THE CENTER FOR BIOLOGICAL DIVERSITY • HUMANE SOCIETY OF THE UNITED STATES • WHALE AND DOLPHIN CONSERVATION • TURTLE ISLAND RESTORATION NETWORK • DEFENDERS OF WILDLIFE

August 27, 2014

Jon Kurland
Assistant Regional Administrator for Protected Resources
Alaska Region NMFS
Attn: Ellen Sebastian
P.O. Box 21668
Juneau, AK 99802–1668
Submitted via www.regulations.gov

RE: Comments on 90-Day Finding on a Petition To Identify the Central North Pacific Population of Humpback Whale as a Distinct Population Segment (DPS) and Delist the DPS Under the Endangered Species Act [NOAA–NMFS–2014–0051]

On behalf of the Center for Biological Diversity, the Humane Society of the United States, Whale and Dolphin Conservation, Turtle Island Restoration Network and Defenders of Wildlife, we hereby submit the following comments on the status review that the National Marine Fisheries Service (NMFS) initiated in response to a petition to designate the Central North Pacific humpback whale population as a distinct population segment (DPS) and delist that DPS under the Endangered Species Act (ESA). 79 Fed. Reg. 36,281 (June 26, 2014). Humpback whales are currently protected as endangered throughout their range. Increasing numbers of Central North Pacific humpback whales hold promise for recovery and highlight the success of the ESA. But delisting a DPS of humpback whales at this time would be premature for a number of reasons. First, the ESA does not allow NMFS to designate a DPS in order to delist that population. Second, humpback whales continue to face many threats, including the destruction or modification of their habitat through ocean acidification and climate change, and other natural or manmade factors such as noise pollution, entanglement in fishing gear and deadly collisions with boats. Finally, even if there is a distinct breeding stock of Central North Pacific humpback whales, these whales mix with, and are not easily distinguishable from, other humpback stocks that currently face more severe threats.

I. NMFS Cannot Designate a DPS for the Purpose of Delisting the DPS

The ESA's definition of "species" includes "any subspecies . . . and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature." 16 U.S.C. § 1532(16). By amending this definition to include "distinct population segments," Congress extended the protections of the ESA to locally vulnerable populations of vertebrate fish and wildlife species in circumstances where a species as a whole is not endangered or threatened. The plain language of the statute does not sanction NMFS's finding—implicit in its determination that the petitioned action may be warranted—that it can carve out a DPS from a species-level listing for the purpose of reducing the protections for a segment of a listed species.

Indeed, in vacating and remanding a final rule of the U.S. Fish & Wildlife (FWS) that designated a western Great Lakes gray wolf DPS for the purpose of delisting that DPS, the U.S. District Court for the District of Columbia questioned the ability of the FWS to use the DPS tool to delist a previously unlisted entity, finding that the text of the ESA "quite strongly suggests—consistent with common usage—that the *listing* of any species (such as the western Great Lakes DPS) is a precondition to the *delisting* of that species." *Humane Soc'y v. Kempthorne*, 579 F. Supp. 2d 7, 17 (D.D.C. 2008) (emphasis added). NMFS's designation of a Central North Pacific DPS for the purpose of removing federal protections within that DPS would be similarly unlawful.

The agency's own DPS policy likewise confirms that DPSs are a proactive measure to *prevent* the need for listing a species over a larger range. Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act, 61 Fed. Reg. 4722 (Feb. 7, 1996). The DPS policy provides that a vertebrate population must be both "significant" and "discrete" to be designated as a DPS. *Id.* at 4725. The requirement that a population segment be "significant" reflects how the DPS tool is to be properly used. The DPS policy instructs that a DPS be designated only if the population segment is important enough to warrant protection. Like the ESA's restriction of the DPS tool to vertebrates, the policy's restrictions of DPSs to "significant" populations makes no sense if the tool could be used to remove protections from a population already protected by a listing. Under such a theory, the DPS policy would allow the removal of federal protections from a "significant" population of an endangered species, while forbidding this option for non-significant populations.

As the DPS policy explains:

> Listing, delisting, or reclassifying distinct vertebrate population segments may allow the Services to protect and conserve species and the ecosystems upon which they depend before large scale decline occurs that would necessitate listing a species or subspecies throughout its entire range. This may allow protection and recovery of declining organisms in a more timely and less costly manner, and on a smaller scale than the more costly and extensive efforts that might be needed to recover an entire species or subspecies.

Id. The DPS tool is therefore intended to be used to protect a population segment without having to list the entire species. Nowhere does the policy state or even imply that a DPS may be used to strip federal protections from a portion of a listed species.

"Consistent with the language of the ESA and the agency's DPS policy, several federal courts have concluded that a DPS can be used when listing a species or subspecies is not warranted, but a local population of the species is facing additional threats." *See Defenders of Wildlife v. Sec'y, U.S. Dep't of Interior*, 354 F. Supp. 2d 1156, 1169 (D. Or. 2005) (explaining that "if a distinct and significant population of an unlisted species is struggling while other populations are faring well, FWS may designate the struggling population as a DPS and list it as endangered"); *Nat'l Ass'n of Home Builders v. Norton*, 340 F.3d 835, 842 (9th Cir. 2003) (noting that under the DPS

Policy, "[t]he FWS does not have to list an entire species as endangered when only one of its populations faces extinctions"); *Friends of the Wild Swan v. U.S. Fish & Wildlife Serv.*, 12 F. Supp. 2d 1121, 1134 (D. Or. 1997) (same).

If NMFS were permitted to use the DPS tool to delist the Central North Pacific population of the humpback whale, it could allow for the delisting of any population that is huddled within a discrete area, regardless of the health of the species outside that line. This tactic would effectively stop recovery in its tracks, preventing developing populations from ever reaching areas of unoccupied range where the species still retains and needs the protections of the ESA. This is not what Congress intended when the DPS tool was conceived.

II. Humpback Whales Continue to Face Threats from Destruction or Modification of Habitat and Other Natural or Manmade Factors

Even if NMFS could lawfully designate a DPS for the purposes of delisting that DPS (which, for the reasons articulated above, it cannot), the population does not meet the ESA's delisting criteria. Once listed under the ESA, a species can only be delisted if it is determined that: the species is now extinct; protection under the ESA is no longer required because the best scientific and commercial data available indicate that it is no longer endangered or threatened (i.e., the species has recovered); or that data used in the original classification, or the interpretation of those data, were erroneous. 50 C.F.R. § 424.11(d). In deciding whether to delist a species due to recovery, NMFS must conduct the same Section 4(a)(1) threats analysis it conducts when it decides whether to list a species. 16 U.S.C. § 1533(c)(2)(B); 50 C.F.R. § 424.11(d); *see also Defenders of Wildlife v. Babbitt*, 130 F. Supp. 2d 121, 133 (D.D.C 2001) (noting that "the same five statutory factors must be considered in delisting as in listing.") (citations omitted).

