UNITED STATES OF AMERICA
DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

In re: **Proposed Waiver and Regulations Governing the Taking of Eastern North Pacific Gray Whales by the Makah Indian Tribe**	Administrative Law Judge Hon. George J. Jordan Docket No. 19-NMFS-0001 RINs: 0648-BI58; 0648-XG584

Rebuttal Testimony of Donald J. ("DJ") Schubert

1. I submit this testimony in rebuttal to information provided in the direct testimony submitted by Dr. Shannon Bettridge, Dr. Jeffrey Moore, Dr. Dave Weller, Mr. Chris Yates, Dr. John Bickham, Dr. John Brandon, and Mr. Jonathan Scordino.[1]

2. My principal focus in this testimony is on those specific facts relevant to the criteria that the National Marine Fisheries Service (NMFS) must prove in order to issue a waiver under the Marine Mammal Protection Act (MMPA) as requested by the Makah Tribe, and to address issues relevant to the proposed rules published on April 5, 2019 (84 Fed. Reg. 13604) that would govern the take of marine mammals (and specifically gray whales) by the Makah Tribe if NMFS authorizes the waiver permitting the tribe to resume whaling.

[1] In preparation of this rebuttal testimony, AWI approached a number of gray whale and other experts regarding the submission of rebuttal testimony. None of the experts were able to submit rebuttal testimony due, in large part, to the truncated time constraints associated with the deadline for such testimony during the very busy summer period when many biologists are engaged in field research. Although I have attempted in this testimony to include some of their views on key issues related to gray whales, their ecology and threats to the species, individual groups of whales, and their habitat, as well as the waiver criteria, based on my conversations with these independent experts (views which I share), AWI has encouraged them to consider submitting written comments at the appropriate juncture—as required by the regulations governing this hearing (50 C.F.R. § 228.19(b))—because the parties and the ALJ would benefit from their written opinions about the matters at hand in light of their status as internationally recognized experts on the topics at issue.

3. As noted in my direct testimony, in order to issue a waiver of the MMPA, the Secretary (of Commerce) must consider the "distribution, abundance, breeding habits, and times and lines of migratory movements of such marine mammals," 16 U.S.C. § 1371(a)(3)(A), and "must be assured that the taking of such marine mammals is in accord with sound principles of resource protection and conservation as provided in the purposes and policies of this chapter." *Id*. (emphasis added). In addition, NMFS must find "such taking will not be to the disadvantage of those species and population stocks." *Id*. at § 1373(a).

4. The policies declared by Congress when promulgating the MMPA include:

> (1) certain species and population stocks of marine mammals are, or may be, in danger of extinction or depletion as a result of man' s activities;
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> (2) such species and population stocks should not be permitted to diminish beyond the point at which they cease to be a significant functioning element in the ecosystem of which they are a part, and, consistent with this major objective, they should not be permitted to diminish below their optimum sustainable population. Further measures should be immediately taken to replenish any species or population stock which has already diminished below that population. In particular, efforts should be made to protect essential habitats, including the rookeries, mating grounds, and areas of similar significance for each species of marine mammal from the adverse effect of man' s actions;
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> (3) there is inadequate knowledge of the ecology and population dynamics of such marine mammals and of the factors which bear upon their ability to reproduce themselves successfully;
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> (4) negotiations should be undertaken immediately to encourage the development of international arrangements for research on, and conservation of, all marine mammals;
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> (5) marine mammals and marine mammal products either— (A) move in interstate commerce, or (B) affect the balance of marine ecosystems in a manner which is important to other animals and animal products which move in interstate commerce, and that the protection and conservation of marine mammals and their habitats is therefore necessary to insure the continuing availability of those products which move in interstate commerce; and
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> (6) marine mammals have proven themselves to be resources of great international significance, esthetic and recreational as well as economic, and it is

> the sense of the Congress that they should be protected and encouraged to develop to the greatest extent feasible commensurate with sound policies of resource management and that the primary objective of their management should be to maintain the health and stability of the marine ecosystem. Whenever consistent with this primary objective, it should be the goal to obtain an optimum sustainable population keeping in mind the carrying capacity of the habitat.

Id. at § 1361(1-6). (emphases added).

5. For the purpose of this administrative hearing, these standards as well as the sufficiency of the regulations to govern any take of gray whales should be the sole focus of any testimony. Other information, including much of the information contained in the direct testimony submitted by the individuals identified above, is unrelated to the waiver criteria to be addressed at the hearing, is misleading, and/or is based on questionable assumptions. If the available evidence is critically and objectively evaluated, it should be determined that NMFS has failed to meet its burden of proof to demonstrate, using the best available scientific evidence, that the issuance of the requested waiver is consistent with the MMPA.

6. In this testimony, I will, consistent with the Partial Stipulation regarding the Scope of Issues to be Addressed at the Hearing (submitted to the administrative law judge (ALJ) on June 10, 2019), identify deficiencies in the testimony of those individuals previously named related to information about the Eastern North Pacific (ENP) population of gray whales, the Pacific Coast Feeding Group (PCFG), and the Western North Pacific (WNP) stock of gray whales and, specifically, in the context of the MMPA criteria for issuance of a waiver. I will follow this with a summary of any additional discrepancies, alternative interpretations, or errors contained in the above-referenced testimony. While I will not provide a response to every affirmative claim or statement made in each person's declaration or testimony, the lack of a response should not be interpreted as support or acquiescence to the information. Rather, it may

be an indication that the specific information is irrelevant to the determination to be made during this administrative hearing.

7. The ENP gray whales are currently estimated to number 26,960 (Carretta et al. 2019a[2], Durban et al. 2017[3]). According to Carretta et al. (2019a),[4] the current Potential Biological Removal (PBR) is 801 whales per year, and known and estimated human caused mortality and serious injury is 139 whales per year. The ENP gray whale population is currently considered "at 85% of carrying capacity (K) and at 129% of the maximum net productivity level (MNPL), with a probability of 0.884 that the population is above MNPL and therefore within the range of its optimum sustainable population (OSP)." (Carretta et al. 2019a).[5]

8. In its 2015 Draft Environmental Impact Statement on the Makah Tribe's Request to Hunt Gray Whales (DEIS) and as noted in the NMFS Biological Report on the Eastern North Pacific (ENP) Gray Whale Stock[6] (NMFS 2019; hereafter NMFS Biological Report), NMFS concedes that climate change, and specifically ocean warming in the Arctic, is changing the ecology of the primary spring/summer/fall feeding grounds of the gray whales.[7] NMFS fails,

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[2] Carretta, J.V., K.A. Forney, E.M. Oleson, D.W. Weller, A.R. Lang, J. Baker, M.M. Muto, B. Hanson, A.J. Orr, H. Huber, M.S. Lowry, J. Barlow, J.E. Moore, D. Lynch, L. Carswell, and R.L. Brownell, Jr. 2019a. U.S. Pacific Marine Mammal Stock Assessment: 2018. Gray Whale (*Eschrichtius robustus*): Eastern North Pacific Stock and Pacific Coast Feeding Group. NOAA-TM-NMFS-SWFSC-617. Pgs. 157-166. Attached as Exhibit 1.

[3] Durban, J., D.W. Weller, and W.L. Perryman. 2017. Gray whale abundance estimates from shore-based counts off California in 2014/2015 and 2015/2016. Paper SC/A17/GW/06 presented to the International Whaling Commission.

[4] Carretta et al. *supra* note 2.

[5] *Id.*

[6] National Marine Fisheries Service. 2019. Biological Report on the Eastern North Pacific (ENP) Stock of Gray Whales. Prepared by the West Coast Region of the National Marine Fisheries Service in support of the proposed waiver and regulations authorizing a limited hunt of ENP gray whales by the Makah Indian Tribe. March 2019 at ¶¶ 4-5. *See* Exhibit 1-7 to Declaration of Chris Yates (April 2, 2019).

[7] *See* DEIS at e.g., 3-69, 3-98, 3-99, and 3-196.

however, to fully evaluate the potential impact of these human-caused impacts to the Arctic ecosystems on the future abundance of ENP gray whales.

9. Fundamentally, an ecosystem regime shift is underway whereby a benthic-driven ecosystem (where the majority of organic matter is transferred from the water column to the benthos supporting an abundant, diverse, and productive faunal assemblage, including amphipods, the principal, caloric-rich prey species of the gray whale) is transforming into a pelagic-driven ecosystem (where the majority of the organic matter is being consumed in the water column by pelagic species, including various fish species, that are expanding their range to the north as ocean waters warm) (Tynan & Demaster 1997[8], Bluhm & Gradinger 2008[9], Moore and Stabeno 2015[10], Coyle et al. 2007[11], Aydin and Mueter 2007[12], Grebmeier et al. 2006[13], Grebmeier et al. 2018[14]). This has resulted, for example, in a significant decline in the density, abundance, and productivity of amphipods and other benthic prey within traditional gray whale

[8] Tynan, C.P., and D.P. DeMaster. 1997. Observations and predictions of Arctic climate change potential effects on marine mammals. Arctic, 50(4):308-322. Attached as Exhibit 2.
[9] Bluhm, B.A. and R. Gradinger. 2008. Regional variability in food availability for arctic marine mammals. Ecological Applications, 18(2 supplement): S77-S96. *See* Exhibit M-0026 to Declaration of Jonathan Scordino (May 15, 2019).
[10] Moore, S. E., and P. J. Stabeno. 2015. Synthesis of Arctic Research (SOAR) in marine ecosystems of the Pacific Arctic. Progress in Oceanography, 136:1–11. *See* Exhibit M-0209 to Declaration of Jonathan Scordino (May 15, 2019).
[11] Coyle, K.O., B. Konar, A. Blanchard, R.C. Highsmith, J. Carroll, M. Carroll, S.G. Denisenko, and B.I. Sirenko. 2007. Potential effects of temperature on the benthic infaunal community on the southeastern Bering Sea shelf: possible impacts of climate change. Deep-Sea Research II, 54:2885-2905. Attached as Exhibit 3.
[12] Aydin, K., and F. Mueter. 2007. The Bering Sea—A dynamic food web perspective. Deep-Sea Research II 54: 2501-2525. Attached as Exhibit 4.
[13] Grebmeier, J.M., J.E. Overland, S.E. Moore. E.V. Farley, E.C. Carmack, L.W. Cooper, K.E. Frey, J.H. Helle, F.A.McLaughlin, and S.L. McNutt. 2006. A Major Ecosystem Shift in the Northern Bering Sea. Science, 311: 1461-1464. *See* Exhibit 13 to Declaration of DJ Schubert (May 20, 2019).
[14] Grebmeier, J.M., K.E. Frey, L.W. Cooper, and M. Kędra. 2018. Trends in benthic macrofaunal populations, seasonal sea ice persistence, and bottom water temperatures in the Bering Strait region. Oceanography, 31(2):136–151.*See* Exhibit 12 to Declaration of DJ Schubert (May 20, 2019).

feeding areas (Blanchard 2019[15], Moore 2008[16], Grebmeier et al.. 2006[17]) and/or a change to the composition of the benthic fauna to favor other species, including other amphipod species, that are not as nutritionally or calorically rich to meet the energy demands of gray whales and other marine mammal species. The declining amount of sea ice—both in terms of actual quantity of sea ice and its quality (i.e., thickness)—is reducing the amount of algae that grows on the underside of the ice and would normally be released into the water column upon ice melt, and changing the timing of phytoplankton blooms (Kahru et al. 2010[18], Soreide et al. 2010[19]). In addition, climate change has resulted in atmospheric blocking events in Alaska which has led to a decline in phytoplankton (Le et al. 2019[20]) . As a result, less organic matter is available to the benthic fauna on the ocean floor, which is contributing to the changes observed to the composition, abundance, and productivity of the benthic fauna (Blanchard 2019[21], Coyle et al. 2007[22]). Some of these changes are summarized in the Committee on the Status of Endangered

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[15] Blanchard, A.L., N.L. Demchenko, L.A.M. Aerts, S.B. Yazvenko, V.V. Ivin, I. Shcherbakov, and H.R. Melton, 2019. Prey biomass dynamics in gray whale feeding areas adjacent to northeastern Sakhalin (the Sea of Okhotsk), Russia, 2001–2015. Marine Environment Research, 145: 2001–2015. *See* Exhibit M-0020 to Declaration of Jonathan Scordino (May 15, 2019)

[16] Moore, S. 2008. Marine mammals as ecosystem sentinels. Journal of Mammalogy, 89(3):534-540. *See* Exhibit M-0204 to Declaration of Jonathan Scordino (May 15, 2019)

[17] Grebmeier et al. *supra* note 13.

