PETITION TO LIST THE COMMON THRESHER SHARK (*ALOPIAS VULPINUS*) UNDER THE U.S. ENDANGERED SPECIES ACT EITHER WORLDWIDE OR AS ONE OR MORE DISTINCT POPULATION SEGMENTS

Photo: NOAA SWFSC, Walter Heim

Petition Submitted to the Secretary of Commerce and the NOAA Fisheries Service

Petitioner
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August 21, 2014

EXPLOITERS
FRIENDS
of ANIMALS

August 22, 2014

Hon. Penny Pritzker
Secretary of Commerce
U.S. Department of Commerece
1401 Constitution Ave., NW
Washington DC 20230

Eileen Sobeck
Asst. Administrator for Fisheries
NOAA Fisheries Service Headquarters
1315 East West Highway
Silver Springs MD 20910

Re: Petition to List the Common Thresher Shark as Endangered or Threatened

Dear Secretary Pritzker and Assistant Administrator Sobeck:

Friends of Animals ("FoA") hereby petitions the Secretary of Commerce, acting through the National Marine Fisheries Service (NMFS), an agency within the National Oceanic and Atmospheric Administration (NOAA), to list the Common thresher shark (*Alopias vulpinus*) as "endangered" or "threatened" under the U.S. Endangered Species Act. (16 U.S.C. §§ 1531 *et seq.*). We request that NMFS list the species: (1) throughout its entire range (worldwide); or in the alternative (2) as six distinct population segments. The six subpopulations, any of which might qualify for listing, are in the Eastern Central Pacific, Indo-West Pacific, Northwest and Western Central Atlantic, Southwest Atlantic, Mediterranean, and Northeast Atlantic. We also request that NMFS list the species throughout its entire range under the Endangered Species Act (ESA), and designate critical habitat for the species in U.S. waters.

The common thresher shark is a pelagic species, inhabiting both oceanic and coastal waters, and can be found in both temperate and subtropical seas worldwide. (Gervelis & Natanson 2013 at 1535). All members of the genus *Alopias*, including the common thresher shark, are listed as vulnerable on the International Union for Conservation of Nature (IUCN) Red List due to their declining populations. (Gervelis & Natanson 2013). The largest risk to the species is its one-sided relationship with humans. This species poses very little threat to humans. The largest threat of injury is divers getting hit with the enormous tail. Attacks of any kind on humans are almost unheard of. On the other hand, the largest menace to the thresher shark is human fishing—for sport or for their fins, liver oil, tails, and flesh.

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NEW YORK OFFICE • 1841 BROADWAY SUITE 350 • NEW YORK, NY 10023 • T 212 247 8120 • F 212 582 4482
WILDLIFE LAW PROGRAM • 7500 E. ARAPAHOE ROAD SUITE 385 • CENTENNIAL, CO 80112 • T 720 949 7791 FRIENDSOFANIMALS.ORG

There are three main threats to the common thresher shark. First is utilization for commercial and recreational purposes. Indeed, the primary cause of the species' decline is human exploitation, primarily through fishing. Second, the lack of adequate regulatory mechanisms around the world has allowed exploitation of the species to go unchecked. Finally, other natural or manmade factors such as low reproductive rates make the common thresher more susceptible to exploitation and human population growth, threatening the continued survival of this species.

The petition, filed pursuant to 5 U.S.C. § 553(e) and 50 C.F.R. § 424.14, consists of this cover letter and the attached petition, as well as all material cited within which are hereby specifically incorporated by reference.

Please do not hesitate to contact me at (720) 949-7791 if you need more information. My address appears below and on the cover sheet of the petition.

Sincerely,

Michael Harris
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INTRODUCTION

Petitioner Friends of Animals requests the Secretary of Commerce, acting through the National Marine Fisheries Service (NMFS), an agency within the National Oceanic and Atmospheric Administration (NOAA), to list the common thresher shark (*Alopias vulpinus*) as "threatened" or "endangered" under the U.S. Endangered Species Act. 16 U.S.C. §§ 1531-1544. We request that NMFS list the species throughout its entire range under the Endangered Species Act (ESA), and designate critical habitat for the species in U.S. waters.

The common thresher shark is a pelagic species, inhabiting both oceanic and coastal waters, and can be found in both temperate and subtropical seas worldwide. Gervelis 2013, Exhibit 10 at 1535. All members of the genus *Alopias*, including the common thresher shark, are listed as vulnerable on the International Union for Conservation of Nature (IUCN) Red List due to their declining populations. Gervelis 2013, Exhibit 10.

There are two main reasons for this decline. First, thresher sharks are exploited for recreational and commercial purposes. Like many shark species, the common thresher shark's fin has high commercial value. Unlike most sharks, however, some consider the common thresher shark's meat excellent for consumption, making common threshers more targeted than other shark species. In fact, common thresher sharks are the third most targeted catch in countries outside of the U.S. (Lewis 2011, Exhibit 17). In addition to their meat and fins, their hides are used for leather while the small amount of oil found in their livers is considered highly valuable and sold at high price ranges. In the Americas, threshers are often caught as bycatch in longline, purse seine, commercial gill nets, and mid-water fisheries, which contributes to their current rate of decline. (Reardon et al. 2009, Exhibit 28).

Recreationally, some consider the common thresher sharks a desirable game fish because they are a larger shark species and put up a significant fight when caught, making the capture of a thresher more prized. Fight times range from 32 to 140 minutes and generally increase with body size. (Heberer 2010, Exhibit 12).

Second, the common thresher shark exhibits slow life history characteristics. The species develops quite slowly, taking approximately 5 years to reach sexual maturity and has low fecundity. (Gervais & Natanson 2013, Exhibit 10 at 1536). This slow life history results in a low capacity to recover from even moderate levels of exploitation. (Gervais & Natanson 2013, Exhibit 10 at 1536).

PETITIONERS

Friends of Animals is a nonprofit, international animal advocacy organization, incorporated in the state of New York since 1957. The group advocates for the interests of animals living freely, on their own terms. Friends of Animals maintains offices in Connecticut, New York, Washington, D.C., Pennsylvania, California, and British Columbia. The organization also sponsors a variety of programs to protect, rescue, recover, and reintroduce imperiled animals, including marine species.

ENDANGERED SPECIES ACT AND CRITERIA FOR LISTING

Congress enacted the ESA in order to "provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, [and] to provide a program for the conservation of such endangered species and threatened species…" (16 U.S.C. § Petition to List the Scalloped Hammerhead Shark under the Endangered Species Act 1531(b)). Section 3 of the ESA (16 U.S.C. § 1532) defines key terms in the Act. Those relevant to this petition include:

1. § 1532(16) "The term 'species' includes 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."

2. § 1532(6) "The term 'endangered species' means any species which is in danger of extinction throughout all or a significant portion of its range ..."

3. § 1532(20) "The term 'threatened species' means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range."

A species must satisfy at least one of five listing criteria in order to qualify for listing as a "threatened" or "endangered" species under the ESA. Section 4 of the ESA (16 U.S.C. § 1533(a)(1)), sets forth the five listing factors:

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; or

E. Other natural or manmade factors affecting its continued existence.

Considering these factors, the common thresher shark may qualify as "threatened" or "endangered" due to: (B) overutilization for commercial and recreational purposes, (D) the inadequacy of existing regulatory mechanisms, and (E) other factors, including low reproductive rates, causing higher risk of overutilization.

CRITERIA FOR LISTING AS A DPS

Species may qualify for protection under the ESA regionally as Distinct Population Segements ("DPS"). Analysis of common thresher shark populations indicates six subpopulations might qualify for listing as DPSs: Eastern Central Pacific, Indo-West Pacific, Northwest and Western Central Atlantic, Southwest Atlantic, Mediterranean, and Northeast Atlantic.

NMFS and the U.S. Fish and Wildlife Service have jointly published principles for defining a DPS (61 Fed. Reg. 4722 (Feb. 7, 1996)). A species must be a vertebrate that is discrete from other populations of the species and significant to the species. These terms are defined as follows:

Discreteness: A population segment of a vertebrate species may be considered discrete if it satisfies either one 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.
> 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.

Significance: If a population segment is considered discrete under one or more of the above conditions, its biological and ecological significance will then be considered in light of Congressional guidance…that the authority to list DPS's be used''…sparingly'' while encouraging the conservation of genetic diversity. In carrying out this examination, the Services will consider available scientific evidence of the discrete population segment's importance to the taxon to which it belongs. This consideration may include, but is not limited to, the following:

> 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 segment would result in a significant gap in the range of a 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 historic range, or
> 4. Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

(Id. at 4725).

Although these guidelines are "non-regulatory" and serve only as policy guidance for the agencies, NMFS is committed to using these criteria for evaluating DPS's described in this petition (Id. at 4723).

CLASSIFICATION AND NOMENCLATURE

Taxonomy. The petitioned species is *Alopias vulpinus*. The full taxonomic classification is detailed in Table 1.

Table 1. Taxonomy of *Alopias vulpinus*.

Kingdom	Animalia
Phylum	Chordata
Subphylum	Vertebrata
Class	Chondrichthyes
Subclass	Elasmobranchii
Superorder	Euselachii
Order	Lamniformes
Family	Alopiidae
Genus	*Alopias*
Species	*Alopias vulpinus*

Source: Integrated Taxonomic Information System (ITIS)

Common Name. *Alopias vulpinus*is known by the common names "thresher shark," "Tiburon zorro comun," "zorro," and "renard marin." For the purposes of this petition, the species will be referred to as "common thresher shark," or "thresher."

