Pelagic Long Lines Background

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2 CBD, Oceana, TIRN to NOAA re: Draft Environmental Assessment To Consider the Potential Impacts of Authorizing an Exempted Fishing Permit For Longline Vessels to Fish Within the U.S. West Coast Exclusive Economic Zone (October 3, 2016)

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7 Oceana to NMFS and PFMC: Opposition to Pelagic Longlines off the U.S. West Coast (March 30, 2017)

8 TIRN, CBD v US Dept of Commerce, NMFS, et al. 878 F.3d 725, United States Court of Appeals, Ninth Circuit (December 27, 2017)

9 Oceana to PFMC and NOAA re: Bycatch in Pelagic Longline Swordfish Fisheries (February 8, 2018)

10 Audubon California to PFMC re: Swordfish Management and Monitoring Plan (August 27, 2018)

11 Oceana white paper: “Providing Domestically Caught U.S. West Coast Swordfish: How to Achieve Environmental Sustainability and Economic Profitability” (August 2018)

12 Oceana to PFMC and NOAA re: Bycatch in Pelagic Longline Fisheries (October 23, 2018)

13 Oceana Fact sheet: Hawaii Shallow-Set Longline Fishery (HI SSLL)

14 Polovina, J. and Woodworth-Jefcoats. 2013. Fishery-Induced Changes in the Subtropical Pacific Pelagic Ecosystem Size Structure: Observations and Theory. PLoS ONE 8(4): e62341. doi:10.1371/journal.pone.0062341

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June 3, 2019

PELAGIC LONGLINES OFF THE U.S. WEST COAST

Pelagic longlines used to catch tuna, swordfish, and sharks, are widely known to have high levels of bycatch. Despite numerous gear modifications, improvements, and management measures, even the highly regulated pelagic longline fisheries off Hawaii have unacceptable levels of bycatch and have been shut down year after year for their interactions with sensitive and endangered species. The Hawaii fishery has been through litigation for decades (see history in most recent attached court decision) and has shown that there is no way to alter pelagic longline gear such that it doesn't catch excessive numbers of protected species. This bycatch would likely be much higher off California because we have much higher concentrations of protected species. In fact, NMFS conducted deep-set longline experiments in 2011, which resulted in over 75% of the catch being unmarketable species (bycatch), including 42 blue sharks caught for every swordfish.

Pelagic longlines were initially prohibited in 1977, when the California Fish and Game Commission issued regulations requiring swordfish be taken only with handheld hook and line or harpoon within California's territorial sea (0-3nm) 14 C.C.R. §107.12. In 1989 with the enactment of Section 9028 of the Fish and Game Code, the California Legislature prohibited the landing of fish caught with hook and line gear longer than 900 feet inside US West Coast Exclusive Economic Zone (EEZ). Pelagic longline gear is also currently prohibited under the HMS FMP adopted in 2004. There is a Hawaii-based shallow set and deep set pelagic longline fishery that operates on the high seas outside the EEZ. This fishery regularly lands swordfish in California, and some participants are based in California. The 12-month season starting in January was closed in April in 2018 and 2019 due to excessive takes of endangered sea turtles.

Authorizing additional pelagic longline effort under the Pacific Highly Migratory Species Fishery Management Plan (HMS FMP) would increase bycatch, undermine and impair implementation of SB 1017, and impose significant new workload on state and federal fishery managers, and NGOs that could focus their attention elsewhere, and will likely lead to substantial new litigation. The recreational fishing and conservation communities have long opposed the introduction of a West Coast-based pelagic longline fishery due to the impact on other marine life including seabirds, sharks, and valuable marlins.

The Pacific Fishery Management Council (PFMC) considered the authorization of a West Coast-based pelagic longline fishery outside the EEZ in 2009 (in the same area as the Hawaii-based fishery), but ultimately decided not to move forward due to concerns around environmental impacts. Despite this decision, with the recent changes in PFMC composition and the state's move to phase out drift gillnets, NOAA Fisheries has pushed the PFMC to reconsider the authorization of a pelagic longline fishery outside the EEZ and has approved exempted fishing permits to allow pelagic longlines inside the EEZ. The Council is tentatively scheduled to discuss this issue at their November 2019 meeting in Costa Mesa.

NMFS and other pelagic longline proponents are taking a 2-prong approach aimed at the long-term goal of opening the US West Coast EEZ to pelagic longlines. First, they are issuing Exempted Fishing Permits to allow commercial pelagic longline based on the Hawaii fishery inside the US West Coast EEZ. Second, they are trying to authorize and issue West Coast- based pelagic longline permits to fish outside the US West Coast EEZ. This would both remove the longstanding prohibition on pelagic longlines in the HMS FMP and establish a management machinery at NMFS West Coast Region and the PFMC to manage pelagic longlines. The arguments for these measures are that we need to collect new data to determine whether pelagic longlines have unacceptably high bycatch, and that we need to increase domestic swordfish landings. Deep-set buoy gear is a gear type that has a currently untapped potential to increase domestic swordfish landings, and linked buoy gear offers the potential to scale up the catching

power of this proven clean fishing method. We need to give deep set buoy gear a chance. Unless and until deep set buoy gear has been authorized for several years and determined not to be commercially viable, there is no need to explore pelagic longlines. Any effort to do so would be counter to the solution reached in SB 1017.

The California Department of Fish and Wildlife has a seat on the PFMC and California has 3 additional seats on the Council that are appointed by the Governor. California also plays a role through the Coastal Zone Management Program implemented by the California Coastal Commission whereby the state may request to review federal actions for consistency with the state's coastal management program.

NOAA's Office of Coastal Management recently denied the California Coastal Commission's request to review a pelagic longline exempted fishing permit for consistency with state law, finding that endangered leatherback sea turtles are not a coastal resource of California despite their status as the state's marine reptile and their regular use of state waters as a foraging destination.

We request that CDFW and the state of California adopt the following position:

1. Strongly oppose any further consideration of authorizing a West Coast-based pelagic longline fishery outside the EEZ. Specifically, at the June 2019 PFMC meeting, request that the item be removed indefinitely from future PFMC agendas (it is currently scheduled for November 2019).
2. Oppose any future Exempted Fishing Permits that seek to test pelagic longlines.
3. Oppose any new pelagic longline fishing.

Attached to this summary are several recent reports, analyses, and comment letters from stakeholders opposing the introduction of a pelagic longline fishery that detail the issues associated with pelagic longline fisheries in general and why the introduction of a pelagic longline fishery in the California Current is inadvisable.

Images Oceana received from a Freedom of Information Act request from NOAA from the Hawaii shallow-set longline fishery.

For more information or follow-up, contact:

Jennifer Fearing jennifer@fearlessadvocacy.com
Geoff Shester gshester@oceana.org
Tara Brock tbrock@oceana.org
Paul Shively pshively@pewtrusts.org
Andrea Treece atreece@earthjustice.org

Submitted via email: RegionalAdministrator.WCRHMS@noaa.gov.

October 3, 2016

Mr. Barry Thom, Regional Administrator
NOAA Fisheries West Coast Region (NMFS)
7600 Sand Point Way NE, Bldg. 1
Seattle, WA 98115

Re: Draft Environmental Assessment (EA) To Consider the Potential Impacts of Authorizing an Exempted Fishing Permit (EFP) For Longline Vessels To Fish Within the U.S. West Coast Exclusive Economic Zone (EEZ); 81 Fed. Reg. 60675 (Sept. 2, 2016)

Dear Mr. Thom:

The Center for Biological Diversity, Oceana, and the Turtle Island Restoration Network request that you adopt Alternative 1, under which NMFS would deny the EFP to authorize longline vessels within 200 nm of the California and Oregon coasts, because of the detrimental and potentially irreversible impacts to migratory seabirds, sea turtles, sharks, marine mammals and whales that utilize this habitat. Expansion toward California and Oregon's coasts of the current longline fishery that operates outside the U.S. EEZ is unwarranted and raises numerous legal, policy and scientific concerns that the EA does not consider. In 2009, when faced with the same decision about whether or not to authorize a new high seas shallow-set longline fishery, the Pacific Fishery Management Council chose to adopt the "no action" alternative precisely for these reasons.[1] Rather than seeking to expand the existing Pacific pelagic longline fishery NMFS should focus on developing a clean and sustainable West Coast fishery that uses buoy and harpoon gear, not pelagic longlines or drift gillnets.

Should NMFS proceed with its analysis for a new pelagic longline fishery, that analysis must fully comply with the mandates of the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), the Migratory

[1] Decisions of the 198th Session of the Pacific Fishery Management Council, at 1, http://www.pcouncil.org/wp-content/uploads/0409decisions.pdf

Bird Treaty Act (MBTA), the National Marine Sanctuary Act (Sanctuaries Act) and NMFS's duty under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) to manage marine resources sustainably, including preventing overfishing and avoiding and minimizing bycatch. Approval of the EFP would require drafting a NEPA environmental impact statement (EIS); consulting with NMFS on an ESA-mandated biological opinion; obtaining MMPA authorization to take endangered and threatened marine mammals; applying for a MBTA permit to take migratory birds; and consulting under section 304(d) of the Sanctuary Act. Until and unless those steps are complete, NMFS cannot legally issue the EFP for expanding longline fishing into the U.S. West Coast EEZ.

I. Introduction: Current regulations are designed to protect diverse marine life off the U.S. West Coast from pelagic longlines.

The public has long opposed longline fishing off the U.S. West Coast because of the impacts to a rich array of marine species that feed in the California Current Large Marine Ecosystem. Marine mammals, fish, sea birds, and sea turtles congregate in the biodiverse, nutrient-rich waters of the California Current large marine ecosystem. The wide suite of iconic marine animals that frequently inhabit the waters within, and adjacent to, California's coastal zone, include endangered sperm, humpback, and fin whales, Dall's porpoise, short beaked common dolphin, northern right whale dolphin, northern elephant seals, California sea lions, and the endangered loggerhead sea turtles, and leatherback sea turtles. These species constitute coastal resources that will be at risk of being caught on longline gear off California. Public concern over the plight of highly endangered marine mammals and sea turtles and the risk presented by longlines and drift gillnets has existed for over a decade.[2] The state and federal decisions to exclude longlines from this area rightly protects the interests of millions of U.S. residents in the aesthetic, recreational, scientific and other value offered by this "Blue Serengeti."[3]

The critically endangered Pacific leatherback sea turtle is currently listed among the eight "Species in the Spotlight" by NMFS, defined as the eight ESA-listed species most at risk of extinction in the near future.[4] The longstanding prohibition on pelagic longlining, a fishing practice known to take and kill leatherback sea turtles helps to prevent this species from going extinct. Reintroducing pelagic longlines to the U.S. West Coast runs directly counter to efforts to

[2] *See* attached letters from scientists: opposing fishing with drift gillnets and longlines in the Pacific Leatherback Conservation Area (dated Feb. 12, 2015), opposing longlines off California (dated Mar. 13, 2007).

[3] Discovery Channel's "Blue Serengeti" episode premiered July 1, 2016, and features famed marine biologist and shark expert Barbara Block who has studied white sharks and other highly migratory species off of California for more than 27 years. http://www.discovery.com/tv-shows/shark-week/tv-shows/tv-shows/.

[4] http://www.nmfs.noaa.gov/stories/2015/05/05_14_15species_in_the_spotlight.html.

spotlight and protect this critically endangered species that is currently declining, which was designated as the state marine reptile of California in 2012 by Governor Jerry Brown.

The EA's characterization of a dying pelagic longline fishery due to regulations is misplaced.[5] By some metrics, such as increasing California landings of bigeye tuna and average price per pound, the pelagic longline fishery outside the EEZ shows no signs of decreasing. California landings of bigeye tuna increased significantly in 2014 and 2015 and were the highest seen since 2004. (Fig. 1). However, according to international scientists, the bigeye tuna in the Eastern Pacific Ocean is overfished.[6] Increased fishing on bigeye tuna will further slow its recovery. Tunas landed in this fishery in 2015 were worth $3.7 million; bigeye tuna was the biggest component of these landings and accounted for $2.9 million in revenue.[7] For comparison, 564 mt of swordfish was landed in 2015 worth $3.3 million.[8] In 2015, after surface hook and line, more West Coast highly migratory species (HMS) landings came from pelagic longline gear than from any other gear type.[9] The average price per pound of highly migratory fish from longlines from 2014-2015 ($2.60-$2.83) is higher than any other gear targeting HMS on the West Coast except harpoons ($5.55-$6.09).[10] This demonstrates that multiple factors influence the geographic distribution of fishing effort and the value of landings.

[5] EA at 1-5 (talking about when longline vessel operators were only allowed to deep-set their gear the "California longline fishery" decreased). All vessels landing in California must hold federal West Coast fishing permits and California state fishing permits.

[6] Inter-American Tropical Tuna Commission (IATTC) 2016, *Status of Bigeye Tuna in the Eastern Pacific Ocean in 2015 and Outlook For the Future*, Scientific Advisory Committee, 7th Meeting, La Jolla, California, 09-13 May 2016, at 10. Compare NMFS's stock status report, which indicates that overfishing is occurring bigeye tuna, but it is not overfished. *See* http://www.nmfs.noaa.gov/sfa/fisheries_eco/status_of_fisheries/archive/2016/second/q2-2016-overfished-overfishing.pdf

[7] Pacific Fishery Management Council, Highly Migratory Species (HMS) Stock Assessment and Fishery Evaluation (SAFE), *Landings by Species*, http://www.pcouncil.org/highly-migratory-species/stock-assessment-and-fishery-evaluation-safe-documents/current-hms-safe-document/.

[8] *Id.*

[9] *Id.*

[10] *Id.* at Table 2, "West Coast commercial HMS landings (round mt), nominal revenue ($1,000s), and average prices by fishery, 2014-2015."

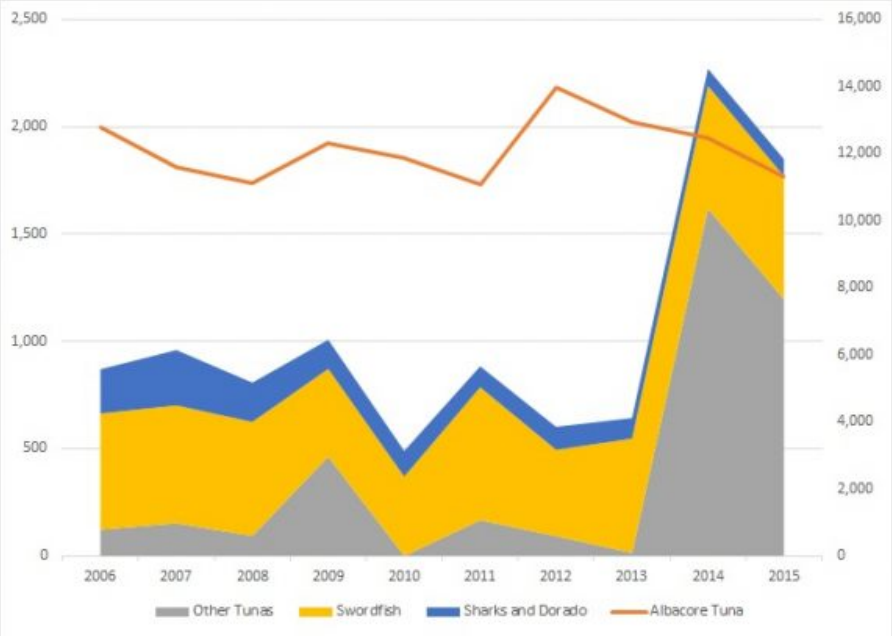

Figure 1. Landings of highly migratory species ("HMS") (metrics tons) by species and groups, 2005-2015. (Source: HMS SAFE Table 3.)

While the regulations that keep pelagic longlines beyond the 200-mile EEZ did not stop the increase in California bigeye tuna landings from 2014-2015, there is no certainty that market forces will continue to support this increase in landings. Bigeye tuna fishing effort in the Eastern Pacific Ocean may continue to increase,[11] but market responses to recent Associated Press articles about alleged human trafficking and abuses of labor in U.S. pelagic longline fleets, including an article about a lawsuit filed against a California resident who owns and captains a vessel docked in San Francisco,[12] may depress U.S. landings in the near term. For example, the grocery store Whole Foods has reportedly stopped buying fish at the Hawaii fish auction because of concerns over unfair labor practices.[13] The EFP proposes to bring this deep-set longline fishery closer to the coast, into an ecological hotspot of biodiversity where bycatch rates are likely to be much higher, but not otherwise improve the fishery's bycatch rates, labor practices, or otherwise encourage market growth by adopting sustainable practices.

[11] In 2009, 2010, 2011, 2012, 2013, and 2014, the proportions of the fishery's annual bigeye tuna catches that were captured in the Eastern Pacific Ocean were about 16, 27, 23, 19, 36, and 36 percent, respectively. The most likely explanation for the increase of deep-set fishing in the Eastern Pacific Ocean is the recent closures of the fishery in the Western and Central Pacific Ocean.

[12] Martha Mendoza, *Fishermen who fled slavery in San Francisco sue boat owner,* Sep. 22, 2016, http://www.bigstory.ap.org/article/753c13460d5b40b9a0eed67ffd3e1014/fishermen-who-fled-slavery-san-francisco-sue-boat-owner.

[13] Gina Mangieri, Whole Foods drops Hawaii fish auction until it proves fair boat labor, Sept. 13, 2016, http://khon2.com/2016/09/13/whole-foods-drops-hawaii-fish-auction-until-it-proves-fair-boat-labor/.

II. Legal Background On NMFS Obligations In Issuing the EFP

a. NEPA requires a hard look at the EFP's environmental consequences.

NEPA requires federal agencies to take a "hard look" at the environmental consequences of their proposed actions before taking action.[14] To accomplish this goal, NEPA requires all federal agencies to prepare an environmental impact statement ("EIS") for all "major Federal actions significantly affecting the quality of the human environment."[15]

The Council on Environmental Quality's ("CEQ") NEPA implementing regulations are binding on all federal agencies[16] and specify that an EIS must be prepared when an action "will or may" affect the environment.[17] The regulations also specify the factors an agency must consider in determining whether an action may significantly affect the environment.[18] These factors include the degree to which the possible effects involve unique or unknown risks; whether the action has cumulatively significant impacts; and the degree to which the action may adversely affect a species listed under the ESA, among others.[19]

NEPA regulations provide that an agency may first prepare an environmental assessment ("EA") aimed at determining whether the environmental impact of a proposed action may be "significant," warranting an EIS.[20] If, pursuant to the EA, an agency determines that an EIS is not required, it must issue a "finding of no significant impact" that briefly presents the reasons why the proposed agency action will not have a significant impact on the human environment.[21]

b. The Sanctuaries Act requires consultation.

The Sanctuaries Act, 16 U.S.C. § 1431 et seq., includes among its purposes the goal "to maintain the natural biological communities in the national marine sanctuaries, and to protect, and, where appropriate, restore and enhance natural habitats, populations, and ecological processes."[22] To achieve these purposes, the Sanctuaries Act requires that "Federal agency actions internal or external to a national marine sanctuary, including private activities authorized by licenses, leases, or permits, that are likely to destroy, cause the loss of, or injure any sanctuary resource are subject to consultation with the Secretary."[23] This consultation provision requires the agency proposing the action to provide a written statement describing the action and the

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[14] *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 350 (1989).
[15] 42 U.S.C. § 4332(2)(C).
[16] 40 C.F.R. § 1507.1
[17] *Id*. § 1508.3.
[18] *Id*. § 1508.27.
[19] *Id.* § 1508.27(b)(1)-(10).
[20] *Id.* § 1501.3.
[21] *Id*. §§ 1501.4(e), 1508.13.
[22] 16 U.S.C. § 1431(b)(3).
[23] 16 U.S.C. § 1434(d)(1)(A).

potential effects on sanctuary resources no later than 45 days before the final approval of the proposed action.[24] The action agency must follow the recommendations of the Secretary to avoid injury to any sanctuary resource or otherwise act to prevent and mitigate damage to such resources.[25]

The EFP allows longline fishing neighboring the boundaries of three National Marine Sanctuaries – Greater Farallones, Cordell Bank National Marine Sanctuaries, and Channel Islands – and inside the Monterey Bay National Marine Sanctuary at Davidson Seamount (fig. 2). It is probable that the EFP would likely cause incidental killing of fin, humpback, and sperm whales and leatherback and loggerhead sea turtles—all of which are resources protected by these sanctuary designations. Consequently, the proposed permit would likely "destroy, cause the loss, or injure" these resources. We are unaware of any action by NMFS to comply with either the consultation provision of the Sanctuaries Act or its substantive requirements. Absent such compliance, the proposed EFP cannot lawfully be issued.

[24] 16 U.S.C. § 1434(d)(1)(B).
[25] 16 U.S.C. §§ 1434(d)(2), 1434(d)(3) & 1434(d)(4).

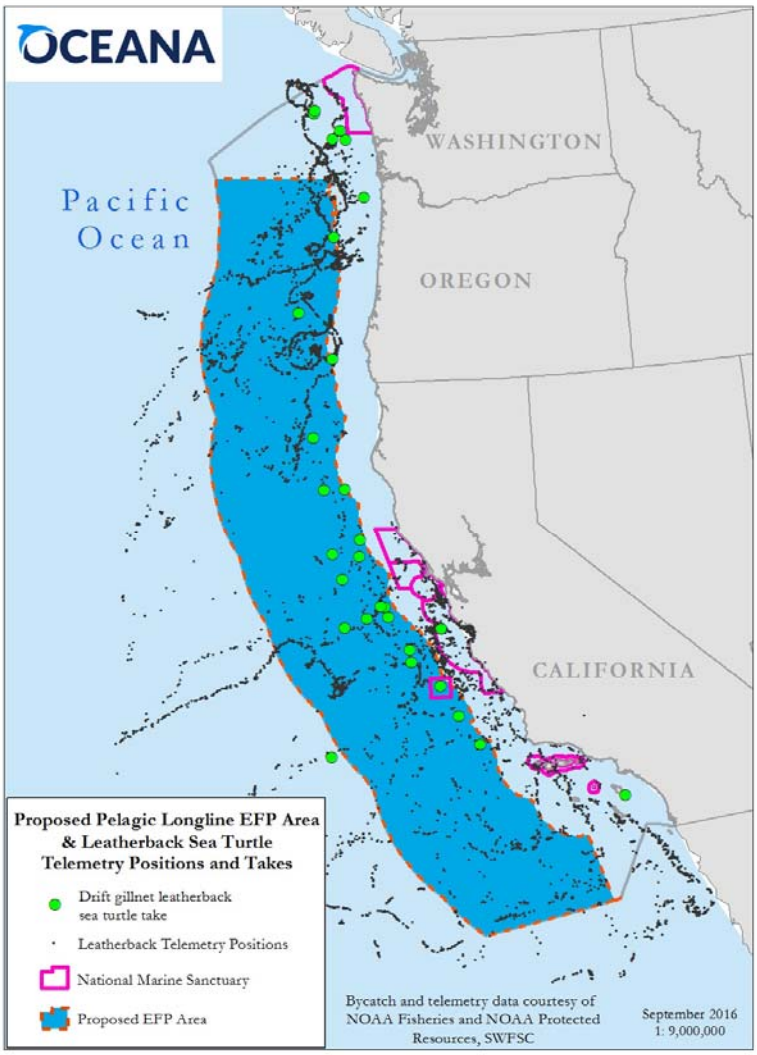

Figure 2. Proposed Pelagic Longline EFP Area & Leatherback Sea Turtle Telemetry Positions and Takes.

c. The ESA prohibits take that would jeopardize endangered species.

Congress passed the ESA, 16 U.S.C. §§ 1531-44, in response to growing concern over the extinction of fish, wildlife and plants.[26] It was enacted, in part, to provide a "means whereby the ecosystems upon which endangered species and threatened species depend may be conserved . . . [and] a program for the conservation of such endangered species and threatened species."[27]

[26] 16 U.S.C. § 1531(a)(1).
[27] 16 U.S.C. § 1531(b).

The Supreme Court has held that the ESA reflects "an explicit congressional decision to require agencies to afford first priority to the declared national policy of saving endangered species."[28]

Section 9 of the ESA prohibits any "person" from "taking" threatened and endangered species.[29] The term "take," found at 16 U.S.C. § 1532(19), means "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."[30] Incidental take is defined as take that is incidental to, and not for the purpose of, the carrying out of an otherwise lawful activity.[31] Such take can only be authorized under an Incidental Take Statement ("ITS"). NMFS cannot authorize incidental takes of endangered marine mammals through an ITS alone, but must also authorize the take under the MMPA.[32]

Section 2(c) of the ESA establishes that it is "the policy of Congress that all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act."[33] The ESA defines "conservation" to mean "the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary."[34] Similarly, Section 7(a)(1) of the ESA directs that the Fisheries Service and other federal agencies shall use their programs and authorities to conserve endangered and threatened species.[35]

Section 7(a)(2) of the ESA requires federal agencies to consult with the departments of Commerce or Interior whenever their actions "may affect" a listed species or critical habitat.[36] The ESA requires federal agencies to "insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the adverse modification of habitat of such species . . . determined . . . to be critical."[37] To "jeopardize" the species means to "engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species."[38]

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[28] *Tennessee Valley Authority v. Hill*, 437 U.S. 153, 185 (1978); *Humane Soc'y of the United States v. Kempthorne*, 481 F.Supp.2d 53, 55 (D.D.C. 2006).
[29] 16 U.S.C. § 1538.
[30] *Id.* § 1532(19).
[31] *Id.* § 1539(a)(1)(B).
[32] *Id.* §1536(b)(4)(C)(iii) [ESA]; *Id.* § 1371(a)(5)(E) [MMPA].
[33] 16 U.S.C. § 1531(c)(1).
[34] 16 U.S.C. § 1532(3).
[35] 16 U.S.C. § 1536(a)(1).
[36] *Id.*
[37] 16 U.S.C. § 1536(a)(2).
[38] 50 C.F.R. § 402.02.

After consultation, NMFS issues a written statement – the biological opinion – that in the case of marine mammals "specifies those measures that are necessary to comply with section 1371(a)(5) of this title [the MMPA's section 101(a)(5)] with regard to such taking."[39] After the issuance of a final biological opinion and "where discretionary Federal involvement or control over the action has been retained or is authorized by law," the agency must reinitiate formal consultation if, among other things, "the amount or extent of taking specified in the incidental take statement is exceeded" or "a new species is listed…that may be affected by the identified action."[40]

d. The MMPA prohibits unauthorized take of ESA-listed marine mammals.

The MMPA places a moratorium on the taking of marine mammals, and only after invoking limited exceptions to this moratorium may NMFS allow take incidental to commercial fishing operations.[41] Specifically, MMPA section 101(a)(5)(E) requires that for endangered or threatened marine mammals, NMFS must make a finding that any incidental mortality or serious injury from commercial fisheries will have a negligible impact on such species or stock. Therefore, NMFS may only authorize incidental take of endangered marine mammals when it has authorized take under both the MMPA and the ESA.

If the biological opinion resulting from a consultation finds jeopardy, the opinion shall specify reasonable and prudent alternatives that will avoid jeopardy and allow the agency to proceed with the action.[42] The Fisheries Service may also "suggest modifications" to the action during the course of consultation to "avoid the likelihood of adverse effects" to the listed species even if the modifications are not necessary to avoid jeopardy.[43] If the expert agency concludes the action will not result in jeopardy, but that take will occur, it must issue an ITS with the biological opinion.[44] The ITS must (1) specify the impact of the taking on the species; (2) specify the reasonable and prudent measures necessary or appropriate to minimize such impact; and (3) set forth terms and condition (including, but not limited to, reporting requirements).[45]

e. The MBTA prohibits unpermitted take of migratory birds.

Congress passed the MBTA on July 3, 1918, to implement and make enforceable by the courts the International Convention for the Protection of Migratory Birds, 39 Stat. 1702 (1916),

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[39] 16 U.S.C. 1536(b)(4)(C)(iii).
[40] 50 C.F.R. § 402.16.
[41] 16 U.S.C. § 1371(a) ("There shall be a moratorium on the taking and importation of marine mammals . . . during which time no permit may be issued for the taking of any marine mammal . . . except in the following cases").
[42] 16 U.S.C. § 1536(b); 50 C.F.R. 402.14(i).
[43] 50 C.F.R. § 402.13.
[44] 16 U.S.C. § 1536(b)(4); 50 C.F.R. § 402.14(i).
[45] 50 C.F.R. § 402.14(i)(1).

between the United States and Great Britain (acting for Canada). These governments were "desirous of saving from indiscriminate slaughter and of insuring the preservation of such migratory birds as are either useful to man or are harmless."[46] The United States subsequently executed treaties with Mexico, Japan, and the former Union of Soviet Socialist Republics, the protections of which are now incorporated into the MBTA.[47]

The MBTA and the Convention it implemented are considered "conservation measures of prime importance."[48] Justice Holmes called the preservation of migratory birds a "national interest of very nearly the first magnitude."[49] Indeed, the "fundamental prohibition in the Migratory Bird Treaty Act is couched in … expansive" language.[50] MBTA section 2 provides that "it shall be unlawful at any time, by any means or in any manner," to, among other prohibited actions, "pursue, hunt, take, capture, [or] kill" any migratory bird included in the terms of the treaties.[51] The term "take" is defined to include to "pursue, hunt, shoot, wound, kill, trap, capture, or collect."[52] The Laysan and black-footed albatross that the pelagic longline fishery kills and injures are included in the list of migratory birds protected by the MBTA.[53]

Notwithstanding these prohibitions, MBTA section 3 authorizes the Secretary of the Interior to "determine when, to what extent, if at all, and by what means, it is compatible with the terms of the conventions to allow hunting, take, capture, [or] killing … of any such bird." 16 U.S.C. § 704. The Service may issue a permit allowing the take of migratory birds if consistent with the treaties, statute and Service regulations.[54]

The EA fails to acknowledge the extent to which seabirds are commonly bycatch of pelagic longline fisheries and the environmental impact from experimental introduction of longline gear off California. The 2015 observer data from the deep-set longline permitted in the Western Pacific fishery shows that seabird interactions occurred at a rate of 0.015 per 1,000 hooks,[55] generally resulting in mortality as birds may get hooked when foraging and are subsequently drowned. The shallow-set longline fishery interaction rate was higher at 0.067 per

[46] Convention, August 16, 1916, U.S.-Gr. Brit., 39 Stat. 1702, 1702.
[47] 16 U.S.C. § 703.
[48] H.R. Rep. No. 65-243 at 3.
[49] *Missouri v. Holland*, 252 U.S. 416, 435 (1920).
[50] *Andrus v. Allard*, 444 U.S. 51, 59 (1979).
[51] 16 U.S.C. § 703.
[52] 50 C.F.R. § 10.12.
[53] *See id.* § 10.13 (list of protected migratory birds).
[54] See 50 C.F.R. pt. 21.
[55] NOAA. 2015. Pacific Islands Regional Office Observer Program. Hawaii Longline Deep-set Quarterly and Annual Reports. http://www.fpir.noaa.gov/Library/PUBDOCs/ObserverQtrAnnRpts/obs_hi_ll_ds_rprts/2015/obs_hi_ll_ds_annual_2015.pdf

1,000 hooks resulting in injury or mortality.[56] These numbers will be different in the California Current and are likely to be higher. To adequately assess impacts, the EA needs to consider studies of seabird abundance and density in fishing areas.[57] Alternatives to minimize seabird bycatch, such as side-setting that can substantially reduce fishery interactions with Laysan and Black-footed albatross, should also be considered.

Cumulative effects on albatross from other West Coast fisheries must also be examined. For example, short-tailed albatross bycatch in the Pacific Coast Groundfish Fishery appeared to exceed the incidental take limit of two short-tailed albatross averaged over a two-year period. Using proxy estimates from catch of black-footed albatross, the 2012-2013 estimated average catch of short-tailed albatross ranged from 1.35 to 2.15. The Pacific Fishery Management Council recommended reinitiation at its June 2015 meeting to incorporate new information on short-tailed albatross population status and fishery takes.[58] The EA should also include this new information.

III. The EA incompletely analyzes impacts to endangered and threatened species.

Based on the information contained in the EA, the documents provided with these comments, including science regarding endangered species plus the history of regulation of fishing gear available to target HMS, NMFS must draft an EIS to address the risk of extinction to sea turtles and marine mammals from authorizing the use of longlines in the EFP. The history of regulation and litigation surrounding longline use in Hawaii and drift gillnets in California puts NMFS on notice of the environmental impacts and controversy that result from the use of fishing gear that incidentally entangles protected species. The EA inadequately addresses population-level impacts to protected species. Thus NMFS is aware that use of longlines is of public concern and a controversial national issue particularly because of the take of endangered species. These factors require analysis of the EFP in an EIS. Below we discuss (a) the arbitrary selection of observer data east of 140^{o} W that the EA analyzed, (b) the EA's failure to look at cumulative impacts to sea turtles and (c) the environmental impacts to marine mammals that the EA failed to consider.

[56] NOAA. 2015. Pacific Islands Regional Office Observer Program. Hawaii Longline Shallow-set Quarterly and Annual Reports. http://www.fpir.noaa.gov/Library/PUBDOCs/ObserverQtrAnnRpts/obs_hi_ll_ss_rprts/2015/obs_hi_ll_ss_annual_2015.pdf

[57] Sydeman et al. 2012. Hotspots of Seabird Abundance in the California Current: Implications for Important Bird Areas. Audubon Reports. http://www.audubon.org/sites/default/files/documents/report_audubon_marine_ibas_011813.pdf

[58] Decision Summary Document, Pacific Fishery Management Council, June 12-15, 2015, http://www.pcouncil.org/wp-content/uploads/2015/06/0615decisions.pdf.

a. The EA arbitrarily analyzes longline observer data east of 140° W. longitude.

First, the EA underestimates the impact of the EFP to protected species in part because NMFS staff stratified the Hawaii observer records to compute estimates of catch from fishing that occurred in areas east of 140° W longitude. This method improperly excludes protected species bycatch, which even though rare is still environmentally significant. The EA states that the total number of hooks observed east of 140° W for the Hawaii shallow-set longline fishery from 2004 through 2014 was 1,950,983. A typical set for swordfish uses about 800 to 1,000 hooks,[59] which means that the EA analyzed about 2,000 sets. The total sets from 2004 through 2014 in the Hawaii shallow-set longline was 14,472,[60] which means that NMFS analyzed observed sets representing about 15% of the Hawaii shallow-set longline data. This percentage is too low to represent the likelihood of longline gear's interactions with protected species. This is especially true in the deep-set longline fishery, which has 20% observer coverage. Further reducing the data set of observed sets to sets east of 140° W longitude is not statistically supportable when estimating bycatch of rare animals.

Second, the EA also fails to provide a rationale for or to analyze the impacts of deciding to consider only fishing catch east of 140° W longitude rather than 150° W longitude, which is the boundary for the Inter-American Tropical Tuna Commission's (IATTC) jurisdiction and the boundary identified for using longline gear in regulations for the U.S. West Coast HMS fishery.[61] NMFS annually reports longline observer data for the area under IATTC jurisdiction. This publicly-accessible data is more recent and informative than the data aggregated over 10 years (2004-2014) in the EA. As just one example of the disparity between the data NMFS reported in the EA and the data reported annually to the IATTC, in 2015 the U.S. deep-set longline fleet in the IATTC Convention Area caught 28 black-footed albatross; in 2014 it caught 8 black-footed albatross and in 2013 it caught 5 black-footed albatross.[62] In contrast, the EA reports that between 2004-2014, the Hawaii deep-set longline fishery east of 140° W caught one

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[59] NMFS 2012, *Attachment 1: Technical corrections to the humpback whale interaction rates and ITS of the Hawaii-based Shallow-set Longline Fishery*, Biological Opinion for the Continued operation of the Hawaii-based Shallow-set Longline Swordfish Fishery, dated Jan. 30, 2012.

[60] *Id*. (reporting 10,904 sets 2004-2011); Hawaii Longline Shallow Set Annual Status Reports (reporting 1307 sets in 2012, 912 in 2013, and 1349 in 2014), http://www.fpir.noaa.gov/OBS/obs_hi_ll_ss_rprts.html.

[61] 50 C.F.R. §§ 660.705(q) (prohibiting directed fishing of swordfish west of 150° W. Long. and north of the Equator on a vessel registered for use of longline gear); 660.712 (same); 223.206(d)(9) (prohibiting directed longline fishing of swordfish by any person not operating under a western Pacific longline permit east of 150° W. Long. and north of the Equator).

[62] IATTC Scientific Advisory Committee, 2016, *United States Summary of 2015 Observer Data per Resolution C-11-08: Resolution on Scientific Observers for Longline Vessels*, Doc. SAC-07 INF A(h); IATTC Scientific Advisory Committee, 2015, *United States Summary of 2014 Observer Data per Resolution C-11-08: Resolution on Scientific Observers for Longline Vessels*, Doc. SAC-06 INF-G; and IATTC Scientific Advisory Committee, 2014, *United States Summary of 2013 Observer Data per Resolution C-11-08: Resolution on Scientific Observers for Longline Vessels*, Doc. SAC-05 INF-G.

black-footed albatross (EA at Table 3-5). The discrepancy between observer data reported to the IATTC, which shows 41 black-footed albatross observed caught in three years, and the EA, which shows one black-footed albatross caught in 10 years, is irreconcilable without more information. This undermines the public's ability to understand the environmental impact of the EFP.

Third, the EA does not provide estimates of catch in the deep-set longline fishery that are extrapolated from the 20% observer coverage. The EA provides information for the Western Pacific shallow-set longline and deep-set longline in tables, but the former gives absolute catch based on 100% observer coverage while the deep-set longline tables showing catch approximating 20% of what actually was caught. As a result, the public cannot calculate the number of protected species caught in the deep-set longline east of 140^{o} W based on the information provided in the EA.

Finally, the EA underestimates the impact of the EFP to protected species because California Current Large Marine Ecosystem provides habitat and therefore attracts a higher density of marine mammals and sea turtles than areas in which the Hawaii longline fleet fishes on the high seas. The EA fails to analyze the uniquely important attributes of this geography, which leads to a gross underestimate of the risk of injury and mortality from pelagic longline fishing inside the California Current Large Marine Ecosystem (see Table 1).

For example, the EA does not report humpback whales that were taken in the Hawaii-shallow-set longline fishery, presumably because those takes were west of 140^{o} W longitude.[63] However, given coastal distribution of threatened and endangered humpback whales in the feeding grounds off the U.S. West Coast,[64] it is more likely this gear will take humpback whales when fishing inside the EEZ than when on the high seas. Excluding these takes biases the analysis of the EA when the habitat west of 140^{o} W longitude for humpbacks is actually more similar to the habitat in the action area off California than on the high seas. Pelagic longlines under the proposed EFP are more likely to catch humpback whales than the EA reports.

b. <u>The EA fails to consider cumulative impacts from commercial fishing that impedes sea turtle recovery.</u>

The Western Pacific leatherback sea turtle populations are currently declining at a rate of 6% per year and on the brink of extinction, as indicated by their inclusion in the NMFS Species in the Spotlight. Adding a new fishery to the US West Coast EEZ, which is a known migration route and foraging area for the Western Pacific population, is simply counter to the intent of the

[63] The HI-SSLL fishery took humpback whales in 2006, 2008, 2011, and 2015. See NMFS observer data at: http://www.fpir.noaa.gov/OBS/obs_hi_ll_ss_rprts.html
[64] See: http://www.nmfs.noaa.gov/pr/images/20160817_humpback_dps_outreach_map.jpg

ESA and NOAA's intent to recover this species. Unfortunately, the situation is so dire that the take of a single animal will not only delay recovery, but exacerbate the decline of the population.

The EA notes that the impacts of this action on sea turtles would be most harmful to two species – the loggerhead and the leatherback. Both loggerhead and leatherback sea turtles are endangered and in imminent peril of extinction. We support Alternative 1, under which the EFP would not be granted, because scientific study demonstrates that endangered sea turtle populations are unlikely to be able to recover unless we reduce the number of interactions and mortalities from commercial fishing. Should NMFS select another alternative, however, it must consider establishing the same areas that are seasonally closed to drift gillnets to protect sea turtles as areas closed to EFP pelagic longline activities too. Both the Pacific leatherback conservation area, closed from August 15 through November 15, and the Pacific loggerhead conservation area, closed during a forecasted or occurring El Niño event from June 1 through August 31,[65] are critical to ensuring that vessels targeting HMS do not jeopardize the continued existence of these species. Furthermore, given the critically endangered and declining population of Pacific leatherback sea turtles, if NMFS selects another alternative, the EFP should be immediately ended and considered a failure if there is one interaction with a leatherback sea turtle.

NMFS must draft an EIS that addresses the cumulative impacts from commercial fishing that impede sea turtle recovery. Observer records in the Hawaii longline fishery indicate that leatherback sea turtles were the most commonly observed sea turtle entangled and injured, and loggerheads were the second most commonly observed sea turtle species. This basis for setting the limits in Alternatives 2 and 3 demonstrates that endangered sea turtles face threats from a variety of commercial fishing sources. The longline fishery would not be the only California (and later Oregon) fishery to kill leatherbacks. For example, a leatherback sea turtle was killed after being entangled in ropes from a crab trap in 2015.[66] Based on this single mortality, no additional mortalities should be allowed by any other fishery off the U.S. West Coast before 2023, otherwise recovery will be delayed.[67] Drift gillnet interactions with both loggerhead and leatherback sea turtles pose additional risks within the area of the proposed EFP, and without 100% observer coverage, it is impossible to ascertain the number of leatherback sea turtles caught and killed in the drift gillnet fishery.

The EA claims that the likelihood of sea turtle take under Alternative 2 is low, based on observer records from the Hawaii longline fisheries, the biology and distribution of the species.

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[65] 50 C.F.R. § 660.713(c)(1)-(2).

[66] Rare leatherback sea turtle found dead near Farallon Islands, San Francisco Chronicle, September 29, 2015, http://www.sfgate.com/bayarea/article/Rare-leatherback-sea-turtle-found-dead-near-6538101.php

[67] K.A. Curtis, J. Moore, and S. Benson (2015 Estimating Limit Reference Points for Western Pacific Leatherback Turtles (*Dermochelys coriacea*) in the U.S. West Coast EEZ. PLoS One DOI:10.1371/journal.pone.0136452

However, ocean conditions are in flux and the distribution of species adjusts to those changing conditions. Observer records from the drift gillnet fishery strongly suggest that juvenile loggerheads move into the waters off California during El Niño years. Therefore, interactions may be more likely during El Niño events or periods of unusually warm water. Drift gillnet fishing is prohibited in conservation areas designed to protect sea turtles. NMFS must consider an alternative closing these areas to longlines as well.

Alternative 3 (the 'preferred alternative') increases the number of allowed leatherback and loggerhead sea turtle interactions. Alternative 3, using the Hawaii longline fishery as a proxy, adds one animal to the limit compared to Alternative 2. The EA states that these additional allowed interactions is to account for potential variability in catch rates because of fishing in a different area (i.e., within the United States mainland EEZ) and the variability in the probability of when the limit would be caught. Where variability and imperfect information come into play, the standard should be to act with greater caution, not to allow for additional harmful interactions with species that are on a course to extinction. Any takes of leatherback sea turtles should indicate this EFP has failed and should permanently end NMFS' efforts to promote additional pelagic longlining off the US West Coast.

The EA points to a variety of measures that would be in place to reduce sea turtle mortality. When the Hawaii fishery reopened in 2004, with measures including the use of circle hooks and sea turtle handling protocols, the EA reports that there was a decline in sea turtle bycatch rates by 90 percent for loggerheads and 82.8 percent for leatherbacks. While these numbers were a significant improvement, even management measures like area closures are not enough to reduce sea turtle mortality to the point where we are reversing extinction trajectories. Furthermore, this fails to account for the decline in sea turtle population over these time periods.

Leatherback Sea Turtles

Pacific leatherback sea turtles migrating to and feeding off the U.S. West Coast are critically endangered. As noted in the EA, in the Pacific, western Pacific leatherback populations have declined more than 80 percent and eastern Pacific leatherbacks have declined by more than 97 percent since the 1980s. Due to this decline, NMFS recently identified the Pacific leatherback sea turtle among eight "species in the spotlight," stating "that of all the species NOAA protects under the ESA, we consider **eight** among the most at risk of extinction in the near future."[68] The agency states in its species in the spotlight five-year action plan that reducing fisheries

[68] NMFS, Species in the Spotlight: Pacific Leatherback. May 14, 2015. http://www.nmfs.noaa.gov/stories/2015/05/05_14_15species_in_the_spotlight.html http://www.nmfs.noaa.gov/stories/2015/06/spotlight_pac_leatherback.html and http://www.nmfs.noaa.gov/stories/2015/05/05_14_15species_in_the_spotlight.html

interactions with leatherback sea turtles is among five priority actions.[69] In contrast to this priority, the proposed action would allow increased leatherback sea turtle takes.

The California coast is a hotspot of leatherback abundance,[70] as adults travel here from Indonesia to feed on the abundance of jellyfish found offshore before returning to Asia to lay eggs.[71] The Pacific leatherback sea turtle is currently on the verge of extinction, and the primary cause is adult mortality in fishing gear, resulting in the above-noted dramatic population decline of more than 97 percent.[72]

Without serious efforts to reduce adult leatherback mortality, scientists calculate the species in the Pacific will be extirpated by 2030.[73] Scientists estimate that the adult population, around 1,400, can sustain no more than one death every six years from all sources if it is to recover at an acceptable pace.[74] Under Alternative 2, the limit on hooked or entangled leatherback sea turtles for the 2-year duration of the EFP is two animals, and under Alternative 3, the preferred alternative, the limit would increase to three, either of which will undoubtedly interfere with the recovery of species.

The EA states that leatherback mortality is expected to be zero, yet it goes on to say that, despite extensive international research using a variety of methods, the ability to definitively determine a turtle's likelihood of post-release survival based on location of hooking, amount of gear remaining attached at release, and the turtle's species and size, remain limited, and research

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[69] http://www.nmfs.noaa.gov/stories/2016/02/docs/leatherback_spotlight_species_5_year_action_plan_final_web.pdf

[70] Roe, J., S. Morreale, F. Paladino, G. Shillinger, S. Benson, S. Eckert, H. Bailey, P. Tomillo, S. Bograd, T. Eguchi, P. Dutton, J. Seminoff, B. Block, J. Spotila. 2013. Predicting bycatch hotspots for endangered leatherback turtles on longlines in the Pacific Ocean. Proc. Roy. Soc. B. 281:20132559. http://dx.doi.org/10.1098/rspb.2013.2559

[71] Benson, S. R., P. H. Dutton, C. Hitipeuw, B. Samber, J. Bakarbessy, and D. Parker. 2007. Post-nesting migrations of leatherback turtles (*Dermochelys coriacea*) from Jamursba-Medi, Bird's Head Peninsula, Indonesia. Chelonian Conservation and Biology 6(1):150–154.

[72] Spotila, J. R., R. D. Reina, A. C. Steyermark, P. T. Plotkin, and F. V. Paladino. 2000. Pacific leatherback turtles face extinction. Nature 405:529–530.

[73] Lewison, R., S.A. Freeman, L. Crowder (2004) Quantifying the effects of fisheries on threatened species: the impact of pelagic longlines on loggerhead and leatherback sea turtles. Ecology Letters 7: 221-231; Tapilatu, R. F., P. H. Dutton, M. Tiwari, T. Wibbels, H. V. Ferdinandus, W. G. Iwanggin, and B. H. Nugroho. 2013. Long-term decline of the western Pacific leatherback, Dermochelys coriacea: a globally important sea turtle population. Ecosphere 4(2):25. http://dx.doi.org/10.1890/ES12-00348.1; Spotila, J. R., A. E. Dunham, A. J. Leslie, A. C. Steyermark, P. T. Plotkin, and F. V. Paladino. 1996. Worldwide population decline of *Dermochelys coriacea*: Are leatherback turtles going extinct? Chelonian Conservation and Biology 2:209–222; Spotila, J. R., R. D. Reina, A. C. Steyermark, P. T. Plotkin, and F. V. Paladino. 2000. Pacific leatherback turtles face extinction. Nature 405:529–530.

[74] IUCN (2013) Population Assessment of *Dermochelys coriacea* (West Pacific Ocean subpopulation) available at http:// www.iucnredlist.org/details/46967817/0; K.A. Curtis, J. Moore, and S. Benson (2015 Estimating Limit Reference Points for Western Pacific Leatherback Turtles (*Dermochelys coriacea*) in the U.S. West Coast EEZ. PLoS One DOI:10.1371/journal.pone.0136452

findings are highly variable. Without clear scientific evidence of post-release survival, it is inappropriate to assume any survivorship of these critically endangered species following an interaction with pelagic longline gear.

The EA does not consider the environmental impact of allowing longline fishing in the Pacific Leatherback Conservation Area, an area closed to drift gillnets from August 15 through November 15 because of the high risk of entanglement, for the primary purpose of avoiding jeopardy to this endangered species.[75] These waters are a key migratory corridor for leatherbacks as they make their remarkable journey from nesting beaches in Indonesia to foraging grounds off the California coast. Keeping this area free from gear that targets HMS is more important now than ever, and placing pelagic longlines in the leatherback sea turtle's migratory corridor as these animals swim to critical foraging grounds would be a tragic decision.

Finally, the EFP is contrary to the spirit of California Assembly Bill 1776. In that Act, the California Legislature announced the Pacific leatherback sea turtle as the official state marine reptile,[76] and designated October 15 as Pacific Leatherback Sea Turtle Conservation Day.[77] To that end, the Legislature, "urges state and federal agencies to take proactive conservation measures and prevent further threats to Pacific leatherback sea turtles and their habitats."[78] The EFP to expand longlining into the EEZ undermines this California directive. NMFS is hosting an inaugural Pacific Leatherback Conservation Day at the Southwest Fisheries Science Center on October 6, 2016. It would be disingenuous to the public for NOAA to be touting its conservation efforts on Pacific Leatherbacks to the public, then approve the introduction of an activity known to be a primary threat to this declining endangered species.

Loggerhead Sea Turtles

North Pacific loggerheads are endangered as a result of the threats they face as they migrate over 7,000 miles between their nesting beaches in Japan and foraging areas off the coast of Baja California.[79] Their population growth rates are low, and extinction risk is commensurately high. Loggerhead nesting populations have declined by at least 80-86 percent since the 1980s, due to death from interactions with industrial fishing.[80]

The science indicates that the North Pacific loggerhead population that occurs off the California coast appears to be declining and there is a substantial likelihood that the population

[75] 50 C.F.R. § 660.713(c)(1).
[76] Cal. Gov Code § 422.5(b).
[77] Cal. Gov Code § 7593.5(a).
[78] Cal. Gov Code § 7593.5(e).
[79] NMFS, Office of Protected Resources. http://www.nmfs.noaa.gov/pr/species/turtles/loggerhead.htm
[80] Lewison, R., S. Freeman and L. Crowder. 2004. Quantifying the effects of fisheries on threatened species: the impact of pelagic longlines on loggerhead and leatherback sea turtles. Ecology Letters 7:221-231.

will decline past the possibility of recovery within coming decades, without drastic reductions in fishing mortality and threats to nesting habitat in Japan.[81] Consequently, the North Pacific loggerhead was identified as a distinct population and its status was changed from 'Threatened' to 'Endangered' under the Endangered Species Act in 2011.

c. The EA inadequately considers the EFP's impacts on marine mammals.

Marine mammals thrive in the abundant California Current Ecosystem and are characteristic of the California coast. Longline fishing in the proposed areas is likely to affect marine mammals, yet no limits to marine mammal interactions are proposed for this EFP. High seas proxy data is not likely to provide an accurate representation of potential takes of marine mammals in California Current waters due to differences in overall productivity, diversity and abundance of each region. Therefore, scientific and fishery data pertaining to species distributions and bycatch in coastal areas (including W of the 140˚W longitude for pelagic longline proxy data) must be incorporated in assessing impacts. Table 1, for example, shows that there is potentially a much higher density of cetaceans in the West Coast EEZ than in Hawaiian EEZ waters. The resulting marine mammal bycatch of a pelagic longline fishery in the more abundant California Current Ecosystem would very likely be even higher than the pelagic longline fishery operating in the Hawaii EEZ or on the high seas.

For reference in the Western Pacific pelagic longline fisheries, from 2008 to 2012: 47 cetaceans were observed interacting with the deep-set fishery, which is observed at about 20% coverage, and of those 75% resulted in serious injury or death; and 43 cetaceans were observed interacting with the shallow-set fishery, which is observed at 100% coverage, and 68% resulted in serious injury or death.[82] The primary species taken in the deep-set fishery was false killer whales and in the shallow-set fishery the primary species taken was Risso's dolphins. Large whales caught in the longline fisheries included a sperm whale and humpback whales. Rare, deep-diving species such as beaked whales were caught in the deep-set fishery.

The cumulative effect of adding fishing effort that results in marine mammal mortality on top of the current mortality occurring from commercial fishing off California is reason in and of itself to deny the Permits. In the past five years, California pot and trap fisheries have entangled gray and humpback whales and the drift gillnet fishery has killed sperm whales, short-beaked common dolphins, northern right whale dolphins, California sea lions and other species. In 2013 and 2014 NMFS implemented emergency measures in the California drift gillnet fishery to lower

[81] NMFS (2009) Loggerhead Sea Turtles (*Caretta caretta*) 2009 Status Review under the U.S. Endangered Species Act, available at http://www.nmfs.noaa.gov/pr/pdfs/statusreviews/loggerheadturtle2009.pdf

[82] Bradford, A.L., and K.A. Forney. 2014. Injury determinations for cetaceans observed interacting with Hawaii and American Samoa longline fisheries during 2008-2012. U.S. Dep. Of Commer., NOAA Tech. Memo., NOAA-TM-NMFS-PIFSC-41, 28 p. + Appendix

anticipated take of sperm whales so as to find a negligible impact from commercial fishing.[83] Adding a fishing gear that risks mortality to stocks already killed by California fisheries creates unnecessary pressure on vulnerable populations of marine mammals.

Table 1. Cetacean density data from Becker et al. 2016[84] (modeled density) and Forney et al. 2015[85] (observed density) showing differences between Hawaiian EEZ waters and the proposed fishing location in the West Coast EEZ plus EEZ waters off the state of WA.

Species	Hawaii EEZ Cetacean Densities (animals/km^2) 2010 observed data (Forney et al. 2015, Table 3)		Species	West Coast EEZ Cetacean Densities (animals/km^2) 1991-2009 habitat modeling data (Becker et al. 2016, Table 3-Line Transect Segment Density)
Pan-tropical spotted dolphin	0.004		Striped dolphin	0.017
Spinner dolphin	0.001		Short beaked common dolphin	0.43
Striped dolphin	0.007		Long beaked common dolphin	0.142
Rough-toothed dolphin	0.005		Common bottlenose dolphin	0.005
Common bottlenose dolphin	0.004		Risso's dolphin	0.013
False killer whale	0.001		Pacific white-sided dolphin	0.029
Short-finned pilot whale	0.007		Northern right whale dolphin	0.018
Sperm whale	0.002		Dall's porpoise	0.031
Bryde's whale	0.0003		Fin whale	0.004
			Blue whale	0.002
			Humpback whales	0.001
Sum cetacean density from HI EEZ observed density study:	0.0313		Sum cetacean density from WC EEZ habitat modeling study:	0.692

[83] *Temporary rule; emergency action; request for comments; California Drift Gillnet Fishery; Sperm Whale Interaction Restriction*, 78 Fed. Reg. 54548 (Sept. 4, 2013).

[84] Becker, E., K. Forney, P. Fiedler, J. Barlow, S. Chivers, C. Edwards, A. Moore, J. Redfern. 2016. Moving towards dynamic ocean management: How well do modeled ocean products predict species distributions? Remote Sensing 8,149.

[85] Forney, K., E. Becker, D. Foley, J. Barlow, E. Olson. 2015. Habitat-based models of cetacean density and distribution in the Central North Pacific. Endang Species Res 27:1-20.

Sperm Whale

Sperm whales have been caught not only in the California drift gillnet fishery, but also in U.S. pelagic longline fisheries. The EA purports to have analyzed fishery-dependent data from the deep-set and shallow-set longline fisheries,[86] but neglects to analyze the incidental take of sperm whale in the Hawaii deep-set longline fishery or the Atlantic Ocean, Caribbean, Gulf of Mexico large pelagic longline fishery, both of which take sperm whales and are listed as Category I fisheries under the MMPA. To fully assess the effect of the proposed action, the agency should analyze in an EIS the extent of sperm whale interactions in these other fisheries before issuing this EFP.

