PETITION TO LIST THE
Caribbean Electric Ray (*Narcine bancroftii*)
UNDER THE U.S. ENDANGERED SPECIES ACT

Submitted to the United States Secretary of Commerce, Acting Through the National Oceanic and Atmospheric Administration National Marine Fisheries Service

Petitioner:
WildEarth Guardians
312 Montezuma Ave.
Santa Fe, NM 87501
505-988-9126

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Photo by NMFS

PETITION PREPARED BY KIMBERLY JAHNKE

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Introduction

WildEarth Guardians hereby petitions the Secretary of Commerce, acting through the National Marine Fisheries Service (NMFS) within the National Oceanic and Atmospheric Administration (NOAA) to list and thereby protect under the Endangered Species Act (ESA) the Caribbean Electric Ray (*Narcine bancroftii*) throughout its range.

The Caribbean Electric Ray (*Narcine bancroftii*) is increasingly rare and imperiled across its range in the Western Atlantic. The principal reason is simple: inshore shrimp trawls and other fisheries are killing too many rays as "bycatch." Though the implementation of Turtle Exclusion Devices and Bycatch Reduction Devices has lowed overall nontarget takes of rays, these mitigation measures are ineffective for the Caribbean Electric Ray because of its small size and slow swimming pace.

The International Union for Conservation of Nature (IUCN) lists the Caribbean Electric Ray as Critically Endangered (Carvalho et al. 2007). Scientists have documented a 98% decline since 1972 in the Northern Gulf of Mexico. *Id*. Fishing activities, both artisanal and commercial, are intense and often unregulated elsewhere in the species' range. Therefore, similar dramatic declines may also have occurred rangewide. More importantly, the Northern Gulf of Mexico, where the Caribbean Electric Ray has drastically declined, is largely within the territorial waters of the United States. ESA listing would therefore confer substantial benefits to this marine species.

Unsustainable bycatch mortality, combined with threats posed by the modification and destruction of Caribbean Electric Ray's habitat along the Gulf and Western Atlantic coasts and elsewhere in the Caribbean, makes survival of this species unlikely unless it is protected under the ESA. The Ray's coastal habitats are threatened by increasing human populations that depend on the sea as both a food source and for energy development. Further, the recent British Petroleum oil spill disaster is a timely example of careless human destruction of the marine ecosystem that sustains the Ray and hundreds of other species in the Gulf of Mexico.

Because of the precarious status of this species, increasing threats, and insufficient regulatory safeguards, NMFS should list the Caribbean Electric Ray as Endangered or Threatened under the Endangered Species Act and provide it with critical habitat. The species is at high risk of extinction.

Applicability of the Endangered Species Act

In light of the Caribbean Electric Ray's imperilment, Petitioner requests listing of this species under the ESA as either threatened or endangered, throughout its historic and current range. Taxa eligible for ESA listing 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)).[1] Both the statute (16 U.S.C. § 1532 *et seq*.) and regulations

[1]The sole exclusion is for "a species of the Class Insecta determined by the Secretary to constitute a pest whose protection…would present an overwhelming and overriding risk to man." 16 U.S.C. § 1532(6). It is difficult to imagine an insect so imperiled as to warrant ESA protection that presents a grave risk to humans.

implementing the Endangered Species Act (50 C.F.R. § 424) are applicable to this petition. Subsections that concern the formal listing of the Ray as an Endangered or Threatened species are:

> "*Endangered species* means a species that is in danger of extinction throughout all or a significant portion of its range."…(k) "species" includes any species or subspecies that interbreeds when mature. *See* 16 U.S.C § 1532(6), 50 C.F.R. § 424.02(e).
>
> "*Threatened species* means any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." *See also* 16 U.S.C § 1532(20), 50 C.F.R. § 424.02(m).

This Petition demonstrates that the Ray is imperiled to the extent that it warrants listing as either Endangered or Threatened under the ESA.

ESA Section 4 (16 U.S.C. § 1533(a)(1)) sets forth listing factors under which a species can qualify for ESA protection (see also 50 C.F.R. § 424.11(c)):

A. The present or threatened destruction, modification, or curtailment of habitat or range;
B. Overutilization for commercial, recreational, scientific, or educational purposes;
C. Disease or predation;
D. The inadequacy of existing regulatory mechanisms; and
E. Other natural or manmade factors affecting its continued existence.

As WildEarth Guardians will demonstrate, at least three of the five listed factors set forth in 16 U.S.C. § 1533(a)(1) and in 50 C.F.R. § 424.11(c) have resulted in the continued decline of the Caribbean Electric Ray and are causing the species to face extinction in the foreseeable future. A taxon need only meet one listing factor outlined in the ESA to qualify for federal listing.

As required by the ESA, WildEarth Guardians also requests that the Secretary designate critical habitat for the Caribbean Electric Ray within the territory of the United States concurrently with listing the species as threatened or endangered. *See* 16 U.S.C. § 1533(a)(3)(A) and 50 C.F.R. § 424.12.

Petitioner

Petitioner WildEarth Guardians ("Guardians") is a non-profit environmental organization with approximately 4,500 members living throughout the United States. Guardians has an active endangered species protection campaign and frequently files petitions to list species under the ESA. Guardians' members and staff frequently use and enjoy the Caribbean Electric Ray's habitat and the ecosystems of the Caribbean and the Gulf of Mexico for recreational, aesthetic, and scientific activities and will continue to do so. Members and staff are harmed by the general loss of biodiversity in the Gulf of Mexico. Guardians and its members have a substantial interest

in the conservation of the Caribbean Electric Ray and will be adversely affected if the Secretaries decline to protect this species and its habitat under the ESA.