SPECIES DESCRIPTION

The common thresher shark is gray, blue-gray, or dark gray on the dorsal surface and fully white below. Common thresher sharks can be distinguished from the two other thresher species by the white of its belly extending in a band over its pectoral fins. Common thresher sharks have small mouths that are arched and have furrows at the corners, unlike the two other thresher species. (Washington Dept. of Fish & Wildlife, undated). Common thresher sharks have small dorsal fins and large, recurved pectoral fins. (Id.)

The species is the largest of the three thresher species, reaching upwards of 573 to 760 cm (approximately 19 to 24 feet). (Gervelis & Natanson 2013 at 1535). Up to 50% of a thresher's length can be attributed to its caudal fin, which is utilized to both pursue and immobilize prey by utilizing a whipping maneuver. (Aalbers et al. 2010). Although the common thresher shark is a large shark, its teeth are relatively small and suitable for catching fish. (Oregon Coast Aquarium Newport, undated). Threshers have been noted as being docile or shy and present little threat to human beings unless they are provoked. *Id*. When threatened or provoked from above, threshers may leap out of the water. (Shark Sider, undated)

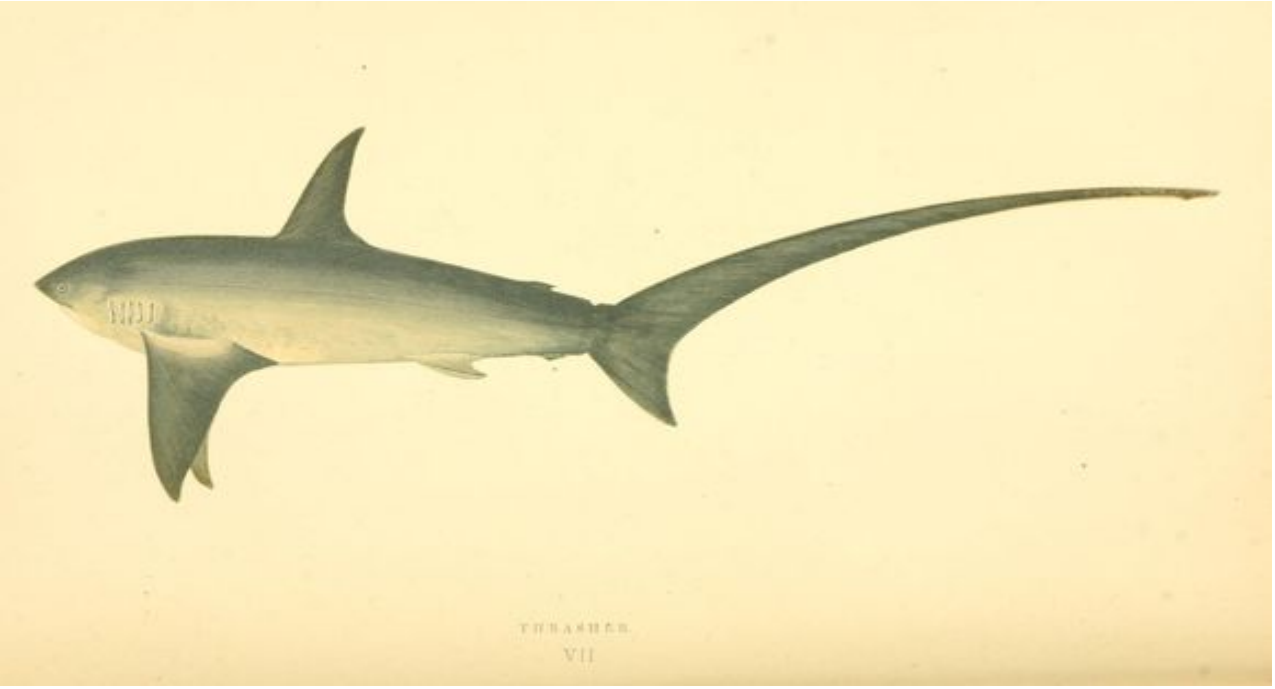

Figure 1. Public Domain, The Freshwater and Marine Image Bank, The University of Washington

Figure 2: Thresher shark leaping out of water. Source: Scott Sheehan / Marine Mammal Research

GEOGRAPHIC DISTRIBUTION

The common thresher shark is largely circumglobal in temperate waters and has been noted as being able to tolerate cold waters. (Goldman et al. 2009). The species can be found in virtually all regions of the world's oceans: in the western Atlantic, eastern Atlantic, Indian Ocean, western Pacific, and the eastern Pacific seas. *Id*. Nurseries generally occur inshore in temperate waters and have been identified in the Adriatic Sea, northeastern Atlantic Ocean, and western Mediterranean, as well as in southern California and South Africa. (FAO 2014). While the species is circumglobal, it exhibits little to no transoceanic migrations, though the species regularly migrates within geographic areas. *Id*.

In North America, the common thresher shark ranges from southern Baja California, Mexico to British Columbia, Canada. (Cartamil et al. 2010). Common thresher sharks also frequent oceans off of the northeastern region of the United States, particularly in the offshore and cold inshore waters during the summer months. (Gervelis & Natanson 2013). The highest concentrations, however, occur in a region that extends from Point Conception, California, to Cabo Colonet, Mexico. *Id*. Threshers also occur in the North Atlantic, from Newfoundland, Canada, to Cuba.

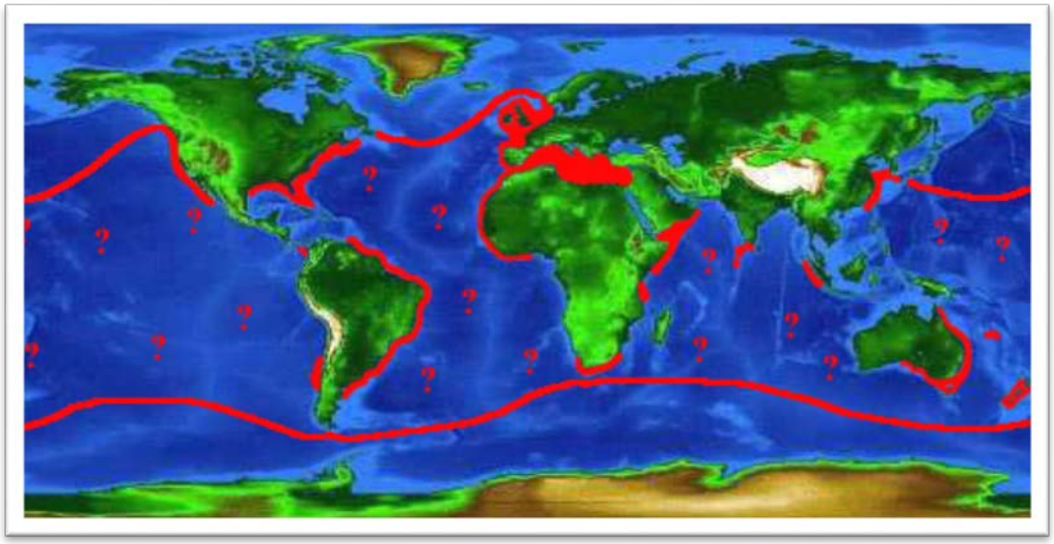

Figure 3. World distribution map for the common thresher shark. Source: Florida Museum of Natural History

HABITAT REQUIREMENTS

Common thresher sharks primarily live beyond the continental shelf, but rarely range beyond 200 miles from the coast. (NOAA "Fact Sheet" undated). The species inhabits tropical and cold-temperate waters worldwide. (Goldman et al. 2009). Adult threshers may prefer offshore habitat, because higher turbidity found in nearshore waters might interfere with their predatory mechanism of stunning prey with the caudal fin. (Cartamil et al. 2010 at 601).

Additionally, common thresher sharks have an ontogenetic increase in dietary scope, and thus, as they grow in size, they become more generalized predators and may seek out the diverse array of prey species found beyond the continental shelf. *Id*. During nightfall, common thresher sharks primarily occur at mid-range depths, remaining near the continental shelf. While adult sharks occur in varying depths, young sharks generally inhabit shallow bays. (Goldman et al. 2009).

LIFE HISTORY

The average life span of a common thresher shark is 25 years. Though larger sharks, such as makos and reef sharks, prey on juveniles, adult threshers have no known predators (humans excluded). (EOL, undated)

Like many shark species, common thresher sharks have long life spans, reproduce late in life, and have very few young at a time. (*Id.*) Both sexes mature at approximately 5 years of age, and longevity ranges from 28 to 46 years for females, and 15 to 25 years for males. (*Id.*)

Diet

Threshers mostly feed on small schooling fishes and some bottom fishes. In general, however, the diet consists mostly of small schooling pelagic fish. (NOAA "Fact Sheet" undated). The top six prey species are the northern anchovy, Pacific sardine, Pacific hake, Pacific mackerel, jack mackerel, and market squid. *Id*. Other species that threshers feed upon include herring, shad, pilchards, mendhaden, lanternfishes, lancetfishes, needlefishes, scad, bluefishes, plaice, flounder, and sole. (Animal Diversity Web, undated). Threshers have also been known to feed on octopus, pelagic crustaceans and, on rare occasions, seabirds. (*Id*.)