[18] Kahru, M., V. Brotas. M. Manzano-Sarabia, and B.G. Mitchell. 2010. Are phytoplankton blooms occurring earlier in the Arctic? Global Change Biology. doi: 10.1111/j.1365-2486.2010.02312.x. Attached as Exhibit 5.

[19] Soreide, J.E., E. Leu, J. Berge, M. Graeve, and S. Falk-Petersen. 2010. Timing of blooms, algal food quality and Calanus glacialis reproduction and growth in a changing Arctic. Global Change Biology. doi: 10.1111/j.1365-2486.2010.02175.x. Attached as Exhibit 6.

[20] Le, C., S. Wu., C. Hu., M.W. Beck, and X. Yang. 2019. Phytoplankton decline in the eastern North Pacific transition zone associated with atmospheric blocking. Global Change Biology. DOI: 10.1111/gcb.14737. Attached as Exhibit 7.

[21] Blanchard et al. *supra* note 15.

[22] Coyle et al. *supra* note 11.

Wildlife in Canada (COSEWIC) Assessment and Status Report on the Grey Whale (*Eschrichtius robustus*)[23] (hereafter COSEWIC Assessment) which reported that:

> A major shift in the northern Bering Sea ecosystem has been occurring since the early 2000s (Grebmeier et al. 2006). This involves change from an ice-dominated (in winter and spring), shallow system with tight pelagic-benthic coupling and favouring bottom-feeding organisms including Grey Whales, to a warmer, sub-Arctic system with lighter ice conditions that is increasingly dominated by pelagic fish. Satellite tracking of mothers with calves from Mexico to their northern feeding grounds in 2005 (Mate and Urbán-Ramírez 2007) supports the hypothesis that there has been a major shift northward in the Grey Whales' summer foraging range since the early 1980s (Moore et al. 2000). Of 17 adult whales tagged, only two spent significant time, presumably foraging, in the Bering Sea – one in Chirikov Basin and the other along the Russian coast south of the Bering Strait. All of the others headed directly into the Chukchi Sea and some of them only left there and moved back south through the Bering Strait in mid-November. None of the whales in the southern Chukchi Sea stayed in only one area, and they had large, mostly non-overlapping ranges. At least some of the whales moved north in June through approximately 30-40% ice cover (International Whaling Commission 2007, p. 151; Mate and Urbán-Ramírez 2007).[24]

Furthermore, increasing temperatures in the Arctic are resulting in the expansion of the northern geographic range and duration of favorable conditions for harmful algal blooms (Lefevbre et al. 2016).

10. The reduction in sea ice has provided gray whales with the ability to expand their range to the north (which they have done), but this expansion has not only occurred because gray whales are physically able to extend their range in the absence of sea ice, but also because the whales had to expand their range to find additional food sources (Grebmeier et al. 2006[25], Moore

[23] COSEWIC 2017. COSEWIC assessment and status report on the Grey Whale Eschrichtius robustus, Northern Pacific Migratory population, Pacific Coast Feeding Group population and the Western Pacific population, in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xxi + 74 pp. Attached as Exhibit 8. (http://www.registrelepsararegistry.gc.ca/default.asp?lang=en&n=24F7211B-1).
[24] *Id*. at 25.
[25] Grebmeier et al. *supra* note 13.

2008[26]). To date, given the ability of gray whales to adapt their feeding behavior to exploit prey species in the water column and on the water surface, they have been able to adapt to the significantly changing ocean conditions to find and exploit prey patches and species. Whether they will continue to expand their range and/or find sufficient quantities of the type of prey species they need to survive is unknown but, in time, could result in a reduction in gray whale productivity (Moore 2008[27], Tynan and DeMaster 1997[28]) and an increase in competition between gray whales, bowhead whales, and species expanding their range to the north over prey (Moore and Huntington 2008[29], Grebmeier et al. 2018[30], Moore et al. 2010[31]). Cumulatively, these adverse impacts linked to climate change and ocean warming could reduce the carrying capacity of the Arctic for gray whales.

11. As evident from its direct testimony and DEIS, NMFS fails to consider the long-term implications of the changes occurring to the Arctic ecosystems and the potential impacts of these changes on gray whale abundance, distribution, breeding habits, migration routes, and their role in the ecosystem—the basic criteria required to issue a waiver of the MMPA. While relevant research in the Arctic is ongoing and may, in time, provide information to better predict such long-term impacts, there is currently a lack of data to understand or evaluate such impacts. For gray whales to continue to survive and thrive in the changing Arctic, they need to find additional sources of prey, including patches of amphipods that can meet their caloric/energy needs. The

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[26] Moore *supra* note 16.
[27] *Id.*
[28] Tynan and DeMaster *supra* note 8.
[29] Moore, S.E., and H.P. Huntington. 2008. Arctic marine mammals and climate change: impacts and resilience. Ecological Applications. 19 (2 supplement):S157-S165. *See* Exhibit 10 to Declaration of DJ Schubert (May 20, 2019).
[30] Grebmeier et al. *supra* note 14.
[31] Moore S.E., J.C. George, G. Sheffield, J. Bacon, and C.J. Ashjian. 2010. Bowhead whale distribution and feeding near Barrow, Alaska in late summer 2005-06. Arctic, 63:195–205. Attached as Exhibit 9.

abundance and availability of such prey is dependent on a suite of factors including water depth, substrate type, primary production, abundance of pelagic species, ice sheet reduction and retreat, accessibility to open water areas, quantity and quality of prey species (i.e., caloric content), and competition for prey with other species (e.g., bowhead whales). As the Arctic continues to change, the availability, accessibility, and productivity of this important feeding area for gray whales may decline, potentially resulting in a reduction in gray whale numbers or a shift in gray whale distribution to other feeding areas (likely to the south of the current primary feeding area) to survive. If this latter scenario were to occur, such changes in distribution may be occurring as the ENP gray whale population seeks out and exploits existing prey patches/areas until they are forced to find alternative feeding areas.

12. The current gray whale Unusual Mortality Event (UME) (*see* https://www.fisheries.noaa.gov/national/marine-life-distress/2019-gray-whale-unusual-mortality-event-along-west-coast) may be, in part, due to the changes occurring to Arctic ecosystems due to climate change and ocean warming. The potential causes and implications of the UME to gray whales is discussed in my direct testimony on the UME submitted to the ALJ on August 6. As noted in that testimony, without knowing the cause of the UME, its likely duration, and its potential impact on ENP, PCFG, and WNP gray whale population numbers, to authorize an intentional hunt on gray whales is biologically reckless and antithetical to the precautionary principle of the MMPA.

13. In the proposed rules and as noted in the declarations of Yates (Declaration at ¶ 53) and Weller (Declaration at ¶ 69), NMFS concludes that small numbers of ENP gray whales that could be killed during a Makah hunt would not cause gray whale numbers to diminish beyond the point at which they cease to be a significant functioning element in the ecosystem.

This assertion is based on the Northern California Current ecosystem, which NMFS claims best comports to the boundaries of the PCFG gray whale range (Proposed Rule at 84 Fed. Reg. 13643). NMFS draws the same conclusion even when it evaluates the impact of the hunt at scale of the northern Washington Coast (the boundaries of which are not disclosed). As indicated in my direct testimony (at ¶¶ 47, 95, 96, 97, 98), this analysis is flawed since the proposed hunt will focus only on gray whales in the Makah Usual & Accustomed fishing area (Makah U&A), and since the best available scientific evidence suggests that there may be multiple ecosystems along the Washington Coast.

14. The MMPA was the first law in the United States to mandate and ecosystem-based approach to marine resource management. Nevertheless, it does not include a definition of "ecosystem" and, here, instead of identifying the ecosystem or ecosystems that best emulates the proposed gray whale hunt area (the Makah U&A), NMFS selects an ecosystem that encompasses the entire range of the PCFG gray whales. An ecosystem is generally considered "a community of organisms living in a particular environment and the physical elements in that environment with which they interact."[32] Ecosystems can be large (e.g., the arctic, tropical forests, or the ocean) or small (e.g., a single log, a pond, a meadow) depending on the scale of the area under examination. Other "ecosystems" that the PCFG gray whales inhabit include the Salish Sea ecosystem and the Puget Sound ecosystem (which is part of the Salish Sea ecosystem). While the portion of the Makah U&A where the hunt is proposed to occur is not within those ecosystems, since ecosystem is not defined under the MMPA, NMFS should define it consistent with the hunt area in order to properly assess the impacts of the hunt on gray whales and their role in ecosystem function at the local level where the impacts will occur. Asserting, as NMFS does,

[32] See https://enviroliteracy.org/ecosystems/

that the proposed hunt will have no impact on ecosystem function or health at the scale of the Northern California Current ecosystem is akin to the State of California closing all of its beaches because a swimmer was stung by a jellyfish off of Newport Beach—i.e., it is a disproportionately sized area as compared to the actual scope of the underlying action.

15. Furthermore, NMFS's comparison of the role of gray whales in those ecosystems to the dynamic, highly energetic, large-scale ecosystem processes (i.e., currents, winds, tides, upwellings, salinity) that shape such ecosystems is inappropriate. This comparison is not balanced as the role of gray whales in the ecosystem (or any marine species for that matter) cannot compare to such large-scale ecosystem processes. Declarants for NMFS (Yates Declaration at ¶ 53 and Weller Declaration at ¶ 69) and the Makah (Scordino testimony at ¶ 31) dismiss the potential harm of the proposed hunt on the ecosystem occupied by gray whales by suggesting that the killing of only a limited number of whales each year could not possibly have an adverse impact when, in fact, no one has adequately studied the role played by, and full suite of benefits provided by gray whales in the Makah U&A. Given the vast uncertainty on this issue, in the absence of any pertinent research on this question, at a bare minimum NMFS and the ALJ must give the benefit of the doubt to the legally protected species (i.e., the gray whale)—rather than to the Makah Tribe's interest in hunting and otherwise exploiting the species—in light of the conservation purposes of the MMPA and the precautionary approach contained therein.

