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[Submitted via certified U.S. Postal Mail](#)

**Re: Supplement to the Record for the 90-Day Finding for the Caribbean Electric Ray
(*Narcine bancroftii*)**

Dear Ms. Somma:

We hereby submit comments on behalf of WildEarth Guardians and Defenders of Wildlife to supplement the record informing the National Marine Fisheries Service's (NMFS) new 90-day finding for the Caribbean electric ray (*Narcine bancroftii*, referred to in this petition as "electric ray" or "ray"). NMFS' previous negative 90-day finding for the ray was published at 76 Fed. Reg. 15,947 (Mar. 22, 2011). Pursuant to a settlement reached between NMFS and WildEarth Guardians in Case 8:13-cv-00523 (M.D. Fla.), NMFS has agreed to make a new 90-day finding on WildEarth Guardians' September 2010 petition to list the ray including the supplemental information provided herein. We incorporate that petition and its bibliography by reference. For the convenience of NMFS, we will provide the references cited herein and listed in the bibliography on a CD-ROM by postal mail.

ENDANGERED SPECIES ACT AND IMPLEMENTING REGULATIONS

The Endangered Species Act (ESA), 16 U.S.C. §§ 1531-44, was enacted in 1973 "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. § 1531(b). The protections of the ESA only apply to species listed as endangered or threatened according to the provisions of the statute. The ESA delegates authority to determine whether a species should be listed as endangered or threatened to the Secretary of the Departments of Interior or Commerce, depending generally on whether the species is terrestrial or marine. The Secretaries have in turn delegated authority to the Director of

the U.S. Fish & Wildlife Service (FWS) and the Administrator of NMFS (collectively, “wildlife agency” or “wildlife agencies”).

As defined in the ESA, an “endangered” species is one that is “in danger of extinction throughout all or a significant portion of its range.” 16 U.S.C. § 1532(6); see also 16 U.S.C. § 1533(a)(1). A “threatened species” is one that “is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.” 16 U.S.C. § 1532(20). The appropriate wildlife agency must evaluate whether a species is threatened or endangered as a result of *any* of the five listing factors set forth in the Act. 16 U.S.C. § 1533(a)(1):

- 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.

A taxon need only meet one of the listing criteria outlined in the ESA to qualify for federal listing. 50 C.F.R. § 424.11.

NMFS is required to make listing determinations “solely on the basis of the best scientific and commercial data available to [it] after conducting a review of the status of the species and after taking into account” existing efforts to protect the species. 16 U.S.C. § 1533(b)(1)(A); *see also* 50 C.F.R. §§ 424.11(b), (f). In making a listing determination, the wildlife agency must give consideration to species which have been “identified as in danger of extinction, or likely to become so within the foreseeable future, by any State agency or by any agency of a foreign nation that is responsible for the conservation of fish or wildlife or plants.” 16 U.S.C. § 1533(b)(1)(B)(ii). *See also* 50 C.F.R. § 424.11(e) (stating that the fact that a species has been identified by any State agency as being in danger of extinction may constitute evidence that the species is endangered or threatened). Listing may be done at the initiative of the wildlife agency or in response to a petition. 16 U.S.C. § 1533(b)(3)(A).

90-Day Finding Standard

After receiving a petition to list a species, the wildlife agency is required to determine “whether the petition presents substantial scientific or commercial information indicating that the petitioned action may be warranted.” 16 U.S.C. § 1533(b)(3)(A). Such a finding is termed a “90-day finding” because the finding is due within 90-days of receipt of a petition. A “positive” 90-day finding leads to a status review for the species and a determination of whether the species will be listed as either threatened or endangered, to be completed within twelve months. 16 U.S.C. § 1533(b)(3)(B). A “negative” initial finding ends the listing process, and the ESA authorizes judicial review of such a finding. 16 U.S.C. § 1533(b)(3)(C)(ii).

The applicable regulations define “substantial information,” for purposes of consideration of petitions, as “that amount of information that would lead a reasonable person to believe that the measure proposed in the petition may be warranted.” 50 C.F.R. § 424.14(b)(1). In making a

finding as to whether a petition presents “substantial information” warranting a positive 90-day finding, the wildlife agency considers whether the petition:

- i. Clearly indicates the administrative measure recommended and gives the scientific and any common name of the species involved;
- ii. Contains detailed narrative justification for the recommended measure; describing, based on available information, past and present numbers and distribution of the species involved and any threats faced by the species;
- iii. Provides information regarding the status of the species over all or significant portion of its range; and
- iv. Is accompanied by appropriate supporting documentation in the form of bibliographic references, reprints of pertinent publications, copies of reports or letters from authorities, and maps.

50 C.F.R. §§ 424.14(b)(2)(i)-(iv). NMFS’s own guidance on “substantial information” states that the information presented should merely be “adequate and reliable,”¹ not conclusive.

Both the language of the regulation itself, which sets the “reasonable person” standard for substantial information, and the relevant case law underscore that the ESA does *not* require “conclusive evidence of a high probability of species extinction” to support a positive 90-day finding. *Ctr. for Biological Diversity v. Morgenweck*, 351 F. Supp. 2d 1137, 1140 (D. Colo. 2004). In reviewing negative 90-day standards, the courts have consistently held that the evidentiary threshold under a 90-day review is much lower than the one required under a 12-month review. *See, e.g., Ctr. for Biological Diversity v. Kempthorne*, No. CV 07-0038-PHX-MHM, 2008 WL 659822, at *8 (D. Ariz. Mar. 6, 2008) (“[T]he 90–day review of a listing petition is a cursory review to determine whether a petition contains information that warrants a more in-depth review.”). *See also Moden v. U.S. Fish & Wildlife Serv.*, 281 F. Supp. 2d 1193, 1203 (D. Or. 2003) (holding that the substantial information standard is defined in “non-stringent terms” and that “the standard in reviewing a petition... does not require conclusive evidence.”).

Rather, courts have held that the ESA contemplates a “lesser standard by which a petitioner must simply show that the substantial information in the Petition demonstrates that listing of the species *may* be warranted” (emphasis added). *Morgenweck*, 351 F. Supp. 2d at 1141 (quoting 16 U.S.C. § 1533(b)(3)(A)). *See also Ctr. for Biological Diversity v. Kempthorne*, No. C 06-04186 WHA, 2007 WL 163244, at *3 (N.D. Cal. Jan. 19, 2007) (holding that in issuing negative 90-day findings for two species of salamander, FWS “once again” erroneously applied “a more stringent standard” than that of the reasonable person). Thus, a petition does not need to establish a high likelihood that the species is either threatened or endangered at the 90-day finding stage. Although a reviewing court is highly deferential to the Service’s listing determinations:²

¹ U.S. Fish and Wildlife Service & the National Marine Fisheries Service, *Petition Management Guidance 13* (1996), available at <http://www.nmfs.noaa.gov/op/pds/documents/02/110/02-110-06.pdf>.

² *Colo. River Cutthroat Trout*, 448 F.Supp.2d at 175 (“Although the Court may not substitute its judgment for that of the agency, the Court’s review must nevertheless be ‘searching and careful.’”) (citing *Marsh v. Or. Natural Res. Council*, 490 U.S. 360, 378 (1989)).