The thresher's elongated caudal fin allows it to hunt in a way that is unique among sharks. Threshers swim in narrowing circles around schools of small fish, compressing the school, then striking and stunning fish with their caudal fins. Though the common thresher shark is a solitary species, instances of two sharks working together to herd fish have been documented. (FAO 2014).

Reproduction and Dispersal

The common thresher shark is ovoviviparous, with a gestation period of nine months. Current data suggests that threshers, at a minimum, have a biennial cycle. (Natanson & Gervelis 2013 at 1559). This is based on studies of ovaries of recently postpartum and pregnant females which were not in a condition that would recover prior to the mating season.

In some parts of the world, common thresher sharks are thought to breed all year long. The migratory patterns of common thresher sharks near North America suggest they breed in northern waters during the spring and sumer and release their pups into nurseries along the coast as they travel south for the winter months. Females are oviviparous and can only carry two pups at a time. Pups are born independent, but remain in a nursery area for

approximately 3 years for safety. Male common thresher sharks reach maturity at 9 to 10 years of age, and females at 12.3 to 13.4 years of age. (EOL)

Pups are then released into nurseries along the coast as nursing adult sharks travel south for the winter months. Thresher pups are independent within minutes of being born and immediately face predation threats. Thresher pups address these threats by remaining in shallow bays that are 90 m or less for approximately three years, at which point they become large enough to avoid predation. (Lewis 2011).

ECOLOGICAL ROLE

As apex predators, common thresher sharks provide a valuable balance to maintaining a healthy marine ecosystem. Due to the fact that common thresher sharks feed at mid-trophic levels on small pelagic fish and squid, their specialized diet is more likely to exert top-down effects on their prey species. (NOAA "Fact Sheet" undated). Ecosystem stability and biodiversity could suffer if the population of a top predator, such as the thresher, begins to decline. Additionally, the common thresher shark's diet and near-shore habitat often make it an indicator species for pollutants. (ADW).

HISTORIC AND CURRENT POPULATION STATUS AND TRENDS

The common thresher shark was the target of commercial exploitation during the late 1970s and early 1980s. Due to its high demand, the species had suffered a significant reduction in population within a decade of being commercialized. (Heberer et al. 2010). In the Eastern Central Pacific, reported landings of drift gillnet fishery indicated an approximate 70% population decline from the 1970s to the late 1980s. (Goldman et al. 2009). In 1982 alone, a U.S. West Coast target fishery for common threshers reported landings of 1,089.5 t. *Id*. Juvenile and subadult threshers were virtually eliminated from the catch, and by 1996, California catches of common threshers were down to one-fifth of their formal levels. *Id*. The species did not fare much better in other portions of its range. In the species' northwest and western central Atlantic range, thresher shark stocks declined by 63-80% during 1986-2000. *Id*.

As explained in the Encyclopedia of Life[1]:

Eastern Central Pacific
Reported landings in the drift gillnet fishery for this species that developed off the west coast of the USA in the late 1970s, collapsed from a peak of 1,089.5 t in 1982 to less than 300 t by the late 1980s (decline of ~70%). This fishery was effectively eliminated by restrictions on the use of gill nets by 1990, and the population began to slowly recover to just below 50% of the initial subpopulation size. The Common Thresher Shark is still caught as bycatch or as a secondary target, although to a far lesser extent, of the swordfish gillnet fishery. It is clear that the species depends on adequate management measures, and would otherwise be at risk of overfishing. All this considered, the species is assessed as Near Threatened in this region based on significant population declines, which are now managed in US waters.

[1] Any grammatical or typos are in original.

Northwest and Western Central Atlantic
Estimates of trends in abundance from standardized catch rate indices of the U.S. pelagic longline fishery suggest that this species has likely undergone a decline in abundance in this region. Thresher sharks are generally recorded by genus by observers as well as in logbooks, which includes both Common Thresher Shark and Bigeye Thresher Shark (*A. superciliosus*) in this region, of which Common Thresher Shark is the less common. The area covered by the analyses, ranging from the equator to about 50Â°N, encompasses the confirmed range of threshers in this region. Estimates of the decline based on logbook and observer records of combined thresher sharks from 1986-2005 range between 50-80%. Fishing pressure on thresher sharks began over two decades prior to the start of this time series, thus the estimated declines are not from virgin biomass. Furthermore the sample size in the latter observer analysis was also very small compared with the logbook analyses which both showed declines. Given the apparent decline in abundance in this region and high fishing pressure from pelagic fleets, this species is assessed as Vulnerable (A2bd) in the northwest and western central Atlantic.

Mediterranean Sea
Adults and juveniles of Common Thresher Shark are regularly caught as bycatch in longline, purse seine and mid-water fisheries throughout the Mediterranean Sea, as well as in recreational fisheries. The species has some important parturition and nursery areas this region, for example the Alboran sea, where aggregations of pregnant females have been observed. Recent investigations show that pelagic sharks, including this species, are being increasingly targeted in the Alboran Sea by the Moroccan swordfish driftnet fleet. Data from this fishery suggest that both annual catches and mean weights of Common Thresher Shark have fallen as a result of fishing mortality. Given that pelagic fishing pressure is high and ongoing throughout the Mediterranean Sea, increased targeting and the decline in catches described above, Common Thresher Shark is currently assessed as Vulnerable (VU A3bd) in this region.

Northeast Atlantic
The Common Thresher Shark is taken as primarily as bycatch of longline fisheries for tuna and swordfish in the Northeast Atlantic, and also in driftnets and gillnets. It is very likely that this catch is retained. Limited information is available on thresher shark catch in this region and estimated landings are still considered incomplete. Prior to 2000, estimated landings fluctuated at 17-13 t, in 2000?2001 they exceeded 100 t, after which they dropped to 4 t in 2002 and have not exceeded 7 t since. Increased targeting of pelagic sharks by Moroccan drift-netters in the Alboran Sea and Strait of Gibraltar mentioned above, has also likely impacted Common Thresher Shark in the northeast and eastern central Atlantic. The species is currently assessed as Near Threatened in this region and there is a need to collect further data on the status the species in this area.

Indo-West Pacific
Little information is currently available on Common Thresher Shark in the Indo-West Pacific. Whereas records of Bigeye Thresher Shark and Pelagic Thresher are recorded in the catches of fisheries operating in this region, albeit very under-reported, very little

information is available on catches of Common Thresher Shark. Although pelagic fishing effort in this region is high, with reported increases in recent years, the Common Thresher Shark is more characteristic of cooler waters and further information needs to be collected on records and catches of the species in this region.

As a result of the drastic decrease of threshers throughout the 1970s and 1980s, the IUCN recognized the common thresher shark as vulnerable under its Red List in 2007. The Red List serves to provide taxonomic, conservation status and distribution information on a number of species. *Id*. In addition, the Red List is designed to determine the relative risk of extinction for such species. *Id*.

Despite being listed as vulnerable, the common thresher shark continues to be exploited in both target and bycatch fisheries. Consequently, populations continue to be vulnerable to rapid population decline. The meat of a common thresher shark is highly prized for human consumption, and, like many shark species, the common thresher's fins are profitable in the fin trade. The common thresher is also regularly caught as bycatch, although the exact mortality rate through bycatch remains unknown because of the high levels of unmanaged and unreported bycatch mortalities. (FAO 2014).

Additionally, common thresher sharks are larger sharks that are known to fight strongly when hooked. These characteristics make it a more challenging, and unfortunately more desirable, fish to catch. Given these characteristics, threshers have been growing in popularity with recreational anglers within the past decade. *Id*. One shark-fishing tournament noted that common thresher sharks made up 0.1% to 4.8% of the total catch from 1965 to 1995, but in 2004, the same tournament reported that threshers made up 27.8% of the total catch during its 2004 tournament. (Gervelis & Natason 2013 at 1535).

Because common threshers often use their caudal fins to strike its prey, threshers are commonly hooked through the caudal fin by anglers that have set up live baits on hooks. Once a thresher is hooked by its tail, it is then reeled in backwards to the boat. This process of reeling a shark in backwards puts the shark under significant stress because it loses its ability to pass oxygen over its gills. (NOAA "Scientists" 2011). Moreover, the damage to the caudal fin reduces the shark's ability for forward locomotion and capacity for ram ventilation, making it difficult to survive even if it is released after capture. (Heberer 2010). The overall post-release mortality estimate is 26%, with a 100% mortality rate in larger sharks measuring more than 180 cm that had fight times of more than 85 minutes. *Id.*

In addition to its meat and recreational value, the thresher's slow life history makes it vulnerable to exploitation. (Goldman et al. 2009). For instance, the common thresher shark has low fecundity and a mere 4-7% annual rate of population increase. (Reardon et al. 2009). This slow rate of increase is largely attributed to the fact that thresher pups require several years to become mature and reproduce. Thus, even moderate levels of exploitation significantly impact the thresher shark population, and harvested populations

could take decades to recover, even with conservation measures. (Cartamil et al. 2010 at 596).