16. I provide information about some of the ecosystem services or functions attributable to gray whales (*see* Declaration of DJ Schubert at ¶ 95). In its assessment of gray whales, COSEWIC provides additional information about the value of gray whales in an ecosystem. It states:

> As major benthic predators in shallow cold temperate to Arctic marine waters, Grey Whales exert considerable influence on the structure and diversity of

> invertebrate assemblages on the sea floor (Nerini 1984; Oliver and Slattery 1985). Nerini (1984) estimated that in the early 1980s, Grey Whales turned over an area of 3 565 km2 of sea bottom in the Arctic (primarily in the Bering and Chukchi seas) or 9% of the available amphipod community each year. Kvitek and Oliver (1986) used sidescan sonar to estimate that Grey Whales had disturbed up to 36% of the sea floor in three feeding sites off Vancouver Island. Grey Whale foraging in various "pockets" of habitat along the outer coast of Vancouver Island has been studied since the 1970s (e.g., Hatler and Darling 1974; Darling 1984; Kvitek and Oliver 1986; Murison *et al*. 1984; Dunham and Duffus 2001, 2002; Feyrer and Duffus 2011). The whales exert strong top-down pressure on prey populations, primarily mysid shrimp (family Mysidacea) and porcelain crab larvae (family Porcellanidae) at this site (Nelson *et al*. 2008). Their predation may also promote planktonic diversity (Feyrer and Duffus 2011). Bottom-feeding Grey Whales rearrange soft sediments and thus mobilize chemical nutrients bound in benthic substrates (Feder *et al.* 1994; Oliver and Slattery 1985). Also, by feeding on the benthos but defecating and urinating in the water column, Grey Whales contribute to nutrient mobilization and cycling (c.f. Roman and McCarthy 2010; Lavery *et al*. 2014). Due to their coarse baleen, Grey Whales filter only relatively large (> 6 mm) invertebrates from the sediments and smaller invertebrates are expelled near the surface where they serve as food for marine birds and fishes (Obst and Hunt 1990; Grebmeier and Harrison 1992).[33]

Furthermore, the COSEWIC Assessment expands on the symbiotic and commensal relationship between gray whales and other species:

> In addition to their influence on prey, Grey Whales interact with a number of species throughout their range. They are hosts to many endoparasites and ectoparasites (e.g., Blokhin 1984; Dailey et al. 2000) and are the exclusive hosts for one barnacle, *Cryptolepas rachianecti*, and the cyamid crustacean *Cyamus scammoni*. Grey Whales are involved in a variety of symbiotic and commensal interactions. For example, Swartz (1981) described a cleaning symbiosis between Topsmelt (*Atherinops affinis*) and Grey Whales on the Mexican wintering grounds. On the sub-Arctic and Arctic feeding grounds, many species of seabirds (e.g., Northern Fulmar, *Fulmarus glacialis*; Red Phalarope, *Phalaropus fulicaria*; Black-legged Kittiwake, *Rissa tridactyla*; and Thick-billed Murre, *Uria lomvia*) feed on invertebrates from Grey Whale mud plumes. Grey Whales probably represent the only means of accessing benthic prey for these seabirds (Obst and Hunt 1990; Grebmeier and Harrison 1992).[34]

[33] COSEWIC *supra* note 23 at 16.
[34] COSEWIC *supra* note 23 at 29.

In addition, as reported by Grebmeier and Harrison (XXX)[35], the feeding ecology og gray whales in the northern Bering Sea benefits seabirds. NMFS has not adequately assessed the impact of the proposed hunt on the ability of gray whales to continue to provide the benefits and services to those ecosystems that they inhabit.

17. The PCFG gray whale group is currently estimated to contain 243 animals (Carretta et al. 2019b[36], Calambokidis et al. 2017[37]). Carretta et al. (2019b)[38] indicates that the PBR for PCFG gray whales is 3.5 and the known, average level of known and estimated human caused mortality was 1.35 between 2012-2016.

18. NMFS continues to consider the PCFG gray whales to be part of the larger ENP population. Many of the declarants continue to believe, despite the best available scientific evidence to the contrary, that PCFG gray whales are not eligible for designation as a separate population stock under the MMPA. *See*, *e.g.*, Bettridge Declaration at ¶¶ 17-18; Yates Declaration at ¶ 7; Weller Declaration 7, 20; Scordino testimony at ¶¶ 72, 100; Bickham testimony at pg. 6. In the Partial Stipulation re Scope of Issues to be Addressed at the Hearing, the parties agreed that "this hearing and the associated waiver rulemaking are not the appropriate vehicles for identifying or challenging the identification of any particular population stock under

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[35] Grebmeier, J.M., and N.M. Harrison. 1992. Seabird feeding on benthic amphipods facilitated by gray whale activities in the northern Bering Sea. Marine Ecology Progress Series, 80:125-133. Attached as Exhibit 10.

[36] Carretta, J.V., K.A. Forney, E.M. Oleson, D.W. Weller, A.R. Lang, J. Baker, M.M. Muto, B. Hanson, A.J. Orr, H. Huber, M.S. Lowry, J. Barlow, J.E. Moore, D. Lynch, L. Carswell, and R.L. Brownell, Jr. 2019b. U.S. Pacific Marine Mammal Stock Assessment: 2018. Gray Whale (*Eschrichtius robustus*): Western North Pacific Stock. NOAA-TM-NMFS-SWFSC-617. Pgs. 157-166. Attached as Exhibit 11.

[37] Calambokidis, J., J. Laake, and A. Perez. 2017 Updated analysis of abundance and population structure of seasonal gray whales in the Pacific Northwest, 1996-2015. International Whaling Commission Scientific Committee gray whale workshop SC/A17/GW/05. *See* Exhibit M-0053 to Declaration of Jonathan Scordino (May 15, 2019).

[38] Caretta et al. *supra* note 36.

the MMPA," but they agreed that "evidence concerning the various populations, stocks, or groups of gray whales recognized or supported by the scientific literature and the impacts of the proposed waiver on them may be considered." Here, there is compelling (and rapidly mounting) scientific evidence that PCFG gray whales should be designated as a management stock (see below for further discussion of this point) and that the requested waiver, if issued with the proposed rules (as written), will have an adverse impact on PCFG gray whale abundance (by killing them, including those that have a demonstrated high fidelity to the Makah U&A), distribution (by causing some or all of them to alter their seasonal movements to avoid areas where they are subject to hunting and harassment), breeding habits (by allowing hunting to occur during the breeding period in December/January), role in the ecosystem (*see supra* ¶ 16), and otherwise will disadvantage these whales. These are the statutory criteria that NMFS would have to satisfy if it were to issue a waiver to the Makah Tribe to permit the taking of PCFG gray whales if they were a separate population stock under the MMPA; criteria that it could not meet. Here, the burden is on NMFS to prove that PCFG gray whales are not a population stock, a burden that NMFS has failed to demonstrate.

19. In 2011, NMFS undertook as reevaluation of its 2005 Guidelines for Assessing Marine Mammal Stocks[39] (GAMMS).[40] This reevaluation covered several elements of the GAMMS including stock definition. As a result of those deliberations, NMFS made some

[39] NMFS. 2005. Revisions to Guidelines for Assessing Marine Mammal Stocks. 24 pp. Available at: http://www.nmfs.noaa.gov/pr/pdfs/sars/gamms2005.pdf. Attached as Exhibit 12.
[40] Despite engaging in a comprehensive review of GAMMS in 2011, NMFS indicates that the 2005 GAMMS was not officially revised until 2016. Bettridge Declaration at ¶ 13. For the purpose of this testimony, AWI refers to GAMMS 2011 given that it was during this decision-making process where revisions were made to the 2005 GAMMS.

fundamental changes to its GAMMS, including as they pertained to the definition of a stock. As noted in GAMMS 2011[41] (which provided revisions to GAMMS 2005[42]):

> The PBR system was designed to assure the goal of the MMPA that population stocks should not be permitted to diminish beyond the point at which they cease to be a significant functioning element in the ecosystem of which they are a part, and, consistent with this major objective, they should not be permitted to diminish below their optimum sustainable population. Minimum abundance, which is critical to successful implementation of the PBR system, can be seriously over-estimated if distinct stocks are not correctly identified (e.g., are inappropriately pooled into one or a few large stocks), and this overestimate can result in incorrect calculation (also overestimates) of PBR.

The original GAMMS guidelines on defining stocks were also cited for historical reference. Those guidelines specified that:

> The clear intent of the MMPA is to restore and maintain stocks within their Optimum Sustainable Population (OSP) level. Therefore, a risk-averse strategy of defining the stocks should be used to be consistent with these goals. A risk-averse strategy requires starting with a definition of stocks based on small groupings that are only "lumped" when there is compelling evidence to do so. Such evidence comes from biological studies. Further, the guidelines stated that in the event of virtually no biological stock data, a stock should be defined simply as the area from which marine mammals are taken (i.e., the area in which the fishery is operating)."

20. Based on the reevaluation of the GAMMS, the principal change made to defining a stock was to replace "reproductively isolated" or "demographic isolation" with "demographically independent" when evaluating if a group of marine mammals should be designated as a population stock. This change was made because reproductive isolation could imply that no interchange between stocks is permissible, which was never the intent of the use of the terms "reproductively isolated" or "demographic isolation" and was not consistent with how NMFS interpreted those terms. With that change, NMFS now defines a stock "as being a

[41] Moore, J.E., and Merrick, R., editors. 2011. Guidelines for Assessing Marine Mammal Stocks: Report of the GAMMS III Workshop, February 15 – 18, 2011, La Jolla, California. Dept. of Commerce, NOAA Technical Memorandum NMFS-OPR-47. Attached as Exhibit 13.
[42] NMFS *supra* note 39.

management unit that identifies a demographically independent biological population," and further provides that "demographic independence means that the population dynamics of the affected group is more a consequence of births and deaths within the group (internal dynamics) rather than immigration or emigration (external dynamics)." GAMMS 2011.[43] For example, as explained in GAMMS 2016,[44] a population stock is more influenced by internal recruitment when "the exchange of individuals between population stocks is not great enough to prevent the depletion of one of the populations as a result of increased mortality or lower birth rates." Conversely, even when dispersal rates from one stock to another are high enough to "homogenize morphological or genetic differences detectable between putative populations," those rates may "still be insufficient to deliver enough recruits from an unexploited population (source) to an adjacent exploited population (sink) so that the latter remains a functioning element of its ecosystem" as is required to meet the requirements of the MMPA. GAMMS 2011.[45]

21. A stock determination can be based on a host of factors, including "distribution and movements, population trends, morphology, life history, genetics, acoustic call types, contaminants and natural isotopes, parasites, and oceanographic habitat)." GAMMS 2011.[46] "Different population responses (e.g., different trends in abundance) between geographic regions are also an indicator of stock structure, as populations with different trends are not strongly linked demographically. When different types of evidence are available to identify stock structure, the Report (Stock Assessment Report) must discuss inferences made from the different types of

[43] Moore and Merrick *supra* note 41 at 72.
[44] N. LeBoeuf. 2016. Guidelines for Preparing Sock Assessment Reports Pursuant to the 1994 Amendments to the MMPA. National Marine Fisheries Service Instruction 02-204-01. February 22, 2016. Attached as Exhibit 14.
[45] Moore and Merrick *supra* note 41 at 72.
[46] *Id.*

evidence and how these inferences were integrated to identify the stock." GAMMS 2011.[47] The GAMMS suggest that any, all, or any combination of these criteria if met by a particular group of marine mammals would provide the basis for the group's designation as a population stock under the MMPA. Notably, while "evidence of morphological or genetic differences in animals from different geographic regions indicates that these populations are demographically independent," the GAMMS does not specify that such genetic differences must be in both maternally and paternally inherited DNA. Another revision to the GAMMS occurred in 2016 which reiterated and confirmed the changes made in the 2011 GAMMS to the criteria used to determine if a stock should be designated.

