legally caught, retained, and offloaded from the same trip and are recorded on the dealer weighout slip as sold. Bluefin tuna landings in the Gulf of Mexico from commercial gears other than pelagic longline are prohibited (Diaz *et al.* 2009).

Despite the overfished stock status of the western Atlantic bluefin tuna, there is still incredible political pressure in the U.S. to increase harvests in order to utilize the U.S. ICCAT quota, as mentioned above in section III.C. NMFS' proposed rule provides a microcosm example of why the Atlantic bluefin tuna population as a whole is suffering – competition among countries within the ICCAT management system creates an incentive to increase harvests even while Atlantic bluefin tuna populations rapidly decline.

Another incentive to increase harvests is the extraordinarily high prices that Atlantic bluefin tuna demand. United Nations sources estimate that an adult fish is worth $50,000 or more.[15] In January 2010, a giant bluefin tuna weighing 233kg (513 lb) fetched 16.3 million yen ($177,000) in an auction at the world's largest wholesale fish market in Japan. This was the highest price paid for a tuna since 2001 when a 440-pound (200 kilogram) tuna sold for a record 20.2 million yen ($220,000).[16] These high prices create an overwhelming incentive to keep fishing for Atlantic bluefin tuna.[17] In some fisheries, as the species is fished down, it becomes uneconomical to continue to increase effort for the same catch. With tuna's high prices, the market will not provide a check against an unsustainable harvest.[18]

The range of Atlantic bluefin tuna has changed significantly in the past fifty years due to extraordinary fishing pressure resulting in fisheries collapse (see Figures 3 and 4). These major changes are consistent with the observation that large predatory fish biomass is only about 10% of pre-industrial levels (Myers and Worm 2003). The question remains whether ecosystem-wide effects of declines are reversible because of the global scale of the declines (Myers and Worm 2003). Atlantic bluefin tuna may be an especially good example of a species where declines in certain areas are irreversible (see Figures 3 and 4 for depictions of where fisheries used to exist but are no longer active). Tuna are still extremely rare in northern European waters where 60 years ago, the resource supported important commercial and sportfisheries (MacKenzie and Myers 2007). Although fishing effort has intensified in recent decades in some areas, Fromentin (2009) suggests that continued increases in fishing effort are not sustainable. Because Atlantic bluefin tuna have been heavily exploited over its whole spatial distribution for a decade, there are no more refugia and all potential sub-populations are currently exploited (Fromentin 2009). This is likely to strongly reduce bluefin tuna resilience to overfishing (Fromentin 2009).

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[15] Announcement of tentative U.S. negotiating positions for agenda items and species proposals submitted by foreign governments and the CITES Secretariat, *available at* http://www.fws.gov/international/pdf/CoP15notice4-CLEAN%20WEB%20tentative%20U.S.%20positions_final.pdf (last visited May 18, 2010).

[16] Associated Press. Giant tuna fetches $177,000 at Tokyo Auction, January 5, 2010, *available at* http://www.guardian.co.uk/environment/2010/jan/05/giant-tuna-toky-auction (last visited May 18, 2010).

[17] The high prices tuna fetch overseas is an incentive for domestic harvest as well. Over half the U.S. catch is exported to foreign markets, primarily Japan. *See* FishWatch website, National Marine Fisheries Service, *at* http://www.nmfs.noaa.gov/fishwatch/species/atl_bluefin_tuna.htm (last visited May 18, 2010).

[18] Existing regulatory mechanisms are inadequate (see section VI.D. for more discussion), but even if lower catch quotas were in place, as a result of the great demand for tuna, the Atlantic bluefin tuna would still be endangered because of the illegal, unregulated fleets that ignore quotas, restrictions, boundaries, and other rules and regulations. Ellis, Richard. March 2008. The bluefin tuna in peril. Scientific American, *available at* http://www.scientificamerican.com/article.cfm?id=bluefin-tuna-in-peril (last visited May 20, 2010).

Figures 3 and **4** illustrate some of the differences in the fisheries over time: (1) catches now come from considerably smaller number of squares than in the 1960s, including the disappearance of fisheries off Brazil and off Norway; (2) catches in the West are now much smaller than in the 1960s; (3) fisheries have expanded in the middle of the Atlantic north to Iceland; and (4) purse seine catches have been eliminated in the West but have increased considerably in the Mediterranean, particularly in the eastern Mediterranean where there were few catches in the 1960s.

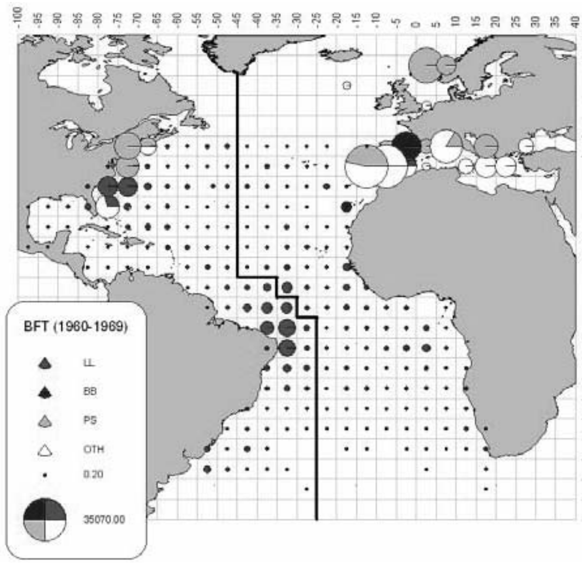

Figure 3.

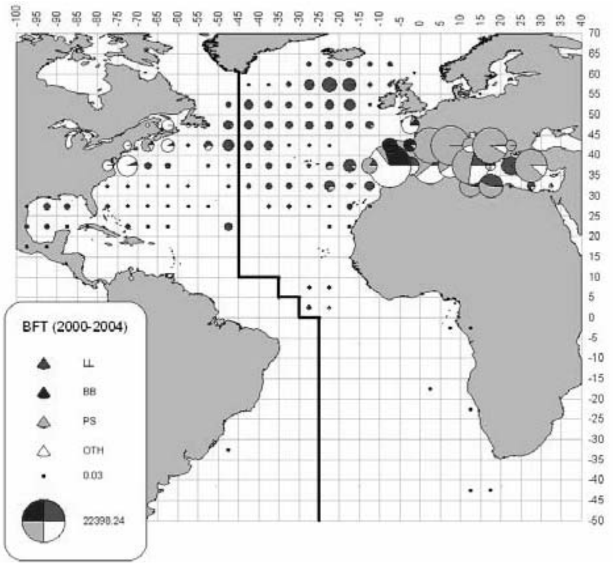

Figure 4.

Source: Hurry *et al.* 2008, Figure BFT 1 and Figure BFT 2.

As an example of an early fishery collapse, Natural England, the United Kingdom's independent advisor on the natural environment, identified Atlantic bluefin tuna as a species in immediate danger of extinction[19] (Natural England 2010). Natural England cited the tuna sport fishery starting in the 1920s and 1930s as the start of the decline. By the 1960s, "catches had collapsed and the amount of bluefin tuna in the waters around England is now considered too low to support commercial or recreational fishing" (Natural England 2010). The fishing that occurred prior to 1970 is rarely considered by fisheries scientists or managers studying Atlantic bluefin tuna because reliable catch data may not exist. Anecdotal evidence such as that recognized by Natural England, however, indicates drastic declines and even potential population-level effects of pre-1970 fisheries. Similar changes (i.e. disappearances) in the spatial distribution of large, adult bluefin tuna since the 1950s-1970s have been documented in the Bay of Biscay, the North Sea and Norwegian Sea, and the Black Sea (MacKenzie *et al.* 2009).[20]

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[19] Daniel Sanderson. "Tunny face final sunset." Scarborough Evening News, March 22, 2010, *available at* http://www.scarborougheveningnews.co.uk/news/Tunny-face-final-sunset-.6168040.jp (last visited May 17, 2010).

[20] As another example of the severe and irreversible effects of fishing on the Atlantic bluefin tuna, one early Atlantic bluefin tuna fishery collapse occurred in the Norwegian Sea and North Sea in 1963. Fishing affected the population dynamics during the 1950s, and the combination of that stress with environmental changes led to the eradication of the fishery. The Atlantic bluefin tuna fishery in this region has not returned or recovered since the collapse.