The ‘may be warranted’ standard, however, seems to require that in cases of such contradictory evidence, the Service must defer to information that supports petition's position. It would be wrong to discount the information submitted in a petition solely because other data might contradict it. At this stage, unless the Service has demonstrated the *unreliability* of information that supports the petition, that information cannot be dismissed out of hand.

Kemphorne, 2007 WL 163244, at *4.

NMFS’s previous negative 90-day finding for the Caribbean electric ray states the 90-day finding standard as follows:

- We evaluate the petitioner’s request based upon the information in the petition including its references, and the information readily available in our files...
- We will accept the petitioner’s sources and characterizations of the information presented, if they appear to be based on accepted scientific principles, unless we have *specific information in our files* that indicates the petitioner’s information is incorrect, unreliable, obsolete, or otherwise irrelevant to the requested action.
- Information that is susceptible to more than one interpretation or that is contradicted by other available information *will not be dismissed* at the 90-day finding stage, so long as it is reliable and a reasonable person would conclude it supports the petitioner’s assertions. In other words, *conclusive information* indicating the species may meet the ESA’s requirements for listing is not required to make a positive 90-day finding.
- We will not conclude that a lack of specific information alone negates a positive 90-day finding, if a reasonable person would conclude that the unknown information itself suggests an extinction risk of concern for the species at issue.

76 Fed. Reg. at 15,948 (emphasis added).

Best Available Scientific and Commercial Data Standard

ESA listing decisions, such as 90-day findings, must rely on the “best scientific and commercial data available.” 16 U.S.C. § 1533(b)(1)(A). Similar to the “substantial information” standard for the 90-day review decision, case law has established that the scientific evidence presented also need not be conclusive.³ If the evidence presented is the most recent, available biological information on a species, NMFS cannot simply disregard it because it is inconclusive. This is particularly important under a 90-day review since as noted above, the wildlife agency must

³ See *City of Las Vegas v. Lujan*, 891 F.2d 927, 933 (D.C. Cir. 1989) (“[Section 4] merely prohibits the Secretary from disregarding available scientific evidence that is in some way better than the evidence he relies on. Even if the available scientific and commercial data were inconclusive, he may – indeed must – still rely on it at this stage...”); *Trout Unlimited v. Lohn*, 645 F. Supp. 2d 929, 950 (D. Or. 2007) (“[T]he agency ‘cannot ignore available biological information’”) (citing *Kern Co. Farm Bureau v. Allen*, 450 F.3d 1072, 1080 -81 (9th Cir.2006)); *In re Polar Bear Endangered Species Act Listing and 4(d) Rule Litigation*, 794 F. Supp. 2d 65, 106 (D.D.C. 2011) (“As this Court has observed, ‘some degree of speculation and uncertainty is inherent in agency decisionmaking’ and ‘though the ESA should not be implemented ‘haphazardly’...an agency need not stop in its tracks when it lacks sufficient information.’”) (citing *Oceana v. Evans*, 384 F. Supp. 2d 203, 219 (D.D.C. 2005)).

make a positive finding and commence a status review when a reasonable person would conclude based on the available evidence that listing *may* be warranted.

THE IUCN RED LIST

The International Union for the Conservation of Nature (IUCN) was founded in 1984 and is the largest professional global conservation network. The IUCN is a highly respected scientific authority. The organization is perceived as a neutral forum gathering and distributing scientific information on the conservation status of species. IUCN's 11,000 experts establish and use definitive standards to evaluate the extinction risk faced by particular species and maintain this information in an on-line database known as the IUCN Red List of Threatened Species ("Red List"). The Red List is well respected and is considered an authoritative source on species' conservation status.⁴ The United States supports the work of the IUCN and scientific agencies of the United States, including FWS and NMFS, use the Red List as a reference and a source of best available scientific and commercial information when evaluating the extinction risk faced by species.

The scientific data utilized to support the Red List determinations "are regularly published in scientific literature," and should be peer reviewed.⁵ Additionally, the science supporting a Red List listing is considered the best scientific information available.⁶ Any listing determinations can be petitioned, though any challenge must also be backed by scientifically published sources.⁷ Finally, all species are reviewed either every ten or five years by Red List Authorities ("RLAs"). An RLA is the Species Survival Commission ("SSC," one of IUCN's six scientific commissions) Specialist Group "responsible for the species, group of species, or specific geographic area."⁸ The reassessment of the species and the supporting information ensures that the "IUCN Red List is credible and scientifically accurate."⁹

The Red List provides "taxonomic, conservation status and distribution information on plants and animals" throughout the world.¹⁰ Based on the best available evidence, a species can be categorized by the IUCN as (1) Extinct; (2) Extinct in the Wild; (3) Critically Endangered; (4) Endangered; (5) Vulnerable; (6) Near Threatened; (7) Least Concern; (8) Data Deficient; and (9) Not Evaluated.¹¹ The general aim of the system is to provide an explicit, objective framework for

⁴ See generally Rodrigues *et al.* 2006. See also Butchart *et al.* 2005 ("The IUCN Red List is now widely recognized as the most objective and authoritative system for classifying species in terms of their risk of extinction") and Ginsburg 2001 ("Red Lists and Red Data Books of the World Conservation Union (IUCN) are among the most widely used tools available to conservationists world-wide for focusing attention on species of conservation concern").

⁵ *Red List Overview: Introduction*, IUCN Red List, <http://www.iucnredlist.org/about/red-list-overview> (accessed Oct. 18, 2013).

⁶ *Id.*

⁷ *Procedure for Handling of Petitions against Current Listings on the IUCN Red List of Threatened Species*, IUCN Red List, http://www.iucnredlist.org/documents/petitions_process.pdf (accessed Oct. 18, 2013).

⁸ *Red List Overview: Establishment of Red List Authorities*, IUCN Red List, <http://www.iucnredlist.org/about/red-list-overview> (accessed Oct. 18, 2013).

⁹ *Id.*

¹⁰ *About*, IUCN Red List, <http://www.iucnredlist.org/about> (accessed Oct. 17, 2013).

¹¹ Species Survival Network, *IUCN Red List Categories and Criteria 14-15* (2001), available at http://jr.iucnredlist.org/documents/redlist_cats_crit_en.pdf.

the classification of species according to their extinction risk. The IUCN Red List categories are widely recognized internationally, are relied on in a variety of scientific publications, and are used by numerous governmental and non-governmental organizations. In evaluating the extinction risk faced by a species, the IUCN first decides whether adequate data exists to make an assessment. For those species without sufficient data, the IUCN lists the species as Data Deficient. If there is adequate data, the IUCN places the species into one of the seven remaining categories based on application of its criteria. The IUCN considers species in the Critically Endangered, Endangered, or Vulnerable categories to be threatened with extinction.

The IUCN defines a Critically Endangered species as one where the best available evidence indicates that it meets the criteria for this category and the species is considered to be facing an extremely high risk of extinction in the wild. An Endangered species is one considered to be facing a very high risk of extinction in the wild, and a Vulnerable species is considered to be facing a high risk of extinction in the wild. Accordingly, these categories are analogous to the ESA's endangered and threatened species definition.