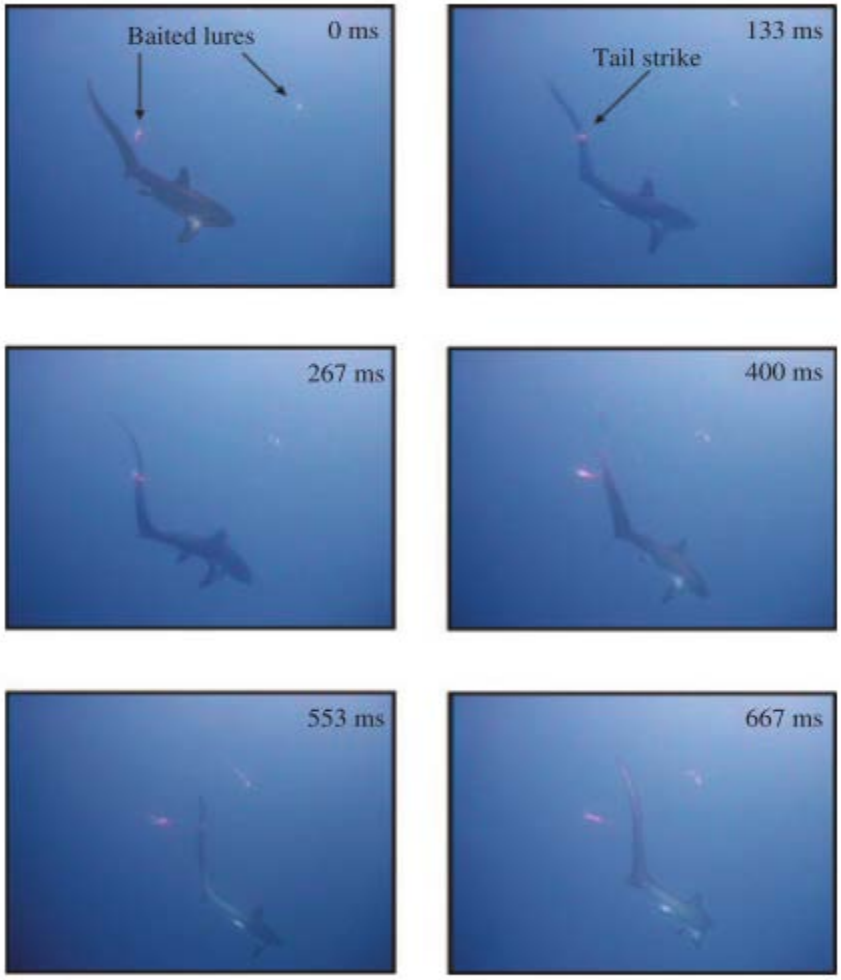

Figure 4. Frames from a video sequence of a *Alopias vulpinus* using its caudal fin to strike a baited lure. Source: Aalbers et al. 2010.

IDENTIFIED THREATS TO THE PETITIONED SPECIES: CRITERIA FOR LISTING

The common thresher shark meets three of the five criteria for listing under Section 4 of the ESA (16 U.S.C. § 1533(a)(1)):

> **B. Overutilization for commercial, recreational, scientific, or educational purposes;**
> **D. The inadequacy of existing regulatory mechanisms; and/or**
> **E. Other natural or manmade factors affecting its continued existence.**

See 16 U.S.C. § 1533(a)(1).

Historic and continued trends of fishing of this commercially and recreationally valuable shark remain a threat. (Criterion B). The U.S does not provide adequate protection

for this species. Additionally, this global species lacks international protection under the Convention on International Trade in Endangered Species (CITES), and regional management mechanisms remain ineffective. (Criterion D). Finally, the biological constraints of the common thresher shark, such as its low reproduction rate, coupled with the significant time required to reach maturity, contribute to the species' vulnerability to harvesting and its inability to recover rapidly. (Criterion E).

A. UTILIZATION FOR COMMERCIAL, RECREATION, SCIENTIFIC, OR EDUCATIONAL PURPOSES

1. Commercial Exploitation

The primary threat to *Alopias vulpinus* is economic exploitation by humans. (Shark Sider; EOL). All parts of the thresher shark are commercialized, but the fins of a shark are most valuable and highly sought after. Finning involves the practice of removing a shark's fins at sea and discarding the remainder of the shark carcass back into the ocean. Finning is a problematic practice because it is cruel and wasteful. This practice also has detrimental effects on the population of sharks.

In addition to its large fins, common thresher sharks are also targeted because the species is one of a handful of sharks that has a demand for its meat. (Gervelis & Natanson 2013 at 1535). Consequently, threshers are often caught in longline and pelagic gillnet fisheries and have also been fished with anchored bottom and surface gillnets. (Goldman et al. 2009). Even in instances where it is not the targeted species, threshers are often caught as bycatch. Additionally, people kill the shark to use its skin for leather and to extract small amounts of rich vitamin oils from its liver. (Goldman et al. 2009).

Common thresher sharks are threatened from a combination of slow life history characteristics, hence low capacity to recover from moderate levels of exploitation, and high levels of largely unmanaged and unreported mortality in target (for fins and their valuable meat) and bycatch fisheries. These threats extend to the worldwide populations, but have been analyzed for distinct populations as follows in the Encyclopedia:[2]

Eastern Central Pacific
A target pelagic gillnet fishery for this species developed off the west coast of the USA, Eastern Central Pacific (particularly California, and also Washington and Oregon) in the late 1970s (Goldman 2005, Maguire *et al.* 2006). This fishery serves as a well documented case of population depletion and provides strong evidence that there are numerous isolated subpopulations or stocks globally. Starting with 15 vessels in 1977, the fishery expanded to over 225 vessels in 1982 (Holts 1988, Hanan *et al*. 1993). The fishery peaked in 1982 with reported landings of 1,089.5 t (Anonymous 1993), declining

[2] The Encyclopedia of Life provides a detailed review of the threats to the Common thresher shark worldwide. This discussion, and all references cited within, are incorporated by reference in this petition. Any grammatical or typos are in original.

due to overfishing to less than 300 t by the late 1980s (Maguire *et al*. 2006). Fishing had heavily reduced the number of juvenile and subadult *A. vulpinus* off central and southern California, virtually eliminating them from the catch. In 1996, California catches of Common Thresher Shark were down to one-fifth of former levels (Smith 1998). This fishery was effectively eliminated by restrictions on the use of gill nets by 1990 (Bedford 1992, Smith 1998, Maguire *et al.* 2006). It was originally believed that a Pacific-wide distribution of the species would act as a buffer against over-harvesting (Bedford 1992, Smith 1998). However, this was shown not to be the case, as that portion of the population remained at low levels for several years, and is only reappeared in the catch records and in market places some time later (Bedford 1992, Smith 1998). The species is still caught as bycatch or as a secondary target, although to a far lesser extent, of the swordfish gillnet fishery and may be sold for higher prices in the market than swordfish (Bedford 1992, Smith 1998, Maguire *et al.*2006).

While the majority of fishery data for this species in the Pacific has come from California, it is fished in numerous locations throughout its range there. The Spanish pelagic longline fishery for swordfish and sharks is expanding rapidly in the Pacific, with effort expanding from the traditional grounds in the southeast Pacific into the central south Pacific and areas of the north Pacific in recent years (Mejuto 2005). *A. vulpinus* is taken in both artisanal and commercial longline fisheries in areas off South America, including Peru and Chile (M. Romero pers. comm., Bonfil *et al*. 2005). Hong Kong customs data shows that Peru is amongst the 20 countries that export the most dried fins to Hong Kong (Bonfil *et al*. 2005).

Indo-West Pacific

Little information is currently available on *A. vulpinus* in the Indo-West Pacific. Whereas records of *A. superciliosus* and *A. pelagicus* are recorded in the catches of fisheries operating in this region, albeit very under-reported, very little information is available on catches of *A. vulpinus*. Although pelagic fishing effort in this region is high, with reported increases in recent years, *A. vulpinus* is more characteristic of cooler waters and further information needs to be collected on records and catches of the species in this region.

Northwest and Western Central Atlantic

Thresher sharks are also an important pelagic species in the north Atlantic, although *A. vulpinus* is only sporadically recorded in the northwest and western central Atlantic and *A. superciliosus* is the more common thresher shark in this area. Thresher sharks are generally recorded by genus by observers as well as in logbooks. Analysis of U.S. Atlantic pelagic longline data from their scientific observer program for 1992?2005, suggest that the region of the US east coast where *A. vulpinus* is somewhat common is from about 35°N-40°N (approximately North Carolina to Philadelphia), where *A. vulpinus*: *A. superciliosus* are caught in a ratio of ~1:3 (Baum unpublished data). The first longline fisheries in the Atlantic were begun by the Japanese in 1956 in the western equatorial waters (Uozumi and Nakano 1996). The fleet expanded rapidly in the 1960s, and covered almost the entire Atlantic by the late 1960s (Bonfil 1994), including the areas currently fished by the American fleet. Fishing pressure is high and ongoing and as *A. vulpinus* is an

incidental catch in these fisheries monitoring of catches of this species is extremely limited. Currently, there are no management measures specific to this species in any EEZ or within international waters, and no stock assessments have been done. In Canada and the U.S., less than 5% of the pelagic longlining fleets are monitored by observers, making it difficult to elucidate reliable trends in abundance from these data. Fisheries monitoring in international waters is even more limited. The pelagic longline fishing grounds for the US fleet extend from the Grand Banks (about 45°N) in the northwest Atlantic to 5-10°S off the South American coast, within which geographical areas of longline fishing are defined for classification (Cortcs *et al*. 2007).