Species Characteristics

I. Taxonomy

Narcine bancroftii (Griffith and Smith, 1834) is known by the common names "Caribbean Electric Ray," "Lesser Electric Ray," "Brazilian Electric Ray," "Small Electric Ray," "Spotted Torpedo Ray," "Torpedofish," "Trembler," and "the Electric Ray" (Press 2010). Throughout this petition, this species is referred to as *N. bancroftii* or the Caribbean Electric Ray. The genus name *Narcine* is derived from the Greek "*narke*" meaning numbness, referring to its ability to produce an electric shock. *Id*. The species has been almost universally referred to as *Narcine brasiliensis* (von Olfers, 1831), but recent revisions in taxonomic classification have subdivided that wider-ranging species (Carvalho et al. 2007; McEachran and Carvalho 2002 at p. 521). *N. brasiliensis* is now considered to be restricted to the southwestern Atlantic, while *N. bancroftii* is found from North Carolina to the Northern Coast of Brazil (Carvalho et al. 2007).

Kingdom	*Animalia* – Animals
Phylum	*Chordata* – Chordates
Subphylum	*Vertebrata* – Vertebrates
Class	*Chondrichthyes* - Cartilaginous Fishes
Subclass	*Elasmobranchii* - Rays, Sawfishes, Torpedoes, and Skates
Suborder	*Euselachii*
Order	*Torpediniformes*
Family	*Narcinidae* – Electric Rays, Narcinides, Numbfishes
Genus	*Narcine* - Numbfishes
Species	*Narcine bancroftii* – Lesser Electric Ray

Table 1: Taxonomic Hierarchy[2]

[2]See ITIS Report, http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=621086. [Accessed July 2010]. The Integrated Taxonomic Information System (ITIS) is a coalition of federal agencies formed to create scientifically credible taxonomic information for scientific use and the American public.

II. Species Description

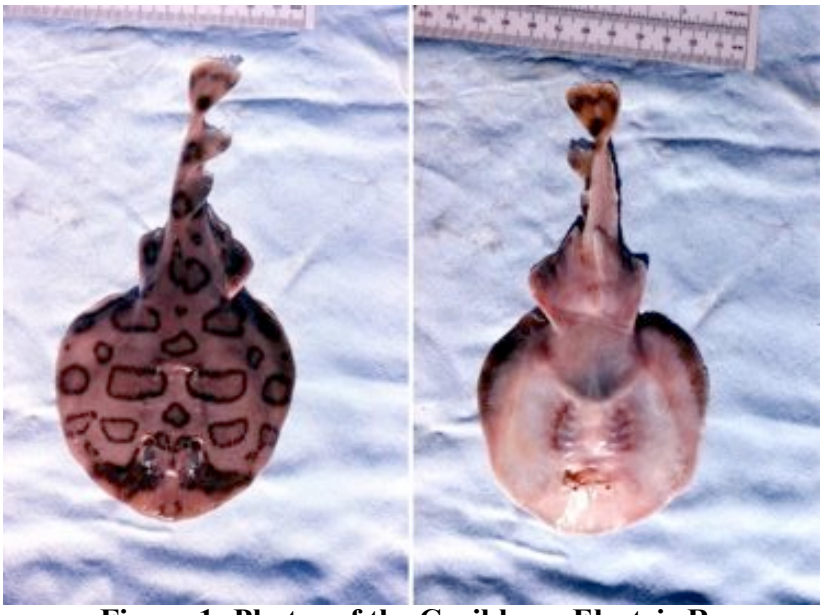

Figure 1: Photos of the Caribbean Electric Ray.
Source: Florida Museum of Natural History[3]

N. bancroftii is a small, shallow water ray found on soft, sandy substrates from the intertidal zone to depths of 35 meters (Carvalho et al. 2007). The Caribbean Electric Ray is one of nine genera and 24 species in the *Narcinidae* family but is the only electric ray that inhabits shallow waters along the United States coastline. It can be distinguished from other electric rays by its moderately long snout and a preorbital length of 11%-13% of its total length (Press 2010).

Sandy or brownish in color with darker, dusty blotches, this Ray is characterized by a flattened, oval-shaped disc, large pelvic fins, and oversized dorsal and caudal fins that cover most of the rear of its tapering tail (Tricas et al. 1997 at p. 208). The gill slits are relatively small and there is no spine on the caudal fin (Press 2010). It has a white to creamy underside, sometimes with grey or brown blotches (McEachran and Carvalho 2002 at p. 521). The skin is soft and loose and lacks dermal denticles or thorns (Press 2010). Dentition consists of conical, sharp tooth rows that vary in number from 17-34 in each jaw, dependent on the age and size of the animal (Press 2010). Males mature at a size of 22-33 cm; females at 20-26 cm; and it can reach a maximum size of 60 cm total length (Press 2010; Carvalho et al. 2007).

The Caribbean Electric Ray produces 14-37 volts of electricity that can deliver a small jolt but is not strong enough to harm humans (Smith 1997 at pp. 284-285; Tricas et al. 1997 at p. 208). Outlines of the kidney-shaped electric organs may be visible behind the eyes as well as spiracles with rounded tubercles along the edges next to the eyes (Smith 1997 at pp. 284-285). Each organ consists of a honeycomb of 280 to 430 columns, containing several hundred electric plates, and the organs combined account for about a sixth of total body weight (Tricas et al. 1997 at p.

[3]See http://www.flmnh.ufl.edu/fish/Gallery/Descript/lesserelectricray/lesserelectricray.html [Accessed July 2010].