The IUCN's criteria for listing a species as Critically Endangered are quantitative, extensive, and rigorously applied. The IUCN's species assessment criteria, like those found in the ESA, require the use of the best available scientific information, but are more objective and quantitative than the ESA's definitions of threatened and endangered species. Under the IUCN's Red List methodology, a species is listed as Critically Endangered if the best available evidence indicates it meets any of the following criteria (A to E):

A. Reduction in population size based on any of the following:

1. An observed, estimated, inferred or suspected population size reduction of $\geq 90\%$ over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are clearly reversible AND understood AND ceased, based on (and specifying) any of the following:
 - (a) direct observation
 - (b) an index of abundance appropriate to the taxon
 - (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat
 - (d) actual or potential levels of exploitation
 - (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.
2. An observed, estimated, inferred or suspected population size reduction of $\geq 80\%$ over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.
3. A population size reduction of $\geq 80\%$, projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1.
4. An observed, estimated, inferred, projected or suspected population size reduction of $\geq 80\%$ over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on

(and specifying) any of (a) to (e) under A1.

B. Geographic range in the form of either B1 (extent of occurrence) OR B2 (area of occupancy) OR both:

1. Extent of occurrence estimated to be less than 100 km² and estimates indicating at least two of a-c:
 - a. Severely fragmented or known to exist at only a single location.
 - b. Continuing decline, observed, inferred or projected, in any of the following:
 - (i) extent of occurrence
 - (ii) area of occupancy
 - (iii) area, extent and/or quality of habitat
 - (iv) number of locations or subpopulations
 - (v) number of mature individuals.
 - c. Extreme fluctuations in any of the following:
 - (i) extent of occurrence
 - (ii) area of occupancy
 - (iii) number of locations or subpopulations
 - (iv) number of mature individuals.
2. Area of occupancy estimated to be less than 10 km², and estimate indicating at least two of a-c:
 - a. Severely fragmented or known to exist at only a single location.
 - b. Continuing decline, observed, inferred or projected, in any of the following:
 - (i) extent of occurrence
 - (ii) area of occupancy
 - (iii) number of locations or subpopulations
 - (iv) number of mature individuals.
 - c. Extreme fluctuations in any of the following:
 - (i) extent of occurrence
 - (ii) area of occupancy
 - (iii) number of locations or subpopulations
 - (iv) number of mature individuals.

C. Population size estimated to number fewer than 250 mature individuals and either:

1. An estimated continuing decline of at least 25% within three years or one generation, whichever is longer, (up to a maximum of 100 years in the future) OR
2. A continuing decline, observed, projected, or inferred, in numbers of mature individuals AND at least one of the following (a-b):
 - a. Population structure in the form of one of the following:
 - (i) no subpopulation estimated to contain more than 50 mature individuals,
OR
 - (ii) at least 90% of mature individuals in one subpopulation.
 - b. Extreme fluctuations in number of mature individuals.

D. Population size estimated to number fewer than 50 mature individuals.

E. Quantitative analysis showing the probability of extinction in the wild is at least 50% within 10 years or three generations, whichever is the longer (up to a maximum of 100 years).

IUCN's Critically Endangered Listing Criteria, available at <http://www.iucnredlist.org>.

IUCN Red List and ESA Listing

Although the criteria differ from the requirements of listing a species as “endangered” or “threatened” under the ESA,¹² both NMFS and FWS have utilized IUCN data and criteria in listing decisions. The IUCN is considered a credible source of scientific data that meets the “best available science” requirement of the ESA.¹³ Reliance on IUCN data easily meets the “substantial information” standard required to initiate a status review under the ESA.¹⁴ Given the rigorous set of listing criteria that must be evaluated and applied, the IUCN Red List is arguably a more objective and science-based listing evaluation process than ESA the listing process. Indeed, a 2012 study by Harris *et al.* underscores that the data for bird taxa (the focus of the case study) show that U.S. wildlife agencies are “failing to keep pace with global listing assessments of imperiled species.” This study contrasts the IUCN Red List, based on “unambiguous criteria, objective categories that measure probability of extinction, and a dynamic system that quantifies uncertainty in assessments” with the vague and much more subjective ESA categories of “threatened” and “endangered” (*Id.* at 70). With respect to marine fish species, Davies and Baum (2012) found that IUCN Red Listings were not biased towards exaggerating threat status, and that IUCN threat listings can serve as an accurate flag for relatively data-poor fisheries.

NMFS has previously relied on IUCN data and species categorizations a number of times in both proposed and final listing decisions. In its decision to list the Guadalupe fur seal as threatened, NMFS specifically noted in its response to the IUCN comment supporting the seal be listed as endangered:

The Guadalupe fur seal is listed by IUCN as “vulnerable.” Included in this category are species “believed likely to move into the ‘Endangered’ category in the near future...” and species whose populations “have been seriously depleted and whose ultimate security has not yet been assured.” This classification corresponds more closely with the ESA definition of “threatened” than “endangered” and therefore, it appears that the “threatened” status is consistent with the IUCN category of vulnerable.¹⁵

Here, NMFS noted the IUCN categorization of the species and applied the comparable ESA categorization. NMFS thereby validated the IUCN Red List as a legitimate source of information.

¹² 16 U.S.C. § 1533.

¹³ *Id.* § 1533(b)(1)(A).

¹⁴ 16 U.S.C. § 1533(b)(3)(A).

¹⁵ Threatened Fish and Wildlife; Guadalupe Fur Seal, 50 Fed. Reg. 51,252, 51,254 (Dec. 16, 1985).

In a more recent listing decision, NMFS discussed the IUCN categorization of three species of seals. Specifically the decision stated that “the bearded seal is currently classified as a species of ‘Least Concern’ on the IUCN Red List. *These listings highlight the conservation status of listed species and can inform conservation planning and prioritization.*”¹⁶ Again this decision is clearly giving credence to the IUCN Red List as a valid source of the best available scientific data.

NMFS has previously relied on and adapted the IUCN’s criteria for estimating risk extinction. For example, in its proposed endangered listing of a distinct population of Hawaiian insular false killer whale, NMFS’ biological research team “defined the level of risk based on thresholds that have been used to assess other marine mammal species, and consistent with the criteria used by the IUCN Red List of Threatened Species (IUCN, 2001).”¹⁷ This reliance on the IUCN risk criteria also appeared in a joint decision by NMFS and the Service to determine nine distinct population segments of loggerhead turtle.¹⁸ Furthermore, almost the entire joint decision was supported by IUCN Marine Turtle Specialist reports or IUCN scientists’ papers on loggerheads.¹⁹ A number of other listing decisions by NMFS have also cited to IUCN reports and species categorizations.²⁰

Relatedly, the FWS has also relied on IUCN science numerous times. There have been some recent notable examples, including the listing of polar bears as threatened and the proposed delisting of three captive antelope species.²¹ Additionally, the FWS has a grant program called

¹⁶ Threatened Status for the Arctic, Okhotsk, and Baltic Subspecies of the Ringed Seal and Endangered Status for the Ladoga Subspecies of the Ringed Seal, 77 Fed. Reg. 76,740, 76,748 (Dec. 28, 2012) (emphasis added).

¹⁷ Proposed Endangered Status for the Hawaiian Insular False Killer Whale Distinct Population Segment, 75 Fed. Reg. 70,169, 70,170 (Nov. 17, 2010).

¹⁸ Determination of Nine Distinct Population Segments of Loggerhead Sea Turtles as Endangered or Threatened, 76 Fed. Reg. 58,868, 58,899 (Sept. 22, 2011).

¹⁹ *See id.*; *see also* 12-Month Finding and Proposed Endangered Listing of Five Species of Sawfish Under the Endangered Species Act, 78 Fed. Reg. 33,300 (June 4, 2013) (Relying on IUCN data throughout proposed listing).