Atlantic Bluefin Tuna Ranching

Increasingly Atlantic bluefin tuna are captured for net pen aquaculture. After capture by purse seine vessels, juvenile tunas are transferred to a tow pen and then to open water net-pens. At the aquaculture facility, the tuna are raised captive in large mesh nets. The tuna are fed many times their own weight in fish while being grown out. About nine months after capture, tuna are harvested and slaughtered. This type of aquaculture does not relieve any pressure on populations because it requires the capture of wild fish, and if anything it increases the fishing pressures on bluefin tuna.

In 1997, only 200 t of eastern Atlantic bluefin tuna were put into cages; since 2003, 20,000 to 25,000 t have been farmed each year (SCRS 2008). The dramatic increase in farming operations, and the resulting tremendous recent expansion of the purse seine fleet in the Mediterranean has had a number of worrisome effects. Because catch data is collected only at time of sale/harvest, the fact that a majority of fish caught in the Mediterranean are transferred into pens means that there is a severe lack of accurate fishery dependent data collected (see below section on inadequacy of existing regulatory mechanisms for more detail). The increase in demand has also expanded the fishery's capacity at a time when overcapacity is a major concern.[21] This increase in capacity, which far exceeds total allowable catch[22] (see Figure 4 below), also indicates the magnitude of unreported catch for farming purposes. The increase in fishing effort in the Mediterranean means that there is no refuge for Atlantic bluefin tuna in the Mediterranean during the spawning season (SCRS 2008). Lastly, without good catch data, the population level effects of farming are unclear. Tunisian farms are targeting spawning fish, with more than 98% of the total sampled fish larger than the length at first maturity (SCRS 2008, citing SCRS/2008/104).

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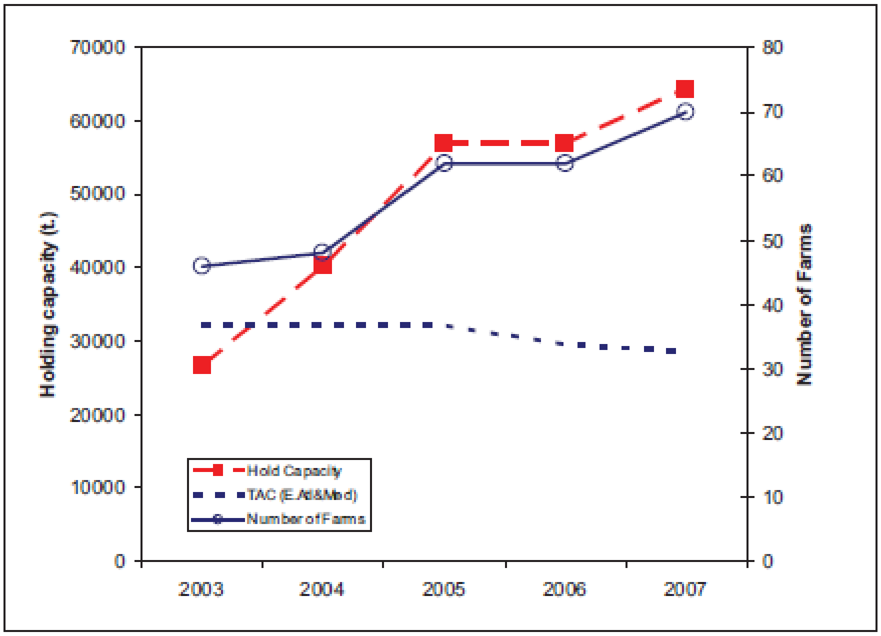
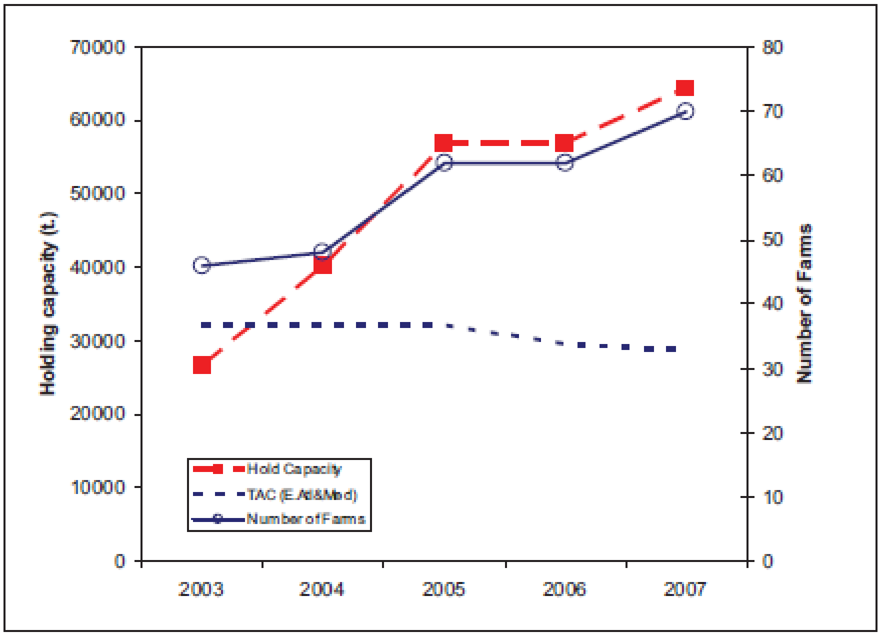
[21] Excerpt from SCRS 2008 on overcapacity:

> As regards farming capacity for bluefin tuna in the Mediterranean, according to the ICCAT record of farming facilities (July 2008), it has grown to about 64,000 t, which would represent approximately 51,000-57,000 t round weight of (large) fish at time of capture (Figure 43). This estimated farming capacity is as much as twice the 2008 TAC agreed by the Commission [Rec. 06-05] and represents a capacity excess of more than 32,000 t above the predicted short-term catch level consistent with the effort level implied by the Convention objective.

[22] According to ICCAT records of farming facilities (July 2008), farming capacity has grown to about 64,000 t, which would represent approximately 51,000-57,000 t round weight of (large) fish at time of capture (Figure 43). This estimated farming capacity is as much as twice the 2008 total allowable catch agreed to by the Commission [Rec. 06-05] and represents a capacity excess of more than 32,000 t above the predicted short-term catch level consistent with sustainable fishing effort levels. The estimates of fleet size indicate there is sufficient active fishing capacity to fully supply the farms to their indicated limits (SCRS 2008).

Figure 4. Estimated Mediterranean bluefin farm capacity and number of farms as reported by ICCAT members to the Secretariat. Agreed total allowable catches ("TACs") for the time period are also indicated.





C. PRESENT OR THREATENED DESTRUCTION, MODIFICATION OR CURTAILMENT OF ITS HABITAT OR RANGE

Worldwide, habitat loss and degradation is the primary cause of species extinction (Primack 2001). Atlantic bluefin tuna is also at risk from threats to its habitat including pollution and ocean climate change.

a. Oil and Gas Activities in the Gulf of Mexico

Western Atlantic bluefin tuna's only known spawning grounds are in the Gulf of Mexico. This area is also a hotbed of oil and gas extraction activities. Without protection under the ESA, Atlantic bluefin tuna will continue to be drastically affected by these activities. In an attempt to protect this area, in 1999 NMFS designated a large portion of the Gulf of Mexico as essential fish habitat[23] ("EFH") for highly migratory species ("HMS") (NMFS 2009). NMFS identified that oil and gas development on the outer continental shelf is one of the major activities with the potential to impact HMS's EFH; there are approximately 4,000 oil and gas platforms in the Gulf of Mexico (NMFS 2009). Many of the shallower sites and most of the deepwater sites fall within HMS EFH, particularly for bluefin tuna. Many of the deeper sites are also located within the habitat area of particular concern[24] ("HAPC") for bluefin tuna spawning (see Fig. 3; NMFS 2009).

Direct and indirect impacts to the environment from oil and gas activities include (excerpted from NMFS 2009):

- disturbance created by the activity of drilling,
- associated pollution from drilling activities,
- discharge of wastes associated with offshore exploration and development,
- operational wastes from drilling muds and cuttings,
- potential for oil spills, and potential for catastrophic spills caused by accidents or hurricanes, and
- alteration of food webs created by the submerged portions of the oil platform, which attract various invertebrate and fish communities.