208). Scientists believe the shock is employed as an attempt to stun prey or as a defense (Smith 1997 at pp. 284-285). *N. bancroftii* eats bottom-dwelling invertebrates, primarily sand worms, but also small fishes, young snake eels, anemones, and crustaceans (Tricas et al. 1997 at p. 208; Press 2010). Predators include large fishes and sharks (Press 2010).

III. Reproduction & Growth/Life History

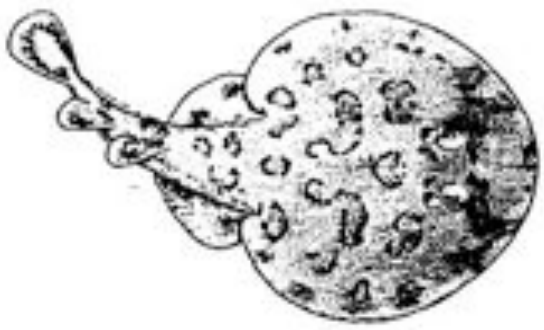

Figure 2: Drawing of a Caribbean Electric Ray.
Source: National Oceanic and Atmospheric Administration[4]

N. bancroftii is characterized by a relatively low age of maturity in females, of two years (Carvalho et al. 2007), and a population doubling time of perhaps 4.5-14 years (Froese and Pauly 2010). Electric Rays have an ovoviviparous mode of reproduction in which the females retain developing embryos during a three-month gestation period (Press 2010). Live births typically take place in August or September (Rudloe 1989). However, researchers believe that diapause is possible, extending the gestation period to up to 11-12 months (Press 2010). Further research is necessary on this issue. *Id*. Oviducts in the female of the Electric Ray may contain up to about 20 pups (Carvalho et al. 2007; McEachran and Carvalho 2002 at p. 521). Embryos are first nourished with yolk and then with histotroph, a protein-rich liquid (Press 2010). Females venture into the surf zone in late summer to bear young (Smith 1997 at p. 284; Tricas et al. 1997 at p. 208). Pups average about 11 cm at birth and, like other sharks and rays, have a more intense color pattern than adults (Tricas et al. 1997 at p. 208). Young are born able to give off electrical charges (Press 2010).

Geographic Distribution

I. Range

The IUCN describes *N. bancroftii* as having a "wide range in the western Atlantic from North Carolina, through the Gulf of Mexico, the Caribbean, the Lesser and Greater Antilles and the north coast of South America" (Carvalho et al. 2007). Individual populations are localized and do not migrate extensively (Rudloe 1989). The Ray occurs at least to the state of Maranhão in Brazil but the exact southern extent of its range is unknown due to confusion in previous records

[4]See http://www.nefsc.noaa.gov/lineart/lesser%20electric%20ray.jpg [Accessed July 2010].

where the species is referred to as the *N. brasiliensis* (Carvalho et al. 2007). It is uncertain in these records whether documented *N. brasiliensis* truly represent *N. bancroftii*. *Id.* The Caribbean Electric Ray's existence in the Bahamas has not been confirmed. *Id.*

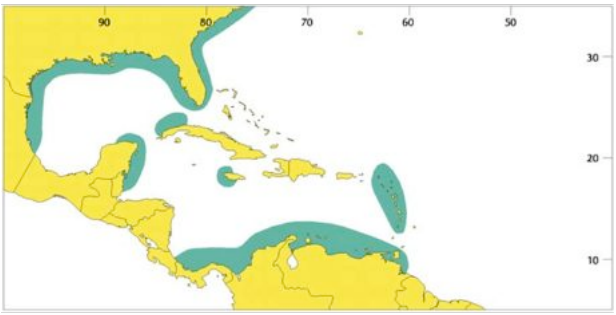

Figure 3: Range of Caribbean Electric Ray.
Source: McEachran and Carvalho (2002).

II. Habitat Requirements

Electric Rays are slow swimmers with small home ranges that are highly localized within an area, concentrating in surf zone adjacent to barrier beaches and offshore sand bars in warm months and moving offshore in winter (Rudloe 1989). Rays have been found off shady beaches, in muddy enclosed bays, in estuaries, on coral reefs, off river mouths, and on upper continental slopes, from the intertidal down to a depth of about 55 meters (Press 2010). These Rays are unable to penetrate fresh water to any extent and are absent from inland rivers and lakes. A bottom-dweller, the Caribbean Electric Ray often buries beneath the sand or mud in shallow waters or swims among seagrass. *Id*.

Population Status & Trends

According to the IUCN[6] Shark Red List Authorities S.L. Fowler and P.M. Kyne, the Caribbean Electric Ray is Critically Endangered, as evaluated in 2007.[7] The IUCN's assessment for this species indicates the highest level of extinction risk, short of a species being extinct in the wild. The IUCN reports that populations of this species have largely declined precipitously where documented in United States waters (Carvalho et al. 2007). Though *N. bancroftii* has a low age of maturity and a very intense fishery is required to locally eliminate the species, this has been demonstrated to be occurring in the Northern Gulf of Mexico, the United States East Coast, and in Florida's waters. The species has declined 98% since 1972 in the Northern Gulf of Mexico.

[6]According to its website, the IUCN is the world's oldest and largest global environmental network. It is a democratic membership union with more than 1,000 government and non-governmental organization (NGO) members, and almost 11,000 volunteer scientists in more than 160 countries. Its work is supported by over 1,000 professional staff in 60 offices and hundreds of partners in public, NGO and private sectors around the world. *See* http://www.iucn.org/about/ [Accessed July 2010].