22. In 2012, NMFS assembled a task force primarily composed of NMFS scientists and managers to evaluate the stock structure of gray whales, including the PCFG and WNP. The results of those deliberations are summarized in Weller et al. (2013).[48] At that time, NMFS was well aware of the implications of identifying PCFG gray whales as a population stock under the MMPA to the proposed Makah whale hunt. According to Donna Darm of NMFS, if that occurred, "there would be some possibility of needing to request multiple exemptions (waivers)." Weller et al. 2013.[49] The Makah Tribe was also clearly concerned about these deliberations, as evidenced by its submission of three documents prepared by the tribe and its attorneys for consideration by the task force, each of which included information intended to undermine any

[47] *Id*.
[48] Weller, D.W., S. Bettridge, R.L. Brownell, Jr., J.L. Laake, J.E. Moore, P.E. Rosel, B.L. Taylor, and P.R. Wade. 2013. Report of the National Marine Fisheries Service gray whale stock identification workshop. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-SWFSC-507. *See* Exhibit 3-2 to Declaration of Dr. David Weller (April 1, 2019).
[49] *Id*. at 3.

consideration of designating the PCFG gray whales as a population stock under the MMPA. Weller et al. 2013 at 29. [50]

23. In the direct testimony submitted by some of the Makah declarants, the declarants focus on the definition of a stock under the MMPA as one of their justifications for concluding that the PCFG gray whales do not constitute a population stock under the MMPA. *See* Scordino testimony at pg.72; Bickham testimony at pg. 31, 32. The MMPA defines a "stock" to be "a group of marine mammals of the same species or smaller taxa in a common spatial arrangement, that interbreed when mature."[51] As noted in GAMMS 2016,[52] to properly interpret this definition, it must be considered in the context of the MMPA's objectives, including that stocks should not be permitted to diminish below the point where they cease to be a significant functioning element in the ecosystem, should not be permitted to diminish below their optimum sustainable population, and should be managed to maintain the health and stability of the marine ecosystem. GAMMS 2016.[53] To be consistent with these goals, "a stock is recognized as being a management unit that identifies a demographically independent biological population."[54] Indeed, contrary to the interpretation of this term by some of the declarants for the Makah, the task force agreed they would continue to interpret "interbreed when mature" consistent with the concept of "demographic independence," Weller et al. (2013), where "demographic independence" allows "for some level of exchange of individuals between stocks."[55] That level of exchange of

[50] *Id*. at 29.
[51] 16 U.S.C. § 1362(11)
[52] LeBoeuf *supra* note 44 at 3.
[53] *Id*. at 3.
[54] *Id*.
[55] Weller et al. *supra* note 48 at 5.

individuals between population stocks should not be great enough to prevent the depletion of one of the populations as a result of increased mortality or lower birth rates. GAMMS 2016.[56]

24. The task force concluded that "after review of results from photo-identification, genetics, tagging, and other studies within the context of the GAMMS guidelines there remains a substantial level of uncertainty in the strength of the lines of evidence supporting demographic independence of the PCFG [from the ENP]." Weller et al. 2013;[57] Bettridge Declaration ¶ 16; Weller Declaration at ¶ 19. In addition, the task force held that "both the photo identification and genetics data indicate that the levels of internal versus external recruitment are comparable, but these are not quantified well enough to determine if the population dynamics of the PCFG are more a consequence of births and deaths within the group (internal dynamics) rather than related to immigration and/or emigration (external dynamics)." Weller et al. 2013;[58] Weller Declaration at ¶ 27; Yates Declaration at ¶ 7. At that workshop, the participants based their review on the 2005 GAMMS[59] but, during their discussion, they agreed to some of the same fundamental interpretations of stock structure (e.g., demographic independence instead of isolation) as contained in GAMMS 2011[60] and GAMMS 2016[61], as such an interpretation was more consistent with how NMFS has addressed the stock definition issue in the past. Despite declining to designate PCFG gray whales as a population stock, NMFS repeatedly states that PCFG gray whales may warrant designation as a population stock in the future (NMFS Biological Report at

[56] LeBouef *supra* note 44 at 3.
[57] Weller et al. *supra* note 48 at ii. 40.
[58] *Id*. at iii, 41.
[59] NMFS *supra* note 39. The task force relied on GAMMS 2005 during their deliberations instead of GAMMS 2011 as GAMMS 2011 had not been formally approved at the time of the gray whale stock structure workshop.
[60] Moore and Merrick *supra* note 41.
[61] LeBouef *supra* note 44.

1, Yates Declaration at ¶ 23, Bettridge Declaration at ¶ 20, Carretta et al. (2019a[62])). There is, as noted in this testimony and in the best available scientific evidence, and consistent with the objectives and intent of the MMPA, considerable support for designating PCFG gray whales as a population stock under the MMPA which should, at a minimum, cause NMFS to reevaluate the PCFG gray whales as a population stock through the Stock Assessment Report process and/or via another workshop. Until this is done, NMFS should suspend the current waiver process. Even if NMFS were to again decide that the PCFG gray whales do not warrant population stock status, the requested waiver, if issued with the proposed rules (as written), will have an adverse impact on PCFG gray whales inconsistent with the mandatory standards contained in the MMPA.

25. As an initial matter, the GAMMS do not require that all recruitment into any marine mammal group be internal. Indeed, demographic independence, the fundamental determinant of a population stock, means that "the population dynamics of the affected group is *more* a consequence of births and deaths within the group (internal dynamics) rather than immigration or emigration (external dynamics)." GAMMS 2011 (emphasis added).[63] The GAMMS do not specify or quantify the meaning of "more" in this standard. Thus, by the plain terms of the guidelines, as long as the majority of the recruitment is internal, the group of marine mammals would qualify to be designated as a population stock under the MMPA.

26. The photo-identification data (Darling 1984[64]; Calambokidis et al. 2002)[65] directly refute the conclusion made by the task force. The photo-identification data show that the

[62] Carretta et al. *supra* note 2.
[63] Moore and Merrick *supra* note 41 at 23.
[64] Darling, J. (1984). Gray whales off Vancouver Island, British Columbia. In Jones, M., Swartz, S., and Leatherwood, S., editors, The Gray Whale *Eschrichtius robustus*. Academic Press, Inc., Orlando, FL. *See* Exhibit M-0084 to Declaration of Jonathan Scordino (May 15, 2019).

majority of individuals sighted in the PCFG area during the summer, are sighted in multiple years, and therefore cannot represent individuals that are new recruits into the PCFG gray whale group. Indeed, while new whales are seen during each summer in the PCFG region, these may be transient gray whales never to be recruited into the PCFG gray whale group, PCFG gray whales that had not been previously photographed and identified, or particularly if they remain in the region for an extended period of time, recruits into the PCFG gray whale group. Significantly, such external recruitment, if it is occurring, does not prevent the PCFG gray whales from being designated as population stock.

27. In one of the earliest studies published about PCFG gray whales, Darling (1984)[66] documents the biology and ecology of a small group of "resident" gray whales (35-50) that spent their summers off of Vancouver Island, Canada. Calambokidis et al. (2002).[67] in one of the early studies published about PCFG gray whales, concluded that, in respect to the proposed Makah gray whale hunt;

> The results also indicate that early in the season it could be difficult to determine with certainty which whales were migrating through the region and which were part of the feeding aggregation that remained in the region. This could be an important management concern related to aboriginal takes of whales in the Pacific northwest. During the migration it would be expected that the overwhelming majority of whales in the migratory corridor would be migrating animals based on the large size of the overall gray whale population and the low numbers of whales estimated in the group that stays in the region. However, some of the gray whales identified in this study as early as March (during the gray whale migration) were animals that had been seen in previous years and stayed through the summer and autumn.The most reliable way to select migratory animals would be based on a combination of season (as close as possible to the time of

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[65] Calambokidis, J., J.D. Darling, V. Deecke, P. Gearin, Ms. Gosho, W. Megill, C.M. Tombach, D. Goley, C. Toropova, and B. Gisborne. 2002. Abundance, range and movements of a feeding aggregation of gray whales (*Eschrichtius robustus*) from California to southeastern Alaska in 1998. Journal of Cetacean Research and Management, 4(3):267-276. *See* Exhibit M-0047 to Declaration of Jonathan Scordino (May 15, 2019).

[66] Darling *supra* note 64.

[67] Calambokidis et al. *supra* note 65.

> peak migratory passage), location (in the migratory corridor and away from known feeding areas) and behaviour (animals travelling and not milling in an area).

Calambokidis and Perez (2017a)[68] closely examined the occurrence of mothers and calves in the PCFG region over two decades and found that "overall 59 of 91 (65%) calves documented through 2014 were resighted in a year subsequent to their birth year, a not unreasonable proportion considering survival for calves post their initial encounter and the potential (that) some of these recently born calves have been missed." This high proportion of calves determined to be PCFG gray whales demonstrates "a higher degree of internal recruitment to the PCFG than had been suggested by previous less complete data" and the high rate of PCFG gray whale births and internal recruitments "is consistent with the increasing estimates of the PCFG abundance in recent years."

28. Furthermore, Calambokidis and Perez (2017b)[69] provided additional evidence of internal recruitment and internal breeding among PCFG gray whales. They reported that PCFG gray whales of both sexes were documented traveling together during the south and northbound migrations. Specifically, in 15 of the total of 21 cases, "multiple animals were reported to be in the group and in most of these (9) multiple PCFG whales were present in the group including five cases involving three to five PCFG whales."[70] Of the 27 total PCFG gray whales with known sexes identified in these migrating groups, "15 were females and 11 males[71] and in groups with

[68] Calambokidis, J., and A. Pérez. 2017a. Internal recruitment to the PCFG from births to PCFG mothers. International Whaling Commission Scientific Committee gray whale workshop SC/A17/GW/04. Attached as Exhibit 15.
[69] Calambokidis, J. and A. Pérez. 2017b. Association of PCFG gray whales on migration. International Whaling Commission Scientific Committee gray whale workshop SC/A17/GW/02. *See* Exhibit M-0057 to Declaration of Jonathan Scordino (May 15, 2019).
[70] *Id*. at 3.
[71] The sex of one of the 27 animals was not reported.

multiple animals of known sex, four of six groups contained animals of mixed sexes."[72] Considering the small number of PCFG gray whales as compared to that of much larger ENP gray whale stock, the documented "encounters of multiple PCFG whales together (is) extremely unlikely to occur by random chance."[73] For the southbound migrations, when such associations were closer, such group travel "extends the time PCFG whales would be associated through the year and would increase the potential for breeding with other whales from the same feeding group."[74] While this does not rule out breeding between PCFG gray whales and non-PCFG gray whales (which is consistent with the genetic evidence, yet does not preclude designation of PCFG gray whales as a population stock), it provides evidence to support internal recruitment within the PCFG gray whale group and breeding among PCFG gray whales. Furthermore, considering that the start of the gray whale migration coincides with the period of conception, which for most, but not all, gray whales occurs during a three-week period centered in early December (Rice and Wolman 1971[75], Shelden et al. 2004[76]), most gray whales arrive in their wintering areas after

[72] Calambokidis and Perez *supra* note 69 at 1.
[73] *Id*. at 5.
[74] *Id*. at 5, 6. The authors also note that this finding of inter-group travel in PCFG gray whales would suggest that the same may occur in WNP gray whales which had been previously suggested by Weller et al. (2012). Weller, D.W., A.M. Burdin, B. Würsig, B.L. Taylor, and R.L. Brownell, Jr. 2002. The western gray whale: a review of past exploitation, current status and potential threats. Journal Cetacean Research and Management. 4 (1): 7-12. *See* Exhibit M-0296 to Declaration of Jonathan Scordino (May 15, 2019).
[75] Rice, D.W. and A.A. Wolman. 1971. The Life History and Ecology of the Gray Whale (*Eschiritius robustus*). American Society of Mammalogists, Special Publication No. 3. Rice and Wolman also state that "...gray whale breeding is highly synchronous, with females coming into oestrus in a 3-week period from late November to early December; this coincides with the initiation of the southward migration out of the summering areas." *See* Exhibit M_0244 to Declaration of Jonathan Scordino (May 15, 2019).
[76] Shelden, K.E.W., D.J. Rugh, and A. Schulman-Janiger. 2004. Gray whales born north of Mexico: indicator of recovery or consequence of regime shift? Ecological Applications, 14(6), pp. 1789–1805. *See* Exhibit M-0266 to Declaration of Jonathan Scordino (May 15, 2019).

conception has taken place.[77] Consequently, since the majority of gray whales breed early during the southbound migration, the evidence that PCFG gray whales may migrate together in mixed-sex groups is significant in regard to interbreeding by PCFG gray whales. Unfortunately, the wintering areas are often referred to as breeding areas (including by AWI) which is not consistent with known reproductive timing of gray whales.