Because of these omissions, we request NMFS prepare an EIS with full information about the environmental impacts of longline use to sperm whales in the California Current Large Marine Ecosystem. One alternative NMFS should consider in the EIS to protect sperm whales is prohibiting fishing in deepwater areas, which is prime habitat for foraging for sperm whales.[87]

Humpback Whale

Similar to the sperm whale, the EA mischaracterizes the prevalence of longline interactions with humpback whales because it omits reported entanglements in gillnets off southern California and interactions with Hawaii longlines.[88] It also fails to identify biologically important areas for humpbacks[89] and other hotspots of humpback whale activity (Table 1).[90]

Reports of humpback whale entanglements off the U.S. West Coast have increased for the past three years, putting this year on pace to break the record again. In 2015, one humpback whale was reported entangled off California in longline gear that was wrapped around its fluke.[91] With respect to entanglements in nets, from 2014 through June 30, 2016, four whales were reported entangled, with none disentangled, in southern California in netting that may have been from the drift gillnet fishery. The incident with the most evidence suggesting the source was a California drift gillnet occurred on October 17, 2015, when a humpback was confirmed

[86] *See* EA at 3-26 (claiming that sperm whales were one of several protected species "identified in the DGN fishery dataset, but not in the Hawaii longline fisheries datasets").
[87] *See* National Marine Fisheries Service, Fisheries Off West Coast States; Highly Migratory Fisheries; California Drift Gillnet Fishery; Sperm Whale Interaction Restriction, 78 Fed. Reg. 54548, 54550 (Sept. 4, 2013), renewed May 22, 2014 through August 5, 2014 (79 Fed. Reg. 29377 (May 22, 2014).
[88] EA at 3-26.
[89] Calambokidis, J., Steiger, G. H., Curtice, C., Harrison, J., Ferguson, M. C., Becker, E., ... & Van Parijs, S. M. (2015). 4. Biologically Important Areas for Selected Cetaceans Within US Waters-West Coast Region. Aquatic Mammals, 41(1), 39, http://www.cascadiaresearch.org/reports/Calambokidisetal2015BIAs.pdf.
[90] Becker et al. 2016, *supra* n.84.
[91] NMFS Case ID 20150528Mn.

entangled in large mesh blue gillnet approximately four miles off Del Mar.[92] The mouth and head were entangled in the mesh netting and the netting was cutting into the rostrum. The mesh appeared to be twine, not monofilament. Three other humpback whales were reported in southern California wrapped in gillnets for which neither mesh size nor material could be identified: (1) in May 2015, there was an unconfirmed report of a humpback entangled 10 miles west of Channel Islands Harbor, outside of Santa Barbara, in netting and buoys; (2) in September 2015, a humpback whale was confirmed entangled off Ventura, California, six miles south of White Sands, below Mugu Lagoon, with gillnet wrapped around and covering most of its tail and with netting and line trailing 40 feet behind the whale; and (3) on October 31, 2015, a juvenile humpback was confirmed entangled around its head and pectoral fin in blue gillnet 4.9 miles outside of Newport Harbor in California. These entanglements and the increasing trend in reports off the U.S. West Coast must be noted in an EIS for the EFP.

Fin Whale

As with sperm and humpback whales, the EA neglects to include important information about the extent of endangered fin whales' interactions with fishing gear. In February and March 2015 one fin whale was confirmed entangled in unknown gear 2.5 nm west of Dana Point Harbor, California.[93] In October 2015, NMFS confirmed another fin whale was entangled with rope 2 nm off Dana Point.[94] Finally, in 2015 one fin whale was observed injured in the Hawaii shallow-set longline fishery operating east of 150^{o} W.[95] In total, these are three fin whales known to be injured or killed in one year – 2015 – that are not considered in the EA but should be.

The EA must take into account the cumulative impact of interactions between fin whales and fishing gear. Reported entanglements are underestimates because not all are reported. Thus, the EA currently fails to give information sufficient to determine the environmental impacts of the EFP when taken together cumulatively with other human-caused sources of injury and mortality.

[92] NMFS Case ID 20151017Mn.
[93] NMFS Case ID 20150207Bp.
[94] NMFS Case ID 20151009Bp.
[95] IATTC Scientific Advisory Committee, 2016, *United States Summary of 2015 Observer Data per Resolution C-11-08: Resolution on Scientific Observers for Longline Vessels*, Doc. SAC-07 INF A(h); Pacific Islands Regional Observer Program Shallow Set Annual Status Report, January 1, 2015-December 31, 2015, http://www.fpir.noaa.gov/Library/PUBDOCs/ObserverQtrAnnRpts/obs_hi_ll_ss_rprts/2015/obs_hi_ll_ss_annual_2015.pdf.

Guadalupe Fur Seal

Guadalupe fur seals are of particular conservation concern because there has been recent evidence of this threatened species expanding its breeding range into U.S. waters. [96] Further, Guadalupe fur seals are stranding off California at a high rate in an ongoing unusual mortality event ("UME") that started in January 2015.[97] From 2015-2016, over 175 have stranded, but the number stranded may indicate a larger number of unseen mortalities.[98] The EA provides no information on estimated abundance of Guadalupe fur seals or whether additional take in fishing gear may impact the success of purported breeding colonies off California (fig. 3).

The EA inadequately addresses the impact of fisheries on Guadalupe fur seals because it fails to aggregate data from various sources such as stranding data, observer data, and injury reports. First, recent stranding data from The Marine Mammal Center ("TMMC") can show what percent of stranded Guadalupe fur seals have signs of trauma associated with entanglement in netting or fishing line. In 2014, before the UME began, TMMC reported 12 of 57, or over 20% of stranded Guadalupe fur seals had signs of injury from anthropogenic sources like fishing gear.[99] Second, in addition to the reports of recent longline interactions that are noted in the EA, observer data from the Hawaii longline fishery indicates a reported interaction in the first quarter of 2016 that resulted in injury to a Guadalupe fur seal.[100] This injury triggers a requirement for reinitiation of ESA consultation for NMFS's operation of the pelagic longline fishery.[101] Third, on the West Coast from 2010-2014, 16 Guadalupe fur seals were subject to human-related injury and mortality.[102] Of these, at least five were entangled in net fisheries, one of which was a large-mesh gillnet as used in the California drift gillnet fishery.[103] Adding all injuries and mortality associated with entanglements together, conservatively 40 Guadalupe fur seals have been entangled since 2010.

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[96] Biological opinion on issuance of permit 16087 (modification) for research on Guadalupe fur seals (September 11, 2014), at 2, http://www.nmfs.noaa.gov/pr/consultation/opinions.htm.
[97] NOAA Fisheries, *2016 Guadalupe Fur Seal Unusual Mortality Event in California*, http://www.nmfs.noaa.gov/pr/health/mmume/guadalupefurseals2015.html.
[98] *Id.*
[99] Comment from TMMC dated Dec. 22, 2014, regarding notice of initiation of status review for the Guadalupe Fur Seal, https://www.regulations.gov/document?D=NOAA-NMFS-2014-0131-0003.
[100] Pacific Islands Regional Observer Program Shallow Set, Quarterly Status Report, January 1, 2016 – March 31, 2016, dated Apr. 28, 2016, http://www.fpir.noaa.gov/Library/PUBDOCs/ObserverQtrAnnRpts/obs_hi_ll_ss_rprts/2016/obs_hi_ll_ss_1st_qrtr_2016.pdf.
[101] 50 C.F.R. § 402.16.
[102] Caretta, J., M. Muto, S. Wilkin, J. Greeman, K. Wilkinson, M. DeAngelis, J. Viezbicke, and J. Jannot, 2016. *Sources of Human-Related Injury and Mortality for U.S. Pacific West Coast Marine Mammal Stock Assessments, 2010-2014*, NOAA-TM-NMFS-SWFSC-554, at 3 https://swfsc.noaa.gov/textblock.aspx?Division=PRD&ParentMenuId=148&id=1253.
[103] *Id.* Appendix 4 (recording an entanglement in a large mesh gillnet off San Diego, CA).

Additional mitigation measures should be added to the preferred alternative in order to protect vulnerable Guadalupe fur seals. For example, the Marine Mammal Commission has suggested that research activities be suspended if a Guadalupe fur seal is observed.[104] Likewise, the EFP should be suspended if a Guadalupe fur seal is observed. Additionally, NMFS should exclude EFP activity from areas in which fisheries have interacted with Guadalupe fur seals from 2010-2016 if the locations of those interactions are known. Finally, no EFP activities should be permitted around Guadalupe fur seal purported breeding colonies (see figure 1 below).

Figure 3. Map of area for research on Guadalupe fur seals ("Action Area") showing purported breeding colonies.[105]

[104] Letter from Timothy J. Ragen, Executive Director, Marine Mammal Commission, to Michael Payne, Chief, Permits Conservation, and Education Division, Office of Protected Resources, NMFS, dated 19 March 2012, regarding the proposed authorization of take incidental to abalone research, 77 Fed. Reg. 12246 (Feb. 29, 2012), http://www.mmc.gov/wp-content/uploads/VanBlaricom_iha_031912.pdf.
[105] Biological opinion on issuance of permit 16087 (modification) for research on Guadalupe fur seals (September 11, 2014), http://www.nmfs.noaa.gov/pr/consultation/opinions.htm.

IV. Increasing fishing effort on pelagic fish populations is inconsistent with scientific recommendations, international resolutions and the requirements of the Magnuson-Stevens Act.

In addition to potential negative interactions between deep-set longline gear and vulnerable sea turtle, marine mammal, and seabird populations, we are concerned about the impact of increased fishing effort on pelagic fish populations.

Longline gear is proven to be a wasteful, largely indiscriminate gear that may affect the integrity of other populations of fish and sharks. Discard rates from vessels with permits to fish in the Western Pacific pelagic longline fisheries remain high as 44% of animals caught are non-marketable.[106] A previous deep-set longline experimental fishing permit in the California Current resulted in a 76% discard rate.[107] The majority of non-marketable catch in Hawaii consists of sharks. A 2014 study of deep-set longline fishing in the West Coast EEZ yielded very high levels of non-marketable catch as well (Table 2). The goal of the study was to test gear modifications that could reduce bycatch beyond the improvements that came with circle hooks. Results showed that non-marketable catch outnumbered marketable catch (primarily pomfret and opah) 3 to 1, and fully 70% of the catch was non-marketable blue shark, a key apex predator in the California Current Ecosystem. In fact, 41 blue sharks were caught for every swordfish. These results confirm that the gear is highly unselective, and will have detrimental impacts to top predators with an important ecological role. The California Current Ecosystem is among the few known rookeries for large sharks, including blue sharks, mako sharks, and white sharks in the entire Pacific basin. Furthermore, comparison to the longline fishery in the Western Pacific strongly suggests that a California longline fishery may have higher bycatch rates.

The Magnuson-Stevens Act requires that bycatch be minimized to the extent practicable.[108] The proposed action is likely to significantly increase fish bycatch and is counter to the agency's legal responsibility, especially when the bycatch can be first avoided by using cleaner deep-set buoy gear and harpoon gear to selectively target swordfish.

[106] NMFS. 2015. Hawaii Shallow-set Longline Data (2007-2013). Unpublished data.
[107] Dewar, H., S. Kohin. 2014. Deep-Set Longline Study. http://www.pcouncil.org/wp-content/uploads/K5b_SUP_SWFSC_PPT1_MAR2014BB.pdf
[108] Magnuson-Stevens Act §301(a)(9), 16 U.S.C.A. §1851(a)(9).

Table 2. Total catch of deep-set longline sets in the EEZ off California in 2011, 2012, and 2013.[109]

Species	2011-2013
Marketable	
Swordfish	8
Opah	67
Pomfret	23
Albacore	4
Bluefin	6
Mako	2
Dorado	1
TOTAL	111
Non-Marketable	
Blue shark	328
Lancet fish	5
King of the Salmon	17
Mola	1
Oil fish	1
TOTAL	352

Bigeye Tuna In the Eastern Pacific Ocean

The proposed action is likely to result in bycatch of bigeye tuna. Yet the EA fails to include the best available science indicating that bigeye tuna in the Eastern Pacific Ocean is overfished, but no overfishing is occurring (fig. 2)[110] and fails to analyze the adequacy of regulations to rebuild the stock. If recent levels of fishing mortality, recruitment, and catchability continue, stock assessment scientists predict recovery, but current regulations contain significant loopholes that hinder responsible fisheries management. For example, the EA notes that the United States institutes limits for bigeye tuna caught in the EPO by U.S. vessels, but those limits have been met or exceeded in recent years. In addition, those limits apply only to longline vessels greater than 78.74 feet (24 m) in overall length. Finally, the U.S. fishery management plan governing West Coast highly migratory fisheries does not calculate specific reference points – such as values for status determination criteria, maximum sustainable yield, and acceptable biological catch – which undermines science-based management of domestic fisheries.

[109] NMFS, *Deep-Set Longline Study*, Agenda Item K.5.b. Supplemental SWFSC PowerPoint 1, March 2014, http://www.pcouncil.org/wp-content/uploads/K5b_SUP_SWFSC_PPT1_MAR2014BB.pdf.
[110] Inter-American Tropical Tuna Commission (IATTC) 2016, *Status of Bigeye Tuna in the Eastern Pacific Ocean in 2015 and Outlook For the Future*, Scientific Advisory Committee, 7th Meeting, La Jolla, California, 09-13 May 2016.

Heavy fishing pressure on bigeye tuna not only affects bigeye stock status, but can also have ecosystem effects.[111] For example, a 16-year time series (1996-2011) of U.S. deep-set longline catch and effort data showed drastic changes to the fishery: (1) a fourfold increase in the number of hooks set; (2) a 50% decrease in catch rates for bigeye tuna and over a dozen other large fish; and (3) an increase in discards – unwanted fish thrown overboard – from 30 to 40% of the total catch.[112] Declines in abundance of bigeye tuna and altered size structure can affect the evolutionary characteristics of populations and ecosystem processes and stability.[113] Management advice resulting from these findings included reducing fishing effort on bigeye tuna to prevent further ecosystem impacts,[114] but as of yet measures have not been implemented. The EA neglects to consider these repercussions of mismanaging bigeye tuna populations.

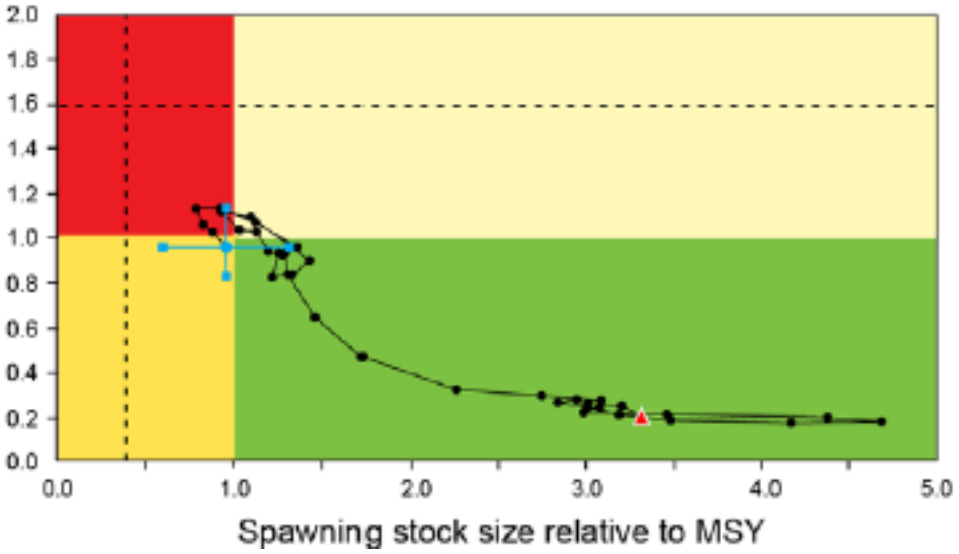


Figure 2. Kobe plot of the time series of estimates of spawning stock size and fishing mortality relative to reference points. Each dot is based on the average fishing mortality rate over three years; the large dot indicates the most recent estimate. The squares around the most recent estimate represent its approximate 95% confidence interval. The triangle represents the first estimate (1975). Source: IATTC 2016, Document SAC-07-05a.

[111] Gilman, E., Chaloupka, M., Read, A., Dalzell, P., Holetschek, J., & Curtice, C. (2012). Hawaii longline tuna fishery temporal trends in standardized catch rates and length distributions and effects on pelagic and seamount ecosystems. *Aquatic Conservation: Marine and Freshwater Ecosystems*, 22(4), 446-488; Polovina, J. J., & Woodworth-Jefcoats, P. A. (2013). Fishery-induced changes in the subtropical Pacific pelagic ecosystem size structure: observations and theory. *PloS one*, 8(4), e62341.
[112] Polovina and Woodworth-Jefcoats, *supra* n.111.
[113] Gilman et al. 2012, *supra* n.111.
[114] *Id.*

Pacific Bluefin Tuna

Fishing is the primary threat to the survival of Pacific bluefin tuna; thus the EA must consider the impact of additional fishing effort on the population. According to the 2016 stock assessment by the International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean (ISC), decades of overfishing have left the population at just 2.6% of its unfished size. Recent fishing rates (2011-2013) were up to three times higher than commonly used reference points for overfishing. Nearly 98% of all Pacific bluefin tuna landed are juveniles caught primarily in nursery grounds near Japan or off the coast of California and Mexico before they have had a chance to spawn. Without young fish to mature into the spawning stock to replace the aging adults, the future is grim for Pacific bluefin. We urge NMFS not to expand longline fishing to waters within the West Coast EEZ and further reduce the chances for its recovery.

V. Conclusion: NMFS must choose the No Action Alternative and deny the EFP.

This controversial EFP would allow both deep-set and shallow-set longlines inside the West Coast EEZ. The serious risks this action poses to threatened and endangered species triggers consultation under the ESA, which has not yet been completed. In the absence of biological opinions on the effect of these actions on endangered species, this EA simply does not provide the public with a complete documentation of the environmental impacts associated with this action, particularly on the species that would be most affected. NMFS should reopen the public comment period if this consultation, or any other ongoing analysis that may affect NMFS's decision making process, adds critical new information to the record.[115] The EA to support the EFP is inadequate in many respects, but most concerning is the lack of information surrounding potential environmental impacts to endangered and threatened species, in particular the Pacific leatherback and North Pacific loggerhead sea turtles. In a stunning contradiction, the preferred alternative would allow take of three leatherback sea turtles, one of eight "species in the spotlight" that NMFS determined are most at risk of extinction in the near future. The agency would authorize these takes despite recent estimates that the population can sustain no more than one death off the United States West Coast every six years without delaying recovery. Moreover,

[115] *See, e.g., Aina Nui Corp. v. Jewell*, 52 F. Supp. 3d 1110, 1119 (D. Haw. 2014).

> The APA generally requires an agency to make available to the public, for review and comment, the materials on which it relies in making a final decision. If an agency adds critical new information to the record after the close of a public comment period, it must reopen the comment period. "[A]n agency, without reopening the comment period, may use supplementary data, unavailable during the notice and comment period, that expands on and confirms information contained in the proposed rulemaking and addresses alleged deficiencies in the pre-existing data, so long as no prejudice is shown."

Id. (quoting *Idaho Farm Bureau Fed'n v. Babbitt*, 58 F.3d 1392, 1402 (9th Cir.1995)).

the observer data upon which the agency relies in its analysis is neither statistically sound nor complete and cannot support a Finding of No Significant Impact. Because substantial questions remain regarding whether this action will cause significant environmental impacts, NMFS must either deny the EFP or complete an EIS to comprehensively address its effects.

We recognize that NMFS seeks to identify new alternatives to increase domestic production of swordfish off the U.S. West Coast while minimizing bycatch. It would be a misuse of government resources to invest in further efforts in pelagic longlines, as all the available data and testing of this method to date indicate it will result in a wide suite of unacceptable bycatch impacts. Instead, we urge NOAA to put resources into authorizing and further testing deep-set buoy gear, which is showing immense promise as a profitable gear type for targeting swordfish that minimizes bycatch.

Please feel free to contact us with any questions.

Sincerely,

Catherine Kilduff, Senior Attorney
Center for Biological Diversity
202-780-8862
ckilduff@biologicaldiversity.org

Ben Enticknap, Pacific Campaign Manager & Senior Scientist
Oceana
503-235-0278
BEnticknap@oceana.org

Cassie Burdyshaw, Advocacy & Policy Director
Turtle Island Restoration Network
513-292-3101
cburdyshaw@tirn.net

October 3, 2016

Barry Thom, Regional Administrator
NOAA Fisheries West Coast Region
7600 Sand Point Way NE, Bldg. 1
Seattle, WA 98115

via email: RegionalAdministrator.WCRHMS@noaa.gov

RE: Draft Environmental Assessment of an Exempted Fishing Permit Application to Fish Longline Gear in the U.S. West Coast Exclusive Economic Zone

Dear Mr. Thom:

Wild Oceans, founded in 1973 by conservation-minded fishermen, has been working to keep indiscriminate gear such as longlines out of the Pacific on the grounds that pelagic longlining carries too high a price tag in terms of its well-documented environmental costs, as well as its proven high management costs. The Pacific Fishery Management Council (PFMC), the California Legislature and the California Fish and Game Commission have historically rejected multi-mile longlines because of unavoidable bycatch problems. And this bycatch is not only protected species, but recreationally-important species such as striped marlin, blue marlin and tuna.

The Draft Environmental Assessment (DEA) of an Exempted Fishing Permit (EFP) to Fish with Longline Gear in the West Coast Exclusive Economic Zone (EEZ) prepared by NOAA Fisheries fails to consider or test any modifications to traditional longlines that would produce high yields of target select species while minimizing bycatch. We do not support any EFP that employs traditional longlines, and urge NOAA Fisheries to choose Alternative 1, the "no action" alternative and deny this EFP application, considering the following:

The DEA fails to adequately consider the risk of increased fishing pressure on bigeye tuna, an overfished stock targeted by deep-set longlines. Instead, the DEA relies on the false assumption that bigeye tuna are neither overfished nor subject to overfishing. According to the most recent stock assessment of bigeye tuna in the eastern Pacific, the species is overfished.[1] Fishing effort must be reduced or maintained in order to halt their decline, yet the proposed fishery will increase effort. The DEA fails to adequately consider that the United States fleet catches or exceeds its annual bigeye allocation. Adding 225,000 additional hooks to the deep-set longline fleet targeting bigeye tuna will only increase the United States catch, increase the likelihood that the United States exceeds its allocation, and decrease the likelihood that the Eastern Pacific Ocean stock of bigeye tuna will rebuild.

The DEA fails to adequately consider the impact on blue sharks. The IUCN lists blue shark as near threatened, and there is concern over the removal of such large numbers of this keystone predator from the oceanic ecosystem. The DEA predicts the bycatch of 6.395 blue shark per 1000 hooks in the proposed shallow-set longline fishery and .888 bluesharks per 1000 hooks in the proposed deep-set longline fishery. However, the DEA fails to include data from deep-set longline research conducted by NOAA Fisheries in 2011, 2012 and 2013 within the EEZ and within the area proposed for this EFP.[2] In this study, the longline vessel caught 28 blue sharks per thousand hooks. Notably, the average soak time was less than four hours. By ignoring this data, the DEA fails to adequately analyze the impact of this EFP on blue sharks.

The reliance on limited longline observer records from the high seas longline fishery east of 140° west latitude provides an incomplete picture of bycatch. NOAA Fisheries proffers that "[s]tratifying the data in this way reduces, to some degree, the otherwise likely bias towards the suite of species and magnitude of interactions in coastal areas and warmer waters surrounding the Hawaiian Islands." But, by stratifying the data, NOAA Fisheries fails to adequately consider the probable impact of longlines on the California Current Large Marine Ecosystem (CCLME).

The CCLME produces abundant ecosystem goods and services including fisheries, recreation, tourism, energy production, climate regulation, pollution control, and transportation. This highly productive ecosystem supports forage fish populations that serve as food for larger species, including migratory fishes, birds and

[1] Inter-American Tropical Tuna Commission (IATTC) 2016, *Status of Bigeye Tuna in the Eastern Pacific Ocean in 2015 and Outlook For the Future*, Scientific Advisory Committee, 7th Meeting, La Jolla, California, 09-13 May 2016.
[2] NOAA Fisheries Deep-Set Longline Study presentation to PFMC, Agenda Item K.5.b, Supplemental SWFSC PowerPoint 1, March 2014.

mammals that transit the California Current every year.

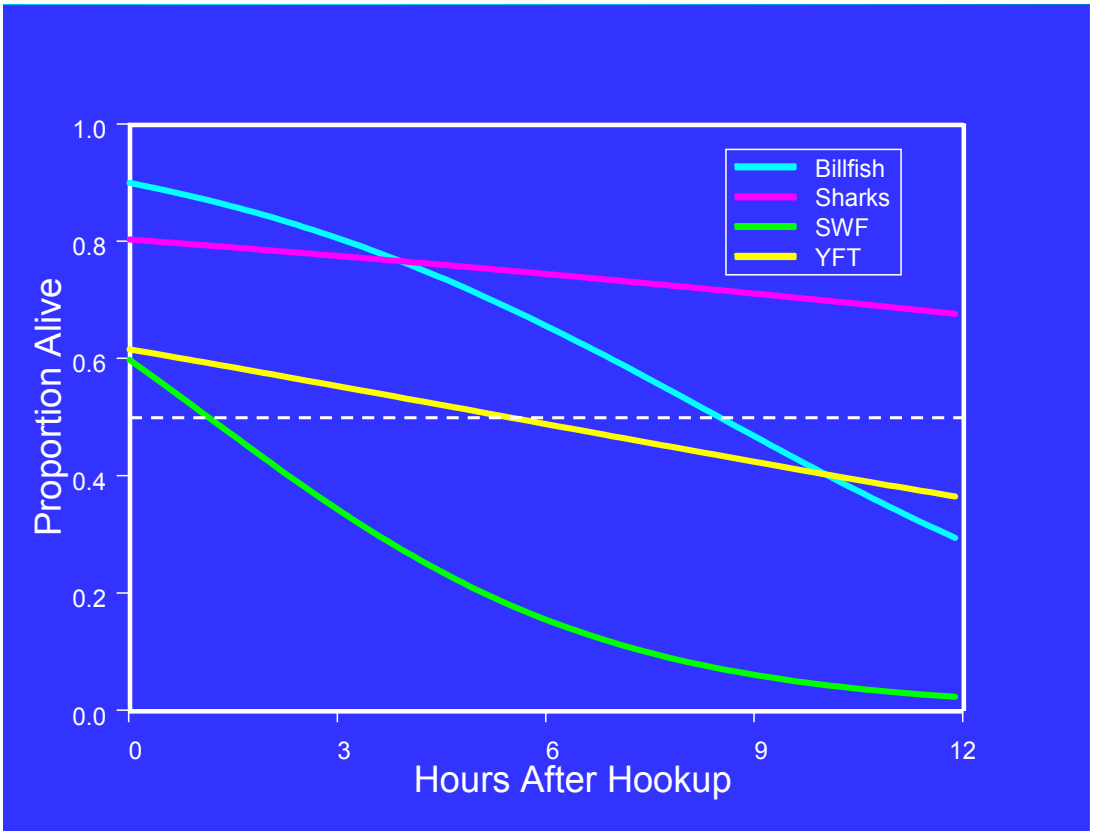
The DEA fails to consider how the composition of species within the CCLME differs from the composition in the high seas data area. By ignoring these differences, the DEA fails to consider the impact of the EFP on marine mammals, sea turtles, sea birds and large predatory fish that reside in or migrate through the CCLME. Without providing the public with this information and analysis, it is impossible for the public to adequately consider and comment on the full extent of impacts the EFP will have on the CCLME.

The DEA fails to consider that circle hooks may increase interactions with certain vulnerable species. The DEA is predicated on the use of circle hooks and mackerel-type bait, as now used in the Hawaii-based longline fishery, aimed at reducing the take of endangered sea turtles. The conservation value of using non-offset circle hooks for marlin, sailfish and a number of other recreationally-caught species, instead of J-hooks, is also well documented, substantially reducing post-release mortality. Circle hooks have also proven effective in reducing longline interactions with sea turtles and some non-target fish.

However, there is evidence that circle hooks can increase hook-ups with some species of billfish and shark, and because longline-caught fish can remain on the line for many hours, they die regardless of how non-lethal the hooks may be. In a study conducted by Berkeley et al, the mortality rate for billfish surpassed fifty percent after they had been on a circle hook for about 8 hours.[3] The DEA fails to consider these potential adverse impacts or mitigation measures to reduce these impacts. Instead, the reliance on circle hooks to mitigate bycatch mortality merely underscores the fact that there is no way to avoid longline bycatch, aside from strictly limiting or prohibiting the gear.

[3] Berkeley, S.A. and R.E. Edwards. 1998. Factors Affecting Billfish Capture and Survival in Longline Fisheries: Potential Application for Reducing Bycatch Mortality. Col. Vol. Sci. Pap. ICCAT, 48(1): 255-262.

Bycatch Mortality Increases Significantly After Several Hours On a Multi-Mile Pelagic Longline Rigged with Circle Hooks



Berkeley & Edwards 1998

The DEA fails to adequately consider the increased risk to critically endangered sea turtles caused by additional longline effort. Additional longline effort would inevitably increase risk to critically endangered loggerhead and leatherback sea turtles. NOAA Fisheries' preferred alternative allows the EFP participants to hook or entangle three leatherback sea turtles and two loggerhead sea turtles during the two year EFP. (Alternative 2 allows the hooking or entanglement of two leatherback sea turtles and one loggerhead sea turtle.) With leatherback and loggerhead sea turtle populations in dire straits, any additional take of leatherback or loggerhead sea turtles could impact their survival. The logic presented by NOAA Fisheries to support the take of endangered turtles is backwards, first deciding to establish a longline fishery and then determining how to accommodate it under the Endangered Species Act. Rather, NOAA Fisheries should consider the risk to leatherback and loggerhead sea turtles as reason not to approve the EFP in the first place.

The DEA fails to adequately consider the impact of increased bycatch and discard of billfish. Pursuant to a request by PFMC, NOAA Fisheries included a striped marlin bycatch limit of 57 animals. We support a striped marlin bycatch limit on any EFP issued for longlines. However, NOAA Fisheries arbitrarily choose a limit "equal to the number of animals expected to be caught using catch rates from a subset of data from the Hawaii longline fishery used as a proxy for EFP fishing." By choosing this number, the DEA is accommodating instead of reducing the catch of striped marlin.

Furthermore, NOAA Fisheries failed to include any reference to or analysis of this cap vis-à-vis the Billfish Conservation Act of 2012. The Billfish Conservation Act prohibits the sale of marlin, sailfish and spearfish in the continental United States, allowing only a limited exemption for the local sale and consumption of billfish in Hawaii and neighboring Pacific island territories. The analysis fails to recognize that the majority of striped marlin caught in the Hawaii longline fleet are kept and sold – i.e., there is no incentive to avoid marlin in that fishery - and fails to consider whether choosing a limit equal to the number taken in the Hawaii longline fishery as bycatch conflicts with the intent of the Act.

Finally, by limiting data to observer data on the high seas, the DEA fails to adequately analyze whether and how the bycatch of striped marlin is likely to increase within the EEZ.

The EFP will increase fishing pressure on data poor stocks. A West Coast longline fishery will also interact with many species, including mahi mahi, shortbill spearfish, moonfish and wahoo, for which we lack sufficient data to manage the stocks in a manner that prevents overfishing or achieves rebuilding goals.

The DEA fails to adequately evaluate the cumulative impact of authorizing the EFP. It is clear that this EFP is a preliminary step towards authorizing a longline fishery within the EEZ. Yet, the cumulative impact analysis does not evaluate the impacts of a future longline fishery as part of the Highly Migratory Species Fishery Management Plan and the resulting impacts to prohibited species, such as striped marlin, vulnerable sharks or endangered species like sea turtles, albatrosses and marine mammals.

Clearly, the major problem with longlines is that they are "long." The typical set for swordfish or tuna is 30-40 miles in length, fishing over 1,000 hooks, and the hooks remain in the water from 12-24 hours. Shorter lines and soak times, say 6 hours or less, might diminish its lethal impact. But what we are talking about here is pelagic longlining, which measures "efficiency" in terms of maximizing hooks fished on multi-day fishing trips, instead of in terms of maximizing catch of target species and minimizing bycatch and bykill.

Allowing experimentation with such indiscriminate gear does little to expand our

understanding of how we can reduce bycatch of protected and vulnerable species, and instead reinforces the status quo and ignores the decades of experience with longlines that argues for further limiting, not expanding, their use. For these reasons, we urge NOAA Fisheries to choose Alternative 1, the "no action" alternative, and support the historic position of the California Legislature and the California Fish and Game Commission and their decisions to keep multi-mile longlines out of the EEZ.

Sincerely,

Theresa Labriola
West Coast Fisheries Director

EARTHJUSTICE

ALASKA CALIFORNIA FLORIDA MID-PACIFIC NORTHEAST NORTHERN ROCKIES
NORTHWEST ROCKY MOUNTAIN WASHINGTON, D.C. INTERNATIONAL

October 3, 2016

Amber Rhodes, Fishery Policy Analyst
Sustainable Fisheries Division
National Marine Fisheries Service
501 West Ocean Blvd., Suite 4200
Long Beach, California 90802
RegionalAdministrator.WCRHMS@noaa.gov

RE: Comments on the draft Environmental Assessment of Exempted Fishing Permit application to fish with longline gear in the U.S. West Coast Exclusive Economic Zone

Dear Ms. Rhodes:

Thank you for your consideration of the following comments on the draft environmental assessment ("EA") for the proposed exempted fishing permit ("EFP") application to fish with shallow-set and deep-set longline gear in the U.S. West Coast exclusive economic zone ("EEZ"). The draft EA suffers from fundamental flaws that render its conclusions invalid. As such the draft EA does not provide a valid basis for authorizing the EFP. Overall, granting this EFP would be inconsistent with applicable law, sound science, and sustainable fishery management goals.

We already know that the kinds of pelagic longlining proposed in the EFP catch, injure, and kill far more non-target species than target species, including critically endangered Pacific leatherback sea turtles, loggerhead and green sea turtles, whales and other marine mammals, endangered albatross and other seabirds, sharks, and billfish, among others. Expanding the use of this non-selective gear in the ecologically crucial, sensitive California Current Large Marine Ecosystem ("CCE") is, simply put, a bad idea. We therefore urge NMFS to select the "no action" alternative. We recommend that NMFS instead focus its resources on investigating and promoting the use of more selective gear and taking actions to foster the recovery of the multiple threatened, endangered, and otherwise vulnerable species that would be harmed by the development of a new longline fishery.

The EA's analysis of impacts is incomplete and inaccurate

The draft EA fails in multiple ways to present a full, accurate analysis of the impacts the EFP would have on the CCE. The draft EA bases its analysis on incomplete data, fails to present extrapolated take data, and omits key data from past deep-set longline fishing. It underestimates impacts to a number of vulnerable species and fails entirely to address others. These failings are described in comments by The Pew Charitable Trust, Audubon California, Wild Oceans, Oceana and the Center for Biological Diversity. We share concerns raised in these letters and will not repeat them in detail here. Instead, we focus on the ways in which these flaws violate applicable law.

NEPA is "our basic national charter for protection of the environment."[1] NEPA's fundamental purposes are to guarantee that: (1) agencies take a "hard look" at the environmental impacts of their actions before the actions occur by ensuring "that the agency, in reaching its decision, will have available, and will carefully consider, detailed information concerning significant environmental impacts," and that (2) "the relevant information will be made available to the larger audience that may also play a role in both the decision making process and the implementation of that decision."[2] "NEPA emphasizes the importance of coherent and comprehensive up-front environmental analysis to ensure informed decision-making to the end that the agency will not act on incomplete information, only to regret its decision after it is too late to correct."[3] Agencies' evaluation of environmental consequences must be based on scientific information that is both "[a]ccurate" and of "high quality."[4] Providing accurate, high quality information is vital to fulfilling the agency's duty to inform the public of the proposed action's impacts and provide the public the opportunity to comment on the environmental impacts of their actions.[5] NEPA analysis must analyze and disclose the reasonably foreseeable impacts of the proposed action itself as well as its cumulative impacts when added to the existing environmental baseline and to impacts of other existing and reasonably foreseeable federal agency actions.

The draft EA fails to meet these basic requirements. Its analysis is based on numerous data gaps and inaccuracies, including the following:

- The EA relies on a subset of data from the Hawaii longline fishery as a proxy for estimating take in the U.S. West Coast EEZ that is unlikely to fully represent impacts here. The EA bases its analysis on bycatch data from the zone east of 140° W longitude.[6] By relying exclusively on this offshore data, the EA fails to account for the increased density of affected species closer to shore. As a result, the EA fails to accurately assess likely impacts to a number of species, such as humpback and sperm whales; black-footed, short-tailed, and Laysan's albatross; and thresher sharks.
- The EA fails to disclose or analyze data from the West Coast-based deep-set longline fishery and deep-set longline fishing trials in 2011, 2012, and 2013.[7]
- The EA fails to consider peer-reviewed science showing that fishery-related mortalities in the critically endangered western Pacific leatherback population must be significantly curtailed if the species is to recover;[8]

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[1] *Klamath-Siskiyou Wildlands Ctr. v. U.S. Bureau of Land Mgmt.*, 387 F.3d 989, 993 (9th Cir. 2004) (citing 40 C.F.R. § 1500.1(a)).
[2] *Dep't of Transportation v. Public Citizen*, 541 U.S. 752, 768 (2004) (quoting *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989)); *see also Ctr. for Biological Diversity v. U.S. Department of the Interior*, 623 F.3d 633, 642 (9th Cir. 2010).
[3] *Ctr. for Biological Diversity v. U.S. Forest Serv.*, 349 F.3d 1157, 1166 (9th Cir. 2003) (citation and internal quotation marks omitted).
[4] 40 C.F.R. § 1500.1(b).
[5] 40 C.F.R. § 1506.6.
[6] *Id.* at 3-1.
[7] Deep-Set Longline Study, Supplemental SWFSC PowerPoint 1, Agenda Item K.5.b, March 2014, *available at* http://www.pcouncil.org/wp-content/uploads/K5b_SUP_SWFSC_PPT1_MAR2014BB.pdf,

- The EA misrepresents likely magnitude of take of marine mammals by reporting only the number of observed takes in the drift gillnet fishery and not reporting the total number of animals taken when the observed takes are extrapolated based on observer coverage, which are often many times higher.
- The EA further underrepresents the likely take of marine mammals by failing to account for instances where a marine mammal that was "released alive" was seriously injured (thus considered taken under the Marine Mammal Protection Act).
- The EA incorrectly states that the Potential Biological Removal for sperm whales is 12.7 individuals; according to the 2015 stock assessment report, the PBR of sperm whales is 2.7.[9]
- The EA fails to disclose or consider that the eastern Pacific stock of bigeye tuna, one of the species targeted with deep-set longline gear, is currently overfished and the U.S. fleet already regularly catches or exceeds its bigeye allocation.
- The EA fails to disclose or analyze data from past deep-set longline fishing trials that shows that the fishing caused excessive shark bycatch, catching 41 blue sharks for every swordfish

In addition to failing to base its analysis on relevant, accurate scientific data, the draft EA fails to analyze cumulative impacts to the numerous species affected by the proposed EFP. For instance, the draft EA does not analyze how the take that would occur under the EFP would affect marine mammal and sea turtle species when added to the take that occurs in the drift gillnet fishery or would occur under the proposed EFP to allow drift gillnet fishing in the Pacific leatherback conservation area. Nor does the draft EA analyze the reasonably foreseeable impacts to developing a full-fledged shallow-set and/or deep-set longline fishery in the U.S. West Coast EEZ, even though the EFP is proposed in order to facilitate that development.

Moreover, it is not clear that the EFP would serve any purpose other than to allow an otherwise unlawful, destructive fishing practice to take place within the biological hotspot of the CCE. In fact, the EFP application fails to include all existing mitigation measures available to reduce impacts from longline gear, and fails to require or test any further innovation to actually make the use of this gear more sustainable. In addition, the EFP seems unlikely to produce useful, informative data to understand the impacts of a future longline fishery. Thus far, NMFS has declined to disclose or analyze existing data from the West Coast deep-set longline fishing trials conducted in 2011, 2012 and 2013, even though those trials were supposed to provide a better understanding of how deep-set longline gear would affect target and non-target species. To the extent NMFS's omission of that data is based on concerns regarding data confidentiality, such concerns are not a valid basis for withholding relevant EFP results. NMFS's EFP regulations specifically provide for the release of data to the public and allow NMFS to require an EFP applicant "to waive the right to confidentiality of information gathered while conducting

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[8] Curtis KA, Moore JE, Benson SR (2015) Estimating Limit Reference Points for Western Pacific Leatherback Turtles (*Dermochelys coriacea*) in the U.S. West Coast EEZ. PLoS ONE 10(9): e0136452. doi:10.1371/journal.pone.0136452

[9] Caretta, J. *et al.*, U.S. Pacific Marine Mammal Stock Assessments: 2015, May 2016, p.165, *available at* http://www.nmfs.noaa.gov/pr/sars/pdf/pacific2015_final.pdf.

exempted fishing as a condition of an EFP."[10] If NMFS declines to use available data from EFPs designed to test longlining off the U.S. West Coast to inform its understanding of the likely effects of developing a full-scale longline fishery in the same area, there is no point in granting such EFPs at all.

The proposed EFP is inconsistent with applicable law

Granting the proposed EFP would conflict with a number of applicable laws, most notably the Endangered Species Act ("ESA") and the Magnuson-Stevens Fishery Conservation and Management Act ("MSA"). NMFS should therefore select the "No Action" alternative and decline to grant the EFP.

As noted above, both the EFP itself and the reasonably foreseeable development of a full-scale longline fishery in the U.S. West Coast EEZ would dramatically increase the injury and death of numerous non-target species, including multiple species protected under the ESA. These species include humpback whales, which have experienced a dramatic increase in fishery-related take in recent years that is likely above PBR; the short-tailed albatross, a species whose population is already limited by fisheries bycatch; and loggerhead and leatherback sea turtles. The draft EA significantly underestimates impacts to these species in terms of both numbers and significance. While all listed species must receive NMFS's full attention, we are particularly concerned about impacts to the critically endangered western Pacific leatherback sea turtle.

The ESA tasks NMFS not just with preventing the extinction of listed species, but actively promoting their recovery.[11] Section 2(c) of the ESA establishes that it is "…the policy of Congress that all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act."[12] The ESA defines "conservation" to mean "…the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this Act are no longer necessary."[13]

NMFS includes the Pacific leatherback its 2016-2020 "Species in the Spotlight" plan, which is "part of a strategy to marshal resources for species listed under the Endangered Species Act of 1973 (ESA) for which immediate, targeted efforts are vital for stabilizing their populations and preventing their extinction."[14] NMFS identifies the Pacific leatherback as a "Priority #1" species, meaning it is "a species whose extinction is almost certain in the immediate future because of a rapid population decline or habitat destruction…."[15] In the Pacific leatherback's case, fisheries bycatch is major factor in its rapid population decline. Both the

[10] 50 C.F.R. 600.745(B)(3)(v)(I).
[11] 16 U.S.C. §§ 1532(15), 1536(a)(2).
[12] 16 U.S.C. § 1531(c)(1).
[13] 16 U.S.C. § 1532(3).
[14] NOAA Fisheries. January 2016. Species in the Spotlight, Priority Actions: 2016-2020, Pacific Leatherback Sea Turtle, *Dermochelys coriacea*, at 1.
[15] NOAA Fisheries. January 2016. Species in the Spotlight, Priority Actions: 2016-2020, Pacific Leatherback Sea Turtle, *Dermochelys coriacea*, at 1, quoting NMFS Endangered and Threatened Listing Recovery Guidelines (55 Fed. Reg. 24296 (June 15, 1990)).

IUCN and NMFS have determined that reducing fisheries bycatch of Pacific leatherbacks is essential to promoting the species' survival and recovery. Facilitating the expansion of longline gear in the Pacific leatherback's migratory and foraging areas when that gear is already known to injure and drown these critically endangered turtles is contrary to NMFS's goal of stabilizing the leatherback populations and preventing their extinction. NMFS should be seeking to move away from the use of longline gear in all Pacific leatherback migratory pathways and habitats, not expand its use into new areas.

The western Pacific leatherback has declined by more than 80% since the 1980s; the IUCN projects that the population will experience a 96% decline by 2040.[16] The population is so low that removing even one leatherback during the proposed experimental fishing could significantly impair the species' ability to survive and recover. In fact, in order to avoid delaying the species' recovery, scientists estimate that total take by all U.S. West Coast fisheries needs to be limited to no more than one turtle every six years.[17] The drift gillnet fishery took an estimated 4 leatherbacks in 2013 alone.[18]

NMFS may not authorize further take of a species that is already so deeply in jeopardy. When determining whether the proposed EFP would be likely to jeopardize the species' continued existence, NMFS must examine its likely effect on the Pacific leatherback's chance of recovery as well as survival.[19] The Ninth Circuit has made clear that actions that appreciably reduce a species' likelihood of recovery are considered to jeopardize its continued existence.[20] The best available science shows that allowing more take of leatherbacks – even one during the two-year course of the EFP – would impair the species' recovery, if not its survival. Issuing the EFP would thus violate NMFS's obligations under the ESA.

Granting the EFP would also conflict with NMFS's obligations under the MSA. The MSA requires NMFS to prevent or end overfishing.[21] Yet the proposed EFP would impermissibly increase fishing effort on already overfished bigeye tuna. It would also increase fishing mortality for a number of data poor species that may be vulnerable to overfishing or at risk of being overfished, including mahi mahi, shortbill spearfish, moonfish, and wahoo. Moreover, the EFP would significantly increase bycatch and bycatch mortality in the HMS fishery, contrary to National Standard 9.[22]

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[16] IUCN Redlist of Threatened Species, Version 2015-4, www.iucnredlist.org, downloaded March 23, 2016.
[17] Curtis KA, Moore JE, Benson SR (2015) Estimating Limit Reference Points for Western Pacific Leatherback Turtles (*Dermochelys coriacea*) in the U.S. West Coast EEZ. PLoS ONE 10(9): e0136452. doi:10.1371/journal.pone.0136452
[18] NMFS California/Oregon Drift Gillnet Observer Program, Observed catch 2013-2014, *available at* http://www.westcoast.fisheries.noaa.gov/publications/fishery_management/swr_observer_program/drift_gillnet_catch_summaries/.
[19] 16 U.S.C. § 1536(a)(2).
[20] *Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv.*, 481 F. 3d 1224, 1237–38 (9th Cir. 2007), *as amended on other grounds by* 524 F.3d 917 (9th Cir. 2008) (requiring agency to consider both survival and recovery in determining whether project is likely to jeopardize species); *see also* 50 C.F.R. § 402.02 (defining "jeopardize" as action that would reduce "the survival and recovery of a listed species" by "reducing the reproduction, numbers, or distribution of that species.").
[21] 16 U.S.C. § 1851(a)(1).
[22] 16 U.S.C. § 1851(a)(9).

Conclusion

We urge NMFS to select the "No Action" alternative and deny the proposed EFP to allow shallow-set and deep-set longlining in the U.S. West Coast EEZ. Pelagic longline fishing is known to cause high bycatch of myriad finfish, shark, seabird, marine mammal, and sea turtle species. Deploying longline gear in the ecologically critical CCE will only confirm that fact, needlessly damaging the marine environment. Instead of devoting federal resources to expanding the use of non-selective longline gear, NMFS should facilitate a transition to selective, actively tended gear such as deep-set buoy gear.

Thank you for your consideration.

Sincerely,

Andrea A. Treece
Staff Attorney, Oceans Program

THE PEW CHARITABLE TRUSTS

111 SW Columbia Street, Suite 200
Portland, Oregon 97201
pewtrusts.org

October 3, 2016

Barry Thom, Regional Administrator
Sustainable Fisheries Division
National Marine Fisheries Service
501 West Ocean Blvd., Suite 4200
Long Beach, California 90802
RegionalAdministrator.WCRHMS@noaa.gov

RE: Request for comments on the draft environmental assessment (EA) of an exempted fishing permit (EFP) application to fish longline gear in the U.S. West Coast exclusive economic zone (EEZ)

Dear Mr. Thom:

We write in response to the National Oceanic and Atmospheric Administration's Fisheries Service (NOAA Fisheries) request for comments on the draft EA to consider the potential effects on the environment caused by the authorization of an EFP for vessels to fish deep-set longlines (DSLL) and shallow set longlines (SSLL) in the U.S. West Coast EEZ. The Pew Charitable Trusts supports the development of new and innovative fishing gears that have the ability to significantly reduce bycatch and bycatch mortality, while providing high quality seafood. Unfortunately, this proposal does not meet that standard. To this end, we request that NOAA Fisheries select Alternative 1, the "no action" alternative, and deny this EFP application.

Pelagic longlines are known to have high bycatch of protected and vulnerable species and were prohibited off the West Coast specifically because of their impact on endangered sea turtle populations.[1] Data from the Hawaii SSLL and DSLL fisheries shows high bycatch of sensitive species including leatherback and loggerhead sea turtles known to inhabit the action area.[2] In 2011, 2012 and 2013, NOAA Fisheries conducted deep-set longline trials inside the West Coast EEZ. [3] The results of these tests showed very high bycatch rates including 41 blue sharks caught for every swordfish and more than three non-marketable species for each marketable fish caught.

[1] Final rule to prohibit shallow longline sets targeting swordfish east of 150° W longitude by vessels managed under the HMS FMP, March 11, 2004.
[2] National Bycatch Report First Edition Update 2, 2016, Section 7. Pacific Islands Overview, pp.70-79.
[3] NOAA Fisheries presentation to the PFMC, Agenda Item K.5.b, Supplemental SWFSC PowerPoint 1, March 2014, p. 12.

Species	2011-2013	
Marketable		
Swordfish	8	
Opah	67	
Pomfret	23	
Albacore	4	
Bluefin	6	
Mako	2	
Dorado	1	
TOTAL	111	
Non-Marketable		Mortalitiy
Blue shark	328	31-62
Lancet fish	5	5
King of the Salmon	17	17
Mola	1	0
Oil fish	1	1
TOTAL	352	54-85

Figure 1. Catch and bycatch from DSLL trials conducted in the West Coast EEZ as presented to the Pacific Fishery Management Council (PFMC).[4]

In testing new fishing gears off the West Coast, NOAA Fisheries should prioritize research and development of highly selective and actively tended gear types, not gears known to have high bycatch rates.

The draft EA has several flaws, data gaps, and inconsistencies that do not provide sufficient data analysis for the agency to issue this EFP.

Incomplete and misleading data. The data used as a proxy to determine the potential effects of longlines in the West Coast EEZ is incomplete and fails to account for the fact that the density of affected species tends to increase closer inshore. It is not clear why the agency stratified the data and included only information from the zone east of 140° W longitude[5] and does not present the whole data set to better inform the potential effect on the environment caused by pelagic longlines. We provide the following three examples to show how bifurcating the data along the 140° W longitude biases the data and analysis toward offshore species distribution:

- The EA states that "common thresher sharks may be more available within the [U.S] West Coast EEZ than on the high seas,"[6] but the EA fails to include data closer to shore where species distribution may be more comparable to the action area.
- The data presented on the Hawaii DSLL fishery on page 3-8 of the EA shows the fishery catching only one black-footed albatross over the 10 year period

[4] NOAA Fisheries presentation to the PFMC, Agenda Item K.5.b, Supplemental SWFSC PowerPoint 1, March 2014, p. 12.
[5] *Id.* at 3-1.
[6] *See Id.* at pp. 4-10 and 4-11.

presented. However, data from the National Bycatch Report[7] shows that in 2013 alone, the Hawaii DSLL fishery caught an estimated 257 black-footed albatross.[8]

- Because the agency bifurcated the data, the EA concludes that "no marine mammals were observed caught in the Hawaii DSLL fishery data."[9] This statement is misleading in that the Hawaii DSLL fishery has had observed interactions with sperm whales and the Hawaii SSLL fishery has interacted with humpback whales,[10] both of which occur in the action area.

The EA should present the Hawaii longline data from west of 140°W longitude in order to more fully inform the analysis of the potential effects on the environment from the proposed action.

We understand that the agency truncated the SSLL data from the Hawaii fleet to reflect the use of circle hooks and mackerel bait and other management measures implemented after 2004 to reduce bycatch. It is not clear, however, why the agency also shortened the timeframe it used for analyzing the Hawaii DSLL fishery data. Although the agency claims this is for consistency, there is no reason to truncate the data on the DSLL fishery because there have been no changes in the fishery that would affect the catch or bycatch composition to warrant the analysis of only a portion of the data set. If there is a need for consistency in the timeframe of data sets, then it is unclear why the agency did not also truncate the data on the DGN fishery to meet the suggested timeframe. Even if there were a valid reason for shortening the data set associated with DSLL, the EA should present the full data set in order to properly analyze the potential environmental effects of the proposed EFP and provide for analysis by stakeholders.

Further, data from the West Coast-based DSLL fishery and DSLL trials was not included in the analysis. The data used to analyze the potential environmental impacts of the proposed EFP should include all relevant fishery data including information collected in the West Coast-based DSLL fishery and the DSLL trials in 2011, 2012, and 2013 as presented to the PFMC in 2014.[11]

Incomplete data on marine mammal takes and serious injury. The EA contains data on the observed marine mammal catch in the drift gillnet (DGN) fishery, but is remiss in including the extrapolated number of observed animals and the condition that animals were in upon release. This omission provides an incomplete look at the impact of the DGN fishery in the West Coast EEZ. For example, the table on page 3-11 shows the

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[7] National Bycatch Report First Edition Update 2, *available at* http://www.st.nmfs.noaa.gov/observer-home/first-edition-update-2.

[8] National Bycatch Report First Edition Update 2, Table 7.8.3 Pacific Islands Region Seabird Bycatch By Fishery (2013), *available at* http://www.st.nmfs.noaa.gov/Assets/Observer-Program/bycatch-report-update-2/Table%207.8.3.pdf.

[9] Draft Environmental Assessment, Consideration of an Exempted Fishing Permit to Fish with Longline Gear in the West Coast Exclusive Economic Zone, September 2016, p. 4-16, *available at* http://www.westcoast.fisheries.noaa.gov/publications/nepa/HMS/longline_efp_draft-ea_hms_sept16.pdf.

[10] Table 7.6.3a Pacific Islands Region Marine Mammal Bycatch for Hawaii-Based Longline Fisheries (2013), *available at* http://www.st.nmfs.noaa.gov/Assets/Observer-Program/bycatch-report-update-2/Table%207.6.3a.pdf

[11] Deep-Set Longline Study, Supplemental SWFSC PowerPoint 1, Agenda Item K.5.b, March 2014, *available at* http://www.pcouncil.org/wp-content/uploads/K5b_SUP_SWFSC_PPT1_MAR2014BB.pdf,

DGN fishery caught 2 sperm whales between the 2001/2002 and 2013/2014 fishing seasons.[12] When extrapolated based on the level of observer coverage in that year, the agency estimates that the DGN fishery resulted in the mortality of 16 sperm whales.[13] The EA should include the extrapolated number of animals as well as the observed number of animals to better inform the public of the potential cumulative impacts of this proposal.

A column should also be added to the table on page 3-11 to show animals released "seriously injured" as this is a distinct status under the Marine Mammal Protection Act (MMPA) and more accurately describes the condition of the animals released in the DGN fishery. As an example, one of the sperm whales discussed above was released "seriously injured,"[14] which the agency interprets as an injury that is "more likely than not to result in mortality."[15] Identifying the seriously injured sperm whale as released alive is not accurate as the animal likely died as a result of its injuries after being released. The EA should display the animals that were released seriously injured in addition to those released dead or alive.

Incorrect Potential Biological Removal (PBR) level of sperm whales. The EA incorrectly states the PBR level of sperm whales as 12.7 animals on page 3-31 and in the table on page 4-17. According to the 2015 stock assessment report, the PBR of sperm whales is 2.7 animals.[16]

Incomplete analysis of turtle impacts. The EA does not properly analyze the impacts on Pacific leatherback sea turtles. The preferred alternative identified in the EA, Alternative 3, would go against the PFMC's recommendation to allow only one vessel to fish under the EFP and would increase the recommended take or entanglement of endangered sea turtles. Alternative 3 would allow for 2 vessels to fish SSLL and DSLL gear in the U.S. West Coast EEZ and would permit the take or entanglement of 3 leatherback sea turtles and 2 loggerhead sea turtles.[17] This limit is a 50 percent increase in the amount of turtle takes recommended by the PFMC.[18]

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[12] Draft Environmental Assessment, Consideration of an Exempted Fishing Permit to Fish with Longline Gear in the West Coast Exclusive Economic Zone, September 2016, p. 1-2, *available at* http://www.westcoast.fisheries.noaa.gov/publications/nepa/HMS/longline_efp_draft-ea_hms_sept16.pdf.
[13] U.S. Pacific Marine Mammal Stock Assessments: 2012, January 2013, p. 168, *available at* http://www.nmfs.noaa.gov/pr/sars/pdf/po2012.pdf
[14] *Id*.
[15] Process for Distinguishing Serious from Non-Serious Injury of Marine Mammals, National Marine Fisheries Service Policy Directive PD 02-038, effective January 27, 2012, p. 2, *available at* http://www.nmfs.noaa.gov/pr/pdfs/serious_injury_policy.pdf
[16] Caretta, J. *et al.*, U.S. Pacific Marine Mammal Stock Assessments: 2015, May 2016, p.165, *available at* http://www.nmfs.noaa.gov/pr/sars/pdf/pacific2015_final.pdf.
[17] Draft Environmental Assessment, Consideration of an Exempted Fishing Permit to Fish with Longline Gear in the West Coast Exclusive Economic Zone, September 2016, p. 2-5, *available at* http://www.westcoast.fisheries.noaa.gov/publications/nepa/HMS/longline_efp_draft-ea_hms_sept16.pdf.
[18] *Id.* at 2-6.