[7]The IUCN is generally recognized as the leading international scientific authority on the conservation status of species. *See* http://www.iucn.org/about/work/programmes/species/about_ssc/specialist_groups/specialist_group_pprofiles/shark_sg_profile/ [Accessed July 2010].

Id. Fishing activities, both artisanal and commercial, are similarly intense and unregulated elsewhere and similar declines may be present throughout the rest of the species' range. *Id*.

The IUCN assessed the population trend of *N. bancroftii* as unknown at the time of publishing (Carvalho et al. 2007). It also noted that at the time of assessment this species exhibited an extensive distribution, but subsequent taxonomic revision may result in subdivision of the species in the future, thereby narrowing its range and decreasing population size. *Id.*

The Reef Environmental Education Foundation (REEF) also tracks information and sightings of the species across its range using the Roving Diver Technique (RDT) and reports this data annually on their website (REEF 2010).[8] According to this data collecting method,[9] sightings of the Electric Ray are extremely rare in recent years (2000 models). Diver recorded sighting frequency is very low (not more than 5 sightings out of hundreds or thousands dives recorded annually) in habitats along the Florida coast, the Gulf of Mexico, and the northwestern Caribbean. These sightings were low even before the taxonomic split between *N. bancroftii* and *N. brasiliensis*.

Criteria for Endangered Species Act Listing

I. The Caribbean Electric Ray is a "Species" Under the ESA

The ESA, 16 U.S.C. §§ 1531 – 1544, allows any species of fish, wildlife, or plant to be listed under its provisions. Section 3(8) of the ESA defines "fish or wildlife" as "any member of the animal kingdom, including without limitation any … fish…" (16 U.S.C. § 1532 (8)). The Caribbean Electric Ray is a cartilaginous fish first described as *Torpedo brasiliensis* in 1831 by J.F.M von Olfers in Germany (Press 2010). Recent taxonomic revisions have divided the previous wide-ranging species resulting in the currently valid species, *Narcine bancroftii* Griffith (1834) (Carvalho et al. 2007). *Narcine bancroftii* is recognized as a distinct species by the IUCN. *Id*.

II. The Caribbean Electric Ray is Endangered or Threatened Under the ESA

The Caribbean Electric Ray merits immediate listing under the ESA on the basis of the best scientific and commercial data available. ESA Section 4 (16 U.S.C. § 1533(a)(1)) sets forth listing factors under which a species can qualify for ESA protection. The Ray meets at least three of these listing factors (bolded):

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[8]REEF, with support from The Nature Conservancy and guidance by the Southeast Fisheries Science Center of the National Marine Fisheries Service, is a grassroots, non-profit organization of recreational divers who regularly conduct fish biodiversity and abundance surveys during their dives along the West Coast of the US and Canada. *See* http://www.reef.org/about/faq#What%20is%20REEF [Accessed July 2010].

[9]During RDT surveys, divers swim freely throughout a dive site and record every observed fish species that can be positively identified. Species and approximate abundance scores are recorded on an underwater slate. The search for fishes begins as soon as the diver enters the water. The goal is to find as many species as possible so divers are encouraged to look under ledges and up in the water column. Each recorded species is assigned one of four abundance categories based on about how many were seen throughout the dive [single (1); few (2-10), many (11-100), and abundant (>100)]. *See* http://www.reef.org/programs/volunteersurvey [Accessed July 2010].

A. The present or threatened destruction, modification, or curtailment of habitat or range;
B. Overutilization for commercial, recreational, scientific, or educational purposes;
C. Disease or predation;
D. The inadequacy of existing regulatory mechanisms; and
E. Other natural or manmade factors affecting its continued existence.

This species is threatened by habitat destruction from energy development, burgeoning human populations, and other pressures (Factor A); failure of federal or state agencies to protect the Ray from the threat of fishing bycatch and habitat destruction (Factor D); and killing, abortion of embryos, and cumulative threats (Factor E).

A. Present and Threatened Destruction, Modification, and Curtailment of Habitat and Range

Though the Caribbean Electric Ray's range is relatively large, localized habitat loss and degradation are threats to significant portions of the species' range. Electric Rays are torpid swimmers with small home ranges, highly localized within an area, making them susceptible to localized population depletion (Rudloe 1989). Coastal areas in the United States and abroad have been threatened and destroyed at an alarming rate, affecting all species of sharks and rays (Camhi et al. 1998). As NMFS stated very recently in its proposed rule for ESA protection of the Largetooth Sawfish:

> Coastal habitats in the southern U. S. Gulf of Mexico region have experienced and continue to experience losses due to urbanization. Wetland losses in the Gulf of Mexico region of the U.S. averages annual net losses of 60,000 acres (242.8 km2) of coastal and freshwater habitats from 1998 to 2004. Although wetland restoration activities are ongoing in this region of the U.S., the losses significantly outweigh the gains. These losses have been attributed to commercial and residential development, port construction (dredging, blasting, and filling activities), construction of water control structures, modification to freshwater inflows (Rio Grande River in Texas), and gas and oil related activities.

See 75 Fed. Reg. 25174 at 25180, internal citations omitted.

In light of the April 2010 British Petroleum oil spill disaster, the threat of habitat modification and degradation is now more acute for Gulf of Mexico marine life, including the Caribbean Electric Ray.

BP Oil Spill. As one of the worst environmental disasters in our United States history, the British Petroleum (BP) oil spill is jeopardizing the survival of many of the marine species residing in the Gulf and southeastern Atlantic, including the Electric Ray.