Anecdotal information suggests that recreational fishermen may target various fish species, including HMS, in the vicinity of oil platforms due to increased abundance and availability near platforms. While the apparent increase in abundance of fish near oil platforms may appear to be beneficial, little is known about the long term environmental impacts of changes caused by these structures to fish communities, including potential changes to migratory patterns, spawning behavior, and development of early life stages (NMFS 2009).

One of the disturbances created by the act of exploration and drilling is ensonification of the water column. Effects on marine species include physiological or anatomical effects on auditory systems, potential behavioral alterations, and auditory masking. The highest energy levels produced by seismic airguns fall within the frequency range from 10 to 200 Hz (up to

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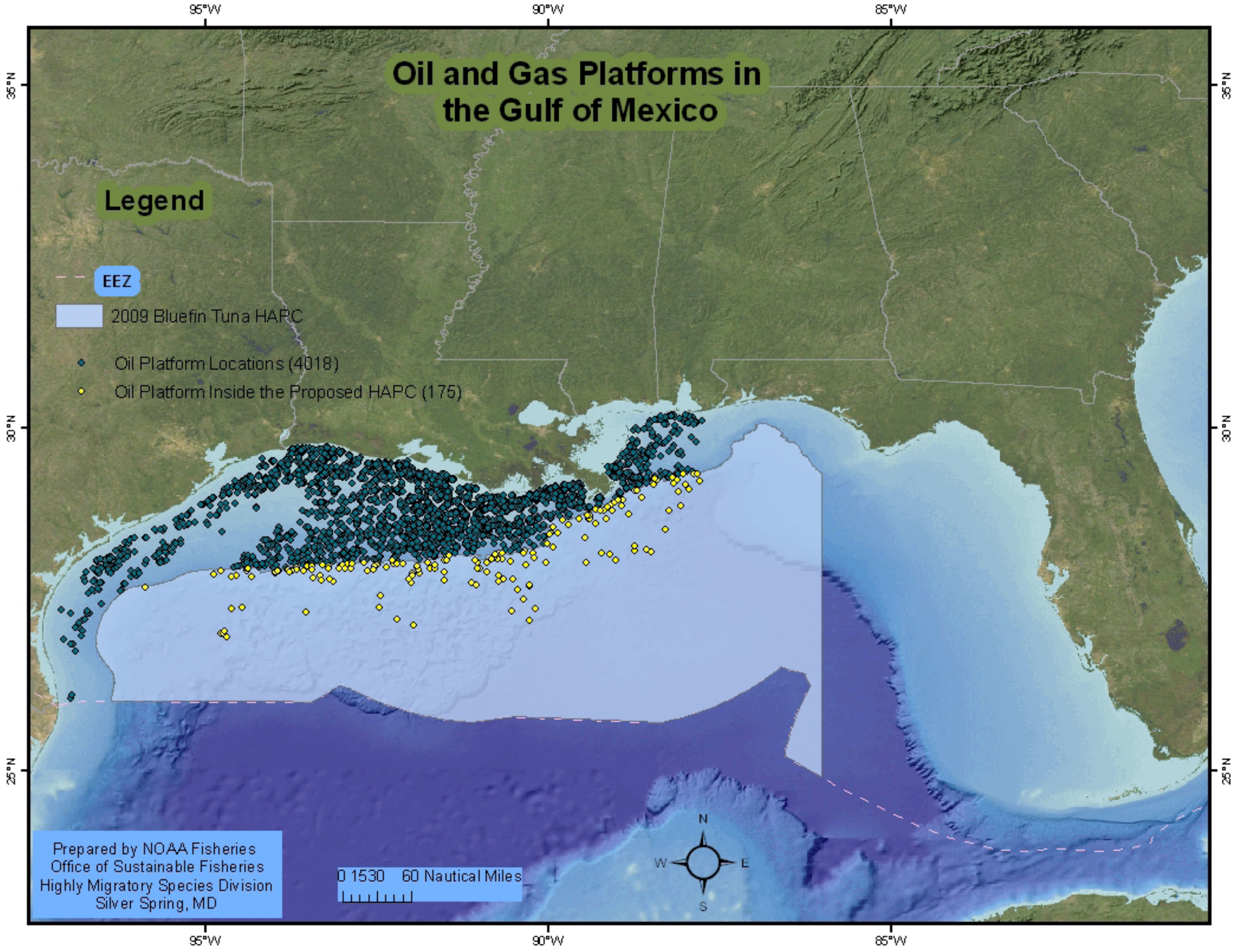
[23] The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requires NMFS to identify and describe Essential Fish Habitat (EFH) for all federally managed fisheries in order to minimize, to the extent practicable, adverse effects on such habitat caused by fishing, and to identify other actions to encourage the conservation and enhancement of EFH. EFH is defined in the Magnuson-Stevens Act as those habitats necessary for spawning, breeding, feeding, or growth to maturity.

[24] HAPCs are intended to focus conservation efforts and bring heightened awareness to the importance of the habitat. These areas are within EFH and identified based on one or more of the following considerations:
i) The importance of the ecological function provided by the habitat;
ii) The extent to which the habitat is sensitive to human-induced environmental degradation;
iii) Whether, and to what extent, development activities are, or will be, stressing the habitat type;
iv) The rarity of the habitat type. 50 C.F.R. § 600.815(a)(8).

1,000 Hz), which is within the audible range for Gulf of Mexico highly migratory fishes (MMS 2004). Although rigorous supporting data are not available, several studies indicate that seismic shooting can temporarily alter the behaviors and movements of several fish species when received sound pressures are sufficiently high (MMS 2004).

Figure 5. Oil and gas platforms in the Gulf of Mexico showing the overlap with Atlantic bluefin tuna HAPC. The HAPC for spawning bluefin tuna in the Gulf of Mexico is in light blue.



Source: NMFS 2009, Figure 4.1.

i. *Deepwater Horizon* Gulf of Mexico Spill

An example of a catastrophic spill affecting Atlantic bluefin tuna's HAPC and EFH began on April 20, 2010. The offshore oil rig *Deepwater Horizon* exploded and caught fire in the Gulf of Mexico leaving 11 workers dead and spilling millions of gallons of oil into the water. The oil rig, operated by BP, sank two days later about 50 miles off the Louisiana coast. Five thousand feet below the surface, the ruptured deepwater well continues to gush oil. Experts now estimate that nearly 30 million gallons of oil have spilled into the ocean – almost 3 times as many gallons as were released by the *Exxon Valdez* in 1989. The exact rate of the oil spill is unclear, but estimates of 70,000 barrels a day have been reported.[25] At the time of this Petition, satellite images show that the oil slick is spanning more than 10,000 square miles and has reached the shores of the Gulf Coast. Meanwhile, researchers have found enormous oil plumes in the deep waters of the Gulf of Mexico, as large as 10 miles long, 3 miles wide and 300 feet thick in spots.[26] There is mounting concern that sea currents will carry the spill south past the Florida Keys and up the Atlantic Coast. Despite extensive efforts to respond to the oil spill, the prospects of stopping the leak are still distant at the time of this Petition. Cleanup and containment efforts have proven inadequate to prevent disastrous impacts on ocean ecosystems and wildlife.

Long-term harmful effects of the oil spill and the clean-up efforts on the Gulf of Mexico marine ecosystem have yet to be seen. In Alaska, a recent scientific study has shown that harlequin ducks are still encountering oil from the *Exxon Valdez* oil tanker spill that occurred March 24, 1989 (Esler *et al.* 2010). There is a real potential for oil to persist in the marine ecosystem for decades and prevent full recovery of species after such a disaster. Deepwater oil plumes deplete dissolved oxygen, which can be dangerous for sea life. In addition to the added toxins from the oil itself in the water column, as of May 21, 2010, over 715,000 gallons of toxic chemical dispersants were applied.[27] The effects of dispersants on marine ecosystems are unclear, but the U.S. Environmental Protection Agency found the dispersant killed 25 percent of organisms 500 feet beneath its application. [28]

The immediate impacts on the western stock of Atlantic bluefin tuna are more easily predicted, and the spill occurred during spawning season. The only known spawning grounds for the western Atlantic bluefin population are located in the Gulf of Mexico (see Figure 6, which shows the occurrence of the tuna on the spawning grounds and its migration). Bluefin tuna gather to spawn in these waters after traveling over vast stretches of the Atlantic. These spawners are the most valuable members of the population because of their reproductive potential. Adults are at risk of taking in oil dispersed in the water column through their gills. Early life history stages such as eggs and larvae may be particularly vulnerable to human induced environmental degradation (NMFS 2009). Losing the young of the year will affect the population for decades, especially because tuna are late to sexually mature.[29] Even beyond the effects on the western stock this spawning season, the Gulf of Mexico ecosystem is likely to be compromised for several decades. Because the entire stock aggregates yearly in this area for spawning, the severe degradation of this habitat has the potential to devastate the population.