Baum *et al*. (2003) concluded from their analysis of Northwest Atlantic pelagic longline data that the relative abundance of all thresher sharks (*A. vulpinus* and *A. superciliosus* combined) had declined 80% from 1986-2000. This analysis is based on estimates of trends in abundance from standardized catch rate indices of the U.S. pelagic longline fishery logbook data, and the fifteen year time period is over one generation length for this species. Although the analysis is not species specific, the sample size of thresher sharks in this data is over 20,000. Furthermore, the area covered by the dataset analysed, ranging from the equator to about 50°N, encompasses the confirmed range of *A. vulpinus* in these two regions (Compagno 2001). An alternative analysis of the same logbook dataset for 1986-2005 that also combined *A. vulpinus* and *A. superciliosus*, resulted in an overall decline of 63% (Cortes *et al.* 2007). Fishing pressure on thresher sharks began over two decades prior to the start of this time series, thus the estimated declines are not from virgin biomass.

A more recent analysis of *Alopias* species trends from scientific observer data between 1992 and 2005 in the same U.S. pelagic longline fishery found an almost identical instantaneous rate of decline (-0.12 up to the year 2000) as in the logbook analysis (Baum *et al.* unpublished manuscript). For this nine year period (1992-2000), the decline amounts to 68%, therefore the decline back to when the fishery started in the 1960s (less than three generation period of 51 years) would be much greater. However, because of recent increases in the catch rates in 2004 and 2005, the overall trend from 1992-2005 of -0.024 was non-significant, and would amount to only a 26% decline (Baum *et al*. unpublished manuscript). Cortes *et al.* (2007) also conducted an alternative analysis of this same observer dataset for the same time period that also combined *A. vulpinus* and *A. superciliosus*. This analysis of the observer dataset showed a trend opposite to that of the logbook analysis, with a 28% increase since 1992. In contrast, the nominal observer series showed a 39% decline and the logbook index for the same time period showed a decrease of 50%. Furthermore the sample size in the observer analysis was much smaller (n=14-84) than that in the logbook analysis (n=112-1,292) and thus the trend estimated should be regarded with caution. Cortes *et al.*'s (2007) observer analysis was restricted to four out of the 11 geographical areas covered by the pelagic longline fishing fleet to keep a balanced statistical design (Cortes *et al*. 2007). Their full logbook analysis, which showed an overall decline of 63%, had much larger sample sizes and is thus better to estimate trends with more certainty (Cortes *et al.* 2007).

Southwest Atlantic
The thresher shark *A. vulpinus* is not as common in regional longline catches compared as the bigeye thresher*A. superciliosus*. Amorim *et al*. (1998) document its occurrence in the Santos (Sao Paulo) tuna longline fishery as "low" with only six specimens observed from 1974 to 1996. Gadig *et al.* (2001) reported on small numbers of juveniles taken by gillnet off Sao Paulo State.

Mediterranean Sea
Adults and juveniles of *Alopias vulpinus* are regularly caught as bycatch in longline, purse seine and mid-water fisheries throughout the Mediterranean Sea, as well as in recreational fisheries (Lipej *et al*. 2004). This species has some important parturition and nursery areas in the Mediterranean (Adriatic and Alboran Seas). Moreno and Moron (1992) observed aggregations of pregnant females of *A. vulpinus* in the Strait of Gibraltar.

Even though driftnetting is banned in Mediterranean waters, this practice has continued illegally (WWF 2005). The Moroccan swordfish driftnet fleet in the Alboran Sea operates year round, resulting in high annual effort levels (Tudela *et al*. 2005). Even though sharks are a secondary target or bycatch of this fishery, some boats deploy driftnets 1-2 miles from the coast where the chance of capturing pelagic sharks is higher. The catch rate for *A. vulpinus* is higher in boats actively fishing for sharks (from 0.7 to 1.5 N/fishing operation and 0.09 to 0.11 catch per km net). Both annual catches and mean weights of *Alopias vulpinus* have fallen as a result of fishing mortality in the Moroccan driftnet fishery, illustrating the likely impact of this illegal fishery on stocks in the Alboran Sea and adjacent Atlantic (Tudela *et al.* 2005). Valeiras *et al.* (2003) also report that pelagic sharks are forming an increasing proportion of the catch of Spanish swordfish sleets. Pelagic fishing pressure is high and ongoing throughout the Mediterranean Sea (Tudela 2004, Megalofonou *et al.* 2000).

Northeast Atlantic
A. vulpinus is caught primarily as a bycatch of longline fisheries for tuna and swordfish in the northeast Atlantic, and are also taken in driftnets and gillnets (ICES 2005, 2007). As a highly valuable species, it is very likely that this bycatch is retained (ICES 2005). Limited information is available on thresher shark catch in this region. ICES 2006 reports estimated landings of thresher shark at 13-107 t from 1996 to 2005 in the ICES area, however these data are still considered incomplete. Prior to 2000, estimated landings fluctuated at 17-13 t, in 2000?2001 they exceeded 100 t, after which they dropped to 4 t in 2002 and have not exceeded 7 t since. Increased targeting of pelagic sharks by Moroccan drift-netters in the Alboran Sea and Strait of Gibraltar (Tudela *et al.* 2005), mentioned above, has also likely impacted *A. vulpinus* in this area.

i. Direct Catch

The shark fin trade presents a significant problem for the common thresher because its large fin makes it a highly profitable species, and consequently, 2-6% of the fin trade market is made up of threshers. (Goldman et al. 2009). Fin economic values vary according

to shark species, the position of the fin, which determines the density of the fin needles, and the size of the fins, as larger fins contain longer fin needles and are thus more valuable. (Oceana 2011 at 8). The first dorsal, two pectorals, and lower caudal are usually the most valuable because they often contain a dense amount of fin needles. (See Figure below). These four fins are often sold as fin sets, with the four fins usually coming from the same shark. *Id.* at 9.

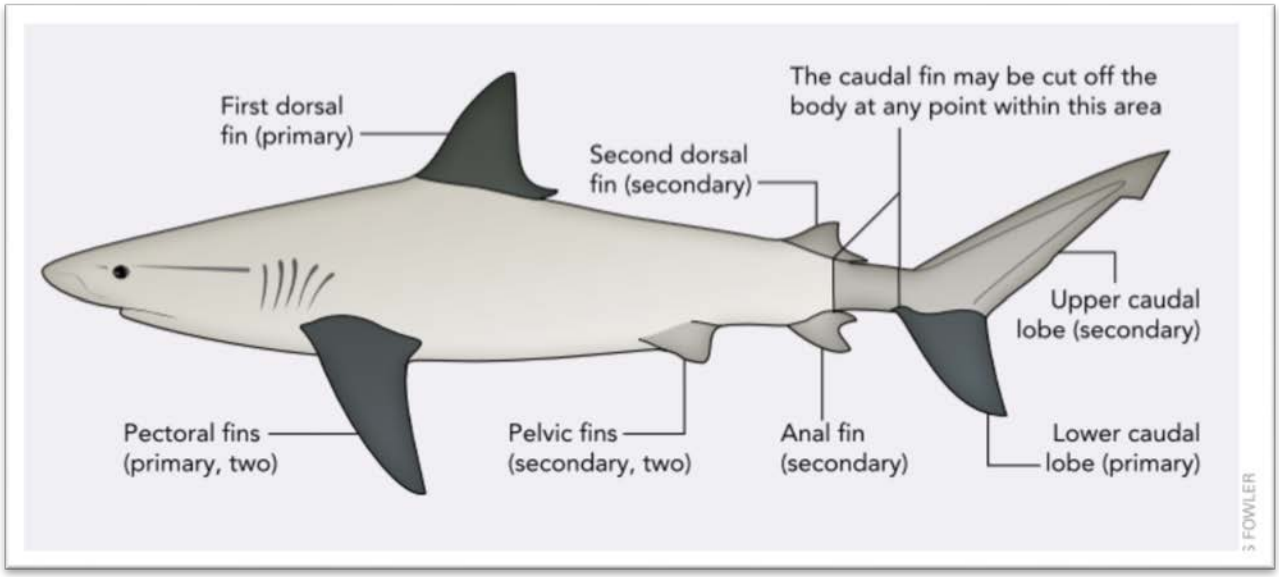

Figure 5: Primary (dark grey) and secondary (light grey) shark fin sets. Source: Oceana 2011 at 8.

In China, common threshers are the third most targeted catch of fisheries. (FAO 2014). Though catch statistics are not available, a 2006 Food and Agriculture Organization of the United Nations (FAO) review of the species' status found that "unless demonstrated otherwise, it is prudent to consider *Alopias* species as being fully exploited or overexploited globally." (Goldman et al. 2009). This finding is supported by statistics that reveal that populations of common threshers in the Atlantic Ocean have been reduced to up to 67% in the last ten years. (Lewis 2011).

In the U.S., most of the thresher harvest comes from the West Coast drift gillnet. (NOAA "FishWatch" undated). In 2012, the West Coast drift gillnet fishery caught approximately 40 metric tons of threshers. (NOAA "Fisheries" undated). Though there are no specific federal regulations for common thresher on commercial harvest, a federal ban on shark finning and required permits for highly migratory species, such as the thresher, provide some relief for commercial harvests.

ii. Indirect Catch

Even when common threshers are not targeted, the effect of being caught as bycatch is equally devastating. In general, bycatch represents a major threat to over 70% of elasmobranch species, and such species can experience population declines over short time

periods. (Gallagher et al. 2014 at 6). Common threshers that are caught as bycatch are unlikely to be released because threshers have high commercial value, and they may even be sold for higher prices than the swordfish that many gillnet fisheries are designed to catch. (Lewis 2011).