Figure 4: The Estimated Range Impacted by the Gulf Oil Spill.
Source: National Center for Atmospheric Research.

The oil spill in the Gulf of Mexico will have lasting effects on both marine and coastal habitat required by the Caribbean Electric Ray. An oil spill can cause extensive mortality throughout the marine ecosystem from the basic foundations of phytoplankton, algae, coral and seagrass to the largest and most mobile organisms.[12]

The *New York Times* reported in June 2010,

> Vast underwater concentrations of oil sprawling for miles in the Gulf of Mexico from the damaged, crude-belching BP PLC well are unprecedented in "human history" and threaten to wreak havoc on marine life, a team of scientists said today, a finding confirmed for the first time by federal officials…
>
> "It's an infusion of oil and gas unlike anything else that has ever been seen anywhere, certainly in human history," said Samantha Joye of the University of Georgia, the expedition leader.
>
> Bacteria are breaking down the oil's hydrocarbons in a massive, microorganism feeding frenzy that has sent oxygen levels plunging close to what is considered "dead zone" conditions, at which most marine life are smothered for a lack of dissolved oxygen.
>
> Such low-oxygen conditions were noticed farther from the spill site, although Joye said she did not think the process would immediately produce a dead zone, since low nutrient concentrations in the water would limit the rate of the bacterial consumption.

[12] See An introduction to marine oil spills, James Perran Ross, Dept. Wildlife Ecology and Conservation IFAS, University of Florida. 2010. (emphasis added). Online at: http://www.wec.ufl.edu/Introduction%20to%20Marine%20oil%20spills.pdf [Accessed July 2010].

> Joye said her team also measured extremely high levels of methane, which is also spewing from the gushing BP well at up to 10,000 times background levels in Gulf waters.
>
> "I've been working in the Gulf of Mexico for 15 years," Joye said. "I've never seen methane concentration this high anywhere in the water."

See Quinlan and Vorhees (2010). In addition to harming large marine wildlife, the spill will likely also impact both the Ray and its prey, including shrimp, crabs and worms.

Another worry is how the chemical dispersants being used to break up the undersea oil will impact the Gulf's inhabitants. Dr. Joye expressed concern for how this dispersants will affect a variety of organisms and indicated that a full understanding of the effects on the Gulf's biota is likely years away. *Id*.

The current oil spill situation, combined with the already-strained ecosystems in the Gulf of Mexico and coastal areas within the Ray's range, is a recipe for extinction, particularly given its current lack of ESA protection. Even more, oil spills are possible at any time in the Gulf due to the current volume of drilling. NMFS et al. (2010: I-41 to I-42) discuss the likely escalating in Gulf oil drilling in both U.S. and Mexican waters:

> Oil and gas exploration and production have occurred in the Gulf of Mexico for over 100 years. Activities associated with exploration and development include, but are not limited to, construction of support facilities including refineries and waste management, increased traffic and construction in ports, installation of pipelines and oil platforms, and use of explosives and sonar. Oil and gas exploration will likely increase as existing sources are depleted.

Drilling at an accelerating rate subjects marine species, including the Ray, to elevated risks. State Carvalho et al. (2007): "Pollution and oil exploration may also adversely affect the habitat of *N. bancroftii*, although no specific information is available."

Localized Habitat Concerns. For localized *N. bancroftii* populations living in coral reef habitats, habitat degradation in the form of coral reef destruction is a serious threat. NOAA concluded in its final rule listing Elkhorn and Staghorn Corals under the ESA that reef habitat in the Gulf of Mexico is threatened by multiple factors:

> Seven stressors (natural abrasion and breakage, anthropogenic abrasion and breakage, sedimentation, persistent elevated sea surface temperature, competition, excessive nutrients and sea level rise) were identified as affecting both species through present or threatened destruction, modification, or curtailment of their habitats or ranges. These stressors consist of destruction or disruption of substrate to grow on, and modification or alteration of the aquatic environment in which the corals live.

See 50 Fed. Reg. 26852 at 26857.

NMFS should also consider the effects of Florida red tide to be important to limiting the range of *N. bancroftii* around this State and other areas. Red tide (*Karenia brevia*) is a local phenomenon in the Gulf of Mexico, along the Florida coast, and it impacts many species of fish and wildlife.[15] Some evidence indicates that global warming and pollution of the Gulf is making red tides more common.[16]

Wide-ranging problems of declining coastal habitats and ecosystems from human population growth, pollution, and oil and gas exploration adversely impact the Caribbean Electric Ray and prompt ESA protection is essential to ensure continued survival of the species.

B. Overutilization for Commercial and Recreational Purposes

Direct overutilization has not been implicated in the decline of this species. The tail region of the Ray may be consumed as food and is considered of good quality but the Ray is not commercially important to humans as a food source (McEachran and Carvalho 2002 at p. 521; Press 2010). Accordingly, fisheries are not directed at the Ray. However, the Caribbean Electric Ray is greatly threatened by incidental takings, or bycatch in other fisheries, primarily shrimp trawls (Carvalho et al. 2007). Discussion of the bycatch threat is addressed under the analysis of ESA listing Factor E below.

C. Disease or Predation

Disease and predation of the Caribbean Electric Ray is not known to be a threat. Predators of the Caribbean Electric Ray include large sharks and fish (Press 2010). Prevalence of disease in the wild is largely unknown; however, Electric Rays in captivity often exhibit monogenean infestations of the gills. *Id*. If the species were to become extinct in the wild, the difficulties in keeping the species alive in captivity could make reintroduction of the species unlikely.