Pacific leatherback sea turtles (Pacific leatherbacks) are listed as endangered under the U.S. Endangered Species Act (ESA)[19] and are designated as "priority #1" under NOAA Fisheries Endangered and Threatened Listing Recovery Guidelines meaning their extinction is almost certain in the immediate future because of rapid population decline or habitat destruction.[20] Pacific leatherbacks are also listed as "critically endangered" on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species.[21] The western Pacific subpopulation has dropped 83 percent over the last three generations,[22] in large part due to incidental catch by fishermen. The IUCN projects this subpopulation will have "declined by 96% by the year 2040, or one generation from now"[23] and lists fisheries bycatch as "the major obstacle to this population's recovery."[24]

The PLCA was closed to DGN gear in 2001 to protect leatherbacks during their annual migration to feed off the U.S. West Coast and was deemed "necessary to avoid the likelihood of the CA/OR [DGN] fishery jeopardizing the continued existence of the leatherback sea turtle population."[25] The PLCA has reduced the number of leatherback interactions in the fishery from 166 between 1990 and 2001 to a dozen between 2001 and 2015.[26] NOAA Fisheries recently released a *5-Year Action Plan for Pacific Leatherback Turtles* that is intended to "guide agency actions where we have the discretion to make critical investments to safeguard these most endangered species."[27] Under the Plan, NOAA Fisheries aims to prioritize resources toward leatherback recovery and touts the PLCA as a significant step taken to conserve and recover leatherbacks by addressing threats that occur in U.S. waters.[28]

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[19] 35 Fed. Reg. 8491, June 3, 1970, *available at* http://www.nmfs.noaa.gov/pr/pdfs/fr/fr35-8491.pdf.

[20] 55 Fed. Reg. 24296, June 15, 1990 (Priority #1 is defined as a species whose extinction is almost certain in the immediate future because of a rapid populations decline or habitat destruction, whose limiting factors and threats are well understood and the needed management actions are known and have a high probability of success, and is a species that is in conflict with construction or other developmental project or other forms of economic activity.).

[21] Tiwari, M., Wallace, B.P. & Girondot, M. 2013. *Dermochelys coriacea* (West Pacific Ocean subpopulation). The IUCN Red List of Threatened Species 2013: e.T46967817A46967821. http://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T46967817A46967821.en. Downloaded on 21 March 2016.

[22] Tapilatu, R. F., P. H. Dutton, M. Tiwari, T. Wibbels, H. V. Ferdinandus, W. G. Iwanggin, and B. H. Nugroho. 2013. Long-term decline of the western Pacific leatherback, *Dermochelys coriacea*, a globally important sea turtle population. Ecosphere 4(2): Article 25.

[23] Tiwari, M., Wallace, B.P. & Girondot, M. 2013. *Dermochelys coriacea* (West Pacific Ocean subpopulation). The IUCN Red List of Threatened Species 2013: e.T46967817A46967821. http://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T46967817A46967821.en. Downloaded on 21 March 2016.

[24] *Id*.

[25] 66 Fed. Reg. 44,549 (August 24, 2001) (codified at 50 C.F.R. § 223.206(d)(6) (2002); see also 50 C.F.R. § 660.713(c)(1) (2015) (codifying closure in current regulation).

[26] NMFS California/Oregon Drift Gillnet Observer Program, Observed catch 1990-2015, *available at* http://www.westcoast.fisheries.noaa.gov/publications/fishery_management/swr_observer_program/drift_gillnet_catch_summaries/.

[27] Species in the Spotlight, Priority Actions: 2016-2020, Pacific Leatherback Turtle, *Dermochelys coriacea*, January 2016, p. 3, *available at* http://www.nmfs.noaa.gov/stories/2015/06/spotlight_pac_leatherback.html

[28] *Id* ("The U.S. has taken significant steps to protect leatherbacks in its waters. In the Pacific, since 2001 the [PLCA] off of California has prohibited [DGN] fishing from August 15 to November 15 in 213,000 square miles of the Exclusive Economic Zone.").

A critical component of NOAA Fisheries strategy under the *5-Year Action Plan* is reducing leatherback interactions with fisheries.[29] Given this prioritization, it would be wholly inconsistent for NOAA Fisheries to approve an EFP that would increase the interaction risk with leatherbacks.[30] The proposed EFP would allow for two longline vessels to access the PLCA during times when Pacific leatherbacks are known to frequent the area.[31] In denying a previously recommended EFP to allow DGN vessels into the PLCA, NOAA Fisheries stated it "is concerned about threats to leatherback sea turtles within the migratory pathways to and from these apparently critical nearshore waters if the DGN EFP were to be issued."[32] Pacific leatherbacks are in worse shape than at the time of the 2007 denial.[33] If NOAA Fisheries were to change its previous position allowing fisheries with known bycatch of sea turtles into the PLCA, it would need to justify how doing so would not appreciably reduce the likelihood of both the survival and recovery of this species.[34]

A peer-reviewed paper published last year establishing the maximum sustainable mortality, known as the limit reference point (LRP), for western Pacific leatherbacks off the U.S. West Coast resulted in a local LRP of 0.8 turtles per five years to promote relatively fast population recovery.[35] According to NOAA Fisheries observer data, the DGN fishery caught an estimated 4 leatherbacks in 2013 alone.[36] Given this information, it is hard to see how opening the PLCA to longline gear, even experimentally, would not increase the risk to leatherback turtle populations and be detrimental to the species' recovery. This is specifically the type of situation contemplated in regulation as grounds for denial of an EFP.[37]

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[29] *Id*.
[30] Fed. Reg. 2016-04368, Published March 1, 2016, p. 10595 ("[NOAA Fisheries] is mindful of the population status of Pacific leatherback sea turtles and that test fishing in the PLCA with DGN gear would have interaction risks with the endangered Pacific leatherback sea turtle.").
[31] 66 Fed. Reg. 44,549 (August 24, 2001).
[32] McInnis, Rodney, Regional Administrator, National Marine Fisheries Service. Letter to Mr. Donald Hansen, Chairman, Pacific Fishery Management Council, June 5, 2007, *available at* http://www.pcouncil.org/bb/2007/0607/InfoRpt_5_Sup.pdf.
[33] Tiwari, M., Wallace, B.P. & Girondot, M. 2013. *Dermochelys coriacea* (West Pacific Ocean subpopulation). The IUCN Red List of Threatened Species 2013: e.T46967817A46967821. http://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T46967817A46967821.en (categorizing the population trend as declining) Downloaded on 21 March 2016.
[34] 16 U.S.C. § 1536(a)(2); *see also Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv.*, 481 F. 3d 1224, 1237–38 (9th Cir. 2007), *as amended on other grounds by* 524 F.3d 917 (9th Cir. 2008) (requiring agency to consider both survival and recovery in determining whether project is likely to jeopardize species); *see also* 50 C.F.R. § 402.02 (defining "jeopardize" as action that would reduce "the survival and recovery of a listed species" by "reducing the reproduction, numbers, or distribution of that species.").
[35] Curtis, K. A., J.E. Moore,& S.R. Benson. "Estimating limit reference points for western Pacific leatherback turtles (*Dermochelys coriacea*) in the US West Coast EEZ." PLoS ONE (2015), 10(9): e0136452. doi:10.1371/journal.pone.0136452 *available at* http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0136452.
[36] NMFS California/Oregon Drift Gillnet Observer Program, Observed catch 2013-2014, *available at* http://www.westcoast.fisheries.noaa.gov/publications/fishery_management/swr_observer_program/drift_gillnet_catch_summaries/.
[37] See 50 C.F.R. § 600.745 ("Grounds for denial of an EFP include, but are not limited to, [a]ccording to the best scientific information available, the harvest to be conducted under the permit would detrimentally

Insufficient cumulative impact analysis. The cumulative impact analysis does not consider the impact of allowing multiple entanglements and mortality of leatherbacks under this EFP in addition to other injuries and mortalities of leatherbacks caused by U.S. fisheries including the crab pot fishery and the hard cap regime proposed in the DGN fishery.[38] There is also no discussion about the potential for a future West Coast longline fishery after conclusion of this EFP and how this would impact the environment. These reasonably likely future actions must be assessed in the cumulative impacts analysis in order to meet the requirements under the National Environmental Policy Act.

In conclusion, we support a healthy and sustainable swordfish fishery off the West Coast without the collateral environmental damage caused by indiscriminate fishing gears like DSLL and SSLL. This EFP, if approved, will be a misguided step with potentially dire consequences for leatherback sea turtles and other species indiscriminately caught with longline gear. These impacts will only worsen if a longline fishery is allowed off the West Coast. We encourage the continued development of innovative fishing gears to replace DGN gear, such as deep-set buoy gear and linked buoy gear. New gears should effectively catch target species with minimal bycatch, while providing a high quality product to consumers. Because longline gear does not meet these standards, we urge NOAA Fisheries to select Alternative 1, the "no action" alternative, and disapprove this EFP proposing to use longlines in the West Coast EEZ.

Thank you for considering these comments.

Sincerely,

Paul Shively
Project Director, U.S. Oceans, Pacific
The Pew Charitable Trusts
pshively@pewtrusts.org

Tara Brock
Senior Associate, U.S. Oceans, Pacific
The Pew Charitable Trusts
tbrock@pewtrusts.org

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affect the well-being of the stock of any regulated species of fish, marine mammal, threatened or endangered species....").

[38] Preliminary Draft Environmental Assessment: Drift Gillnet Hard Caps and Monitoring Alternatives, August 18, 2015, p.17, *available at* http://www.pcouncil.org/wp-content/uploads/2015/08/G2a_NMFS_Rpt1_DGN_draftEA_and_metrics_SEPT2015BB.pdf.

Audubon CALIFORNIA

Amber Rhodes
Fishery Policy Analyst
National Marine Fisheries Service, West Coast Region
501 West Ocean Blvd. Long Beach, CA 90802
amber.rhodes@noaa.gov
WCRHMS@noaa.gov

RE: Request for comments on the draft environmental assessment (EA) of an exempted fishing permit (EFP) application to fish longline gear in the U.S. West Coast exclusive economic zone (EEZ)

Dear Ms. Rhodes,

Audubon California opposes the authorization of new pelagic deep-set longline (DSLL) and shallow-set longline (SSLL) fisheries within the west coast EEZ, unless and until albatross bycatch can be brought to negligible levels. The EA provides no indication a longline fishery in the west coast EEZ would be able to meet that standard. As such, we urge NMFS to reject this EFP application.

Of particular concern for Audubon is the black-footed albatross (*Phoebastria nigripes*). The recovery of this species has stalled and is likely being constrained by adult mortality due to longline bycatch throughout its range. Since 2010, the Hawaii DSLL and SSLL has captured between 92-576 (with an average of 268) black-footed albatross per year (Table 1). As described below, this level of capture from the U.S. based Hawaii fisheries alone is negatively impacting the species. A purpose of this proposed EFP and its preferred alternative ("Project") is to inform the potential development of a full scale longline fishery in the U.S. west coast EEZ. A new fishery in the U.S. EEZ - where high concentrations of albatrosses occur - would have an added negative impact on the species. Furthermore, pelagic longlines are known to have high bycatch of other protected species and were previously prohibited in the west coast EEZ specifically because of their impact on endangered sea turtle populations.[1] Data from the Hawaii SSLL and DSLL fisheries shows high bycatch of sensitive species known to inhabit the action area.[2]

Additionally, the Draft Ecological Assessment ("EA") itself presents incomplete and wrong information on albatross bycatch in the Hawaii-based DSLL and SSLL fisheries, leading to an inaccurate assessment of both rates and amounts of albatross mortality resulting from these fisheries. The EA also fails to adequately describe the impact and threat to black-footed albatross from bycatch, and the potential cumulative impact of this bycatch in the context of other threats

[1] Final rule to prohibit shallow longline sets targeting swordfish east of 150° W longitude by vessels managed under the HMS FMP, March 11, 2004.
[2] National Bycatch Report First Edition Update 2, 2016, Section 7. Pacific Islands Overview, pp.70-79.

including sea level rise and invasive species. The EA also fails to include short-tailed albatross as a species potentially affected by the Project. While Audubon is concerned about bycatch of other marine wildlife, our comments pertain to black-footed, short-tailed, and Laysan albatrosses, the three species of north Pacific albatross also comprising the species that are captured in the Hawaii DSLL and SSLL fisheries and that would overlap with the Project area.

Proposed Action

The Proposed Action is to issue an EFP to allow two vessels to fish with longline gear in the United States EEZ, which is currently prohibited. Longline gear would be fished in both deep-set longline and shallow-set longline gear configurations. The proposed action area is the United States EEZ off California and Oregon. The expected level of fishing effort would be 225,000 hooks total for DSLL and 108,000 hooks total for SSLL for the 2 year duration of the EFP.

North Pacific albatrosses are impacted by pelagic longline fisheries

Albatrosses are long-lived seabirds with deferred maturity, low fecundity and natural high rates of adult survival. These life history characteristics make albatross populations especially vulnerable to small increases in adult mortality.[3] The total breeding population of the **black-footed albatross** numbers roughly 67,000 pairs, with 95 percent of the population nesting in the Northwestern Hawaiian Islands. The remaining 5% of the birds nest on several remote islands in Japan.
The total breeding population of the **Laysan albatross** is estimated at 590,000 pairs with 99% nesting in the North western Hawaiian Islands.[4] Both species are benefiting from active management at Hawaiian Islands including a major recent push to eradicate and control invasive *Verbisina encelioides* (golden crownbeard) at Midway Atoll where most albatrosses nest.[5] The total global population **short-tailed albatross** is estimated at 2,364, with over 99% nesting on islands off of Japan. Short-tailed albatross is on the IUCN Red List and is U.S. Endangered.[6]

According to the U.S.G.S. Status Assessment of Laysan and black-footed albatrosses, North Pacific Ocean, 1923-2005[7] (herein referred to as Arata et al.), "incidental mortality (bycatch) in commercial fisheries is the greatest anthropogenic source of mortality (post-fledging) for both species….the black-footed albatross breeding population currently may be at risk of decline due to fishery bycatch." Further a recent analysis by Bakker et al. concluded that the Arata et al. calculations for the potential biological removal (PBR), which is an estimate of the amount of human-caused mortality a population can withstand while recovering towards or maintaining an optimal sustainable population, was underestimated by a factor of two.[8] Reflecting this sensitivity to bycatch mortality, the IUCN Red List (2015) notes "given the risk of bycatch approaching Potential Biological Removal, and potential risk to nesting habitat from sea-level rise (Storlazzi *et al.* 2013), it seems appropriate to precautionarily project future declines approaching 30% over the next 56 years (three generations)."

A recent definitive study on the overlap of black-footed albatross foraging range with some sectors of the west coast groundfish fleet notes that "low fishing mortality is of conservation concern because fishing mortality is often underestimated and albatrosses are far-ranging and can suffer

[3] Croxall, J.P., Butchart, S.H.M., Lascelles, B., Stattersfield, A.J., Sullivan, B., Symes, A.,Taylor, P., 2012. Seabird conservation status, threats and priority actions: a global assessment. Bird Conserv. Int. 22.
[4] EA at pg. 3-45.
[5] U.S. Fish and Wildlife Service. 2014. Fighting Weeds to Save Seabirds. https://www.fws.gov/refuges/news/FightingWeedsToSaveSeabirds.html
[6] IUCN Red List Species. 2015.
[7] Arata, J.A., Sievert, P.R., and Naughton, M.B., 2009, Status assessment of Laysan and black-footed albatrosses, North Pacific Ocean, 1923–2005: U.S. Geological Survey Scientific Investigations Report 2009-5131.
[8] Finkelstein, M. and V. Bakker. 2015. Risk management for at-risk seabirds: assessing bycatch effects on the population dynamics of black-footed albatross (Phoebastria nigripes). Pacific Seabird Group (San Jose, CA)

mortality in many fisheries, resulting in cumulative negative population level impacts."[9] NMFS has noted that Korean, Japanese and Taiwanese longline fisheries probably capture upwards of 10,000 or more North Pacific albatrosses but these fleets do not have observer coverage and do not report albatross bycatch.[10] Other experts have estimated that "pelagic longlining by U.S. Japanese, and Taiwanese fleets appears to be the single largest cause of black-footed albatross mortality at this time. Across fleets, pelagic longlining vessels likely kill at least 5000-14 000 black-footed albatross in the North Pacific, removing 1.9- 5% of the population." [11]

Driven partially by the need to reduce the take of federally endangered short-tailed albatross to negligible levels, the U.S. has taken strong and effective steps to reduce seabird bycatch in west coast and Alaska fisheries. Albatrosses comprise the vast majority of seabirds caught in the Hawaii longline fishery. For SSLL, when requirements for the Hawaii fishery to employ gear technology methods to mitigate seabird bycatch were introduced, seabird catch rates and levels declined by an order of magnitude. Before these measures, the average nominal annual seabird catch rate was 0.55 seabirds per 1,000 hooks. Following seabird regulations, the average nominal annual seabird catch rate, using data through the end of 2011, was 0.04 seabirds per 1,000 hooks. Now, 75% of albatross captures occur during hauling which occurs during the daytime.[12]

Steps taken by the U.S. to reduce seabird bycatch

In the 2000's NMFS, the U.S. Fish and Wildlife Service, and the U.S. Department of State began to invest heavily in the reduction of seabird bycatch in longline fisheries, to very positive effect. In 2001 the U.S. developed the *National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries,* fulfilling a national responsibility to reduce incidental seabird catch in longline fisheries as called for in the *International Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries.* In 2014 NOAA reported in the *Implementation of the U.S. National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries* that the United States "has improved research, outreach and education on, and domestic management of incidental seabird catch, resulting in a significant decrease in seabird incidental catch in its domestic fisheries." In 2014-2015 the Pacific Fishery Management Council adopted and NMFS subsequently put in place regulations for Seabird Avoidance Measures (primarily streamer lines) in the West Coast groundfish fishery. In recognition of these accomplishments, in 2015 NOAA's Seabird Program and partners on the west coast won the Presidential Migratory Bird Federal Stewardship Award for its decades of work in developing and putting in place technologies for reducing seabird bycatch.

As noted by the *Agreement to Conserve Albatrosses and Petrels* (ACAP), the foremost international agreement that brings countries together to ensure the future of imperiled albatrosses and petrels, "the most significant threat facing albatrosses and petrels is mortality arising from interactions with fishing gear, especially in longline and trawl fishing operations." The three north Pacific albatrosses –black-footed, Laysan, and short-tailed- have recently been added to the list of ACAP-listed species. Although not yet a member, NMFS notes that "the U.S. actively participates in ACAP… and the U.S. will continue to support ACAP's efforts and will continue activities related to ACAP so we may work with other key nations more effectively on measures for reducing seabird bycatch worldwide." These statements clearly convey a strong intent on the part

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[9] Guy, T. et al. 2013. Overlap of North Pacific albatrosses with the U.S. West Coast groundfish and shrimp fisheries. Fisheries Research 147 (2013) 222-234.

[10] Cousins, K. Managing pelagic longline-albatross interactions in the North Pacific Ocean. http://www.wpcouncil.org/documents/managebird.pdf

[11] Lewison, R. and L. Crowder. 2003. Estimating Fishery Bycatch and Effects on a Vulnerable Seabird Population. Ecological Applications, Vol. 13, No. 3 (Jun., 2003), pp. 743-753

[12] Gilman E, Chaloupka M, Wiedoff B, Willson J (2014) Mitigating Seabird Bycatch during Hauling by Pelagic Longline Vessels. PLoS ONE 9(1): e84499.doi:10.1371/journal.pone.0084499

of NMFS to continue to be a global leader in the reduction of seabird bycatch, through development and promulgation of best practices in our waters.

Other threats to North Pacific albatrosses

Other threats to these albatrosses include the impacts of climate change, invasive species on breeding islands, reduced reproductive output due to contaminants, nesting habitat loss and degradation due to human development and invasive plant species.[13] Sea level rise poses a very serious threat to Laysan and black-footed albatrosses. These species nest primarily on the low-lying Hawaiian islands which new studies show will be heavily subjected to the impacts of sea level rise. New models of wave driven flooding forecast nest losses up to 10% greater than passive inundation models at +1.0 meter sea level rise. At projections of + 2.0 meter sea level rise, approximately 60% of albatross nests were overwashed. In sum, habitat loss due to passive sea level rise may decrease the carrying capacity of some islands to support seabird colonies, while sudden high water events directly reduce survival and reproduction, as well as accelerate erosion and reduce habitat area.[14]

Invasive species are another serious threat. In 2015 the U.S. Fish and Wildlife Service biologists and volunteers discovered non-native house mice attacking adult nesting Laysan and black-footed albatrosses at Midway Atoll. Incubating birds are being bitten and preyed upon by non-native mice during the night – causing debilitating injuries and often death. Refuge managers are working with a team of rodent control and wildlife experts to develop and deploy strategies to suppress mouse population levels in order to stop the attacks or minimize their incidence.[15] The Service is also in the process of assessing the feasibility of eradicating the house mice at Midway. This study would inform planning and compliance under NEPA for the eradication of house mice. [16]

The EA uses incomplete data and information to assess potential impacts of the Project to albatrosses

The fundamental purpose of NEPA is to ensure that the federal government fully analyzes and considers the environmental impacts of a proposed action, such as granting a permit, before it takes action. A critical part of that process is providing the public the opportunity to comments on the proposed action in light of its environmental impacts. Presenting an objective analysis of all relevant scientific data is key to ensuring that the federal government and the public have an accurate, complete understanding of a proposed action's consequences before the agency commits resources to moving forward with it. Thus, in order to satisfy NEPA, NMFS's EA must be based on complete, accurate, and high quality data, and must fully disclose all reasonably foreseeable impacts on the environment from the proposed EFP, and must disclose all cumulative impact of the proposed EFP when added to other existing or reasonably foreseeable impacts in the affected area. The draft EA fails to satisfy these requirements.

A. The data used as a proxy to determine the potential effects of longlines in the West Coast EEZ is incomplete and misrepresents the rate and amounts of albatross mortality likely to take place in the West Coast EEZ

[13] Arata et al. 2009. Ibid.
[14] Reynolds MH, Courtot KN, Berkowitz P, Storlazzi CD, Moore J, Flint E (2015) Will the Effects of SeaLevel Rise Create Ecological Traps for Pacific Island Seabirds? PLoS ONE 10(9): e0136773. doi:10.1371/journal.pone.0136773
[15] USFWS. 2016. Scientists Document Non-native Mice Attacking Nesting Albatrosses at Midway Atoll National Wildlife Refugehttp://www.fws.gov/refuge/Midway_Atoll/news/mouse.html
[16] Flint, Beth. 2016. Personal Communication.

The EA asserts that "over the 11 year span of data collection in the Hawaii longline fisheries, 30 seabirds were caught in the SSLL fishery…"[17] This statement is wrong. According to publicly available observer data, from 2010 to 2015 (6 years) the DSLL fishery captured an estimated 66 to 535 black-footed albatrosses each year,[18] and the SSLL fishery captured an observed 19-49 birds per year.[19] The total black-footed albatross captured in these six years is 1,258 birds. The DSLL fishery captured an estimated 65-236 Laysan albatross per year. The total Laysan albatrosses captured in these six years is 904.

The much lower albatross capture rate presented in the EA is due to the fact EA does not use all of the available fisheries bycatch data. Rather, it states that "given the disparate fishing areas between the Proposed Action and the entire Hawaii longline fleet, NMFS staff stratified the Hawaii observer records to compute CPUE estimates from fishing that occurred in areas east of 140° W latitude… Stratifying the data in this way reduced, to some degree, the otherwise likely bias towards the suite and magnitude of interactions in coastal waters and warmer waters surrounding the Hawaiian Islands." The EA notes that for this geography, from 2004-2014 a total of 20 black-footed and 11 Laysan albatross were caught in the DSLL and SSLL fisheries. For DSLL, capture rates were 0.002 birds-per-1000-hooks for black-footed albatross, and 0.00 for Laysan albatross. For SSLL, capture rates were 0.010 birds-per-1000 hooks for black-footed albatross, and 0.006 birds-per-hook for Laysan albatross.

This approach misrepresents the rate of bycatch likely to occur as well as the number of albatrosses likely to captured in the Project. Specifically, the approach of truncating the data to this area fails to include SSLL and DSLL incidental bycatch data from areas of where short-tailed and black-footed albatrosses are more likely to be encountered, As Figures 3 and 4 show, the area east of 140° W to the western border of the U.S. EEZ is of low use by black-footed albatross during the breeding season in particular. Figure 5 shows that black-footed albatross make long range chick provisioning trips from their colonies at the Hawaiian Islands to the U.S EEZ to exploit prey resources in the California Current upwelling system, particularly at the shelf break region (1000 m). Figure 7 shows that short-tailed albatrosses also make heavy use of this area in their non-breeding season. Figure 6 shows that Laysan albatross are the exception, most often being found seaward of 2000 m and south of 32°.[20] Albatrosses also have a tendency to follow fishing boats. In a directed study of this phenomenon, mean densities of black-footed albatross were 332 times higher near vessels longline fishing.[21] Clearly, the Project overlaps with important albatross foraging areas, in particular, the shelf break region (1000 m). The Project is also in proximity to highest use forage areas for albatrosses, which could increase the overlap of albatrosses and fishing vessels. These facts should be described in the EA.

The EA states that "based on the Hawaii interaction rates, three black-footed albatross and one Laysan albatross may be caught under Alternative 2." We disagree with this statement. These calculations are based on bycatch rates from the limited geography used by the EA, described above. When all rate-of-capture data for albatrosses from Hawaii SSLL and DSLL fisheries are aggregated (Table 2) for the years 2008-2016, for SSLL birds-per-1000-hooks ranges from 0.042 (2011) to 0.122 (first quarter of 2016) and for DSLL birds-per-1000-hooks ranges from 0.005 (2014) to 0.043 (first quarter of 2016). These catch rates, more accurately reflecting the inclusion of captures in areas where albatrosses occur at higher densities, are substantially higher than the rates for east of 140°W alone which are used in the EA as a proxy for expected bycatch levels for the Project. Using average 2008-2016 incidental bycatch rates of 0.0595 for SSLL and 0.0211 for

[17] EA at 3-44
[18] NOAA Fisheries. 2016. Hawaii longline deep set quarterly and annual status reports. http://www.fpir.noaa.gov/OBS/obs_hi_ll_ds_rprts.html
[19] NOAA Fisheries. 2016. Hawaii longline shallow set quarterly and annual status reports http://www.fpir.noaa.gov/OBS/obs_hi_ll_ss_rprts.html
[20] Guy, T. et al. 2013. Overlap of North Pacific albatrosses with the U.S. West Coast groundfish and shrimp fisheries. Fisheries Research 147 (2013) 222-234.
[21] Guy et al. 2013. Ibid.

DSLL, almost five (4.92) albatrosses would be caught. This is about 20% higher than the estimate of albatrosses anticipated to be caught provided by the EA. In a full scale fishery, this difference would have important ramifications.

Finally, the EA fails to note that the rate of capture of black-footed albatrosses in the Hawaii longline fishery has been increasing. Between the time periods 2008-2012 and 2013-2016 (first half), the capture rate increased from 0.006-0.008 birds per 2000 hooks, to 0.11-0.015 birds per 1000 hooks. This change needs to be noted and discussed in the final EA.

In sum, given the high use of the Project area and very high use of nearby shelf-break areas to the east (in the 50 mile zone excluded from the Project), the EA may be substantially underestimating the expected rate of albatross bycatch from these vessels. The EA must include all incidental bycatch data in its assessment of risk to protected species in the final EA and how this would translate to risk in a full scale longline fishery in the U.S. EEZ.

B. The EA fails to include short-tailed albatross as a species likely to be affected by the Project

According to NMFS (2015), "Bycatch of short-tailed albatrosses in commercial fisheries continues to be a major conservation concern.[22]" Yet, the EA fails to include a contingency plan should a short-tailed albatross be seen or captured in the fishery. The EA includes in its Terms and Conditions "compliance with seabird avoidance and protection measures pursuant to 50 CFR 660.712(c), and some of these measures pertain directly to short—tailed albatross." The EA's use of the area east of 140º W as the proxy for Project impacts may have led to short-tailed albatross not being included in the list of species likely to be affected by the Project. The EA also notes "it is not expected that short-tailed albatross would be taken by the EFP fishery based on seabird deterrents included in Alternative 2 and the lack of observed short-tailed interactions with either the Hawaii-based or the DGN fishery..."

This is an incorrect approach. Figure 7 shows the Project area overlaps with known post-breeding foraging areas for this federally endangered species. In fact, in 2011, a short-tailed albatross mortality was documented in the limited entry sablefish fishery off the Oregon coast. Other fisheries are subject to strict Incidental Take Limits for the species as implemented through Endangered Species Act consultation under Section 7. The final EA must include a risk analysis for capture of short-tailed albatross in the EFP and how such a capture would intersect with ESA consultation under Section 7 of the ESA.

Evaluation of fisheries bycatch on black-footed albatross

A. Published and in prep. Population Viability Assessment (PVA) analyses

Population Viability Assessment approaches with Potential Biological Removal parameters allow for the opportunity to evaluate the impacts of bycatch to the species. The Potential Biological Removal (PBR) is an estimate of human caused mortality a population can withstand while recovering towards or maintaining an optimal sustainable population. The PBR approach is mandated for stock assessments under the Marine Mammal Protection Act and has been employed extensively to assess bycatch mortality for sea turtles and well as land and seabirds including albatrosses.[23,24] Two recent such assessments evaluate the risk of fisheries bycatch to black-footed

[22]Good, T. et al. 2015. Observed and Estimated Bycatch of Short-tailed Albatross in U.S. West Coast Groundfish Fisheries 2010-2013 http://www.pcouncil.org/wp-content/uploads/2015/06/D4_Sup_Att5_Bycatch_Rpt_short-tailed-albatross_E-ONLY_JUN2015BB.pdf

[23] Zydelis, R., Bellebaum, J., Osterblom, H., Vetemaa, M., Schirmeister, B., Stipniece, A., Dagys, M., van Eerden, M., Garthe, S., 2009. Bycatch in gillnet fisheries - An overlooked threat to waterbird populations. Biological Conservation 142, 1269-1281.

[24] Dillingham, P.W., Fletcher, D., 2011. Potential biological removal of albatrosses and petrels with minimal demographic information. Biological Conservation 144, 1885-1894.

albatrosses. Both show a high sensitivity of the species to small changes in bycatch rate, and a test run of increased bycatch of black-footed albatross that would likely result from a new full scale SSLL and DSLL fishery is described below.

First, Arata et al. evaluated the status and trends of Laysan and black-footed albatross populations using linear regression, population viability analysis (PVA) and age-structured matrix models. This analysis found that the black-footed albatross population, summed across all three colonies, is stable, or slightly increasing, with a population growth rate of 0.03 percent per year. The report noted the presence of uncertainties in the model and emphasized the importance of continued information to improve the accuracy of future assessments. These uncertainties are reflected in the results, for example the PVA results for the black-footed albatross colony on French Frigate Shoals indicate that this colony has a 50-percent probability of increasing by 74 percent in the next 60 years, but it also has a 35-percent probability of significantly decreasing. In particular, the report noted that "there is no scientific observer program on the International pelagic longline fleet, thus preventing accurate estimates of total bycatch and hampering establishment of mitigation programs."

In addition to uncertainties about the rate of black-footed albatross bycatch in the international fleet, there are substantial uncertainties about the actual rate of bycatch in observed fisheries. Even where there is 100% observer coverage, such as in the U.S.-based longline fleets, bycatch estimates for seabirds are generally considered to be biased low.[25] For example, Arata et al. used a percentage of injured birds (20.9%) as a proxy to estimate birds that were caught but not hauled in. But two recent studies showed higher pre-haul loss rates of 50%[26] and 28% to 34%.[27]

The second assessment by a group of independent scientists, Bakker et al. 2015[28], re-evaluated the results of Arata et al. and also used a lower, albatross-specific PBR.[29] This group determined Arata et al. underestimated the PBR for both black-footed albatross and Laysan albatross by 2-fold as mentioned above. This analysis showed the traditional PBR was exceeded under a higher bycatch scenario, and, the more conservative, albatross-specific PBR was exceeded under both moderate and higher bycatch scenarios (Figure 1). The higher bycatch scenario showed a better model fit and thus appears to be closer to the actual black-footed albatross bycatch rate. The result was a slower population-wide mean growth rate of 0.018/year, compared with Arata et al.'s estimate of 0.03% per year.

[25] Lebreton, J.-D., Veran, S., 2013. Direct evidence of the impact of longline fishery on mortality in the Black-footed Albatross Phoebastria nigripes. Bird Conservation International 23, 25-35.
[26] Brothers, N., A. Duckworth, C. Safina, and E. Gilman. 2010. Seabird Bycatch in Pelagic Longline Fisheries Is Grossly Underestimated when Using Only Haul Data. Volume 5, Issue 8, e12491.

[27] Gilman, E., N. Brothers, D. Kobayashi. 2005. Principles and approaches to abate seabird bycatch in longline fisheries. *Fish and Fisheries* 6(1): 35-49.
[28] Bakker, V., M. Finkelstein, D. Doak, L. Young, E. VanerWerf,, Arata, J. and P.Sievert, 2016. The albatross of assessing and managing risk for wide-ranging long-lived species, In advanced draft for submission to Biological Conservation.
[29] Dillingham, P.W., Fletcher, D. 2011. Ibid.

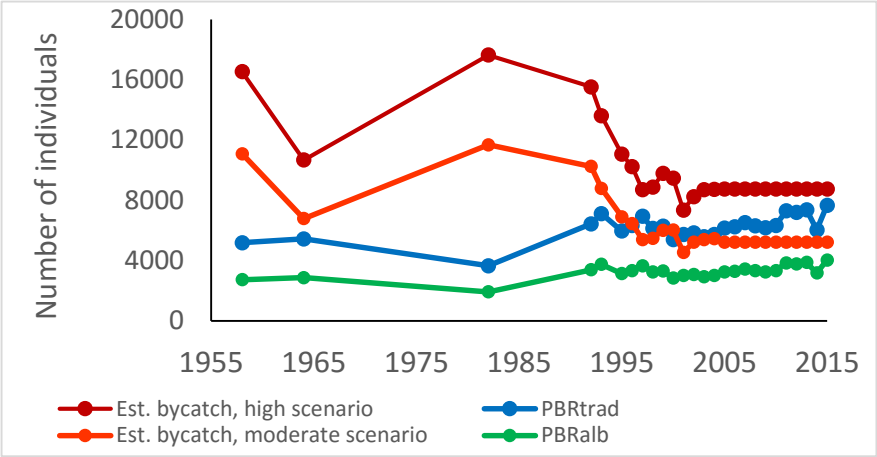

Figure 1. The predicted effects of bycatch of black-footed albatross. (a) Estimated bycatch compared to the Potential Biological Removal rate based on the traditional formula ($PBR_{trad,}$ Wade 1998), and an albatross-specific formula (PBRalb, Dillingham and Fletcher 2011). Adapted from Bakker and Finkelstein.[30]

Regardless of these differences, both models show high sensitivity to small changes in bycatch rate for black-footed albatross, indicate the black-footed albatross population growth is limited by current levels of fisheries bycatch, and thus point to the high importance of ensuring bycatch is held to negligible levels in commercial fisheries.

B. Population Viability Analysis modeled with new fleet effort

To better understand the potential population-level effect of a new west coast longline fishery on black-footed albatross, two of the Bakker et al. 2015 authors (Bakker & Finkelstein) modeled the effect of additional incidental bycatch at a rate of 248 black-footed albatross per year, beyond the most recent estimated incidental catch rates in the Hawaii fishery and other global fisheries from Arata et al. [31] 248 is slightly under the mean of 268 black footed albatross captured in the fishery from 2010 through the first half of 2016 (Table 1). The PVA simulation found the increase in bycatch mortality is 0.0007 which would result in a reduction of about 3.5% breeding pairs compared with no additional bycatch to the year 2036. This is likely an underestimate; these simulations assumed an equal probability of mortality for all post-hatch year birds while data suggest that a disproportionate number of adults (~>8 years old, ~90%) are killed as bycatch in the Hawaiian fishery. If post-breeding adults are indeed killed at higher rates than pre-breeders, the negative effect on black-footed albatross population growth from additional bycatch mortality would be greater. Further it is known that there is a mortality gender bias for the Hawaii fisheries which would also impact albatross population growth.[32]

[30] Bakker et al. Ibid. 2016.

[31] Bakker, V. and M. Finkelstein. 2016. Unpublished data.

[32] Beck, J. and M. Hester. 2016. Necropsy Findings from Seabird Bycatch in Hawai‘i and Alaska Longline Fisheries: Examinations conducted in 2015-16. Unpublished Report to NOAA Alaska Fisheries Science Center.

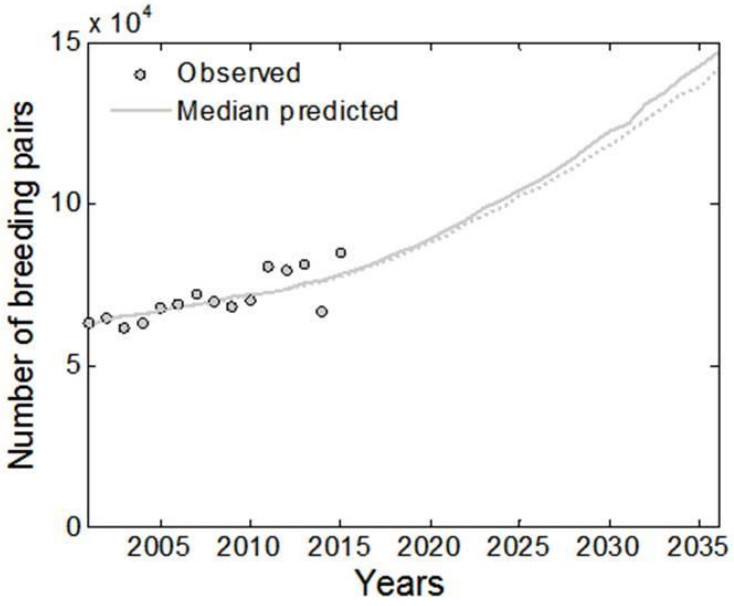

Figure 2. Black-footed albatross mean number of breeding pairs based on a stochastic population viability analysis (Bakker et al. in prep) with an added bycatch-related mortality of 248 post-hatch year birds. Mean based on 1000 simulations. The solid line assumes 2005 estimated high bycatch rates (Arata et al.) continue until the end of the simulation interval (2036) while the dotted line assumes that starting in 2016, 248 non hatch year birds are added to the 2015 bycatch rate and this continues to the end of the simulation interval (2036).

Conclusion

NMFS and other federal agencies, and U.S. fishing fleets, should be commended for strong, effective action to reduce seabird bycatch in U.S. and international waters over the past 15-20 years. The U.S. Fish and Wildlife Service, other U.S. agencies, and private funders have invested tens of millions of dollars in efforts to restore and protect seabird breeding islands and reduce incidental bycatch in fisheries.

In keeping with these successes, we urge NMFS to reject this EFP application due to inadequacies in the EA and the threat to albatrosses- especially short-tailed and black-footed - posed by longline fishing. The EA provides incomplete information on the degree of albatross bycatch that would be expected from the EFP Project and a full scale longline fishery in the U.S. EEZ. The EA also fails to note that the Project area overlaps with medium to high use by all three north Pacific albatrosses. Together, this provides a misleading picture of the impact of the Project and a full scale longline fishery in the U.S. EEZ. Black-footed albatross is classified as “vulnerable” by the IUCN due to a variety of threats including bycatch, sea level rise, changes to the prey base, and invasive species. While the vast majority of bycatch of this species is now the result of non-U.S. fleets, PVA modeling described herein shows that small changes to bycatch levels can have a measurable effect on the species. The EA also fails to include short-tailed albatross in the list of species likely to be affected by the Project.

In the future we encourage NMFS and partners to direct attention to further reducing albatross bycatch in longline fisheries, for example approaches to reduce mortalities in daytime haulback, where an estimated 75% of seabird mortalities now occur in the fishery.[33]

We thank you for the opportunity to comment. Please do not hesitate to contact us with any questions.

Sincerely,

Anna Weinstein
Marine Program Director

Year	Shallow Set	Deep Set	Total
2010	38	66	104
2011	19	73	92
2012	37	167	204
2013	28	257	285
2014	29	160	189
2015	41	535	576
2016	44	380	424
Mean			267.71429

Table 1. Number of black-footed albatrosses captured in Hawaii longline fisheries. Shallow set data is observed and deep set is estimated/extrapolated from ~20% observer coverage. Compiled from: NMFS. http://www.fpir.noaa.gov/OBS/obs_hi_ll_ds_rprts.html

Year	Shallow Set	Deep Set
2008	0.029	0.007
2009	0.063	0.006
2010	0.044	0.007
2011	0.042	0.006
2012	0.069	0.008
2013	0.076	0.011
2014	0.044	0.005
2015	0.067	0.015
2016	0.1015	0.1245
Mean	0.0595	0.021055556

Table 2. Rate of capture of black-footed albatrosses per 1000 hooks. Compiled from:: NMFS. http://www.fpir.noaa.gov/OBS/obs_hi_ll_ds_rprts.html

[33] Gilman E, Chaloupka M, Wiedoff B, Willson J (2014) Mitigating Seabird Bycatch during Hauling by Pelagic Longline Vessels. PLoS ONE 9(1): e84499.doi:10.1371/journal.pone.0084499

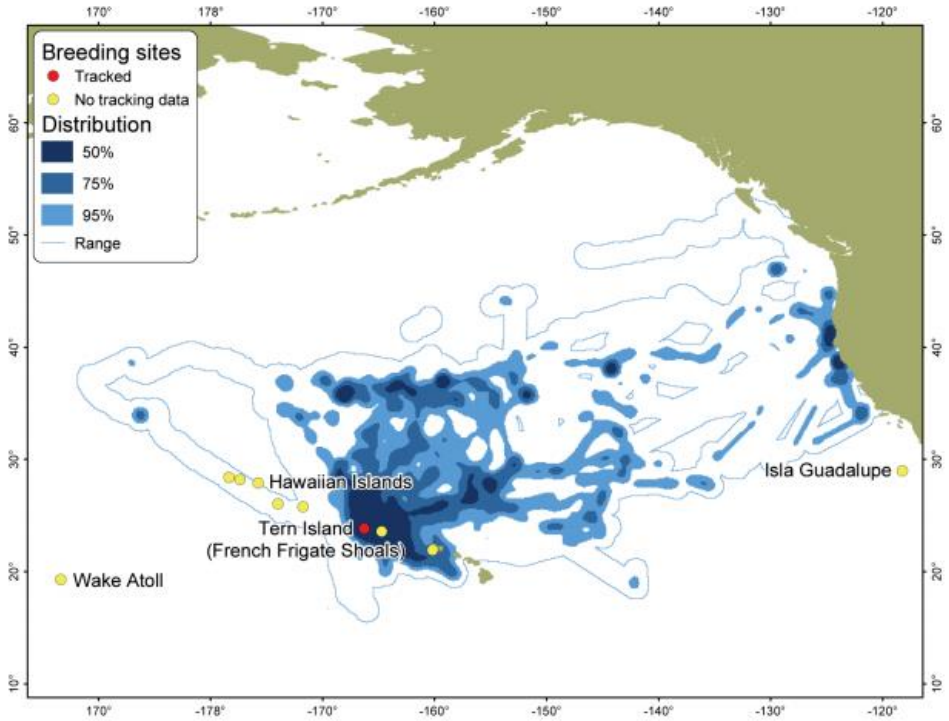

Figure 3. Satellite tracking of breeding adult black-footed albatrosses, fall/winter.[34]

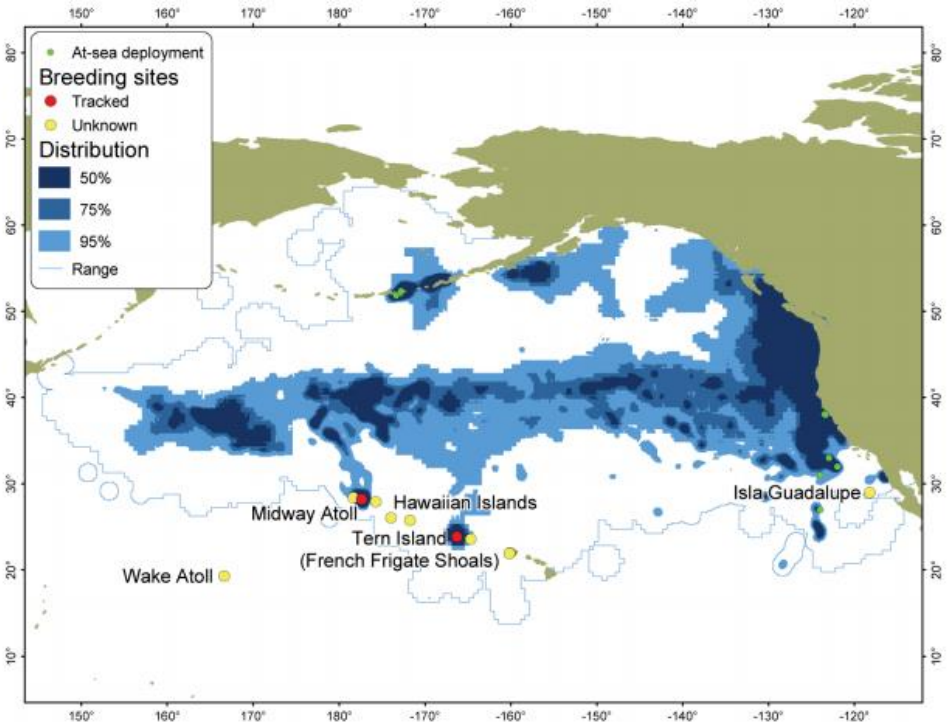

Figure 4. Satellite tracking of non-breeding adult black-footed albatrosses, spring/summer.[35]

[34] Agreement on the Conservation of Albatrosses and Petrels. 2015. Species Profiles: Black-footed albatross *(Phoebastria nigripes.)* http://www.acap.aq/en/resources/acap-species2/239-black-footed-albatross/file

[35] Agreement on the Conservation of Albatrosses and Petrels. 2015. Ibid.

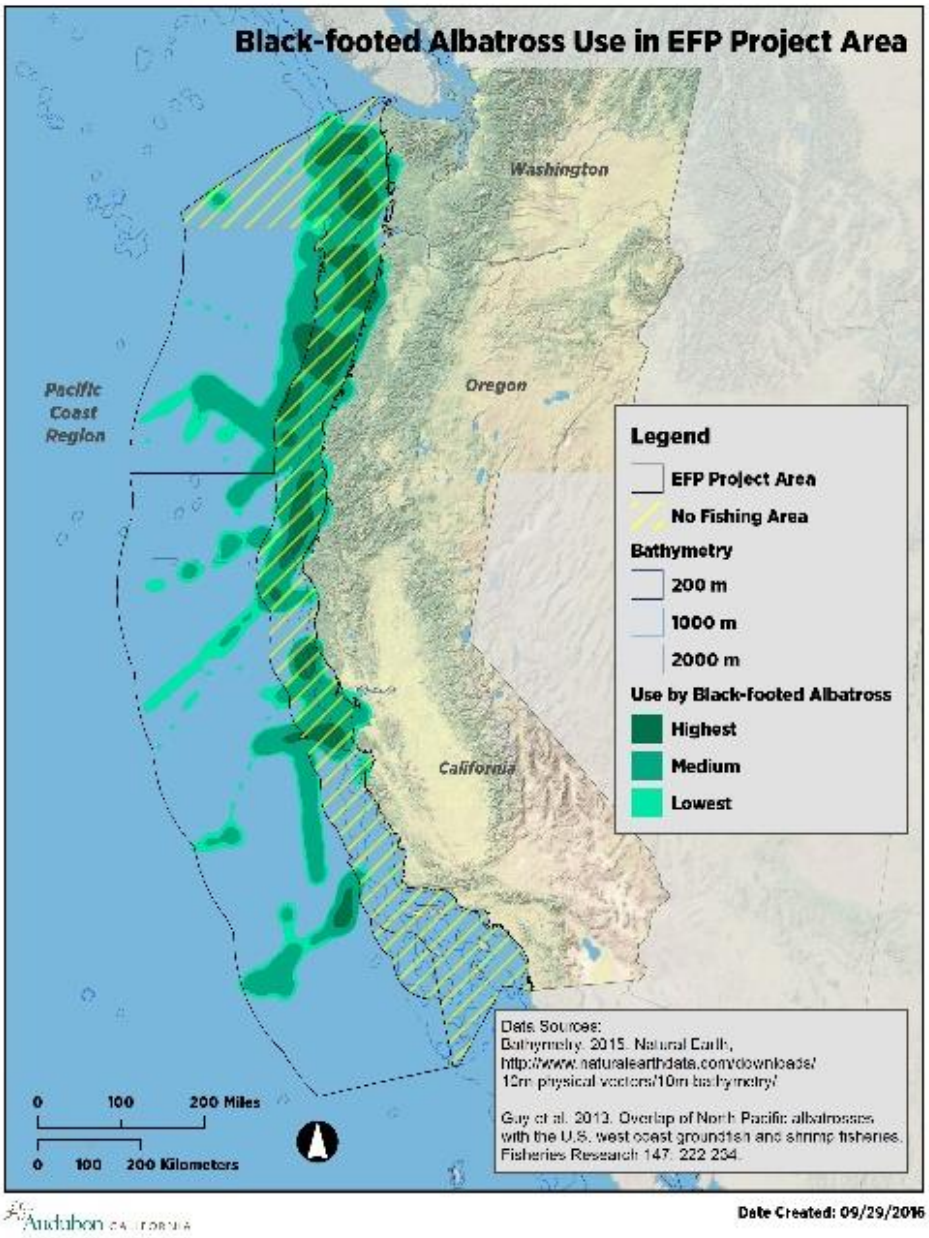

Figure 5. Black-footed albatross use of the EFP Project area.

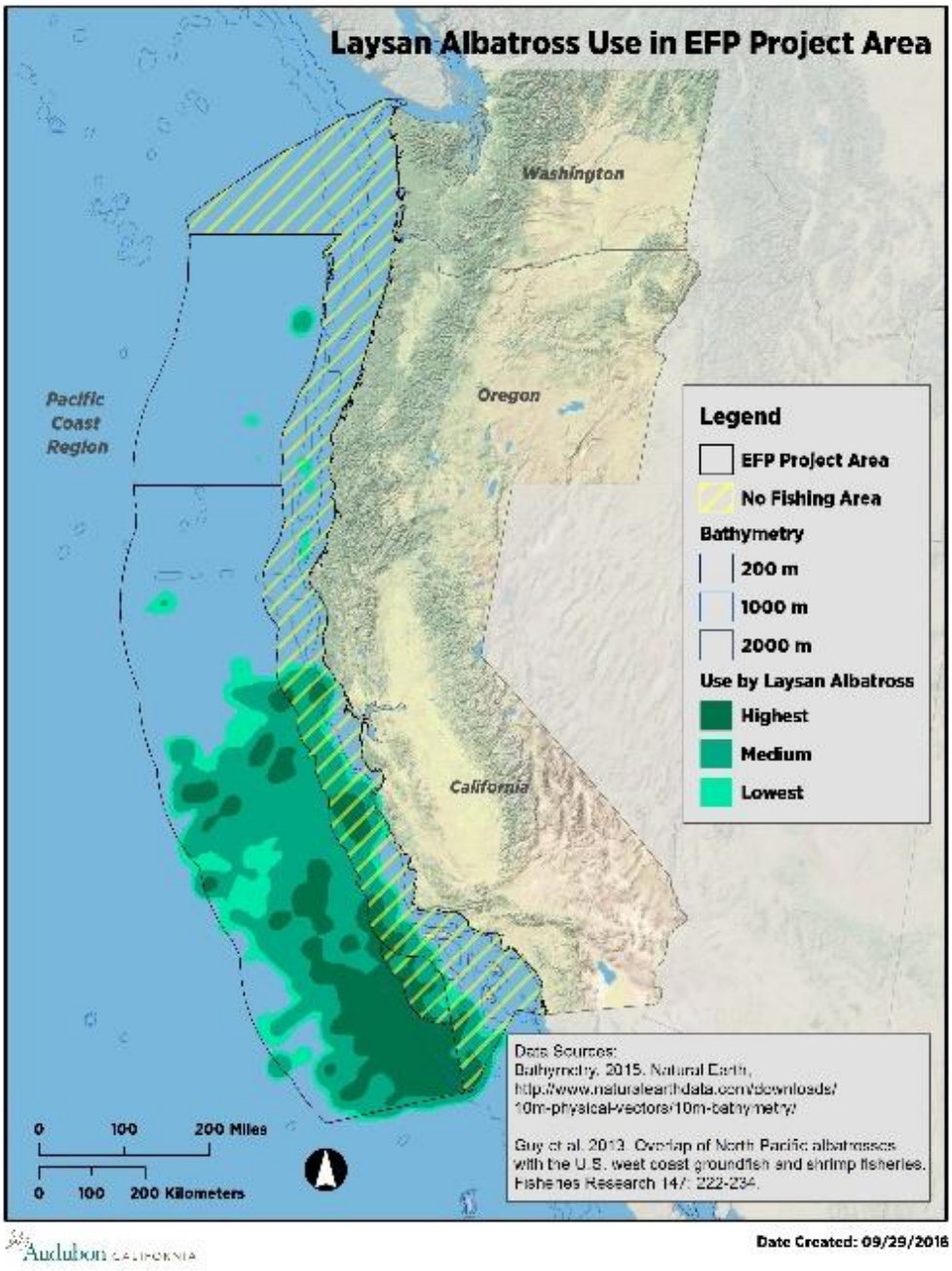

Figure 6. Laysan albatross use of the EFP Project area.

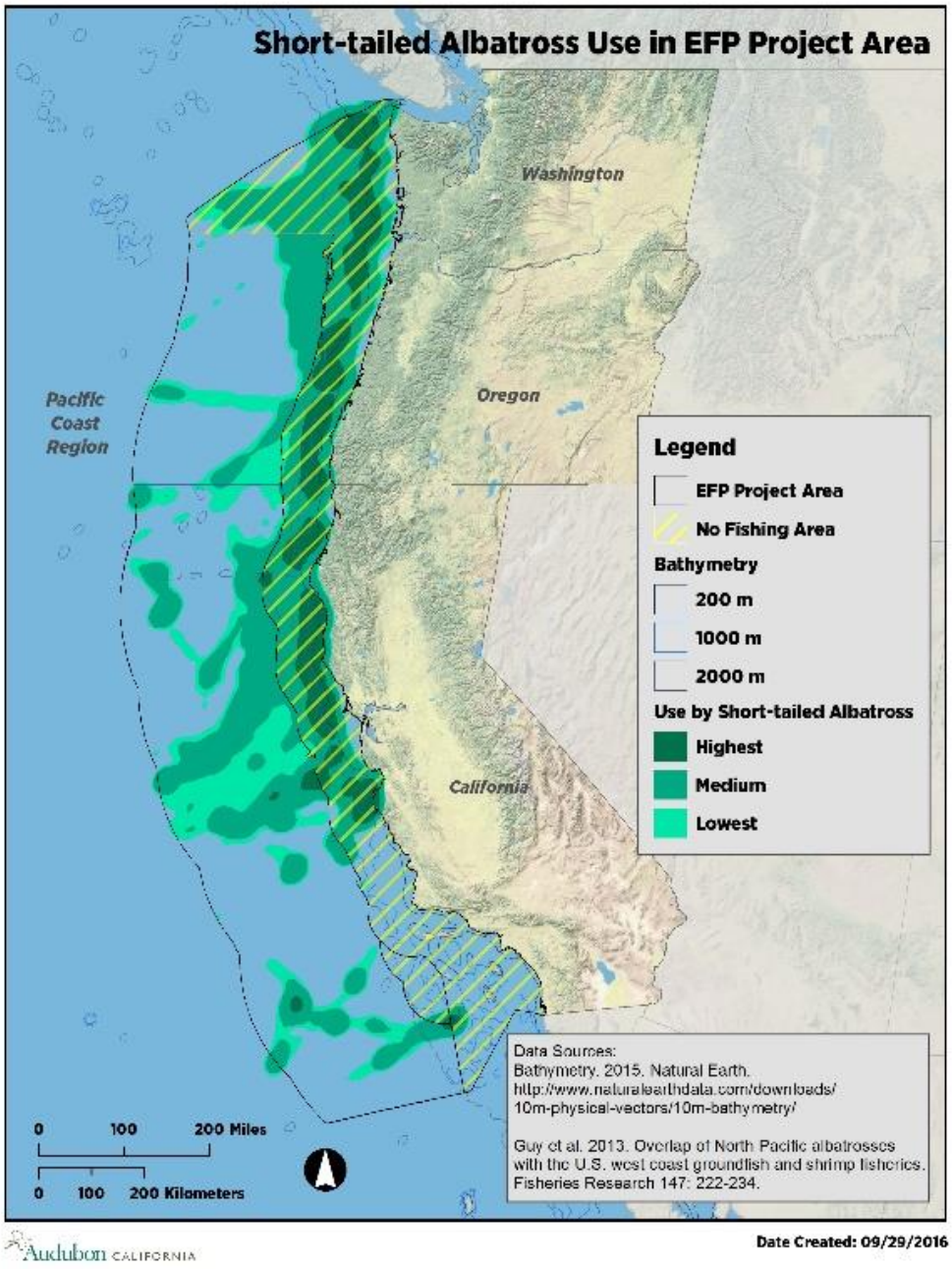

Figure 7. Short-tailed albatross use of the EFP Project area.