²⁰ *See* 90-Day Finding on a Petition To List the Dwarf Seahorse as Threatened or Endangered, 77 Fed. Reg. 26,478, 26,481 (May 4, 2012); 90-Day Finding on a Petition To List Nassau Grouper as Threatened or Endangered, 77 Fed. Reg. 61,556, 61,561 (Oct. 10, 2012); *See also* Proposed Listing Determinations for 82 Reef-Building Coral Species, 77 Fed. Reg. 73,220, 73,253 (Dec. 7, 2012), available at <https://www.federalregister.gov/articles/2012/12/07/2012-29350/endangered-and-threatened-wildlife-and-plants-proposed-listing-determinations-for-82-reef-building> (“All the proposed corals are listed in the IUCN Red List of Threatened Species as vulnerable, endangered, or critically endangered. Thus, the proposed listing is consistent with these classifications.”); Listing Determinations for Six Distinct Population Segments of Scalloped Hammerhead Sharks, 78 Fed. Reg. 20,718, 20,721 (Apr. 5, 2013) (“[T]he IUCN classification for the scalloped hammerhead shark alone does not provide the rationale for a listing recommendation under the ESA, but the sources of information that the classification is based upon are evaluated in light of the standards on extinction risk and impacts or threats to the species.”); 12-Month Finding on Petitions To List the Northeastern Pacific Ocean Distinct Population Segment of White Shark as Threatened or Endangered, 78 Fed. Reg. 40,104, 40,123 (July 3, 2013), available at <https://www.federalregister.gov/articles/2013/07/03/2013-16039/endangered-and-threatened-wildlife-12-month-finding-on-petitions-to-list-the-northeastern-pacific> (“Listing a species on the IUCN Red List does not provide any regulatory protections for the species, but serves as an evaluation of the species’ status.”).

²¹ Determination of Threatened Status for the Polar Bear (*Ursus maritimus*) Throughout Its Range, 73 Fed. Reg. 28,212, 28,216 (May 15, 2008); Removing the Gray Wolf (*Canis lupus*) From the List of Endangered and Threatened Wildlife, 78 Fed. Reg. 35,664, 35,678 (Jun. 13, 2013); 12-Month Findings on Petitions to Delist U.S. Captive Populations of the Scimitar-horned Oryx, Dama Gazelle, and Addax, 78 Fed. Reg. 33,790, 33,791 (Jun. 5, 2013).

“Wildlife Without Borders.” The program funds projects to conserve species with a very high risk of extinction that are located outside the United States, Canada, and wealthier European nations.²² Species eligible for grants “should meet the criteria to be listed as ‘Critically Endangered’ or ‘Endangered’ on the International Union for the Conservation of Nature (IUCN) Red List.”²³ The FWS utilizes the IUCN’s categorization of imperiled species, recognizing its legitimacy as a species-listing system. Moreover, in the past, the FWS has used IUCN categorization of species in its Candidate Notice of Review. The FWS explained:

Those species with the highest IUCN rank (critically endangered)... originally comprised a group of approximately 40 candidate species (“Top 40”). These 40 candidate species have had the highest priority to receive funding to work on a proposed listing determination. As we work on proposed and final listing rules for those 40 candidates, we apply the ranking criteria to the next group of candidates with an LPN of 2 and 3 to determine the next set of highest priority candidate species.²⁴

Again, this highlights the FWS’ reliance on IUCN’s categorization of species and the IUCN’s credibility as a source of the best available scientific data.

Although NMFS and the FWS are separate agencies, they have been given the same task of determining whether a species is “threatened” or “endangered.” In 1994, the agencies promulgated a “Notice of Interagency Cooperative Policy on Information Standards under the ESA,” a joint statement by the agencies agreeing to both utilize “the best scientific and commercial data available” when determining whether any species is endangered or threatened. The information can include “...status surveys, biological assessments, and other unpublished material... from State natural resource agencies and natural heritage programs, Tribal governments, other Federal agencies, consulting firms, contractors, and individuals associated with professional organizations and higher educational institutions.”²⁵ This type of policy agreement indicates that there is uniformity in what the agencies can and should rely on. Thus if the FWS finds it acceptable to rely on IUCN categorizations and data, NMFS should as well.

Given the objective, data-driven process used by the IUCN Red List to categorize species, the IUCN categorization of a species as imperiled, including Critically Endangered, indicates that reasonable people – experts in their field – have determined that the best available scientific evidence shows that the species is likely to be “threatened” or “endangered” as those terms are defined in the ESA.

²² U.S. Fish and Wildlife Service. “Wildlife Without Borders: Critically Endangered Animals Conservation Fund” (2013), available at <http://www.fws.gov/International//pdf/factsheet-wildlife-without-borders.pdf>.

²³ *Id.*

²⁴ Review of Native Species That Are Candidates for Listing as Endangered or Threatened, 76 Fed. Reg. 66,370, 66,380 (Oct. 26, 2011) (In 2012, the FWS did not mention IUCN and instead pointed to the recent settlement decisions).

²⁵ Notice of Interagency Cooperative Policy on Information Standards under the Endangered Species Act, NOAA Fisheries: Endangered Species Act Policies, Guidance and Regulations, <http://www.nmfs.noaa.gov/pr/pdfs/fr/fr59-24271.pdf> (last updated Aug. 12, 2013).

THE IUCN RED LIST DESIGNATION OF CRITICALLY ENDANGERED FOR CARIBBEAN ELECTRIC RAY SUPPORTS A POSITIVE 90-DAY FINDING

Applying the Red List criteria to the Caribbean electric ray, the IUCN determined the Caribbean electric ray was Critically Endangered based on criteria A2(a), (b) & (d), A3(b) & (d), and A4(b) & (d). This assessment signifies the highest level of threat short of a species being extinct in the wild. In other words, according to the IUCN, the Caribbean electric ray is as close to extinction in the wild as possible.

Under criteria A2(a), (b) & (d), the IUCN found the Caribbean electric ray had suffered “[a]n observed, estimated, inferred or suspected population size reduction of $\geq 80\%$ over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on direct observation, an index of abundance appropriate to the taxon, and actual or potential levels of exploitation.”

Under criteria A3(b) & (d), the IUCN found the Caribbean electric ray has suffered “[a] population size reduction of $\geq 80\%$, projected or suspect to be met within the next 10 years of three generations, whichever is the longer (up to a maximum of 100 years), based on... an index of abundance appropriate to the taxon and actual or potential levels of exploitation.”

Under criteria A4(b) & (d), the IUCN found the Caribbean electric ray had suffered “[a]n observed, estimated, inferred, projected or suspected population size reduction of $\geq 80\%$ over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on... an index of abundance appropriate to the taxon and actual or potential levels of exploitation.”

The IUCN Red List designation of the Caribbean electric ray occurred in 2007, based on the assessment of a panel of elasmobranch experts and reviewed by other elasmobranch experts. See <http://www.iucnredlist.org/details/63142/0> [Assessment information]. The IUCN assessment itself was based on a review of the best available data in the peer-reviewed, published literature. See <http://www.iucnredlist.org/details/biblio/63142/0> [Bibliography]. As per its latest five-year review, the IUCN continues to classify the Caribbean electric ray as Critically Endangered (Kyne *et al.* 2012).