Pursuant to 16 U.S.C. § 1533(a)(1), the five listing factors are:

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

A species has not recovered, and cannot be delisted, "until the threats to the species as analyzed under section 4(a)(1) of the Act have been removed." 51 Fed. Reg. 19,926, 19,935 (June 3, 1996). Threats to the humpback whale within the North Pacific have not been removed, and the species remains imperiled by several factors, including the present or threatened destruction, modification, or curtailment of its habitat or range and other natural or manmade factors. *See* 16 U.S.C. § 1533(a)(1)(A), (E).

Destruction, modification or curtailment of habitat or range: Ocean Acidification and Climate Change

Climate change and ocean acidification are progressing rapidly in the North Pacific, with potential widespread impacts to marine mammals (Grebmeier 2012). Alaska waters are especially prone to rapid ocean acidification due to a naturally high level of dissolved carbon dioxide in colder waters, and also to a combination of physical and biological processes. Researchers have already observed rapid ocean acidification and changes in ocean chemical processes (Micheli et al. 2012, Cross et al. 2012, Evans et al. 2013b).

Warming water, loss of sea ice and ocean acidification will fundamentally change the "behavior, condition, survival, and interactions" of marine mammals in Alaska waters (USGCRP 2013). Effects on marine mammals include "changes in abundance, distributions, timing and range of migrations, community structure, prey abundance and distributions, changes in trophic relationships, reproductive success, and ultimately, survival" (Simmonds and Eliott 2009).

Researchers stress that while marine mammal species evolved to be migratory, capable of dealing with changing environmental conditions, the current rate of change is unprecedented (Simmonds and Isaac 2007). Thus, cetaceans' ability to adapt to anthropogenic climate change will be complex and difficult to predict (Simmonds and Eliott 2009). Declines and shifts in species compositions are already widespread at the lower trophic levels (Comeau et al. 2010, 2012, Lischka et al. 2010). Certain marine mammal species, including the walrus, polar bear, and narwhal, are already impacted by these changes (Grebmeier 2012); baleen whales in the North Pacific are also likely already experiencing impacts, or will be affected in the near future (Simmonds and Isaac 2007).

Moore and Huntington (2008) found that "there is a very real likelihood that seasonally migrant cetaceans will range farther north and perhaps stay longer, if trends in sea ice reduction continue. Fin, humpback, minke, gray, and killer whales seem especially poised for such opportunity." Although the authors speculate that the plasticity of the seasonally resident animals may provide resilience in foraging opportunities, this change in range also puts these species in range of increasing ship traffic, offshore energy exploration and development and poorly monitored fishing activity that may also increase risks.

An expert workshop has also speculated on increased risk arising with increased opportunity for exploration and development of offshore oil and gas reserves. A recent workshop convened by the International Whaling Commission noted that Arctic basins have great potential for further development with major volumes of resources offshore. (IWC, 2014) Further, the expected increase in oil and gas activities involve potential impacts from development and transport as well as from production, and a rapid development of shipping as a service for offshore/onshore oil and gas projects can be expected. This portion of the IWC workshop also identified substantial data gaps including the need for more information on distribution and shifting habitat use by marine mammals.

In particular, Reeves, citing his published work (Reeve et al., 2014) recommended a better understanding of the increasing co-occurrence of seasonal habitat use by marine mammals and human activities and the mitigation of possible impacts from ship traffic, oil and gas exploration and production and strict regulation of seismic and other activities producing intense noise, all of which may increase with the increasing availability of arctic environment for human traffic and exploitation. (IWC, 2014b)

Ocean Acidification

Ocean acidification is likely the greatest greenhouse-gas-driven threat to humpback whales because it threatens their food supply. Global greenhouse gas emissions are tracking the most fossil-fuel intensive Intergovernmental Panel on Climate Change (IPCC) emissions scenario. Due to the United States and international failures to adequately address climate change, greenhouse gas emissions are increasing at an accelerating pace. Carbon Dioxide (CO_2) is the dominant greenhouse gas driving the observed changes in the Earth's climate and oceans (NRC 2011). The atmospheric concentration of CO_2 reached ~395 parts per million (ppm) in 2012 (NOAA 2013) compared to the pre-industrial concentration of ~280 ppm. The current CO_2 concentration has not been exceeded during the past 800,000 years (IPCC 2013) and perhaps not during the past 15 to 20 million years (Tripati et al. 2009). Atmospheric CO_2 emissions have risen particularly rapidly since the 2000s (Raupach et al. 2007, Friedlingstein et al. 2010). The global fossil fuel CO_2 emissions growth rate was 1.1% per year during 1990-1999 compared with 3.1% during 2000-2010 (Global Carbon Project 2011). Since 2000 this growth rate has largely tracked or exceeded the most fossil-fuel intensive emissions scenarios projected by the IPCC, the A1FI and RCP8.5 scenarios (Peters et al. 2012).

The ocean's absorption of anthropogenic CO_2 has already resulted in more than a 30% increase in the acidity of ocean surface waters, at a rate likely faster than anything experienced in the past 300 million years, and ocean acidity could increase by 150% to 200% by the end of the century if CO_2 emissions continue unabated (Orr et al. 2005, Feely et al. 2009a, Hönisch et al. 2012). Waters around Alaska have naturally lower concentrations of carbonate, and are more vulnerable to rapid ocean acidification (Cross et al. 2012, Mathis et al. 2014). Biological and physical processes in the waters around Alaska further exacerbate decreasing pH and carbonate, or increase the partial pressure of carbon dioxide.

Recent observations of calcium carbonate saturation states in the North Pacific and Bering Sea have found that full water column undersaturation of calcium carbonate due to ocean acidification is already prevalent. Mathis et al. (2011b) reported that extensive areas of bottom waters over the Bering Sea shelf are becoming undersaturated with respect to aragonite for at least several months (July to September), and some areas of bottom water were already observed to be undersaturated with respect to calcite (Fabry et al. 2009, Mathis et al. 2011b). Re-mineralization of organic matter exported from surface waters appears to increase bottom water CO_2 concentrations over the shelf in summer and fall, suppressing the calcite and aragonite saturation state values. In the surface waters, removal of CO_2 by high rates of phytoplankton primary production increases saturation state values between spring and summer, but these increases are partly counteracted by sea ice melt water and terrestrial river runoff that have low saturation state values and that are increasing with climate warming.