March 30, 2017

Mr. Herb Pollard, Chair
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, OR 97220-1384

Mr. Barry Thom
West Coast Regional Administrator
National Marine Fisheries Service West Coast Region
7600 Sand Point Way NE, Bldg. 1
Seattle, WA 98115-0070

RE: Agenda Item B.1: Open Comment Period – Opposition to Pelagic Longlines off the U.S. West Coast

Dear Mr. Pollard, Mr. Thom, and Council Members:

You have the shared privilege and responsibility to protect the ocean's most majestic wildlife. That responsibility includes ensuring ocean wildlife can safely swim Pacific Ocean waters without being killed in commercial fishing gear. We, the undersigned 24,494 residents of the United States (including 6,106 residents of California, Idaho, Oregon, and Washington), urge you to prevent the authorization of pelagic longline fishing gear off the U.S. Pacific Coast. Use of this gear would lead to the entanglement and death of sea turtles, dolphins, whales, sea birds, sharks and many other important ocean species.

Pelagic longlines used to catch swordfish, which can reach 60 miles in length and trail thousands of baited hooks, will inevitably ensnare and drown many other unsuspecting marine animals. Such a U.S. West Coast-based pelagic longline fishery, whether deep-set or shallow-set, has no place among the diversity of ocean life of the Northeast Pacific, particularly species already endangered with extinction.

Pacific leatherback sea turtles, for example, migrate 6,000 miles from their nesting beaches to feed in the productive waters off the U.S. West Coast. These sea turtles are so imperiled that federal scientists recently concluded that no more than one leatherback can be injured or killed every six years off the U.S. West Coast without delaying recovery. Introducing additional pelagic longlines in their migratory path threatens the very survival of these sea turtles. What is more, the Pacific Ocean off the U.S. West Coast includes highly important nursery grounds and breeding areas for many shark species, and pelagic longlines would decimate these ecologically important and vulnerable animals.

We ask the National Marine Fisheries Service to deny and cease consideration of Exempted Fishing Permits that would allow pelagic longlines inside the West Coast Exclusive Economic Zone (EEZ), and that the Pacific Council cease further consideration of authorizing any additional West Coast-based pelagic longline fishing inside or outside the West Coast EEZ. Clean fishing gears exist to selectively catch swordfish without injuring and killing other ocean

animals. Efforts should focus on expanding opportunities to meet demand for swordfish utilizing clean, sustainable fishing techniques like deep-set buoy gear, not authorizing or expanding a fishing method that is known to be destructive and will harm ocean wildlife.
Pelagic longlines have been banned inside West Coast waters since 1977 for a reason. The public has already clearly spoken. We do not want pelagic longlines off the U.S. Pacific coast.

Sincerely,
24,494 residents of the United States

For full list of signatories see:

http://www.pcouncil.org/wp-content/uploads/2017/03/B1b_Sup_PubCmt3_FullVersionElectricOnly_Oceana_Apr2017BB.pdf

878 F.3d 725
United States Court of Appeals, Ninth Circuit.

TURTLE ISLAND RESTORATION NETWORK; Center for Biological Diversity, Plaintiffs–Appellants,
v.
UNITED STATES DEPARTMENT OF COMMERCE; National Marine Fisheries Service; Wilbur L. Ross, in His Official Capacity as Secretary of Commerce; U.S. Department of the Interior; U.S. Fish & Wildlife Service; Ryan Zinke, in His Official Capacity as Secretary of the Interior, Defendants–Appellees,
and
Hawaii Longline Association, Intervenor–Defendant–Appellee.

No. 13-17123
|
Argued and Submitted June 14, 2016 Honolulu, Hawaii
|
Filed December 27, 2017

Synopsis
Background: Environmental groups brought action challenging decision of the National Marine Fisheries Service (NMFS) to allow a Hawai'i-based swordfish fishery to increase its fishing efforts, which could result in unintentional deaths of endangered sea turtles, alleging violations of Endangered Species Act (ESA) and Migratory Bird Treaty Act (MBTA), and challenging decision of the United States Fish and Wildlife Service (FWS) to issue a "special purpose" permit to the NMFS, which authorized the fishery to incidentally kill migratory birds. The United States District Court for the District of Hawai'i, Susan Oki Mollway, J., 2013 WL 4511314, entered summary judgment in agencies' favor. Environmental groups appealed.

Holdings: The Court of Appeals, Mary H. Murguia, Circuit Judge, held that:

FWS's decision to issue special purpose permit was arbitrary and capricious;

NMFS's biological opinion (BiOp) concluding that allowing fishery to increase fishing efforts would result in no jeopardy for **loggerhead sea turtles** was arbitrary and capricious;

NMFS's BiOp concluding that allowing fishery to increase its fishing effort would result in no jeopardy for leatherback sea turtles was supported by scientific record;

NMFS was entitled to rely on climate-based population assessment model in formulating BiOp; and

NMFS's determination that there was no available data from which it could credibly predict impacts of climate change was not arbitrary and capricious.

Affirmed in part; reversed in part.

Callahan, Circuit Judge, filed separate opinion dissenting in part.

Attorneys and Law Firms

***729** David L. Henkin (argued) and Paul H. Achitoff, Earthjustice, Honolulu, Hawaii, for Plaintiffs–Appellants.

Brian C. Toth (argued), Ellen J. Durkee, Dean K. Dunsmore, and Kristen L. Gustafson, Attorneys; Jeffrey H. Wood, Acting Assistant Attorney General; Environment & Natural Resources Division, United States Department of Justice, Washington, D.C.; Philip Kline, Office of the Solicitor, United States Department of the Interior, Portland, Oregon; Elena Onaga, Office of General Counsel, National Oceanic & Atmospheric Administration, United States Department of Commerce, Honolulu, Hawaii; for Defendants–Appellees.

Ryan P. Steen (argued) and Jeffrey W. Leppo, Stoel Rives LLP, Seattle, Washington, for Intervenor–Defendant–Appellee.

Appeal from the United States District Court for the District of Hawaii, Susan Oki Mollway, Chief District Judge, Presiding, D.C. No. 1:12-cv-00594-SOM-RLP

Before: Sidney R. Thomas, Chief Judge, and Consuelo M. Callahan and Mary H. Murguia, Circuit Judges.

Dissent by Judge Callahan

OPINION

MURGUIA, Circuit Judge:

***726** Plaintiffs Turtle Island Restoration Network and the Center for Biological Diversity challenge the decision of the National Marine Fisheries Service ("NMFS") to allow a Hawaii-based swordfish fishery to increase its fishing efforts, which may result in the unintentional deaths of endangered sea turtles. Plaintiffs also challenge the decision of the U.S. Fish and Wildlife Service ("FWS") to issue a "special purpose" permit to the NMFS, which authorizes the fishery to incidentally kill migratory birds.

Plaintiffs brought suit against the agencies under various environmental statutes that the NMFS and the FWS are charged with administering, including the Magnuson–Stevens Fishery Conservation and Management Act (the "Magnuson–Stevens Act"), the Endangered Species Act of 1973 ("ESA"), the Migratory Bird Treaty Act ("MBTA"), and the National Environmental Policy Act ("NEPA"). The Hawaii Longline Association subsequently intervened to represent the interests of the swordfish fishery in defense of the agencies' actions. We have jurisdiction under 28 U.S.C. § 1291, and we affirm in part, and reverse and remand in part.

BACKGROUND

I. Regulatory Framework

In response to concerns about overfishing, Congress enacted the Magnuson–Stevens ***730** Act to promote the long-term biological and economic sustainability of marine fisheries in U.S. federal waters. *See* 16 U.S.C. § 1801(b). Under this Act, the NMFS and eight regional councils develop "management plans" for the nation's fisheries, which the Secretary of Commerce may approve, partially approve, or reject. *Id.* §§ 1801(b)(4), 1852(h)(1), 1854(a)(3). The Magnuson–Stevens Act demands that a management plan be consistent with the national standards set out in the Act and "any other applicable law,"

id. § 1853(a)(1)(C), including the ESA, *id.* §§ 1531–43, and the MBTA, *id.* §§ 703–12.

The ESA provides for the conservation of fish, wildlife, and plant species that are at risk of extinction by requiring federal agencies to ensure that actions they authorize, fund, or carry out are "not likely to jeopardize the continued existence" of any ESA-listed species. 16 U.S.C. § 1536(a)(2). Agencies proposing actions that may affect an ESA-listed species must consult with either the NMFS or the FWS—depending on the species involved—which then reviews the proposed action and prepares a "biological opinion" ("BiOp") that evaluates whether and the extent to which the action may impact the species. *Id.* § 1536(b); 50 C.F.R. § 402.12. If the NMFS or the FWS finds that the proposed action would not jeopardize any species' continued existence, it issues a statement permitting the "taking" of a particular number of protected animals "if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity." 16 U.S.C. § 1539(a)(1)(B).

The FWS also has authority to enforce the MBTA, *id.* §§ 703–12; 50 C.F.R. § 10.1, which strictly prohibits the taking of any migratory bird the Act protects except under the terms of a valid permit issued by the Secretary of the Interior, *id.* § 703(a). The Secretary of the Interior has issued regulations authorizing various types of exemptions to the MBTA permitting the taking of migratory birds under certain circumstances. *See* 16 U.S.C. § 704(a).

In addition to the substantive mandates of the ESA and the MBTA, both the NMFS and the FWS are subject to NEPA's procedural requirements. *See Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 348, 109 S.Ct. 1835, 104 L.Ed.2d 351 (1989). NEPA is concerned with process alone and "merely prohibits uninformed—rather than unwise—agency action." *Id.* at 351, 109 S.Ct. 1835. NEPA requires federal agencies to prepare environmental impact statements ("EIS") detailing the effects of any proposed action that stands to have a significant impact on the environment. *See* 42 U.S.C. § 4332(C); *Robertson*, 490 U.S. at 350, 109 S.Ct. 1835. An agency may also prepare an environmental assessment ("EA") to determine whether an EIS is needed. 40 C.F.R. §§ 1501.4(b), 1508.9(a)(1); *Te–Moak Tribe of W. Shoshone of Nev. v. U.S. Dep't of Interior*, 608 F.3d 592, 599 (9th Cir. 2010). If the EA shows that the proposed action may significantly affect the environment, then the agency must prepare a full EIS. *W. Watersheds Project v. Abbey*, 719 F.3d 1035, 1050 (9th Cir. 2013). Otherwise, the agency issues a finding of no significant impact and the proposed action can proceed without further study. *Id.*

II. The Hawaii–Based Longline Fishing Industry

"Longline" fishing is a commercial fishing method that involves reeling out—or "setting"—a single, horizontal mainline to which shorter "branchlines" are attached at intervals. Each dangling branchline carries baited hooks. A typical longline set ***731** can use several hundred or thousand individual hooks, allowing a single fishing vessel to spread its efforts over a large area. While the mainline is in the water, the fishing equipment often ensnares birds, sea turtles, and other marine wildlife in addition to the target fish. This incidental taking of non-target animals is known as "bycatch."

The NMFS collects bycatch statistics by tracking the number of times a non-target animal is hooked or entangled by fishing gear. The most commonly observed non-target animal interactions are with Northern Pacific loggerhead and leatherback sea turtles, both of which are currently listed under the ESA as "endangered." *See* 50 C.F.R. § 17.11. In addition, several types of albatross interact often with the longline fisheries, including the black-footed albatross and the Laysan albatross.

There are two separately regulated longline fisheries based out of Hawaii: the deep-set fishery—which targets tuna—and the shallow-set fishery, which targets swordfish. The two fisheries are managed by the Fishery Ecosystem Plan for Pelagic Fisheries of the Western Pacific Region ("Pelagics FMP"), developed by the Western Pacific Fishery Management Council ("Council") in accordance with the Magnuson–Stevens Act and implemented by the NMFS. In 2001, the shallow-set fishery was closed by court order due to the NMFS's failure to prepare an EIS analyzing the impact of longline fishing on the sea turtle population, which the court found was a violation of the agency's NEPA obligations. *See Leatherback Sea Turtle v. Nat'l Marine Fisheries Serv.*, No. 99-00152, 1999 WL 33594329 (D. Haw. Oct. 18, 1999). In response, the NMFS issued an EIS and a BiOp in which the agency concluded that the shallow-set fishery was adversely affecting several species of sea turtles. In 2002, the NMFS issued regulations prohibiting all Hawaii-based swordfish longlining.

The Council subsequently developed various measures to minimize turtle bycatch, and in 2004 the NMFS reauthorized shallow-set longlining subject to new restrictions designed to reduce the number and severity of interactions between protected turtles and fishing gear. In part, the NMFS strictly limited the number of interactions the fishery could have with leatherback and **loggerhead sea turtles** to a maximum of 16 and 17, respectively, per fishing season. Further, the NMFS imposed an annual limit of 2,120 shallow sets, which represents fifty percent of the average number of sets deployed prior to the fishery's closure in 2001.

In 2008, the NMFS proposed an amendment to the Pelagics FMP ("Amendment 18") that would remove the 2,120 annual set limit, allowing gear deployments to increase to their pre-2001 maximums, and also increase the number of sea turtle interactions allowed each year. After consulting internally pursuant to the ESA, the NMFS produced a BiOp concluding that Amendment 18 would not jeopardize the sea turtles. The NMFS issued a final rule implementing Amendment 18 in December 2009. 74 Fed. Reg. 65,640 (Dec. 10, 2009).

Plaintiffs initiated suit against the NMFS on the grounds that the 2009 rule violated the ESA and the MBTA. *See Turtle Island Restoration Network v. U.S. Dep't of Commerce*, 834 F.Supp.2d 1004, 1007 (D. Haw. 2011). Plaintiffs' MBTA claim was based on the fishery's incidental take of migratory seabirds without an MBTA permit. The parties settled the case, and the NMFS entered into a consent decree that required it to withdraw its no jeopardy BiOp, reinstate the 2004 annual turtle-interaction caps, and issue a new BiOp after deciding whether to reclassify various population segments of sea turtles ***732** under the ESA. *Id.* at 1023–25. The other remaining provisions of the 2009 rule remained in effect, including the removal of annual set limits.

The NMFS later proposed raising the shallow-set fishery's annual turtle interaction cap to 26 (with leatherbacks), and 34 (with loggerheads) and otherwise continuing to operate the fishery in accordance with the provisions of Amendment 18 to the Pelagics FMP. In January 2012, the NMFS issued a new BiOp concluding that the shallow-set fishery would not jeopardize the continued existence of either the loggerhead or leatherback turtles if it operated under higher caps on turtle interactions.

While it was engaged in the re-consultation process, the NMFS submitted an application to the FWS for a special purpose permit that would allow the shallow-set fishery to take migratory seabirds in connection with swordfish longlining. The FWS issued a final EA in which it considered denying the permit, granting the permit as requested, and granting the permit while requiring the NMFS to conduct new research on additional ways to avoid seabird interactions. *See* 77 Fed. Reg. 1501 (Jan. 10, 2012). The FWS ultimately concluded that none of the alternatives would have a significant adverse impact on the seabirds' population levels. Accordingly, the FWS issued a finding of "no significant impact." In August 2012, the FWS granted a three-year special purpose permit authorizing the shallow-set fishery to kill a maximum of 191 black-footed albatross, 430 Laysan albatross, 30 northern fulmars, 30 sooty shearwaters, and one short-tailed albatross. Of those birds, only the short-tailed albatross is listed under the ESA, 50 C.F.R. § 17.11(h).

Plaintiffs subsequently filed this lawsuit under the ESA, the MBTA, and their implementing regulations, challenging the NMFS's final rule approving the continued operation of the shallow-set fishery and the FWS's issuance of a migratory bird permit to the NMFS. After the parties moved for summary judgment, the district court ruled in the agencies' favor on all of Plaintiffs' claims. Plaintiffs timely appealed.

STANDARD OF REVIEW

We review challenges to final agency action decided on summary judgment de novo and pursuant to Section 706 of the Administrative Procedure Act ("APA"). *Turtle Island Restoration Network v. Nat'l Marine Fisheries Serv.*, 340 F.3d 969, 973 (9th Cir. 2003). Review is based on the administrative record. *Camp v. Pitts*, 411 U.S. 138, 142, 93 S.Ct. 1241, 36 L.Ed.2d 106 (1973).

The APA requires courts to "hold unlawful and set aside agency action, findings, and conclusions found to be ... arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law," "in excess of statutory jurisdiction," or "without

observance of procedure required by law." 5 U.S.C. § 706(2)(A), (C)–(D). "The scope of review under the 'arbitrary and capricious' standard is narrow and a court is not to substitute its judgment for that of the agency." *Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 43, 103 S.Ct. 2856, 77 L.Ed.2d 443 (1983). Nevertheless, we require the agency to "examine the relevant data and articulate a satisfactory explanation for its action," and we will strike down agency action as "arbitrary and capricious if the agency has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency," or if the agency's decision "is so implausible ***733** that it could not be ascribed to a difference in view or the product of agency expertise." *Id.*

Separate from the APA, we also give deference to an agency's interpretation of the statutes and regulations that define the scope of its authority. *Chevron, U.S.A., Inc. v. Natural Resources Defense Council, Inc.* compels us to defer to an agency's reasonable interpretation of its enabling legislation. 467 U.S. 837, 843, 104 S.Ct. 2778, 81 L.Ed.2d 694 (1984). Under the *Chevron* analysis, we must first exhaust the traditional tools of statutory construction to determine whether Congress has "directly spoken to the precise question at issue." *Id.* at 842, 104 S.Ct. 2778. If we determine that the statute is silent or ambiguous on the question at hand, then at *Chevron* step two we must respect the agency's interpretation so long as it "is based on a permissible construction of the statute." *Id.* at 843, 104 S.Ct. 2778. A permissible construction is one that is not "arbitrary, capricious, or manifestly contrary to the statute." *Id.* at 844, 104 S.Ct. 2778; *see also Judulang v. Holder*, 565 U.S. 42, 132 S.Ct. 476, 483 n.7, 181 L.Ed.2d 449 (2011) (recognizing that *Chevron* step two is equivalent to the APA's arbitrary and capricious standard).

Chevron deference applies only to agency decisions rendered through formal procedures. *United States v. Mead Corp.*, 533 U.S. 218, 226–27, 121 S.Ct. 2164, 150 L.Ed.2d 292 (2001). However, under *Auer v. Robbins*, we must also defer to an agency's interpretation of its own ambiguous regulations, which controls unless "plainly erroneous or inconsistent with the regulation," or where there are grounds to believe that the interpretation "does not reflect the agency's fair and considered judgment of the matter in question." *Christopher v. SmithKline Beecham Corp.*, 567 U.S. 142, 132 S.Ct. 2156, 2159, 183 L.Ed.2d 153 (2012) (quoting *Auer v. Robbins*, 519 U.S. 452, 461–62, 117 S.Ct. 905, 137 L.Ed.2d 79 (1997)). Similarly, "we must ensure that the interpretation is not inconsistent with a congressional directive; a court need not accept an agency's interpretation of its own regulations if that interpretation is inconsistent with the statute under which the regulations were promulgated." *Marsh v. J. Alexander's LLC*, 869 F.3d 1108, 1116–17 (9th Cir. 2017) (internal changes, quotation marks and citations omitted). Our review of an agency's construction of a statute or regulation that does not qualify for either *Chevron* or *Auer* deference is de novo, although we may still accord the agency's opinion some weight. *Satterfield v. Simon & Schuster, Inc.*, 569 F.3d 946, 952–53 (9th Cir. 2009) (citing *Skidmore v. Swift & Co.*, 323 U.S. 134, 140, 65 S.Ct. 161, 89 L.Ed. 124 (1944)).

DISCUSSION

I. "Special Purpose" Permit

Plaintiffs argue that the FWS acted arbitrarily and capriciously by issuing a special purpose permit to the NMFS on behalf of a commercial operation—the shallow-set fishery—that provides no benefit to migratory birds. Plaintiffs specifically contend that, in issuing this permit, the FWS ignored or violated its obligations under the MBTA.

The MBTA is a strict liability criminal statute that Congress enacted for the "object and purpose ... to aid in the restoration of [game and other wild] birds." 16 U.S.C. § 701. The MBTA states in expansive language that, unless otherwise permitted by the Secretary of the Interior, "it shall be unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, [or] attempt to take, capture, or kill ... any migratory bird." 16 U.S.C. § 703(a). The MBTA also limits the ***734** FWS's authority to authorize the killing of migratory birds absent specified regulations "[s]ubject to the provisions and in order to

carry out the purposes of the conventions" underlying the Act. *Id.* § 704(a). The conventions underlying the MBTA stipulate that migratory birds may only be killed under "extraordinary conditions," where birds have "become seriously injurious to the agricultural or other interests in any particular community." *Humane Soc'y of the U.S. v. Glickman*, 217 F.3d 882, 885 (D.C. Cir. 2000) (internal quotation marks omitted).

Pursuant to the MBTA, the FWS has enacted a permitting program for narrow categories of migratory bird takings, such as scientific collecting, rehabilitation, hunting, and depredation control. *See* 16 U.S.C. §§ 704(a), 712(2) (empowering the FWS to promulgate implementing regulations); 50 C.F.R. §§ 21.21–21.61 (authorizing the issuance of various types of permits). The FWS has also established a "special purpose" permit that allows a person to "lawfully take ... migratory birds ... for any purpose not covered by the standard form permits" included elsewhere in the regulations. 50 C.F.R. § 21.27(a). The FWS may issue such a permit for "special purpose activities related to migratory birds," where the applicant "makes a sufficient showing" that the activity would be "of benefit to the migratory bird resource, important research reasons, reasons of human concern for individual birds, or other compelling justification." *Id.*

Here, the FWS interpreted § 21.27 as authorizing it to grant a special purpose permit sanctioning the incidental take of migratory birds to the NMFS, thereby allowing a commercial activity—longline fishing—that does not concern bird conservation. In its decision to issue the permit, the FWS found that the "commercial fishery carries no intrinsic benefit for migratory bird resources," "the take that occurs is neither directed by, nor is the result of, important research," and that "the take that occurs does not result from concern for individual birds." However, the FWS found that "compelling justification" existed to permit the continued operation of the shallow-set fishery, which the FWS believed "provides a net benefit to the Nation" economically and "serves as a benchmark internationally for employing effective seabird mitigation techniques and serves as an example of responsible conservation practices by a fishery." The FWS also noted that "[c]losure of this fishery would likely result in replaced effort by foreign longline fleets to supply swordfish demand, where use of bycatch mitigation methods would not likely follow international best practices."

We conclude that the FWS's decision to issue a special purpose permit to the NMFS on behalf of a commercial fishery was arbitrary and capricious. Although the FWS's interpretation of § 21.27 would ordinarily deserve deference, *see Mead*, 533 U.S. at 226–27, 121 S.Ct. 2164, we cannot conclude that such deference is appropriate in this case. Deference to the FWS's interpretation is not warranted because the plain language of this regulation is not reasonably susceptible to the FWS's new interpretation. The other "standard form permits" the MBTA regulations authorize govern discrete types of takings, such as scientific collecting, taxidermy, and rehabilitation, and although § 21.27 is intended to allow the FWS to authorize activities not otherwise permitted by the regulations, it is still a narrow exception to the MBTA's general prohibition on killing migratory birds. *See Marsh*, 869 F.3d at 1116–17 ("[W]e must always ensure that the interpretation is not inconsistent with a congressional directive ...."); ***735** *Ctr. for Biological Diversity v. Salazar*, 706 F.3d 1085, 1092 (9th Cir. 2013) ("[W]e must interpret [a] regulation as a whole, in light of the overall statutory and regulatory scheme ...." (internal quotation marks omitted)). The FWS's construction of § 21.27's "special purpose activit[y]" exception as applying to basic commercial activities like fishing that have no articulable "special purpose" is therefore inconsistent with the existing permitting scheme that the FWS has enacted. The FWS must read the "special purpose" provision in the context of the regulation's other requirements that, taken together, fail to turn § 21.27 into a general incidental take exception: the permit must "relate[ ] to migratory birds" and may issue only upon a "sufficient showing of ... [a] compelling justification." 50 C.F.R. § 21.27.

The FWS unpersuasively argues that the phrase "related to migratory birds" is not a restriction on its permitting authority, but merely a description of what can be permitted. The FWS specifically maintains that longline fishing is "related to migratory birds" because it incidentally interacts with them. Although nothing in the regulation requires that the permitted activity directly concern migratory birds, it nevertheless strains reason to say that every activity that risks killing migratory birds "relate[s] to" those birds. *See* 50 C.F.R. § 21.27. The FWS's approach to the regulation renders the majority of its text superfluous. *See Nat'l Ass'n of Home Builders v. Defs. of Wildlife*, 551 U.S. 644, 669, 127 S.Ct. 2518, 168 L.Ed.2d 467 (2007) (cautioning against reading an agency regulation in a way that renders part of it redundant).

The FWS's interpretation of § 21.27 as authorizing it to grant an incidental take permit to the NMFS does not conform to either the MBTA's conservation intent or the plain language of the regulation. We therefore conclude that the FWS's grant of a special purpose permit to the NMFS was arbitrary and capricious.[1]

II. 2012 "No Jeopardy" BiOp

Plaintiffs also argue that the NMFS violated the ESA by failing to properly assess the shallow-set fishery's impacts on endangered sea turtles. The ESA permits federal agencies to authorize actions that will result in the taking of endangered or threatened species only if the projected take "is not likely to jeopardize the continued existence of" any listed species. 16 U.S.C. § 1536(a)(2). "*Jeopardize the continued existence of* means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." 50 C.F.R. § 402.02 (emphasis added).

Where listed marine species are concerned, the NMFS prepares a BiOp evaluating the effects of the proposed action on the survival and recovery of the listed species. 16 U.S.C. § 1536(c). The agency specifically considers the proposed action's direct, indirect, and cumulative effects on a listed species in relation to the environmental baseline, and opines on whether the action is likely to jeopardize the species' survival. 50 C.F.R. § 402.14(g)(4); *see also Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv.*, 524 F.3d 917, 924 (9th Cir. 2008). Where a species is already in peril, an agency may not take an action that will cause an "active change of status" for the worse. *Nat'l Wildlife Fed'n*, 524 F.3d at 930.

***736** When formulating a BiOp, the NMFS must base its conclusions on evidence supported by "the best scientific and commercial data available." 16 U.S.C. § 1536(a)(2); 50 C.F.R. § 402.14(g)(8). This requirement "prohibits [an agency] from disregarding available scientific evidence that is in some way better than the evidence [it] relies on." *San Luis & Delta–Mendota Water Auth. v. Jewell*, 747 F.3d 581, 602 (9th Cir. 2014) (citation and internal quotation mark omitted). "The determination of what constitutes the '*best* scientific data available' belongs to the agency's 'special expertise' ...." *Id.* (emphasis in original) (citation omitted).

In 2012, the NMFS issued a BiOp concluding that the removal of the annual limit of 2,120 shallow-set lines in the fishery might result in the incidental "take" of Northern Pacific loggerhead and leatherback sea turtles, but would not jeopardize the continued existence of either species for the next 25 years. To establish the environmental baseline, the NMFS used existing studies on loggerhead and leatherback interactions with all Pacific longline fisheries (domestic and international) from 2000 to 2009. The NMFS ultimately found that the Hawaii-based shallow-set fishery is currently responsible for killing two to three loggerheads and leatherbacks (each) per year. The NMFS also determined that the impacts associated with anthropogenic climate change were likely beginning to affect both sea turtle species, but lacked sufficient data to quantify the threat that climate change posed to the turtles.

The NMFS then attempted to predict the impact that allowing the fishery to deploy 5,500 longline sets per year—the approximate maximum annual number of sets before the fishery was first closed out of concern for the sea turtle populations—would have on the loggerheads and leatherbacks. The NMFS ultimately projected that setting 5,500 lines would kill no more than one adult, female loggerhead turtle and four adult, female leatherback turtles. The NMFS then employed population viability assessment models to forecast the risk that killing small numbers of adult, female sea turtles would lead to the species' extinction. The NMFS concluded from the results that the proposed action could not reasonably be expected to appreciably reduce the likelihood of survival of either the loggerhead or the leatherback turtles.

The NMFS's "no jeopardy" conclusion was not affected by the agency's consideration of the cumulative effects of worsening climates. And, the NMFS's analysis of "spillover" trends suggested that the proposed increase in Hawaii-based swordfishing would benefit sea turtles overall. Because domestic fisheries operate under more stringent conservation measures than foreign fleets that compete to provide swordfish to U.S. consumers, the NMFS predicted that increasing domestic fishery yields would displace foreign fishing activities in the same area that the Hawaii-based shallow-set fishery operates, resulting in a net decrease in mortalities for the affected turtle species. However, because the NMFS concluded that the projected decrease in turtle deaths from this "spillover" effect was not precise enough to incorporate into its population assessment models, the NMFS did not incorporate these benefits into its no jeopardy finding.

A. Population Viability Assessment Models

Plaintiffs argue that the 2012 BiOp's conclusion that the proposed action would not appreciably impact loggerhead and leatherback sea turtles is unsupported by the scientific methods the FWS relied on. To project the impact of the shallow-set fishery's operations on the sea turtle species' ***737** likelihood of survival, the NMFS ran a climate-based population forecast model and relied primarily on the results of this model, "along with inputs from multiple experts and sources, where available." The climate-based model showed a significant decline in loggerhead numbers over the next generation even without the proposed action of removing the fishery's set limits: 99.5% of the tests showed the loggerhead falling below the quasi-extinction threshold within 25 years. When the model was run incorporating the anticipated mortality associated with the fishery's operations without set limits, the results were similar. The NMFS specifically found that "[v]irtually all the loggerhead climate model runs ... indicat[ed] high extinction risk with high model confidence." The additional loss to the loggerhead population from the proposed action ranged from 4 to 11%. As for the leatherback turtles, the climate-based model showed an increase in leatherback population over the next generation without a change in the fishery's set limits, and even with the proposed action the "extinction risk remain[ed] in the low category," although the results predicted a "measurable loss to the population" of 16 to 30%.

Based on the results from the model, the NMFS decided that it did not "believe that the small effect posed by the lethal takes in this fishery, when considered together with the environmental baseline and the cumulative effects, will be detectable or appreciable" and "that the additional risk to the [loggerhead turtles] that would result from loss of one adult female annually is considered negligible." Similarly, the NMFS concluded "that the proposed action would have a negligible impact on the risk to ... the western Pacific leatherback population as a whole." Therefore, the NMFS opined that increasing the maximum annual number of sets at the fishery would not jeopardize either species.

1. Loggerhead Turtles

With respect to the loggerhead turtles, the NMFS violated the APA's requirement that the agency articulate a rational connection between the population viability model upon which the NMFS relied and its no jeopardy conclusion. The BiOp acknowledged that the climate-based model predicted a decline in loggerhead populations to a level that "represents a heightened risk of extinction," but still upheld a finding of "no jeopardy" on the grounds that there was "little to no difference in the extinction risk when the annual removal of one adult female loggerhead resulting from the proposed action is considered in the model." We rejected similar logic in *National Wildlife Federation*, holding that "where baseline conditions already jeopardize a species, an agency may not take action that deepens the jeopardy by causing additional harm." 524 F.3d at 930 (noting that listed species' "slow slide into oblivion is one of the very ills the ESA seeks to prevent"). In *National Wildlife Federation*, the NMFS had prepared a BiOp in which it determined that hydropower dam operations would not jeopardize threatened and endangered salmon populations. *Id.* at 925. NMFS, however, had already determined that baseline environmental conditions posed a risk of jeopardy to the species. *Id.* Therefore, to reach a conclusion of "no jeopardy," the agency completely excluded from the environmental baseline all impacts from "nondiscretionary" federal activities such as operations relating to irrigation, flood control, and power generation. We held that this exclusion was improper and that baseline conditions must be factored into the jeopardy analysis, cumulatively with the entirety of agency actions. The relevant inquiry is therefore whether the "action effects, when added to the underlying baseline ***738** conditions," are such that they would cause jeopardy. *Id.* at 929.

Here, the NMFS improperly minimized the risk of bycatch to the loggerheads' survival by only comparing the effects of the fishery against the baseline conditions that have already contributed to the turtles' decline. The BiOp's no jeopardy opinion is premised on the proportionally low risk that the shallow-set fishery poses to the loggerheads relative to other threats, such as international fishing and climate change: the NMFS specifically found that although "any level of take and mortality can have an adverse effect on the overlying population ... the expected level of take from the action, including a small number of mortalities, is extremely small when considered together with all impacts considered in the Status of the Species, Baseline and Cumulative Effects sections, including other federally authorized fisheries and foreign fisheries." As in *National Wildlife Federation*, the agency reached an arbitrary conclusion by only comparing the prospective harm to the loggerheads that is

attributable to the proposed action—the death of a single adult, female loggerhead per year—to the much greater harm resulting from factors beyond the fishery. Based on this impermissible comparison, the agency concluded that the proposed action's adverse impacts would not appreciably reduce the loggerheads' likelihood of survival. *See Nat'l Wildlife Fed'n*, 524 F.3d at 930.

The NMFS relies heavily on the conservative nature of its calculations to support the difference between its conclusion and the climate-based model's results. The NMFS asserts that it rounded up its calculation of maximum adult female mortality, modeled the viability of turtle populations using the maximum potential number of annual interactions opposed to the average number of interactions reported in previous years, and estimated the number of sea turtle deaths based on the assumption that the shallow-set fishery would immediately operate at 5,500 sets each year. In reality, the increase in sets is expected to be gradual over many years. The ESA, however, requires agencies to rigorously ensure their actions will not "tip [the loggerhead] species from a state of precarious survival into a state of likely extinction." *See Nat'l Wildlife Fed'n*, 524 F.3d at 930. The agency may not reject the "best scientific data" in favor of its belief that "incidental take ... would be reduced to the best extent possible" and "the vast majority of the **loggerhead sea turtle** takes from the proposed action are expected to be non-lethal."

The NMFS also notes that the climate-based model used an assumed fraction of the current turtle population size (50%) as a proxy for extinction, and explains that "population decline below that" number "does not necessarily mean that" the species is "unrecoverable" or "functionally extinct." But, given the agency's endorsement of the climate-based model and its expert's decision to use a "quasi-extinction threshold" to reflect a decline in the turtle population to numbers insufficient to ensure the population's viability, this logic does not support the NMFS's determination that the projected population declines would not appreciably threaten the loggerheads' survival.

Another rationale presented in the BiOp is that "spillover effect is reasonably certain to contribute to a reduction in loggerhead mortalities ... due to reduced effort in foreign fisheries." Shortly thereafter, however, the NMFS noted that data on foreign fishery bycatch are "likely incomplete or inaccurate." The NMFS went on to state that "mortality reduction data associated with spillover effects are not as robust as those analyzed for the direct ***739** effects of the proposed action." For those reasons, the NMFS did not incorporate the estimated sea turtle mortalities that would be avoided due to a potential spillover effect into its population assessment models.

The NMFS's model showed the loggerhead species are on a path toward extinction, which accords with the fact that the NMFS recently raised the Pacific loggerhead's ESA listing from "threatened" to "endangered." The NMFS also found that "effects" to the loggerhead "are likely to occur as a result of worsening climate change," which the NMFS "expect[s] to continue and therefore may impact sea turtles and their habitats in the future." Rising levels of marine debris "could also increase entanglements." Even though the NMFS was unable to quantify the risks of climate change and its associated impacts, the agency recognized that they would be detrimental to the loggerheads.

The climate-based model predicted that the proposed action would exacerbate the loggerheads' decline, and the BiOp is structurally flawed to the extent the NMFS failed to incorporate those findings into its jeopardy analysis. *Nat'l Wildlife Fed'n*, 524 F.3d at 927. Because the NMFS has not articulated a rational connection between the best available science and its conclusion that the **loggerhead sea turtles** would not be affected by the increased fishing efforts, the agency's determination that the loggerhead "population will remain large enough to retain the potential for recovery" is arbitrary and capricious.

2. Leatherback Turtles

Plaintiffs also argue that the 2012 BiOp improperly concluded that the fishery would have no appreciable impact on the leatherback turtle population. Unlike its conclusion concerning the loggerheads, however, the NMFS's no jeopardy conclusion regarding the leatherback turtles finds support in the scientific record and, therefore, is sufficient to withstand judicial review.

Plaintiffs specifically argue that the NMFS erred in limiting the "temporal scale" of its analysis to 25 years, despite the fact that the fishery's operations have no related limitation and the NMFS determined that impacts on the sea turtles due to increasing temperatures "are expected to occur slowly over the next century." However, the NMFS was entitled to rely on the climate-based population assessment model, even though that model could only predict changes in the turtle population for 25 years. *See San Luis & Delta–Mendota Water Auth. v. Locke*, 776 F.3d 971, 997 (9th Cir. 2014) ("[T]he agency has substantial discretion to choose between available scientific models, provided that it explains its choice."); *The Lands Council v. McNair*, 537 F.3d 981, 988 (9th Cir. 2008) (explaining that the court may not "act as a panel of scientists that instructs the [agency] how to ... choose[ ] among scientific studies"), *overruled on other grounds by Winter v. Nat. Res. Def. Council, Inc.*, 555 U.S. 7, 129 S.Ct. 365, 172 L.Ed.2d 249 (2008). The constraints in the available data supply a reasonable justification for the NMFS to limit its analysis. Accordingly, we cannot conclude that the 2012 BiOp violated the ESA or that the NMFS otherwise acted arbitrarily and capriciously in determining that the fishery would have no appreciable effect on the leatherback turtle population.

B. Consideration of the Effects of Climate Change

Lastly, Plaintiffs argue that the 2012 BiOp failed to evaluate the impacts of global climate change. Plaintiffs specifically maintain that the NMFS acted arbitrarily by dismissing the effects of global ***740** warming on sea turtles as uncertain without further study.

In the 2012 BiOp, the NMFS explained that the effects from climate change on listed turtle species include rising sand temperatures and sea levels, beach erosion, increased storm activity, and changes in ocean temperature and chemistry. The BiOp also summarized studies anticipating that climate change will impact, among other traits and behaviors, turtle gender ratios, nesting habitat, and reproductive capacity. However, the NMFS determined that there was no available data from which it could credibly project the impacts that climate change would have on the loggerhead or leatherback turtle survival rates. With respect to the loggerhead turtles, the NMFS explained that "current scientific methods are not able to reliably predict the future magnitude of climate change and associated impacts or the adaptive capacity of this species." The NMFS also stated that "leatherbacks are probably already beginning to be affected by impacts associated with anthropogenic climate change in several ways," but noted that it did "not have information to predict what the population would do" or "what impact other climate-related changes may have such as increasing sand temperatures, sea level rise, and increased storm events." As the NMFS observed elsewhere in the BiOp, the effects of climate change will not be globally uniform, and the uncertainty of the rate, magnitude, and distribution of such effects on different temporal and spatial scales—not to mention the turtles' ability to adapt to these effects—have not been comprehensively studied. Consequently, the NMFS decided that climate change effects could not be "reliably quantified" nor "qualitatively described or predicted" by the agency at the time.

Here, we cannot conclude from the NMFS's lack of precision that it failed to adequately consider the effects of climate change on the sea turtles. On the whole, the BiOp demonstrated that the NMFS considered a variety of ways in which climate change may affect the sea turtles, but simply concluded that the data available was too indeterminate for the agency to evaluate the potential sea-turtle impacts with any certainty. *Cf. Greenpeace Action v. Franklin*, 14 F.3d 1324, 1326–27, 1336 (9th Cir. 1993) (holding that the agency's no jeopardy conclusion was not arbitrary because the BiOp at issue demonstrated that the agency had based its no jeopardy decision on the best available scientific data, even though the data was "uncertain"); *Stop H–3 Ass'n v. Dole*, 740 F.2d 1442, 1460 (9th Cir. 1984) (sustaining a BiOp that stated "we have very little data for providing an opinion, but feel it would be unreasonable to request [an additional] study which would be unlikely to provide definitive results.... Based on the available information, which we grant is weak, it is our opinion the proposed project is not likely to jeopardize the continued existence of the Oahu Creeper"). Plaintiffs have failed to sufficiently refute the NMFS's stated inability to offer more specific predictions on the effects of climate change, and they have not alleged that less speculative scientific information is available that the agency overlooked. *San Luis & Delta–Mendota*, 747 F.3d at 602 ("[W]here [superior] information is not readily available, we cannot insist on perfection: [T]he 'best scientific ... data available,' does not mean the best scientific data possible." (citation and internal quotation marks omitted)). Accordingly, the NMFS's consideration of climate change in the BiOp was neither arbitrary, capricious, nor contrary to the NMFS's

obligation to base its jeopardy decision on the best scientific data it could obtain. *See* 16 U.S.C. § 1536(a)(2).

***741 CONCLUSION**

We conclude that the FWS's grant of an incidental take permit to the NMFS in reliance on the "special purpose permit" provision in 50 C.F.R. § 21.27 was arbitrary and capricious because the FWS's interpretation of § 21.27 does not conform to either the MBTA's conservation intent or the plain language of the regulation. We therefore reverse the district court's grant of summary judgment affirming the FWS's decision to issue the permit.

We also conclude that NMFS's 2012 BiOp's no jeopardy finding as to the **loggerhead sea turtles** was arbitrary and capricious because the scientific data suggested that the loggerhead population would significantly decline, and the agency failed to sufficiently explain the discrepancy in its opinion and the record evidence. We therefore reverse the district court's grant of summary judgment upholding this portion of the BiOp. We otherwise affirm the district court's grant of summary judgment to Defendants.

AFFIRMED in part; REVERSED in part; and REMANDED. Each party shall bear its own costs on appeal.

CALLAHAN, Circuit Judge, dissenting in part:

I agree with the majority that the 2012 Biological Opinion ("BiOp") is not arbitrary and capricious in determining that the Hawaii-based shallow-set fishery expansion would have no appreciable effect on the leatherback sea turtle population, and that the 2012 BiOp adequately considers the impact of global climate change. However, I dissent from the remainder of the majority opinion.

First, the majority errs in rejecting the U.S. Fish and Wildlife Service's ("FWS") issuance of a special purpose permit (the "Permit") under the Migratory Bird Treaty Act ("MBTA") to the National Marine Fisheries Service ("NMFS") for the incidental take of migratory birds. The majority determines that issuing the Permit runs afoul of the pertinent regulation's plain language and the MBTA's conservation-oriented purpose. That conclusion, however, reflects a misapplication of our deferential standard of review under *Auer v. Robbins*, 519 U.S. 452, 117 S.Ct. 905, 137 L.Ed.2d 79 (1997), because both the regulation—50 C.F.R. § 21.27—and the MBTA itself accommodate FWS's view. *See Auer*, 519 U.S. at 461, 117 S.Ct. 905; *Marsh v. J. Alexander's LLC*, 869 F.3d 1108, 1116–17 (9th Cir. 2017). Moreover, the Permit accords with FWS's past practice, and thereby reflects its considered judgment—another basis for granting deference under *Auer*. *Christopher v. SmithKline*, 567 U.S. 142, 132 S.Ct. 2156, 2166, 183 L.Ed.2d 153 (2012).

Second, the majority errs in rejecting the 2012 BiOp's assessment of the proposed shallow-set fishery expansion's effects on the endangered **loggerhead sea turtle**. NMFS's BiOp concludes that the proposed action would not jeopardize the continued survival and recovery of the loggerhead, as is required to green-light the project under the Endangered Species Act ("ESA"). The majority dismisses the BiOp as arbitrary and capricious because, among other things, it concludes that the scientific evidence does not support NMFS's no-jeopardy conclusion, and it perceives a conflict with our case law. I disagree. While the record data shows that the loggerhead is in decline, NMFS reasonably concluded that the fishery expansion would not appreciably reduce the likelihood of the loggerhead's survival and recovery. Nor did NMFS misapply our decision in *National Wildlife Federation v. National Marine Fisheries Service*, 524 F.3d 917 (9th Cir. 2008) *("NWF")*: it considered the incremental impact of the proposed ***742** action along with degraded baseline conditions. That is precisely what *NWF* requires.

The majority's contrary conclusion is a classic example of the judiciary exceeding its authority by substituting an agency's

judgments with its own. This complex case relies on the technical and scientific findings of experts tasked with the responsibility of protecting our Nation's species-in-peril. It is in this context that our respect for a coordinate branch of government is at its zenith. Indeed, we are " 'at our most deferential' when reviewing scientific judgments and technical analyses within the agency's expertise," *Lands Council v. McNair*, 629 F.3d 1070, 1074 (9th Cir. 2010) (quoting *Balt. Gas & Elec. Co. v. Natural Res. Def. Council*, 462 U.S. 87, 103, 103 S.Ct. 2246, 76 L.Ed.2d 437 (1983)) (adjustment omitted) *("Lands Council II")*, and should only reject an agency's action if it is plainly arbitrary and capricious, *see Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 42–43, 103 S.Ct. 2856, 77 L.Ed.2d 443 (1983). Yet instead of anchoring its analysis in well-established principles of agency deference, the majority sets sail on a voyage of discovery, leaving in its wake our precedent and the doctrinal moorings of *Auer v. Robbins*. I dissent, respectfully.

I.

A.

Under *Auer v. Robbins*, we must defer to an agency's reasonable interpretation of its own regulation. *See Christopher*, 132 S.Ct. at 2166. Deference is not warranted, however, "when the agency's interpretation is plainly erroneous or inconsistent with the regulation," or when it does not reflect the agency's "considered judgment." *Id.* (internal quotation marks omitted). A lack of "considered judgment" may be evidenced by (i) an "agency[ ] interpretation [that] conflicts with a prior interpretation," (ii) "when it appears that the interpretation is nothing more than a convenient litigating position," or (iii) when the interpretation amounts to a "*post hoc* rationalization advanced by an agency seeking to defend past agency action against attack." *Id.* (internal quotation marks and adjustment omitted).[1]

At issue is FWS's issuance of a special purpose permit allowing NMFS to authorize incidental take of migratory birds that are protected under the MBTA. 50 C.F.R. § 21.27 authorizes FWS to issue permits for the take of migratory birds protected ***743** under the MBTA in certain circumstances. In full, the regulation provides that

> [p]ermits may be issued for special purpose activities related to migratory birds, their parts, nests, or eggs, which are otherwise outside the scope of the standard form permits of this part. A special purpose permit for migratory bird related activities not otherwise provided for in this part may be issued to an applicant who submits a written application containing the general information and certification required by part 13 and makes a sufficient showing of benefit to the migratory bird resource, important research reasons, reasons of human concern for individual birds, or other compelling justification.

50 C.F.R. § 21.27. The majority declines to defer to FWS's issuance of the Permit because it finds that FWS's action is plainly contrary to § 21.27 and the MBTA and is therefore ultra vires. Because I conclude that issuing the Permit does not depart from FWS's past practice, is not inconsistent with § 21.27's text, and comports with the MBTA's conservation-oriented purpose, I would defer to FWS's determination.

1.

Appellants Center for Biological Diversity, et al. ("CBD") argue that FWS's Permit should not be accorded *Auer* deference because, CBD asserts, it does not align with FWS's past practice.

To determine whether an agency has departed from past practice, the first step is—manifestly—to define the practice. *Christopher*, 132 S.Ct. at 2167–68. A practice is a policy or mode of operating that is defined by articulable parameters; simply showing that a current action differs from a prior one in some way does not establish a departure from past *practice*. *Cf. FCC v. Fox Television Stations, Inc.*, 556 U.S. 502, 538, 129 S.Ct. 1800, 173 L.Ed.2d 738 (2009) (agency departed from past practice by deeming broadcasts of non-literal uses of expletives as actionable only upon repetition); *Dillmon v. Nat'l Transp. Safety Bd.*, 588 F.3d 1085, 1090–91 (D.C. Cir. 2009) (agency departed from past practice of deferring to an ALJ's credibility determinations).

CBD argues that by issuing the Permit, FWS has changed course from its prior position that it lacks authority to grant permits to allow unintentional bird taking—i.e., incidental taking—for an activity that is not directed at migratory birds. The majority does not base its decision on this rationale and for good reason: FWS has long-issued incidental take permits for all manner of activities whose only relationship to migratory birds is that they affect the birds. For example, since at least 1996, FWS has authorized incidental take of migratory birds for commercial activities through Endangered Species Act ("ESA") Habitat Conservation Plans ("HCPs").[2] A benefit of entering into an HCP is that it comes with an ESA § 10 incidental take permit. *See* 16 U.S.C. § 1539(a)(1)(B), (a)(2). That permit "double[s]" as a § 21.27 special purpose permit under the MBTA. *See* Dep't of Commerce, *Habitat Conservation Plan Assurances ("No Surprises") Rule*, 63 Fed. Reg. 8859, 8862–63 (Feb. 23, 1998). Critically, the take that occurs results from activities that are unrelated to ***744** migratory birds—e.g., natural gas drilling, homebuilding, and myriad other types of land development—except that they result in incidental bird deaths—the very ill that CBD insists infects the Permit at issue here.

FWS has also issued incidental take permits for bald and golden eagles—which are migratory birds—for activities that, too, are not directed at migratory birds. *See* 50 C.F.R. §§ 22.11; 22.26. And in 1998, FWS issued a special purpose permit allowing the incidental take of migratory raptors by a wind farm due to collisions and electrocutions. *See* FWS Region 6, Fed. Fish & Wildlife Permit No. PRT–808690 (1998). In short, CBD's categorical assertion that "FWS has always understood [§] 21.27 does *not* authorize incidental take as the Permit allows" is plainly wrong.

Identifying one error in CBD's consistency-with-past-practice argument reveals another. CBD asserts that, "until [FWS] issued to NMFS the permit at issue exempting commercial longline fishing from the MBTA's take prohibition, the *only* Special Use Permits FWS had ever issued authorizing incidental take of non-endangered migratory birds were specifically intended to *promote migratory bird conservation* ...." If CBD means to say that past permits were always associated with activities that had as their *purpose* bird conservation, then the preceding paragraph refutes this contention. But if CBD means something more capacious—i.e., that such activities must incorporate bird conservation strategies—then the Permit addresses this concern. NMFS regulates the Hawaii-based shallow-set longline fishery under a program that is expressly geared at reducing seabird bycatch. *See* 50 C.F.R. § 665.815(a)(1), (2), (4). Indeed, since the program took effect in 2004, incidental take of seabirds by the fishery has plunged nearly 90 percent. Thus, whatever CBD means by activities that "*promote migratory bird conservation*," FWS's issuance of the Permit is consistent with the agency's historical practice of tying incidental take permits to conservation measures. If there is a past practice to be discerned, that is it.[3]

2.

CBD insists that FWS's past statements belie the agency's assertion that the Permit accords with historical practice. CBD points to a 2009 regulation governing take under the Bald and Golden Eagle Protection Act ("BGEPA"). *See* Dep't of the Interior, *Eagle Permits; Take Necessary to Protect Interests in Particular Localities*, 74 Fed. Reg. 46,836, 46,862 (Sept. 11,

2009). BGEPA allows for the take of bald and golden eagles—which species also fall under the purview of the MBTA—pursuant to an MBTA permit. 50 C.F.R. § 22.11; *see* 50 C.F.R. § 22.26. In response to a public comment, the regulation's preamble notes that "[n]o permit is currently available to authorize incidental take under the MBTA." 74 Fed. Reg. at 46,862. CBD ***745** seizes on this language as evidence that the Permit is unlawful.

CBD's argument proves too much. If the cited statement means that FWS does not issue incidental take permits for migratory birds as a categorical rule, then *all* other instances of such permits would be unlawful. Yet CBD spills pages of ink distinguishing the Permit here from other take permits granted under the aegis of § 21.27, without suggesting that those permits are similarly unlawful. Moreover, under CBD's interpretation, the cited statement is irreconcilable with FWS's other pronouncements permitting take for, e.g., migratory birds that are also ESA-listed species. *See* 2016 HCP Handbook at 16–9. *Cf. Boise Cascade Corp. v. EPA*, 942 F.2d 1427, 1432 (9th Cir. 1991) (where possible, courts avoid statutory interpretations that result in inconsistencies).

A more natural reading of FWS's statements—and one that comports with FWS's past practice—is that the agency recognizes that the MBTA lacks a programmatic framework for issuing incidental take permits. To be sure, a comprehensive regulation governing incidental take would be preferable. It could set forth uniform criteria for issuing permits, thereby offering predictability for the regulated and environmental communities.[4] But the fact that there exists a better way to authorize incidental take does not mean that it is the *only* lawful way of doing so. Neither the majority nor CBD provides a persuasive explanation for why § 21.27 does not support case-by-case issuance of permits authorizing incidental take.[5]

Undeterred, CBD takes aim at yet another non-MBTA regulation. This one—the so-called "No Surprises Rule"—implements the HCP provision of the ESA. *See* 63 Fed. Reg. at 8862–63. The rule explains that an ESA § 10 incidental take permit, issued in conjunction with an HCP, may "double" as a special purpose permit under the MBTA for ESA-listed species. FWS explains that issuing an ESA § 10 permit in lieu of an MBTA § 21.27 special purpose permit is appropriate because the ESA is more species-protective than the MBTA. *Id.* For example, HCPs require an "operating conservation program designed to conserve the species and minimize and mitigate the impacts of take of the listed species of migratory birds to the maximum extent practicable." *Id.* at 8863. CBD extracts from this statement the conclusion that special purpose permits may not be used to cover incidental take of non-ESA-listed species because such species will not enjoy the superior protections of the ESA.

***746** CBD's reasoning founders on a logical fallacy. The No Surprises Rule provides that, because an ESA take permit comes with greater protections than an MBTA permit, a party need not *also* apply for an MBTA permit: the latter is subsumed under the former. *See id.* at 8862–63. But that does not mean that ESA-level protections are *necessary* to authorize take under the MBTA. Put another way, the No Surprises Rule says nothing about whether it is appropriate to issue a special purpose permit for incidental take under the MBTA for non-ESA-listed species.[6]

By analogy, consider a hypothetical state's labeling requirements for perishable foodstuffs. The default regulation for all perishable foods requires the use-by date to be no more than thirty days from the sell-by date. But certain perishable foods are on a "highly perishable" list, and are subject to stricter regulations requiring the affixed use-by date to be no more than a week from the sell-by date. Now consider a particular perishable food that is not subject to the stricter regulations because it is not on the applicable list. Does this mean it is not governed by the laxer default rule? Not at all. Yet that is CBD's logic here: that because the ESA's heightened protections apply to some migratory birds, other non-ESA birds are not subject to the MBTA's take provision. In fact, nothing about FWS's incidental take policy toward ESA-listed migratory birds forecloses the agency from issuing incidental take permits for non-ESA-listed migratory birds.

B.

While FWS's issuance of the shallow-set fishery incidental take permit reflects its considered judgment and is consistent with its past practice, we may still be compelled to withhold deference if its interpretation of § 21.27 is "plainly erroneous or

inconsistent with the regulation." *Christopher*, 132 S.Ct. at 2166 (internal quotation marks omitted). The majority relies on this rationale in concluding that we should not afford FWS's action *Auer* deference, but its reasoning is based on flawed logic and a misinterpretation of the MBTA.

1.

The majority claims that the "special purpose activit[y]" exception to the general ban on permitting take does not apply here because fishing lacks an "articulable special purpose." What qualifies a purpose as "special"? The majority never quite answers this question, except to obliquely note that "special purpose" must be read "in the context of the regulation's other requirements ...." Those requirements are, according to the majority, that the activity authorized by the permit "relate[ ] to migratory birds," be paired with a "compelling justification," and have a conservation purpose.[7] But the majority never ***747** explains what it means to "relate[ ] to migratory birds," except to posit a proposition in the negative—namely, that not all activities that risk killing migratory birds "relate[ ] to those birds." Landowners, environmental practitioners, and FWS will be hard-pressed to decipher this delphic explanation. Do some activities that do not have as their purpose the conservation of migratory birds "relate to those birds"? Which ones? And how do we know?

The *Auer* inquiry is more straightforward. We consider the agency's interpretation relative to the regulation and the governing statute. *Marsh*, 869 F.3d at 1116–17. We must assure ourselves that the agency has fairly construed its own regulation, while also keeping one eye trained on Congress' intent. *Id.* To that end, " '[we] need not accept an agency's interpretation of its own regulations if that interpretation is ... inconsistent with the statute under which the regulations were promulgated.' " *Id.* at 1117 (quoting *Mines v. Sullivan*, 981 F.2d 1068, 1070 (9th Cir. 1992)).

My analysis proceeds as follows: I disaggregate § 21.27 into its relevant textual parts, consider each part against the regulation's broader structure and context, and then assess FWS's interpretation against the MBTA.

• ***"Permits may be issued for* special purpose activities ... *which are otherwise outside the scope of the standard form permits of this part."*** The regulation does not define "special purpose activit[y]." It is also a regulatory term of art that is not susceptible to interpretation by reference to dictionary definitions.

Deploying a wider net, we expand our analysis to the regulation's structure and context. The latter part of the sentence is instructive. It indicates that a "special purpose activit[y]" is one that is not covered by an expressly identified permitting scheme. Contrary to CBD's assertion, nothing in the context of the regulation indicates that to be "special" an activity's purpose must be *directed at* migratory birds.[8] *See Klem*, 208 F.3d at 1092.