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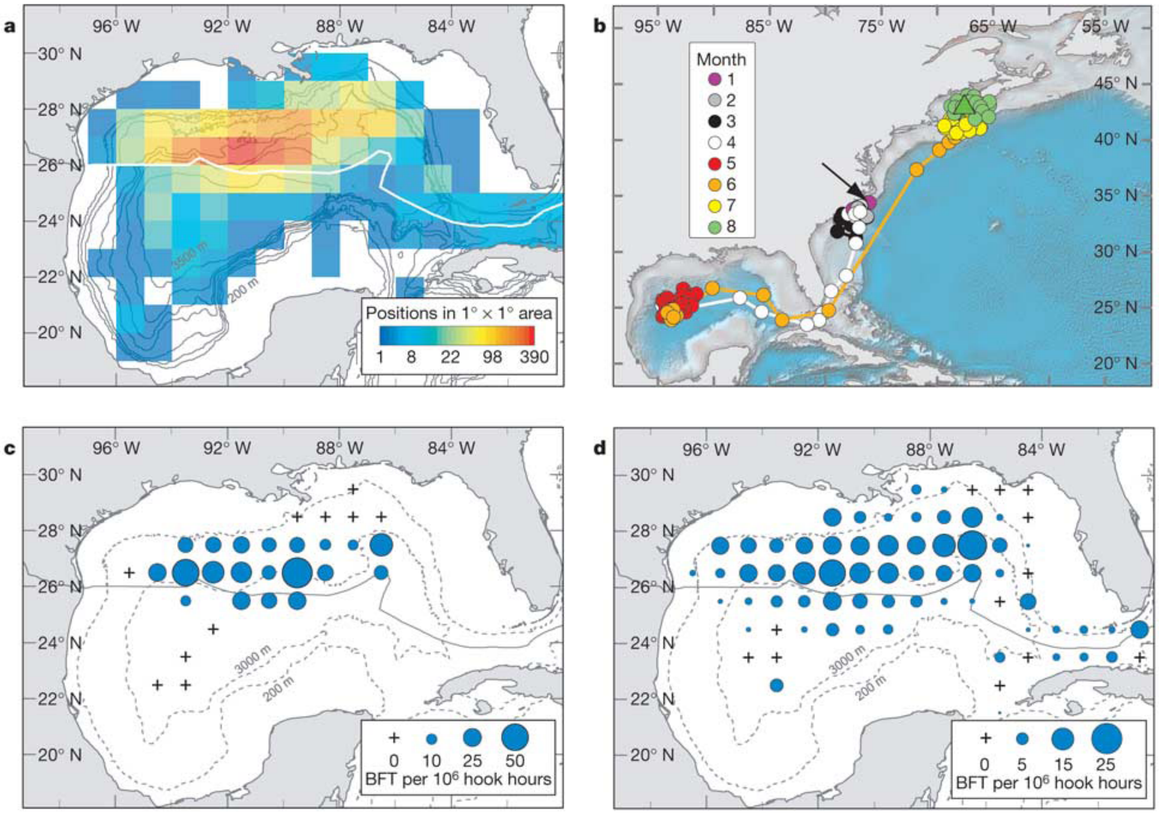
[25] Harris, Richard. "Gulf Spill May Far Exceed Official Estimates." National Public Radio, May 14, 2010, *available at* http://www.npr.org/templates/story/story.php?storyId=126809525 (last visited May 17, 2010).
[26] Gillis, Justin. "Giant Plumes of Oil Forming Under the Gulf." New York Times, May 15, 2010, *available at* http://www.nytimes.com/2010/05/16/us/16oil.html (last visited May 17, 2010).
[27] Deepwater Horizon Response website, http://www.deepwaterhorizonresponse.com/go/doc/2931/543103/ (last visited May 21, 2010).
[28] Ferran, Lee & Bradley Blackburn. "EPA May Not Force BP to Change Dispersants," ABC News, May 21, 2010, *available at* http://abcnews.go.com/WN/epa-bp-dispersants/story?id=10711367.
[29] JP, "Endangered Species: Spill timing raises threat to bluefin tuna." Greenwire, May 14, 2010, *available at* http://www.eenews.net/Greenwire/2010/05/14/8/ (last visited May 17, 2010).

Figure 6. Occurrence of Atlantic bluefin tuna on their western spawning ground in the Gulf of Mexico. a, Observed locations of Atlantic bluefin tuna in the GOM. b, Movements of an individual Atlantic bluefin tuna showing a migration between the foraging grounds in the North Atlantic and the breeding grounds in the GOM. Color denotes the month of each position. c, Distribution of Atlantic bluefin tuna catch per unit effort ("CPUE") in the GOM, based on the data from the US pelagic longline scientific observer program (1992–2004). d, Atlantic bluefin tuna CPUE, based on US pelagic longline logbook data (1992–2003). Only 1^o x 1^o areas with a total effort exceeding 50,000 and 500,000 hooks are shown in c and d, respectively. Areas exceeding this minimum effort without any bluefin tuna caught are denoted by black crosses. Solid white lines (a) and grey lines (c and d) indicate the US Exclusive Economic Zone.



Source: Block 2005, Figure 2.

b. Ocean climate change

Abiotic and biotic environmental changes significantly affect the distributions and perhaps the productivity of tunas (FAO 2001). As mentioned above, NMFS identified EFH for HMS, including Atlantic bluefin tuna. In addressing the potential threats to habitat for HMS, NMFS stated that because most HMS EFH is comprised of open ocean environments occurring over broad geographic ranges, "large-scale impacts such as global climate change that affect ocean temperatures, currents, and potentially food chain dynamics, are most likely to have an impact and pose the greatest threat to HMS EFH" (NMFS 2009, p. 295). These impacts are already underway and must be taken into account when evaluating the extinction risk for Atlantic bluefin tuna.

Climate change is already impacting the North Atlantic Ocean, resulting in warming temperatures, rising sea levels, increasing acidification, and altered circulation and nutrient supplies (Bindoff *et al.* 2007, Beaugrand 2009). These impacts are projected to intensify in this century. Already, carbon dioxide (“CO_2”) emissions from fossil-fuel burning and industrial processes have been accelerating at a global scale, with the emissions growth rate since 2000 exceeding even the most fossil-fuel intensive emissions scenarios developed by the Intergovernmental Panel on Climate Change emissions scenarios developed in the late 1990s (Raupauch *et al.* 2007). This drastic acceleration in CO_2 emissions is generating stronger-than-expected and sooner-than-expected climate forcing (Canadell *et al.* 2007).

The oceans have absorbed most of the heat that has been added to the climate system, and as a result, the oceans are warming. Global ocean temperatures have increased by 0.31ºC on average in the upper 300 m during the past 60 years (1948-1998) (Levitus *et al.* 2000), and locally, some ocean regions are experiencing even greater warming (Bindoff *et al.* 2007). Global ocean temperatures increased by 0.10°C in the upper 700 m between 1961-2003 (Bindoff *et al.* 2007) and by 0.037°C in the upper 3000 m (Levitus *et al.* 2005). Notably, the largest increases in global ocean temperature have occurred in the upper ocean where primary production is concentrated and are impacting ocean productivity (Behrenfeld *et al.* 2006). The IPCC has projected 1.1 to 6.4°C (2° to 11.5°F) of additional surface warming (relative to 1980-1999) by the end of this century, with higher warming under the more intensive greenhouse gas emissions scenarios (Solomon *et al.* 2007). Warming of the surface layer and increases in the amount of fresh water entering the North Atlantic from the melting Arctic sea ice and from the Greenland Ice Sheet are predicted to affect the amount of deep mixing of ocean waters in the North Atlantic with consequences for altering thermohaline circulation in the world’s ocean (McMullen and Jabbour 2009).