Under existing CO_2 emission rates, models predict that the surface waters of the Arctic Ocean and parts of the North Pacific will be undersaturated with respect to aragonite in the next 50 years, starting as early as 2016 in the Arctic (Orr et al. 2005). Surface waters of the parts of the

North Pacific are already undersaturated with respect to calcite (Steinacher et al. 2009, Mathis et al. 2011b).

This unprecedented ocean acidification threatens to alter prey availability for humpback whales (Simmonds and Eliott 2009, Fleming and Jackson 2011). Changes in circulation patterns in the Bering Sea in the past resulted in a shift in humpbacks' prey base. In the 1970s a phase shift from shrimp and small fish to pollock in the Gulf of Alaska resulted in a switch from smaller prey to mostly pollock. Similar shifts in prey base due to climate change and variation may affect humpbacks and their prey in the future, with unknown results (Hollowed et al. 2012). In the Atlantic North Sea, a decline of 70% has been observed for one zooplankton species, related to climate warming (Edwards et al. 2007). It appears that species of plankton adapted to warmer waters are moving north as the climate warms, but not at high enough abundances to adequately replace the cold water plankton species that are in decline (Edwards et al. 2007). Thus, there is an overall decrease in the abundance of plankton in northern waters with climate change.

Ocean acidification especially affects calcifying marine organisms by hindering their ability to build protective shells and skeletons and by disrupting metabolism and critical biological function (Fabry et al. 2008, Feely et al. 2009, Kroeker et al. 2013). The adverse effects of ocean acidification are already being observed in wild marine populations, including reduced shell rate and high mortality of pteropods, a key lower trophic prey species for whales and many other marine animals (Moy et al. 2009, Clark et al. 2010, Comeau et al. 2010, Lischka et al. 2010). Under once IPCC scenario (SRES A2), the Arctic pteropods *Limacina helicina* will be unable to calcify a shell by the end of this century (Comeau et al. 2012). All calcifying marine organisms tested to date have shown at least an initial negative response to decreasing carbonate saturation states (Kroeker et al. 2010, 2013).

Plankton, which comprise the basis of the marine food web and the humpback diet, are among the calcifying organisms adversely affected by ocean acidification. Changes to calcifying zooplankton, such as pteropods and foraminfera, have the potential to affect the ecological and tropic dynamics that govern the exchange of energy and cycling of nutrients throughout the marine food web (Gattuso & Hansson 2011). Studies have shown that pteropods exposed to a pH value predicted for the end of this century exhibited a 28% decrease in calcification (Comeau et al. 2009). Experiments on *Limancina helicina* showed that acidified waters led to smaller and more fragile shells (Comeau et al. 2012). Pteropods form integral components of food webs, and are considered an overall indicator of ecosystem health (Orr et al. 2005). The pteropod *Clio pyramidata* kept in aragonite undersaturated waters began to dissolve within two days (Orr et al. 2005). Studies showed that carbon dioxide related changes to seawater caused reduced calcification of 15% to 44%, resulting in malformed and incomplete shells of coccolithophorids. (Riebesell et al. 2000). Modern shell weights of foraminifera in the Southern Ocean are 30% to 35% lower than those from preindustrial sediments, which is consistent with reduced calcification induced by ocean acidification (Moy et al. 2009).

Krill are a primary prey of humpback whales, and under future levels of ocean acidification there is a potential for changes in the availability and locations of krill. While there are not yet models of impacts on krill in the North Pacific, studies in the Southern Ocean inform potential impacts on krill upon which humpback whales depend. A recent study by Kawaguchi et al.(2013) found that "[t]he data revealed that substantial declines in the viability of major populations of krill in the region may occur within the next 100 years, which is on the trajectory of change that could result in catastrophic consequences for dependent marine mammals and birds of the Southern Ocean." Their study shows that at predicted levels of carbon dioxide in the ocean, there is a dramatic decline in the successful hatching of krill eggs (Kawaguchi 2013).

Ocean acidification will affect humpback whales in other important respects, including exposure to toxic harmful algal blooms. Ocean acidification may already be increasing the toxicity of harmful algal blooms known as "red tides." High CO_2 levels in seawater magnify the toxins of harmful algae. These toxic red tides can poison prey and whales. Some globally distributed diatoms produce a neurotoxin, domoic acid, which can result in human illness and even death. Studies of this genus Pseudo-nitzscia show that the toxicity of these diatoms increases significantly under ocean acidification conditions. A -0.5pH change caused toxin production in the diatoms to increase 4.2-fold, and a -0.3pH unit change increased the toxicity 2.5-fold (Tatters et al. 2012). Already, these harmful algal blooms have been related to mass mortalities of fish and marine mammals, and these studies suggest that the damage will become much worse.

Ocean acidification also decreases the sound absorption of seawater, causing sounds to travel further with potential impacts on whales and other marine mammals that may be sensitive to the noises created by vessel traffic, seismic surveys, military sonar, and other noise pollution (Hester et al. 2008). Already sound travels 10% to 15% further with a change of 0.1 pH, and it is predicted to increase about 40 percent by midcentury with corresponding ocean acidification (Id.). As discussed below, noise pollution in the humpback whales' environment is an ongoing and growing threat.

Climate Change

North Pacific humpback whales concentrate in areas where there are the oceanographic conditions and climate variables that support krill (Dalla Rosa et al. 2012, Friday et al. 2012, Sigler et al. 2012). Modeling of whale occurrences showed that the whales are associated with latitude and bathymetry as well as sea surface temperature and salinity (Dalla Rosa et al. 2012). This indicates that habitat and foraging areas may be strongly influenced by climate change variables. Most researchers agree that cetaceans will be negatively impacted by climate change, and emphasize a precautionary approach to management of marine mammals. This includes preserving large, genetically-diverse populations to allow for migratory species to adapt to, or exploit, the changes caused by global climate change.