• ***Special purpose permits must be* "related to *migratory birds ....*"** The term "relate" has several dictionary definitions (an inauspicious start for the majority), including, as is pertinent here: "[t]o refer to," "[t]o have reference to," "[t]o have some connection with; to stand in relation to," or "[t]o connect, to link; to establish a relation between." Oxford English Dictionary (3d ed. 2009) (goo.gl/grzBqC) (last accessed Dec. 8, 2017). Whether the first two definitions could flex to embrace an activity whose purpose is not *directed at* migratory birds is debatable. But we need not parse those definitions because the last two plainly do: an activity like commercial fishing indisputably has "some connection with" migratory birds.

• ***An applicant for a special purpose permit must "make[ ] a sufficient showing of benefit to the migratory bird resource, important research reasons, reasons of human concern for individual birds, or* other compelling *748 justification."** FWS invoked the "other compelling justification" category as the regulatory hook for issuing the Permit. FWS discerned a "compelling justification" in its determination that the Permit would "provide a[n economic] net benefit to the Nation" and would "serve[ ] as a benchmark internationally for employing effective seabird mitigation techniques and serves as an example of responsible conservation practices by a fishery."

The majority concludes that FWS's rationale is inadequate, observing that FWS fails to "read the 'special purpose' provision

in the context of the regulation's other requirements that, taken together, fail to turn § 21.27 into a general incidental take exception."[9] The problem for CBD and the majority, however, is that nothing in § 21.27 suggests—let alone requires—that all special purpose activities must have as their objective migratory bird conservation to satisfy the "compelling justification" standard. In fact, § 21.27's text reveals just the opposite. The first eligible category is for activities that provide a "benefit to the migratory bird resource." Thus, *one* type of permit is for an activity that is directed at bird conservation. But another listed category—"important research reasons"—includes not even a gloss of conservation intent. Nor does anything in § 21.27 indicate that a characteristic of the first stand-alone category—"benefit to the migratory bird resource"—modifies all those that follow. Rather, the most natural reading is that special purpose permits are appropriate for activities that are *either* directed at bird conservation *or* at other activities that may or may not have a conservation purpose—e.g., scientific research.

Lest there be any doubt, the immediately following subsection makes clear that permits may be issued for non-conservation-related purposes. Section 21.27(a) describes the criteria for issuing a special purpose permit. *See* 50 C.F.R. § 21.27(a). It explains that such a permit "is required before any person may sell, purchase, or barter captive-bred, migratory game birds ...." *Id.* Nothing in this subsection suggests that selling, purchasing, or bartering birds serves the purpose of *conserving* those birds. Nor do those terms have an inherent conservation-oriented meaning—quite the opposite.[10]

In sum, the catch-all category "other compelling justification" is not limited to activities whose purpose is conserving migratory birds. And the majority provides no other limiting condition, except to warn against transforming § 21.27 into a "general incidental take exception." But no party argues that § 21.27 grants FWS a roving license to permit incidental take whenever it chooses. The question is, instead: where the agency's interpretation is not irreconcilable with the regulation's text and reflects the agency's "considered judgment" (i.e., it is consistent with past practice), who gets to decide, the courts or the agency? *Auer* provides the answer: we defer to the agency in which Congress has vested regulatory authority to craft policy based on its expert judgment. *See Christopher*, 132 S.Ct. at 2166–67 (internal quotation marks omitted). Accordingly, I conclude that FWS's interpretation of "other ***749** compelling justification" as including economic benefits and the benefit of teaching other nations good conservation techniques is not "plainly erroneous or inconsistent with the regulation." *Id.* at 2166 (internal quotation marks omitted).

2.

The Permit also comports with the MBTA's conservation purpose. The majority is correct that in passing the MBTA Congress sought to promote migratory bird conservation.[11] But the statute also expressly provides for non-conservation-related take of migratory birds. As is relevant here, the MBTA allows FWS to consider economic factors in determining whether to permit, among other things, the taking, killing, possessing, or sale of migratory birds or their parts. 16 U.S.C. § 704(a). Stated in full, § 704(a) provides that:

> Subject to the provisions and in order to carry out the purposes of the [migratory bird treaty] conventions ... the [FWS] is authorized and directed, from time to time, having due regard to the zones of temperature and to the distribution, abundance, economic value, breeding habits, and times and lines of migratory flight of such birds, to determine when, to what extent, if at all, and by what means, it is compatible with the terms of the conventions to allow hunting, *taking*, capture, *killing*, *possession*, *sale*, purchase shipment, transportation, carriage, or export of any such bird, or any part, nest, or egg thereof, and to adopt suitable regulations permitting and governing the same ....

Id. (emphasis added).

But how—the reader may ask—can we reconcile the statute's conservation-oriented focus with its provisions allowing for the

killing of migratory birds? One way is to interpret § 704(a) as permitting bird deaths—by way of hunting, incidental take, or other means—to the extent that doing so does not threaten the *overall* conservation of migratory birds. Indeed, we would not be the first court to adopt this interpretation. *See Humane Soc'y v. Watt*, 551 F.Supp. 1310, 1319 (D.D.C. 1982), *aff'd*, 713 F.2d 865 (D.C. Cir. 1983) ("It does not necessarily follow from the MBTA's evident purposes of conservation that the statute creates a presumption against hunting ....").

The Permit is consistent with this accommodation of competing statutory directives: it allows for the take of migratory birds when paired with measures designed to minimize such take. Neither CBD nor the majority contends that, if such measures are followed, the MBTA's broad goal of conserving migratory birds is threatened.

3.

The majority has one lure left in its tackle box, but I decline to take the bait. The majority suggests that because the MBTA generally prohibits take, a presumption attaches against reading § 21.27 as authorizing incidental take. The majority reasons that "although § 21.27 is intended to allow the FWS to authorize activities ***750** not otherwise permitted by the regulations, it is still a narrow exception to the MBTA's general prohibition on killing migratory birds."

While it is true that the MBTA generally prohibits taking migratory birds, the majority's observation is a red herring because the statute and regulations provide for numerous exceptions to the general rule.[12] The pertinent question turns on the *scope* of the exception to the prohibition, not the existence of the general prohibition in the first place. As discussed, § 21.27 is ambiguous and accommodates FWS's view that the Permit supports a "special purpose activit[y]" that is anchored in a "compelling justification."

* * *

Because issuing the Permit follows FWS's past practice, is not plainly erroneous or inconsistent with § 21.27, and comports with the MBTA's conservation-oriented purpose, I would hold it to be a lawful exercise of FWS's authority.

II.

The majority also errs in rejecting NMFS's loggerhead turtle BiOp as arbitrary and capricious. The majority's analysis rests on a misapprehension of both binding case law and the administrative record in this case.

Section 7(a)(2) of the ESA requires all federal agencies to ensure that any discretionary "action" they authorize, fund, or implement does not "jeopardize the continued existence" of an ESA-listed species. 16 U.S.C. § 1536(a)(2); 50 C.F.R. § 402.03.[13] To "jeopardize" means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." 50 C.F.R. § 402.02. Put another way, "[t]o 'jeopardize'—the action ESA prohibits—means to 'expose to loss or injury' or to 'imperil.' " *NWF*, 524 F.3d at 930. As we have previously explained,

> [e]ither of these [terms] implies causation, and thus some *new risk of harm*. Likewise, the suffix "-ize" in "jeopardize" indicates some active change of status: an agency may not "cause a species to be or to become" in a state of jeopardy or "subject a species to" jeopardy ....

> [A]n agency may not take action that will tip a species from a state of precarious survival into a state of likely extinction. Likewise, even where baseline conditions already jeopardize a species, an agency may not take action that deepens the jeopardy by causing additional harm.

Id. (emphasis added).

Our discussion of "jeopardy" in *NWF* must be read in the context of the regulatory standard. To "deepen[ ] the jeopardy" of a species is to "reduce appreciably" a species' chance at continued survival and recovery. *See* 50 C.F.R. § 402.02. It cannot—as CBD and the majority suggest—simply mean exacerbating a species' already "imperiled" existence, no matter how de minimis the impact. An "endangered ***751** species" like the loggerhead is, by definition, a "species which is in danger of extinction throughout all of a significant portion of its range." 16 U.S.C. § 1532(6) (defining "endangered"). If the ESA prohibited any action that worsened—no matter how marginally—a species' current plight, then it is difficult to conceive of an action that *could* survive § 7 consultation. That is not the standard: the question is not whether the agency action will negatively affect the species, but whether in doing so it will appreciably reduce its likelihood of survival and recovery. *NWF*, 524 F.3d at 930 (the operative inquiry is whether the action will "*cause[ ]* some *new* jeopardy"—i.e., whether it will "tip a species from a state of precarious survival into a state of likely extinction" (emphasis added)).

In *NWF*, we rejected a BiOp that excluded certain discretionary agency actions from the jeopardy analysis, and which also failed to consider degraded baseline conditions. *Id.* at 933. The BiOp assessed the effects of dam operations on the Chinook salmon, an ESA-listed species. *Id.* at 925–26. We faulted NMFS for departing from its past practice and taking a novel approach in evaluating dam operation impacts. First, NMFS labeled several operations as nondiscretionary, thereby "excluding them from the requisite ESA jeopardy analysis." *Id.* at 928–29. Second, NMFS considered only the marginal impact of certain discretionary dam operations in its jeopardy analysis. *Id.* at 929–30. As concerns the second error, NMFS considered only whether those actions were " 'appreciably' worse than baseline conditions." *Id.* at 930. Only if they were would NMFS then conduct a jeopardy analysis. *Id.*

We held that NMFS's methodology collided with the plain text of the regulations. Section 402.02 explains that an agency action "jeopardizes" a species if it "reduce[s] appreciably the likelihood of" the species' "survival and recovery," when considering the action's direct, indirect, and cumulative impacts measured against the environmental baseline. 50 C.F.R. §§ 402.02; 402.14(g)(4). NMFS executed a different procedure. Instead of weighing the proposed action in the context of the species' continued existence, it assessed the action against then-current baseline conditions. *See NWF*, 524 F.3d at 930.

By way of example, consider a hypothetical scenario in which a residential subdivision is planned for an area inhabited by the endangered arroyo toad. *See Rancho Viejo, LLC v. Norton*, 334 F.3d 1158, 1160 (D.C. Cir. 2003) (Roberts, J., dissenting from denial of rehearing en banc). The development requires a federal permit, thereby triggering ESA § 7 consultation. *Sierra Club v. Bureau of Land Mgmt.*, 786 F.3d 1219, 1224 (9th Cir. 2015) (consultation required where a private project is "funded, authorized, or constructed by any federal agency"). The toad is already threatened by the combined effects of climate change and habitat fragmentation.[14] Existing developments have substantially reduced the toad's habitat, and it teeters on the precipice between survival and extinction. The proposed development would reduce the toad's habitat by an additional 10 percent, which, in the agency's estimation, does not amount to an "appreciable" negative impact when compared to the habitat destruction that has already taken place. Thus, under the methodology rejected by this court in *NWF*, the agency would not have engaged in a jeopardy analysis.

***752** The pertinent question under *NWF*, however, is whether the proposed development would have an appreciable impact on the *toad's survival and recovery*. Comparing only the marginal impact against already degraded baseline conditions conceals this inquiry. Only by considering the impact of the proposed development " 'within the context of other existing human activities that impact the listed species' "—i.e., in the context of climate change effects and an already diminished natural habitat—can the agency determine whether the proposed action will consign the toad to a fate of oblivion. *See NWF*, 524 F.3d at 930. Similarly, the flaw *NWF* identified in that case was NMFS's failure to account for the "existing human activity" of dam operations, which impacted the salmon's survival. *See id.* at 930–31. The court held that NMFS should have considered the proposed agency action—continued dam operations—together with degraded baseline conditions, instead of *against* those conditions. *See id.* at 931.

Turning to the matter before us, NMFS undertook the analysis required by *NWF*. NMFS considered, among other things, the (i) the current status of the **loggerhead sea turtle**, (ii) the direct effects of the proposed action on the loggerhead based on

climate-based and classical modeling, (iii) the impact of climate change and other cumulative effects, and (iv) whether the proposed action would result in an appreciable reduction in the likelihood of the loggerhead's survival and recovery. The majority arrives at a contrary conclusion by fixating on the BiOp's statement that the incremental harm of the proposed action is "the death of a single adult, female loggerhead per year," which is an " 'extremely small ... level of take from the action.' " The majority insists that NMFS ran afoul of *NWF* by comparing the marginal impact of the fishery "to the much greater harm resulting from factors beyond the fishery." But NMFS's consideration of the marginal impact of the fishery did not drive its jeopardy analysis à la *NWF*. Instead, NMFS considered the "adverse effect on the overlying population ... when considered *together with all impacts considered in the Status of the Species, Baseline and Cumulative Effects sections*, including other federally authorized fisheries and foreign fisheries." NMFS explained that,

> [d]espite the projected population decline over one generation, we expect the overall population to remain large enough to maintain genetic heterogeneity, broad demographic representation, and successful reproduction. The proposed action will have a small effect on the overall size of the population, and we do not expect it to affect the loggerheads' ability meet their lifecycle requirements and to retain the potential for recovery.

Thus, unlike in *NWF*, where NMFS failed to consider direct, indirect, and cumulative effects, here, NMFS incorporated the marginal impact of the fishery in assessing whether the action—*combined with baseline conditions*—would "tip [the loggerhead] from a state of precarious survival into a state of likely extinction." *See id.* at 930. It concluded it would not, and we owe that determination deference.[15] *See* ***753** *Lands Council II*, 629 F.3d at 1074 ("Review under the arbitrary and capricious standard is narrow and we do not substitute our judgment for that of the agency.") (internal quotation marks omitted)).

The majority also criticizes NMFS for relying on "the conservative nature of its calculations to support the difference between its conclusion and the climate-based model's results." As a first matter, the majority does not explain where the model results diverge from NMFS's finding of no-jeopardy. Nor could it plausibly do so: an analysis of the record data in the BiOp supports NMFS's conclusion. The climate-based model showed that, in 99.5 percent of the tests, the loggerhead would fall below the quasi-extinction threshold ("QET") in 25 years *without the proposed action*. NMFS similarly found that "[w]hen the same model is run with the proposed action, the mortality of 1 adult female, *the results are similar* with 99.5% to 100% of the runs falling below the QET."[16] Indeed, the model showed that while the proposed action would have a "detectable influence on the loggerhead population, there is *no significant difference in the risk of extinction* between the default, climate-based trends and the forecast considering the direct effects of the proposed action." In other words, the risk of extinction is virtually the same whether or not the shallow-set fishery is expanded. Accordingly, NMFS reasonably concluded that the proposed action would not "reduce appreciably the likelihood" of the loggerheads' "survival and recovery." *See* 50 C.F.R. § 402.02.

At any rate, the majority is simply wrong that NMFS relied on its conservative estimates to arrive at its no-jeopardy conclusion. In fact, NMFS relied on (i) the results of the climate change model showing no statistically significant difference in the risk of extinction to the loggerhead with or without the proposed agency action; and (ii) a "qualitative analysis" reflecting that the loss of one additional female loggerhead per year would still allow the loggerhead population to "remain large enough to maintain genetic heterogeneity, broad demographic representation, and successful reproduction."[17]

***754** Accordingly, because NMFS's path "may reasonably be discerned" and "a reasonable basis exists for its decision," I would affirm NMFS's loggerhead BiOp. *Pac. Coast Fed'n of Fishermen's Ass'ns v. Blank*, 693 F.3d 1084, 1091 (9th Cir. 2012) (internal quotation marks and citation omitted); *Bowman Transp., Inc. v. Arkansas–Best Freight System, Inc.*, 419 U.S. 281, 95 S.Ct. 438, 42 L.Ed.2d 447 (1974) ("[W]e will uphold a decision of less than ideal clarity if the agency's path may reasonably be discerned.").

CONCLUSION

FWS acted within its authority when it issued a special purpose permit to NMFS under the MBTA. Its decision aligns with past practice, is not "plainly erroneous or inconsistent with [50 C.F.R. § 21.27]," and comports with the MBTA's conservation-oriented purpose. The majority errs in holding otherwise. Similarly, NMFS's no-jeopardy finding for the **loggerhead sea turtle** is rationally related to the evidence in the record, satisfies its statutory obligation to consider direct, indirect, and cumulative impacts, and is faithful to our decision in *NWF*. Because we should uphold the MBTA Permit and the loggerhead BiOp, I must respectfully dissent.

All Citations

878 F.3d 725, 85 ERC 2233, 2018 A.M.C. 203, 17 Cal. Daily Op. Serv. 12,327, 2017 Daily Journal D.A.R. 12,267

Footnotes

1 Because we conclude that the FWS acted arbitrarily and capriciously in issuing the incidental take permit to the NMFS under § 21.27, we need not reach Plaintiffs' additional argument concerning whether the FWS's action also violated NEPA.

1 *Auer*'s continued vitality is a matter of considerable debate. Justice Antonin Scalia, the progenitor of the doctrine named after the 1997 case, *Auer v. Robbins*, which he authored, called for its abolition eighteen years later in *Perez v. Mortgage Bankers Association*, —— U.S. ——, 135 S.Ct. 1199, 1213, 191 L.Ed.2d 186 (2015) (Scalia, J., concurring). He appears to have shared this view with at least two other justices, Justices Samuel Alito and Clarence Thomas. *See id.* at 1210 (Alito, J., concurring); *id.* at 1213 (Thomas, J., concurring). *See also* John C. Eastman, *The President's Pen and the Bureaucrat's Fiefdom*, 40 HARV. J.L. & PUB. POL'Y 639, 641 (2017). Also, Justice Neil Gorsuch has openly criticized *Chevron* deference, *see Gutierrez–Brizuela v. Lynch*, 834 F.3d 1142, 1156 (10th Cir. 2016) (Gorsuch, J., concurring) (citing *Marbury v. Madison*, 5 U.S. (1 Cranch) 137, 2 L.Ed. 60 (1803))—a less controversial deference doctrine because it provides for a check-and-balance between two branches of government (Congress and the Executive), whereas *Auer* involves the Executive's interpretations of its own actions. At any rate, my conclusion that the Permit is a lawful exercise of FWS's authority does not rely on the continued validity of *Auer*. Applying traditional tools of statutory construction, the Permit is lawful agency action because it is consistent with (i) the regulatory text of § 21.27, (ii) § 21.27's greater context, and (iii) the purposes of both § 21.27 and the MBTA itself.

2 *See* Fish and Wildlife Service and National Marine Fisheries Service, *Habitat Conservation Planning and Incidental Take Permit Processing Handbook* App'x 5 (Nov. 4, 1996) ("1996 HCP Handbook"); *see also* Fish and Wildlife Service and National Marine Fisheries Service, *Habitat Conservation Planning and Incidental Take Permit Processing Handbook* 16–9 (Dec. 21, 2016) ("2016 HCP Handbook") ("FWS routinely issues consolidated ESA and [MBTA] permits for ESA-listed bird species.").

3 To be sure, what I articulate as FWS's past practice does not precisely align with FWS's own description of its policy for issuing special purpose permits, which broadly encompasses "incidental take of migratory birds" pursuant to agency "activities." Courts are not permitted to make sense of an agency action by supplying a rationale not offered by the agency itself. *Bowman Transp., Inc. v. Arkansas–Best Freight Sys., Inc.*, 419 U.S. 281, 285–86, 95 S.Ct. 438, 42 L.Ed.2d 447 (1974) (citing *SEC v. Chenery Corp.*, 332 U.S. 194, 196, 67 S.Ct. 1760, 91 L.Ed. 1995 (1947)). But my description of the agency's past practice does not supply a rationale for an otherwise arbitrary and capricious agency action. My observation that FWS's issuance of the Permit is consistent with FWS's historical policy simply demonstrates that CBD has not met its burden of showing that FWS has departed from past practice.

4 FWS is in the process of drafting a regulation that would do just that, though it appears the process has stalled. *See* Dep't of the Interior, *Migratory Bird Permits; Programmatic Environmental Impact Statement*, Notice of Intent, 80 Fed. Reg. 30,032 (May 26, 2015).

5 CBD also references statements from a 1996 version of FWS's Habitat Conservation Handbook. The Handbook describes the process governing HCPs under the ESA. Because the Handbook is, at most, a guidance document, it lacks the force and effect of law. *See Perez v. Mortg. Bankers Ass'n*, —— U.S. ——, 135 S.Ct. 1199, 1203–04, 191 L.Ed.2d 186 (2015); *see generally* 1996 HCP Handbook. And to the extent it is probative of FWS's "past practice," it is of little value because the current Handbook is internally contradictory. One chapter states that "[n]on ESA-listed, migratory birds can be covered or otherwise addressed in the HCP and incidental take permit." 2016 Handbook at 3–28. But another chapter states that "if an MBTA protected species is not ESA-listed, the FWS does not have a way to authorize incidental take." 2016 Handbook at 7–7. An internal contradiction is archetypal evidence of a lack of "considered [agency] judgment," and so the Handbook's description of FWS's MBTA permitting

authority is neither persuasive nor deserving of deference. *See Christopher*, 132 S.Ct. at 2166.

6 CBD offers no reason why the rationale for issuing ESA § 10 permits in lieu of an MBTA § 21.27 permit—that the ESA affords species greater protections—is not equally applicable to standalone § 21.27 permits for non-ESA-listed species. FWS, in its discretion, may require a § 21.27 permittee to implement the same types of conservation measures that are codified under the ESA. FWS effectively did just that with the shallow-set fishery here. Because the fishery incorporates conservation measures that have dramatically reduced seabird bycatch, FWS's issuance of the Permit is consistent with its rationale for covering migratory birds under ESA § 10.

7 *See Klem v. County of Santa Clara*, 208 F.3d 1085, 1092 (9th Cir. 2000) ("the question ... is whether the Secretary's interpretation is justified when considered together with the text of [the regulation], taken in context"); *cf. FDA v. Brown & Williamson Tobacco Corp.*, 529 U.S. 120, 133, 120 S.Ct. 1291, 146 L.Ed.2d 121 (2000) (noting the "fundamental canon of statutory construction that the words of a statute must be read in their context and with a view to their place in the overall statutory scheme" (internal quotation marks omitted)).

8 CBD asserts that an "ongoing fishing business ... has no 'special purpose' beyond catching fish." But this observation only begs the question: what *is* a "special purpose"? CBD offers no explanation, except to march out a parade of horribles, warning that if the Permit is allowed to stand then the court will have ushered in a brave new world in which "every activity that happens to somehow harm birds" will qualify for an incidental take permit.

9 The majority correctly adheres to the doctrine that "all the words used in a list should be read together and given related meaning when construing a statute or regulation." *Aguayo v. U.S. Bank*, 653 F.3d 912, 927 (9th Cir. 2011).

10 To be sure, the quoted phrase applies only to captive-bred birds. But the point is that the regulation expressly contemplates issuing special purpose permits for something other than conserving migratory birds.

11 *See Humane Soc'y of U.S. v. Watt*, 551 F.Supp. 1310, 1319 (D.D.C. 1982), *aff'd*, 713 F.2d 865 (D.C. Cir. 1983) (" 'The United States ... [and] Great Britain ..., being desirous of saving from indiscriminate slaughter and insuring the preservation of such migratory birds as are either useful to men or are harmless, have resolved to adopt some uniform system of protection which shall effectively accomplish such objects ....' ") (quoting 39 Stat. 1702 (Convention on the Protection of Migratory Birds) incorporated by reference into the MBTA at 16 U.S.C. § 703(a)).

12 *See* 16 U.S.C. § 703(a) ("*except as permitted by regulations* ... it shall be unlawful ... to ... take ... any migratory bird ...." (emphasis added)); 50 C.F.R. §§ 21.13 (taking certain mallard ducks); 21.15 (incidental take for military readiness activities); 21.23 (taking for scientific research); 21.24 (taking for taxidermy); 21.25 ("dispos[ing]" of migratory waterfowl); 21.26 (killing Canada geese); 21.27 ("special purpose activities" not covered by other permits); 21.29 (taking for raptors).

13 "Section 7 ... appl[ies] to all actions in which there is discretionary Federal involvement or control." 50 C.F.R. § 402.03.

14 *See* U.S. Fish and Wildlife Service, *Arroyo Toad 5–Year Review: Summary and Evaluation* 10, 16 (Aug. 2009).

15 NMFS included in its analysis an assessment of "spillover" effects—i.e., the impact of the expanded domestic shallow-set fishery on foreign fisheries. NMFS found that without the expansion, foreign fisheries would move in and occupy the area. And because the implicated foreign nations generally have weaker environmental laws than does the United States, NMFS concluded "with reasonable certainty, that [under the agency action] there will be a reduction of [loggerhead and leatherback sea turtle] mortalities as a result of the spillover effect." NMFS estimated the reduction to be "11 fewer interactions in the central and north Pacific ... or four fewer [loggerhead and leatherback sea turtle] mortalities."
This data amply supports NMFS's no-jeopardy conclusion. However, NMFS did not incorporate its findings into the jeopardy analysis because it concluded that "data on foreign fisheries is likely incomplete or inaccurate." Thus, while the "spillover" effects data is compelling, I—like the agency—do not rely on it in assessing the reasonableness of NMFS's ultimate determination.

16 The additional loss of one adult female per annum from the proposed action results in a projected reduction in the overall population of 4 to 11 percent, due to a loss of that single turtle's "reproductive potential" over the course of generations. But, contrary to the majority's assessment, NMFS did not credit this numerical loss because it had low confidence in the data. NMFS noted that the estimated loss does "not account for the high mortality rate expected of these hatchlings from other sources, including climate-based threats." In other words, the reduction due to a loss of reproductive potential is significantly overstated.

17 NMFS's use of conservative data inputs is relevant not because it is the sole basis for its no-jeopardy conclusion (as discussed, it isn't), but because it reflects the reasonableness of its findings. For example, NMFS considered the lost "reproductive potential" of all "unborn hatchlings," even though hatchlings have a "high mortality rate." It also assumed that the shallow-set fishery would

immediately operate at 5,500 sets every year, even though the increase is likely to be gradual over time. And its climate model did not incorporate the results of anticipated indirect effects—namely, beneficial "spillover" effects—of the domestic fishery's displacement of international fisheries.

As discussed, NMFS's no-jeopardy conclusion is not unreasonable even without considering the conservative nature of its inputs. Recognizing that those inputs are more conservative than actual conditions warrant therefore only weakens the majority's erroneous conclusion that NMFS's action is arbitrary and capricious. *See George v. Bay Area Rapid Transit*, 577 F.3d 1005, 1011 (9th Cir. 2009) ("The party challenging an agency's action as arbitrary and capricious bears the burden of proof ....").

End of Document

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222 NW Davis Street, Suite 200
Portland, OR 97209 USA

+1.503.235.0278
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February 8, 2018

Mr. Phil Anderson, Chair
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, OR 97220

Mr. Barry Thom, Regional Administrator
NOAA Fisheries West Coast Region (NMFS)
7600 Sand Point Way NE, Bldg. 1
Seattle, WA 98115

Agenda Item B.1: Open Public Comment, Bycatch in Pelagic Longline Swordfish Fisheries

Dear Chair Anderson, Mr. Thom, and members of the Council:

Thank you for the opportunity to provide open public comment on bycatch in pelagic longline swordfish fisheries and its relevance to management of U.S. West Coast highly migratory species (HMS). Oceana analyzed ten years of bycatch data from the Hawaii-based shallow-set longline fishery. The results show an average discard rate nearing 50%; a highly irresponsible level of bycatch which should preclude this gear type from being considered for any HMS fisheries off the U.S. West Coast.

The California Current Ecosystem is globally important for its unique oceanographic conditions supporting a diverse array of wildlife, including sea turtles, sea lions, whales, dolphins, seabirds, and commercially and recreationally important fish species. New pelagic longline swordfish fisheries inside or outside the West Coast exclusive economic zone (EEZ) would dramatically increase bycatch of protected marine life, sharks and other fish species. Oceana opposes efforts to schedule scoping for an HMS fishery management plan (FMP) amendment that would authorize a pelagic shallow-set longline swordfish fishery off the U.S. West Coast, outside the EEZ, and we oppose proposals to 'test' pelagic longlines inside the West Coast EEZ.

Over the past several years there have been efforts to introduce a pelagic shallow-set longline fishery to the U.S. West Coast. In 2015, the Pacific Fishery Management Council approved an exempted fishing permit that would allow the use of shallow-set longlines inside the U.S. West Coast EEZ and the Council has continued to entertain a future agenda item to begin scoping for an HMS FMP amendment to authorize a West Coast-

based high seas shallow-set longline swordfish fishery, an item which was brought forward in 2009 and failed.

The California-based drift gillnet swordfish fishery has historically had, and currently has a significant bycatch issue. Adding another unselective gear to the West Coast swordfish fishery would only complicate and delay progress toward significantly reducing bycatch in this fishery. Instead, the Council should continue to focus on the development and authorization of deep-set buoy gear, as a responsible, low impact fishing gear for targeting swordfish off the U.S. West Coast.

In 1989, with the enactment of Section 9028 of the Fish and Game Code, the California Legislature prohibited pelagic longline fishing in the EEZ off the California coast by banning the use of hook and line fishing gear longer than 900 feet.[1] A prohibition on pelagic longline gear is also specified in the Council's HMS FMP, and when faced with the opportunity to authorize a high seas shallow-set pelagic longline fishery in 2009, the Council selected the "no-action" alternative due to bycatch concerns.[2]

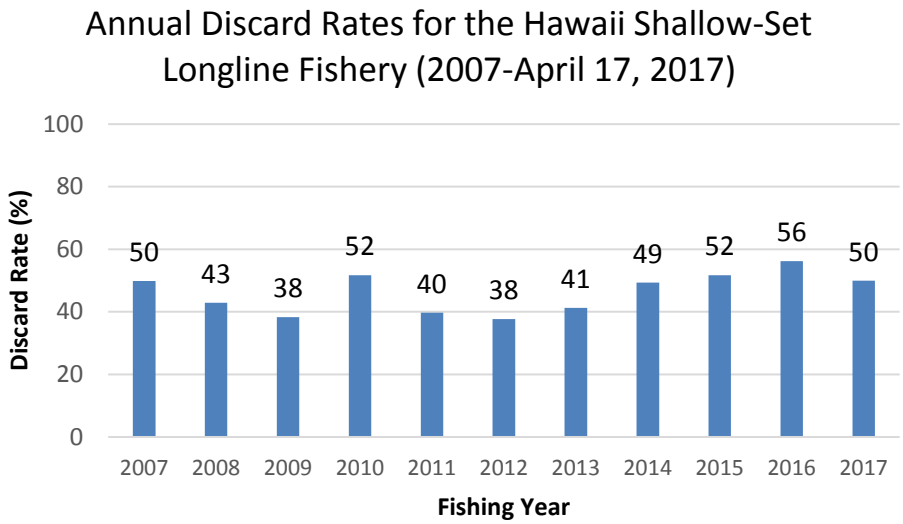

Figure 1. Annual discard rates (by number of animals) in the HI SSLL fishery, 2007-April 17, 2017

In response to a Freedom of Information Act request, Oceana recently received and analyzed observer data for the Hawaii-based shallow-set longline (SSLL) fishery.[3] Our analysis of NMFS observer data (the fishery has 100% observer coverage) shows that while bycatch in this fishery has improved since 2000, when mitigation measures such as circle hooks instead of J hooks were enforced, this fishery remains highly unselective (Figure 1).

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[1] Cal. Fish & Game Code § 9028
[2] Decisions of the 198th Session of the Pacific Fishery Management Council, at 1, http://www.pcouncil.org/wp-content/uploads/0409decisions.pdf
[3] NMFS (2017). FOIA observer data on the Hawaii shallow-set longline fishery.

The average discard rate (by number of animals) for the Hawaii SSLL fishery from 2007-April 17, 2017 is 46% (206,987 animals discarded).

Consistent with the Magnuson-Stevens Fishery Conservation and Management Act definition of bycatch[4], discards in Figure 1 are defined as animals caught but not kept. They are instead released and listed in the observer data as either Alive, Injured, Dead, or Unknown. The percentage of discards that have been released injured or dead in the same timeframe is 31.4%.

According to observer data, protected species including migratory sea birds, sea turtles, and marine mammals, are likely to perish or be injured when caught on pelagic longlines. Over 750 seabirds, 60 dolphins, and 190 sea turtles were incidentally caught by this fishery from January 2007 to April 2017 (Figure 2). Sharks and rays and non-target finfish were the most frequent bycatch in the fishery with 131,270 and 74,677 discards, respectively, between 2007 and April 17, 2017.

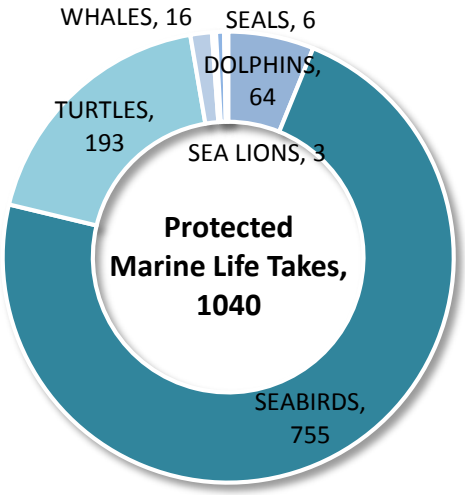

Figure 2. Observed Protected Marine Life Takes in the HI SSLL Fishery, 2007-April 17, 2017

Although interactions between the HI SSLL fishery and protected sea turtle species have decreased with gear and bait modifications implemented in 2000, it is important to look at this decrease in the broader context. For example, the Western Pacific population of Pacific leatherback sea turtles is estimated to have decreased within the same timeframe.[5] Given the lack of recovery of sea turtles, the risk posed to their populations by **any** interaction with a fishery off our coast remains high.

[4] 16 U.S.C. 1802 §(3)(2)
[5] Tapilatu et al. 2013. Long-term decline of the western Pacific leatherback, *Dermochelys coriacea:* a globally important sea turtle population. Ecosphere 4(2):1-15.

Since 2007, the HI SSLL fishery has caught and discarded at least 88 different non-target species, including six species of Endangered Species Act (ESA) listed mammals and turtles (see appended table). The Hawaii pelagic longline fisheries are known to take high numbers of false killer whales, and in January 2010, a false killer whale Take Reduction Team was formed to reduce mortality and serious injury of this species as required under the Marine Mammal Protection Act. In general, bycatch of marine mammals and other species would be expected to be even higher inside the U.S. West Coast EEZ than in the areas observed in the HI SSLL fishery, due to the higher densities of these animals in the California Current Ecosystem.[6, 7]

Additionally, we remind the Council of the NMFS tests to target swordfish using deep-set pelagic longline gear off central and southern California conducted in 2011-2013. During those experimental gear trials, only eight swordfish were caught and 76% of all fish caught with these deep-set longlines were non-marketable species.[8]

Due to the high bycatch rates and interactions with protected species that are associated with pelagic longlines, we strongly oppose an HMS FMP amendment authorizing the use of pelagic longline gear off the U.S. West Coast as well as exempted fishing permits. We urge the Council to remove this item from the year-at-a-glance agenda and we urge NMFS to deny the proposed pelagic longline EFP.

Sincerely,

Erin Kincaid
Marine Scientist

Ben Enticknap
Pacific Campaign Mgr. and Sr. Scientist

Attached: Oceana 2018. Collateral Capture: Bycatch in the Hawaii Shallow-Set Longline Fishery

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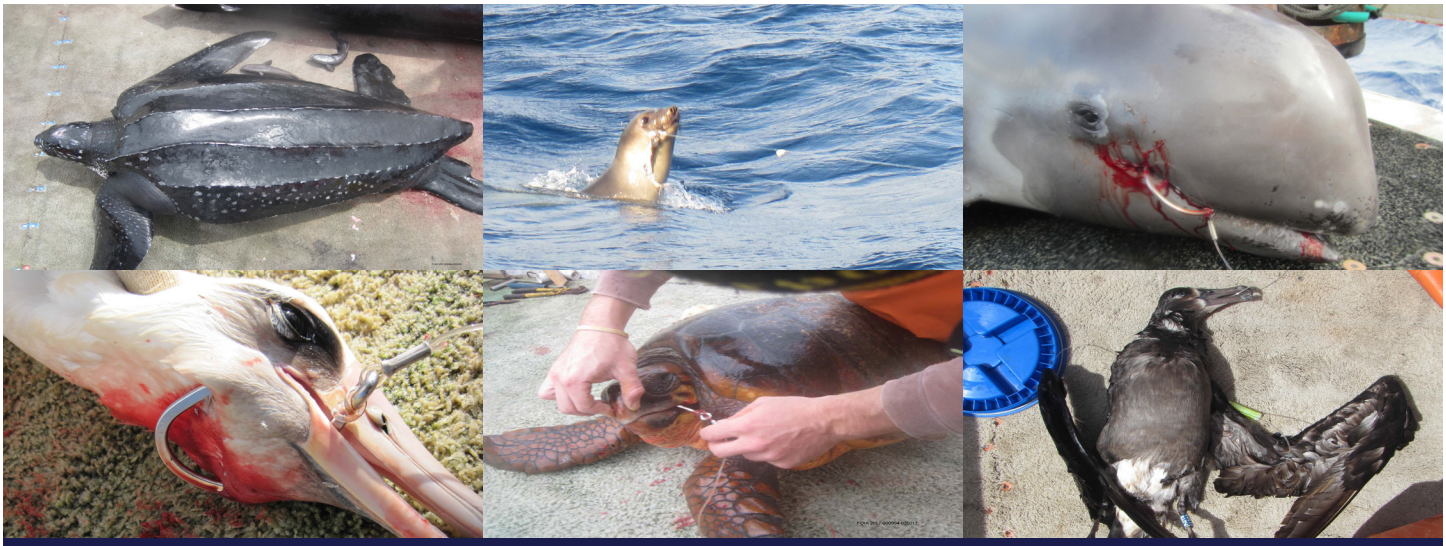
[6] Becker, E., K. Forney, P. Fiedler, J. Barlow, S. Chivers, C. Edwards, A. Moore, J. Redfern. 2016. Moving towards dynamic ocean management: How well do modeled ocean products predict species distributions? Remote Sensing 8,149.
[7] Forney, K., E. Becker, D. Foley, J. Barlow, E. Olson. 2015. Habitat-based models of cetacean density and distribution in the Central North Pacific. Endang Species Res 27:1-20.
[8] NMFS SWFSC Report. March 2014. Available: http://www.pcouncil.org/wp-content/uploads/K5b_NMFS_SWFSC_ALTERNATIVE_GEAR_MAR2014BB.pdf

Appendix

List of all species or categories caught in the Hawaii Shallow-Set Longline fishery from 2007-April 2017. Species listed as endangered or threatened under the ESA are indicated (*).

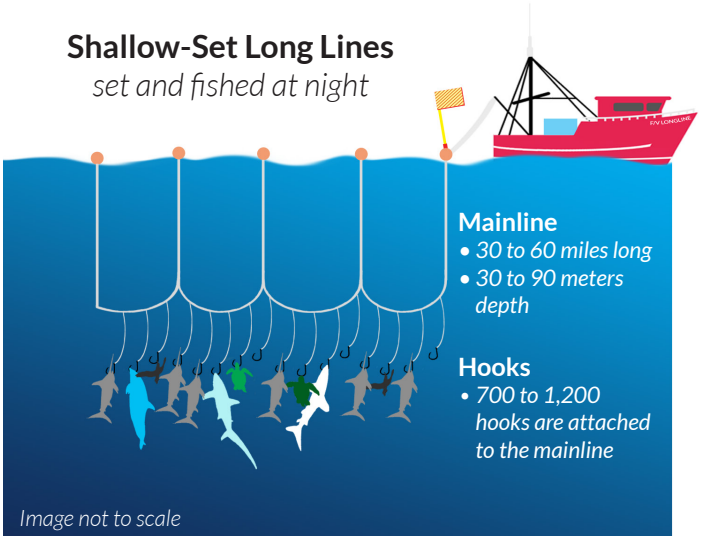
Catch Species (common name)		
Albacore Tuna	Longfin Escolar	Silky Shark
Beaked Whale, Ginkgo-toothed	Longfin Mako Shark	Skipjack Tuna
Bigeye Thresher Shark	Longnose Lancetfish	Slender Mola
Bigeye Tuna	Louver	Smooth Hammerhead Shark
Bignose Shark	Lustrous Pomfret	Snake Mackerel
Black Gemfish	Manta/Mobula	Striped Dolphin
Black Marlin	Mesoplodont Beaked Whale	Striped Marlin
Black-footed Albatross	Mobula (Devil Ray)	Swordfish
Blainville's Beaked Whale	Mobula Manta	Tapertail Ribbonfish
Blue Marlin	Northern Elephant Seal	Tiger Shark
Blue Shark	Oceanic White-Tip Shark*	Unid. Hammerhead Shark
Bluefin Tuna	Oilfish	Unid. Mako Shark
Bottlenose Dolphin	Olive Ridley Turtle	Unid. Snake Mackerel
Cigarfish	Opah	Unid. Thresher Shark
Common Mola	Other Identified Bird	Unidentified Beaked Whale
Common Thresher Shark	Other Identified Bony Fish	Unidentified Billfish
Cookie Cutter Shark	Other Identified Shark	Unidentified Bony Fish
Crestfish	Pelagic Puffer	Unidentified Common Dolphin
Crocodile Shark	Pelagic Stingray	Unidentified Dolphin
Dagger Pomfret	Pelagic Thresher Shark	Unidentified Dolphin or Whale
Deepwater Dogfishes	Pomfret, Brama spp.	Unidentified Gull
Dogfish, Velvet	Pompano Dolphinfish	Unidentified Hardshell Turtle
Dolphinfish	Rainbow Runner	Unidentified Kogia Whale
Escolar	Remora/Suckerfish	Unidentified Pinniped
False Killer Whale	Risso's Dolphin	Unidentified Pomfret
Fanfish	Roudi's Escolar	Unidentified Ray
Fin Whale*	Rough Pomfret	Unidentified Sea Lion
Flying Fish	Rough-Toothed Dolphin	Unidentified Shark
Galapagos Shark	Sailfish	Unidentified Shearwater
Giant Manta Ray	Salmon Shark	Unidentified Snake Mackerel
Gray Reef Shark	Sandbar Shark	Unidentified Tuna
Great Barracuda	Scalloped Hammerhead Shark	Unidentified Whale
Green/Black Turtle*	Scalloped Ribbonfish	Unspecified Kahala (Amberjack)
Guadalupe Fur Seal*	Sharptail Mola	Wahoo
Hammerjaw	Short-beaked Common Dolphin	White Shark
Humpback Whale*	Shortbill Spearfish	Yellowfin Tuna
Laysan Albatross	Shortfin Mako Shark	Yellowtail
Leatherback Turtle*	Shortnose Lancetfish	
Loggerhead Turtle*	Sickle Pomfret	



Collateral Capture
Bycatch in the Hawaii Shallow-Set Longline Fishery

The Hawaii Shallow-Set Longline (HI SSLL) fishery uses pelagic (midwater) gear to target swordfish. Unfortunately, of all the animals ensnared by these suspended, baited hooks, nearly half are injured, dying, or dead non-target species and are consequently tossed overboard.

Shallow-set longline gear consists of a continuous mainline supported by floats that typically stretches 30 to 60 miles in length. Anywhere from 700 to 1,200 hooks are attached. The lines are set at dusk between 30 and 90 meters depth and left to soak until dawn.



As the lines are pulled out of the water they reveal a multitude of other animals carelessly captured including seabirds, sea turtles, dolphins, and many non-target fish. This gear also entraps and harms marine mammals including humpback whales, bottlenose dolphins, short-finned pilot whales, false killer whales, and Risso's dolphins. Because of these documented entanglements, the HI SSLL fishery is classified as a Category II fishery under the Marine Mammal Protection Act – a federal designation given to fisheries that are known to cause incidental death or serious injury to marine mammals.

The Hawaii Shallow-Set Longline fishery entangled many threatened and endangered species from 2007 to 2017. These include Pacific leatherbacks, Pacific loggerheads, and green sea turtles, humpback and fin whales, Guadalupe fur seals, and oceanic whitetip sharks. A scientific study estimates that even one Pacific leatherback mortality from waters off the U.S. West Coast over the course of five years is sufficient to hinder recovery of this critically endangered animal.[1] Putting further pressure on these endangered species by introducing pelagic longlines off the U.S. West Coast would be reckless.

Cover Photo: Documented bycatch ensnared by shallow-set longlines off Hawaii includes leatherback sea turtles, northern elephant seals, Risso's dolphins, Laysan albatrosses, loggerhead sea turtles, and black-footed albatrosses.

February 2018

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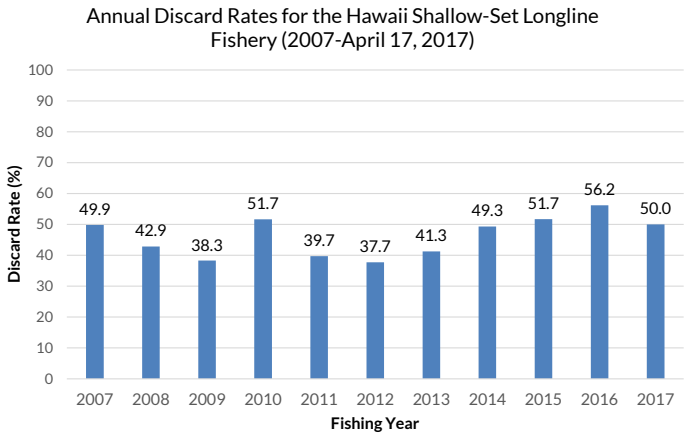
From 2007 through April 17, 2017:

- 206,987 animals were discarded
- 46% of the total catch was discarded
- 64,926 of the discarded animals were released dead or injured, resulting in a death/injury rate of discards of 31.4%
- Over 750 seabirds, 60 dolphins, and 190 sea turtles were caught by this fishery
- 131,270 sharks and rays were discarded
- In 2015, a humpback whale and a fin whale were entangled in this gear and consequently injured



A discard refers to any animal caught that is not kept. This includes animals released alive, dead, or injured. Discard rates (percentage of the total number of animals caught that are thrown overboard) are determined using data provided by fishery observers.[2] The HI SSLL fishery has 100% observer coverage. Data from all sets in the fishery for 2007 through April 17, 2017 were used to determine discard rates.

Keep Shallow-Set Longlines Off the U.S. West Coast

In 1989, longlines were prohibited off the state of California and the Pacific Fishery Management Council (Council) included this prohibition in the West Coast Highly Migratory Species Fishery Management Plan. The Council in 2009 voted to not authorize a West Coast-based pelagic shallow-set longline fishery on the high seas due to significant bycatch concerns.

The drift gillnet swordfish fishery also has very high bycatch, jettisoning approximately 61 percent of everything it catches, on average. Adding another dirty gear to a fishery with disturbingly high discard rates will only complicate and delay progress toward reducing bycatch in the West Coast swordfish fishery. Selective, alternative gear, such as deep-set buoy gear, must be promoted and utilized to build a responsible and sustainable swordfish fishery off the U.S. West Coast.

[1]K.A. Curtis, J. Moore, and S. Benson. 2015. Estimating Limit Reference Points for Western Pacific Leatherback Turtles (Dermochelys coriacea) in the U.S. West Coast EEZ. PLoS One DOI:10.1371/journal.pone.0136452

[2]NMFS. 2017. Hawaii shallow-set longline observer data. Freedom of Information Act release.

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Audubon CALIFORNIA

Phil Anderson, Chair
Pacific Fishery Management Council
1100 NE Ambassador Place, #101
Portland, Oregon 97220

August 27, 2018

Re: Agenda Item H.6: Swordfish Management and Monitoring Plan

Dear Chair Anderson and Council Members:

We write to ask that the Council discontinue consideration of a west coast-based longline fishery under the Highly Migratory Species Fishery Management Plan (HMS FMP). Specifically, we ask the Council remove actions in the Swordfish Management and Monitoring Plan to introduce a west coast-based longline fishery, and also remove these actions from the Council's year-at-a-glance calendar. Of highest concern to Audubon is the black-footed albatross (*Phoebastria nigripes*) (BFAL). The recovery of this species has stalled and is likely being constrained by adult mortality via longline bycatch throughout its range.[1,2,3,4]

Audubon has previously submitted to the Council two letters opposing development of new west coast longline fisheries, due to unacceptable impacts to BFAL. Since that time, longline bycatch of BFAL in the Hawaii-based fishery has increased, global longline effort remains poorly understood and may be increased, and demographic models have been refined showing higher potential vulnerability of BFAL to fisheries bycatch than thought previously. At stake is the future of one of our three magnificent north Pacific albatrosses, which agencies, funders, and private groups have spent millions of dollars over many decades to recover and protect.

Background
BFAL use area east of the west coast EEZ extensively, especially during the breeding season (Figure 1).[5] The area east of 150 degrees west is important foraging area for all three species of

[1] Guy, T. et al. 2013. Overlap of North Pacific albatrosses with the U.S. West Coast groundfish and shrimp fisheries. Fisheries Research 147 (2013) 222-234
[2] Bakker, V., M. Finkelstein, D. Doak, L. Young, E. VanerWerf, and P.Sievert, 2018. The albatross of assessing and managing risk for long-lived pelagic seabirds. *Biological Conservation* 217: 83-95.
[3] Veran, S., Gimenez, O., Flint, E., Kendall, W.L., Doherty, P.F., Jr., Lebreton, J.-D., 2007. Quantifying the impact of longline fisheries on adult survival in the black-footed albatross. Journal of Applied Ecology 44, 942-952.
[4] Lebreton, J.-D., Veran, S., 2013. Direct evidence of the impact of longline fishery on mortality in the Black-footed Albatross Phoebastria nigripes. Bird Conservation International 23, 25-35.
[5] Agreement on the Conservation of Albatrosses and Petrels. 2015. Species Profiles: Black-footed albatross (Phoebastria nigripes.) http://www.acap.aq/en/resources/acap-species2/239-black-footed-albatross/file

North Pacific albatrosses.[6] The total breeding population of the BFAL numbers roughly 67,000 pairs, with 95 percent of the population nesting in the Northwestern Hawaiian Islands. Albatrosses are long-lived seabirds with deferred maturity, low fecundity and natural high rates of adult survival. These life history characteristics make albatross populations especially vulnerable to small increases in adult mortality. According to the *U.S.G.S. Status Assessment of Laysan and Black-footed Albatrosses, North Pacific Ocean, 1923-2005* (herein referred to as Arata et al. 2009), "incidental mortality (bycatch) in commercial fisheries is the greatest anthropogenic source of mortality (postfledging) for both species….the black-footed albatross breeding population currently may be at risk of decline due to fishery bycatch."[7] A recent definitive study on the overlap of black-footed albatross foraging range with some sectors of the west coast groundfish fleet notes that "low fishing mortality is of conservation concern because fishing mortality is often underestimated and albatrosses are far-ranging and can suffer mortality in many fisheries, resulting in cumulative negative population level impacts."[8]

Other threats to BFAL include predation by introduced mammals, reduced reproductive output due to contaminants, nesting habitat loss and degradation due to human development and invasive plant species, and potential loss and degradation of habitat due to climate change and sea-level rise.[9]

New information showing increased fisheries bycatch and North Pacific longline effort

Bakker & Finkelstein (2018 and 2017)[10,11] building on Arata (2009) have developed and refined population models for BFAL showing the extreme sensitivity of the species to small increases in fisheries bycatch. The Potential Biological Removal (PBR) is an estimate of human caused mortality a population can withstand while recovering towards or maintaining an optimal sustainable population. The PBR approach is mandated for stock assessments under the Marine Mammal Protection Act and has been employed extensively to assess bycatch mortality for sea turtles and well as land and seabirds including albatrosses.[12] For decades, estimated bycatch from all fisheries likely exceeded the traditional PBR value of 5600 birds, illustrating that bycatch is indeed high enough to potentially limit BFAL population growth.

Bakker & Finkelstein (2017) further note that "Increases in BFAL bycatch are predicted to have minimal population level effects if they occur only in Hawaiian fisheries and are temporary or episodic. Likewise, effects are predicted to be relatively small if bycatch increases occur only in

[6] Finkelstein, M., Keitt, B.S., Croll, D.A., Tershy, B., Jarman, W.M., Rodriguez-Pastor, S., Anderson, D.J., Sievert, P.R., Smith, D.R., 2006. Albatross species demonstrate regional differences in North Pacific marine contamination. Ecological Applications 16, 678-686.

[7] Arata, J.A., Sievert, P.R., and Naughton, M.B., 2009, Status assessment of Laysan and black-footed albatrosses, North Pacific Ocean, 1923–2005: U.S. Geological Survey Scientific Investigations Report 2009-5131.

[8] Guy, T. et al. 2013. Ibid.

[9] Arata et al. 2009. Ibid.

[10] Bakker, V., M. Finkelstein, D. Doak, E. VanderWerf, L. Young, J. Arata, P. Sievert, and C. Vanderlip. 2018. The albatross of assessing and managing risk for long-lived pelagic seabirds. *Biological Conservation* 217: 83-95.

[11] Bakker, V. and M. Finkelstein. 2017. Potential impacts of recent increases in Hawaiian longline bycatch on the population dynamics of black-footed albatross *Phoebastria nigripes*. From: Workshop on the factors influencing albatross interactions in the Hawaii longline fishery: towards identifying drivers and quantifying impacts. Western Pacific Fishery Management Council. November 7-9.

[12] Dillingham, P.W., Fletcher, D., 2011. Potential biological removal of albatrosses and petrels with minimal demographic information. Biological Conservation 144, 1885-1894.

Hawaiian fisheries and stabilize at 2015 and 2016 levels. However, in scenarios in which bycatch increases occur in all fisheries, either permanently or episodically, BFAL population growth is substantially affected, with predicted future trajectories at best stable or at worst declining dramatically. Indeed, BFAL populations are predicted to decline as much as 95% by 2040 if total BFAL bycatch has increased proportional to Hawaiian bycatch."

While total BFAL bycatch is unknown, is has been increasing in the Hawaii-based longline fisheries, prompting research and review by NMFS and the Western Pacific Fishery Management Council.[13] In 2017, BFAL bycatch increased in the shallow- and deep-set fleet to 509 birds, which is 36% over average 2010-2016 levels (Table 1). According to a recent study, these increases may be linked to decreasing central North Pacific ocean productivity, which declined 1.1% per year from 1998-2012. During periods of lower ocean productivity, Laysan and BFAL albatrosses appear to preferentially attend vessels and obtain a larger food subsidy from longline fishing vessels.[14]

BFAL bycatch in foreign fleets in poorly understood, but distant-water longline fleet size in China has expanded.[15,16] If total North Pacific longline fleet size is increasing, and albatrosses are increasingly attending vessels, overall bycatch may be increasing. Finally, new research conducted by NMFS has begun to quantify BFAL bycatch in the west coast catcher-processor fleet, comprised of nine vessels. In a 12-month period from 2016-2017, an estimated 58 BFAL were killed during fleet operations by bird strikes on wires and cables.[17]

Conclusion

Due to high levels of bycatch of protected and recreationally important species, longlines have been prohibited off the west coast since 2004[18] and in California since 1989.[19] Fortunately, new gears with lower bycatch offer alternatives for targeting swordfish and have wide public support.[20] We very much appreciate the proactive actions on the part of the Council to protect seabirds over the last several years, including new regulations requiring seabird bycatch mitigation measures in the west coast fleet, protection of the food base through the unmanaged forage species initiative, and 100% observer coverage in many fleets. At its September meeting,

[13] Workshop on the factors influencing albatross interactions in the Hawaii longline fishery: towards identifying drivers and quantifying impacts. Western Pacific Fishery Management Council. November 7-9.
[14] Gilman, E., M. Chaloupka, J. Peschon, and S. Ellgen. 2016. Risk factors for seabird bycatch in a pelagic longline tuna fishery. *PLOS One* 11(5). May 18.
[15] Bycatch in longline fisheries for tuna and tuna-like species: a global review of status and mitigation measures. 2014. United Nations Food and Agriculture Organization. http://www.fao.org/3/a-i4017e.pdf (pg 102)
[16] Tuna Fishery Yearbook 2016. Western and Central Pacific Fisheries Commission. file:///C:/Users/aweinstein/Desktop/YB_2016_0.pdf Pg 9.
[17] Jannot, J. E., T. Good, V. Tuttle, A. M. Eich, and S. Fitzgerald, editors. 2018. U.S. West Coast and Alaska Trawl Fisheries Seabird Cable Strike Mitigation Workshop, November 2017: Summary Report. U.S. Department of Commerce, NOAA Technical Memorandum NMFSNWFSC-142. https://doi.org/10.7289/V5/TM-NWFSC-142
[18] Final rule to prohibit shallow longline sets east of 150° W, 50 CFR Part 223, Fed. Reg. Vol. 69, No. 48, Thursday, March 11, 2004.
[19] In 1989 with the enactment of Section 9028 of the Fish and Game Code, the California Legislature prohibited pelagic longline fishing off the California coast by banning the use of hook and line fishing gear longer than 900 feet.
[20] Shively, P. and T. Brock. Pew Trusts comment under H.6 to the PFMC. September, 2018.

we respectfully ask that the Council follow a similarly prudent approach in the case of longline fisheries.

Thank you for your support and service to our healthy fisheries and oceans.