The ocean’s absorption of anthropogenic carbon dioxide from the atmosphere is changing the chemistry of the ocean, causing ocean waters to become more acidic, and resulting in profound impacts on marine life (Feely *et al.* 2010). The oceans have thus far absorbed approximately 30% of the excess carbon dioxide emitted since the beginning of the industrial revolution (Feely *et al.* 2004); about half of the carbon dioxide released into the atmosphere from human activities will ultimately be absorbed by the oceans (74 Fed. Reg. 17484). Currently, global oceans are absorbing about 22 million tons of carbon dioxide each day (Feely *et al.* 2006). Surface ocean pH has already dropped by 0.11 units on the pH scale, from 8.16 in 1800 to 8.05 today, equivalent to a 30% increase in acidity, and the surface concentration of carbonate ions has decreased by more than 10% since the pre-industrial era (Caldeira and Wickett 2003, Orr *et al.* 2005). Ocean acidification will worsen due to the continuing rise in atmospheric carbon dioxide concentrations. If CO_2 levels reach 788 ppm, ocean pH would drop 0.3 or 0.4 units amounting to a 100–150% change in acidity, and tropical surface concentrations of carbonate would decline by 45% (Orr *et al.* 2005, Meehl *et al.* 2007). A pH change of this magnitude has not occurred for more than 20 million years (Feely *et al.* 2004).

Ocean acidification disrupts metabolism and other biological functions in marine life. Changes in the ocean’s carbon dioxide concentration result in accumulation of carbon dioxide in the tissues and fluids of fish and other marine animals, called hypercapnia, and increased acidity in the body fluids, called acidosis. These impacts can cause a variety of problems for marine animals including difficulty with acid-base regulation, calcification, growth, respiration, energy turnover, and mode of metabolism (Pörtner *et al*.2004). In fish, high concentrations of carbon dioxide in seawater can lead to cardiac failure and mortality (Ishimatsu *et al*. 2004). At lower concentrations sublethal effects can be expected that can seriously compromise the fitness of fish (*Id.*). Juvenile and larval stages of fish were found to be even more vulnerable (*Id.*). Squid, for example, show a very high sensitivity to pH because of their energy intensive manner of swimming (Pörtner *et al*. 2004; Royal Society 2005). Because of their energy demand, even under a moderate 0.15 pH change squid have reduced capacity to carry oxygen and higher carbon dioxide pressures are likely to be lethal (Pörtner *et al*. 2004). Studies have shown that squid under elevated carbon dioxide have a slowed metabolic activity and impaired behaviors, and researchers say warming waters will mean that the oxygen-poor zones the squid inhabit at night will be shallower reducing squid habitat and increasing their vulnerability to predators (Rosa and Seibel 2008).

Some studies show that juvenile marine organisms are particularly susceptible to ocean acidification (Ishimatsu *et al*. 2004; Kurihara and Shirayama 2004). In conditions simulating future seawater with elevated carbon dioxide, larval clownfish lost their detection and homing abilities to find suitable habitat (Munday *et al*. 2009). Moreover, low pH enhances accumulation of mercury in the food chain (Morel *et al.* 1998, Glover *et al*. 2010). Ocean acidification increases the mobility of mercury in the environment (USGS 2000), resulting in increased accumulation of mercury in Atlantic bluefin tuna.

Ocean acidification can also decrease the sound absorption of seawater causing sounds to travel further with potential impacts on marine life that may be sensitive to noise of vessel traffic, seismic surveys, and other noise pollution (Hester *et al*. 2008). Already sound travels 10-15 percent further with a change of 0.1 pH, and it is predicted to increase about 40 percent by mid century with corresponding ocean acidification (Hester *et al*. 2008). Additionally, a decline of 0.3 pH united causes a 40 percent decrease in the sound absorption of surface seawater and sound may travel 70 percent farther (Brewer and Hester 2009). As discussed above, due to the geophysical surveys in the Gulf of Mexico, there is ensonification of the Atlantic bluefin tuna's spawning habitat. Ocean acidification will exacerbate effects including physiological or anatomical effects on auditory systems, potential behavioral alterations, and auditory masking.

Oceanographic variability, especially on the scale discussed above, may limit both the productivity of a stock and the potential of a stock to achieve a recovery goal. Thus it is important to determine the nature and extent of the impact of climate variability upon the pelagic ecosystems and tuna stocks and take it into account in stock assessment and management (FAO 2001). Temperature changes of a few degrees can disrupt upwelling currents, which in turn reduces or eliminates the nutrients necessary for phytoplankton, and thereby have potential repercussions throughout the food chain (NMFS 2009). As a result, changes in migratory patterns may be the first indication that large scale shifts in oceanic habitats may be occurring. The shift in availability of bluefin tuna from fishing grounds off North Carolina to waters off Canada during the winter months may be evidence of changes in oceanographic conditions affecting historical distribution patterns; potential causative factors in the shift include preferences for cooler water temperatures and prey availability (NMFS 2009). A recent report by the Conservation Law Foundation indicated that low food availability had reduced growth rates in larval cod and haddock and that rising sea surface temperatures had the potential to further reduce productivity for these and other fish stocks off the New England coast (Bandura and Vucson, 2006).

NOAA researchers are able to account for climate change in fisheries management models. For example, researchers have forecasted the future of the Atlantic croaker fishery in the mid-Atlantic under various climate and fishing scenarios. Previous studies have shown a strong link between croaker abundance and winter temperature, and this work provided the hypothesis that recruitment is determined by temperature-driven, overwinter mortality of juveniles (Hare *et al.* 2010). The model demonstrated that "both exploitation and climate change significantly affect abundance and distribution of Atlantic croaker" and that "climate effects on fisheries must be identified, understood, and incorporated into the scientific advice provided to managers if sustainable exploitation is to be achieved in a changing climate" (Hare *et al.* 2010). Although such a direct link between temperature and abundance may be hard to identify in Atlantic bluefin tuna, recruitment and growth and maturity rates in marine fish populations vary according to environmental factors. Fisheries stock assessments do not adequately account for the effect of the environment on populations (Hare *et al.* 2010). Hare *et al.* demonstrate that it is possible to model recruitment as a function of spawning-stock biomass *and* a projected environmental variable. Therefore, NMFS and its status review team should not rely solely on the stock assessments for making a determination under the ESA, but also consider the best available science regarding climate effects on Atlantic bluefin tuna.

In contrast to Atlantic croaker, for which Hare *et al.* hypothesized that maximum sustainable yield ("MSY") and the fishing mortality consistent with MSY will increase with increasing temperatures, warm waters have the potential to harm Atlantic bluefin tuna stocks. Block *et al.* (2005) have evaluated the physiology of Atlantic bluefin tuna in the warm spawning grounds of the Gulf of Mexico and proposed that warm waters increase the species' stress, leading to increased longline bycatch mortality. Atlantic bluefin tuna are unique among teleosts for their endothermic capacity and cardiovascular physiology. Given this unique physiology that makes tuna particularly vulnerable to increased ocean warming, any models projecting population status of the Atlantic bluefin tuna should take into account increased mortality from climate change.

Changing ocean conditions due to climate change and ocean acidification may result in species shifts and ecosystem changes that will adversely impact Atlantic bluefin tuna. Climate change could have impacts on prey availability, behavioral consequences, and water quality. Ecosystem changes brought upon by climate change and ocean acidification threatens to further stress Atlantic bluefin tuna populations that are already under tremendous pressure from overfishing and ongoing population declines.

D. INADEQUACY OF EXISTING REGULATORY MECHANISMS

a. International Commission for the Conservation of Atlantic Tunas ("ICCAT")

There is no doubt that the existing regulatory mechanisms are inadequate for the Atlantic bluefin tuna. ICCAT is the regional fisheries management organization which has jurisdiction over Atlantic bluefin tuna. Therefore, the responsibility for the overfishing and poor status of the Atlantic bluefin tuna stocks falls on ICCAT and its member countries, and there is wide consensus that the ICCAT process is failing. The international community has begun to take unusual steps in questioning the effectiveness of ICCAT and whether ICCAT is meeting its legal obligations under international law, in particular the need to "adopt measures to ensure the long-term sustainability of straddling fish stocks and highly migratory fish stocks and promote the objective of their optimum utilization"[30] (FAO 2010b).