The average global surface temperature has warmed by more than 0.85 degrees Celsius (1.5 degrees Fahrenheit) since the industrial revolution, most of which has occurred in the past three decades (IPCC 2013). In the United States, temperatures have warmed by more than 1.1°C (2ºF) over the past 50 years, with the greatest warming in Alaska (Karl et al. 2009). Globally, the decade from 2000 to 2010 was the warmest on record (NASA 2012), and 2005 and 2010 tied for the hottest years on record (NOAA 2012a). By the end of this century, the average temperature in the United States is expected to increase by 2.2 to 3.6°C (4 to 6.5°F) under a lower emissions scenario and by 3.9 to 6.1°C (7 to 11°F) under a higher emissions scenario (Karl et al. 2009). Not only is the climate warming, but also the ocean temperatures are rising and salinity is changing

(IPCC 2013). Approximately 80 percent of the heat put into the climate system is absorbed by the ocean (IPCC 2007).

Anthropogenic climate change has resulted in population declines and extinctions. Climate change is already causing changes in distribution, phenology, physiology, genetics, species interactions, ecosystem services, demographic rates, and population viability: many animals and plants are moving poleward and upward in elevation, shifting their timing of breeding and migration, and experiencing population declines and extirpations (Parmesan and Yohe 2003, Root et al. 2003, Parmesan 2006, Chen et al. 2011, Maclean and Wilson 2011, Warren et al. 2011, Cahill et al. 2012). Because climate change is occurring at an unprecedented pace with multiple synergistic impacts, climate change is predicted to result in catastrophic species losses during this century. The IPCC concluded that 20% to 30% of plant and animal species will face an increased risk of extinction if global average temperature rise exceeds 1.5°C to 2.5°C relative to 1980-1999, with an increased risk of extinction for up to 70% of species worldwide if global average temperature exceeds 3.5°C relative to 1980-1999 (IPCC 2007). Other studies have predicted similarly severe losses: 15% to 37% of the world's plants and animals committed to extinction by 2050 under a mid-level emissions scenario (Thomas et al. 2004); the potential extinction of 10% to 14% of species by 2100 if climate change continues unabated (Maclean and Wilson 2011); and the loss of more than half of the present climatic range for 58% of plants and 35% of animals by the 2080s under the current emissions pathway, in a sample of 48,786 species (Warren et al. 2013). Scientists have warned that the Earth is fast approaching a global "state-shift" that could result in unanticipated and rapid changes to Earth's biological systems (Barnosky et al. 2012).

Changing ocean conditions and the melting of sea ice in the Arctic are also likely to increase vessel traffic. This, in turn, may increase the risk of vessel-related mortality which we will discuss in greater depth below.

Because there are many unknowns about how these climatic and ocean changes will affect humpback whales, NMFS must take a precautionary approach to their management. Indeed, delisting the Central North Pacific population of humpback whales in the face of such uncertainties would run afoul of the precautionary, conservation mandate embodied in the plain language of the ESA. *See TVA v. Hill*, 437 U.S. 153, 194 (1978) ("Congress has spoken in the plainest of words, making it abundantly clear that the balance has been struck in favor of affording endangered species the highest of priorities, thereby adopting a policy which it described as "'institutionalized caution.'"); *Conner v. Burford*, 848 F.2d 1441, 1454 (9th Cir. 1986) (Congress "inten[ded] to give the benefit of the doubt to the species.").

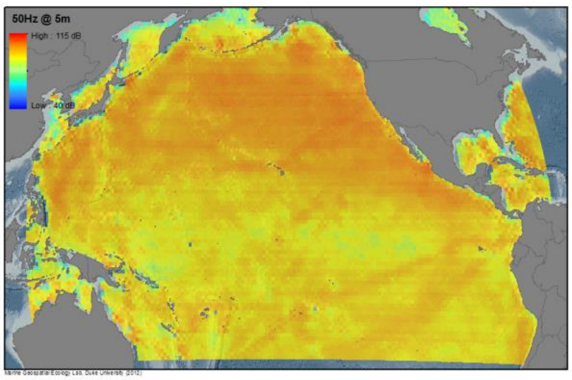
Other Natural or Manmade Factors

Increased human activities in Arctic and Alaska waters, due to loss of sea ice and other changes, further impact cetaceans through noise pollution, expanded fishing activities, shipping, and other impacts, (Simmonds and Isaac 2007), and continue to threaten the survival and recovery of Central North Pacific humpback whales.

Noise Pollution

Humpback whales depend on vocalizations for key behavior and communication. In an increasingly noisy acoustic environment humpback whales may experience stress and reduced communication and success in foraging, interacting, and breeding. A study of humpback whales found that they reduced their vocalizations in the presence of wind and background noise and shifted instead to using surface-generated sounds such as breaching to communicate (Dunlop et al. 2010). While this shift shows behavior modification to address changes in the acoustic environment, it also reduces the information contained with the communication (Id.) and is more energetically expensive for the animals.

Noise in the oceans is increasing significantly. Humpback whales are losing up to 52% and 94%, respectively, of their communication space in the busiest areas of the ocean off the British Columbia coast, according to a new study (Williams 2013). For example, in the Puget Sound at least 90% of the time at least one extremely noisy vessel is traveling through the shipping lanes (Bassett 2012). Cargo ships were the largest contributor to the vessel noise, followed by tugs and passenger vessels. The researchers found that noise in the area from these vessels averaged about 120 decibels (dB), and regularly exceed 120 dB, the current acoustic criterion for behavioral harassment of marine mammals for continuous sound types (120 dB re 1 lPa) in the United States (Id.).



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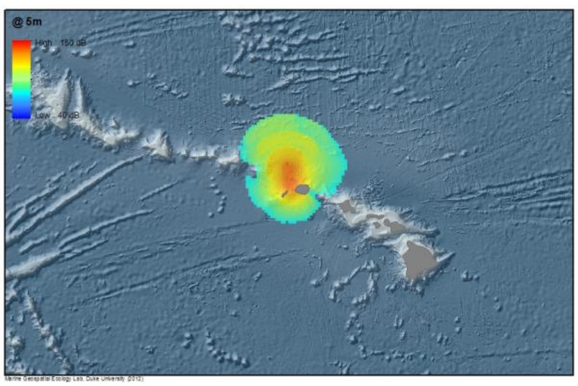

B.

Figure A. These noise layers display modeled predictions of wide-ranging contributions from “chronic” anthropogenic sources of underwater noise, specifically large commercial vessels.