In making a negative 90-day finding for the Caribbean electric ray, NMFS did not make a credible case for why the IUCN Critically Endangered designation (and the best available scientific information upon which that designation is based) should be rejected as unreliable. The IUCN Red List designation in 2007, affirmed in 2012, demonstrates that the best available data is more than sufficient to lead reasonable people – i.e., elasmobranch experts on the IUCN’s Shark Specialist Group – to conclude that the petitioned action may be warranted.

ESA STANDARDS SUPPORT A POSITIVE 90-DAY FINDING

NMFS’ recitation of the standards applicable to evaluating petitions at the 90-day stage

notwithstanding, the negative 90-day finding for the Caribbean electric ray failed to adhere to these standards. Rather than accepting petitioner's characterizations of the best available scientific data, which was grounded in accepted scientific principles, NMFS dismissed the cited studies without demonstrating that these studies were in fact unreliable or incorrect. NMFS asserted that its own data contradicted these findings, yet failed to present its data or its analysis thereof in the negative 90-day finding. NMFS rejected the petition for failing to provide absolute population numbers demonstrating that the Caribbean electric ray is at a critically low population level, thus ignoring that the 90-day finding only requires that "a reasonable person" would believe that the petitioned action may be warranted, a standard that the petition and these supplemental comments more than meet, as shown below.

Population Abundance and Trends

NMFS is required to evaluate whether information on declining population trends indicates that listing may be warranted. The ESA's statutory and regulatory requirements do not mandate, and have never been interpreted as requiring absolute abundance figures, especially at the 90-day stage where NMFS must accept the sources and characterizations of the information presented where that information is based on accepted scientific principles, even where that information may be contradicted by other information. In short, the low bar for a 90-day finding required NMFS to give the sources of information cited in the petition the benefit of the doubt. NMFS failed to do this for the Caribbean electric ray petition. Rather than accept Shepherd and Myers' (2005) research demonstrating a 98% decline in abundance – as shown through NMFS's own fishery-independent survey data in the northern Gulf of Mexico over 30 years – as the best available scientific information on the species, NMFS improperly rejected this data by applying a higher standard than required at the 90-day stage – namely, that petitioners demonstrate a "critically low population count." 76 Fed. Reg. at 15,949.

NMFS cites lack of information on what would constitute a "critically low population count" for the Caribbean electric ray: "[w]hile the petitioner provides some evidence that the Caribbean electric ray population, at least in the Northern Gulf of Mexico, may have declined relatively rapidly, it fails to provide substantial information that the species is at a critically low population level or has a low resilience for recovery." 76 Fed. Reg. at 15,949. In rejecting the information in the petition – information that the IUCN's elasmobranch experts found sufficient to warrant listing the species as Critically Endangered under the Red List's quantitative, objective, and more exacting standards – NMFS violated its mandates under the ESA to act on the "best available" scientific information to make a positive 90-day finding where a "reasonable person" would find the information presented sufficient to believe that listing "may be warranted."

The ESA requires the "best available" information, not conclusive proof. *See, e.g. Bldg. Indus. Ass'n of Superior Cal. v. Norton*, 247 F.3d 1241, 1246 (D.C. Cir. 2001) ("the Service must utilize the 'best scientific... data available,' not the best scientific data possible"). Information on the precise size, number, and location of populations either historically or currently is often unavailable for imperiled species. In establishing the best available information standard, Congress expressed a desire to not wait for perfect or conclusive information, which may come too late or never, before protecting species for which the best information available shows that threats puts them at risk of extinction now or in the foreseeable future. NMFS's decision here

clearly frustrates the Congressional desire to “give the benefit of the doubt to the species” in interpreting the best available science standard in the listing provisions of the ESA. *Greenpeace v. Nat’l Marine Fisheries Serv.*, 55 F. Supp. 2d 1248, 1261 (W.D. Wash. 1999).

NMFS’s negative 90-day finding fails to make any showing that the Shepherd and Myers paper is not based on accepted scientific principles or is otherwise “incorrect, unreliable, obsolete, or irrelevant.” 76 Fed. Reg. 15,948. Indeed, NMFS would have a hard time disputing the credibility of Shepherd and Myers’ work, which was relied on not only by the IUCN in reaching its Red List determination of Critically Endangered²⁶ but has also been cited at least sixty times in the relevant scientific literature on elasmobranchs.²⁷

Guardians’ FOIA requests revealed internal NMFS correspondence criticizing Shepherd and Myers 2005 on the basis of NMFS scientist John Carlson’s issues with Dr. Ransom Myers’ other work, stating that “[NOAA] had issues with that study and addressed that and other studies out of the same shop. it help help [sic] your findings to note their [sic] has been issues with the data. see attached.”²⁸ The attached document does not, however, discuss the Caribbean electric ray. Rather, it is a critique of two articles describing shark declines in the northwest Atlantic and Gulf of Mexico (Burgess *et al.* 2005). The Burgess *et al.* critique (on which John Carlson is a co-author) challenged the cited Baum and Myers’ papers for, among other reasons, the alleged flaws in analyzing fishery-dependent data sets. Not included in the discussion is the response from Baum and co-authors (Baum *et al.* 2005). Nor is the Burgess *et al.* critique at all relevant to the reliability of the Shepherd and Myers (2005) paper based on NMFS’s own fishery-independent research surveys. If NMFS is intending to discuss issues with the data or methods in Shepherd and Myers 2005, it should do so transparently in a 12-month review.

In the finding, NMFS states that though Shepherd and Myers (2005) documented a significant decline in “mean standardized catch per tow” of the ray between 1972 and 1973, between 1973 and 2002 the mean standardized catch per tow remained “stable.” However, what NMFS failed to address was that between 1973 and 2002 the mean standardized catch per tow remained “stable” at close to zero. NMFS’s statement that “the Caribbean electric ray was the fifth (out of 31) most common species recorded in the data presented in Shepherd and Myers (2005)” is misleading, because NMFS looked only at the total data for occurrence patterns of elasmobranchs captured in the northern Gulf of Mexico shrimp trawl survey.²⁹ Saying that the Caribbean electric ray was the fifth most common species out of this group is not saying much when the total number caught was 78 electric rays over 19 years of a 31-year study (Shepherd and Myers 2005). Since there was a 98% drop in abundance from 1972 to 1973, it is likely that the count in subsequent years was limited to 1 or 2 individuals. NMFS’ conclusion that the species is “relatively common” is therefore questionable. The finding states: “[w]hile we do not have an estimate of population numbers, the data does indicate that the species is relatively common, and it occurs in high enough abundance to be detected repeatedly during annual

²⁶ See <http://www.iucnredlist.org/details/biblio/63142/0> [Bibliography].

²⁷ See Citations, <http://onlinelibrary.wiley.com/doi/10.1111/j.1461-0248.2005.00807.x/citedby>

²⁸ Dec, 7, 2010, Subject: Re: Petition to List the Caribbean Electric Ray under the ESA From: John Carlson <John.Carlson@noaa.gov> To: "Andrew.Herndon" <Andrew.Herndon@noaa.gov>

²⁹ The four most commonly caught elasmobranch species were represented by 911 individuals (*Rhizoprionodon terraenovae*), 233 individuals (*Raja texana*), 210 individuals (*Sphyrna tiburo*) and 90 individuals (*Dasyatis americana*).

sampling... [S]ince 2002 Caribbean electric rays have been documented in [fisheries independent monitoring (FIM)] cruises every year through 2010” (NMFS 2011 at 15949).