In response to concerns about the sustainable management of high seas fisheries, ICCAT conducted an independent review of its performance against its objectives. Although this review covered all species within ICCAT's management jurisdiction, the Executive Summary of the final report noted that ICCAT's international reputation "will be based largely on how ICCAT manages fisheries on bluefin tuna (BFT). [ICCAT's members'] performance in managing fisheries on bluefin tuna particularly in the eastern Atlantic and Mediterranean Sea is widely regarded as an international disgrace" (Hurry *et al.* 2008). The consensus is that ICCAT is ineffective at controlling the international catch of Atlantic bluefin tuna, in large part because of the lack of members' political will to properly regulate the fishery (*e.g.*, only three member countries provided 2007 catch data timely for the 2008 assessment).[31]

The independent review panel (Hurry *et al.* 2008, hereinafter "Panel") concluded that ICCAT objectives were not met for either the western or eastern Atlantic bluefin stocks. On the whole, the Panel was shocked by the dearth of information and data for even the iconic bluefin tuna. There are no fishery independent stock size data except for the larval index in the Gulf of Mexico; data on catch size composition are missing; and fixed growth equations (which actually are likely to change in time and space) provide an uncertain age composition of catch. The Panel's specific recommendations for ICCAT's management of each of these stocks are included below.

ICCAT members' failure to manage stocks is particularly egregious for the eastern Atlantic bluefin tuna. The Panel found unacceptable and inconsistent with ICCAT objectives: (1) "the management of fisheries on bluefin tuna in the eastern Atlantic and Mediterranean" and (2) "the regulation of bluefin farming." As a result of the Panel's finding, and also because of published statements from the European Community (EC), the Panel recommended to ICCAT "the suspension of fishing on bluefin tuna in the eastern Atlantic and Mediterranean until [ICCAT members] fully comply with ICCAT recommendations on bluefin." In addition, the Panel recommended that ICCAT "consider an immediate closure of all known bluefin tuna spawning grounds at least during known spawning periods." At the next ICCAT meeting, neither of these recommendations was enacted.

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[30] 1995 UN Fish Stocks Agreement, Article 5(a).

[31] As mentioned above, in March 2010, Tom Strickland, assistant Interior secretary for Fish and Wildlife and Parks, noted that ICCAT has failed to protect Atlantic bluefin tuna: "in light of the serious compliance problems that have plagued the eastern Atlantic and Mediterranean fishery and the fact that the 2010 quota level adopted by ICCAT is not as low as we believe is needed, <u>the United States continues to have serious concerns about the long-term viability of either the fish or the fishery</u>." P. Reis, *U.S. backs proposed trading ban on bluefin tuna*. Greenwire, Mar. 3, 2010 (emphasis added).

For the western Atlantic bluefin tuna, ICCAT's management performance is shockingly poor. In 1998, ICCAT initiated a 20-year rebuilding plan for the western Atlantic bluefin tuna designed to achieve B_{MSY} (the biomass supporting maximum sustainable yield) with 50% probability. The 2008 assessment indicated that the stock "is not rebuilding as rapidly as was projected under the plan initially" (SCRS 2008). In fact, ten years after initiation of the rebuilding plan (half way through the 20-year plan), the SCRS estimated the 2007 SSB to be 7% below the level of the rebuilding plan's first year (SCRS 2008). The Panel attributes the "slow" (non-existent) rebuilding of the western Atlantic stock to two potential causes: (1) ICCAT's adoption of strong positions taken by the U.S., Canada, Japan, and Mexico for quotas to levels that fail to meet rebuilding goals, and (2) the rate of mixing between the eastern and western stocks. Even small rates of mixing from East to West can have significant effects on the West due to the fact that the eastern stock is much larger than that of the western stock (SCRS 2008).

i. Lack of Data Plagues Eastern Atlantic Bluefin Management

The largest problem for science-based management of eastern Atlantic bluefin tuna is the lack of fishery independent and dependent data. Reported catches from the mid-1970s until 2007 are grossly inaccurate and underestimate the extent of Atlantic bluefin decline. This leads to overfishing and severe population declines because scientists cannot base lower quotas on the high catch that actually occurs or fishery independent data that would show the decline.

No fishery independent data exists for the eastern Atlantic bluefin tuna (Hurry *et al*. 2008). The SCRS (2008) recommended that recent European and Mediterranean aerial surveys or larval surveys that have stopped be reinstated, and that large-scale, well planned conventional tagging experiments cross-Atlantic and Mediterranean are needed to significantly improve the status of the Atlantic bluefin tuna resource.

Several problems plague the collection of fishery dependent data for the eastern Atlantic bluefin tuna. First, fisheries dependent data are severely lacking because ICCAT members do not report the required data. For example, only three of ICCAT's contracting parties with quotas in this fishery had submitted the required data for a stock assessment session in 2008 (SCRS 2008, Appendix 6). This resulted in data for less than 15% of the total allowable catch (SCRS 2008, Appendix 6). The scientists tasked with submitting the assessment in 2008 wrote to the ICCAT chair in frustration, stating that it was "disappointing that such a large group of scientists and international experts meets during two weeks at considerable expense to their organizations and is unable to complete the work required because of a (chronic) lack of data being transmitted in time" (SCRS 2008, Appendix 6). The lack of timely data transmission is "even more incomprehensible given the high international concern about bluefin tuna stock assessment" (SCRS 2008, Appendix 6). The result of the lack of reporting fishery dependent data was that the scientists were unable to evaluate the status of the eastern stock as of 2007.

Second, in addition to a lack of reporting generally, there is substantial under-reporting of total catches (SCRS 2008). For the 2008 stock assessment, the SCRS provided assessments based on "reported" catch data and found it necessary to "adjust" the catch data upward to take account of underreporting (SCRS 2008). In 2007, the reported catch for the eastern Atlantic stock was 34,514 t and the SCRS (2008) estimated that actual catch was 61,000 t, based on examination of market data which showed that exports to Japanese and U.S. markets largely exceeded reported catches. The 2007 total allowable catch was 29,500 t—about half of the estimated catch.

Third, an emerging problem with fishery dependent data in the eastern Atlantic and Mediterranean is the explosion of fish farms. Data are reported at time of sale of the farmed fish, not at the time they are caught and placed in pens. Demand for tuna to stock the farms has increased the purse seine fishery, which supplies tuna to the farms.[32] Purse seine fisheries, which represent more than 60% of the total recent reported catch of the eastern Atlantic stock, provide no catch rate information, such as the catch composition, spatial distributions of the catch or effort. Even though data about the tuna are collected when they are harvested from the farms (at time of sale), these data inadequately provide information about the wild population. Therefore, holding tuna in fattening farms introduces additional uncertainties to estimates of total catch, catch-at-age and catch by area (SCRS 2008).

All of these data problems plaguing the eastern Atlantic bluefin tuna mean that effective regulation of catch is nearly impossible. Without science based management, the decline in the stock will continue and the Atlantic bluefin tuna will be fished to extinction.

b. United States Management Measures Are Inadequate

Fisheries Management Fails to Achieve Optimum Yield

Just as ICCAT is inadequate to prevent the slide of bluefin tuna toward extinction, U.S. fishery management also fails to meet its legal obligation to manage fisheries in order to attain optimum yield. The Magnuson Stevens Act governs the conservation and management of U.S. fisheries. Accordingly, the U.S. manages a fishery for the western Atlantic bluefin tuna through its Consolidated Atlantic Highly Migratory Species Fishery Management Plan ("HMS FMP"). Western Atlantic bluefin tuna were designated as *overfished* in 1997 meaning that NMFS is charged with managing it by attaining the optimum yield that will rebuild the population to a healthy level. 16 U.S.C. § 1854(e). Under the Atlantic Tunas Convention Act, the U.S. must maintain consistency with ICCAT recommendations. *See* 16 U.S.C. § 971d(e)(1)(A). In turn, the HMS FMP implements the U.S.'s proportion of ICCAT's total allowable catch of western Atlantic bluefin tuna.