29. In his testimony, Scordino suggests that most gray whales are added to the PCFG as a result of external recruitment based on several lines of evidence: (1) that the number of new calves recruited into the PCFG represent less than a quarter of the total number of recruited gray whales from 1994 through 2014; (2) a change in research effort does not explain an increase in the proportion of calves observed in the Makah U&A; and (3) evidence of PCFG migrating together is subject to selection bias thereby overstating the proportion of groups with more than one PCFG gray whale and understating the proportion of groups with only one PCFG gray whales. None of these arguments stand up to even minimal scrutiny.

30. These lines of evidence, however, do not withstand scrutiny. For example, Scordino claims (citing Calambokidis et al. (2017)[78] that, from 1999 through 2014, a total of 54 calves were recruited into the PCFG comprising on 22.6 percent of the 238 gray whales recruited into the PCFG during those years (Scordino testimony at pgs. 46-47). Not only could I not find the data in Calambokidis et al. (2017) on which this conclusion was drawn, but by using such a large time frame, particularly when photo-identification surveys were in their infancy as baseline data on PCFG gray whale numbers and individual identities were being collected, this biased the

[77] This breeding timing would be applicable to WNP gray whales as well. Indeed, based on data from tagged WNP gray whales, if they bred during the year when they were tagged, they should have done so prior to or during their eastward migration to the migratory range of the ENP gray whales suggesting that they likely mate with other WNP gray whales. The only exception to this is in the event an ENP gray whale had been recruited into the WNP gray whale population.
[78] Calambokidis et al *supra* note 37.

results to suggest that external recruitment into the PCFG was predominant. If, however, the time frame was limited to 2010-2015, then based on the data provided by Calambokidis et al. (2017),[79] the 31 gray whale calves recruited into the PCFG during those years represented 79.5 percent of all whales recruited into the PCFG during that time period, demonstrating that internal recruitment was predominant.

31. Scordino claims that within the Makah U&A, there has been a consistent effort to survey PCFG gray whales, including calves, from May through July from 1996 to the present (Scordino testimony at pg. 47). Consequently, if survey efforts outside the Makah U&A have increased or those researchers have become more vigilant in documenting calves then it would follow that observations of calves within the Makah U&A should be a smaller proportion of all calves documented in the full PCFG range. Yet, as reported by Scordino, from 1996-2010, 15 percent of all calves observed in the PCFG range were observed in the Makah U&A while that number increased to 28.8 percent from 2011-2015. *Id*. Considering that mother whales with calves move throughout the PCFG range during the May through July time period, multiple PCFG gray whale survey teams are documenting the same gray whales calves making calf percentages for any particular area largely meaningless. What is more meaningful is identifying the mother, determining if she has returned to a section of the PCFG range used in the past (i.e., demonstrating site fidelity), and then to attempt to confirm in subsequent years if her calf becomes recruited into the PCFG. The fact that 28.8 percent of all calves observed in the PCFG range were observed in the Makah U&A from 2011 to 2015 suggest that gray whale mothers with calves have found sufficient habitat/prey in that area which should be grounds for increasing their

[79] *Id*. at pg. 29

protection not initiating a hunt which, if authorized, may result in their harassment (noting that mother/calf pairs cannot be hunted if the hunt were to be authorized).

32. Finally, Scordino downplays the significance of the findings of Calambokidis and Perez (2017b)[80] by suggesting that the methodology employed to scan photographs of whale groups on their southward or northward migration to identify known PCFG gray whales resulted in a positive selection bias (Scordino testimony at pg. 50). As a result, Scordino claims that Calambokidis and Perez (2017b) overstated the frequency of more than one PCFG gray whale being in a group and understated the frequency of a single PCFG gray whale being in a group. *Id*. This claim dismisses the skill of the Cascadia Research experts in identifying PCFG gray whales based on known distinguishing characteristics, and ignores the possibility that the photographs being evaluated may not have been sufficient to identify all whales in a group which could have resulted in an underestimate of the number of groups with two or more PCFG gray whales. Absent more details on the quality of the photographs and the skill/expertise of the person or persons evaluating each photograph, it is difficult to demonstrate that any selection bias occurred in the Calambokidis and Perez (2017b) study.

33. The best available genetic data for PCFG gray whales provides, contrary to the conclusion of the task force, ample evidence to support a stock designation for PCFG gray whales under the MMPA. The mitochondrial genetic data (mtDNA) show that the movement rate between PCFG individuals and the larger population is small enough to be considered demographically independent, which is incompatible with the idea that external recruitment is as high as internal recruitment. Indeed, the genetic evidence presented by Weller et al. (2013)

[80] Calambokidis and Perez *supra* note 69.

should have been sufficient to approve a stock designation for PCFG gray whales. For example, Weller et al. (2013) reports that:

> Frasier *et al*. (2011) examined mtDNA differences between whales sampled in Clayoquot Sound, British Columbia (representing the PCFG) and a more carefully constructed data set of ENP whales from LeDuc *et al.* (2002) in which known PCFG whales were specifically removed. They found significant genetic differentiation between the two sample sets and high levels of haplotype diversity in the PCFG sample, comparable to samples thought to represent the larger ENP population. Using this dataset, Frasier *et al.* (2011) also performed a likelihood ratio test using Theta (Θ) as a proxy for effective population size to examine whether the two sample sets come from the same population. The likelihood ratio test indicated that Θ for the PCFG did not equal Θ for the ENP and the authors concluded that the two groups were demographically independent.[81]

In a study undertaken by NMFS to determine the veracity of the data presented by Frasier et al. (2011), Weller et al. (2013) stated that:

> Lang et al. (2011) expanded on this result and compared whales sighted over two or more years within the PCFG seasonal range to animals sampled on the feeding ground(s) north of the Aleutians using both mtDNA and nuclear microsatellite markers. Significant differentiation was seen for the mtDNA data but not the microsatellite data, supporting the conclusion of Frasier et al. (2011) that structure is present among different feeding areas and this structure may be directed by matrilineal fidelity to feeding grounds.[82]

34. Contrary to assertions that PCFG gray whales do not demonstrate high fidelity to select summering areas, Calambokidis et al. (2017) determined that such fidelity is present among PCFG gray whales. For example, between June through November 1996 to 2015, 793 individual and unique gray whales were seen within the PCFG range with 544 of these whales (68.6%) were observed within the smaller Oregon to Southern Vancouver Island region while 288 or the 793 gray whales were observed within the Makah U&A. While there is interchange of PCFG gray whales between the larger PCFG region and the Makah U&A, 47.7 to 77.5 percent of PCFG gray whales (excluding those seen in only a single year) observed within the PCFG range

[81] Weller et al. *supra* note 48 at 27.
[82] *Id*.

were observed at some point within the Makah U&A. Similarly, as noted in the NMFS Biological Report, Calambokidis et al. (2014)[83] determined that of all PCFG gray whales observed between northern California and northern British Columbia, 35.5 to 58.5 percent of the whales seen in at least one year (depending on the region) were observed within the Makah U&A while, for those whales seen in at least two years, 41.3 to 78.9 percent were seen within the Makah U&A.

35. For the 143 PCFG gray whales observed in nine or more years, while none of these whales exclusively occupied a single PCFG region,[84] 67.1 percent were seen in at least four of the nine regions from 1996 to 2015. As reported by Calambokidis et al. (2017), "whales did regularly visit the same regions across years with 94.4% were seen in at least one of the regions during six or more of the years they were seen and 65.7% were seen in a region two-thirds or more of the years they were seen." Furthermore, updated analyses of photo-identification data through 2015 found a higher degree of internal recruitment than had been suggested by previous "less complete" data (Calambokidis and Pérez 2017a).[85]

36. NMFS has failed to conclusively demonstrate that PCFG gray whales are not a population stock under the MMPA and the 2016 GAMMS. Instead, it continues to assert that the significant difference in mtDNA between PCFG and ENP gray whales is not sufficient to designate PCFG gray whales as a population stock under the MMPA. Similarly, Scordino, Bickham, and Brandon suggest that the small, but statistically significant, mtDNA differences between PCFG and ENP gray whales, along with the lack of any difference in nuclear DNA

[83] Calambokidis, J., J. Laake, and A. Perez. 2014. Updated analysis of abundance and population structure of seasonal gray whales in the Pacific Northwest, 1996-2012. Final Report to National Marine Mammal Laboratory, Seattle, WA. *See* Exhibit M-0054 to Declaration of Jonathan Scordino (May 15, 2019).
[84] *See* Calambokidis et al *supra* note 37 at Table 3 for a definition of the different PCFG regions.
[85] Calambokidis and Perez *supra* note 68.

(bipaternally inherited) between PCFG and ENP gray whales, demonstrates why PCFG gray whales must not be designated as a population stock (*see* Scordino testimony at pg. 100, Bickham testimony at pg. 21). The GAMMS, however, does not prevent a group of marine mammals from being designated as a population stock because of potential inter-stock breeding.

37. Based on the best available evidence in 2012, including evidence of significant mtDNA differences between PCFG and ENP gray whales (Frasier et al. 2011[86]; Lang et al. 2011a[87]; Lang et al. 2011b[88]), and the GAMMS standards, the task force should have recommended that PCFG gray whales be designated as a population stock under the MMPA. The evidence for such a designation then was compelling and now is overwhelming; evidence that NMFS must not ignore moving forward in light of the MMPA's best available science standard. Today, there is additional evidence that internal recruitment is more important than external recruitment to the PCFG gray whale population. *See, e.g.* Calambokis and Perez, 2017a[89]; Calambokidis and Perez, 2017b[90]. At a minimum, because seven years has passed since the task force met, the GAMMS has been revised twice, and the new scientific evidence pertinent to whether the PCFG should be designated as a population stock under the MMPA has emerged

[86] Frasier, T. R., S. M. Koroscil, B. N. White, and J. D. Darling. 2011. Assessment of population substructure in relation to summer feeding ground use in the eastern North Pacific gray whale. Endangered Species Research 14:39-48. See Exhibit M-0103 to Declaration of Jonathan Scordino (May 15, 2019).

[87] Lang A.R., D.W. Weller, B.L. Taylor, R.G. LeDuc, J. Calambokidis, A.M. Burdin, V.L. Pease, A. Klimek, J. Scordino, K.M. Robertson, D. Litovka, V. Burkanov, P. Gearin, J.C. George, B. Mate and R.L.J. Brownell. 2011a. Genetic analysis of stock structure and movements of gray whales in the eastern and western North Pacific. 19th Biennial Conference on the Biology of Marine Mammals.Tampa, Florida. Attached as Exhibit 16.

[88] Lang A.R., D.W. Weller, R.G. LeDuc, A.M. Burdin, V.L. Pease, D. Litovka, V. Burkanov and R.L. Brownell, Jr. 2011b. Genetic analysis of stock structure and movements of gray whales in the eastern and western North Pacific. Paper SC/63/BRG10 presented to the Scientific Committee of the International Whaling Commission. Attached as Exhibit 17.

[89] Calambokidis and Pérez *supra* note 68.

[90] Calambokidis and Pérez *supra* note 69.

(see e.g., Calambokidis and Pérez 2017a[91] and Calambokidis and Pérez 2017b),[92] NMFS should voluntarily agree to a reanalysis of this issue to ensure its scientific validity before considering whether to allow hunting of these same whales, preferably by convening a new task force which should include non-NMFS species-specific experts. Issuing the requested waiver and associated rules (as currently written) now could adversely impact PCFG gray whale abundance, distribution, breeding behaviors, role in the ecosystem, and otherwise disadvantage the PCFG gray whales that use the Makah U&A.