Figure B. An example of the sound fields generated by a typical naval active sonar training exercise in Hawai'i for one of the representative noise event scenarios for SoundMap modeling. The source data used in this event scenario were derived with using the Navy Acoustic Effects Model (NAEMO) to represent a simulation of a 96-hour multi-ship sonar operation on the Pacific Missile Range Facility (PMRF) off the island of Kaua'i. For this event, sound sources from both naval vessels (including two equipped with 53C sonar, one with a 56C sonar), active sonobuoys (3 AN/SSQ-62), and helicopters (3 AN/AQS-22) were modeled. Pings at nominal source levels of 235 dB re uPa@1m (dB) for the 53C (3.5 kHz), 225 dB for the 56C (7.5 kHz), 217 dB for the AN/AQS-22 (4.1 kHz) and 201 for the AN/SSQ-62 (8 kHz) at typical rates and durations. (http://www.st.nmfs.noaa.gov/cetsound/sound_data.html).

Another contributor to ocean noises that are harmful to humpback whales is sonar activities used in Navy training exercises. The Navy has been conducting training exercises in the Hawaii, Southern California, and Northwest Training Ranges for several decades, and it is planning to increase the intensity and tempo of its training activities. For Navy testing and training activities from 2014 to 2019 in the Southern California and Hawaii Training Ranges, NMFS anticipates more than 50,000 Level B takes of humpback whales with an average of 10,000 per year. 78 Fed. Reg. 7,043 (Jan. 31, 2013). Many whales will experience multiple exposures over time, which raises concerns for cumulative impacts. The Navy's activities in this area include surface-to-air gunnery and missile exercises; anti-submarine warfare exercises involving tracking aircraft, sonobuoys, and use of surface ship sonar; air-to-surface bombing exercises; and sink exercises. Specifically, the Navy intends to use mid-frequency sonar, and some of the mid-frequency systems the Navy employs are capable of generating sounds in excess of 235 dB.

The variety and spread of adverse impacts of anthropogenic noise are increasingly recognized. A recent court decision found that NMFS had underestimated impacts from a Northwest Training Range that would affect a variety of marine mammals in the Pacific, including humpback whales. *Intertribal Sinkyone Wilderness Council v. Nat'l Marine Fisheries Serv*., 970 F. Supp. 2d 988 (N.D. Cal. 2013). In this case, the actions proposed by the U.S. Navy included anti-submarine warfare exercises involving tracking aircraft and sonar; surface-to-air gunnery and missile exercises; air-to-surface bombing exercises; and extensive testing for several new weapons systems. In particular, the use of mid-range sonar can injure nearby animals and can disrupt feeding, migration, and breeding or drive whales from areas vital to their survival.

In 2011, a study found that beaked whales stopped foraging and communicating and fled sonar at levels below what regulators consider disturbance (Tyack et al. 2011). Studies now also show similar adverse impacts for blue whales, another baleen whale like the humpback (Goldbogen et al. 2013). Sonar can displace whales from their preferred habitat and disrupt feeding, breeding, nursing, communication, navigation and other behaviors essential to their survival. Most appallingly, sonar can directly injure whales—very often killing them—by causing hearing loss, hemorrhages and other kinds of tissue trauma, or by driving them rapidly to the surface or to shore.

Recent research provided insight into a newer acoustic impact, this one regarding Ocean Acoustic Waveguide Remote Sensing (OAWRS), which was being used to assist in the censusing of fish. Researchers studying humpback whales for another purpose detected significant behavioral changes as a result of the noise from this technology that was being used roughly 200 km from the whales (Risch, et al., 2012). The documented silence of whales in the presence of this sound may interfere with feeding or breeding behaviors if the use of the technology is more widespread. These sorts of emerging technologies, primarily to address heightened concerns over increasingly depleted fish stocks, are likely to continue to grow and their impact to spread.

Masking of key biological sounds can result from increasing ensonification of the ocean. With an increase in background noise levels from shipping and other anthropogenic sound sources, whales are forced to increase the volume of their vocalizations, and, the distances over which they need to communicate will be increasingly restricted (Wright, 2008). Ship traffic is increasing and is expected to expand into new areas, such as the high northern Pacific, with a concomitant increase in noise and its adverse impacts (Id.).

Changes in normal behavioral communications have the potential to impact the whales' ability to detect food sources and conspecifics, resulting in long term impacts to the population. Rolland and colleagues (2012) documented an increase in stress hormone production in North Atlantic right whales related to vessel noise, which could result in lower reproductive rates and decreased immune system response among whales. As a result, the adverse impacts of increased anthropogenic noise on humpback whales in the North Pacific cannot be discounted.

Entanglement in Fishing Gear

Humpback whales are at risk from entanglement in active and lost fishing gear. Humpbacks are one of the most frequently entangled reported whale species along the U.S. west coast (Saez et al. n.d.). Trap-pots and gillnets are the most common for entanglement (Id.). Fifty-four humpback whales were reported entangled in fishing gear between 1982 and 2010 along California, Oregon, and Washington (Id.). Reports of fishing gear mortalities or injuries of humpback whales from the Central North Pacific stock from 2006 to 2010 reported 55 incidents, 18 of which were serious injuries or mortalities (NMFS 2012). These figures represent the minimal number of interactions as, according to the 2012 Central North Pacific Humpback Whale Stock Assessment Report, "No observers have been assigned to several fisheries that are known to interact with this stock, making the estimated mortality rate unreliable." A scar based study of humpbacks in Southeast Alaska found that between 51% and 78% of humpbacks had scars consistent with entanglement (Neilson et al., 2009).

Analogous modeling of similar issues in the Gulf of Maine predicted that as many as 29 humpbacks may die as a result of entanglement each year and go undetected (Robbins 2009). For Atlantic humpbacks entanglement in fishing gear is the leading cause of mortality (Van der Hoop et al. 2013).

These reported entanglements are only a portion of the actual number because approximately 50% are not reported. A small number of studies have attempted to estimate the portion of individuals dying that are subsequently detected (Kraus et al. 2005, Williams et al. 2011, Punt and Wade 2012); all estimated carcass detection rates were considerably less than 50% (id.) with one study concluding that only 5.7% of humpback whale entanglements were reported over the study period (Robbins 2009).

Vessel strikes and Vessel Harassment

Vessel strike-related mortality is a documented threat to humpback whales. The petitioners assert that ship strikes do not pose a threat to the Central North Pacific population of humpbacks, citing low reports of ship strikes in annual Stock Assessment Reports (SAR) with an average of 1.4 serious injuries or mortalities resulting per year. However, the data provided in their citation of Appendix 8 of the 2012 SAR only considers events that occurred in Alaska and does not provide any vessel-related SI/M events from Hawaii or Southeast Alaska/northern British Columbia, both areas where this stock is known to occur. However, the recently published final 2013 SAR has an updated table of reported ship strikes that does include incidents in Hawaiian waters, and these numbers triple the average annual take of humpbacks reported in the 2012 SAR (NMFS, 2013b).