As described previously, ICCAT has completely failed at preventing the steady decline of bluefin tuna and therefore the same inadequacies of managing the fishery exist in the U.S. The bluefin tuna population is so severely depleted that despite continued effort U.S. fisherman are unable to catch more than a small portion of the allowable quota set by ICCAT and implemented through the HMS FMP. The continued decline of the bluefin tuna population undermines the U.S. management scheme and demonstrates that existing measures are woefully ineffective at maintaining stocks, much less meeting the requirements to rebuild the population to a healthy level.

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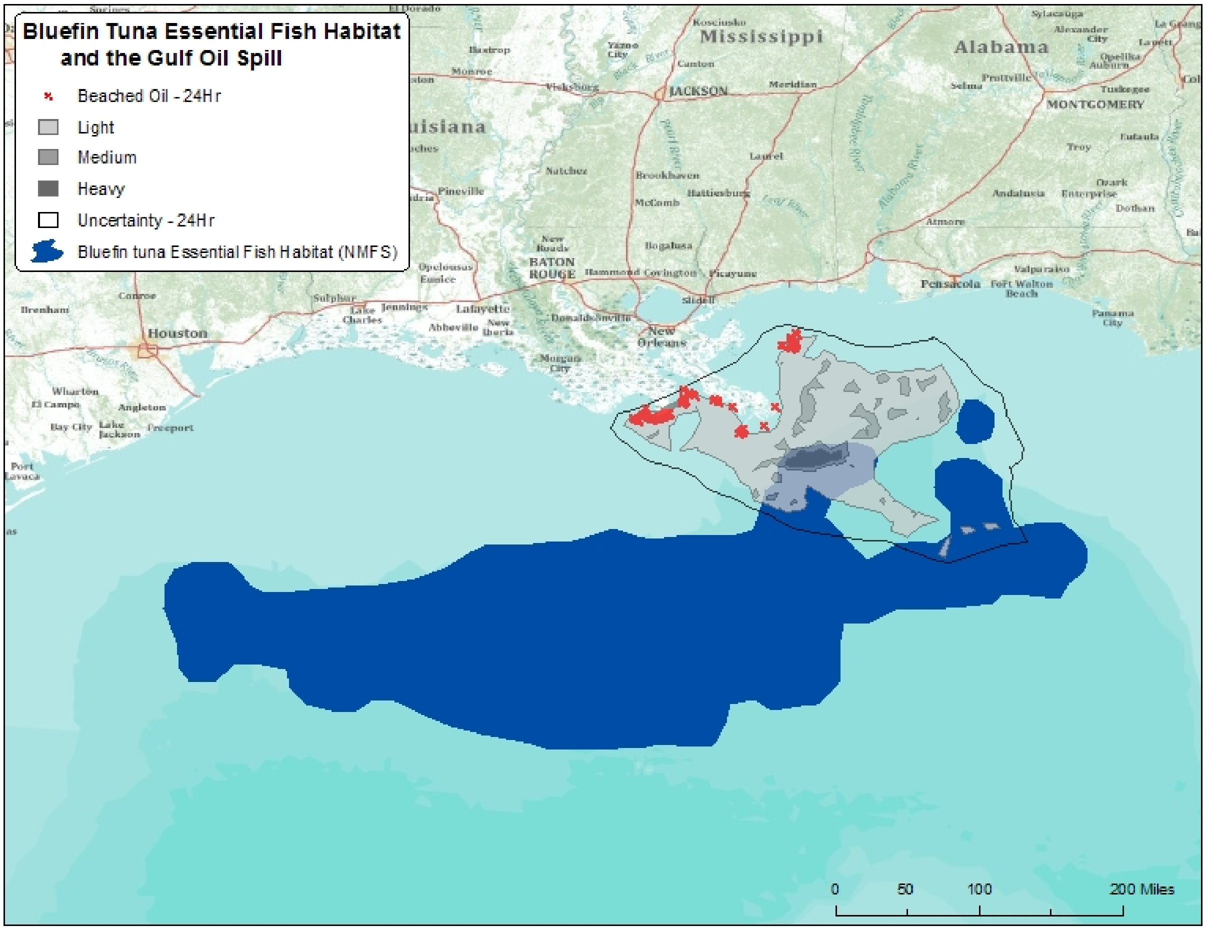
[32] The SCRS (2008) notes that "the vast area of the Mediterranean [is now] covered by BFT fishing over its entire surface, a situation that has never been encountered in the past and that is of high concern since there appears to no longer exist any refuge for BFT in the Mediterranean during the spawning season."

Habitat Protections Are Non-existent

Directed fishing targeting bluefin tuna in the Gulf of Mexico is prohibited, and the core of the tuna's spawning ground in the Gulf of Mexico is managed by the U.S. as essential fish habitat ("EFH") under the Magnuson Stevens Act. On June 12, 2009 NMFS designated an of the Gulf of Mexico as a Habitat Area of Particular Concern, identifying bluefin spawning ground as needing special protections; however, NMFS declined to implement any measures that would actually protect the habitat (NMFS 2009). Despite NMFS' actions to identify important habitat in the Gulf for bluefin tuna, these designations have done little to prevent the decline of bluefin or even impose needed protections. The Gulf oil spill provides an example because although the Minerals Management Service, which regulates offshore oil drilling, had to consult with NMFS regarding the EFH the consultation relied on an inadequate analysis of the impacts of potential oil spills (see Figure 7 for the location of the oil spill in relation to Atlantic bluefin tuna essential fish habitat). Additionally, while the Amendment designating the Gulf as a Habitat Area of Particular concern noted that offshore drilling and especially the proliferation of deepwater drilling would have environmental impacts, the rule failed to implement any measures to address those concerns (NMFS 2009).

Figure 7. Atlantic bluefin tuna essential fish habitat overlaid with BP *Deepwater Horizon* oil spill extent as of May 24, 2010.



Source: Center for Biological Diversity, May 24, 2010.

Regulation of Greenhouse Gases Is Inadequate

Ocean climate change and acidification due to greenhouse gas emissions pose long-term threats to the Atlantic bluefin tuna. However, there are currently insufficient legal mechanisms regulating greenhouse gases on a national level in the United States. Efforts to regulate greenhouse gases under the Clean Air Act could be promising; however, they are still in development. The primary international regulatory mechanisms addressing global warming--United Nations Framework Convention on Climate Change and the Kyoto Protocol--do not and cannot adequately address the impacts of global warming and acidification that may threaten bluefin tuna. A review of the inadequacy of these existing regulatory mechanisms for global warming and acidification can be found in the 2009 federal listing petition for 83 coral species prepared by the Center For Biological Diversity (http://www.biologicaldiversity.org/campaigns/coral_conservation/pdfs/Coral_petition_10-20-09.pdf).

E. DISEASE AND PREDATION

Emerging environmental stresses from climate change or ecosystem shifts due to natural or manmade stresses may make the Atlantic bluefin tuna more vulnerable to disease. In addition, as tuna ranching becomes more prevalent the spread of disease, which is known to occur in confined aquaculture operations, may affect not only captive tuna but also spread to wild populations. Diseases and parasites are likely to spread from confined or escaped fish to the wild populations (Pew 2001). Net pen aquaculture also creates a breeding ground for disease. Confined fish are particularly vulnerable to disease, which can kill the entire captive population, or if controlled through antibiotics can create more virulent strains of disease that are resistant to antibiotics. In addition to the immediate effects on the tuna in the aquaculture facility, tuna can escape from net pens. Escaped fish are likely to spread diseases from the aquaculture facility into the wild fish populations (Pew 2001). As discussed elsewhere in the Petition, however, the best scientific information available indicates that the decline of this species is due primarily to fishing harvests; destruction, degradation or modification of critical habitat; and the lack of effective regulatory mechanisms protecting the species; not disease or predation.