In instances where common thresher sharks are released, they appear to have low survival rates due to injury or high level of stress. Prolonged behavioral, physiological, biochemical or other challenges can cause high levels of stress and such high levels are typified by elevated catecholamine, cortisol, and other stress hormones in the blood. (Hight et al. 2006 at 146). High levels of catecholamine can alter cardiodynamics, affect branchial and systemic vascular resistances, augment respiratory gas transfer efficiencies, and can cause intense vasoconstriction, which can cause irreversible organ and tissue damage through acidosis or anoxia. *Id.* at 148.

A recent study of juvenile threshers caught on drift longlines indicated that the adrenaline concentration of moribund threshers were much higher than those of the tag-release group from the study. *Id*. The study attempted to maximize captured shark survival rates by deploying the longline for a short period of three hours before recovery, and the entire handling process for each shark took less than 10 minutes. Even under such circumstances, approximately 5% of threshers were either dead or moribund. *Id.* at 147. Though there are no studies that document the precise survival rates of common thresher sharks when caught as bycatch, common thresher sharks are often noted to be a significant bycatch species. (Sharks, Skates & Rays of the Pacific Northwest undated). In fact, a 2014 study of the vulnerability of sharks as pelagic longline bycatch revealed that the closely related bigeye thresher is among the top five species most vulnerable to bycatch mortality. (Gallagher et al. 2014 at 5). Threshers are known to be a species that is not robust to entanglement and handling, and thus, the likelihood of post-release survival decreases with increased handling time and entanglement. (Lyons et al. 2013 at 380).

Figure 6. A doomed thresher shark in Mexico's Gulf of California is entangled in a gill net. Source: National Geographic

2. Recreational Exploitation

Common thresher sharks are the largest threshers and can measure beyond 600 cm (20 feet). (FAO 2014). Because of their large size, common threshers are naturally a desirable game fish. In addition to its size, however, the common thresher also tends to fight strongly when caught, sometimes even jumping out of the water, which is another reason why it is a popular target for sport anglers. (FAO 2014). Though the species is large as a whole, larger individual threshers are more sought after by anglers because they tend to resist for longer periods of time than smaller individuals. The common thresher is often hooked by the tail because it strikes the bait with its caudal fin. Threshers are then reeled in backwards towards the boat. Recreational fishing for the thresher, however, is not federally regulated. (NOAA "Scientists" 2011).

Aware of the problems with harvesting and the thresher's life history characteristics, some anglers and conservationists have recently begun promoting thresher fishing as a catch and release sport, however, such efforts are futile if the fish cannot survive the release. The common thresher is a ram-ventilating species that requires forward motion to ventilate the gills. (Heberer et al. 2010 at 499). Therefore, when individuals are reeled in backwards, they are unable to properly ventilate their gills, and the damage may be done before the animal even reaches the boat. In fact, research indicates that this inability to pass oxygen over its gills often leads to death. (NOAA

"Scientists" 2011). Consequently, the survival rate of threshers that were caught and released is just 26%. (Heberer et al. 2010 at 499).

Larger threshers are most negatively affected by catch-and-release techniques because they tend to resist for longer periods of time. This extended fight time results in a higher post-release mortality, with one study finding that all sharks measuring more than 180 cm (6 feet) with fight times greater than 85 minutes died. That same study, however, had no mortalities for smaller sharks measuring less than 130 cm with fight times of 85 minutes or less. (Heberer et al. 2010 at 499). This strongly indicates that larger sharks resist for longer periods of time and that the duration of fight time has a strong influence on post-release survival. *Id.* at 495.

Figure 7. A thresher shark hooked by the tail. Source: National Oceanic and Atmospheric Association

Figure 8. A thresher hooked by the tail. Source: World Fishing Network

B. THE INADEQUACY OF EXISTING REGULATORY MECHANISMS

1. National Regulation

Existing regulations have not adequately protected the common thresher shark. There are no regulatory mechanisms specifically for common thresher sharks. Threshers, however, are protected under the Shark Finning Prohibition Act (SFPA), Shark Conservation Act (SCA), and Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), which cover all sharks.[3] The Magnuson-Stevens Act is the primary law regarding marine fisheries management. (NOAA "Magnuson-Stevens" undated).

In 2000, the SFPA amended section 307 of the Magnuson-Stevens Act to prohibit individuals under U.S. jurisdiction from engaging in finning, possessing shark fins aboard a U.S. fishing vessel without the corresponding carcasses, and landing fins without the corresponding carcasses. (FWS 2013 at 25687). The SFPA amendment also extended the US Atlantic finning ban to US Pacific waters. (Fowler & Seret 2010 at 37). Similarly, the SCA was enacted in 2010 and also amended the Magnuson-Stevens Act. The SCA prohibits

[3] The dogfish shark is the only exception.

finning, transferring fins from one vessel to another vessel, and receiving a fin in such a transfer, unless the fin is naturally attached to the corresponding carcass. (FWS 2013 at 35686).

These measures, however, do not prohibit landing of sharks if their fins are intact, and thus, fins may be taken so long as it is not done at sea. In sum, the various amendments to the Magnuson-Stevens act has culminated in 16 U.S.C. § 1857(P)(i) – (iii), which address the conservation of sharks by prohibiting: (i) finning at sea; (ii) possession of severed fin at sea without the corresponding carcass; and (iii) landing a fin without the corresponding carcass. Additionally, the Act specifies that for the purposes of § 1857(P), there is a rebuttable presumption that any fins landed from a fishing vessel or found on board a vessel were taken in violation of § 1857(P) if the total weight of shark fins exceeds five percent of the total weight of shark carcasses landed or found on vessels. Though these laws provide some relief, they do not prohibit the harvesting of fins, but merely the act of finning; a shark may be landed and its fin may still be harvested so long as it is done on land. This does not adequately address the concerns surrounding thresher populations. The ban merely prohibits one method of depleting the population while continuing to allow unsustainable rates of shark fishing through means other than finning in open waters.

In addition to general laws that prohibit finning, eleven states and territories have placed bans on the shark fin trade. The Commonwealth of the Northern Marianas, Guam, Delaware, Maryland, Illinois, New York, Washington, Oregon, California, Hawaii and most recently, Massachusetts, prohibit the sale, trade, and possession of shark fin. (Knowles 2013; Inquisitr 2014). These state-specific laws are much more significant than the federal finning ban because these state bans freeze the shark fin market altogether in the covered states. However, there are only nine states and two territories that have such bans. Given the vulnerability of the common thresher shark to recover from even mild exploitation, similar bans and heightened conservation mechanisms need to be implemented across the board in order to protect the health of common thresher shark populations.

2. International and Regional Regulation

There are no laws that specifically address the needs of the common thresher shark. In June of 2014, however, the European Union, Egypt, Ecuador, and Costa Rica formally proposed that the common thresher shark, along with the pelagic and big eye threshers, receive protection under the International Convention on the Conservation of Migratory Species of Wild Animals (CMS). (Global Shark Conservation 2014). Final decisions on whether the three thresher species will be listed under the CMS will be made in November of 2014.

Though there are no regulations that specifically protect common thresher sharks, regulations that provide general protection for all sharks exist. The high seas are the last of the commons, and accordingly, a majority of marine wildlife do not fall squarely within national boundaries. Thus, management is based on national as well as regional measures. Several Regional Fisheries Management Organizations (RFMOs) have adopted measures that address shark finning, such as the International Commission for the 2004

Conservation of Atlantic Tunas, the General Fisheries Commission of the Mediterranean, the Indian Ocean Tuna Commission, North Atlantic Fisheries Organization, the Southeast Atlantic Fisheries Organization, the Western Central Pacific Fisheries Commission and the Northeast Atlantic Fisheries Commission. All of these regional finning regulations utilize a maximum fin to carcass weight ratio as their management mechanisms.

These ratios are problematic for shark conservation for several reasons. First, the ratios are not clearly defined. The ratios set by these RFMOs are identical and prohibit vessels from having the total weight of fins exceed 5% of the total weight of shark carcasses on board. (Fowler & Seret 2010 at 15). The ambiguity lies in what constitutes weight. The total weight in these ratios can refer to dressed weights or live weights. Dressed weight refers to the weight of a shark after it is beheaded and gutted. Live weight refers to the weight of a whole shark. Though there is some variance, most species' fins weigh less than 5% of their live weight, and the mean and median fin to carcass ratio were 3% and 2.2%, respectively. (Biery & Pauly 2012). The ratios set by these regulations were deliberately unclear about whether the weight referred to the dressed weight or live weight of sharks in order to accommodate the different domestic standards of party countries. (Fowler & Seret 2010 at 17). This becomes problematic when a country interprets weight to mean live weight, which allows fishers to harvest more fins than correspond to the number of carcasses, while still meeting the weight ratio. Moreover, ratio-based regulations may also allow for high-grading, which is the practice of mixing carcasses and fins from different species, usually fins from larger species with carcasses from smaller species, to maximize profit. (Oceana 2011). These loopholes are particularly detrimental to larger shark species, such as the common thresher shark, because their larger fins are more valuable, and accordingly, it is more likely that they will be victims of finning.