The rates of vessel collisions involving humpback whales off the coast of Hawaii have increased significantly, as have the number of vessels between 7.9 and 19.8 m in length, the vessel class most frequently involved in the collisions (Lammers et al., 2013). While the petitioners suggest that increased ship strike reports in Hawaii and Alaska are a result of a "considerable increase in whale numbers," the Lammers et al. (2013) study indicates that the rate of collisions in Hawaiian waters was greater than predicted based on the number of whales present, and suggests that the increased number of reported collisions cannot be solely explained by the increased whale population. Another study also found that most vessel operators in Alaska were exceeding required speed restrictions prior to striking a humpback whale; therefore, increases in whale populations are not the single causal factor in increasing rates of reported whale collisions in Alaska either (Neilson et al., 2012). Similarly, the risk of strikes is substantial in British Columbia but not considered in the SAR or by the petitioner. According to Williams and O'Hara (2010) it is possible that 10 to 20 humpback whales may be killed annually, as a result of ship strikes off British Columbia, and these events could go undetected (Williams and O'Hara, 2010). As will be discussed further below, whales from the CNP area mix in Alaska and, to some extent off the coast of British Columbia. Risk for humpbacks may increase in the near future for those using habitat in or near British Columbia. For example, the recent reduction in protection under the Species at Risk Act in Canada has paved the way for approval of a mega-pipeline construction project by Enbridge Northern Gateway that appears likely to have an adverse impact on humpbacks in that area. The pipeline, and vessel traffic associate with it, will increase risk of oil spills and collisions with increased tanker traffic (Alava and Silberg, 2014). This project may pose a risk to both stocks, as whales from southeastern Alaska are known to mix in the general area with those from British Columbia (Baker et al., 2013) and this risk has not been considered.

In cases where humpback whales are struck at sea, carcass detection and recovery are unlikely to occur, rendering vessel collision data as an absolute minimal estimate. This is of particular concern in Alaska where a study by Neilson and colleagues (2012) indicated that resource limitations and the remoteness of the area pose a significant challenge for documenting vessel collisions with whales. In cases where carcasses may strand, ship strikes cannot be ruled out without conducting a thorough necropsy, as resulting external trauma may not be evident (Wiley et al., 1995; Campbell-Malone et al., 2008). Even strikes that appear to be "non-lethal" should not be discounted as SI/M cases or contributing to long term impacts on whale populations. For example, Lucky, a North Atlantic right whale, was hit by a vessel and survived for 14 years before being found dead off the coast of Georgia, pregnant with her first known calf. Her death was a result of the scar tissue from her injury being stressed, causing a re-opening the wounds with her increasing girth (Right Whale News 2005). In another case, the necropsy of a humpback whale (Fingerpaint) that stranded and was euthanized on the coast of Virginia determined that the whale succumbed to an apparent infection resulting from a vessel strike wound she received years earlier (Virginia Aquarium, 2012).

According to a study by Jensen and Silber (2003), humpback whales were second only to gray whales as the large cetacean species most likely reported as being struck by vessels, and represented more than 25% of vessel strikes in the Pacific. Another study by Neilson et al. (2012) found that 86% of 108 reported whale-vessel collisions in Alaskan waters involved humpback whales, and Allen et al. (2014) reported that collisions between humpbacks and vessels comprised the majority of large whale injuries and deaths reported between 2007 and 2011 in Alaska. Moreover, a summary of the entries into the global IWC data base on ship strikes lists humpback whales as one of the most commonly struck whale species (IWC 2014).

Vessel strikes on North Pacific humpbacks are likely to increase with the loss of sea ice and opening of the Northwest Passage (Simmonds and Isaac 2007). The petitioners fail to address the increasing volume of ship traffic in the Arctic Ocean over the next century due to reductions in the amount of Arctic sea ice (NOAA 2014). Plans are already in motion to explore offshore energy development in areas off both Hawaii (BOEM 2012) and Alaska (BOEM 2014), which would also increase ship traffic in these regions when vessels are being utilized for exploration, installation and maintenance of offshore structures.

Between 2001 and 2010, nearly 50 large whales off the California coast were documented as having been struck by ships (NMFS 2010). There has been an average of one documented humpback vessel strike per year between 2005 and 2010 (Redfern et al. 2013). As we have noted above, most vessel strikes are undocumented, so the number of collisions is much higher. At an estimated 17% detection rate, which is likely a conservative estimate, 5.9 humpback whales are struck each year (Id.). Some humpback whales may also experience energetic costs or altered behavior from vessel harassment (see, e.g., Cartwright et al. 2012). Petitioners have not only underestimated the likelihood that vessel-related mortality is under-reported, but they have also failed to account for the fact that an increase in vessel traffic in humpback summer feeding areas will likely increase the number of humpbacks involved in collisions.

As is noted above, a 2014 IWC workshop was held to focus on assessing risk to marine mammals that may be increasing their use of arctic waters on a year-round or seasonal basis (IWC, 2014b). In his presentation on Arctic marine operations and shipping at this IWC workshop, Lawson Brigham projected that "most of the Arctic traffic increases in large ships are by tankers, bulk carriers and LNG carriers, as well as cruise ships and offshore support vessels. Destinational voyages, rather than trans-Arctic voyages, are the primary mode of Arctic navigation." (Id.) He also stated that Arctic shipping remains seasonal in most regions with possible extensions to the length of the navigation season for the eastern Northern Sea Route and through Bering Strait. In some cases the ship navigation seasons mirror the cetacean migration routes in spring and autumn." (Id.) This vessel traffic mirroring of migratory routes and seasonal high use by cetaceans is cause for concern, particularly if humpbacks begin to feed in more productive higher latitude waters.

Cumulative Effects

A species must be listed under and protected by the ESA if the best scientific and commercial data available show "that the species is endangered or threatened because of any one *or a combination of* the [listing] factors." 50 C.F.R. § 424.11(c) (emphasis added); *see also Carlton v. Babbitt*, 900 F. Supp. 526, 530 (D.D.C. 1995) (the agency "must consider each of the listing factors singularly *and in combination* with the other factors") (emphasis added); *Wildearth Guardians v. Salazar*, 741 F. Supp. 89, 102 (D.D.C. 2010) (same). While any one of the threats detailed above is a sufficient reason to find that the Central North Pacific population of humpback whales is still imperiled, the import of these threats when considered *in combination*, clearly demonstrate that humpback whales remain endangered, and cannot be delisted.