38. Based on other examples of marine mammal groups being designated as population stocks under the MMPA as reported in Weller et al. (2013),[93] it would appear that a different outcome was reached by the task force in its evaluation of a PCFG gray whale stock compared to previous decisions by NMFS to identify other marine mammal groups that have been designated as population stocks. For example, Atlantic harbor porpoises were originally considered a single stock but, over time, mtDNA evidence was found to support four stocks in the Northwest Atlantic, including the Gulf of Maine stock, even though nuclear microsatellite data did not support such structure (Weller et al., 2013[94] citing Rosel et al. 1999[95]). NMFS decided to designate the Gulf of Maine group of harbor porpoises as a population stock under the MMPA based on mtDNA and contaminant studies suggesting that they were distinct from other groups of harbor porpoises in the western North Atlantic.[96] Similarly, in 2011, NMFS increased

[91] Calambokidis and Pérez *supra* note 68.
[92] Calambokidis and Pérez *supra* note 69.
[93] Weller et al *supra* note 48.
[94] *Id.*
[95] Rosel P.E., S.C. France, J.Y. Wang, and T.D. Kocher T.D. 1999. Genetic structure of harbour porpoise *Phocoena* populations in the northwest Atlantic based on mitochondrial and nuclear markers. Molecular Ecology. 8:S41-S54. Attached as Exhibit 18.
[96] Hayes, S.A., E. Josephson, K. Maze-Foley, and P.E. Rosel, Editors. 2019. US Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2018; Harbor porpoise (*Phocoena*

the number of stocks of Alaska harbor seals from three to twelve based pm mtDNA, satellite telemetry, trend, and distributional data. Weller et al 2013[97] citing Allen and Angliss 2012.[98] At the time this decision was made, "nDNA (nuclear DNA) data were not available and mtDNA analyses were considered sufficient to meet the criteria of demographic independence under the GAMMS guidelines."[99] Finally, humpback whales in the Northwest Atlantic were originally classified as a single stock (Waring et al. 1999[100]) but genetic studies found small but significant differences in mtDNA between animals sampled on different feeding grounds (Palsbøll et al. 2001[101]) and photo-identification efforts determined strong site fidelity of individual whales to the Gulf of Maine feeding area (Clapham et al. 1993[102]). Based on this evidence, NMFS determined in 2000 that humpback whales in the Gulf of Maine feeding area should be

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phocoena phocoena): Gulf of Maine/Bay of Fundy Stock. NOAA Technical Memorandum NMFS-NE-258. Pages 114-122. Attached as Exhibit 19.

[97] Weller et al *supra* note 48.

[98] Allen B.M. and Angliss R.P. 2012. Alaska marine mammal stock assessments, 2011. U.S. Department of Commerce, NOAA Technical Memorandum, NMFS-AFSC-234. Attached as Exhibit 20.

[99] Weller et al *supra* note 48 at 25.

[100] Waring, G.T., D.L. Palka, P.J. Clapham, S. Swartz, M.C. Rossman, T.V.N. Cole, K.D. Bisack, and L.J. Hansen. 1999. U.S. Atlantic marine mammal stock assessments - 1998. U.S. Department of Commerce, NOAA Technical Memorandum, NMFS-NE-116. 182 pp. Attached as Exhibit 21.

[101] Palsbøll, P.J., J. Allen, T.H. Anderson, M. Berube, P.J. Clapham, T.P. Feddersen, N. Friday, P. Hammond, H. Jergensen, S. Katona, A.H. Larsen, F. Larsen, J. Lien, D.K.. Mattila, F.B. Nygaard, J. Robbins, R. Sponer, R. Sears, J. Sigurjónsson, T.D. Smith, P. Stevick, G. Vikingsson and N. Oien. 2001. Stock structure and composition of the North Atlantic humpback whale, *Megaptera novaeangliae*. Paper SC/53/NAH11 presented to the Scientific Committee of the International Whaling Commission.

[102] Clapham P.J., L.S. Baraff, C.A. Carlson, M.A. Christian, D.K. Mattila, C.A. Mayo, M.A. Murphy, and S. Pittman. 1993. Seasonal occurrence and annual return of humpback whales, Megaptera novaeangliae, in the southern Gulf of Maine. Canadian Journal of Zoology 71:440-443. Attached as Exhibit 22.

designated as a population stock under the MMPA (Waring et al. 2000[103]). In the Pacific, three humpback whale stocks are currently recognized in the North Pacific, based on three feeding areas (Allen and Angliss 2012[104]; Carretta et al. 2013[105]). Finally, as summarized by Calambokidis et al (2017):

> Population structure in other large whales has been the subject of recent inquiry and has revealed diverse results for different species. Clapham et al. (2008) examined 11 sub-populations of whales subjected to whaling that were extirpated possibly due to the loss of the cultural memory of that habitat and concluded subpopulations often exist on a smaller spatial scale than had been recognized. Studies of other baleen whales, particularly humpback whales, have shown evidence of maternally directed site fidelity to specific feeding grounds based on photographic identification studies (Calambokidis et al. 1996, 2001, 2008). This high degree of fidelity to specific feeding areas is often discernible genetically. In the North Pacific strong mtDNA differences were found among feeding areas even when there was evidence of low level of interchange from photo-ID (Baker et al. 2008). Similar findings were documented for humpback whales in the North Atlantic which feed in different areas but interbreed primarily on a single breeding ground (Palsboll et al. 1995) like ENP gray whales.[106]

Overall, the evidence supporting a stock designation for PCFG gray whales is stronger than the evidence that was deemed sufficient to designate population stocks for these other marine mammal stocks.

39. NMFS's 2016 final rule regarding its reassessment of the listing of humpback whales under the Endangered Species Act (16 U.S.C. 1531 et seq.), provides even more evidence of the selective applications of the GAMMS to some marine mammals groups and not others. 81 Fed. Reg. 62,260 (September 8, 2016). In that final rule, NMFS redesignated the humpback

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[103] Waring, G.T., J.M. Quintal, S.L. Swartz. 2000. U.S. Atlantic and Gulf of Mexico marine mammal stock assessments - 2000. U.S. Department of Commerce, NOAA Technical Memorandum, NMFS-NE-162. 197 pp. Attached as Exhibit 23.
[104] Allen and Angliss *supra* note 98.
[105] Carretta, J.V., E. Oleson, D.W. Weller, A.R. Lang, K.A. Forney, J. Baker, B. Hanson, K. Martien, M.M. Muto, M.S. Lowry, J. Barlow, D. Lynch, L. Carswell, R.L. Brownell, Jr., D.K. Mattila, and M.C. Hill. 2013. U.S. Pacific Marine Mammal Stock Assessments: 2012. U.S. Department of Commerce, NOAA Technical Memorandum, NMFS-SWFSC-504. Attached as Exhibit 24.
[106] Calambokidis et al *supra* note 12.

whale under the ESA by splitting the global population into 14 Distinct Population Segments (DPS), removing the species-level listing, listing four DPSs as endangered and one DPS as threatened, and determining that the remaining nine DPSs did not warrant listing. While humpback whale stock delineation under the MMPA is currently under review,[107] the current stock designation appear to be based on significant mtDNA differences and strong site fidelity to feeding areas; precisely what is seen in PCFG gray whales. In the California/Oregon/Washington stock, for example:

> Photo-identification evidence also suggests strong site fidelity to feeding areas, but animals from multiple feeding areas converge on common winter breeding areas (Calambokidis *et al*. 2008). Baker *et al*. (2008) reported significant differences in mtDNA haplotype frequencies among different breeding and feeding areas in the North Pacific, reflecting strong matrilineal site fidelity to the respective migratory destinations. The most significant differences in haplotype frequencies were found between the California/Oregon feeding area and Russian and Southeastern Alaska feeding areas (Baker *et al*. 2008).[108]

For the Western North Pacific stock of humpback whales, photo-identification, distribution, genetic, and Discovery tag data was used to define both breeding population and stock structure in the North Pacific.[109] For the Western North Pacific and Central North Pacific stocks, their feeding areas "overlap in waters from British Columbia to the Bering Sea…" similar to how

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[107] Carretta, J.V., K.A. Forney, E.M. Oleson, D.W. Weller, A.R. Lang, J. Baker, M.M. Muto, B. Hanson, A.J. Orr, H. Huber, M.S. Lowry, J. Barlow, J.E. Moore, D. Lynch, L. Carswell, and R.L. Brownell, Jr. 2018. U.S. Pacific Marine Mammal Stock Assessment: 2017. NOAA-TM-NMFS-SWFSC-602 at 42. Attached as Exhibit 25.

[108] *Id*. at pages 38-45 Humpback whale (*Megaptera novaeangliae*): California/Oregon/Washington Stock.

[109] Muto, M.M., V.T. Helker, R.P. Angliss, P.L. Boveng, J.M. Breiwick, M.F. Cameron, P.J. Clapham, S.P. Dahle, M.E. Dahlheim, B.S. Fadely, M.C. Ferguson, L.W. Fritz, R.C. Hobbs, Y.V. Ivashchenko, A.S. Kennedy, J.M. London, S.A. Mizroch, R.R. Ream, E.L. Richmond, K.W.W. Shelden, K.L Sweeney, R.G. Towell, P.R. Wade, J.M. Waite, and A.N. Zerbini. 2019. Alaska Marine Mammal Stock Assessments, 2018. Humpback whale (*Megaptera novaeangliae*): Western North Pacific Stock. NOAA-TM-AFSC-393. Pages 205-216. Attached as Exhibit 26.

some PCFG gray whales may access Arctic feeding areas used by ENP gray whales in some years.[110]

40. NMFS has failed to explain, including in any of the declarations submitted for the hearing, why it does not apply the same standard for designating population stocks under the MMPA to all marine mammal groups that qualify for such a designation. This is significant because without explaining why it treated PCFG differently, it cannot satisfy its obligation under the best available science standard to demonstrate that the waiver will not have an adverse effect on the marine mammals that will be impacted by the waiver and associated rules.