Second, the RFMOs fail to specify whether the ratio applies to wet or dried fins. This is significant because eight dried fin sets weigh less than 5% of the weight of a single whole shark carcass. (Fowler & Seret 2010 17). This allows for yet another loophole within weight ratio regulations because vessels can stay within the ratio limit by discarding seven out of the eight sharks while drying the fin sets of all eight animals on board. *Id.*

In addition to these problems, there are little to no enforcement mechanisms for these RFMO finning bans. Compliance monitoring is said to be "extremely limited in most areas," and even the occasional high seas inspections are rare. *Id.*

Most countries allow for some degree of shark fishing and trade, but a handful of countries have blanket bans on the shark fin trade. The Bahamas, the Republic of Congo (also known as Congo-Brazzaville), Fiji, French Polynesia, Israel, the Republic of Maldives, the Marshall Islands, and Palau have strict bans on all shark fishing. (Shark Savers WildAid undated). Other countries have bans on shark fishing, but with some limitations. The Cook Islands, Egypt, Indonesia, and the New Zealand territory of Tokelau ban shark fishing within a limited area off of their respective coasts. (Shark Savers WildAid undated). Though there are international regulations by region and country, they are inadequate because a majority of the world's oceans allow for shark fishing and finning. Furthermore, all of the major RFMOs still implement the 5% fin to carcass ratio regulation, which is riddled with

loopholes. These general regulations are inadequate for all species, but especially for larger species such as the common thresher sharks, whose larger fins make them a more targeted species.

C. OTHER NATURAL OR MANMADE FACTORS AFFECTING ITS CONTINUED EXISTENCE

Several characteristics of common thresher sharks make them biologically vulnerable to fishing. As previously discussed, threshers generally have low reproductive rates. Threshers are ovoviviparous or live-bearing, which results in small litters of just two to four well-developed pups. (DCNA undated). Additionally, common thresher sharks are polygynous, with males impregnating multiple females. This also poses a problem for the species as sport fishers target larger, violent, sharks because they present a greater challenge. If a prolific male is killed, that loss could have a much larger impact on population declines.

The size of threshers also poses a threat to young threshers. Newborn common thresher sharks are approximately 150 cm in length. The size of the pups makes them easy targets for larger sharks that prey upon these young sharks. Though younger threshers usually remain in nurseries for approximately three years until they are large enough to avoid predation, they are still much more likely to fall prey to predators than pups of smaller shark species. (Lewis 2011).

D. QUALIFICATION AS ONE OR MORE DPSS

1. Discreteness

Subpopulations of common thresher sharks discussed above are distinct from each other. Despite the species' declining numbers, the common thresher has a global range that extends across many international governmental boundaries. The result, as discussed above, is a broad and varied spectrum of harvest control, habitat management, conservation statuses, and regulatory mechanisms. This is significant in light of the ESA, since two primary problems facing the species is utilization and inadequate regulations—problems that are typically local in nature. Due broad differences in regulation of their management and capture, the subpopulations of common thresher sharks should be considered sufficiently discrete for protection as DPS's under the ESA.

2. Significance

Given that the species as a whole is considered at least vulnerable, if not threatened, and because of the significant threats to the species as a whole, the loss of any one of the subpopulations would be significant. Not only would the loss of any one of the subpopulations "result in a significant gap in the range of the taxon" (61 FR 4722 at 4725), but could result in the loss of unique characteristics that are likely among members of these various populations. While little is known about each of the subpopulations, there does appear to be different life history and behavioral characteristics among them. For instance, while the species is generally migratory, in the eastern Pacific and western Indian

Ocean and possibly elsewhere this species is not known to make transoceanic movements (UN Factsheet, undated). Similarly, while for the most part, these sharks are rogue mavericks and remain largely independent, on occasion, they join together in large groups. This phenomenon in the common thresher has mostly been observed in the Indian Ocean. The reasoning for these get-togethers is currently unknown. (Shark Sider, undated)

The final qualification for protecting a population as a DPS, if it is found to be both discrete and significant, is whether the DPS merits such protection. As shown above, population estimates for the common thresher in each of the DPS' have declined rapidly in recent years. Additionally, each DPS meets multiple ESA listing criteria. Consequently, each of the five DPSs warrants listing as "threatened" or "endangered" under the ESA.

CONCLUSION

The common thresher sharks merits listing as an Endangered or Threatened Species under the Endangered Species Act. The species faces threats from historic and continued fishing for both commercial and recreational purposes. Like many sharks, it has a low reproduction rate and a slow rate of maturation, which impedes its ability to recover from fishing. Currently, threshers do not receive any protections to sufficiently address the threats it faces, making the listing of the species that much more crucial in its continued survival. Listing the common thresher shark under the ESA would protect the species along the western Atlantic, where common threshers heavily reside, and northeastern Atlantic coast of the United States. Moreover, the listing would prohibit the import and export of common thresher shark products, which would place a freeze on the fin market trade for common threshers. Similar bans on the fin market trade in several U.S. states indicate that such a measure is much more effective for shark conservation than just a ban on finning.

REQUESTED DESIGNATION

Friends of Animals hereby petitions the National Marine Fisheries Service within the National Oceanic and Atmospheric Administration to list the common thresher shark (*Alopias vulpinus*) as "endangered" or "threatened" pursuant to the Endangered Species Act. We request that NMFS list the species: (1) throughout its entire range (worldwide); or in the alternative (2) as six distinct population segments. The six subpopulations, any of which might qualify for listing, are in the Eastern Central Pacific, Indo-West Pacific, Northwest and Western Central Atlantic, Southwest Atlantic, Mediterranean, and Northeast Atlantic. The listing is warranted because the common thresher shark is threatened under three of the five ESA listing factors: overutilization; inadequate existing regulatory mechanisms; and other natural or manmade factors affecting its continued existence. ESA listing will help conserve and recover the depleted common thresher shark population.

CRITICAL HABITAT

Friends of Animals requests that critical habitat be designated for this species concurrent with final ESA listing.

REFERENCES

ANIMAL DIVERSITY WEB (ADW), Lewis, J. (2011) *Alopias vulpinus*, Retrieved from http://animaldiversity.ummz.umich.edu/accounts/Alopias_vulpinus/ [Accessed July 31, 2014]

Aalbers, S.A., Bernal, D., Sepulveda, C.A. (2010) The functional role of the caudal fin in the feeding ecology of the common thresher shark Alopias vulpinus JOURNAL OF FISH BIOLOGY 76: 1863 – 1868. Retrieved from http://pier.org/userdocs/images/files/scientific_publications/Aalbers%20et%20al.%202010.pdf [Accessed July 31, 2014]

Bedford, D.W. 1992a. Thresher shark. Pages 49–51 *in* W.S. Leet, C.M. Dewees, and C.W. Haugen, eds., California's living marine resources and their utilization. California Sea Grant Extension Publ. UCSGEP-92–12*

Biery, L., Pauly, D. (2012). A global review of species-specific shark-fin-to-body-mass ratios and relevant legislation. JOURNAL OF FISH BIOLOGY. Retrieved from file:///Users/ajyoon/Downloads/IOTC-2013-WPEB09-INF04_-_Sharks_-_Biery_and_Pauly.pdf [Accessed July 31, 2014]

Bonfil. R., Simpfendorfer, C.A., and Acuña, E. (2005). Regional Overviews: 7.10 Southeast Pacific. pp. 186-192, in: Fowler, S.L., Cavanagh, R.D., Camhi, M., Burgess, G. H., Cailliet, G.M., Baum JK, Myers RA, Kehler DG, Worm B, Harley SJ, Doherty PA (2003) Collapse and conservation of shark populations in the northwest Atlantic. Science 299

Cartamil, D., Wegner, N.C., Aalbers, S., Sepulveda, C.A., Baquero, A., Graham, J.B. (2010). Diel movement patterns and habitat preferences of the common thresher shark (*Alopias vulpinus*) in the Southern California Bight. MARINE AND FRESHWATER RESEARCH 61: 596-604

Clarke, S. C., McAllister, M. K., Milner-Gulland, E. J., Kirkwood, G. P., Michielsens, C. G. J., Agnew, D. J., Pikitch, E. K., Nakano, H. and Shivji, M. S. (2006), Global estimates of shark catches using trade records from commercial markets. Ecology Letters, 9: 1115–1126.*

Compagno, L.J.V. 1990c. Shark exploitation and conservation. In H.L. Pratt, Jr., S. H. Gruber, & T. Taniuchi, eds.. Elasmobranchs as living resources: Advances in the biology, ecology, systematics, and the status of the fisheries. NOAA Technical Report (90): 397-420, fig. 1-16.*

Cortés, E., C.A. Brown, and L.K. Beerkircher. 2007. Relative abundance of pelagic sharks in the western North Atlantic Ocean, including the Gulf of Mexico and Caribbean Sea. Gulf and Caribbean Research 19*

DCNA (Dutch Caribbean Nature Alliance). Undated. Common Thresher Shark. Retrieved from http://www.dcnanature.org/thresher-shark/ [Accessed July 31, 2014]

EOL (Encyclopedia of Life). Undated. *Alopias vulpinus* Common Thresher Shark. Retrieved from http://eol.org/pages/994691/details [Accessed August 21, 2014]

FAO (Food and Agriculture Organization of the United Nations). 2014. Species Fact Sheets Alopias vulpinus. Retrieved from http://www.fao.org/fishery/species/2008/en [Accessed July 31, 2014]

Fordham, S.V., Simpfendorfer, C.A., and Musick, J.A. (comp. and ed.). Sharks, rays and chimaeras: the status of the chondrichthyan fishes. Status Survey. IUCN/SSC Shark Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK.*

Fowler, S., Seret, B. (2010) Shark fins in Europe: Implications for reforming the EU finning ban. The Shark Specialist Group and the European Elasmobranch Association. [Accessed July 31, 2014]

Gadig, O. B. F. (2001). Tubaro˜es da Costa Brasileira. PhD thesis, Universidade Estadual Paulista, Unesp.*

Gallagher, A.J., Orseben, E.S., Hammerschlag, N., Serafy, J.E. 2014 Vulnerability of oceanic sharks as pelagic longline bycatch. GLOBAL ECOLOGY AND CONSERVATION.