III. Central North Pacific Humpback Whales Are Not Distinguishable for Management Purposes

While the petitioners have presented evidence from the multi-year study of Pacific humpbacks that indicated that there are likely multiple possible DPSs of humpbacks, defining these units and providing appropriate management of adverse impacts to any one or more of them is complex at best.

Defining a DPS in the Pacific is Complex

We opposed an earlier petition by the Hawaii Fishermen's Association that requested that NMFS declare humpbacks throughout the North Pacific as a single DPS, pointing out that there is more defined stock structure. Although the Alaska Petitioners requesting a Central North Pacific DPS have presented some evidence that there is stock structure, a Central North Pacific DPS cannot be delineated without disadvantaging other possible DPSs.

In support of their contention that the Central North Pacific population is a DPS, petitioners have pointed to the fact that NMFS has already defined the Central North Pacific stock in its SARs (petition at 5). While this is clearly true, the requirements under the Marine Mammal Protection Act ("MMPA") for defining management units and those of the ESA for designating DPSs are quite different. The MMPA defines the terms "population stock" or "stock" as meaning "a group of marine mammals of the same species or smaller taxa in a common spatial arrangement, that interbreed when mature." 16 U.S.C. § 1362(11). In 1995, NMFS issued Guidelines for Assessing Marine Mammal Stocks (GAMMS) (Wade and Angliss, 1995). These guidelines took pains to point out that Evolutionarily Significant Units (ESUs), which are roughly analogous to DPSs, are different from MMPA management units. *See* 61 Fed. Reg. 4722, (Feb. 7, 1996) (discussing the relationship of a salmon DPS with an ESU). The initial GAMMS also discussed the appropriateness of subdividing for management purposes and pointed out, for example, that when splitting stocks, it is important to know the degree of mixing, in part because the "movement of small numbers of individuals between the populations could prevent genetic or morphological differences, yet [this movement] might still be insufficient to prevent the decline and extirpation of one of the populations" (Wade and Angliss, 1995). Subsequent GAMMS revisions have not substantially changed this underlying principle.

The Alaska petitioners also aver that the Central North Pacific population demonstrates "marked separation" from other stocks in the North Pacific Basin (petition at 2). This is somewhat simplistic, particularly since they focus their threat analysis largely on humpbacks frequenting Alaskan waters.

In fact, there is mixing occurring between stocks. In the wake of the NMFS SPLASH program, Baker and colleagues (2013) reported that "strong maternal fidelity and natal philopatry shape genetic structure in North Pacific humpback whales." This study also acknowledges that the structure is "complex," noting that "the southeastern Alaska feeding grounds show strong migratory connection only with the Hawaiian breeding grounds, but other whales from Hawaii migrate to the Northern Gulf of Alaska and other feeding grounds" and that whales from the "Northern Gulf of Alaska show migratory connections to breeding grounds from Asia to Mexico, e.g., Ogasawara, Hawaii, Mexico-Revillagigedo and Mexico-mainland" (Id.). The authors go on to say that the "influence of maternal fidelity operates somewhat independently on feeding and breeding grounds over an evolutionary time scale; i.e., individuals can share fidelity to one habitat but not another. As a consequence, there are no simple divisions of the oceanic population into migratory subpopulations that remain isolated year-round" (Id.). Not only does this mixing complicate the issue of drawing a "simple division" in designating a DPS, it has significant management implications.

For example, takes occurring in an area of mixing could result in a problem for the persistence of any smaller population or DPS. Since, for most humpbacks in the Pacific, there is a very limited photo-ID catalog to assist in individual identification, determining the stock origin of a dead animal would be difficult. If humpbacks from a smaller stock (e.g., western North Pacific) are mixing with humpbacks from the larger Central North Pacific population on the northern feeding grounds and are subject to vessel or fishery-related mortality or other adverse anthropogenic impacts, they may suffer undetected and unsustainable mortality that may be inappropriately attributed to the larger stock at the expense of protecting the smaller stock.

Although Baker and colleagues conclude that there is evidence for five different DPSs in the Pacific (with those from the breeding area in Hawaii being one of them), they note that "[a]lthough recognition of breeding stocks is most consistent with the criterion for reproductive isolation used in defining DPS under the ESA . . . the observed assortment of mtDNA haplotypes on feeding grounds is strong evidence for recognizing unique maternal traditions of migration and habitat use as units to conserve." This supports our contention that it will be difficult to manage impacts in these mixed-stock feeding areas to assure that animals from smaller and more fragile breeding stocks are not disadvantaged by anthropogenic impacts that occur in the feeding area.

Drawing Boundary Lines and Protecting Habitat for Listed DPS

If NMFS determines that the Central North Pacific (or Hawaii breeding) humpbacks are a DPS and delists them, it is not clear how NMFS could draw boundaries for the various DPSs that would sufficiently protect listed DPSs that share feeding habitat with Central North Pacific humpbacks. In the past, when NMFS has designated a marine mammal DPS, it has drawn boundary lines that define that stock or its critical habitat. For example, Steller sea lions are divided into Eastern and Western DPSs, with the western DPS designated as endangered under the ESA and the eastern DPS being delisted from the ESA. NMFS defined the Western DPS of Steller sea lions as extending eastward to 144° West longitude (Cape Suckling, Alaska) with the eastern DPS being east of that line. 50 C.F.R. § 223.102; 50 C.F.R. § 224.101(b). This presents the clearest means of delineating stocks of the same species that may overlap. Additionally, some areas within the more protected stock's range can be granted greater levels of protection. In another example, while there is some overlap in habitat use and boundaries with pelagic false killer whales, the endangered Hawaii insular stock of false killer whales is considered to be comprised of those "seen within 40 km of the main Hawaiian Islands between Hawaii Island and Oahu," and protections are provided within their general stock boundary (NMFS, 2013). In the case of listed Southern resident killer whales, because of a well-documented photo-identification database of a very small DPS and intense study of their seasonal habitat use, no specific geographic boundary for this stock was drawn to delineate it from transient killer whales that may overlap in range. However, critical habitat was designated to protect those areas used seasonally by the listed resident killer whales from which the non-listed population also incidentally benefits. 71 Fed. Reg. 69,054 (Nov. 29, 2006). Whether by drawing lines on a map, or relying on a database with readily identifiable and well-studied individuals, NMFS has designated either geographic stock boundaries (by latitude or distance from shore in two of our examples) and/or by designating critical habitat boundaries for listed stocks that may abut non-listed stocks of the same species and provide some incidental protection for the non-listed stock.