41. In Canada, PCFG gray whales are classified as a "designatable unit" pursuant to the COSEWIC guidelines for recognizing designatable units.[111] In November 2017, COSEWIC concluded that PCFG gray whales should be designated as endangered[112] under Canada's Species at Risk Act (SARA).[113] Under Canadian law, a "designatable unit" "should be discrete and evolutionarily significant units of the taxonomic species, where 'significant' means that the unit is important to the evolutionary legacy of the species as a whole and if lost would likely not be replaced through natural dispersion." A "designatable unit" is conceptually equivalent to a "population stock" under the MMPA

42. In determining, in November 2017, that PCFG gray whales qualify as a "designatable unit," COSEWIC, relying on the same data available to NMFS, concluded that PCFG gray whales were both discrete and significant. In regard to discreteness, COSEWIC

[110] *Id*. at 213. See also, *Id*. for Humpback whale (*Megaptera novaeangliae*): Central North Pacific Stock. Pages 217-230 at 220.
[111] COSEWIC guidelines for recognizing designatable units. Approved by Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in November 2015. Available at: https://www.canada.ca/en/environment-climate-change/services/committee-status-endangered-wildlife/guidelines-recognizing-designatable-units.html.
[112] This recommendation was submitted to the Ministry of the Environment on October 15, 2018.
[113] Species at Risk Act (S.C. 2002, c. 29)

considered several relevant studies, including Frasier et al. (2011)[114] which "concluded that their genetic results, in combination with photo-identification data demonstrating strong maternally directed fidelity to summer feeding grounds, demonstrated that the PCFG 'qualifies as a separate MU [Management Unit, sensu Moritz 1994], and requires separate management consideration.'"[115] While it acknowledged that D'Intino et al. (2013)[116] "found no indication of population structure from this analysis and concluded that the combined data from mitochondrial and nuclear markers and photo-identification suggest a single interbreeding population with seasonal, maternally directed site fidelity to different feeding areas,"[117] it cited to the results reported by Lang et al. (2014)[118] who "found statistically significant differences in all mtDNA comparisons of the PCFG whales with the Chukotka whales but none of their comparisons using microsatellite data was significant."[119]

43. Based on these findings coupled with photo-identification data, COSEWIC determined that "the use of feeding grounds is influenced by internal recruitment but mating is random with respect to feeding ground affiliation."[120] Consequently, it found that it was reasonable to consider PCFG gray whales as "genetically distinct insofar as there is a consistent

[114] Frasier et al *supra* note 86.
[115] COSEWIC *supra* note 23 at 10.
[116] D'Intino, A.M., J.D. Darling, R. Urbán, and T.R. Frasier. 2013. Lack of nuclear differentiation suggests reproductive connectivity between the 'southern feeding group' and the larger population of eastern North Pacific gray whales, despite previous detection of mitochondrial differences. Journal of Cetacean Research and Management 13:97-104. See Exhibit M-0080 to Declaration of Jonathan Scordino (May 15, 2019).
[117] COSEWIC *supra* note 7 at 10.
[118] Lang, A.R., J. Calambokidis, J. Scordino, V.L. Pease, A. Klimek, V.N. Burkanov, P. Gearin, D.I. Litovka, K.M. Robertson, B.R. Mate, J.K. Jacobsen, and B.L. Taylor. 2014. Assessment of genetic structure among eastern North Pacific gray whales on their feeding grounds. Marine Mammal Science 30:1473-1493. See Exhibit M-0174 to Declaration of Jonathan Scordino (May 15, 2019).
[119] COSEWIC *supra* note 23 at 11.
[120] COSEWIC *supra* note 23 at 11.

pattern of mtDNA differentiation even though the differences in haplotype frequencies between PCFG and other 'eastern' Grey Whales are not large"[121] and, while there "are no morphological or life history features that distinguish the two groups … a clear behavioural difference exists between them."[122]

44. In regard to the significance of PCFG gray whales, COSEWIC determined that because "the genetic differences between PCFG and other 'eastern' Grey Whales cannot be considered to reflect relatively deep intraspecific phylogenetic divergence… ," it evaluated two other criteria to assess significance: (1) persistence in an ecological setting unusual or unique to the species, such that it is likely or known to have given rise to local adaptations, or (2) loss of the population would result in an extensive disjunction in the range of the species in Canada that would not be recolonized by natural dispersal.[123]

45. With regard to criterion 1, COSEWIC found that PCFG whales occupy a unique environmental setting in which there are differences in behaviour, specifically related to their selection of feeding habitat and mode of foraging (e.g., Duffus 1996[124]; Darling et al. 1998[125]; Dunham and Duffus 2001[126], 2002[127]; Nelson et al. 2008[128]), that may distinguish PCFG whales

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[121] *Id*.
[122] *Id*.
[123] *Id*.
[124] Duffus, D.A. 1996. The recreational use of grey whales in southern Clayoquot sound, Canada. Applied Geography 16:179-190. Attached as Exhibit 27.
[125] Darling, J.D., K.E. Keogh, and T.E. Steeves. 1998. Gray whale (*Eschrichtius robustus*) habitat utilization and prey species off Vancouver Island, BC. Marine Mammal Science 14:692-720. *See* Exhibit M-0085 to Declaration of Jonathan Scordino (May 15, 2019).
[126] Dunham, J.S., and D.A. Duffus. 2001. Foraging patterns of gray whales in central Clayoquot Sound, British Columbia, Canada. Marine Ecology Progress Series 223:299-310. *See* Exhibit M-0090 to Declaration of Jonathan Scordino (May 15, 2019).
[127] Dunham, J.S., and D.A. Duffus. 2002. Diet of gray whales (*Eschrichtius robustus*) in Clayoquot Sound, British Columbia, Canada. Marine Mammal Science 18:419-437. *See* Exhibit M-0091 to Declaration of Jonathan Scordino (May 15, 2019).

from longer-distance migrating grey whales.[129] If, as is likely, this behaviour is culturally inherited from mother to calf, these differences might be used to infer that some degree of "local adaptation" is present, or incipient.[130] As indicated in the COSEWIC analysis, based on changes in the environmental carrying capacity for gray whales in the North Pacific, Pyenson and Lindberg (2011)[131] concluded that "the 'ecological plasticity in feeding' exhibited by PCFG whales was a critical factor in allowing their species to adapt to dramatic fluctuations in the environment during the Late Pleistocene and the Holocene"[132] and that "the 'behavioral plasticity' shown by PCFG whales 'will be an important trait with the increasingly rapid heating of the Northern cryosphere projected to occur in the coming decades' and therefore 'protecting those individuals that display alternative migratory behavior and feeding modes should be an important priority regardless of their molecular or morphological similarity [to the rest of the grey whale population].'"[133] COSEWIC acknowledges, however, that the reported differences in foraging behaviors between PCFG and ENP gray whales may not be as consistent as assumed by Pyenson and Lindberg (2011).[134]

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[128] Nelson, T.A., D.A. Duffus, C. Robertson, and L.J. Feyrer. 2008. Spatial-temporal patterns in intra-annual gray whale foraging: characterizing interactions between predators and prey in Clayoquot Sound, British Columbia, Canada. Marine Mammal Science 356-370. Attached as Exhibit 28.
[129] COSEWIC *supra* note 23 at 11.
[130] COSEWIC *supra* note 23 at 11, 12.
[131] Pyenson, N.D. and D.R. Lindberg. 2011. What happened to gray whales during the Pleistocene? The ecological impact of sea-level changes on benthic feeding areas in the North Pacific Ocean. PLoS One 6(7): e21295. See Exhibit M-0236 to Declaration of Jonathan Scordino 9May 15, 2019).
[132] COSEWIC *supra* note 23 at 12.
[133] COSEWIC *supra* note 23 at 12.
[134] Pyenson and Lindberg *supra* note 131.

46. Regarding criterion 2, COSEWIC cited to Frasier et al. (2011)[135] who determined that observed population structuring from maternally directed site fidelity to different feeding grounds is "common in whales and important for management,"[136] which, in turn, led them to find that:

> … because of this site fidelity, knowledge of specific feeding areas is only present within certain matrilines. Therefore, if whales are extirpated from a specific feeding ground, they will not be 'replaced' (or the area will not be repopulated) by others from the larger population because knowledge of that feeding area has been lost."[137]

Based on this, COSEWIC concluded that:

> … if the PCFG were to be extirpated, this would result in a persistent (albeit not very extensive) disjunction in the range of the species in Canada (temporal and possibly also spatial as PCFG whales are more likely than other whales to occur in waters between Vancouver Island and the mainland).[138]

47. To support this conclusion, COSEWIC refers to Western North Pacific gray whales and how its population that migrated annually from the Okhotsk Sea southward along the Japanese islands and the mainland of Asia was nearly extirpated by whaling by the early 1970s and how, despite decades of protection from whaling, the persistence of this population remains in doubt and there is no "clear evidence of repopulation or re-establishment of the Grey Whale's historical migration along the Asian mainland and Japan despite decades of complete protection from whaling."[139]

48. COSEWIC recognizes that there is a large migratory population of gray whales that migrates through the PCFG gray whale range seasonally and that, therefore, even if all

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[135] Frasier et al *supra* note 86.
[136] COSEWIC *supra* note 23 at 13.
[137] *Id*.
[138] *Id*.
[139] *Id*.

PCFG gray whales were to disappear, recolonization might occur fairly rapidly[140] and that Lang and Martien (2012)[141] concluded that immigration of approximately four whales per year into the PCFG was most consistent with empirical data.[142] As noted previously, since a population stock under the MMPA can include some external recruitment, even if Lang and Martien (2012) are correct, this does not disqualify PCFG gray whales from designation as a population stock under the MMPA. In addition, COSEWIC notes that the suggestion (see e.g., Calambokidis et al. (2012)[143] that there had been an apparent influx of whales into the area (referring to the PCFG area) in the late 1990s and early 2000s (in response to a gray whale Unusual Mortality Event from 1999-2000) may have been due to previous PCFG population estimates from 1996-1997 being biased low with the rapid increased in abundance estimates at that time was, in part, due to the smaller area of surveillance in 1996-1997[144] (Calambokidis et al. 2017).[145]

49. The basis for COSEWIC's endangered recommendation for PCFG gray whales was that:

> "members of this small population migrate annually from their wintering grounds in Mexico to their summer feeding areas in Pacific Northwest waters, where they reside the entire summer. The population estimate is low, at about 243 individuals. Due to its small size, the population is vulnerable to stochastic events and threats including contamination from oil spills." COSEWIC Gray Whale Assessment at iii, xv.

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[140] *Id*.
[141] Lang, A.R., and K.K. Martien. 2012. Update on the use of a simulation-based approach to evaluate plausible levels of recruitment into the Pacific Coast Feeding Group of gray whales. Unpublished paper SC/64/AWMP4, Scientific Committee, International Whaling Commission, Cambridge, UK. See Exhibit M-0176 to Declaration of Jonathan Scordino (May 15, 2019).
[142] COSEWIC *supra* note 23 at 13.
[143] Calambokidis, J., J.L. Laake, and A. Klimek. 2012. Updated analysis of abundance and population structure of seasonal gray whales in the Pacific Northwest, 1998-2010. International Whaling Commission Scientific Committee (SC/M12/AWMP2-Rev). See Exhibit M-0052 to Declaration of Jonathan Scordino (May 15, 2019).
[144] COSEWIC *supra* note 23 at 13.
[145] Calambokidis et al *supra* note 37.

This recommendation was supported by the COSEWIC working group on marine mammals and, in turn, the full COSEWIC group which consists of all of the taxa-specific working groups indicating that the full suite of experts on multiple taxa (not just marine mammals) agreed with the recommendation based on the best available scientific evidence. While Species at Risk Act (SARA) has not yet accepted this recommendation—under Canadian law it has three years from the date when the recommendation was submitted to the Ministry of Environment (October 15, 2018) to make a decision—it is expected that, given the strength of the evidence supporting this recommendation, SARA will accept the recommendation by or before October 15, 2021 (pers. comm. Dr. Tim Frasier, June 31, 2019). At bare minimum, in evaluating the waiver criteria as part of this proceeding, NMFS must explain why it has reached a different conclusion from an authoritative body with jurisdiction over these same species and how, under the best available science, the waiver will not adversely impact the PCFG.[146]

50. The COSEWIC recommendation included consideration of the same evidence that NMFS reviewed and rejected as a basis to support a population stock designation under the MMPA. It also considered more recent evidence published by Calambokidis and Perez (2017a & b), that NMFS has not considered in any formal reevaluation of the PCFG gray whale stock designation, has ignored, or which it continues to believe does not support a population stock designation for PCFG gray whales (Carretta et al., 2019a[147]). When SARA accepts the COSEWIC recommendation (or even now considering that the recommendation has been made), this creates an unfortunate and arbitrary scenario where PCFG gray whales will be designated as

[146] AWI has contacted authorities in Mexico and Canada regarding the proposed hearing and proposed rules and have, to date, not found any evidence that the US government or NMFS informed their counterparts in Mexico and Canada, both range states of the gray whale, about the administrative hearing process or the proposed rules. AWI has not attempted to ascertain if the US government/NMFS informed authorities in the Russian Federation about these developments.
[147] Carretta et al *supra* note 2.

(or recommended to be designated as) endangered in Canada and afforded the full protections of such a designation under Canadian law while, if they swim across the international border and into the Makah U&A will be subject to being harpooned and killed in a hunt.