FIM data from 2002-2010 is neither detailed nor analyzed in the negative 90-day finding, and thus it is unclear what “detected repeatedly” means in this context, or what is meant by “relatively common.” As the count was limited to a low number of individual rays per trawl per year in the five analyzed shrimp statistical zones after 1973, it is difficult to imagine what it would take for NMFS to consider a species “rare.” In making its new 90-day finding, NMFS should present and analyze the newer FIM data for 2003-13. Commenters note that the Southeast Area Monitoring and Assessment Program (SEAMAP) Environmental and Biological Atlases for the Gulf of Mexico from 2001 through 2010, which collate the FIM research trawl surveys for the fall shrimp/groundfish surveys in all of the surveyed Gulf of Mexico statistical zones, demonstrate that Catch Per Unit Effort (CPUE) for Caribbean electric rays ranges from a high of 0.076 in 2006 to a low of 0.005 in 2010.³⁰ Certainly the aggregate data does not support NMFS’ assertion that the species is relatively common, but NMFS should make an apples-to-apples comparison of the 2002-13 data to the data analyzed by Shepherd and Myers by breaking out the data from SEAMAP fall shrimp/groundfish trawls in survey statistical zones 11 and 13-16.

NMFS must also conduct a thorough search of its files in redoing the 90-day finding on the Caribbean electric ray to determine if older data or reports in its files can shed light on the question of what the Caribbean electric ray’s abundance might have been before the advent of large-scale shrimp trawling. As McClenachan *et al.* (2012) point out, when historical data is omitted from extinction risk assessments, the use of shorter-term data alone may obscure severe population declines pointing towards endangered status and lead managers inaccurately to believe that populations are not at risk of extinction. Where, as here, NMFS’s FIM data only goes as far back as 1972, NMFS must determine whether pre-1972 data in its files is indicative of the Caribbean electric ray’s current status.

NMFS also premised its negative 90-day finding in part on its assumption that the Caribbean electric ray has a relatively high resiliency for recovery in light of its relatively early maturation compared to other shark and ray species. 76 Fed. Reg. at 15,949. Recent analysis by Pinsky *et al.* (2011), however, undermines the claim that slower maturing marine species are more vulnerable to species collapse than faster maturing species. To the contrary, Pinsky *et al.* revealed that “fast” fish species experience population collapse just as often as species with slower life histories. Although NMFS similarly dismisses the evidence presented on the abortion of embryos by gravid females caught as bycatch and the potential impacts to the species, 76 Fed. Reg. at 15,949, García *et al.* (2010) found that chondrichthyans tend to have a higher extinction risk if they are matrotrophically viviparous as are Caribbean electric rays. And Rudloe (1989) specifically identifies the Caribbean electric ray as having a low rate of reproduction and localized distributions, thus rendering it vulnerable to overfishing. We also refer NMFS to the Spanish-language article by Acevedo *et al.* (2007b) cited below concerning bycatch in Colombian artisanal shrimp fisheries resulting in abortions by gravid females. These studies show that NMFS has little, if any basis for its assumption that the Caribbean electric ray’s

³⁰ Data taken from the fall shrimp/groundfish survey tables in the SEAMAP Environmental and Biological Atlases of the Gulf of Mexico, 2001 – 2010, Available at http://www.gsmfc.org/default.php?p=sm_ov.htm#content@10:links@8

population is highly resilient to overfishing via bycatch or for its dismissal of the best available scientific information to the contrary.

Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

NMFS concluded that it “appears extremely unlikely that the Caribbean electric ray is facing intense shrimp fisheries in multiple other countries within the Caribbean electric ray’s range” because shrimp trawling was banned in Venezuela in 2009 and in Belize in 2011. 76 Fed. Reg. at 15,952. However, the impacts of decades of shrimp trawling on the Caribbean electric ray’s population in those areas remains unknown. NMFS also stated that “[w]hile Costa Rica, Panama, and Colombia do have active commercial shrimp fisheries, they fish primarily in the Pacific Ocean where the Caribbean electric ray is not found.” While FAO data supports the finding’s suggestion that Costa Rica and Panama shrimp fisheries mainly take place in the Pacific, the same cannot be said for Colombia. On the contrary: “[a]lthough shallow-water shrimp has been over-fished since the eighties, it still accounts for 30 per cent and 95 per cent of the [Colombian] industrial fleet’s catches in the Pacific and Atlantic respectively” (FAO 2003). The bycatch-to-shrimp ratio in Colombia ranks among the highest in the world (Duarte *et al.* 2009 at 114).

The finding claims that the “state of the commercial shrimp fishery in Cuba is unknown, but the political and economic climate within the country makes it unlikely to be a source of great fishing effort.” At least one report indicates that this is completely speculative and unfounded. Cuba is “an important source of high-valued tropical seafood for the world market” and “[s]ince 1995, total fisheries catch [in Cuba] has increased 9.4%, total income derived from fishing has increased 8.3%, and seafood exports have increased 6.9%” (Adams *et al.* 2000 at 7). “The Cuban fishing fleet now concentrates on the production of high-valued species such as spiny lobster, shrimp, reef fish, tunas, sponges, and others” (Adams *et al.* 2000 at 1). Impacts from the Cuban fishery should not be discounted.

NMFS also states that “[i]n the Lesser Antilles, only Trinidad and Tobago has a commercial shrimp fishery.” 76 Fed. Reg. at 15,952. Though true, this statement does nothing to explain the assumption that the Trinidad and Tobago commercial shrimp fishery is not impacting the ray. Even as small as it is, this fishery landed 785 tons of shrimp and discarded 703 tons of bycatch in a single year (Gillett 2008 at 273).

Moreover, NMFS completely fails to evaluate the Mexican shrimp fishery on the Gulf of Mexico – at least 614 industrial shrimp boats are registered to Mexico in the Atlantic and Caribbean (NIP 2010).

Lastly, NMFS’s analysis of the U.S. shrimp fisheries’ potential impacts on the ray lacks any justification. The findings’ optimistic statement that “reduction in effort has likely reduced the potential threat of shrimp trawling to the Caribbean electric ray,” 76 Fed. Reg. at 15,952, provides no evidence, aside from mere speculation, that the millions of hours of shrimp trawling still occurring annually do not present a continued threat to the Caribbean electric ray’s population. Figure 1 shows shrimp landings in the Gulf from 2000-2012, in thousands of pounds. Landings are on the rise again in 2011 and 2012, and are nearing 2007 levels; the declines in effort referenced in the finding may well be temporary. NMFS’s conclusion is contrary to the

IUCN’s conclusions that “actual or potential levels of exploitation” (i.e. bycatch in shrimp trawling) are responsible for Caribbean electric ray population reductions, placing the species in the Critically Endangered category.