The Alaskan feeding areas are used by humpbacks that may not breed in Hawaii. If NMFS determines that the Central North Pacific (or Hawaii breeding) humpbacks are a DPS and delists them, it is not clear how NMFS proposes to draw boundaries for the various DPSs that would enable measures to be put in place to protect resources and habitat for those DPSs that remain listed as endangered yet share feeding habitat with humpbacks from the non-listed DPS. As part of the status review, NMFS must consider how to draw stock boundaries either geographically or in some other manner, and it must assure that it has still protected areas used by any humpbacks that are in listed DPSs.

If Mortalities Occur NMFS Must Find a Way to Assign the Take to the Appropriate DPS

As we have noted above, literature indicates that there is mixing occurring to a limited extent in the breeding grounds of Hawaii and, to a larger extent, in the feeding grounds in Alaska. Should NMFS declare that there are multiple DPSs in the Pacific, the agency must first determine a means of accounting for any documented mortality. There is great similarity in appearance of animals such that more complex analysis must be undertaken to ascertain population/stock identity. There is a very limited photo ID catalog for the Pacific basin, and cost may limit the agency's ability to use DNA to determine stock origin.

In other species where there is mixing of management stocks or of physically similar species, the agency must still assign takes to a particular stock or species and has used different approaches. For example, long- and short-finned pilot whales are separate species whose distribution overlaps in the mid-Atlantic. A Potential Biological Removal (PBR) level has been calculated for each species. Fishery-related mortality occurs in the shared mixing zone. NMFS has acknowledged the problem of properly assigning mortality, given that these separate *species* are difficult for fishery observers to distinguish in the field. The stock assessment for short-finned pilot whales states "[t]otal fishery-related mortality and serious injury cannot be estimated separately for the 2 species of pilot whales in the U.S. Atlantic EEZ because of the uncertainty in species identification by fishery observers. The Atlantic Scientific Review Group advised adopting the risk-averse strategy of assuming that either species might have been subject to the observed fishery-related mortality and serious injury" (NMFS 2013 at 178). We understand that the agency may be considering a means of apportioning mortality for these two species of pilot whales based on the proportion of each species occurring in the mixing zone but it has not yet done so.

In another example of attributing mortality in areas of overlap, coastal bottlenose dolphins are listed as depleted under the MMPA, yet the agency has (as it has for humpback whales in the Pacific) identified a number of distinct populations based on stable isotope analysis, photo-identification and genetic analysis (NMFS, 2013). However, assigning mortality has been difficult. In the stock assessment for the northern migratory stock of Atlantic bottlenose dolphins, the agency states that "complex seasonal spatial movements and the overlap of coastal and estuarine stocks . . . greatly limit the ability to fully assess the mortality of each of these stocks" (Id.). The agency has tried to address the problem of stock identity of dead animals by stating in the SARs for both Northern and Southern migratory animals that "[s]ince observed mortalities (and effort) cannot be definitively assigned to a particular stock within certain regions and times of year, the minimum and maximum possible mortality of the [] migratory stock are presented for comparison to PBR" (Id.).

MMPA-depleted coastal bottlenose dolphins provide an example of how the agency has addressed the mortalities within a species that has populations that are clearly distinct units (i.e., there are 15 management units for this single species on the east coast) but members of the same species. This resembles the case of North Pacific humpbacks where there are distinct populations of the same species that overlap in some times and areas and that are morphologically similar (and thus not readily distinguishable if found dead or seriously injured) and where some of these populations have greater management concerns than others. We believe it may be more precautionary to keep the species listed and continue to manage population stocks separately, particularly considering that NMFS would have to treat the Central North Pacific population of humpback whales as an endangered species even if it was delisted. See 16 U.S.C. § 1533(e) (vesting NMFS with the authority to treat a non-listed species as a listed species when it "so closely resembles in appearance, at the point in question, a species which has been listed pursuant to such section that enforcement personnel would have substantial difficulty in attempting to differentiate between the listed and unlisted species; the effect of this substantial difficulty is an additional threat to an endangered or threatened species; and such treatment of an unlisted species will substantially facilitate the enforcement and further the policy of [the ESA]").

IV. Designate critical habitat

Section 4(a)(3)(A)(i) of the ESA states that, "to the maximum extent prudent and determinable," NMFS "shall, concurrently with making a determination . . . that a species is an endangered species or threatened species, designate any habitat of such species which is then considered to be critical habitat." 16 U.S.C. § 1533(a)(3)(A)(i); *see also id*. § 1533(b)(6)(C). Despite this express requirement, NMFS has not yet designated any critical habitat for humpback whales, and the whales remain vulnerable to injury and death in their most essential habitat areas. If NMFS identifies any DPSs of humpback whales, it will constitute a revision of the larger listed entity, thereby triggering the agency's mandatory duty to designate critical habitat anew. There are many important habitat areas in U.S. waters that should be designated as critical habitat for humpback whales in order to promote the survival and recovery of this imperiled species.

V. Conclusion

Humpback whales in the Central North Pacific appear to be on the road to recovery, showing that the ESA is working. But NMFS's finding that designating a DPS solely to delist that DPS may be warranted is contrary to the requirements of the ESA. Congress never intended that a DPS could be used as a delisting tool because to do so would hinder species recovery rather than promote it. In addition, it is premature to remove ESA protections for humpback whales in the Central North Pacific population because they continue to face threats from climate change and ocean acidification and other natural or manmade factors. Finally, observed mortality and serious injury in mixing areas may be inappropriately attributed to the more robust Central North Pacific population to the detriment of animals from a more fragile population.

Sincerely,

Rebecca Noblin, Alaska Director
Center for Biological Diversity
rnoblin@biologicaldiversity.org

Sharon B. Young
Marine Issues Field Director
The Humane Society of the U.S.
syoung@humanesociety.org

Regina Asmutis-Silvia
Executive Director, North America
Whale and Dolphin Conservation

Todd Steiner
Executive Director
Turtle Island Restoration Network

Jane P. Davenport
Senior Staff Attorney
Defenders of Wildlife

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