Sincerely,

Anna Weinstein
Marine Program Director

Year	Shallow set	Deep set	Total
2010	38	66	104
2011	19	73	92
2012	37	167	204
2013	28	257	285
2014	29	160	189
2015	41	535	576
2016	44	380	424
2017	51	458	509

Table 1. Number of black-footed albatrosses captured in Hawaii-based longline fisheries. Shallow set data is observed and deep set is estimated/extrapolated from ~20% observer coverage. Compiled from: NMFS. http://www.fpir.noaa.gov/OBS/obs_hi_ll_ds_rprts.html

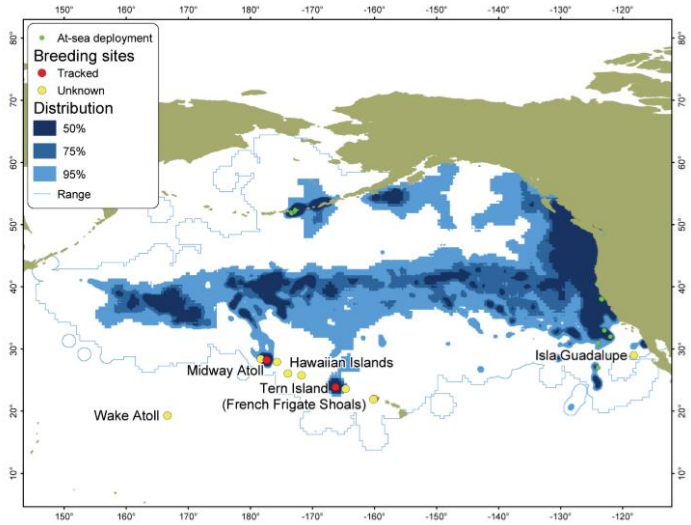
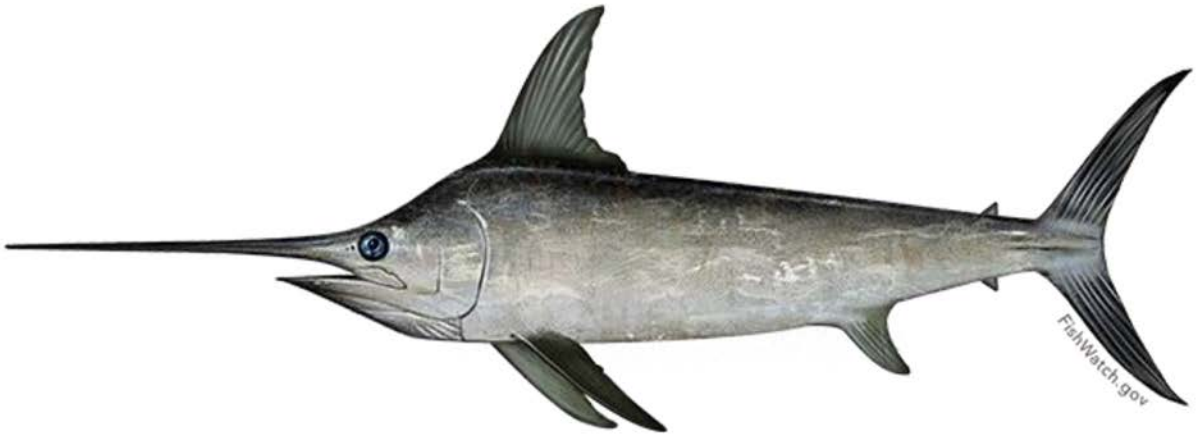


Figure 1. Satellite tracking of non-breeding adult black-footed albatrosses, spring/summer. From: Agreement on the Conservation of Albatrosses and Petrels. 2015. Species Profiles: Black-footed albatross (*Phoebastria nigripes.*) http://www.acap.aq/en/resources/acap-species2/239-black-footed-albatross/file

Providing Domestically Caught U.S. West Coast Swordfish:

How to Achieve Environmental Sustainability and Economic Profitability



Geoff Shester, Ph.D., Oceana California Campaign Director and Senior Scientist
Erin Kincaid, Oceana Pacific Marine Scientist
Carlito Turner, Oceana Research Associate
Ben Enticknap, Oceana Pacific Campaign Manager and Senior Scientist
August 2018

OCEANA Protecting the World's Oceans

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Cover image: NOAA

Introduction

The California Current Large Marine Ecosystem off the U.S. West Coast is one of the richest temperate marine ecosystems in the world. Fueled by life-giving swarms of krill and forage fish like sardine and anchovy, these productive waters support a wide diversity of marine life including large and diverse populations of whales, dolphins, sea turtles and sea birds, as well as top ocean predators like white sharks, bluefin tuna and swordfish that travel here to feed. The California Current ecosystem also supports many recreational and commercial fisheries. One of those fisheries, the U.S. West Coast drift gillnet swordfish fishery, is at a major crossroad.

Drift gillnets targeting swordfish stretch up to one mile in length and are deployed at night amid this epicenter of ocean wildlife off California. This fishery is one of the dirtiest fisheries in the Nation in terms of its overall bycatch rate and impact to protected marine life. On average, the fishery throws overboard more animals than those kept. It also kills more dolphins than all other observed West Coast fisheries combined. Despite gear modifications to reduce marine mammal interactions and area closures to protect endangered sea turtles, major ecological concerns remain with the unacceptably high levels of bycatch associated with this fishing method. In addition, many fishermen have left the fishery and landings in California have decreased by 57 percent from 2008 to 2018.[1] Fortunately, however, there are other ways to catch swordfish that are cleaner and profitable.

The National Marine Fisheries Service (NMFS) and federal Pacific Fishery Management Council (Council) are considering alternative swordfish fishing gears like shallow-set longlines, deep-set longlines, and deep-set buoy gear.[2] If these fishing gears can maximize catch efficiency and minimize bycatch, they have the potential to replace drift gillnets and revitalize West Coast commercial swordfish fishing. In 2015, the Council and NMFS proposed regulations to implement strict limits—called hard caps—to limit the take of the nine most at-risk species of whales, dolphins, and sea turtles in the drift gillnet swordfish fishery. However, in 2017, NMFS withdrew its proposed rule claiming detrimental economic impacts, without providing the Council the opportunity to correct or address the issue. The Council also approved new monitoring requirements, including 100% observer coverage or electronic monitoring, to be phased in by 2018, and a suite of performance metrics to measure bycatch of other marine mammals and finfish. However, NMFS decided not to adopt these requirements and observer coverage in the fishery has remained below 20 percent on average.

The decline in U.S. West Coast swordfish landings raises concerns about the bycatch impacts of foreign-caught swordfish imports. While the extent of such a transfer effect is likely small (U.S. drift gillnet landings represent roughly 1% of U.S. swordfish consumption)[3], such concerns can be directly addressed by promoting clean domestic fisheries and banning imports from countries that do not meet U.S. standards. As fishery managers on the U.S. West Coast search

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[1] PFMC. Swordfish Landings by fishery, 2008-2017. 2018. Agenda Item G.7 Attachment 2 https://www.pcouncil.org/wp-content/uploads/2018/05/G7_Att2_Landings_of_swordfish_2008-2017_Jun2018BB.pdf

[2] NMFS. Status of Exempted Fishing Permits. Available: http://www.westcoast.fisheries.noaa.gov/fisheries/migratory_species/status_exempted_permits.html

[3] California State Senate Appropriations Analysis, April 30, 2018. In 2015 DGN swordfish landings totaled 72.5 metric tons, while nearly 11,000 metric tons of swordfish were imported into the U.S. http://leginfo.legislature.ca.gov/faces/billAnalysisClient.xhtml?bill_id=201720180SB1017#

for ways to boost waning regional swordfish catches, understanding the benefits and drawbacks of different gear types is essential. To that end, this report contains a comparative analysis of the gear types utilized in North American swordfish fisheries, with recommendations for how alternative gear types can best replace destructive drift gillnets. This analysis concludes with a transition plan for the drift gillnet fleet to deep-set buoy gear and harpoon gear that could lead to a clean and productive West Coast swordfish fishery.

Bycatch

"Bycatch" refers to the incidental catch, discarding, and resultant injury or mortality of non-target fish, protected marine species and seabirds in fisheries.[4] Under the Magnuson-Stevens Fishery Conservation and Management Act, Regional Fishery Management Councils and NMFS have an ongoing responsibility to minimize and avoid bycatch.[5] As stated in the National Oceanic Atmospheric Administration (NOAA) National Bycatch Report:

> *Ensuring the sustainability of marine resources for future generations is the primary mission of the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS). Reducing the unintentional capture, or bycatch, of fish, marine mammals, sea turtles, and seabirds is an essential part of this goal and is required under NMFS' guiding legislation.*[6]

Under the law, conservation and management measures are required to minimize and avoid bycatch. Bycatch should be avoided, but where it cannot be avoided, managers must work to minimize the mortality of bycatch. In some fisheries, like the U.S. West Coast swordfish fishery, different gear types can be used that are more selective than drift gillnets, thus target species can be selectively caught, avoiding the take of non-target marine life in the first place.

The Drift Gillnet Fishery

Drift gillnets are an unselective fishing gear used off the California coast to catch swordfish and thresher sharks. The enormous nets, which can measure over a mile in length and two hundred feet in height, drift near the surface at night in the open ocean and indiscriminately entangle many forms of marine life. Due to this, drift gillnets have been internationally recognized as harmful. The practice is banned in many places around the globe including the Mediterranean Sea and on the international High Seas. In the United States, domestic concerns over swordfish drift gillnet gear have led to prohibitions in all coastal states except California. [7,8,9]

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[4] NOAA: Policy Directive (2.7.2006).
[5] Magnuson Stevens Fishery Conservation and Management Act, 16 U.S.C. § 1853(a)(11).
[6] National Marine Fisheries Service. 2011. U.S. National Bycatch Report [W. A. Karp, L. L. Desfosse, S. G. Brooke, Editors]. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/SPO-117E, 508 p.
[7] PFMC. 2013, Status of the U.S. West Coast Highly Migratory Species Fisheries through 2013. Stock Assessment and Fishery Evaluation Report (SAFE).
[8] PFMC. 2011. Fishery Management Plan for U.S. West Coast Fisheries for Highly Migratory Species: As Amended Through Amendment 2.
[9] NMFS. 2013. Amendment 8 to the 2006 Consolidated Atlantic Highly Migratory Species Fishery Management Plan: Commercial Swordfish Management Measures. 2013.

The California-based drift gillnet fishery discards more animals than it retains. According to data from the NOAA Drift Gillnet Fishery Observer Program, from 2008 to 2018, the drift gillnet fishery discarded approximately 52 percent of all animals caught.[10] A few examples of the frequently discarded species include ocean sunfish (*Mola mola*), blue sharks, pelagic stingrays, and shortfin mako sharks.

NMFS estimates of marine mammals, seabirds, and sea turtles caught in the DGN fishery from 2001-2015.

753 Dolphins
507 Seals and Sea Lions
112 Seabirds
53 Whales
35 Sea Turtles

Source: Carretta JV, Moore JE, Forney KA (2017) Regression tree and ratio estimates of marine mammal, sea turtle, and seabird bycatch in the California drift gillnet fi shery: 1990-2015. NOAA Technical Memorandum, NOAA-TM-NMFS-SWFSC-568. 83 p. Tables 4-39.

© NOAA, 1997. Short beaked common dolphin killed in a California swordfish drift gillnet. Its tail fin is cut off.

From 2001-2015, NMFS estimates that the California drift gillnet fishery caught over 1,400 marine mammals, seabirds and sea turtles.[11] All dolphins were killed, and only a handful of the large whales, turtles and sea lions escaped without serious injury or death. In addition, more than 140,000 fish, including tens of thousands of sharks were thrown overboard.[12] In response to the take of marine mammals in the 1990s, bycatch reduction measures including buoy line extenders and acoustic pingers — devices that emit noise to keep marine mammals away from nets — were made mandatory in 1997. However, there have only been modest improvements in protected species interaction rates in the fishery; from 1990 to 2000, a combined 13.7 marine mammals, sea turtles, and sea birds were caught per 100 drift gillnet sets. From 2004 to 2014, this number fell only marginally to 10.8 per 100 sets.[13] A few of the protected species caught by the drift gillnet fleet include humpback, gray, and minke whales, bottlenose dolphins, Pacific white-sided dolphins, leatherback sea turtles, California sea lions, and Northern elephant seals.

[10] NOAA. 2017. West Coast Region Observer Program. http://www.westcoast.fisheries.noaa.gov/fisheries/wc_observer_programs/sw_observer_program_info/data_summ_report_sw_observer_fish.html
[11] Carretta JV, Moore JE, Forney KA (2017) Regression tree and ratio estimates of marine mammal, sea turtle, and seabird bycatch in the California drift gillnet fishery: 1990-2015. NOAA Technical Memorandum, NOAA-TM-NMFS-SWFSC-568. 83 p. Tables 4-39.
[12] NOAA. 2017. West Coast Region Observer Program. http://www.westcoast.fisheries.noaa.gov/fisheries/wc_observer_programs/sw_observer_program_info/data_summ_report_sw_observer_fish.html
[13] *Id.*

Drift gillnets also threaten endangered sperm whales living in the California Current ecosystem. In 2010, two sperm whales were observed caught by the California drift gillnet fleet. One of the whales was confirmed dead and the other whale sustained serious injuries that were likely fatal.[14] These mortalities exceeded the potential biological removal (1.5 animals)—the maximum number of deaths that the population can sustain and still recover — set at the time for the endangered whales under the Marine Mammal Protection Act.[15] The two sperm whale mortalities occurred in a set where an onboard observer noted that the acoustic pingers were functioning, both before and after the whales were killed.[16] NMFS originally estimated 16 sperm whales were injured or killed by the drift gillnet fleet in 2010 and issued emergency regulations in 2013 requiring hard caps on sperm whale bycatch and 100 percent observer coverage.[17] However, these protections were removed following NMFS's recalculation of potential biological removal and mortality estimates. Since 2010, the observer program has documented the fishery killing gray whales, northern right whale dolphins, shortfin pilot whales, Risso's dolphins, sea lions, elephant seals and porpoises. Furthermore, the fishery continues to catch critically endangered Pacific leatherback sea turtles, including an observed interaction in 2012.[18] NMFS estimates the fishery killed or seriously injured six leatherback sea turtles from 2001-2015.[19] Despite the efforts of fishery managers, bycatch reduction measures have failed to end the indiscriminate killing of marine life.

[14] Carretta, James V., and L. Enriquez. 2012. Marine Mammal and seabird bycatch in California gillnet fisheries in 2010. NOAA Fisheries. Administrative Report LJ-12-01. https://swfsc.noaa.gov/uploadedFiles/Divisions/PRD/Programs/Coastal_Marine_Mammal/2010_Bycatch_Estimates_Carretta_Enriquez%20LJ-12-01.pdf

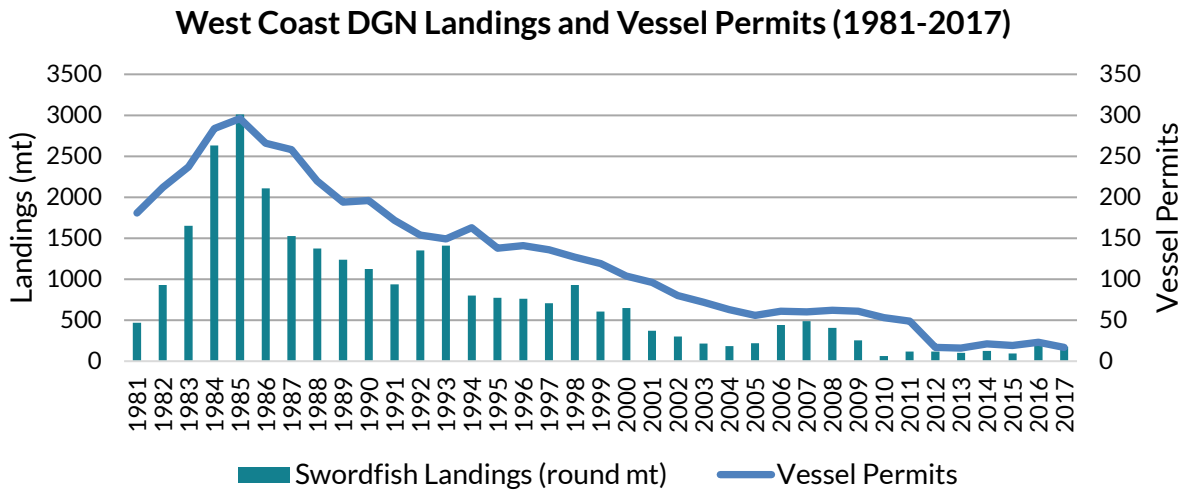
[15] NMFS. 2014. Recommendations from the Pacific Offshore Cetacean Take Reduction Team to Minimize Sperm Whale Interactions in the West Coast Swordfish Drift Gillnet Fishery. 2014. Agenda Item K.5.b. http://www.pcouncil.org/wp-content/uploads/K5b_NMFS_RPT_POCTRT_MAR2014BB.pdf

[16] Carretta, James V., and L. Enriquez. 2012. Marine Mammal and seabird bycatch in California gillnet fisheries in 2010. NOAA Fisheries. Administrative Report LJ-12-01.

[17]http://www.westcoast.fisheries.noaa.gov/publications/fishery_management/swr_observer_program/dgn_observer_fleet_notice_2013.pdf

[18] NOAA. 2017. West Coast Region Observer Program. http://www.westcoast.fisheries.noaa.gov/fisheries/wc_observer_programs/sw_observer_program_info/data_summ_report_sw_observer_fish.html

[19] Carretta JV, Moore JE, Forney KA (2017) Regression tree and ratio estimates of marine mammal, sea turtle, and seabird bycatch in the California drift gillnet fi shery: 1990-2015. NOAA Technical Memorandum, NOAA-TM-NMFS-SWFSC-568. 83 p. Tables 4-39.



West Coast DGN landings and vessel permits. Source: PFMC HMS SAFE 2012, Swordfish Landings by fishery, 2008-2017.

In addition to high levels of bycatch, participation and landings in the drift gillnet fishery are also declining. In California, annual landings by the drift gillnet fleet have declined since peaking at 2,198 metric tons (mt) in the mid-1980s.[20] In 2017, the California drift gillnet fleet landed approximately 176 mt of swordfish.[21] Participation has also dropped precipitously; from 2000 to 2017 the number of drift gillnet permits that have been actively fishing declined by 86 percent, from 119 to just 17.[22]

Exploring North American Swordfish Fisheries and Alternative Gears Used to Catch Swordfish

Alarmingly high levels of bycatch, frequent interactions with endangered and protected species, decreasing swordfish landings, and declining participation by fishermen, all signal that a transition from drift gillnets to clean gear types is needed. There are a number of other gear types that can be used to catch swordfish. Some of these gear types could help reestablish a productive U.S. West Coast swordfish fishery, while others would only exacerbate current problems. Exploring the methods used by other North American swordfish fisheries demonstrates which alternative gears could help revitalize the U.S. West Coast swordfish fishery.

[20] PFMC. 2012, Status of the U.S. West Coast Highly Migratory Species Fisheries through 2011. Stock Assessment and Fishery Evaluation Report (SAFE).
[21] PFMC. Swordfish Landings by fishery, 2008-2017. 2018. Agenda Item G.7 Attachment 2 https://www.pcouncil.org/wp-content/uploads/2018/05/G7_Att2_Landings_of_swordfish_2008-2017_Jun2018BB.pdf
[22] PFMC. 2014 HMSMT Report: Drift Gillnet Management. 2014. Agenda Item K.5.b. http://www.pcouncil.org/wp-content/uploads/K5b_HMSMT_DGN_MAR2014BB.pdf

Harpoon Gear

In **California**, archeological records show that harpoon fishing for swordfish has been practiced for nearly 3,000 years.[23] While technologies have certainly changed, the fundamentals remain the same. To catch swordfish, fishermen spot the swordfish finning, jumping, or basking near the surface, and strike the fish with a harpoon that is attached to a buoy.

California's modern day swordfish harpoon fishery first developed in the early 1900s. Logbook records from 1974 to 1993 indicate that 74 percent of pursued swordfish were harpooned and 91 percent of the harpooned swordfish were landed.[24] Harpoon gear was once a major contributor to the West Coast swordfish fishery and in 1978 over 300 vessels made nearly 1,700 mt in landings.[25] However, after drift gillnets were authorized by the California legislature as a legal gear type, many harpoon vessels converted to drift gillnets and harpoon participation and landings quickly declined. In 2017, only 24.5 mt of swordfish were landed on the West Coast with harpoon gear.[26] The harpoon fishery is considered highly selective and there is near zero bycatch associated with the fishery.[27] The California harpoon fishery has no documented incidents of marine mammal bycatch.[28]

There is also a **Canadian** harpoon fishery operating in the Atlantic that is allotted just 10 percent of the Canadian national swordfish quota. Holders of type "A" harpoon licenses, which receive the vast majority of the quota, were able to catch their full quota in seven of the eight years from 2002 to 2009.[29] From 2000 to 2013, an average of over 172 mt was landed by harpoon gear in Canada.[30] Like the California harpoon fishery, the Canadian harpoon fishery is clean; there is no bycatch associated with the fishery and there are no expected interactions with endangered or protected species.[31] The Canadian harpoon fishery's steady production for over a decade shows that modern harpoon fisheries can be financially and ecologically viable.

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[23] Kronman, M. 1988. Harpooning: slow but steady improvements in the technology of a timeless skill. Natl. Fisherman, August, p. 5357, as in, Coan Jr, A.L., Vojkovich, M., Prescott, D. 1998. The California Harpoon Fishery for Swordfish, *Xiphias gladius.*
[24] Coan Jr, A.L., Vojkovich, M., Prescott, D. 1998. The California Harpoon Fishery for Swordfish, *Xiphias gladius.*
[25] *Id.*
[26] PFMC. Swordfish Landings by fishery, 2008-2017. 2018. Agenda Item G.7 Attachment 2 https://www.pcouncil.org/wp-content/uploads/2018/05/G7_Att2_Landings_of_swordfish_2008-2017_Jun2018BB.pdf
[27] California Ocean Science Trust. 2013. Rapid Assessments for Selected California Fisheries. http://opc.ca.gov/webmaster/ftp/project_pages/Rapid%20Assessments/CA%20Rapid%20Assessments.pdf
[28] NMFS. 2014. List of Fisheries, 2014. Web. Last Accessed: October 19, 2015.
[29] Intertek Moody Marine (IMM). 2010. North Atlantic Swordfish Canadian Harpoon Fishery Public Certification Report.
[30] ICCAT. 2015. ICCAT Database. Web. Last Accessed: October 20, 2015.
[31] Intertek Moody Marine (IMM). 2010. North Atlantic Swordfish Canadian Harpoon Fishery Public Certification Report.

Shallow-set Longline

© NOAA, 2013. An endangered Pacific leatherback sea turtle ensnared by a Hawaii-based shallow-set longline.

A shallow-set longline (SSLL) consists of a mainline that can measure up to 60 miles long, attached to hundreds or thousands of baited hooks. Shallow-set gear is set from dusk until dawn when targeting swordfish. The **Hawaii-based** shallow-set longline fleet is required to use circle hooks and mackerel-type bait, which have reduced sea turtle interactions. However, this fishery remains problematic; since reopening in 2004, the fishery has been forced to close twice due to excessive interactions with endangered loggerhead and leatherback sea turtles and was shut down in May of 2018 following settlement of a 2012 lawsuit challenging NMFS action to increase caps for sea turtle takes. From 2007 to 2017, the fleet also caught 755 seabirds, 92 marine mammals, and 193 sea turtles.[32] From 2007 to 2017, on board observers noted that 46 percent of the animals caught by this fishery were discarded, often dead or dying (31 percent).[33]

The **U.S. Atlantic** shallow-set longline fishery targets primarily swordfish and tunas. Swordfish caught in the Atlantic Ocean are subject to minimum size requirements and undersized fish must be released.[34] These size regulations are intended to protect juvenile fish, allowing them to grow and reproduce. However, as a result of being caught underwater for hours, hooked juvenile swordfish have little chance at survival. In the Atlantic shallow-set longline fishery, between 2005 and 2011, 71 percent of the swordfish discards were released dead.[35] In 2012, NMFS estimated that U.S. Atlantic SSLL the fishery caught 413 marine mammals, 1,006 leatherback sea turtles, and 681 loggerhead sea turtles.[36] From 2005 to 2011, the U.S. Atlantic SSLL fishery's catch (not including the Gulf of Mexico and Caribbean) had a 49 percent discard rate and only 17 percent of the total catch was comprised of retained swordfish.[37]

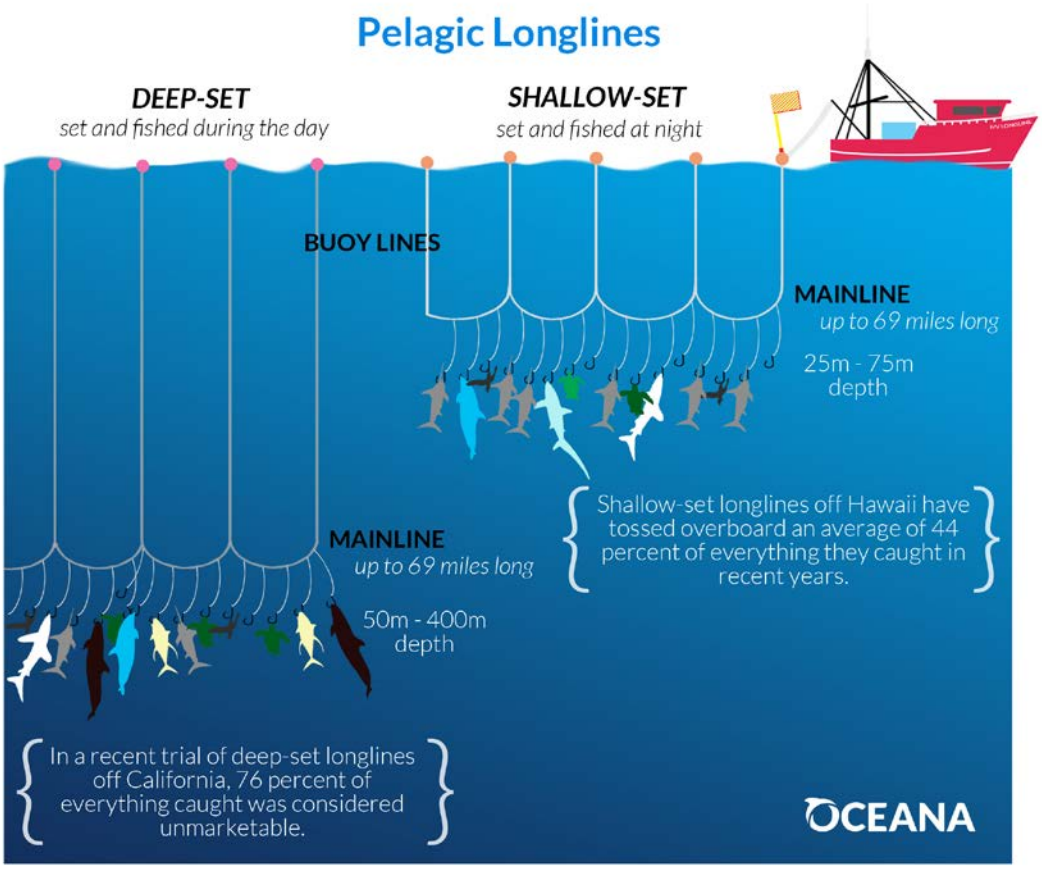
Canada's swordfish fisheries are exclusive to the Atlantic coast and 100 percent of Canadian swordfish catch is exported to the United States.[38] This fishery catches an estimated 1,200 loggerhead sea turtles and 100,000 sharks per year.[39] The fishery also has over eight protected

[32] NOAA. 2014. Pacific Islands Regional Office Observer Program. Hawaii Longline Shallow-set Quarterly and Annual Status Reports. http://www.fpir.noaa.gov/OBS/obs_hi_ll_ds_rprts.html
[33] NMFS. 2017. Hawaii Shallow-set Longline Data (2007-2017). Unpublished data.
[34] NOAA. 2014. NOAA Highly Migratory Species Commercial Compliance Guide. http://www.nmfs.noaa.gov/sfa/hms/compliance/guides/documents/hms_commercial_compliance_guide_april_2014__print_.pdf
[35] MRAG. 2013. MSC Public Certification Report for U.S. North Atlantic Swordfish Pelagic Longline and Handgear Buoy Line Fishery.
[36] NMFS. 2014. Stock Assessment and Fishery Evaluation (SAFE) Report for Atlantic Highly Migratory Species.
[37] MRAG. 2013. MSC Public Certification Report for U.S. North Atlantic Swordfish Pelagic Longline and Handgear Buoy Line Fishery.
[38] Department of Fisheries and Oceans, Canada. 2014. "Swordfish: Species at a glance" Last Accessed October 19, 2015. http://www.dfo-mpo.gc.ca/fm-gp/sustainable-durable/fisheries-peches/swordfish-espadon-eng.htm
[39] Christian, Claire, et al. 2013. "A review of formal objections to Marine Stewardship Council fisheries certifications." *Biological Conservation* 161: 10-17.

species (marine mammals, sea turtles, and sea birds) interactions for every 100 retained swordfish it lands; this is a higher rate than any of the other fisheries assessed in this report. Observer data shows that 51 percent of the catch was discarded between 2002 and 2009.[40] Despite the high levels of bycatch in the Canadian SSLL fishery, the fleet is allotted 90 percent of Canada's national swordfish quota.

Deep-set longline

This report focuses on the shallow-set longline fishery because deep-set longlines primary targets include tunas. However, an alternative experiment using deep-set longline gear was recently conducted off **California**. The results are discouraging. Just 24 percent of the catch was marketable species and less than two percent of the total catch was swordfish.[41] In these experimental trials, over 40 unmarketable blue sharks were caught for every swordfish. Deep-set longline gear is similar to shallow-set longline gear, however deep-set longlines are deployed at greater depths and fished during the day. The low percentage of target catch along with high bycatch rates make deep-set longline gear a poor alternative for the West Coast swordfish fishery.



Both shallow-and deep-set longlines off Hawaii discard important and iconic marine life accidentally caught during fishing, including sea turtles, sharks, whales, albatrosses, and dolphins.

[40] Intertek Moody Marine (IMM). 2011. North Atlantic Swordfish Canadian Pelagic Longline Fishery. Volume 1: Final Report and Determination.
[41] Dewar, H., Kohin, S. 2014. Deep-Set Longline Study. Agenda Item K.5.b. NMFS SWFSC Report. http://www.pcouncil.org/wp-content/uploads/K5b_NMFS_SWFSC_ALTERNATIVE_GEAR_MAR2014BB.pdf

Deep-Set Buoy Gear

In 2006, a deep-set buoy gear fishery was established on the **U.S. Atlantic Coast**. There, fishing takes place at night, with one to two hooks attached to each buoy. Buoys are deployed and retrieved by hand and a vessel will normally deploy 11 to 14 buoys per trip. Between 2007 and 2012, the number of vessels participating in the fishery increased from 42 to 55.[42] Landings from logbook records show that the catch composition during that time period was over 90 percent swordfish.[43] Atlantic buoy gear is also subject to minimum size requirements for swordfish, but because buoy gear is constantly monitored, hooked bycatch is quickly landed and released; subsequently the fishery has very low rates of bycatch mortality. According to logbook records, between 2007 and 2012, 92 percent of the swordfish discarded were released alive.[44] This means that high numbers of released juvenile swordfish may grow large enough to reproduce. The Atlantic buoy gear fishery has low bycatch interaction rates and NMFS has determined that the likelihood of buoy gear injuring marine mammals and protected species is remote.[45]

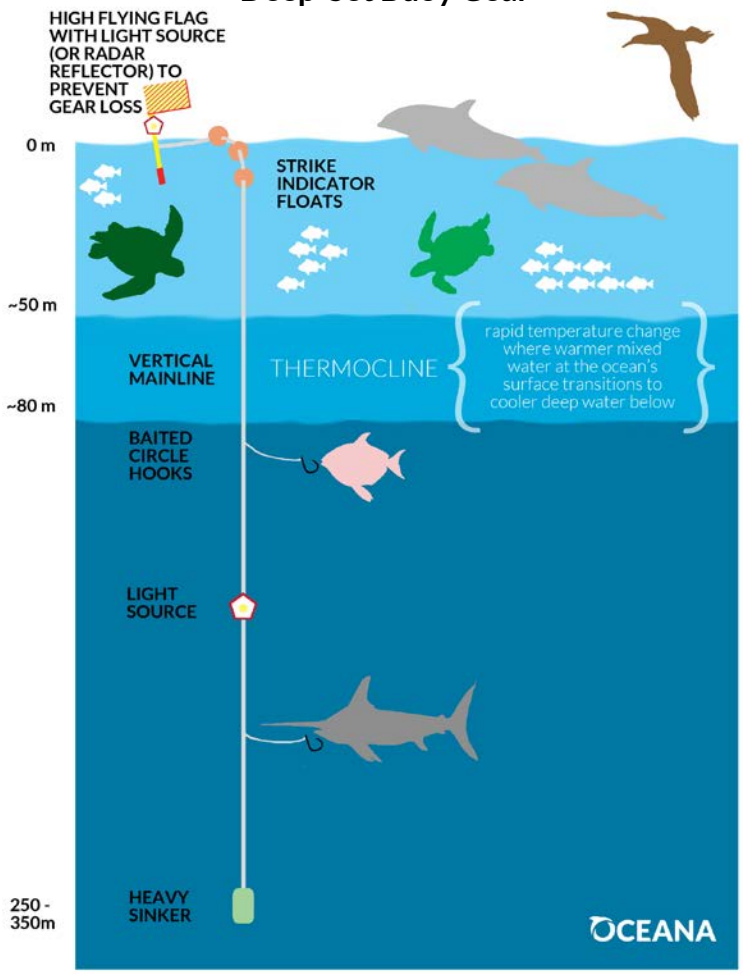
In 2011, researchers and fishermen began testing the use of deep-set buoy gear to target swordfish off **California,** modeled on the commercially successful swordfish fishery in the Atlantic Ocean. Each buoy is connected to a single vertical line with two to three branch lines and baited hooks. The gear is deployed at depths between 250 meters and 350 meters (820 feet to 1148 feet) during the daytime, far below the surface depths where species like sea turtles frequently swim. Commercial fishing trials began in 2015, after four years of successful research trials demonstrated the gear could be profitable and had minimal bycatch. The commercial fishing trials, authorized under exempted fishing permits issued by NMFS, have further confirmed these successful results. Results from the deep-set buoy gear commercial trials in California are demonstrate profitability and minimal bycatch, and the Pacific Fishery Management Council has scheduled authorization of the gear for March 2019.

From 2011 to 2017, more than 98 percent of fish caught in deep-set buoy gear off California were marketable species. There were no sea turtle takes, and only two marine mammal interactions (Northern elephant seals) where the animals were quickly released alive. The catch was primarily swordfish (approximately 83 percent), followed by bigeye thresher shark (approximately 12 percent), and the remainder was various shark species, escolar, and opah.[46] Unlike many other gear types, deep-set buoy gear is actively tended by fishermen, and when a bite is detected the gear is immediately hauled in; this means that if bycatch is captured, it can be released quickly with a high probability of post-release survival. In fact, all non-marketable species captured in experimental and commercial trials to date were released alive.[47] Swordfish caught by deep-set buoy gear are a higher value product pound for pound than drift gillnet or

[42] NMFS. 2014. Stock Assessment and Fishery Evaluation (SAFE) Report for Atlantic Highly Migratory Species.
[43] *Id.*
[44] *Id.*
[45] NMFS. 2013. Amendment 8 to the 2006 Consolidated Atlantic Highly Migratory Species Fishery Management Plan: Commercial Swordfish Management Measures. 2013.
[46] Exempt Fishery Proposal Application for Deep-Set Buoy Gear. Pfleger Institute of Environmental Research. February 2015. http://www.pcouncil.org/wp-content/uploads/H3a_Att2_PIER_MAR2015BB.pdf; PFMC. 2015-2017 PIER Deep-set Buoy Gear EFP. June 2018. Agenda Item G.4 https://www.pcouncil.org/wp-content/uploads/2018/05/G4_Att1_PFMC_2017-2018.BB_.PIER-DSBG.EFP_.Update_Jun2018BB.pdf
[47] *Id.*

pelagic longline caught swordfish (imported and domestic), due to greater freshness, quality, and market demand for sustainable seafood. From 2015-2017, the average market price for swordfish caught with deep-set buoy gear (2015-2017) was $6.53 per pound, versus $3.92 per pound for drift gillnet caught swordfish.[48] A higher market price for selective gear increases its profitability and economic viability. Switching to deep-set buoy gear may involve initial transition costs, with more time required to set and retrieve the gear relative to deploying a drift gillnet. Deep-set buoys, however, may provide fishermen with additional opportunities to fish in locations that are off limits to drift gillnets per existing regulations and where pelagic longlines are banned due to bycatch interactions.[49] High levels of targeted catch and low levels of discard mortality make deep-set buoy gear a profitable, low-bycatch alternative to drift gillnets, with potential to increase domestic landings of swordfish on the U.S. West Coast.

Deep-Set Buoy Gear



Deep-set buoy gear targets swordfish and secondary species like opah, thresher sharks, and mako sharks below the thermocline during the daytime, depths that greatly reduce interactions with marine mammals and sea turtles.

[48] PFMC. Swordfish Landings by fishery, 2008-2017. June 2018. Agenda Item G.7 Attachment 2 https://www.pcouncil.org/wp-content/uploads/2018/05/G7_Att2_Landings_of_swordfish_2008-2017_Jun2018BB.pdf

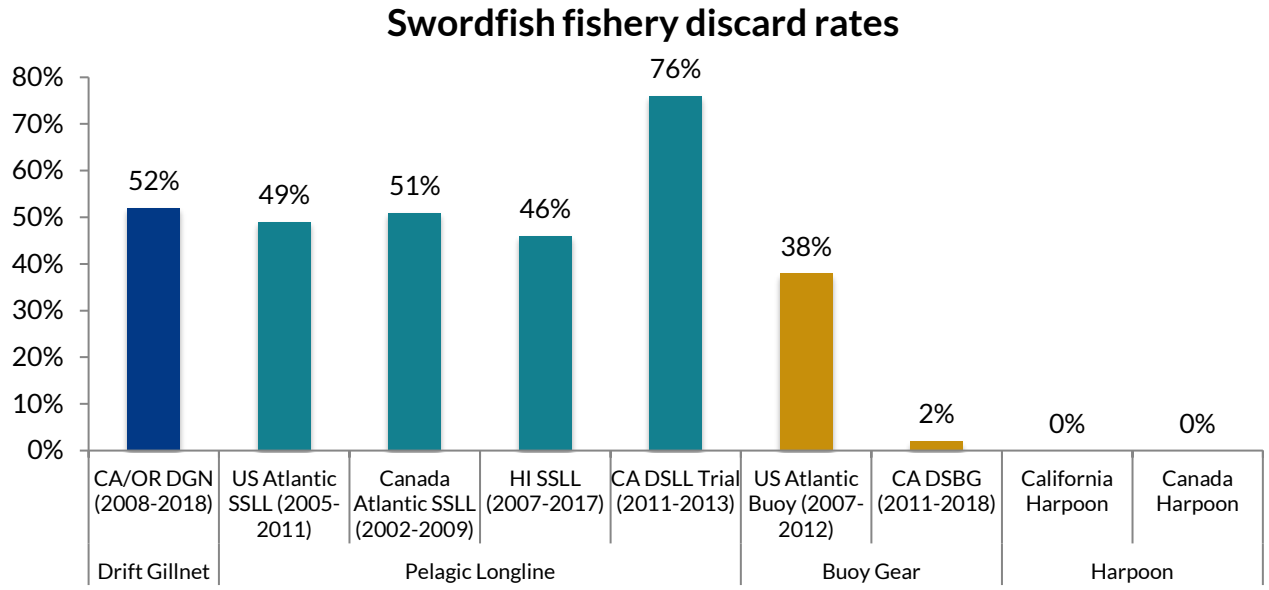
[49] Sepulveda et. al. Testing Modified Deep-Set Buoy Gear to Minimize Bycatch and Increase Swordfish Selectivity. 2014.

Comparison of Swordfish Fisheries

A side-by-side comparison across swordfish fisheries can show us which gear types may be best suited to transition the West Coast swordfish fishery to clean and sustainable methods. For this analysis we compared discard rates, discard mortality, percentage of total catch that is swordfish, and sensitive species caught per retained swordfish across North American swordfish fisheries. These metrics were selected because they help address current concerns in the fishery regarding total catch and selectivity. When compared, these data help elucidate the best options for a clean and productive swordfish fishery on the West Coast.[50]

Discard Rate

The discard rate measures the percentage of the total catch that is discarded. Discards can be alive or dead and include undersized target catch, non-target species, or even protected species—like whales and sea turtles. The drift gillnet fishery has the highest discard rate of any of the commercial fisheries assessed. During a ten-year period from 2008 to 2018, the drift gillnet fishery discarded 52 percent of its catch. Data revealed that commercial longline fisheries also have high discard rates, ranging from 46 percent to 51 percent. For the experimental fisheries (deep-set longlines and deep-set buoy gear) non-marketable species have been used as a proxy for discards because non-marketable species have no economic value and are likely to be discarded. The experimental California deep-set longline catch was comprised of an astounding 76 percent non-marketable species. While Atlantic deep-set buoy gear is highly selective for swordfish, size-limit regulations prevent the retention of undersize fish, so most of the discards are juvenile swordfish. The California deep-set buoy gear trials revealed that less than two percent of the catch was non-marketable species and the harpoon fisheries are estimated to have a discard rate of zero.

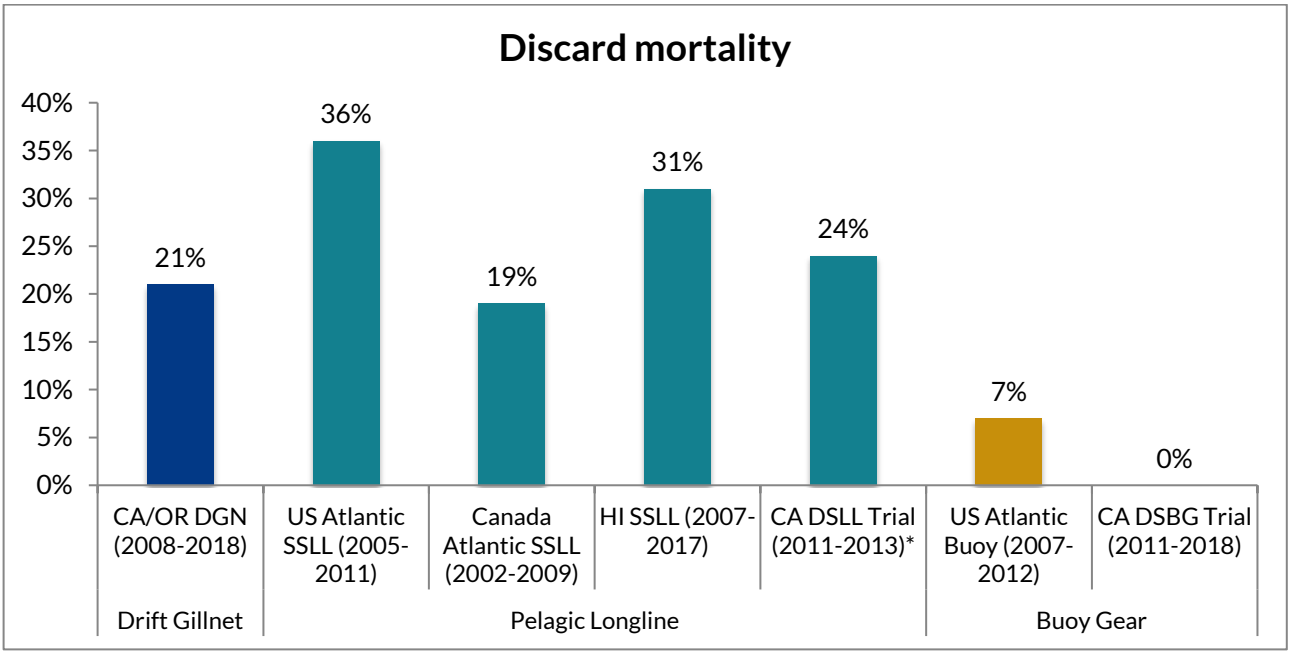


[50] Note: The sources for all data used in these comparisons can be found in the references section. Data that was collected by onboard observers has been used (to the extent available) for the purposes of this analysis.

Discard Mortality

Not all discards are released dead. Discard mortality measures the percentage of discards that are discarded dead, injured, or in an unknown state. However, it does not include potential post-release mortality, which can be high for some species but is not currently assessed. The process of being caught in nets or on hooks can be traumatic. Some animals that are released may live for several hours or days before succumbing to injuries. Due to insufficient species-specific scientific studies, these post-release mortalities are difficult to calculate and are not counted in discard mortality estimates, thus the figures for discard mortality likely underrepresents total mortality.

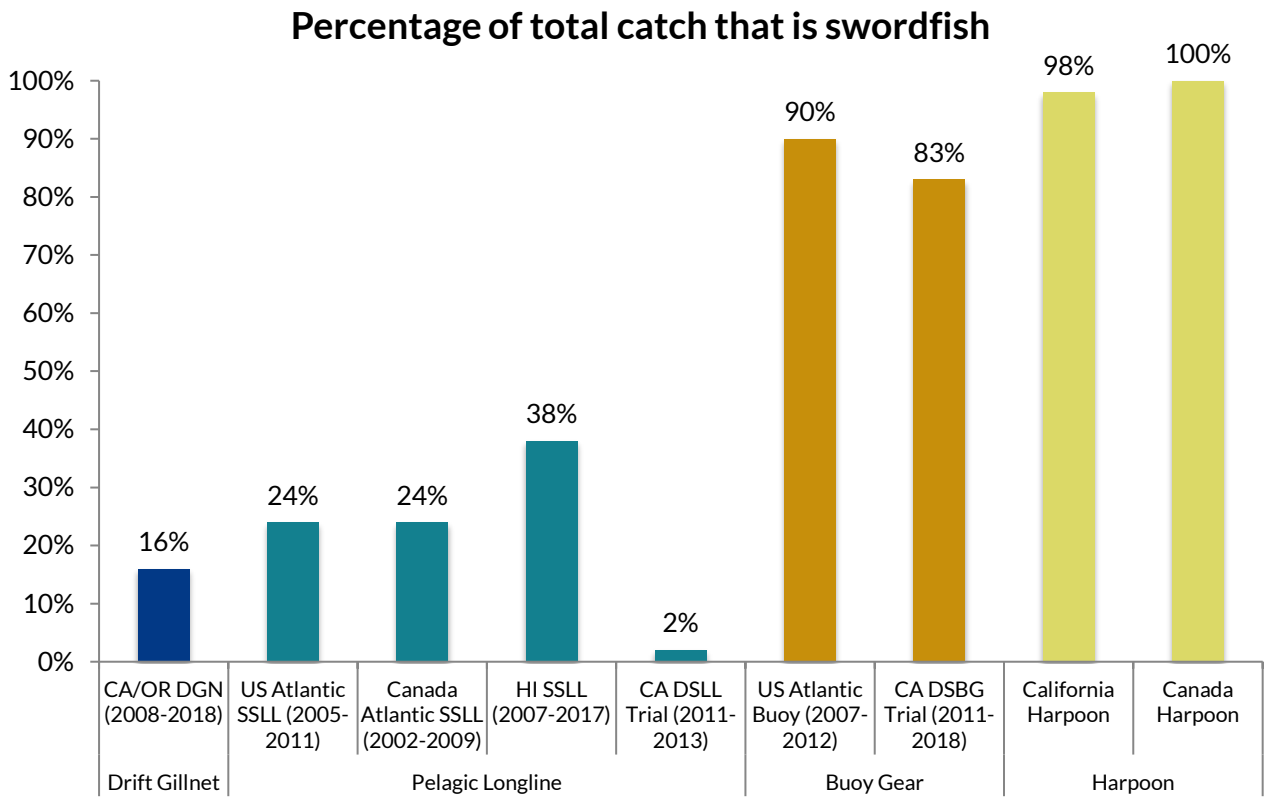
Data shows that of the swordfish fisheries analyzed, those utilizing shallow-set longline gear, deep-set longline gear, and drift gillnets had higher discard mortality than deep-set buoy gear. These gears are normally passively fished for many hours at a time; as a result, animals that are caught in the nets or longlines are often trapped beneath the surface for hours. Marine mammals are unable to surface for air and sharks are unable to pass water over gills, and drown. In contrast, buoy gear is actively monitored, meaning that bycatch can be quickly released, greatly improving the chance of survival.



Note: Discards with a status of "unknown" or "injured" are counted as mortalities.

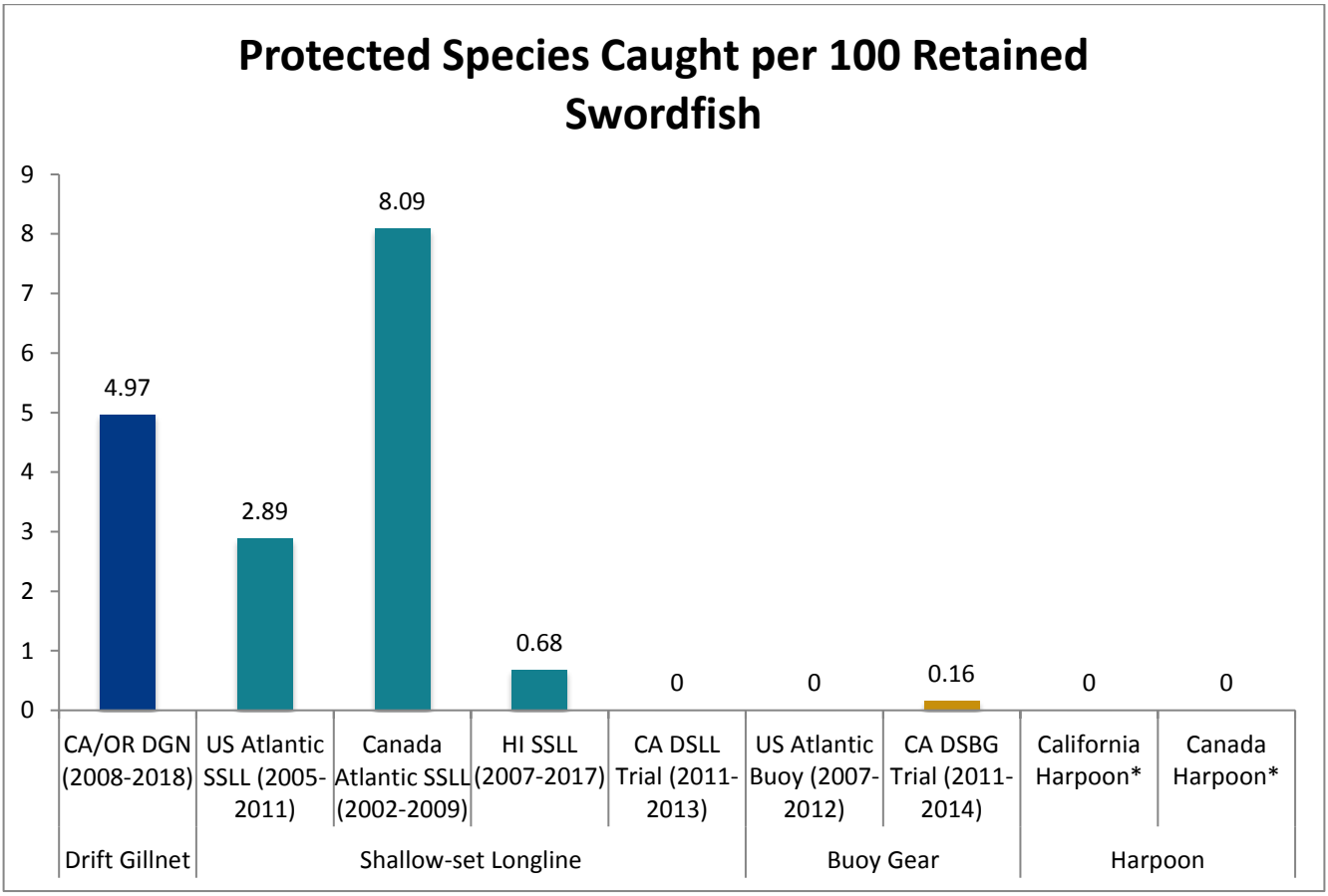
Percentage of the Total Catch that is Swordfish

Maximizing the catch of the target species is critical to the productivity and profitability of a fishery. The ability to catch the target species — in this case swordfish — is also a strong indicator of a gear's efficiency and selectivity. In the drift gillnet fishery only 16 percent of the animals caught were swordfish — the lowest number of any commercial fishery analyzed. Commercial longline gears performed better, with swordfish comprising between 24 percent and 38 percent of the total catch. The California deep-set buoy gear trials and Experimental Fishing Permits (EFP) resulted in a catch composition of 83 percent swordfish, and the commercially successful Atlantic buoy gear fishery is comprised of 90 percent swordfish. Notably, 98 to 100 percent of the harpoon catch is swordfish.



Comparing the Bycatch of Protected Marine Life to Retained Swordfish

Comparing the bycatch of protected marine life (marine mammals, sea turtles, and seabirds) with the amount of retained swordfish is a measure of the overall impact of a swordfish fishery on sensitive and important species adjusted for the amount of swordfish landed. The figure below answers the question: for every 100 swordfish kept, how many interactions did the fishery have with protected species? The highest proportion of protected species per 100 retained swordfish was recorded by the Canadian SSLL fishery, which caught over eight marine mammals, seabird or sea turtles per 100 retained swordfish.



* Based on data from Fisheries Logbook System in NMFS, 2014 and observer data from Kerstetter, 2009.

Transitioning the West Coast Swordfish Fishery to Deep-set Buoy Gear and Supplementing with Increased Harpoon Gear

The bycatch comparisons in this report show that drift gillnet gear is one of the most destructive methods for catching swordfish among North America's swordfish fisheries. Concerns over high discard rates, frequent interactions with protected species, and waning landings and participation demonstrate a need to transition from drift gillnets to selective fishing methods.

Shallow-set longlines, a gear type that is currently banned off the West Coast, are not a solution as they would only create a new suite of bycatch problems including additional takes of several endangered species. Data from SSLL fisheries in Hawaii, the U.S. Atlantic, and Canada, clearly show that the introduction of pelagic longlines would only exacerbate the bycatch issues that are pervasive in the California swordfish drift gillnet fishery.

Deep-set longlines are also an unacceptable alternative. The DSLL trials in California have shown that less than 2 percent of the total catch is actually comprised of swordfish and over three quarters of the catch are unmarketable species, primarily blue sharks. Like SSLL, a commercial DSLL fishery on the West Coast would only exacerbate current bycatch issues. Although drift gillnets and longlines are poor choices for targeting swordfish, the West Coast swordfish fishery has two excellent options: deep-set buoy gear and harpoon gear.

Deep-set Buoy Gear

Why deep-set buoy gear should replace drift gillnets: Buoy gear is an efficient and highly selective method to catch West Coast swordfish. In the deep-set buoy gear trials conducted off California to date, 83 percent of the catch was swordfish, compared to only 16 percent in the California drift gillnet fishery. In the Atlantic buoy gear fishery, 90 percent of the total catch is swordfish. Both in the California trials and the Atlantic fishery, no marine mammals, birds, or sea turtles have been killed or seriously injured to date. One of the major advantages of buoy gear is that it is actively tended. Once a bite is detected, the gear is hauled in, meaning that retained fish are higher quality and any bycatch is expected to be primarily released alive. In the Atlantic buoy gear fishery between 2007 and 2012, 92 percent of the swordfish discards were discarded alive. Since its inception, participation and landings in the Atlantic buoy gear fishery have remained steady or increased, while maintaining low levels of bycatch, proving that buoy gear is commercially sustainable. Based on 100 percent live discards thus far, an expanded commercial California deep-set buoy gear fishery should expect the same positive results.

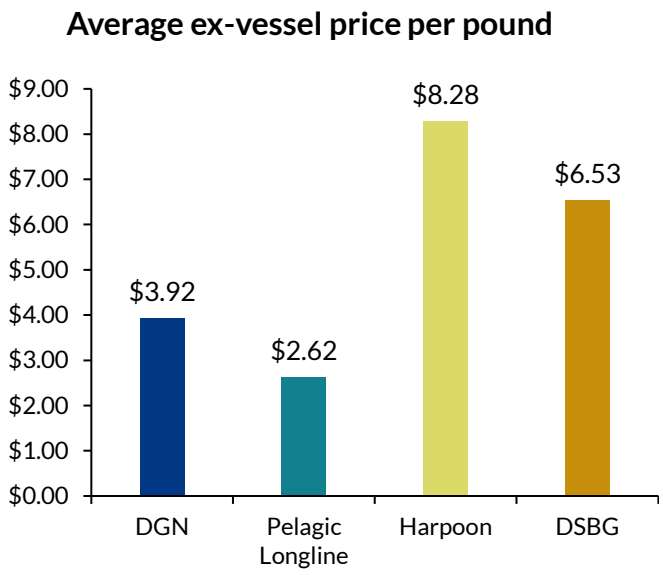
The prospects for economic success in a commercial deep-set buoy gear fishery in California are already demonstrated. Thus far, swordfish landed with deep-set buoy gear has attained high ex-vessel prices, similar to harpoon gear, due to freshness and quality of the landed catch. From 2015-2017 deep-set buoy gear swordfish fetched an average ex-vessel price of $6.53 per pound compared to $3.92 per pound for drift gillnet caught swordfish.[51] This premium price-point means that even if deep-set buoy gear swordfish landings per fishing day are lower than

[51] PFMC. Swordfish Landings by fishery, 2008-2017. June 2018. Agenda Item G.7 Attachment 2 https://www.pcouncil.org/wp-content/uploads/2018/05/G7_Att2_Landings_of_swordfish_2008-2017_Jun2018BB.pdf

drift gillnet landings, fishermen can earn equal or greater profits due to markedly higher prices per pound. From 2015-2017, the average annual swordfish landings revenue per deep-set buoy gear vessel was $57,498 versus $46,181 per drift gillnet vessel.[52]

These ecological and economic indicators suggest that deep-set buoy gear has the potential to reinvigorate the West Coast commercial swordfish fishery, while enabling a full transition away from drift gillnets while maintaining and even increasing domestic swordfish landings and fishing jobs. Along with proven commercial success in the Atlantic, the experience to date off California shows that buoy gear is a viable commercial alternative to drift gillnet swordfish gear.