D. Inadequacy of Existing Regulatory Mechanisms

Federal, state, or international laws and policies to prevent species endangerment or extinction do not adequately protect the Caribbean Electric Ray. There are no conservation measures currently directed at this species (Carvalho et al. 2007).

Scientific Ranking. IUCN ranks the Caribbean Electric Ray as Critically Endangered,[17] defined as "considered to be facing a high risk of extinction in the wild." Although this designation is important for flagging the extinction risk to this Ray, it confers no regulatory protections.

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[15]See Florida Fish and Wildlife Conservation Commission for further discussion of the effects of red tide on marine animals at http://research.myfwc.com/features/view_article.asp?id=5964 [Accessed July 2010].
[16]See 2009 United Press Inc. Science News Article, "'Red tide' linked to nutrient pollution" at www.upi.com/Science_News/2009/01/07/Red-tide-linked-to-nutrient-pollution/UPI-60321231250271/ [Accessed July 2010].
[17]The IUCN Red List is the world's most comprehensive inventory of the global conservation status of plant and animal species. It uses a set of criteria to evaluate the extinction risk of thousands of species and subspecies. These

Fishing Regulations. While the requirements to use Turtle Exclusion Devices and Bycatch Reduction Devices in shrimp trawl fisheries in the Northern Gulf of Mexico have lowered overall bycatch rates, these mitigation measures are ineffective for Electric Rays due to their size and sluggish swimming ability (*see* Steele et al. 2002; Carvalho et al. 2007). This is evidenced by the documented 98% decline in population in the Northern Gulf where catch data is available (Carvalho et al. 2007). Similar population declines may be occurring in other areas where fishing activities are as intense but often unregulated throughout the species' remaining range.

E. Other Natural or Manmade Factors Affecting Its Continued Existence

Bycatch. Incidental capture by inshore shrimp trawls and other fisheries pose a serious threat to the Caribbean Electric Ray in both United States waters and waters abroad (Carvalho et al. 2007). The impacts of these bottom trawl fisheries are rarely monitored but are thought to be significant locally, particularly for regional endemics (Camhi et al. 1998 at p. 9). Electric Rays are generally discarded at sea, and survivorship rates are believed to be quite low (Carvalho et al. 2007).

Furthermore, abortion of embryos by gravid females when they are captured is a serious concern. These females have been observed to abort embryos upon capture; even if discarded individuals survive, reproductive output is reduced. For example, a 47-centimeter total length female caught in Maranhão, Brazil, contained embryos that were aborted on landing on the vessel. The smallest female containing embryos (aborted) was 36 centimeters total length (Carvalho et al. 2007). Embryo abortion makes incidental taking of the species as bycatch even more detrimental.

The decline of the ray by 98% since 1972 in the Northern Gulf of Mexico is likely primarily caused by shrimp trawling (Carvalho et al. 2007). Shrimp trawl fishing is intense in this area, especially in shallow waters that coincide with the range of *N. bancroftii.* Devices intended to reduce bycatch are ineffective for this species due to it size and slow speed (Steele et al. 2002 at p. 349). As these researchers explain, this is because "larger fish were more likely to escape [shrimp trawl nets] than smaller fish, probably because swimming ability is positively associated with size in fishes." *Id*. Faster, quickly responsive fish that can sense turbulence gradients well had the highest rates of escape. *Id.*

In the Northern Gulf of Mexico, the United States East Coast, and in Florida waters, there is particularly intense shrimp trawl fishing, especially in shallow waters, with 4 to 5 million trawl hours annually (Shepherd and Myers 2005). While data in Shepherd and Myers (2005) compared the time period 1972 to 2002, the actual severity of declines in Rays as a result may have been underestimated, as shrimp trawling began in the region around 1912. *Id*. Similar high rates of decline, around 95% decrease, have occurred in the United States coastal areas between Cape Canaveral, Florida, and Cape Hatteras, North Carolina, in United States trawl surveys between 1989 and 2001. *Id*.

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criteria are relevant to all species and all regions of the world. With its strong scientific base, the IUCN Red List is recognized as the most authoritative guide to the status of biological diversity. See http://www.iucn.org/about/work/programmes/species/red_list/about_the_red_list/ [Accessed August 2010].

Figure 5: Shrimp trawl catch. 95% of the catch in this photo that was not shrimp died on deck and was discarded overboard.[18]

Gulf commercial fisheries are some of the most productive in the world. The Gulf supports four of the top seven fishing ports in the nation by weight and eight of the top twenty fishing ports in the nation by dollar value (EPA 2010). According to NMFS, the 2008 commercial fish and shellfish harvest from the five Gulf states (Louisiana, Alabama, Mississippi, Florida, and Texas) was estimated at 1.3 billion pounds valued at $661 million. *Id.* Shrimp trawls are a large part of these commercial fisheries, leading the nation in 2008 with about 73% of the nation's total harvest. *Id*.

Intense shrimp fisheries exist in multiple other countries surrounding the Gulf of Mexico as well, within the Caribbean Electric Ray's range. R Gillett, a consultant to the Food and Agriculture Organization of the United Nations stated, "Shrimp is the most important fishery commodity produced in Mexico in terms of value, exports and employment" (Gillett 2008 at p. 235). On the Mexican east coast, between 30,000 and 32,000 vessels comb inshore estuaries, lagoons, and coastal zones between 5-15 meters deep using cast nets, enmeshed nets and small trawl nets. *Id.* at p. 236. A 2005 study indicates that Mexico's Gulf of Mexico shrimp fisheries generate 19,000 tons of discards (46.2% of total catch). *Id.* at p. 237. Likewise, smaller island nations within the

[18]See Eliott Norse, Marine Conservation Biology Institute/Marine Photobank: http://www.un.org/earthwatch/oceans/oceanfisheries.html [Accessed July 2010].