Gervelis, B. & Natanson, L. (2013). Age and Growth of the Common Thresher Shark in the Western North Atlantic OCEAN TRANSACTIONS OF THE AMERICAN FISHERIES SOCIETY 142: 1535-1545.

Global Shark Conservation. (June 9, 2014) EU, Egypt, Ecuador, and Costa Rica Throw Lifeline to Overfished Sharks. Retrieved from http://www.pewtrusts.org/en/about/news-room/news/2014/06/lifeline-to-overfished-sharks [Accessed July 31, 2014]

Goldman, K.J., Baum, J., Cailliet, G.M., Cortés, E., Kohin, S., Macías, D., Megalofonou, P., Perez, M., Soldo, A. & Trejo, T. (2009). *Alopias vulpinus*. The IUCN Red List of Threatened Species. Version 2014.2. Retrieved from http://www.iucnredlist.org/details/39339/0 [Accessed July 31, 2014]

Hanan, D. A., Holts, D. B., and Coan, A. L., Jr (1993). The California drift gill net fishery for sharks and swordfish during the fishing seasons 1981-82 through 1990-91. California Department of Fish and Game Fish Bulletin 175*

Heberer, C., Aalbers, S.A., Bernal, D., DiFiore, B., Sepulveda, C.A. (2010) Insights into catch-and-release survivorship and stress-induced biochemistry of common thresher sharks (Alopias vulpinus) captured in the southern California recreational fishery FISHERIES RESEARCH 106: 495-500

Hight, B., Graham, J., Kennedy, B., Taylor, V., Sepulveda, C., Bernal, D., Ramon, D., Rasmussen, R., Lai, N. (2006). Plasma catecholamine levels as indicators of the post-release survivorship of juvenile pelagic sharks caught on experimental drift longlines in the Southern California Bight. MARINE AND FRESHWATER RESEARCH 58: 145 – 151

Holts, D. 1988. Review of U.S. west coast commercial shark fisheries. Mar. Fish. Rev. 50:(1)1–8*

Inquisitr. (July 25, 2014) Shark Fin Trade Banned in Massachusetts. Retrieved from http://www.inquisitr.com/1373360/shark-fin-trade-banned-in-massachusetts/ [Accessed July 31, 2014]

Knowles, David. (2013 July 26) Gov. Cuomo signs law making New York the 8th state to ban shark fin trade. New York Daily News Retrieved from http://www.nydailynews.com/news/national/new-york-bans-shark-fin-trade-article-1.1409910 [Accessed July 31, 2014]

Jordan, Vanessa. Thresher Shark (Figure 3). Florida Museum of Natural History Ichthyology Education Biological Profiles. Retrieved from http://www.flmnh.ufl.edu/fish/gallery/descript/threshershark/efo~7.html [Accessed July 31, 2014]

Lipej, L. & De Maddalena, A. & Soldo, A. (2004) Sharks of the Adriatic Sea*

Lyons, K., Jarvis, E., Jorgensen, S., Weng, K., O'Sullivan, J., Winkler, C., Lowe, C. (2013) The degree and result of gillnet fishery interactions with juvenile white sharks in southern California assessed by fishery-independent and –dependent methods. FISHERIES RESEARCH.

Maguire, J.-J.; Sissenwine, M.; Csirke, J.; Grainger, R.; Garcia, S.
The State Of World Highly Migratory, Straddling And Other High Seas Fishery Resources And Associated Species. *FAO FISHERIES TECHNICAL PAPER.* NO. 495. ROME: FAO. 2006. 84P.*

Marine Bio: Sharing the Wonders of the Ocean. Undated (cover photo). Thresher Sharks, Alopias vulpinus. Retrieved from http://marinebio.org/species.asp?id=284 [Accessed July 31, 2014]

Megalofonou, P., D. Damalas & C. Yannopoulos. 2005. Composition and abundance of pelagic shark by-catch in the eastern Mediterranean Sea. Cybium, 29(2)*

Mejuto J., García-Cortés B. and Ramos-Cartelle A., 2006. An overview of research activities on swordfish (Xiphias Gladius) and the bycatch species, caught by the Spanish longline fleet in the Indian Ocean. IOTC 2006-WPB-11*

Natanson, L., Gervelis, B. (2013) The Reproductive Biology of the Common Thresher Shark in the Western North Atlantic Ocean. TRANSACTIONS OF THE AMERICAN FISHERIES SOCIETY 142: 1546-1562.

NOAA (National Oceanic And Atmospheric Administration) Fisheries. (2011). Scientists, Anglers Work Together to Prevent Thresher Shark Tailspin Retrieved from http://www.nmfs.National Oceanic and Atmospheric Administration.gov/stories/2011/12/6_thresher.html [Accessed July 31, 2014]

NOAA (National Oceanic and Atmospheric Administration) Fisheries Feature. Undated. Magnuson-Stevens Fishery Conservation and Management Act Reauthorized. Retrieved

from http://www.nmfs.National Oceanic and Atmospheric Administration.gov/msa2005/ [Accessed July 31, 2014]

NOAA (National Oceanic and Atmospheric Administration) Fisheries Service. Undated. Common Thresher Shark Fact Sheet. Retrieved from https://swfsc.National Oceanic and Atmospheric Administration.gov/uploadedFiles/Divisions/FRD/Large_Pelagics/Sharks/Thresher%20shark%20fact%20sheet-final.pdf [Accessed July 31, 2014]

NOAA (National Oceanic And Atmospheric Administration) Fisheries West Coast Region. Undated. Swordfish Large Mesh Drift Gillnet. Retrieved from http://www.westcoast.fisheries.National Oceanic and Atmospheric Administration.gov/fisheries/migratory_species/hms_DGN_gear.html [Accessed August 1, 2014]

NOAA (National Oceanic And Atmospheric Administration) FishWatch. Undated. FishWatch U.S. Seafood Facts Pacific Common Thresher Shark. Retrieved from http://www.fishwatch.gov/seafood_profiles/species/shark/species_pages/pac_common_thresher_shark.htm [Accessed July 31, 2014]

Oceana. (2011) Shark finning and the EU. Retrieved from http://oceana.org/sites/default/files/euo/OCEANA_Finning_Feb_2011.pdf [Accessed July 31, 2014]

OCAN (Oregon Coast Aquarium Newport). Undated. Common Thresher Shark. Retrieved from http:///exhibits/oregon-coast/animals/common-thresher-shark [Accessed July 31, 2014]

Reardon, M., Márquez, F., Trejo, T. & Clarke, S.C. (2009). *Alopias pelagicus*. The IUCN Red List of Threatened Species. Version 2014.2. Retrieved from http://www.iucnredlist.org/details/161597/0 [Accessed July 31, 2014]

Smith, S.E. et al. 1998. Mar. Fresh. Res. 49:663-678*

Shark Sider (Page created by Mike Rogers). Undated. The Thresher Shark. Retrieved from http://www.sharksider.com/thresher-shark.html [Accessed August 21, 2014]

Shark Savers WildAid. Undated. Laws Protecting Sharks. Retrieved from http://www.sharksavers.org/en/our-programs/shark-sanctuaries/learn-more/laws-protecting-sharks [Accessed July 31, 2014]

Sharks, Skates & Rays of the Pacific Northwest. Undated. Common Thresher Shark. Retrieved from http://www.pacificsharks.org/common_thresher_shark.php [Accessed July 31, 2014]

Tudela, S. (2004). Ecosystem effects of fishing in the Mediterranean: an analysis of the major threats of fishing gear and practices to biodiversity and marine habitats. *Studies and Reviews. General Fisheries Commission for the Mediterranean*. No. 74. Rome, FAO*

Tudela, S., Kai, K.A., Maynou, F., El Andalossi, M. and Guglielmi, P. (2005). Driftnet Fishing and biodiversity conservation: the case study of the large-scale Moroccan driftnet fleet operating in the Alboran Sea (SW Mediterranean). *Biological Conservation* 121*

UN Species Factsheet, Alopias vulpinus, undated.

Valeiras and J. M. de la Serna, 2003. Contribution to the biological study of blue shark (Prionace glauca) incidental catch by the Spanish surface longline fisheries for swordfish in the western Mediterranean. Col. Vol. Sci. Pap. ICCAT, 55(1)*

WDFW (Washington Department of Fish & Wildlife). Undated. Bottomfish Identification: Sharks, Skates, and Ratfishes. Retrieved from http://wdfw.wa.gov/fishing/bottomfish/identification/sharks_skates_ratfish/a_vulpinus.html [Accessed July 31, 2014]