F. OTHER NATURAL OR ANTHROPOGENIC FACTORS

a. Chemical Contaminants

Atlantic bluefin tuna is especially prone to bioaccumulate and biomagnify contaminants from its environment, because it is long-lived and at the top of marine food webs. The majority of scientific studies of contaminants and tuna have focused on investigations of nutrition for consumers rather than the effects of the pollutants on the tunas themselves (Lowenstein *et al.* 2010, Vizzini *et al.* 2010). Taken as a whole, however, these studies show evidence that Atlantic bluefin tuna are clearly exposed to a wide variety of contaminants, some of which are likely to have population-level effects on tuna.

i. Endocrine Disrupting Chemicals (EDCs)

Top predators accumulate high concentrations of contaminants, many of which are recognized as EDCs. The National Institute of Environmental Health Sciences defines endocrine disruptors as “chemicals that may interfere with the body’s endocrine system and produce adverse developmental, reproductive, neurological, and immune effects in both humans and wildlife.”[33] It notes that a wide variety of substances, including pharmaceuticals, dioxins, polychlorinated biphenyls, DDT and other pesticides, and plasticizers such as bisphenol can cause endocrine disruption.

Endocrine disruptors pervade the environment and work in a variety of nefarious ways. They can mimic naturally occurring hormones like estrogens and androgens, thereby causing overstimulation. They can bind to receptors within cells and block endogenous hormones from

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[33] National Institute of Environmental Health Sciences, available at http://www.niehs.nih.gov/health/topics/agents/endocrine/.

binding. They can also interfere with the way natural hormones and their receptors are made or controlled.[34]

These chemicals bioaccumulate and biomagnify over the long lifespan of Atlantic bluefin tuna. Scientists have sounded a warning of potential reproductive alterations in Atlantic bluefin tuna as a result of the bioaccumulation of EDCs (Storelli *et al.* 2008, Fossi *et al.* 2002). Storelli *et al.* (2008) concluded that the exposure of Atlantic bluefin tuna in the Mediterranean to EDCs over their long lifetimes might "create the prerequisite for the development of pathological conditions." Similarly, Fossi *et al.* (2002), based on the data showing high exposure of bluefin tuna to contaminants in the Mediterranean, advised "continuous monitoring to avoid reductions in the population of these species of high commercial and ecological interest." Fisheries scientists and managers do not adequately monitor this threat to Atlantic bluefin tuna, but the impacts on population dynamics could be devastating.

ii. Mercury

As a long-lived predator, Atlantic bluefin tuna are especially susceptible to bioaccumulation of mercury. Bioaccumulation results from the mercury associating with the very base of the food chain, a diatom. The diatom is eaten by a copepod, which then assimilates the mercury, and so on up the food web. The number of trophic levels between predators (Atlantic bluefin tuna) and prey is critical in causing accumulation of mercury (Morel *et al.* 1998). One third of the mercury in surface seawater is from natural sources, and two thirds is of anthropogenic origin (sources include metal production, chlor-alkali and pulp industries, waste handling and treatment, and coal, peat, and wood burning) (Morel *et al.* 1998). As mentioned above, low pH enhances accumulation of mercury in the food chain (Morel *et al.* 1998, Glover *et al*. 2010) and bioaccumulation in Atlantic bluefin is likely to accelerate during climate change induced ocean acidification.

Studies regarding mercury in tuna focus on the effects on the consumer, and do not note any effects on Atlantic bluefin tuna. The levels of mercury accumulating in Atlantic bluefin tuna are frightening in a public health context. Lowenstein *et al.* (2010) recently published species-specific mercury levels of tuna samples collected from restaurants and supermarkets. They found that mean mercury levels "for bluefin *akami* exceed those permitted by the US Food and Drug Administration (2000), Health Canada (2007) and the European Commission (2008)"[35] (Lowenstein *et al.* 2010). The US Food and Drug Administration (FDA) action levels for poisonous or deleterious substances, to which this sentence refers, represent limits at or above which FDA will take legal action to remove products from the market (FDA 2000). Based on this study, much of the tuna sold in supermarkets and restaurants should be removed by the FDA.

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[34] See National Institute of Environmental Health Sciences Endocrine Disruptor Fact Sheet, available at http://www.niehs.nih.gov/health/docs/endocrine-disruptors.pdf (last visited May 21, 2010).

[35] Atlantic Bluefin Tuna (*Thunnus thynnus*), Pacific Bluefin Tuna (*T. orientalis*), and Southern Bluefin Tuna (*T. maccoyii*) are pooled into the sample category "bluefin," but over half the bluefin samples were from *T. thynnus* (Lowenstein *et al.* 2010, data supplement). *Toro* is the Japanese name denoting 'fatty tuna,' and *akami* the Japanese name for 'red tuna.'

b. Offshore Aquaculture in the Gulf of Mexico

Offshore aquaculture, the rearing of aquatic organisms in cages or net pens in federal waters, is an emerging threat to Atlantic bluefin tuna. In January 2009, the Gulf of Mexico Fishery Management Council published the final Fishery Management Plan for Regulating Offshore Marine Aquaculture in the Gulf of Mexico ("aquaculture FMP"). This document, with its associated Programmatic Environmental Impact Statement, was written to streamline the regulatory process for authorizing offshore aquaculture proposals in the Gulf of Mexico.

Large-scale aquaculture can cause significant degradation of the marine environment. Potential impacts of offshore aquaculture include increased nutrient loading, habitat degradation, fish escapement, competition with wild Atlantic bluefin tuna, and spread of pathogens (NMFS 2009). Marine aquaculture is prohibited in Gulf of Mexico EEZ HAPCs (such as the Atlantic bluefin tuna's spawning grounds in the Gulf of Mexico), but the potential impacts resulting from offshore aquaculture will have a wide distribution. The impacts of offshore aquaculture will affect Atlantic bluefin tuna even if the aquaculture is located outside of the HAPC. Offshore aquaculture is simply another threat that potentially will drive already vulnerable Atlantic bluefin tuna populations to extinction.

VI. CRITICAL HABITAT

Petitioners urge NMFS to designate critical habitat for the Atlantic bluefin tuna concurrently with its listing under the ESA because of the serious nature of the threats to the species.

Critical habitat as defined by Section 3 of the ESA is:

> (i) the specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the provisions of section 1533 of this title, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and
>
> (ii) the specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 1533 of this title, upon a determination by the Secretary that such areas are essential for the conservation of the species.

16 U.S.C. § 1532(5). Congress recognized that the protection of habitat is essential to the recovery of listed species, stating that:

> classifying a species as endangered or threatened is only the first step in insuring its survival. Of equal or more importance is the determination of the habitat necessary for that species' continued existence… If the protection of endangered and threatened species depends in large measure on the preservation of the

> species' habitat, then the ultimate effectiveness of the Endangered Species Act will depend on the designation of critical habitat.

H. Rep. No. 94-887 at 3 (1976). Critical habitat is an effective and important component of the ESA, without which Atlantic bluefin tuna's chance for recovery diminishes. Species with critical habitat are twice as likely to be recovering compared to species lacking designated habitat (Taylor *et al.* 2005).

Petitioners request that the NMFS propose critical habitat for the Atlantic bluefin tuna concurrently with its proposed listing. A precautionary approach should be taken in order to buffer against unanticipated events, such as changes in environmental conditions or disaster. At a minimum, the Atlantic bluefin tuna critical habitat must include the northern slope waters of the Gulf of Mexico during the spawning season (Block *et al.* 2005). Petitioners will submit additional comments regarding critical habitat once the NMFS has issued a positive 90-day finding on this Petition and initiated a status review.

VII. CONCLUSION

Based on the best available scientific and commercial data Atlantic bluefin tuna are rapidly headed toward extinction. This Petition demonstrates that listing the Atlantic bluefin tuna population as a whole as endangered under the ESA, and also designating the eastern and western Atlantic bluefin tuna DPSs as endangered under the ESA, is not only consistent with the relevant legal criteria, but also is necessary to prevent its extinction.

The ESA guarantees that the federal government will take conservation measures to recover a threatened or endangered species. Once a species is listed as endangered or threatened, NMFS is required to take affirmative steps to provide for the recovery of the species. 16 U.S.C. § 1533(f). In addition, all federal agencies must ensure that their actions do not jeopardize the continued existence of the species or adversely modify its critical habitat. 16 U.S.C. § 1536(a)(2). Congress directed federal agencies to use "all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to [the ESA] are no longer necessary." 16 U.S.C. §§ 1531(c), 1532(3).

The best available scientific and commercial data indicate now that listing the Atlantic bluefin tuna as endangered should occur, due to the multiple and cumulative threats of overutilization from fishing, habitat destruction, and inadequate regulatory measures. Petitioners strongly urge NMFS and the Secretary to take action to protect the Atlantic bluefin tuna before it is too late.

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