Caribbean Electric Ray's range also rely heavily on shrimp fisheries. *Id.* at pp. 273-287. For example, in the island nation of Trinidad and Tobago in the southern Caribbean Sea, trawls landed 785 tons of shrimp. *Id.* at p. 276. Unfortunately, they also landed 703 tons of groundfish bycatch and of that bycatch, 90% from artisanal vessels and 71% from commercial vessels is discarded. *Id.*

Since fishing activities are similarly intense and most often unregulated in these areas, similar declines to that of the United States coast are likely across the species' range (Carvalho et al. 2007). Also, in some parts of the Ray's range, many inshore fisheries do not intentionally target any particular group of species but instead land and utilize everything they catch. In such cases, Ray catches would not be considered incidental but still may go unrecorded and will contribute significantly to the overall mortality rate of local populations (Camhi et al. 1998 a p. 9).

Poor Health in Captivity. Electric Rays are found with decreasing frequency in the wild. If conservation action is not soon taken, *N. bancroftii* may only continue to survive in captivity. This is bad news for the species, as it does not traditionally fare well under human care (Dean et al. 2005). Electric Rays are prone to monogenean infestation and subsequent bacterial infections of the gills. *Id*. As a result of parasitic infestation, these Rays must also be monitored carefully for anorexia. *Id.* Additionally, treatment to prevent infection from parasitic worms is required if the animals are to be maintained for any length of time in a closed recirculating system. The species also requires a floor of fine sand or silt sediment to reduce ventral abrasion and facilitate capture of natural prey. *Id.*

Critically Low Population Count. The increased rarity of this species makes it increasingly vulnerable to extirpation from stochastic events. Electric Ray populations have reached such critically low numbers in much of its range that the species is threatened by the possibility that male and female Rays may no longer encounter each other with significant frequency for successful breeding. Roberts and Hawkins (1999) discuss "rarity" as a factor that exacerbates the risk of extinction to marine species. Furthermore, the U.S. Fish and Wildlife Service (FWS) has routinely recognized that small population size increases the likelihood of extinction.[19] For the Langford's Tree Snail (*Partula langfordi*), FWS states:

> Even if the threats responsible for the decline of this species were controlled, the persistence of existing populations is hampered by the limited number of known individuals of this species. This circumstance makes the species more vulnerable to extinction due to a variety of natural processes. Small populations are particularly vulnerable to reduce reproductive vigor caused by inbreeding depression, and they may suffer a loss of genetic variability over time due to random genetic drift, resulting in decreased evolutionary and ability to cope with environmental change (Lande 1988; Primm et al. 1988; Center for Conservation Update 1994; Mangel and Tier 1994).[20]

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[19]See, e.g., FWS candidate assessment forms for *Doryopteris takeuchii, Huperzia stemmermanniae, Melicope hiiakae, Ostodes strigatus, Partula langfordi, Peperomia subpetiolata, Phyllostegia bracteata, and Tryonia circumstriata.* Accessible via FWS website at http://www.fws.gov/endangered [Accessed August 2010].
[20]See 2009 Listing Form for *Partula langfordi* at: http://ecos.fws.gov/docs/candforms_pdf/r1/G0AI_I01.pdf [Accessed July 2010] at p. 5

Here FWS relies on citations not specific to *Partula langfordi* that indicate the threat to survival presented by limited population numbers, even without other known threats. The agency similarly notes for a snail called Sisi (*Ostodes strigatus*):

> Even if the threats responsible for the decline of this species were controlled, the persistence of existing populations is hampered by the small number of extant populations and the small geographic range of the known populations.[21]

NMFS should likewise consider small population size to be a threat to the Caribbean Electric Ray.

Human population growth. Human population increases within the range of the Caribbean Electric Ray present an additional threat to this species, as this drives threats to the species' habitat as well as fueling increased fishing or other activities adverse to the Ray. The National Oceanic and Atmospheric Administration (NOAA) has noted the threat of growing human populations to coastal ecosystems:

> As the global population continues to increase and demographic shifts toward coastal areas persist, even greater pressures will be placed on nearshore resources to satisfy human desires for food, culture, tourism, recreation, and profit (Waddell and Clarke 2008).

A World Wildlife Fund report similarly states:

> Nearly 40 percent of the global population now lives within 100 kilometers of a coast, and many of these people depend on the productivity of the sea. As coastal populations soar, pressure on marine resources has become unsustainable in many places.[22]

Figure 7, developed by NOAA, illustrates vividly the greater human population density in coastal areas since the 1960s and projected to increase in the future.

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[21]See 2009 Listing Form for *Ostodes strigatus* at: http://ecos.fws.gov/docs/candforms_pdf/r1/G0A5_I01.pdf [Accessed July 2010] at p. 4.

[22]See World Wildlife Fund report, "Marine protected areas: providing a future for fish and people." Online: http://assets.panda.org/downloads/marineprotectedareas.pdf [Accessed June 2010]. This report focused on the role of Marine Protected Areas in safeguarding marine biodiversity and sustaining fisheries. See p. 8.