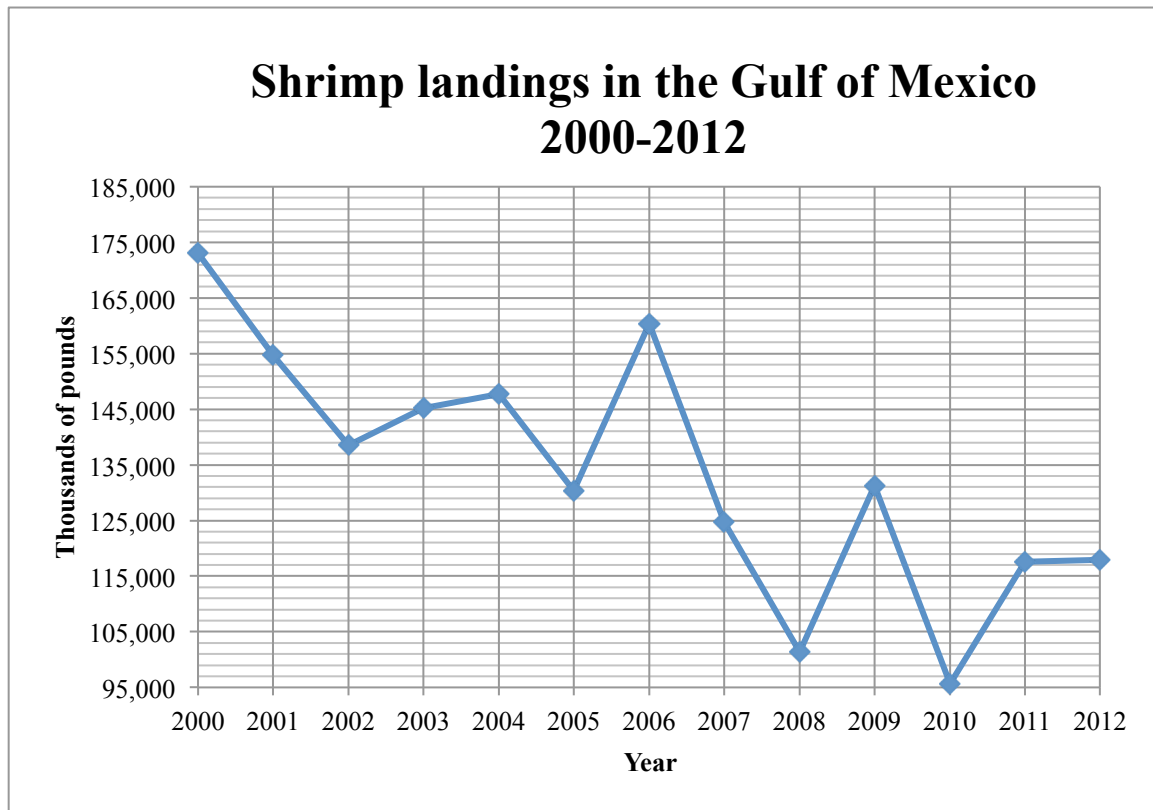


Figure 1. Shrimp landings in the Gulf of Mexico 2000-2012. Source: NOAA fishery market news archive, available at www.st.nmfs.noaa.gov/commercial-fisheries/market-news/related-links/market-news-archives/index (NOAA 2004, 2008, and 2012)

All or Significant Portion of Range

NMFS also did not make the required determination as to whether the petition included sufficient information for a reasonable person to believe that listing Caribbean electric ray as endangered or threatened may be warranted throughout all or *a significant portion of its range*.³¹ Indeed, NMFS erred in discounting Guardians’ petition as failing “to provide substantial evidence that the Caribbean electric ray’s population is critically low throughout its range.” 76 Fed. Reg. at 15,949. NMFS was required to consider whether the evidence analyzed in the Shepherd and Myers (2005) paper meets the relatively low threshold for a positive 90-day finding that listing the ray may be warranted based on its precipitous declines in the Gulf of Mexico. NMFS inappropriately dismissed the best available scientific evidence presented by Shepherd and Myers because that paper is limited to the northern Gulf of Mexico, which constitutes a substantial portion of the species’ range.

³¹ 16 U.S.C. §§ 1532(6), (20) (definitions of endangered and threatened species); see *Defenders of Wildlife v. Norton*, 258 F.3d 1136, 1141 (9th Cir. 2001).

Further, NMFS was required to consider the best available scientific information on the status of the Caribbean electric ray in the South Atlantic, and whether that information might lead a reasonable person to believe that listing may be warranted, but failed to do so. Nowhere in the negative 90-day finding does NMFS acknowledge the existence of SEAMAP survey data for the South Atlantic Bight fishery-independent trawl surveys that it funded and presumably received copies of.³² These reports, covering surveys from 1990 to 2007, must be analyzed for Caribbean electric ray presence and trends as a source of the best available scientific and commercial data.

Supplemental Information on the Caribbean Electric Ray in its Colombian Range

Acevedo *et al.* (2007a) confirms that the biology of the Caribbean electric ray has been impacted by fishing shrimp with trawling nets along Columbia’s Caribbean coast. The analysis was done in the period of August-November 2004. The authors captured 47 specimens from 8 species, including 23 individual Caribbean electric rays, in the area of La Virgen, Baru and Bay Portete, The conclusions of this paper provide information and documentation on the species location and distribution in the Colombian Caribbean (*see also* Acevedo *et al.* 2007b).

Grijalba-Bendeck *et al.* (2007) document that, in the last decades, fisheries and commercialization have increased worldwide and one of the impacted species is the Caribbean electric ray. The ray is mainly by-caught by artisanal fisheries. This study focuses on the area of Santa Marta, Colombia (Table 1). The ray is a species susceptible to artisanal fisheries because pregnant females approach the coast to deliver.

Moreno *et al.* (2010) establishes that the population of the Caribbean electric ray in the Colombian Caribbean suffers from bycatch from artisanal fisheries using nets to fish near beaches. In Colombia, the species has no commercial value, but the nets used are for small and medium pelagic fish and are non-selective.

Table 1. Caribbean electric rays caught in artisanal fisheries in Santa Marta, Colombia. Source: Grijalba-Bendeck *et al.* (2007).

Location	Fishing methods	Species extracted	Results	
Playa Salguero	Artisanal fisheries with trawling nets	Fish and rays	674 fishing throws	18.2% rays 24% were <i>N. bancroftii</i>
Don Jaca	Artisanal fisheries with trawling nets, longline	Sharks, sardines, bonito and others	129 fishing throws with nets and 54 longline	53% rays 3.5 and 3% were <i>N. bancroftii</i>

Grijalba-Bendeck *et al.* (2012) states that the Caribbean electric ray is one of the species included in the group that suffers the most as bycatch in the artisanal shrimp fisheries (Acevedo *et al.* 2007; Stevens *et al.* 2000). In Colombia, artisanal fisheries are a major component in the economic sector. NMFS must consider this scientific data in making a new 90-day finding.

³² See reports available at <http://www.dnr.sc.gov/marine/mrri/SEAMAP/SMreports.html>

CONCLUSION

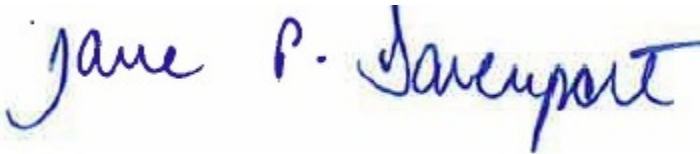
The information presented by WildEarth Guardians in its original petition to list the Caribbean electric ray, as supplemented by the additional information presented herein, support a positive 90-day finding for this species. We urge NMFS to make a positive 90-day finding as required under the Endangered Species Act and initiate a status review forthwith.

Thank you for considering our comments.