Harpoon Gear



Source: PFMC. Swordfish Landings by fishery, 2008-2017. June 2018. Agenda Item G.7 Attachment 2

Why harpoon gear can further increase sustainable West Coast swordfish landings: Harpoon fishing is an extremely selective method that produces little to no bycatch. Skilled harpoon fishermen can target and land swordfish with precision, making it one of the cleanest gear types available. In addition, consumer demand for harpoon caught swordfish is high and customers are willing to pay for sustainably caught, high quality swordfish. In 2017, California harpooned dressed (gutted with head and tail removed) swordfish held an average ex-vessel price of $7.78 per pound — over double the price of swordfish caught in drift gillnets ($3.37) and triple that of longline-caught swordfish ($2.59).[53] There are also opportunities for significant cost savings over other gear types such as drift gillnets and shallow-set longlines, which often require onboard observers to monitor fishing due to high levels of bycatch. Harpoon vessels do not require observers, saving the fleet considerable expense including the management costs associated with the observer program.

Why harpoon gear can complement the deep-set buoy gear fishery: Harpoon landings reached a historic high in 1978, when 1,699 mt were landed in California, over ten times greater than the drift gillnet fishery has landed in recent years.[54] However, since the

[52] *Id.*
[53] PFMC. Swordfish Landings by fishery, 2008-2017. June 2018. Agenda Item G.7 Attachment 2 https://www.pcouncil.org/wp-content/uploads/2018/05/G7_Att2_Landings_of_swordfish_2008-2017_Jun2018BB.pdf
[54] Ito, R., Coan, I. 2007. U.S. Swordfish Fisheries in the North Pacific Ocean. ISC Billfish Working Group Workshop.

introduction of drift gillnets, the harpoon fishery has seen declining participation and production. The harpoon fishery landed 24 mt in 2011 and just 4.2 mt in 2013.[55,56]

In recent years, however, it is not just harpoon caught swordfish that has been low. In 2013, California's swordfish drift gillnet fishery landed only 61 mt.[57] Because swordfish fishing with harpoon gear does not incur bycatch, harpoon gear isn't subject to time and area closures or other management safeguards like those needed to limit bycatch in the drift gillnet fishery. In other words, acting responsibly by fishing with clean gear types comes with the benefit of fewer management measures and more flexibility. Further, phasing out drift gillnet gear all together could help shift fishing effort to other legal gear types like harpoon, and encourage a rise in harpoon landings.

The main economic concern with the harpoon swordfish fishery is that it is only possible during certain ocean conditions where swordfish are basking at the surface, which makes it a less dependable fishing technique if fished on its own. However, during certain periods, it can be extremely productive and could therefore be a supplement to increase swordfish landings if opportunistically fished in tandem with deep-set buoy gear.

It is unknown whether harpoon landings may once again peak to historic levels seen in the 1970s, but if California can encourage the resurgence of the once robust harpoon fishery, harpoon gear could provide a valuable complement to deep-set buoy gear landings.

The Next Step: A Drift Gillnet Transition Plan

Oceana recommends a *transition plan for the West Coast swordfish fishery that phases out and prohibits drift gillnets within a time-certain period, while authorizing and incentivizing deep-set buoy gear and additional harpoon effort.* We envision a comprehensive transition plan that includes the following elements:

1) *Phase out and prohibit drift gillnets over a time-certain period.*

   Establishing a timeline for the complete phase out would allow the remaining swordfish drift gillnet fleet to plan its transition to clean gear types.

2) *Provide financial compensation to drift gillnet fishermen who retire their drift gillnet permits and surrender their drift gillnets.*

   Providing financial compensation from government and non-government sources would help provide the capital necessary for fishermen to transition to cleaner methods, including the purchase of deep-set buoy gear and modifications to fishing vessels to

[55] *Id.*
[56] PFMC. 2012, Status of the U.S. West Coast Highly Migratory Species Fisheries through 2011. Stock Assessment and Fishery Evaluation Report (SAFE).
[57] California Department of Fish and Wildlife (CDFW). 2014. Annual Marine Fisheries Report 2014.

allow fishing with other gears. Fishermen who participate in such a program should qualify for a federal deep-set buoy gear permit.

3) *Oppose attempts to replace drift gillnets with gear types that are similarly destructive.*

   Proposals to re-establish damaging fishing gears such as a California-based shallow-set or deep-set longline fishery should be rejected.

4) *Expand and promote the use of deep-set buoy gear and harpoon gear*.

   Results from California testing and the experience in the Atlantic demonstrate that deep-set buoy gear has the potential to develop into a clean and viable fishery off the West Coast that can increase total landings above current levels. The continued research and commercial trials of deep-set buoy gear will allow for authorization as an allowable gear type in the federal U.S. West Coast Highly Migratory Species Fishery Management Plan and inform any necessary management measures. A successful transition to deep-set buoy gear and harpoon gear will require cooperation among fishermen, fisheries managers, seafood markets and other stakeholders. Marketing efforts, traceability, and partnerships can help grow demand and new markets for deep-set buoy gear caught swordfish to help maintain higher prices.

5) *Ban swordfish imports from countries that do not meet U.S. bycatch standards*.

   The U.S. currently imports two times more swordfish than it catches domestically, including a majority of Mexican and Canadian swordfish catch. By requiring swordfish exporters to demonstrate that they are using clean methods to catch swordfish, the U.S. can influence responsible fishing abroad and hold foreign imports to the same standards as domestically caught swordfish. Under section 101(a)(2) of the Marine Mammal Protection Act (MMPA): *"the Secretary of the Treasury shall ban the importation of commercial fish or products from fish which have been caught with commercial fishing technology which results in the incidental kill or incidental serious injury of ocean mammals in excess of United States standards."*

   NMFS finalized the import provisions of the MMPA in August 2016. Fish and fish products can only be imported into the United States if the harvesting nation has received a comparability finding from NMFS. To receive a comparability finding, the harvesting nation must demonstrate it has prohibited the intentional mortality or serious injury of marine mammals in the course of commercial fishing operations in the fishery. The harvesting nation must demonstrate that it has adopted and implemented, with respect to an export fishery, a regulatory program governing the incidental mortality and serious injury of marine mammals in the course of commercial fishing operations in its export fishery that is comparable in effectiveness to the U.S. regulatory program.[58]

[58] 81 Fed. Reg. 54,390, 54,390-54,391 (Aug. 15, 2016).

Conclusion

Drift gillnets and pelagic longlines targeting swordfish both have high levels of bycatch. Conversely, harpoon and deep-set buoy gear can selectively target swordfish with minimal bycatch. A plan should be developed to transition the current drift gillnet fishery off California from unselective drift gillnets to deep-set buoy gear and harpoon gear. Such a plan should provide drift gillnet fishermen with opportunities to continue fishing swordfish with clean gears and financial incentives so that they can continue to profitably catch swordfish as they learn to effectively use new, clean fishing methods. Concerns over impacts of imported swordfish can be directly addressed by imposing bans on imported swordfish that do not meet U.S. standards, while authorizing and promoting the use of clean methods for targeting swordfish off the U.S. West Coast. Financial compensation cushions the learning curve and capital costs of a gear switch. By assisting fishermen with this transition and focusing efforts toward known sustainable fishing methods, we can achieve a clean, sustainable U.S. West Coast swordfish fishery.

Swordfish Catch and Discard Data References

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Canada Harpoon: Coan Jr, A.L., Vojkovich, M., Prescott, D. 1998. The California Harpoon Fishery for Swordfish, *Xiphias gladius*.

OCEANA Protecting the World's Oceans

222 NW Davis Street, Suite 200
Portland, OR 97209 USA

+1.503.235.0278
OCEANA.ORG

October 23, 2018

Mr. Phil Anderson, Chair
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, OR 97220

Mr. Barry Thom, Regional Administrator
NOAA Fisheries West Coast Region (NMFS)
7600 Sand Point Way NE, Bldg. 1
Seattle, WA 98115

Agenda Item B.1: Open Public Comment, Bycatch in Pelagic Longline Fisheries

Dear Chair Anderson, Mr. Thom, and Council Members,

Thank you for the opportunity to provide open public comment on bycatch in pelagic longline fisheries and its relevance to management of U.S. West Coast highly migratory species (HMS) fisheries. The California Current Large Marine Ecosystem is globally important for its diverse array of ocean wildlife, as a migration route, nursery area, and foraging destination for hundreds of highly migratory species traveling thousands of miles across the Pacific Ocean. Recognizing the risks pelagic longlines pose, this gear is prohibited inside the U.S. West Coast Exclusive Economic Zone (EEZ) and vessels managed under the HMS Fishery Management Plan are prohibited from using shallow-set longline gear on the High Seas of the North Pacific Ocean.[1]

Oceana strongly opposes efforts to introduce pelagic longlines off the U.S. West Coast, inside and outside the EEZ. We request that scoping for a high-seas pelagic longline fishery be removed from future agenda planning. The gear is an unselective fishing method with a wide suite of severe bycatch concerns.

Oceana analyzed ten years of bycatch data for the Hawaii shallow-set and deep-set longline fisheries, and found that both have high average discard rates (in terms of number of animals caught) with 46% for the shallow-set longline fishery and 48% for the deep-set longline fishery.[2] Importantly, bycatch concerns associated with this gear may be even more grave if it were deployed inside the California Current Ecosystem due to the high densities of animals

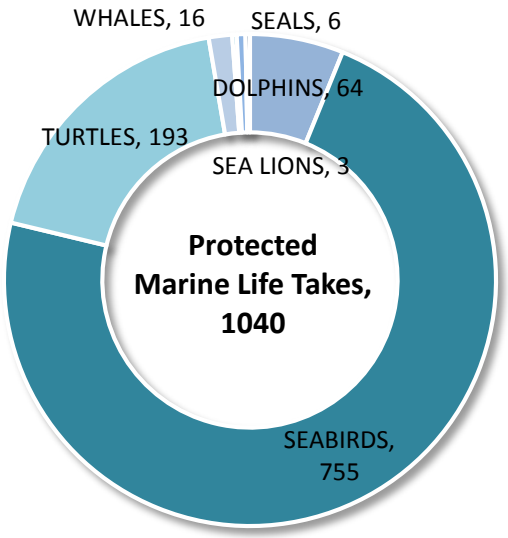
[1] 50 C.F.R. § 660.712(2). 69 Fed. Reg. 11540 (March 11, 2004); 50 C.F.R. § 223.206(d)(9). And, PFMC (2018). Highly Migratory Species Fishery Management Plan, at 51. Available: https://www.pcouncil.org/wp-content/uploads/2018/04/HMS_FMP_thru_A5_Apr18.pdf
[2] NMFS. 2017. Hawaii shallow-set longline observer data. Freedom of Information Act release. NMFS. 2017. Hawaii deep-set longline observer data. Freedom of Information Act release.

found in this part of the ocean .[3, 4] Under both California state and federal fisheries laws, fishery managers have an ongoing responsibility to minimize and avoid bycatch.[5,6] The introduction of this gear type would be lethal to a variety of marine life, irresponsible, and fully inconsistent with this responsibility.

The Hawaii shallow-set longline fishery has a high discard rate (46%) and captures and kills endangered and protected species.

The Hawaii-based shallow-set longline (HI SSLL) fleet is required to use circle hooks and mackerel-type bait, which have been effective at reducing sea turtle interactions. However, this fishery remains problematic; since reopening in 2004, the fishery has been forced to close twice due to interactions with endangered loggerhead and leatherback sea turtles and was shut down as recently as May of 2018 following settlement of a 2012 lawsuit challenging NMFS action to increase sea turtle bycatch caps.

Figure 1. Protected Marine Life Takes in the HI SSLL Fishery, 2007-April 17, 2017



From 2007 to 2017, the fleet caught 755 seabirds, 92 marine mammals, and 193 sea turtles (Figure 1).[7] From 2007 to 2017, on board observers noted that 46 percent of the animals

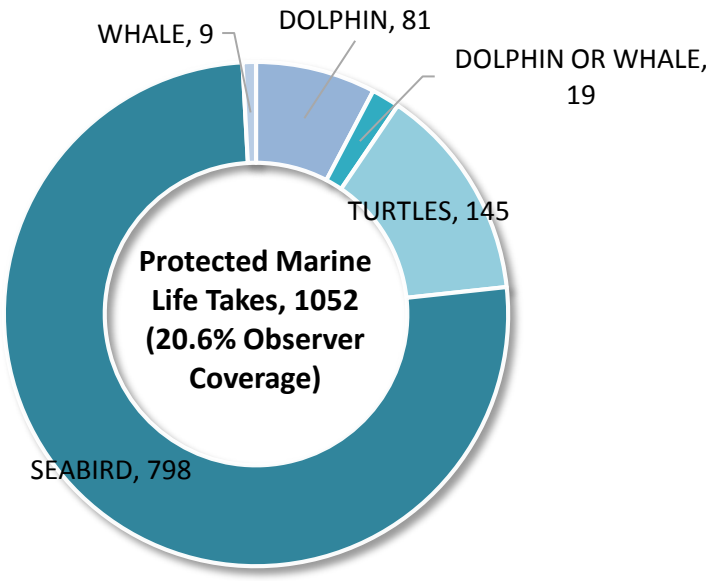
[3] Becker, E., K. Forney, P. Fiedler, J. Barlow, S. Chivers, C. Edwards, A. Moore, J. Redfern. 2016. Moving towards dynamic ocean management: How well do modeled ocean products predict species distributions? Remote Sensing 8,149.
[4] Forney, K., E. Becker, D. Foley, J. Barlow, E. Olson. 2015. Habitat-based models of cetacean density and distribution in the Central North Pacific. Endang Species Res 27:1-20.
[5] Magnuson Stevens Fishery Conservation and Management Act, 16 U.S.C. § 1853(a)(11).
[6] CA Fish & Game Code 7085(c)(1&2).
[7] NOAA. 2014. Pacific Islands Regional Office Observer Program. Hawaii Longline Shallow-set Quarterly and Annual Status Reports. http://www.fpir.noaa.gov/OBS/obs_hi_ll_ds_rprts.html

caught by this fishery were discarded, often dead or dying (31 percent of discards).[8] According to observer data, protected species including migratory sea birds, sea turtles, and marine mammals are likely to perish or be injured when caught on pelagic longlines.

The Hawaii deep-set longline fishery has a high discard rate (48%) and captures and kills large amounts of sharks and protected species.

The Hawaii-based deep-set longline (HI DSLL) fishery, the only NMFS Category I commercial fishery in the Pacific Ocean due to the frequent death and injury to marine mammals,[9] primarily targets tunas and requires a take reduction team to manage issues with false killer whale interactions and discards. Unlike the HI SSLL fishery, the deep-set longline fishery has limited observer coverage, with an average of 20.6 percent of sets being observed.

Figure 2. Observed Protected Marine Life Takes in the HI DSLL Fishery, 2007-April 17, 2017



From 2007 to 2017, 798 seabirds, 109 marine mammals, and 145 sea turtles were observed caught in the HI DSLL fishery (Figure 2).[10] From 2007 to 2017, 48 percent of the animals caught by this fishery were discarded, often dead or dying (62 percent of discards).[11] Studies of

[8] NMFS. 2017. Hawaii Shallow-set Longline Data (2007-2017). Unpublished data.
[9] The fishery is listed as a Category I due to the high incidence of serious injury or mortality for the following species: Bottlenose dolphin, HI; Pelagic False killer whale, HI; Pelagic1 False killer whale, NWHI; Humpback whale. Central North Pacific; Kogia spp. (Pygmy or dwarf sperm whale), HI; Pygmy killer whale, HI; Risso's dolphin, HI; Rough-toothed dolphin, HI; Short-finned pilot whale, HI; Sperm whale, HI; Striped dolphin, HI. National Marine Fisheries Service, Proposed List of Fisheries 2019, at 31.
[10] NMFS. 2017. Hawaii deep-set longline observer data. Freedom of Information Act release.
[11] *Id.*

bycatch in the HI DSLL fishery have found that the bycatch of lancetfish has now surpassed the target species, bigeye tuna, as the species with the highest annual catch rate and the authors suggest this fishery may be altering the trophic structure of the North Pacific ecosystem.[12]

NMFS ceased deep-set pelagic longline trials off California after the gear proved ineffective for targeting swordfish. These trials caught over 40 blue sharks for every swordfish and had an overall discard rate of 76%.[13]

Introducing pelagic longlines off the U.S. West Coast would exacerbate bycatch issues in HMS fisheries and we strongly oppose efforts to do so.

Since 2007, Hawaii-based pelagic longline fisheries have caught and discarded at least 99 different non-target species, including nine species of threatened or endangered marine mammals, sea turtles and one shark (see appended tables). Introducing any additional SSLL fishing effort on the high seas of the North Pacific or introducing this gear inside the U.S. EEZ will only exacerbate impacts on endangered species and increase the bycatch of a diverse array of sharks and other fishes. Any new pelagic longline fisheries would likely cause the injury and death of a significant number of endangered Pacific leatherback sea turtles, endangered loggerhead sea turtles, short-tail albatross, sperm whales, humpback whales and other protected marine life. This would be wholly inconsistent with NMFS's paramount duty to conserve threatened and endangered species as well as protected marine mammals and seabirds. It is inconsistent with sound management of fisheries resources.

Pacific leatherback sea turtle interactions are a particular risk as the population has declined by more than 80 percent since the 1980s.[14] Long-term data on Indonesian nesting beaches and California waters have shown annual declines by 5.9% and 3.7% respectively over the last two decades.[15] A recent population analysis established a reference point of no more than one Pacific Leatherback sea turtle could be killed over a six year period in the US West Coast EEZ to prevent delay in recovery.[16] This critically endangered population is a NOAA Species in the Spotlight that simply cannot sustain any additional mortality on the U.S. West Coast.

In 2009 the Council rejected a proposal to authorize a West Coast-based shallow set longline fishery on the High Seas. Since then the reasons for rejecting this fishery have only magnified.

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[12] Polovina JJ, Woodworth-Jefcoats PA (2013) Fishery-Induced Changes in the Subtropical Pacific Pelagic Ecosystem Size Structure: Observations and Theory. PLoS ONE 8(4): e62341. https://doi.org/10.1371/journal.pone.0062341

[13] NMFS, *Deep-Set Longline Study*, Agenda Item K.5.b. Supplemental SWFSC PowerPoint 1, March 2014, http://www.pcouncil.org/wp-content/uploads/K5b_SUP_SWFSC_PPT1_MAR2014BB.pdf.

[14] Tapilatu, R. F., P. H. Dutton, M. Tiwari, T. Wibbels, H. V. Ferdinandus, W. G. Iwanggin, and B. H. Nugroho. 2013. Long-term decline of the western Pacific leatherback, Dermochelys coriacea, a globally important sea turtle population. Ecosphere 4(2):Article 25. 15 pages.

[15] Benson, S.R., K.A. Forney, E.L. LaCasella, J.T. Harvey, J.V. Carretta. 2018. A LONG-TERM DECLINE IN THE ABUNDANCE OF LEATHERBACK TURTLES, *DERMOCHELYS CORIACEA*, AT A FORAGING GROUND OFF CALIFORNIA, USA. 38th Annual Symposium on Sea Turtle Biology and Conservation Presentation Abstracts.

[16] K.A. Curtis, J. Moore, and S. Benson (2015 Estimating Limit Reference Points for Western Pacific Leatherback Turtles (*Dermochelys coriacea*) in the U.S. West Coast EEZ. PLoS One DOI:10.1371/journal.pone.0136452

What is more, it is simply a waste of valuable time and resources to further pursue an ill-founded idea, particularly when there are other avenues to promoting sustainable swordfish fishing that have broad stakeholder support, namely the authorization of deep-set buoy gear to target swordfish off the U.S. West Coast.

We have heard fairness concerns that Hawaiian-permitted vessels can land pelagic longline caught swordfish in California, but California permitted vessels cannot. We propose the Council write a letter to NMFS and the Western Pacific Fishery Management Council and request management action to prevent Hawaiian permitted vessels from landing swordfish in US West Coast ports. Such a proposal could include moving the eastern boundary of allowable Hawaiian pelagic longlines westward. Rather than investing further management resources on expanded pelagic longline fishing, we urge the Pacific Fishery Management Council to focus efforts instead on reducing bycatch in the U.S. West Coast swordfish fishery by authorizing and promoting deep-set buoy gear and phasing out drift gillnets. Thank you for the opportunity to provide comments on this important issue.

Sincerely,

Geoffrey Shester, Ph.D.
California Campaign Director
and Senior Scientist

Erin Kincaid
Marine Scientist

Appendices

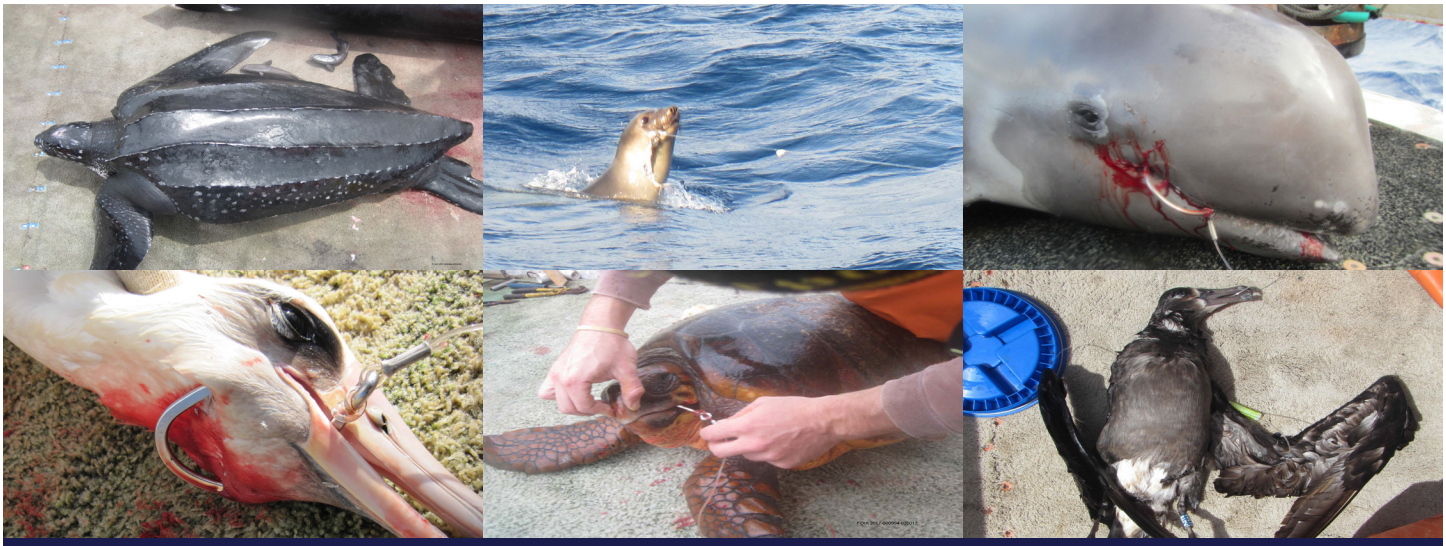
A. List of all 114 species or species categories caught in the Hawaii Shallow-Set Longline fishery from 2007-April 2017. Species listed as endangered or threatened under the Endangered Species Act are indicated (*).

Catch Species (common name)		
Albacore Tuna	Loggerhead Turtle*	Sickle Pomfret
Beaked Whale, Ginkgo-toothed	Longfin Escolar	Silky Shark
Bigeye Thresher Shark	Longfin Mako Shark	Skipjack Tuna
Bigeye Tuna	Longnose Lancetfish	Slender Mola
Bignose Shark	Louver	Smooth Hammerhead Shark
Black Gemfish	Lustrous Pomfret	Snake Mackerel
Black Marlin	Manta/Mobula	Striped Dolphin
Black-footed Albatross	Mesoplodont Beaked Whale	Striped Marlin
Blainville's Beaked Whale	Mobula (Devil Ray)	Swordfish
Blue Marlin	Northern Elephant Seal	Tapertail Ribbonfish
Blue Shark	Oceanic White-Tip Shark*	Tiger Shark
Bluefin Tuna	Oilfish	Unid. Hammerhead Shark
Bottlenose Dolphin	Olive Ridley Turtle*	Unid. Mako Shark
Cigarfish	Opah	Unid. Snake Mackerel
Common Mola	Other Identified Bird	Unid. Thresher Shark
Common Thresher Shark	Other Identified Bony Fish	Unidentified Beaked Whale
Cookie Cutter Shark	Other Identified Shark	Unidentified Billfish
Crestfish	Pelagic Puffer	Unidentified Bony Fish
Crocodile Shark	Pelagic Stingray	Unidentified Common Dolphin
Dagger Pomfret	Pelagic Thresher Shark	Unidentified Dolphin
Deepwater Dogfishes	Pomfret, Brama spp.	Unidentified Dolphin or Whale
Dogfish, Velvet	Pompano Dolphinfish	Unidentified Gull
Dolphinfish	Rainbow Runner	Unidentified Hardshell Turtle
Escolar	Remora/Suckerfish	Unidentified Kogia Whale
False Killer Whale	Risso's Dolphin	Unidentified Pinniped
Fanfish	Roudi's Escolar	Unidentified Pomfret
Fin Whale*	Rough Pomfret	Unidentified Ray
Flying Fish	Rough-Toothed Dolphin	Unidentified Sea Lion
Galapagos Shark	Sailfish	Unidentified Shark
Giant Manta Ray	Salmon Shark	Unidentified Shearwater
Gray Reef Shark	Sandbar Shark	Unidentified Snake Mackerel
Great Barracuda	Scalloped Hammerhead Shark	Unidentified Tuna
Green/Black Turtle*	Scalloped Ribbonfish	Unidentified Whale
Guadalupe Fur Seal*	Sharptail Mola	Unspecified Kahala (Amberjack)
Hammerjaw	Short-beaked Common Dolphin	Wahoo
Humpback Whale*	Shortbill Spearfish	White Shark
Laysan Albatross	Shortfin Mako Shark	Yellowfin Tuna
Leatherback Turtle*	Shortnose Lancetfish	Yellowtail

B. List of all 119 species or species categories caught in the Hawaii Deep-Set Longline fishery from 2007-April 2017. Species listed as endangered or threatened under the Endangered Species Act are indicated (*).

Catch Species (common name)

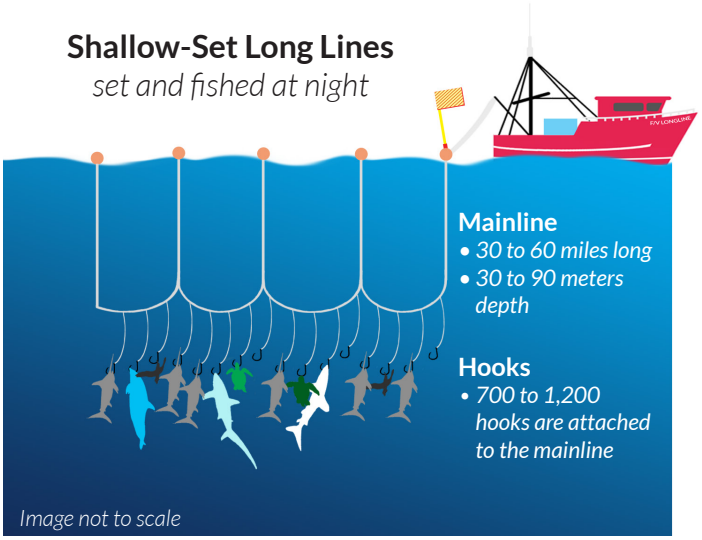
Albacore Tuna	Louvar	Skipjack Tuna
Bigeye Sand Tiger Shark	Lustrous Pomfret	Slender Mola
Bigeye Thresher Shark	Mackerel (incl. Chub, Spotted Chub)	Smooth Hammerhead Shark
Bigeye Tuna	Manta/Mobula	Snake Mackerel
Bignose Shark	Mobula (Devil Ray)	Sperm Whale*
Bigtooth Pomfret	Oceanic White-Tip Shark*	Spotter Dolphin
Black Gemfish	Oilfish	Striped Dolphin
Black Marlin	Olive Ridley Turtle*	Striped Marlin
Black-footed Albatross	Opah	Swallowers
Blacktip Shark	Other Identified Bird	Swordfish
Blue Marlin	Other Identified Bony Fish	Tapertail Ribbonfish
Blue Shark	Other Identified Ray	Tiger Shark
Bluefin Tuna	Other Identified Shark	Unid. Dolphin or Whale
Bottlenose Dolphin	Pacific Pomfret	Unid. Hammerhead Shark
Brama spp. Pomfret	Pelagic Puffer	Unid. Mako Shark
Cigarfishes	Pelagic Stingray	Unid. Thresher Shark
Common Mola	Pelagic Thresher Shark	Unidentified Albatross
Common Thresher Shark	Pompano Dolphinfish	Unidentified Beaked Whale
Cookie Cutter Shark	Pygmy Killer Whale	Unidentified Billfish
Cottonmouth Jack	Rainbow Runner	Unidentified Bird
Crestfish	Razorback Scabbardfish	Unidentified Bony Fish
Crocodile Shark	Red-footed Booby	Unidentified Dolphin
Dagger Pomfret	Remora/Suckerfish	Unidentified Hardshell Turtle
Dolphinfish	Risso's Dolphin	Unidentified Kogia Whale
Escolar	Roudi's Escolar	Unidentified Pomfret
False Killer Whale	Rough Pomfret	Unidentified Puffer
Fanfishes	Rough Triggerfish	Unidentified Ray
Galapagos Shark	Rough-toothed Dolphin	Unidentified Scabbardfish
Giant Manta Ray	Sailfish	Unidentified Shark
Great Barracuda	Salmon Shark	Unidentified Shearwater
Green/Black Turtle*	Sandbar Shark	Unidentified Snake Mackerel
Grey Reef Shark	Scalloped Hammerhead Shark	Unidentified Tuna
Hammerjaw	Scalloped Ribbonfish	Unidentified Whale
Humpback Whale*	Sharptail Mola	Unspecified (Amberjacks) Kahala
Laysan Albatross	Shortbill Spearfish	Velvet Dogfish
Leatherback Turtle*	Shortfin Mako Shark	Wahoo
Loggerhead Turtle*	Short-finned Pilot Whale	White Shark
Longfin Escolar	Shortnose Lancetfish	Yellowfin Tuna
Longfin Mako Shark	Sickle Pomfret	Yellowtail
Longnose Lancetfish	Silky Shark	



Collateral Capture
Bycatch in the Hawaii Shallow-Set Longline Fishery

The Hawaii Shallow-Set Longline (HI SSLL) fishery uses pelagic (midwater) gear to target swordfish. Unfortunately, of all the animals ensnared by these suspended, baited hooks, nearly half are injured, dying, or dead non-target species and are consequently tossed overboard.

Shallow-set longline gear consists of a continuous mainline supported by floats that typically stretches 30 to 60 miles in length. Anywhere from 700 to 1,200 hooks are attached. The lines are set at dusk between 30 and 90 meters depth and left to soak until dawn.



As the lines are pulled out of the water they reveal a multitude of other animals carelessly captured including seabirds, sea turtles, dolphins, and many non-target fish. This gear also entraps and harms marine mammals including humpback whales, bottlenose dolphins, short-finned pilot whales, false killer whales, and Risso's dolphins. Because of these documented entanglements, the HI SSLL fishery is classified as a Category II fishery under the Marine Mammal Protection Act – a federal designation given to fisheries that are known to cause incidental death or serious injury to marine mammals.

The Hawaii Shallow-Set Longline fishery entangled many threatened and endangered species from 2007 to 2017. These include Pacific leatherbacks, Pacific loggerheads, and green sea turtles, humpback and fin whales, Guadalupe fur seals, and oceanic whitetip sharks. A scientific study estimates that even one Pacific leatherback mortality from waters off the U.S. West Coast over the course of five years is sufficient to hinder recovery of this critically endangered animal.[1] Putting further pressure on these endangered species by introducing pelagic longlines off the U.S. West Coast would be reckless.

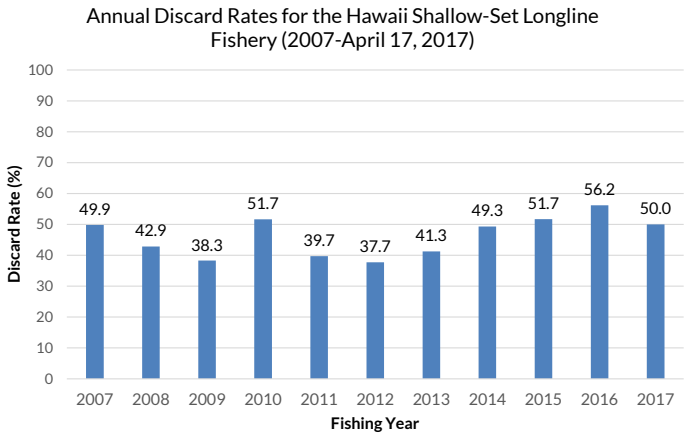
Cover Photo: Documented bycatch ensnared by shallow-set longlines off Hawaii includes leatherback sea turtles, northern elephant seals, Risso's dolphins, Laysan albatrosses, loggerhead sea turtles, and black-footed albatrosses.

February 2018

OCEANA Protecting the World's Oceans

From 2007 through April 17, 2017:

- 206,987 animals were discarded
- 46% of the total catch was discarded
- 64,926 of the discarded animals were released dead or injured, resulting in a death/injury rate of discards of 31.4%
- Over 750 seabirds, 60 dolphins, and 190 sea turtles were caught by this fishery
- 131,270 sharks and rays were discarded
- In 2015, a humpback whale and a fin whale were entangled in this gear and consequently injured



A discard refers to any animal caught that is not kept. This includes animals released alive, dead, or injured. Discard rates (percentage of the total number of animals caught that are thrown overboard) are determined using data provided by fishery observers.[2] The HI SSLL fishery has 100% observer coverage. Data from all sets in the fishery for 2007 through April 17, 2017 were used to determine discard rates.

Keep Shallow-Set Longlines Off the U.S. West Coast

In 1989, longlines were prohibited off the state of California and the Pacific Fishery Management Council (Council) included this prohibition in the West Coast Highly Migratory Species Fishery Management Plan. The Council in 2009 voted to not authorize a West Coast-based pelagic shallow-set longline fishery on the high seas due to significant bycatch concerns.

The drift gillnet swordfish fishery also has very high bycatch, jettisoning approximately 61 percent of everything it catches, on average. Adding another dirty gear to a fishery with disturbingly high discard rates will only complicate and delay progress toward reducing bycatch in the West Coast swordfish fishery. Selective, alternative gear, such as deep-set buoy gear, must be promoted and utilized to build a responsible and sustainable swordfish fishery off the U.S. West Coast.

[1]K.A. Curtis, J. Moore, and S. Benson. 2015. Estimating Limit Reference Points for Western Pacific Leatherback Turtles (Dermochelys coriacea) in the U.S. West Coast EEZ. PLoS One DOI:10.1371/journal.pone.0136452

[2]NMFS. 2017. Hawaii shallow-set longline observer data. Freedom of Information Act release.

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Fishery-Induced Changes in the Subtropical Pacific Pelagic Ecosystem Size Structure: Observations and Theory

Jeffrey J. Polovina*, Phoebe A. Woodworth-Jefcoats

Pacific Islands Fisheries Science Center, NOAA Fisheries, Honolulu, Hawaii, United States of America

Abstract

We analyzed a 16-year (1996–2011) time series of catch and effort data for 23 species with mean weights ranging from 0.8 kg to 224 kg, recorded by observers in the Hawaii-based deep-set longline fishery. Over this time period, domestic fishing effort, as numbers of hooks set in the core Hawaii-based fishing ground, has increased fourfold. The standardized aggregated annual catch rate for 9 small (<15 kg) species increased about 25% while for 14 large species (>15 kg) it decreased about 50% over the 16-year period. A size-based ecosystem model for the subtropical Pacific captures this pattern well as a response to increased fishing effort. Further, the model projects a decline in the abundance of fishes larger than 15 kg results in an increase in abundance of animals from 0.1 to 15 kg but with minimal subsequent cascade to sizes smaller than 0.1 kg. These results suggest that size-based predation plays a key role in structuring the subtropical ecosystem. These changes in ecosystem size structure show up in the fishery in various ways. The non-commercial species lancetfish (mean weight 7 kg) has now surpassed the target species, bigeye tuna, as the species with the highest annual catch rate. Based on the increase in snake mackerel (mean weight 0.8 kg) and lancetfish catches, the discards in the fishery are estimated to have increased from 30 to 40% of the total catch.

Citation: Polovina JJ, Woodworth-Jefcoats PA (2013) Fishery-Induced Changes in the Subtropical Pacific Pelagic Ecosystem Size Structure: Observations and Theory. PLoS ONE 8(4): e62341. doi:10.1371/journal.pone.0062341

Editor: David Hyrenbach, Hawaii Pacific University, United States of America

Received December 4, 2012; **Accepted** March 20, 2013; **Published** April 19, 2013

Funding: These authors have no support or funding to report.

Competing Interests: The authors have declared that no competing interests exist.

* E-mail: jeffrey.polovina@noaa.gov

Introduction

The North Pacific subtropical gyre is a large oceanic gyre bounded on the south by the North Equatorial Current, on the west by the Kuroshio Current, on the north by the Kuroshio Extension Current and the North Pacific Current, and on the east by the California Current [1]. Although low in primary productivity, the warm, vertically stratified oligotrophic waters of the subtropical gyre contain a highly diverse food web populated by tunas, sharks, and billfishes at the top trophic levels [2,3]. Since the 1950s, large-scale fisheries have targeted the tunas, billfishes, and other large predators in this ecosystem. Several studies have suggested possible ecosystem impacts from fishing [3–5]. A comparison of catch, size, and species composition between a research longline survey in the 1950s and observer data from commercial longliners in the 1990s suggested a substantial decline in the abundance of large predators, the mean size of these predators, and some evidence of an increased abundance of formerly rare species [5]. Models of the North Pacific subtropical gyre were generated with Ecopath with Ecosim (EwE) to investigate whether the ecosystem contained any keystone species [3,4]. The results suggested that there was not any single species group that functioned as a keystone, but that a broad reduction of apex predators as a result of fishing might result in an increase in prey in response to a decreased predation [3,4]. In effect the fishing fleet is the keystone predator [4]. However, another modeling effort using an EwE model that incorporated some size-class structure found that while fishing decreased predator abundance there was limited evidence of trophic cascades or other ecosystem impacts based on the decline in predators [6].

A more recent analysis of catch rates for the 13 most abundant species caught in the deep-set Hawaii-based longline fishery over the past decade (1996–2006) provided evidence of a top-down response of the North Pacific subtropical ecosystem. Catch rates for apex predators such as blue shark (*Prionace glauca*), bigeye (*Thunnus obesus*) and albacore (*Thunnus alalunga*) tunas, shortbill spearfish (*Tetrapturus angustirostris*), and striped marlin (*Tetrapturus audax*) declined from 3 to 9% per year while catch rates for 4 mid-trophic species, mahimahi (*Coryphaena hippurus*), sickle pomfret (*Taractichthys steindachneri*), escolar (*Lepidocybium flavobrunneum*), and snake mackerel (*Gempylus serpens*), increased by 6 to 18% per year [7].

Ecosystem food webs and models for the central North Pacific subtropical pelagic ecosystem have traditionally been built from a species-specific perspective [2–4,6]. Recent analysis of the temporal ecosystem dynamics used trophic levels derived from species-specific models [7]. However, recent applications of size-based ecosystem models across various ecosystems show they are emerging as a powerful tool, particularly in pelagic environments where predation is more strongly driven by body size than species' taxonomic identity [8–13]. A key advantage to size-based models is that they are based on broad ecological and physiological relationships requiring few region-specific parameter estimates

apart from sea surface temperature (SST), the size structure at the base of the food web, and fishing gear selectivity.

In this paper we further examine ecosystem changes in the subtropical pelagic system from a size-based perspective and compare observations from the Hawaii-based longline fishery with simulations from a dynamic size-based ecosystem model.

Materials and Methods

Catch and fishing effort data from the Hawaii-based longline fishery are collected in two ways. Federally mandated logbooks are required from all fishers licensed in that fishery. The logbooks report daily records of fishing activity including location, catch by species, number of hooks per set, and other data on the fishing operation. While logbook data provides complete coverage from all vessels, it is most reliable for the landed portion of the catch while catches of discarded species including sharks and fishes with low or no economic value are often not recorded. Fishery observers are placed on a subset of all vessels to record all the species caught, fishing effort, and various operational aspects and since 2006 they have recorded the length of every third fish caught. Over the period 1996–2011, 16% of the deep-set trips had observer coverage. However, even with this relatively modest observer coverage, observer and logbook catch rates for the commercial species were highly correlated. For example, over the period 1996–2006, annual catch rates from observer and logbook data had correlations ranging from over 0.93 for albacore, striped marlin, shortbill spearfish bigeye tuna, and pomfret, between 0.80 and 0.89 for mahimahi, ono, and yellofin tuna, 0.78 for skipjack, and 0.76 for blue shark [7].

The Hawaii-based longline fishery consists of two components: the daytime deepset fishery targeting bigeye tuna, and the nighttime shallow-set fishery targeting swordfish (*Xiphias gladius*). The deep-set fishery typically sets hooks between 100 m and 400 m with the median hook depth at about 250 m while the median depth of the deepest hook in the shallow-set fishery is 60 m [14]. Deep sets and shallow sets can be identified based on a very strong bimodal distribution of the number of hooks between floats. Shallow sets use 2–6 hooks per float while deep sets use 20–32 hooks per float [14]. For our analysis we identified deep sets as those with 10 or more hooks per float and shallow sets as those with fewer than 10 hooks per float. The shallow-set fishery occurs primarily in the winter and spring within a narrow band of 28°–32° N latitude. The shallow-set fishery was closed for several years to reduce interactions with sea turtles. This paper focuses exclusively on the deepset fishery occurring throughout the year over a broad geographic region and provides an uninterrupted observed catch and effort time series from 1996. Restricting our analysis to the deep-set fishery provides a relatively standardized depth range and method of gear deployment. This analysis was further restricted to data that were obtained from the core region of the fishing ground defined as bounded by 12°–27° N latitude. In some years, the fishery made excursions as far south as the equator and as far north as 32° N latitude; however, fishing in these areas was inconsistent over the study period.

Over the past two decades fishing effort in the Hawaii-based longline fishing ground and fishing mortality over the basin has increased about fourfold. For example, from 1996 to 2008 the number of hooks set in the Hawaii-based longline fishery increased from 10 million to 40 million. Recent stock assessments for yellowfin and bigeye tuna in the central and western Pacific estimated an increase in fishing mortality from 0.1 in 1990 to 0.3–0.4 in 2010 [15]. Unfortunately, we do not have any estimates of fishing mortality for either target species or the ecosystem that apply specifically to the central North Pacific, the area covered by the Hawaii deepset fishery.

We based this study on the catch and effort data for 23 species defined as those that have a mean catch per unit effort (CPUE) of at least 0.05 fish per 1000 hooks set over the 1996–2011 period. For those 23 species we estimated the species' mean weights from published length-weight equations by using lengths recorded by observers pooled over the 2006–2011 period (Table S1). Although some species had sufficient lengths to compute annual weights we chose to use mean sizes pooled over the entire time period for all species. The reason was our focus on changes in the ecosystem rather than within-species size structure, and many of our 23 species did not have sufficient length data for finer temporal resolution. An analysis of temporal changes in length for the most abundant tunas and billfishes in the catch is presented in Gilman *et al.* [16].

As a robust indicator of ecosystem size structure, we computed annual combined catch for small species (those with mean weights less than 15 kg) and large species (those with mean weights equal to or greater than 15 kg). The value of 15 kg was determined from the species-specific regressions from Table 1 as discussed in the results section. A generalized additive model (GAM) was fit to these two time series to estimate a standardized CPUE time series for small and large species.

Static size-based models, based on metabolic theory and empirical relationships between body size and trophic level, have been applied to investigate unexploited production and biomass of larger marine animals in the global oceans based on current environmental conditions [17]. Dynamic size-spectrum models can extend this approach by considering the time-dependent and continuous growth and mortality processes that result from size-structured feeding, representative of pelagic ecosystems [8,12]. They can be used to predict the consequences of fishing mortality and changes in primary production as well as temperature effects on dynamic changes in the community size spectrum [13]. A key attribute of these models is that the probability of a predator of size M eating an encountered prey of smaller size m is given by a lognormal probability density function, with a mean value representing the preferred predator–prey mass ratio and a standard deviation that represents the breadth of the relative prey mass. A key strength of this approach is that realized predator–prey mass ratios in fish communities do not appear to vary systematically with temperature or primary production in the world's oceans [18].

A size-based ecosystem model based on the pelagic component of the model detailed in Blanchard *et al.* [19] and adapted for the subtropical pelagic ecosystem [20] was used to simulate the response of the size structure to fishing pressure. Input for the model consists of small (<5 μm) and large (>5 μm) phytoplankton densities, SST, size of entry to the fishery, and gear selectivity as a function of size. We used phytoplankton densities and SST output by the NOAA Geophysical Fluid Dynamics Laboratory prototype Earth System Model 2.1 [20,21], averaged both spatially (12°–27° N, 180°–140°W) and temporally (1996–2011) so the only variable input to the size-based model is fishing mortality.

Results

Linear regressions fit to the annual CPUE time series for each of the 23 species found 12 species had statistically significant positive or negative slopes (Table 1). Eight species 16.4 kg or larger had declining CPUE trends while the remaining 6 species 16.4 kg or larger had no significant trend (Table 1). Three species 12.1 kg or

Table 1. Change in catch rate estimated from statistically significant ($P<0.01$) linear regressions over 1996–2011, in order by by fish size.

Species	% Annual Change in CPUE[a] (*P*-value)	Mean Weight in kg (*M*)
Blue Marlin (*Makaira nigricans*)	−5.0 (0.005)	224.0 (1295)
Blue Shark (*Prionace glauca*)	−3.7 (0.004)	106.4 (22856)
Striped Marlin (*Tetrapturus audax*)	−5.0 (0.004)	93.5 (3800)
Shortbill Spearfish (*Tetrapturus angustirostris*)	−4.2 (0.008)	75.7 (4078)
Shortfin Mako Shark (*Isurus oxyrinchus*)	0	48.3 (624)
Swordfish (*Xiphias gladius*)	0	42.0 (1509)
Yellowfin Tuna (*Thunnus albacares*)	0	33.5 (9224)
Opah (*Lampris guttatus*)	−4.1 (0.008)	30.2 (3923)
Bigeye thresher Shark (*Alopias superciliosus*)	0	24.0 (1922)
Unidentified Tuna	0	24.0 (49)
Bigeye Tuna (*Thunnus obesus*)	−2.1 (0.005)	22.5 (41456)
Oceanic White-tip Shark (*Carcharinus longimanus*)	−6.9 (<0.0001)	19.0 (277)
Albacore Tuna (*Thunnus alalunga*)	−6.9 (<0.0001)	17.1 (4718)
Wahoo (*Acanthocybium solandri*)	0	16.4 (4172)
Escolar (*Lepidocybium flavobrunneum*)	12.1 (<0.0001)	12.1 (9817)
Mola (*Ranzania laevis* and *Mola mola*)	0	8.8 (521)
Skipjack Tuna (*Katsuwonus pelamis*)	0	7.9 (9352)
Mahi Mahi (*Coryphaena hippurus*)	0	7.4 (19346)
Lancetfish (*Alepisaurus ferox*)	2.2 (0.026)	7.1 (34186)
Great Barracuda (*Sphyraena jello*)	0	5.9 (1198)
Pomfrets (*Taractichthys steindachneri* and *Brama japonica*)	0	4.9 (14898)
Pelagic Stingray (*Pteroplatytrygon violacea*)	−5.4 (<0.0001)	3.0 (4165)
Snake Mackerel (*Gempylus serpens*)	15.1 (<0.0001)	0.8 (15371)

From left, columns indicate species, annual percent change in CPUE based on linear regression (*P*-values for significant trends in parentheses, insignificant fits denoted by a 0% change), mean species weight as determined from length-weight conversion (number of fish used in length-weight conversion indicated in parentheses).
[a]from linear fit.
doi:10.1371/journal.pone.0062341.t001

smaller had increasing CPUE trends while one, pelagic stingray, had a declining trend and the remaining 5 had no trend (Table 1). The declining species included billfishes, sharks, and tunas, with linear CPUE trend declines ranging from 2 to 7% annually over the 16-year time period. The species with increasing linear CPUE trends were escolar and two noncommercial species, snake mackerel and lancetfish, with increases of about 12, 15, and 2% annually, respectively (Table 1).

To more rigorously and robustly examine the different CPUE time trends for large and small fishes, we split the catch data into 2 groups consisting of 9 species with mean weights <15 kg, termed small fishes and 14 species with mean weights ≥15 kg, termed large fishes (Table 1). The value of 15 kg used to classify large and small fishes was based on the individual CPUE trends in Table 1 showing that 8 of the 9 species with declining CPUE trends had mean weights of 16.4 kg or larger and all of the species with declining CPUE trends had mean weights 12.1 kg or smaller. A GAM was fit to the catch in numbers per longline set for each size group using independent variables: hooks per set, set latitude, set longitude, SST at set location recorded by the observers, and year (all were significant with $p<2\times10^{-16}$). The GAM was then used to estimate annual CPUE for each size group by first using the model to estimate catch for each set, then cumulating the estimated catch for each year, and dividing annual estimated catch by annual observed effort to obtain annual estimated CPUE. The resultant estimated annual CPUE time series fits the observed annual CPUE time series quite well with correlations between the observed and estimated CPUEs of 0. 97 for large fishes and 0.86 for small fishes (Fig. 1). From the GAM, standardized annual CPUE time series for large and small fishes are computed as a function of year by replacing the set SST, latitude, and longitude by mean SST, longitude, and latitude from the 16 year period in the GAM and following the steps outlined previously to obtain annual CPUE. This standardized CPUE time series, computed with mean SST, latitude and longitude, is standardized to eliminate any trends in CPUE due to changes in these variables over the 16-year time period. The temporal trend in standardized annual CPUE for small fishes increased about 25% while it decreased by about 50% for large fishes over the time period (Fig. 2a). To check how robust the observer CPUE pattern was we computed standardized CPUEs for large and small fishes from the logbook data. The results, presented as supplemental material (Table S2 and Fig. S1) show the same pattern of about a 50% decrease in large fish CPUE and about a 33% increase in small fish CPUE (Fig. S1) very similar to that seen with the observer data, although the logbook data reports only the commercially valuable species omitting lancetfish and snake mackerel in the small size group and sharks in the large size groups.

The mean weights of fishes caught in the Hawaii-based deep-set fishery range from 0.8 kg for snake mackerel to 224 kg for blue marlin (Table 1). Thus for the size at entry to the fishery we use 1.0 kg. To estimate the selectivity of the gear we examine the

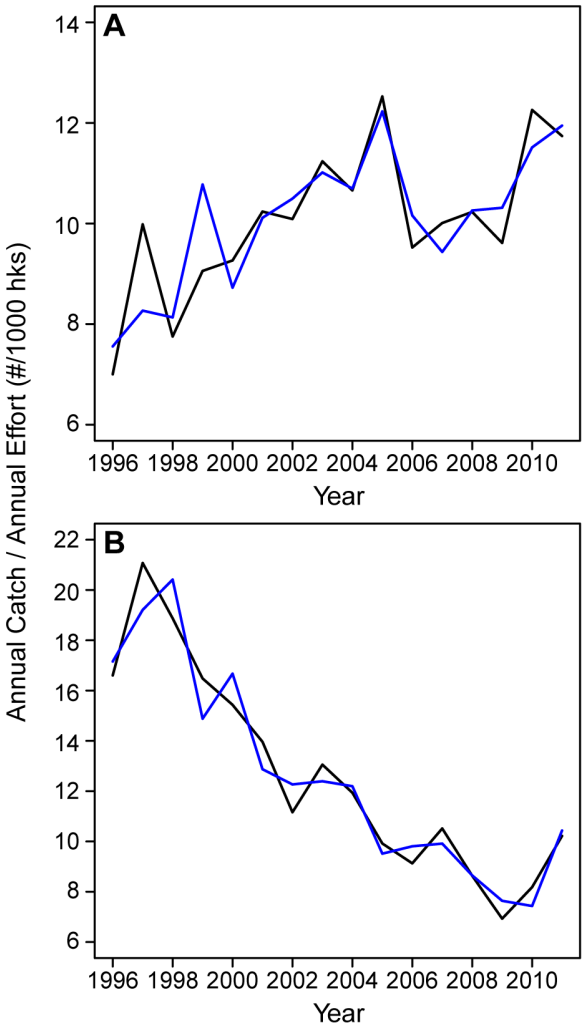

Figure 1. The annual observer and generalized additive model CPUE (# fish per 1000 hooks). Panels indicate (**A**) fishes <15 kg and (**B**) fishes ≥15 kg. In both panels black line represents CPUE from observer data, blue line represents CPUE estimated from the generalized additive model.
doi:10.1371/journal.pone.0062341.g001

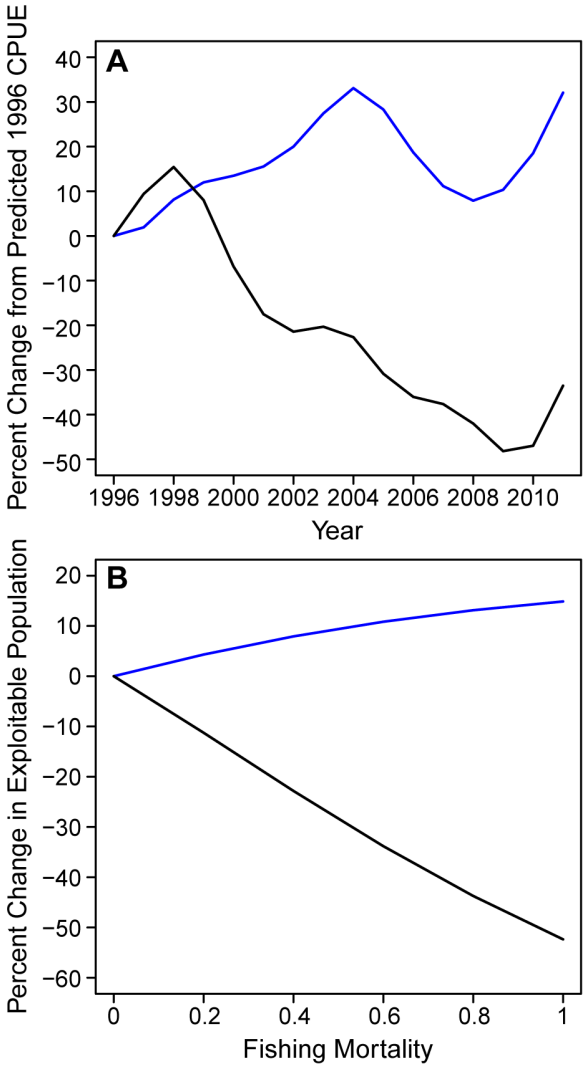

Figure 2. Percent change in standardized CPUE and population size for small and large fishes. Panels indicate (**A**) change in generalized additive model (GAM) standardized CPUE and (**B**) change in size-based model estimated population size for fishes <15 kg (blue) and fishes ≥15 kg (black).
doi:10.1371/journal.pone.0062341.g002

weight-frequency distribution. The weight-frequency distribution of the catch pooled over the 16-year period shows a typical exponential frequency decline with weight above about 15 kg suggesting that fish above this size are largely fully exploited while this is not the case for smaller fishes (Fig. 3). To further define a selectivity function our pelagic size-based model was run with fishing mortality (F) for F = 0.4 and F = 0.6 to generate catch size distributions. We found a simple size selectivity function where fishes greater than 15 kg experience the full level of F while for fishes in the range of 1–15 kg, F is one fourth the level for the larger fishes generated catch size structures similar to that in Fig. 3.

Using this size selectivity function we compute population abundance as a function of F with the size-based model. As F increases from 0 to 1.0, the population of large fishes declines about 60%, relative to F = 0, while the population of small fishes increases about 20%, relative to F = 0 (Fig. 2b). The standardized fishery CPUE derived from the GAM shows the same pattern of a decline in large fish CPUE and concurrent increase in small fish CPUE (Fig. 2a). Further, both observed and model trends show the decline in large fishes is substantially greater than the increase in small fishes (Fig. 2).