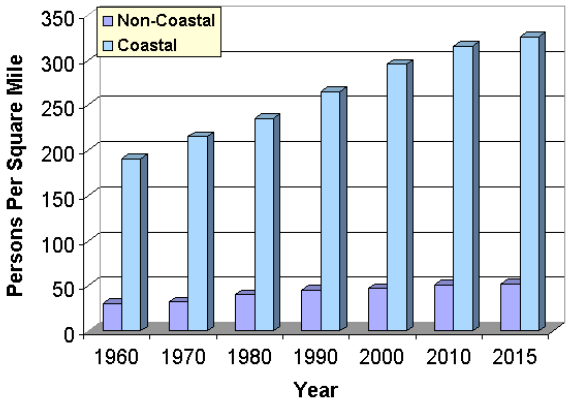

Figure 6: Population density in coastal versus non-coastal areas of the US.
Source: NOAA.[23]

The pressures of human population growth are especially present along the United States Gulf Coast, Electric Ray prime habitat. The EPA Gulf of Mexico Program reports:

> The coastal population of the five states of the Gulf of Mexico is projected by the Census Bureau to increase from a total of 44.2 million in 1995 to an estimated 61.4 million in 2025, nearly a 40% increase. Texas and Florida are the most rapidly growing states.

See EPA (2010).

Cumulative Impacts. As demonstrated above, the Caribbean Electric Ray is threatened by multiple factors. Harm from pollution (including the BP oil spill), bycatch mortality, and biological factors such as small population sizes, should be considered as threats to this species. Growing human populations drive the anthropogenic threats to the Ray. NMFS should assess the synergistic effects of multiple factors in a formal status review for this species.

Value of ESA Listing

Currently, there is no protection afforded to this species despite its critical imperilment and many risk factors, as discussed above. Federal listing of this species under the ESA is essential for the Caribbean Electric Ray's survival and would help ensure (for example):

- Adequate habitat protections, restrictions on take, recovery planning, and funding for this species in U.S. waters;
- Prohibition on take of this species within U.S. waters;
- Prohibition on import, export, or possession of this species by U.S. individuals and corporations; and
- Consultation by U.S. agencies on federal permitting or funding of activities by U.S. and foreign entities that may jeopardize this species.

[23]See http://www.csc.noaa.gov/coastal/images/NeedFig1.gif [Accessed July 2010].

Moreover, ESA listing for the Ray would help it to survive and recover in other nations as well. NMFS has previously recognized that ESA protections for Elkhorn (*Acropora palmata*) and Staghorn Coral (*A. cervicornis*) would benefit these species even though the majority of their ranges exists in other countries: through the recovery planning process, the U.S. can encourage international conservation measures (Clarke et al. 2008). Similar logic applies to the Caribbean Electric Ray.

Requested Designation

WildEarth Guardians hereby petitions the National Marine Fisheries Service within the U.S. Department of Commerce, and the U.S. Fish and Wildlife Service within the Department of Interior, to list the Caribbean Electric Ray (*Narcine bancroftii*) as an Endangered or Threatened species pursuant to the Endangered Species Act throughout its range. This listing action is warranted, given the numerous threats that this species faces, as well as its decline in numbers. The Caribbean Electric Ray is threatened by at least three listing factors: present and threatened destruction, modification and curtailment of habitat and range; inadequacy of existing regulatory mechanisms; and other natural or manmade factors affecting its continued existence.

The Caribbean Electric Ray faces threats from incidental taking as shrimp trawl bycatch and also from habitat degradation. The most obvious example of habitat degradation currently is the disastrous BP oil spill in the Gulf. Further, the threat from habitat destruction is driven by human population increases. With its reduced population levels and localized nature making interaction between males and females less likely, it is biologically vulnerable. Most importantly, the Ray does not enjoy regulatory protections sufficient to address the threats it faces.

The Caribbean Electric Ray's range is extensive, occurring in the western Atlantic from North Carolina to the tip of Florida and through the Gulf of Mexico. However, it is increasingly rare within this range. This petition is submitted with the hope that federal protection will be granted and will prevent this species' extinction. This petition is not limited to a North American population of Caribbean Electric Ray, but seeks the listing of the species throughout its current range, including territorial waters of the United States. We believe ESA listing is vital to preserving and recovering this species.

Critical Habitat

Given that habitat destruction and degradation are significant threats to this species, Guardians requests that critical habitat be designated for the Caribbean Electric Ray within the territory of the United States, concurrent with final ESA listing. Congress defines critical habitat for any threatened or endangered species in 16 U.S.C. § 1532(5)(A) as:

> (i) the specific areas within the geographical area occupied by the 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) 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. *See also* 50 C.F.R. § 424.12.

In determining whether critical habitat is both prudent and determinable, NMFS must analyze the physical and biological requirements of the Caribbean Electric Ray listed in 50 C.F.R. § 424.12(b), including:

(1) Space for individual and population growth, and for normal behavior;
(2) Food, water, air, light, minerals, or other nutritional or physiological requirements;
(3) Cover or shelter;
(4) Sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; and generally;
(5) Habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species.

Critical Habitat designation is both prudent and determinable in protecting this critically endangered Electric Ray. Agency regulations provide that designation of critical habitat is "not prudent" when a "species is threatened by taking or other human activity, and identification of critical habitat can be expected to increase the degree of such threat to the species" (50 C.F.R. § 424.12(a)(1)(ii)). Designation is prudent because fishers are generally not intentionally taking rays. Rather, they are bycatch. The designation would therefore be prudent because it would benefit the species and would not increase the degree of threat. The designation is determinable because there is sufficient information to determine the required habitat of the species and permit identification of the area.

Based on the statutory definition and agency criteria for critical habitat, WildEarth Guardians requests that the Secretary of Commerce, acting through NMFS, designate critical habitat sufficient to protect those areas where the species is known to exist, as well as other, potential recovery habitat that may support the species.

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