Sincerely,

A handwritten signature in black ink that reads "Taylor Jones". The signature is written in a cursive, flowing style.

Taylor Jones
WildEarth Guardians
1536 Wynkoop Street, Ste.301
Denver, CO 80202

A handwritten signature in blue ink that reads "Jane P. Davenport". The signature is written in a cursive, flowing style.

Jane P. Davenport, Defenders of Wildlife

WORKS CITED

- Acevedo, K., et al. "Reproductive Aspects of Three Rajiformes Collected as Bycatch of the Shrimp Trawling Fishery at the Colombian Caribbean Sea." Gulf and Caribbean Fisheries Institute 58 (2007a): 219-225.
- Acevedo, K., E. Molina, and P. Gómez-Canchong. "Sharks and Rays (Subclass Elasmobranchii) Discarded from Commercial Shrimp Trawlers at the Caribbean Sea of Colombia." Acta Biológica Colombiana 12.2 (2007b): 69-80.
- Adams, C., P. S. Vega, and A. G. Alvarez. "An Overview of the Cuban Commercial Fishing Industry and Recent Changes in Management Structure and Objectives." Proceedings of the Tenth Biennial Conference of the International Institute of Fisheries Economics and Trade, July 10-14, 2000, Corvallis, Oregon, USA. Edited by Richard S. Johnston and

compiled by Ann L. Shriver. International Institute of Fisheries Economics and Trade (IIFET), Corvallis, OR, 2001.

Baum, J. K., D. Kehler, and R. A. Myers. "Robust estimates of decline for pelagic shark populations in the northwest Atlantic and Gulf of Mexico." Fisheries 10.30 (2005): 27-29.

Burgess, G. H., et al. Is the collapse of shark populations in the Northwest Atlantic Ocean and Gulf of Mexico real? Fisheries 10.30 (2005): 19-26.

Butchart, S. H. M., et al. "Using Red List Indices to Measure Progress Towards the 2010 Target and Beyond." Philosophical Transactions of the Royal Society 360 (2005): 255-268.

Campagna, C., et al. "Gulf of Mexico Oil Blowout Increases Risks to Globally Threatened Species." BioScience 61.5 (2011): 393-397.

Davies, T. D., and J. K. Baum. "Extinction Risk and Overfishing: Reconciling Conservation and Fisheries Perspectives on the Status of Marine Fishes." Scientific Reports 2.51 (2012): 1-9.

Duarte, L. O., L. Manjarrés, and F. Escobar. "Bottom Trawl Bycatch Assessment of the Shrimp Fishery in the Caribbean Sea off Colombia." Proceedings of the 62nd Gulf and Caribbean Fisheries Institute November 2-6, 2009. Cumana, Venezuela.

Food and Agriculture Organization of the United Nations. (FAO). "Fishery Country Profile: the Republic of Colombia." 2003. <<http://www.fao.org/fi/oldsite/FCP/en/COL/profile.htm>> [Accessed 10/21/2013].

Field, I. C., et al. "Susceptibility of Sharks, Rays, and Chimaeras to Global Extinction." Advances in Marine Biology 56 (2009): 275-363.

Fowler, S. L., et al. (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, 2005.

García, V. B., L. O. Lucifora, and R. A. Myers. "The importance of habitat and life history to extinction risk in sharks, skates, rays, and chimaeras." Proceedings of the Royal Society B 275 (2008): 83-89.

Gillett, R. United Nations. Global Study of Shrimp Fisheries. Food and Agriculture Organization of the United Nations, Rome, 2008.

Ginsburg, J. "The Application of IUCN Red List Criteria at Regional Levels." Conservation Biology 15.5 (2001): 1206-1212.

- Grijalba-Bendeck, M., C. Polo-Silva, and A. Acero P. “An approximation of batoid abundance from artesian fishery, Santa Marta (Colombia).” Boletín de Investigaciones Marinas y Costeras 36 (2007): 251-268
- Grijalba-Bendeck, M., et al. “Trophic and reproductive aspects of some batoids caught at Santa Marta in the Colombian Caribbean Sea.” Latin American Journal of Aquatic Research 40.2 (2012): 300-315.
- Gulf States Marine Fisheries Commission. SEAMAP Environmental and Biological Atlases of the Gulf of Mexico, 2001-2010.
- Harris, J. B. C., et al. “Conserving imperiled species: a comparison of the IUCN Red List and the U. S. Endangered Species Act. Conservation Letters 5 (2012): 64-72.
- INP. “Las Pesquerías de Camarones en México.” Workshop for the Management of the Incidental Capture of Fishes and Reduction of Discards for Trawl Fisheries, Puntarenas, Costa Rica, Feb. 22-26, 2010.
- Kyne, P.M., et al (eds). The Conservation Status of North American, Central American, and Caribbean Chondrichthyans. IUCN Species Survival Commission Shark Specialist Group, Vancouver, Canada, 2012.
- McClenachan, L., F. Ferretti, and J. K. Baum. “From archives to conservation: why historical data are needed to set baselines for marine animals and ecosystems.” Conservation Letters 5 (2012): 349-359.
- Moreno, F., et al. “Trophic spectrum of the electric ray *Narcine bancroftii* (Griffith & Smith 1834) (Elasmobranchii, Narcinidae) in playa Salguero, Santa Marta, Colombian Caribbean.” Pan-American Journal of Aquatic Sciences 4.4 (2009): 413-442.
- Moreno, F., et al. “Reproduction of the electric ray *Narcine bancroftii* (Torpediniformes: Narcinidae) in Santa Marta, Colombian Caribbean.” Latin American Journal of Aquatic Research 38.1 (2010): 27-36.
- National Marine Fisheries Service (NMFS). Endangered and Threatened Wildlife; Notice of 90-Day Finding on a Petition To List the Caribbean Electric Ray as Threatened or Endangered Under the Endangered Species Act (ESA). Federal Register 76.55 (2011): 15947-15952.
- National Oceanic and Atmospheric Administration (NOAA). “Shrimp Statistics: December, 2004.” NOAA Fishery Market News Archive. <www.st.nmfs.noaa.gov/commercial-fisheries/market-news/related-links/market-news-archives/index> [Accessed 10/20/2013].

- ____. “Shrimp Statistics: December, 2008.” NOAA Fishery Market News Archive.
<www.st.nmfs.noaa.gov/commercial-fisheries/market-news/related-links/market-news-archives/index> [Accessed 10/20/2013].
- ____. “Shrimp Statistics: December, 2012.” NOAA Fishery Market News Archive.
<www.st.nmfs.noaa.gov/commercial-fisheries/market-news/related-links/market-news-archives/index> [Accessed 10/20/2013].
- Pinsky, M. L., et al. “Unexpected patterns of fisheries collapse in the world’s oceans.” PNAS 108.20 (2011): 8317-8322.
- Rodrigues, Ana S. L., et al. “The Value of the IUCN Red List for Conservation.” Trends in Ecology and Evolution 21.2 (2006): 71-76.
- Shepherd, T. D., and R. A. Myers. “Direct and indirect fishery effects on small coastal elasmobranchs in the northern Gulf of Mexico.” Ecology Letters 8 (2005): 1095-1104.
- South Carolina Department of Natural Resources. SEAMAP-SA Results of Trawling Efforts in the Coastal Habitat of the South Atlantic Bight. Reports 1990-2007.