Next we use the size-based model to examine the change in the entire ecosystem (fished and unfished) size structure in response to various fishing levels. We express the change in ecosystem size structure as a percent change in the size frequency distribution in the absence of fishing relative to that of a fished ecosystem for various levels of F. The change in ecosystem size structure as a function of F shows a decline in the abundance of fishes larger than15 kg, the size of full recruitment to the fishery, and an increase in abundance of fishes within the size range 0.1–15 kg (Fig. 4). For any level of F, the magnitude of the increase in the 0.1–15 kg size range is less than the decline above 15 kg (Fig. 4). A portion of the small size class (1–15 kg) is also fished so this group is responding to both fishing and top-down impacts. For organisms weighing less than 0.1 kg, there is a very slight decrease in abundance but essentially the top-down or size-based cascade has only one cascade with declines for fishes greater than 15 kg resulting in increases for fishes between 0.1–15 kg (Fig. 4).

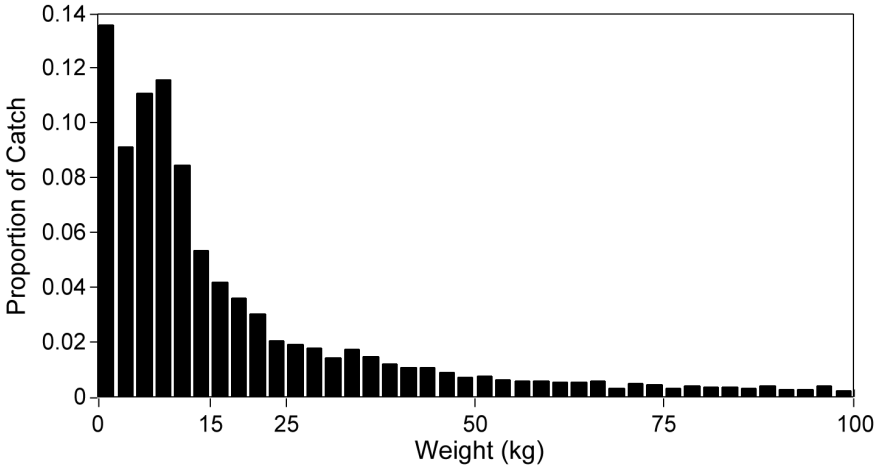

Figure 3. Longline catch weight-frequency distribution. The estimated longline catch weight-frequency distribution for the 23 species listed in Table 1 from the observer data 1996–2011. Distribution truncated above 100 kg.
doi:10.1371/journal.pone.0062341.g003

Size-based indicators derived from catch data including the mean size of the catch or the proportion of large fishes have been proposed as useful indicators to monitor fishery trends and ecosystem impacts. In the presence of a size-based cascade, indicators based only on catch data will necessarily underestimate the impact from fishing on the ecosystem size structure. For example, from the observer data we can monitor the change in the size structure of the catch as the proportion of the catch greater than 15 kg. In 1996 about 70% of the catch was greater than 15 kg but this proportion has declined over time to about 45% by 2011, roughly a 25% decline (Fig. 5a). The size-based model predicts that as F increases from 0.01 to 1.0 the proportion of fishes larger than 15 kg in the catch will decline about 30% (Fig. 5b). This is similar to the decline seen in the observer data. However, we have seen from the size-based model that fishing impacts the ecosystem size structure down to 0.1 kg. Thus a more complete measure of the change in the size structure due to fishing would be to compute the ratio of the population of fish larger than

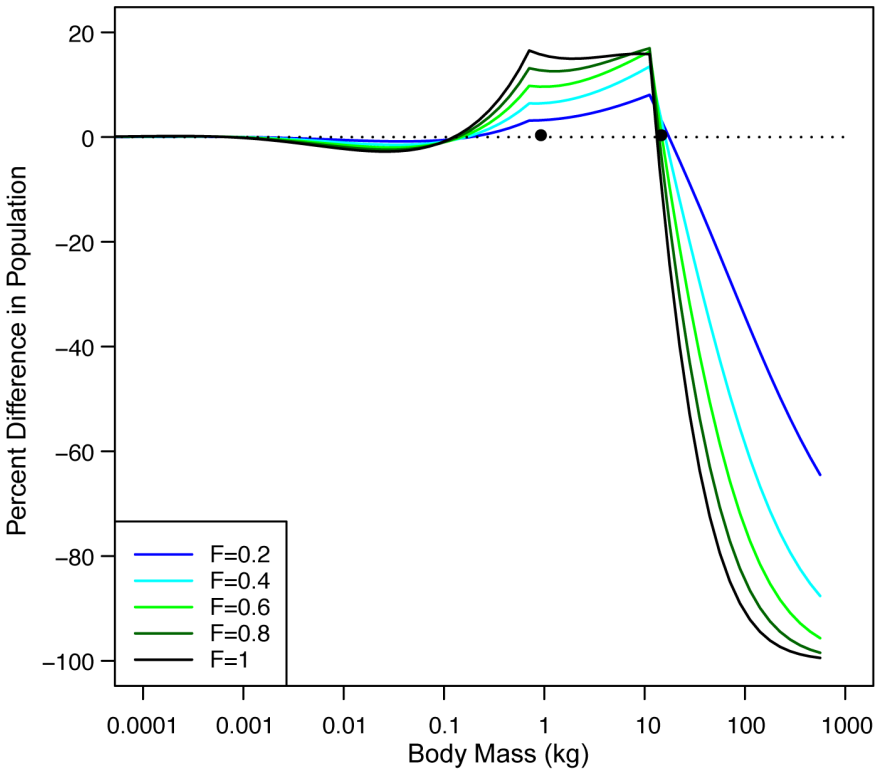

Figure 4. Change in fished ecosystem size structure relative to unfished ecosystem size structure. The percent change in ecosystem abundance by size between the unfished size structure and the fished size structure for F ranging from 0.2 to 1.0. The dots are located at 1 and 15 kg to indicate the size at entry to the fishery and the size of full recruitment.
doi:10.1371/journal.pone.0062341.g004

15 kg relative to all fish larger than 0.1 kg. While we can't do this with catch data, we can with the size-based model. This ratio declines, as F goes from 0.01 to 1.0, by about 55% or almost twice the decline seen in the model catch data since not only does the proportion of large fish decrease but smaller ones increase (Fig. 5b). Thus the change in ecosystem size structure due to fishing may be underestimated if computed from fisheries catch data alone.

The rise in catch rates of noncommercial snake mackerel and lancetfish has an impact on the discards in the fishery. The major components of discards in the fishery are the two non-commercial fishes, lancetfish and snake mackerel, which are 100% discarded, and sharks of which about 95% are discarded based on logbook records. Pelagic stingrays are also discarded but their contribution to the total discards is minimal (Fig. 6). Using these discard proportions and the catch for these 3 species from the observer data, we estimate that in 1996 about 30% of the total catch was discarded while by 2011 this proportion had increased to nearly 40% with about one third of the total catch consisting of snake mackerel and lancetfish (Fig. 6).

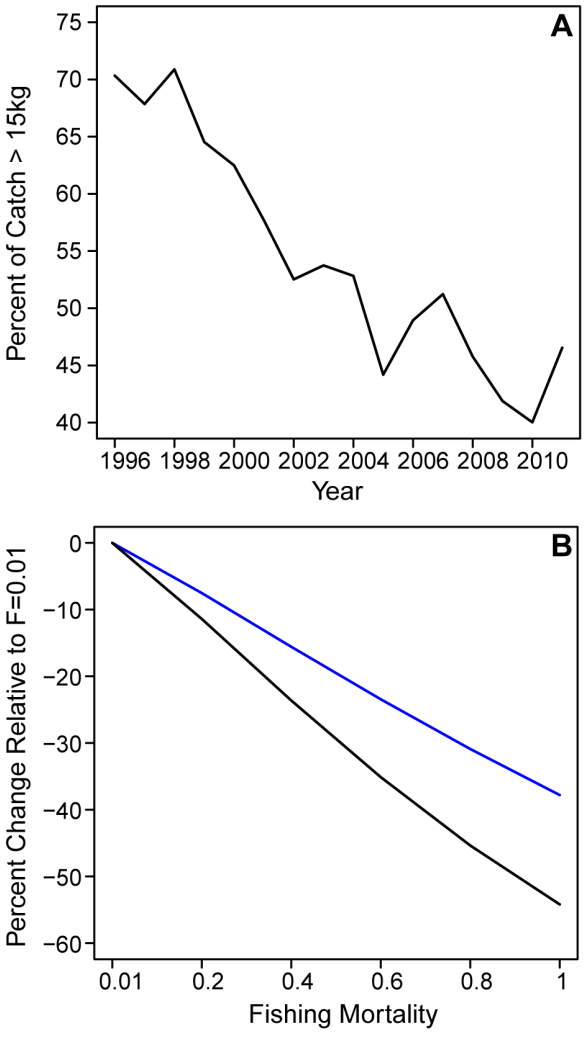

Figure 5. Percent change in catch and biomass. Panels indicate (**A**) the percent of the observed catch >15 kg, by year and (**B**) the percent change in the size-based model large fish catch and biomass relative to F = 0.01 for F ranging from 0.2 to 1.0 for the proportion of catch ≥15 kg (blue) and the proportion of exploitable biomass >0.1 kg that is ≥15 kg (black).
doi:10.1371/journal.pone.0062341.g005

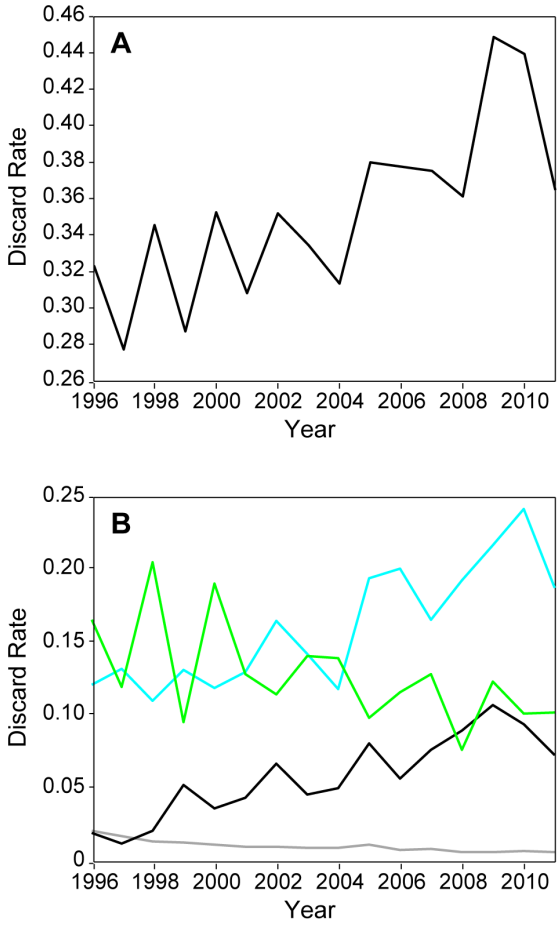

Figure 6. The proportion of the total observed catch estimated to be discarded. Panels indicate (**A**) the combined ratio of estimated discards consisting of the catches of pelagic stingray, snake mackerel, lancetfish, and 95% of the shark catch to total catch and (**B**) the ratio by species of Lancetfish (blue), snake mackerel (black), pelagic stingray (grey), and 95% of the shark catch (green) to total catch.
doi:10.1371/journal.pone.0062341.g006

Discussion

Evidence of fishing impacts to marine ecosystems, especially reductions in trophic structure (fishing down the food web), has been widely reported [22]. Further, decreases in the catch rates of large fishes and increases in the catch rates of small fishes based on longline catches in the central North Pacific between 1950s and 1990s has been previously reported [5]. Our results indicate this trend has continued through 2011. Further, we show that the temporal change in the species and size composition seen over the past 16 years in the Hawaii-based longline observer data is consistent with and can be explained by a size-based model. This suggests that size-based predation is the dominant mechanism in structuring the subtropical pelagic ecosystem, at least the upper trophic levels caught in the deep-set fishery. Earlier work [7] used a species-based model (EwE) to explain this temporal trend as a top-down response using estimated trophic level instead of size. Our current results and the previous ones are consistent in describing the ecosystem change as a top-down response. The fact that two different model approaches reach the same conclusion is seen as positive. We see the current results as a step forward in that a conceptually (size-based predation) and operationally (requiring

many fewer estimated input parameters) simpler model explains the observed ecosystem changes.

One implication of this result is that we have a model-based description of the impact of fishing on the entire ecosystem size structure. The model describes a one-step size-based cascade where a reduction of fishes above the size that is fully exploited by the fishery increases the abundance of organisms from about the size of full entry to the fishery down to about 2 orders of magnitude in size but results in little impact on smaller micronekton and plankton. The reason the top-down impact reaches sizes as small as 0.1 kg is predators have a mean prey size that is $1/100^{th}$ their weight with a lognormal distribution around that mean. The prey of fishes above 15 kg would have a mean size 0.15 kg and larger. The reason the size-based cascade, expressed as a percent of ecosystem abundance, diminishes with declining size is the ecosystem abundance increases exponentially as size decreases. Thus predation impacts from a fixed larger size represent a smaller and smaller fraction of the prey population as size decreases.

A key result of this work is the observation that the impacts to size structure extends to sizes below those caught in the fishery, and hence catch-based indicators will underestimate the impact of fishing on the ecosystem size structure. Further, unless there is a targeted sampling for the sizes below the size at entry to the fishery these changes will not be recognized. Size-based models can help to more fully represent the full ecosystem impact of fishing on size structure.

One exception to the pattern of a decline in CPUE of large fishes and concurrent increase for small fishes is the pelagic stingray (mean weight 3 kg) that exhibited a 5.4% annual decline. However, an earlier study [5] found that this species increased in the central Pacific longline catches between 1950s and 1990s and attributed this change to a reduction in predation due to declining shark abundance. Fishing effort since the 1990s has continued to increase and while the rays are not retained they are often severely damaged in the release process [23]. Thus their increased bycatch mortality may exceed the decreased predation mortality resulting in a population decline. Pelagic stingrays have been characterized as one of two elasmobranchs with the lowest risk of extinction due to their resilient life history characteristics [23] but our data suggest this may not be the case.

A recent analysis of temporal trends in catch rates of tunas, sharks, and billfishes based on a GAM using observer data the Hawaii longline fishery documented strong general declining trends in standardized catch rates for bigeye, yellowfin and albacore tunas, blue and oceanic white tip sharks, shortbill spearfish and striped marlin [16]. Our results for these species, just based on annual CPUEs but from a more geographically restricted region and over a slightly different time period, also showed significant declining trends in these species with the exception of yellowfin tuna where our estimated linear trend was not statistically significant. Additionally, Gilman *et al.* [16] looked at trends in length for tunas and billfishes and found the lengths significantly increased over time due to the distributions of length classes having shifted towards larger fish. The authors suggest reasons for this shift may include operational changes in the fishery and/or increased catches of juveniles in the purse seine fishery [16]. Initially, this shift to larger fish seems contrary to our finding of an ecosystem shift to small-sized fishes but the difference is a within-species vs. between-species comparison. We used mean weights averaged over the entire time series for each of the 23 species and described the shift in the ecosystem size structure as the shift in the relative abundance of small and large species. We did not examine temporal size trends within species, as many of our 23 species did not have sufficient length data. However, looking at the modest within species length changes presented in Gilman *et al.* [16] relative to the pretty substantial changes in the proportions of large and small fishes in the catch data we conclude that the main change to ecosystem size structure comes from changes in relative abundance between large and small species and not the smaller changes in size within species.

An ecosystem approach to fisheries management looks at fishery impacts to the entire ecosystem. Clearly the longline fishery is changing the subtropical ecosystem size structure. Time series of CPUEs computed separately for the pooled small and large fishes represent an informative ecosystem indicator of this trend and should be monitored and reported in any analysis of the fishery. Current reporting in the fishery shows only catch and catch rates in numbers of fishes so managers are not as likely to be aware of the greater decline in weight per effort compared to numbers per effort, and the former may be more closely related to economics of the fishery. Lastly this work shows the value of observer data, which unlike the more commonly collected logbook data, provides information on bycatch and discarded species that contributes to a more complete understanding of ecosystem dynamics.

Our size-based model does not suggest any obvious threshold in changes to an ecosystem size structure that could serve as a management target. A recent meta-analysis of global fisheries explores tradeoffs between multispecies maximum sustainable yield (MMSY) and the collapse of individual stocks [24]. Their model finds that for a wide range of exploitation rates ranging from 0.25 to 0.60 the resultant catches equal or exceed 90% of the MMSY, but with an exploitation rate of 0.60 almost half the species in the ecosystem are expected to collapse, while with an exploitation rate of 0.25 less than 10% of the species are expected to collapse [24]. Thus in a multispecies context, taking into consideration aspects of ecosystem structure and function, the exploitation rate that achieves maximum sustainable yield should be considered an upper limit rather than a management target [24]. Unfortunately our observer data represents only a small portion of the Pacific pelagic fishery so estimating MMSY and the corresponding F is problematic. This analysis needs to be conducted on the basin-scale by the appropriate regional fisheries management organizations. The sharp decline of stingrays and oceanic white-tip shark presents concern of collapse for these species. Currently management of the longline fishery is based on single species basin-wide quotas for yellowfin tuna, bigeye tuna, and striped marlin set by the Western and Central Pacific Fisheries Commission. To the extent that these quotas cap fishing effort and mortality on all species they could prevent further ecosystems impacts. Further, ways to reduce the estimated 40% discard rate in the fishery should be a management focus as well. Lastly, this work highlights the critical importance of observer data in monitoring ecosystem changes.

While this paper has focused on changes in ecosystem structure it is clear that with increases in escolar and snake mackerel CPUEs of 12 and 15% per year respectively and declines in pelagic stingray and oceanic white-tip CPUEs of 5.4 and 6.9% per year respectively we are also seeing changes in the ecosystem composition with potential significant impacts on ecosystem function.

Lastly, while we have seen evidence of changes at the base of the ecosystem in the subtropical Pacific over the past decade, they have been modest relative to the substantial increase in fishing effort [25,26]. However, going forward the impact of climate change has been projected to increase its ecosystem impact and shift the subtropical ecosystem size structure toward smaller sizes even if fishing effort remains constant [20,27]. Thus the combined

impacts of increased fishing effort and future climate change are projected to be additive and accelerate a shift of ecosystem size structure to smaller sizes. The time series of CPUE for our small fishes group shows considerably more interannual variation than the large fishes group. Many of these small fishes have faster growth rates and shorter life spans than the larger fishes and hence may be more responsive to interannual environmental changes. Thus a shift to smaller fishes may result in greater interannual variation in the longline fishery CPUE.

Supporting Information

Figure S1 The annual logbook and generalized additive model CPUE (# fish per 1000 hooks). Panels indicate (**A**) fishes <15 kg and (**B**) fishes ≥15 kg. In both panels black line represents CPUE from logbook data, blue line represents CPUE estimated from the generalized additive model.
(TIF)

Table S1 Mean species weight, length, and length-weight conversion factors. From left, columns indicate species, mean species weight as determined form length-weight conversions, mean length from those recorded by observers measuring every third fish from 2006–2011, *a*, *b*, and reference listing length-weight conversion factors. To convert length (L) in cm to weight (W) in g, the equation $aL^b = W$ was used.
(DOCX)

Table S2 Change in logbook catch rate estimate from statistically significant ($P<0.01$) linear regressions over 1996–2011, ordered by fish size. From left, columns indicate species, annual percent change in CPUE based on linear regression (*P*-values for significant trends in parentheses, insignificant fits denoted by a 0% change), and mean species weight as determined form length-weight conversion.
(DOCX)

Acknowledgments

We thank Dr. Julia Blanchard who provided code and assistance to greatly facilitate our application of the size-based model. We also thank all the scientific observers employed thorough the Pacific Islands Region for their collection of observer data from the longline fishery.

Author Contributions

Analyzed the data: PWJ JJP. Wrote the paper: JJP.

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Increases in the relative abundance of mid-trophic level fishes concurrent with declines in apex predators in the subtropical North Pacific, 1996–2006

Jeffrey J. Polovina (contact author)[1]
Melanie Abecassis[2]
Evan A. Howell[1]
Phoebe Woodworth[2]

Email address for contact author: Jeffrey.Polovina@noaa.gov

[1] Pacific Islands Fisheries Science Center
NOAA Fisheries
2570 Dole St
Honolulu, Hawaii 96822-2396

[2] Joint Institute for Marine and Atmospheric Research
University of Hawaii
1000 Pope Rd.
Honolulu, Hawaii 96822

Abstract—Catch rates for the 13 most abundant species caught in the deep-set Hawaii-based longline fishery over the past decade (1996–2006) provide evidence of a change among the top North Pacific subtropical predators. Catch rates for apex predators such as blue shark (*Prionace glauca*), bigeye (*Thunnus obesus*) and albacore (*Thunnus alalunga*) tunas, shortbill spearfish (*Tetrapturus angustirostris*), and striped marlin (*Tetrapturus audax*) declined by 3% to 9% per year and catch rates for four midtrophic species, mahimahi (*Coryphaena hippurus*), sickle pomfret (*Taractichthys steindachneri*), escolar (*Lepidocybium flavobrunneum*), and snake mackerel (*Gempylus serpens*), increased by 6% to 18% per year. The mean trophic level of the catch for these 13 species declined 5%, from 3.85 to 3.66. A shift in the ecosystem to an increase in midtrophic-level, fast-growing and short-lived species is indicated by the decline in apex predators in the catch (from 70% to 40%) and the increase in species with production to biomass values of 1.0 or larger in the catch (from 20% to 40%). This altered ecosystem may exhibit more temporal variation in response to climate variability.

Manuscript submitted 7 May 2009.
Manuscript accepted 4 September 2009.
Fish. Bull. 107:523–531 (2009).

The North Pacific subtropical gyre is a large oceanic gyre bounded on the south by the North Equatorial Current, on the west by the Kuroshio Current, on the north by the Kuroshio Extension Current and the North Pacific Current, and on the east by the California Current (Pickard and Emery, 1990). Although low in primary productivity, the warm, vertically stratified oligotrophic waters of the subtropical gyre contain a highly diverse food web populated by tunas, sharks, and billfishes at the top trophic levels (Seki and Polovina, 2001; Kitchell et al., 2002). Since the 1950s, the tunas, billfishes, and other large predators in this ecosystem have been targeted by large-scale fisheries. Several studies have indicated possible ecosystem impacts from fishing (Ward and Myers, 2005a; Kitchell et al., 1999; 2002). A comparison of catch, size, and species composition between a research longline survey in the 1950s and observer data from commercial longliners in the 1990s indicated a substantial decline in the abundance of large predators, in the mean size of these predators, and gave some evidence of an increased abundance of formerly rare species (Ward and Myers, 2005a). Models of the North Pacific subtropical gyre were generated with Ecopath with Ecosim, vers. 5 (EwE) modeling software (available from http://www.ecopath.org/index.php) to investigate whether the ecosystem contained any keystone species (Kitchell et al., 1999; 2002). The results indicated that there was not any single species group that functioned as a keystone, but that a broad reduction of apex predators due to fishing might result in an increase in prey (Kitchell et al., 1999; 2002). In effect, the fishing fleet is the keystone predator (Kitchell et al., 1999). However another modeling effort with an EwE model that incorporated some size-class structure revealed that although fishing decreased predator abundance, there was limited evidence (based on the decline in predators) of trophic cascades or other ecosystem impacts (Cox et al., 2002).

The longline logbook and observer data from the Hawaii-based fishery are valuable data sources for investigating the spatial and temporal dynamics of the exploited subtropical ecosystem. The fishery operates over a large portion of the central North Pacific, from the equator to 40°N latitude and from 140°W longitude to the International Date Line. Federally mandated logbooks completed by fishermen provide catch and effort

data on the landed species. A portion of the vessels, randomly selected, also carry observers who record all catches including noncommercial species.

Fishing effort in the Hawaii-based deep-set longline fishery targeting bigeye tuna (*Thunnus obesus*) increased about 250% between 1996 and 2006. The number of fishing sets increased from about 530 per month to 1370 per month, and the number of hooks deployed increased from about 850,000 per month to 2.9 million per month. The catch also increased from 161,000 to 427,000 fishes annually between 1996 and 2006.

In this article, changes in catch rates were investigated within the upper trophic levels of the subtropical ecosystem. Logbook and observer data from the Hawaii-based deep-set longline fishery provided catch and effort data that were used to describe the changes in catch rates of the most commonly caught commercial and noncommercial species from 1996 to 2006. Ecological indicators of the catch were also computed to estimate trends in the exploited ecosystem.

Material and methods

The Hawaii-based longline fishery consists of two components: the daytime deep-set fishery targeting bigeye tuna at depths, and the nighttime shallow-set fishery targeting swordfish (*Xiphias gladius*). The deep-set fishery typically sets hooks between depths of 100 m to 400 m with the median hook depth at about 250 m (Bigelow et al., 2006). Catch data recorded by fishermen in federally mandated logbooks provide daily records of fishing activity such as location, catch by species, number of hooks per set, and since 1996, the number of hooks per float for each set. Deep sets and shallow sets can be identified by a very strong bimodal distribution of the number of hooks between floats. For shallow sets, 2–6 hooks are used per float, whereas for deep sets, 20–32 hooks are used per float (Bigelow et al., 2006). For our analysis we identified deep sets as those with 10 or more hooks per float and shallow sets as those with fewer than 10 hooks per float. The shallow-set fishery operates primarily in the winter and spring within a narrow band of 28–32°N latitude. The shallow-set fishery was closed for several years to reduce interactions with sea turtles. In this article we focus exclusively on the deep-set fishery that operates throughout the year over a broad geographic region and provides an uninterrupted catch and effort time series from 1996. The restriction of our analysis to the deep-set fishery provides a relatively standardized depth range and method of gear deployment. Our analysis was further restricted to data that were obtained from the core region of the fishing ground defined as bounded by 12–27°N latitude. In some years, the fishery made excursions as far south as the equator and as far north as 32°N latitude; however, fishing in these areas was inconsistent over the period of the study.

In addition to logbook records of all commercially valuable catches, a portion of the longline vessels carried observers who recorded all catches and measured a subset of the catches. Between 1996 and 2006 approximately 16% of the deep-set effort in the core fishing ground had observer coverage. The top 13 species in the catch, determined from the observer data, accounted for 90% by number of the total observed catch over the period 1996–2006 in the deep-set fishery in the core fishing ground. In descending order of their proportion in the catch they were bigeye tuna (*Thunnus obesus*), longnose lancetfish (*Alepisaurus ferox*), blue shark (*Prionace glauca*), mahimahi (*Coryphaena hippurus*), sickle pomfret (*Taractichthys steindachneri*), snake mackerel (*Gempylus serpens*), skipjack tuna (*Katsuwonus pelamis*), albacore (*Thunnus alalunga*), yellowfin tuna (*Thunnus albacares*), striped marlin (*Tetrapturus audax*), escolar (*Lepidocybium flavobrunneum*), ono (*Acanthocybium solandri*), and shortbill spearfish (*Tetrapturus angustirostris*). The local name most frequently used in Hawaii for the sickle pomfret is monchong. Other common names used for mahimahi and ono are dolphinfish and wahoo, respectively. Three species reported by observers as part of the catch but not fully reported in logbooks because of their limited commercial value were lancetfish, snake mackerel, and escolar. In recent years escolar has become a commercial species and is now reported in the logbook, but this was not the case in the early part of the time period examined. Escolar is sometimes locally called oilfish or walu, but oilfish is actually the common name for *Ruvettus pretiosus* which represents a relatively rare species in the catch of the longline fishery.

For the 10 species fully reported in the logbooks, we computed a monthly catch-per-unit-of-effort (CPUE) time series. Logbook monthly CPUEs were computed as the total number of fish of a species caught in a month divided by the total number of hooks multiplied by 1000; thus CPUE was computed as the number of fish per 1000 hooks. A generalized additive model (GAM) (Hastie and Tibshirani, 1990) was then used over the 1996–2006 period that fitted observed monthly CPUE and contained a linear function of year to model the time trend, a smoothed monthly term to model the seasonal pattern, and a smoothed spatial term computed from mean monthly latitude and longitude to incorporate any spatial contribution to CPUE.

For the three species not fully reported in the logbooks (lancetfish, snake mackerel, and escolar), we used observer catch and effort data which covered about 16% of the fishing effort over the decade. Because we had much less observer coverage than logbook coverage, we pooled the observer data over the year and computed an annual, rather than monthly, CPUE time series. Observer annual CPUEs were computed as the total number of fish of a species caught in a year on vessels carrying observers divided by the total number of hooks used by those vessels multiplied by 1000. Because of the limited data points with our annual CPUE time series, a simple linear regression was fitted to the annual CPUE data. Although the limited observer coverage was considerably less than that reflected by the logbook data

Table 1

The percentage of the observed catch, the annual percent change in catch per unit of effort (CPUE) from the linear trends, categorical values of production to biomass (P/B), and trophic level for each of the top 13 most abundant species in the observed deep-set longline catch in Hawaii, listed in order of increased annual percent change in CPUE. Trophic level and P/B values are taken from the Ecopath model of Kitchell et al. (2002).

Species	Percentage of total catch		Annual percent change in CPUE	Ratio of production to biomass (P/B)	Trophic level
	1996	2006			
Albacore (*Thunnus alalunga*)	12	2	–9.1	0.6	4.0
Striped marlin (*Tetrapturus audax*)	5	4	–4.8	0.5	4.3
Bigeye tuna (*Thunnus obesus*)	17	17	–3.4	0.8	4.0
Shortbill spearfish (*Tetrapturus angustirostris*)	3	2	–3.3	0.5	4.3
Blue shark (*Prionace glauca*)	12	10	–2.6	0.3	4.0
Skipjack tuna (*Katsuwonus pelamis*)	4	4	0.0	1.9	3.9
Yellowfin tuna (*Thunnus albacares*)	4	4	0.0	1.2	4.0
Ono (*Acanthocbium solandri*)	1	4	0.0	2.0	3.9
Longnose lancetfish (*Alepisaurus ferox*)	10	20	0.0	0.3	3.2
Sickle pomfret (*Taractichthys steindachneri*)	5	9	6.0	1.5	3.2
Mahimahi (*Coryphaena hippurus*)	3	7	6.6	3.0	3.9
Escolar (*Lepidocybium flavobrunneum*)	1	4	10.6	0.8	3.2
Snake mackerel (*Gempylus serpens*)	2	6	17.9	1.0	3.2

for those commercial species where we had both types of data, the observer-based estimates of CPUE compared well with logbook-based estimates. For example, correlations between CPUE trends for commercial species computed from both logbooks and observer data were very similar—0.93 or greater for albacore, striped marlin, shortbill spearfish, bigeye tuna, and sickle pomfret, between 0.80 and 0.89 for mahimahi, ono, and yellowfin tuna, 0.78 for skipjack, and 0.76 for blue shark.

Based on the linear trend derived from either the GAM fitted to monthly CPUE data or the regression line fitted to annual observer CPUE, the annual percent change in CPUE of each species was computed as the slope divided by the intercept multiplied by 12 to convert from monthly to annual values, if necessary, and multiplied by 100 to convert to a percentage. For those species with linear slopes that were not statistically different from zero the annual percent change was set at zero.

From the catch data for the most abundant 13 species, we computed time trends of the annual mean trophic level of the catch, the annual proportion of the catch composed of apex predators (those with trophic level at least 4.0), and the annual proportion of the catch with moderate or high production to biomass (P/B) ratio (defined as at least 1.0). Here we define trophic level 1.0 as primary producers (e.g. phytoplankton), level 2.0 as secondary producers (e.g. zooplankton), level 3.0 as mid-level consumers, and level 4.0 and above as the apex predators. The estimates of trophic level and P/B ratio for most of the 13 species came from a central North Pacific pelagic ecosystem EwE model (Kitchell et al., 2002). The annual trophic level, annual percentage of the catch with trophic level at least 4.0, and annual percentage of catch with P/B ratio of at least 1.0 were computed as a mean weighted by the relative catch in numbers as follows:

$$M_j = \sum_{i=1}^{13} X_i (C_{ij} / CC_j), \quad (1)$$

where M_j = annual trophic level, annual percent of the catch with trophic level at least 4.0, or annual percentage of catch with P/B ratio of at least 1.0 in year j;
X_i = trophic level of species i or binomial variable with value 0 if trophic level < 4.0 or P/B < 1.0 and 100 otherwise;
C_{ij} = catch in number of species i in year j; and
CC_j = combined catch of top 13 species in year j.

Three species—sickle pomfret, escolar, and snake mackerel—are not represented as species groups in the Kitchell et al. (2002) model. However, longnose lancetfish is assigned a trophic level of 3.2 and a P/B ratio of 0.3 in the model. Lancetfish is found from the surface to below 1000 m and feeds on a diverse assemblage of fishes, cephalopods, tunicates, and crustaceans that occupy the scattering layers (Post, 1984). Sickle pomfret, escolar, and snake mackerel all appear to feed on much of the same prey as the longnose lancetfish so it seems reasonable to assign them all to a trophic level of 3.2 (Nakamura and Parin, 1993). For the P/B ratio,

a preliminary growth-rate estimation, based on daily increments on otoliths, indicates that sickle pomfret has rapid growth and reaches 42–49 cm fork length in 12 months (M. Seki, personal commun.[1]).The sickle pomfret growth and maximum size were estimated at just slightly less than the values for skipjack tuna, which has a P/B of 1.9 in the model; hence the sickle pomfret P/B was set at 1.5. Snake mackerel is a relatively fast-growing species with a maximum size of 1.0 m and population doubling time of less than 15 months and therefore it was assigned a P/B of 1.0 whereas escolar has a maximum size of 2 m and is slower growing than snake mackerel, and therefore it was assigned a P/B of 0.8. Recognizing that the P/B values for most of the 13 species are fairly subjective, we used them only to compute the change in the proportion of moderate and high P/B species in the catch where moderate and high P/B species are defined as those with P/B greater than or equal to 1.0.

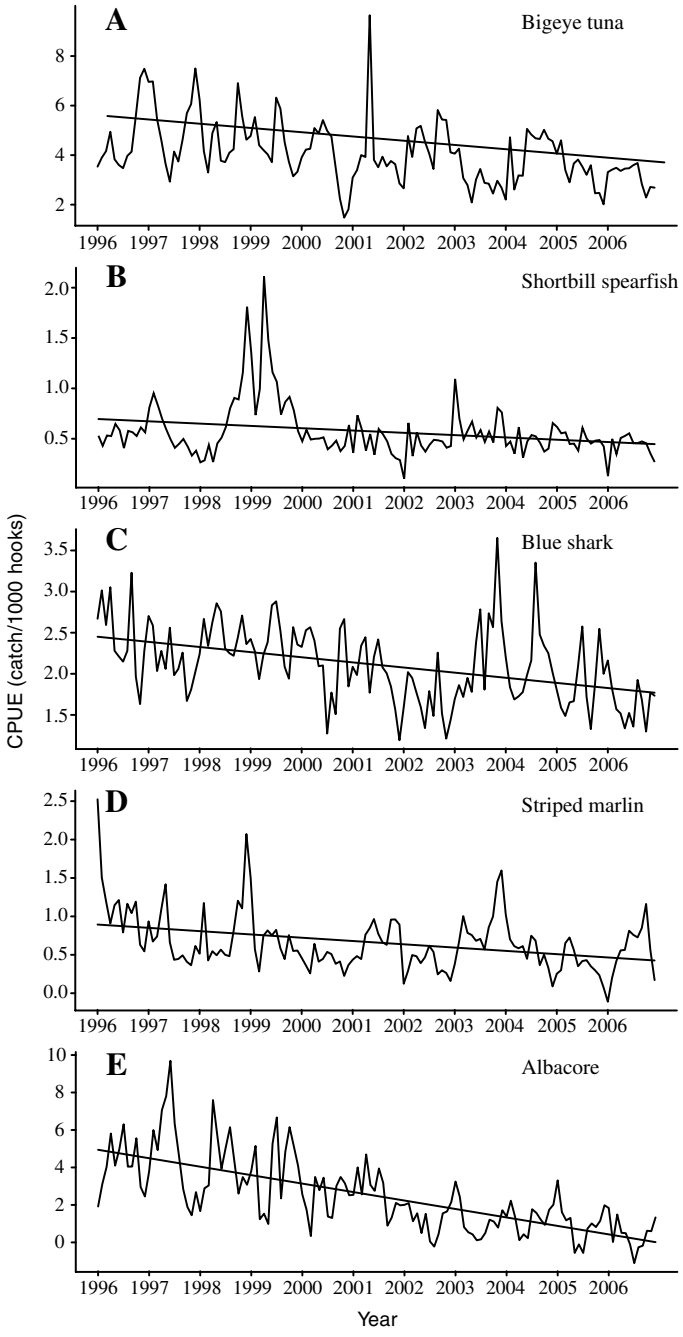

Figure 1

Temporally and spatially adjusted monthly catch per 1000 hooks (CPUE) and linear trend lines from the generalized additive models for those species exhibiting a significantly declining trend in the Hawaii deep-set longline fishery, 1996–2006: (**A**) bigeye tuna (*Thunnus obesus*), (**B**) shortbill spearfish (*Tetrapturus angustirostris*), (**C**) blue shark (*Prionace glauca*), (**D**) striped marlin (*Tetrapturus audax*), (**E**) albacore (*Thunnus alalunga*).

Results

The results from the logbook and observer CPUE time series for the 13 species revealed statistically significant linear trends in slopes ($P<0.05$) for 9 species—5 declining and 4 increasing trends (Table 1, Figs. 1–4). Albacore tuna, bigeye tuna, blue shark, shortbill spearfish, and striped marlin all showed declining CPUE trends; skipjack tuna, yellowfin tuna, ono, and lancetfish showed no significant trends; and mahimahi, sickle pomfret, escolar, and snake mackerel showed increasing trends (Table 1, Figs. 1–4). CPUE trends for albacore tuna, striped marlin, shortbill spearfish, bigeye tuna, and blue shark all decreased from 3% to 9% annually, CPUE trends for yellowfin tuna, skipjack tuna, ono, and lancetfish remained unchanged, whereas CPUE trends for mahimahi, sickle pomfret, escolar, and snake mackerel increased from 6% to 18% annually (Table 1, Fig. 4). For reference, the combined CPUE of all species caught in the deep-set fishery recorded in the observer data declined 4% annually. The species with declining trends had trophic levels of 4.0 or larger and the species with increasing trends had trophic levels of 3.9 or less (Table 1).

The mean annual trophic level of the top 13 species in the catch, weighted by number of fish caught, has declined over the time series by about 0.19 (or 5%), from about 3.85 to 3.66 (Fig. 5). The percentage of the catch of the top 13 species composed of apex predators (trophic level 4 and higher) has declined from about 70% to 40% (Fig. 5). The percentage of the catch of the top 13 species with relatively high P/B,

[1] Seki, Michael P. 2009. Pacific Islands Fisheries Science Center, National Marine Fisheries Service, 2570 Dole Street, Honolulu, HI 96822-2396.

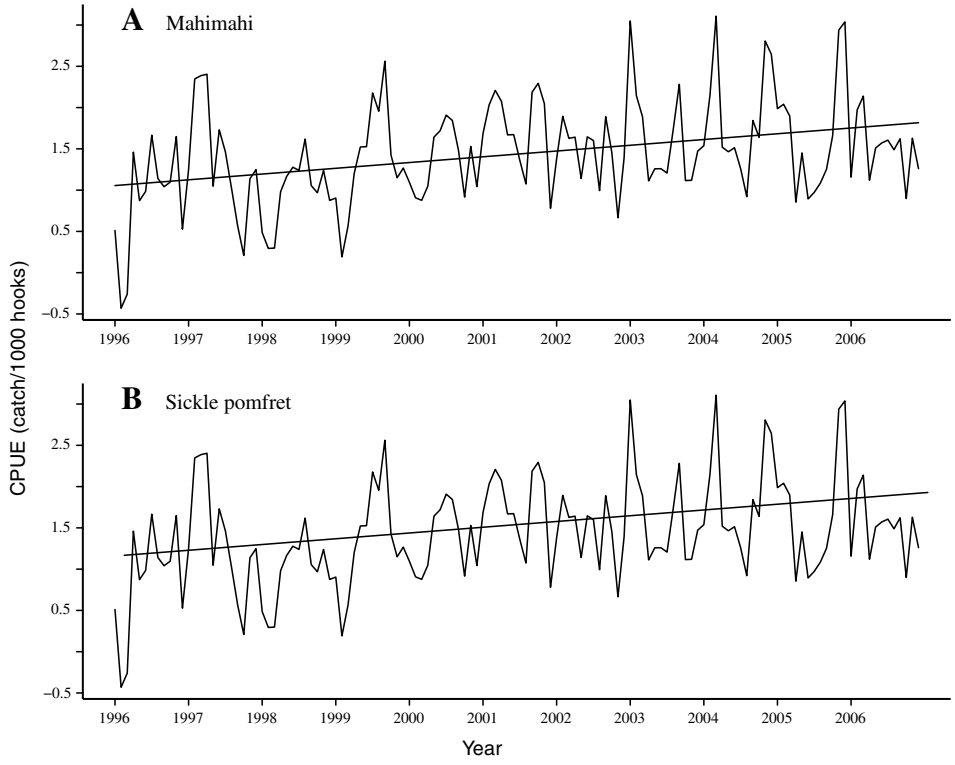

Figure 2

Temporally and spatially adjusted monthly catch per 1000 hooks (CPUE) and linear trend lines from the generalized additive models for those species exhibiting a significantly increasing trend in the Hawaii deep-set longline fishery, 1996–2006: (**A**) mahimahi (*Coryphaena hippurus*), and (**B**) sickle pomfret (*Taractichthys steindachneri*).

greater than or equal 1.0, has approximately doubled from about 20% to 40% (Fig. 5).

Discussion

The longline CPUE, like most fishery-dependent data, responds to a variety of factors that include changes in species targeted, gear changes that impact species catchability, changes in season, and area fished. It is likely that some of these factors have affected the Hawaii-based longline fishery. In an attempt to limit the effect of some of these factors we used only data from the deep-set fishery and from the core geographic region of the fishing ground. Further, for the 10 species for which we had logbook data we used a GAM to account for seasonal and spatial effects. However, in the case of albacore tuna, the 9.1% decline per year may be, at least in part, a result of a shift in targeting. On a basin-wide level the albacore stock, although reduced by fishing, has not exhibited the collapse seen in the deep-set fishery catches (Sibert et al., 2006). Albacore CPUE is greatest in the summer months, and since 2002 a summer fishery for large bigeye tunas has developed at 30°N latitude outside the core area covered in this study. This may have contributed to a shift in targeting from albacore to bigeye tuna.

We observed declines in CPUE trends of large high-trophic-level and lower P/B species, including striped marlin, shortbill spearfish, bigeye tuna, albacore tuna, and blue shark. Increasing CPUE trends were observed for mahimahi, sickle pomfret, escolar, and snake mackerel that are midtrophic-level species with higher P/B values. The increasing trends for mahimahi, escolar, and snake mackerel are most likely not due to increased targeting because snake mackerel has no commercial value, escolar has limited commercial value, and mahimahi is not caught efficiently with deep-set gear (it is generally only caught when the gear is being recovered and hooks are at the surface). The increasing trend is also not likely a response to more hooks being available from the decline in apex species because total catch rates are in the range of 10–20 fish per 1000 hooks and hence hook saturation is not likely a cause. However, the observed increase in catch rates of midtrophic level species concurrent with a decrease in catch rates of apex species is consistent with top-down control where fishing has reduced the abundance of apex species and mid-trophic level species have increased in abundance in response to decreased predation. Mahimahi is an epi-

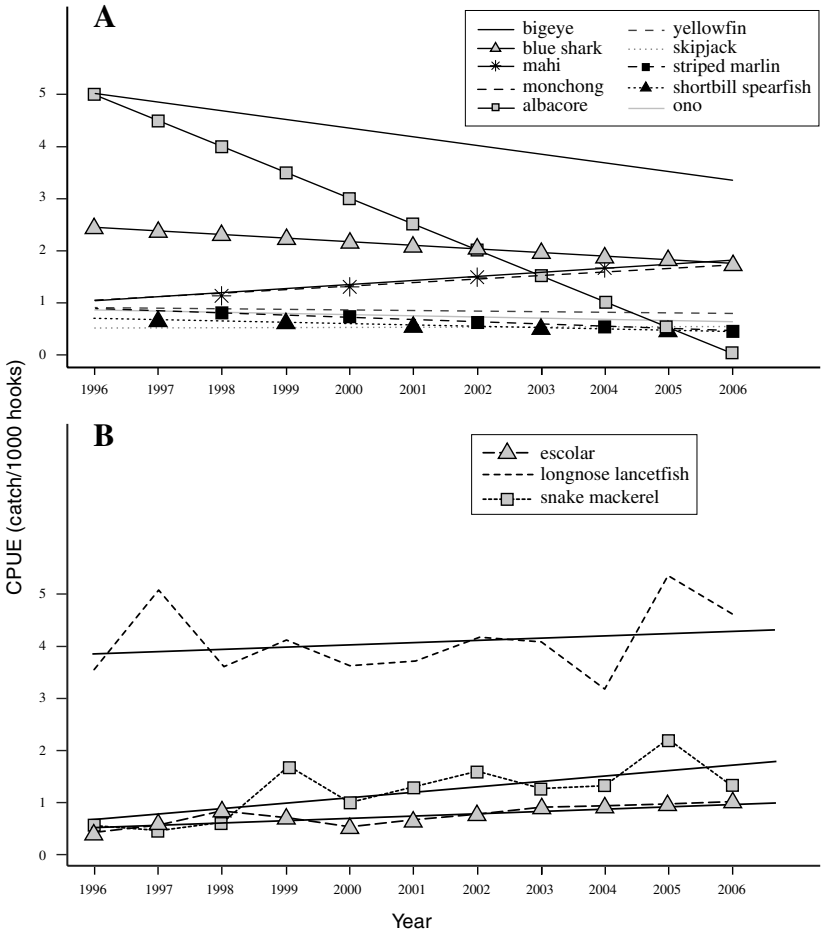

Figure 3

(**A**) Linear catch per 1000 hooks (CPUE) trends for the commercial species in the Hawaii based deep-set longline fishery from the generalized additive models, 1996–2006: bigeye tuna (*Thunnus obesus*), blue shark (*Prionace glauca*), mahimahi (*Coryphaena hippurus*), sickle pomfret (*Taractichthys steindachneri*), skipjack tuna (*Katsuwonus pelamis*), albacore (*Thunnus alalunga*), yellowfin tuna (*Thunnus albacares*), striped marlin (*Tetrapturus audax*), ono (*Acanthocybium solandri*), and shortbill spearfish (*Tetrapturus angustirostris*). (**B**) Annual catch per 1000 hooks (CPUE) and linear regression line for the non-commercial species from the observer catch data in the Hawaii based deep-set longline fishery, 1996–2006: escolar, (*Lepidocybium flavobrunneum*), longnose lancetfish (*Alepisaurus ferox*), and snake mackerel (*Gempylus serpens*).

pelagic species and its predators (billfishes, sharks, and large tunas) have decreased concurrently. An increase in troll and handline CPUE for mahimahi has been observed in the Hawaii fishery since the 1980s (Boggs and Ito, 1993). Sickle pomfret and escolar are mesopelagic species whose predators that include deep-foraging bigeye and albacore tunas, swordfish, and large sharks (Ward and Myers, 2005b). Snake mackerel inhabit both the epipelagic and mesopelagic depths and have many of the same predators as mahimahi in the epipelagic, and sickle pomfret in the mesopelagic depths. We have documented declines in relative abundance of bigeye and albacore tunas, striped marlins, shortbill spearfishes, and blue sharks, all predators of these midtrophic level species. Further, on a Pacific basin scale, biomass of top-level predators, tunas and blue shark, has been estimated to be at 36–91% of the level they would be in the absence of fishing (Sibert et al., 2006).

In a central Pacific EwE model, a top-down control was observed in the simulation (Kitchell et al., 2002; Fig. 3). When an increase in longline fishing was simulated, the biomasses of blue shark, large sharks, brown shark, bigeye tuna, yellowfin tuna, albacore, swordfish, blue marlin, and other marlins all declined; however,

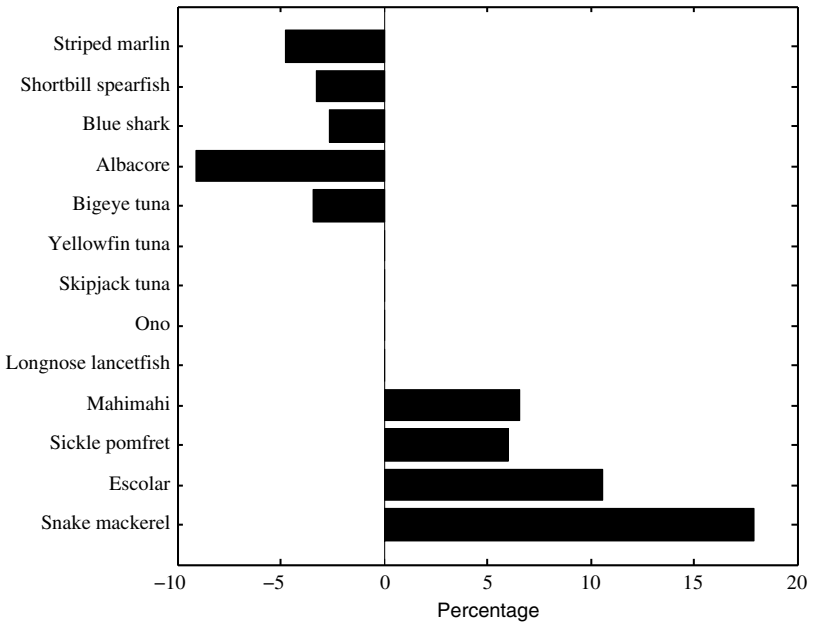

Figure 4

Annual percent change in catch per 1000 hooks (CPUE) (declines in catch are represented by negative values and increases in catch are represented by positive values) from the Hawaii deep-set fishery, over the period 1996–2006, based on the linear trends presented in Table 1 for each species arranged in descending order of its trophic level.

the biomass of mahimahi, flying squid, and lancetfish increased (Kitchell et al., 2002; Fig. 3). The pattern reversed when fishing was eliminated: the biomass of mahimahi, flying squid, and lancetfish all decreased as their predators increased (Kitchell et al., 2002; Fig. 3). Lancetfish CPUE in our analysis showed an increasing trend, but because of its large interannual variation, it was not statistically significant (Fig. 3). Flying squid is not caught in the longline gear. However, as previously discussed, sickle pomfret, escolar, and snake mackerel, although not specifically identified in the Kitchell et al. (2002) model, appear to occupy a very similar prey role in the food web as lancetfish and flying squids. Hence, the observed increase in CPUE for mahimahi, sickle pomfret, escolar, and snake mackerel is consistent with the top-down control seen in the Kitchell et al. (2002) model simulation. Considering an earlier and somewhat different central North Pacific Ecopath model (Kitchell et al., 1999) we concluded that there is no single species that serves as a keystone species in this ecosystem but rather the longline fishery may function as a keystone species.

One additional piece of evidence supporting top-down control for sickle pomfret is that this species was absent in the longline sets of the 1950s but present in the 1990s (Ward and Myers, 2005a). This finding was interpreted as a possible population response to a reduction in predators that included tunas, billfishes and sharks (Ward and Myers, 2005a).

Top-down controls have been observed in temperate ocean ecosystems. A meta-analysis showed shrimp population abundance was controlled by the abundance of its predator, the Atlantic cod (*Gadus morhua*), in eight regions in the North Pacific (Worm and Myers, 2003). Further, at least in one ocean system, the eastern Scotian Shelf, removal of the top predator, the Atlantic cod, resulted in a trophic cascade impacting four trophic levels (Frank et al., 2005). In our pelagic ecosystem, if we considered the longline fleet functioning at the top trophic level, then we have top-down controls spanning three trophic levels: the longline fleet, the apex fishes, and the midtrophic level fishes. Our knowledge of the feeding ecology of many of the midtrophic level fishes that appear to have increased—sickle pomfret, escolar, and snake mackerel—is very limited and therefore we do not know the impacts on the ecosystem from their increased abundance. The juveniles of many of the tunas also occupy the midtrophic level but whether they benefit from the reduction in apex predators or suffer from increased competition or an increase in other predators is unknown but is a critical question for fisheries management. For example, if juvenile tunas are adversely impacted by the increase in other midtrophic level species then a reduction in fishing effort may not result in an increase in adult tunas. Lastly, we do not have data on changes in cetacean abundance and cetaceans have not been included in previous central Pacific models. However, cetaceans are apex predators and if they are

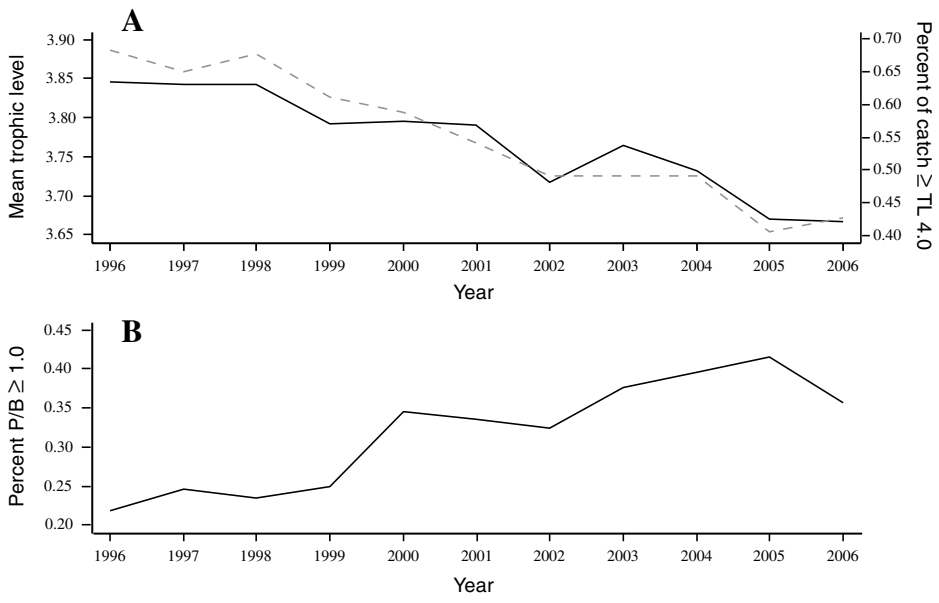

Figure 5

(**A**) Weighted annual mean trophic level of the catch of the 13 most abundant species caught in the deep-set Hawaii-based longline fishery over the period 1996–2006 (solid line), and the percentage of the catch of the 13 species with trophic level (TL) greater than or equal 4.0 (dashed line). (**B**) Percentage of the catch of the 13 species with production to biomass (P/B) greater than or equal 1.0.

not adversely impacted by fishery interactions they may experience less competition because of reduced numbers of apex predator fishes and because more prey would be available with the increase in midtrophic level fishes.

It should be noted that the almost threefold increase in the domestic fishery over the past decade is not the only change in the ecosystem. Over the same period, satellite-derived estimates of surface chlorophyll showed a decline in surface chlorophyll in the Hawaii-based longline fishing ground (Polovina et al., 2008). A change in productivity at the base of the food web could result in bottom-up control that could reduce the abundance of apex predators. Thus it is possible that the substantial changes we have observed in the pelagic ecosystem over the past decade are due to a combination of both bottom-up and top-down controls.

A decline in mean trophic level that exceeds 0.15 has been suggested as representing an ecologically significant fishing down of the food web (Essington et al., 2006). According to this definition the change in the annual mean trophic level of the catch we observed—a decline by 0.19 from 3.85 to 3.66—represents a significant fishing down of the food web in the central North Pacific subtropical gyre. However, an analysis of changes in biomass and trophic level for tunas and blue shark revealed a slight drop in the trophic level of the catch but showed no detectable change in the trophic level of the population (Sibert et al., 2006). A likely reason that we found a more substantial decline in mean trophic level of the catch is that our study encompassed not just the top predators but also midtrophic level fishes.

The decline in the percentage of apex predators from 70% to 40% of the catch and the increase in midtrophic level species from about 20% to 40% of the catch, as well as moderate and high P/B values illustrate the significant increase in the contribution of short-lived, fast-growing, high-fecundity species in the catch and presumably in the exploited population. These species increase their population size rapidly under favorable conditions but given their short life spans, decline quickly in unfavorable conditions. As a result, the current ecosystem will likely exhibit greater temporal variation in response to climate variation.

Acknowledgments

We'd like to acknowledge the contributions of the Pacific Islands Fisheries Science Center (PIFSC) staff, J. Pappas, C. Tokita, and B. Miyamoto, for their work ensuring that the Hawaii-based longline logbook and observer data are accurate, current, and readily accessible. We also thank the scientific observers employed through the Pacific Islands Region for their collection of observer data from the longline fishery. This work has benefited from insightful discussions on the dynamics of pelagic ecosystems with J. Kitchell, C. Walters, and C. Boggs. Finally, acknowledgements to PIFSC colleagues R. Domokos and

P. Kleiber along with P. Ward and two anonymous reviewers whose editorial changes improved the manuscript.

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