51. The economic value of gray whales, including PCFG gray whales, was not addressed by the NMFS or Makah declarants despite the fact that such economic value is another factor that NMFS must consider in determining if the requested waiver should be issued. *See* 16 U.S.C. § 1361(6) ("marine mammals have proven themselves to be resources of great international significance, esthetic and recreational as well as economic"). O'Connor et al. (2009) found that the global whale watching industry (an estimated 30,000 operations in 2008) was worth 2.1 billion dollars in total expenditures that year and employed 13,200 people.[148] Cisneros-Montemayor et al. (2010) estimated that an additional 413 million USD (2009) in yearly revenue, supporting 5,700 jobs, could be realized by maritime countries that do not currently provide opportunities for whale watching increase the global value of the industry to over 2.5 billion and providing nearly 19,000 jobs.[149] Gray whales, including PCFG gray whales, given their migratory patterns where many utilize areas close to the coasts, their presence in the lagoons in Mexico, and the opportunity to see PCFG gray whales within their range throughout the summer months are a particularly economically valuable species for wildlife watching in Mexico, the United States, and Canada. Gray whales are a main species for whale watching

[148] O'Connor, S., Campbell, R., Cortez, H., & Knowles, T., 2009, Whale Watching Worldwide: tourism numbers, expenditures and expanding economic benefits, a special report from the International Fund for Animal Welfare, Yarmouth MA, USA, prepared by Economists at Large. Attached as Exhibit 29.

[149] Cisneros-Montemayor, A.M., U.R. Sumaila, K. Kaschner, and D. Pauly. 2010. The global potential for whale watching. Marine Policy. doi:10.1016/ j.marpol.2010.05.005. Attached as Exhibit 30.

operations in British Columbia, Canada, Mexico,[150] California, Oregon, Washington, and Alaska provided educational/recreational opportunities for nearly 3.3 million of people and over 842 million dollars in both direct and indirect expenditures in 2008. As documented by O'Connor et al. (2009):[151]

Province/ State	Year	Number Whale Watchers	Number Operators	Direct Expenditures	Indirect Expenditures	Total Expenditures
BC (Canada)	2008	430,600	47	27,105,800	91,070,200	118,176,000
Mexico	2006	169,904	206	9,077,843	76,401,220	85,479,063
AK	2008	519,000	60	410,000,000	55,000,000	465,000,000
CA	2008	1,371,467	73	14,308,814	68,573,343	82,882,157
OR	2008	376,618	11	1,587,205	28,246,343	29,833,548
WA	2008	425,000	42	10,845,500	50,590,500	61,436,000

Based on a random survey of 6,129 households in Washington, Leeworthy et al (2017)[152] found that "WA households that recreate on WA's Outer Coast are willing to pay annually the most for improving the natural resource conditions for water quality, maintaining unobstructed Viewscapes from onshore and offshore developments, marine mammals, shoreline quality-number of beaches open (not closed due to harmful algal blooms), shoreline quality-marine debris, and the opportunity to see large predators." Allowing the intentional hunting of gray whales is inconsistent with the desire by Washington residents to improve conditions for marine mammals. In California, in a draft paper authored by Pendleton (2004), whale watching alone

[150] See also Schwoerer, T. 2007. Master's Thesis. The Economic Value of Gray Whales to Local Communities: A Case Study of the Whale Watching Industry in Two Communities in Baja, Mexico. Simon Fraser University. Attached as Exhibit 31.
[151] O'Connor et al *supra* note 121 at 202, 210, 214, 219, 221, and 223.
[152] Leeworthy, V.R., D. Schwarzmann, D. Reyes Saade. 2017. Non-market Economic Value of Recreation Use on the Outer Coast of Washington and the Olympic Coast National Marine Sanctuary, An Attributes Approach: Volume 6, 2017. Marine Sanctuaries Conservation Series ONMS-17-10. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of National Marine Sanctuaries, Silver Spring, MD. pp 26. Attached as Exhibit 32.

"probably generates on the order of $20 million in gross revenues annually and net revenues of between $4 million and $9 million."[153] Furthermore, the economic value (direct and secondary) of gray whales, including PCFG gray whales, to whale watching companies, coastal cities and communities where such companies are based, and the other companies in those communities that benefit financially from visitors/tourists that take advantage of such wildlife watching opportunities does not include the economic value of the conservation education provided by wildlife watching excursions or the economic benefits associated with the ecosystem services provided by gray whales.

52. NMFS continues to state that PCFG gray whales may be designated as a population stock in the future (Yates Declaration at ¶ 23, Bettridge Declaration at ¶ 20, NMFS Biological Report,[154] Carretta et al. (2019a).[155] It also includes in its ENP gray whale Stock Assessment Reports specific information on PCFG gray whales including population abundance estimates, minimum abundance estimates, rate of increase data, a PBR, and data on the average amount of human-caused mortality (Carretta et al. 2019a). Given this, it should extend the same consideration to PCFG in the context of the population stock determination under the MMPA and its implications to the proposed Makah hunt. For example, in the 2015 DEIS it should have discussed the implications of a PCFG stock designation in the context of the MMPA waiver criteria since, if NMFS could not satisfy those criteria (as is the case), then this current proceeding would be unnecessary. It is well aware of such implications since, as noted in Weller et al. (2013), Donna Darm of NMFS reported that if PCFG gray whales were designated as a

[153] Pendleton, L.H. (2004) Understanding the potential economic value of marine wildlife viewing and whale watching in California: executive summary. Attached as Exhibit 33.
[154] NMFS *supra* note 6 at 4 of 89 and 55 of 89.
[155] Carretta et al. *supra* note 2 at 158.

population stock then "there would be some possibility of needing to request multiple exemptions (waivers)."[156]

53. Since such a waiver would be required if the Makah wanted to hunt PCFG gray whales, the current process would have to be suspended pending submission of a second waiver application. This, in turn, would require NMFS to analyze that application, assess its environmental impacts under the National Environmental Policy Act, and make a preliminary decision to either issue or not issue the requested waiver which, if made, would trigger an administrative hearing. Under such a scenario, to issue such a waiver, NMFS would have had to consider the relevant criteria under the MMPA including the distribution, abundance, reproduction, and migratory routes of the PCFG gray whales while also ensuring that, if a waiver were issued for a hunt, the hunt would not result in gray whales ceasing to be a significant functioning part of their ecosystem or disadvantage the PCFG gray whales; criteria that it could not meet given the best available scientific evidence. It would also have to ensure that any hunt would not cause the PCFG gray whales to diminish to below their OSP which also would not be possible, given current evidence, since the carrying capacity for PCFG gray whales is not known and, therefore, NMFS cannot determine if the stock is at OSP. Even today, absent any request from the Makah Tribe for a waiver of the MMPA to permit the taking of PCFG gray whales, NMFS cannot avoid evaluating the MMPA waiver criteria in the context of PCFG gray whales since they are an established feeding group of gray whales, since they are genetically and behaviorally different from ENP gray whales, and since they are ecologically and economically

[156] In regard to WNP gray whales, Darm indicated that "the need for a waiver would be informed by the likelihood of take and obtaining a waiver for WNP gray whales (if the group is recognized as a stock) is highly unlikely given that they are listed as endangered under the Endangered Species Act (ESA) and as such, would be considered depleted under the MMPA." Weller et al. *supra* note 23 at 3.

important within the entire PCFG gray whale range and the specific regions that PCFG gray whales inhabit. Alternatively, since the Makah Tribe has not asked for an MMPA waiver for PCFG gray whales, NMFS could amend the proposed rules to develop a hunt structure that would significantly minimize if not entirely eliminate the potential take of PCFG gray whales.

54. The inclusion in the NMFS Biological Report on gray whales of a theoretical OSP determination for PCFG gray whales (*see* NMFS Biological Report at 30) is not official, is entirely speculative, is not referenced in any of the declarations submitted by NMFS personnel (i.e., Bettridge, Moore, Weller, and Yates) and may, in fact, demonstrate that NMFS recognizes that determining whether the PCFG gray whales are at OSP would be problematic if or when NMFS designates PCFG gray whales as a population stock. Notably, Weller et al. (2013) noted, based on its examination of the potential OSP of PCFG gray whales that, "the data have also not been informative for estimating population carrying capacity (K), a parameter necessary to determine whether current abundance is above MNPL."[157] Furthermore, Punt and Moore (2013) concluded that ""Ultimately it was not possible to draw a definitive conclusion as to whether the PCFG is within OSP."[158]

55. Whether the PCFG is designated as a population stock or not, NMFS has to ensure that any waiver issued to permit a hunt of PCFG gray whales would not cease to be a significant functioning element in the ecosystem. The potential impact of a proposed hunt on the role, function, and benefits of PCFG gray whales in the ecosystem is similar to those articulated for the ENP stock in paragraph 16 in this testimony. If anything, the impacts are more significant given the small number of PCFG gray whales, the even smaller number of PCFG gray

[157] Weller at al. *supra* note 48 at 21.
[158] Punt, A.E., and J.E. Moore. 2013. Seasonal gray whales in the Pacific Northwest: an assessment of optimum sustainable population level for the Pacific Coast Feeding Group. NOAA-TM-NMFS-SWFSC-518 at 12 of 24. Attached as Exhibit 34.

whales that use the Makah U&A, and given the small size of the Makah U&A habitat occupied by gray whales in comparison to the full range of PCFG gray whales and the even larger geographic range of ENP gray whales. For PCFG gray whales, due to their small numbers particularly in regard to the number of PCFG gray whales that occupy the Makah U&A, this concern would be amplified since a hunt, in combination with other natural and anthropogenic mortality factors, could cause the loss of the stock. In GAMMS 2016, NMFS explicitly notes that the loss of a population stock would violate the MMPA because the stock's role in their ecosystem would cease.[159]

56. To address this, NMFS could amend the proposed rules to propose a hunt that would reduce or eliminate the risk of taking a PCFG gray whale (i.e., a limited hunt during the migratory season far enough offshore to minimize the risk of taking a PCFG gray whale). The current proposed rules, while they include some provisions to reduce potential harm from the hunt to PCFG gray whales (e.g., hunt triggers that could prevent a hunt from occurring based on the known or projected number of PCFG gray whales, a cumulative strike limit for PCFG gray whales, including a sub-limit for female PCFG gray whales applicable to the duration of the permit) (84 Fed. Reg. 13608), would permit the take, including harassment and killing, of PCFG gray whales both during proposed even and odd-year hunts. For even-year hunts, since there is no requirement that the hunt be far offshore, the chances of killing a PCFG gray whale are elevated. During an odd-year hunt, the killing of any whale very likely to be a known PCFG gray whale. Absent articulating such an alternative hunt scheme now, if NMFS designates the PCFG gray whales as a population stock in the future, the current statutorily-mandated waiver process would have to be repeated.

[159] LeBoeuf *supra* note 44 at 3 and 4.

57. The WNP gray whale stock is currently estimated to contain 290 animals (Carretta et al. 2019b citing Cooke 2017[160])).[161] Carretta et al. (2019b) indicates that the annual average rate of increase for WNP gray whales was 2-5 percent between 2005 and 2016, the PBR (in US waters) is 0.12, and, while no mortality data is known, "there is some probability of WNP gray whales being killed or injured by ship strikes or entangled in fishing gear within US waters."[162]

58. The testimony of Scordino, Bickham, and Brandon suggest that the current stock designation for these whales is incorrect. Dr. Bickham, for example, claims that the current WNP stock is composed of a Western Breeding Segment (WBS) (gray whales that stay in Asian waters year round) and a Western Feeding Group (WFG) (gray whales the spend the feeding season in Russian waters but migrate to the ENP gray whale breeding lagoons during the winter[163]).

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[160] Carretta et al. (2019b) do not provide a citation for Cooke (2017) in its literature cited section. The proper citation is Cooke, J.G. 2017. Updated assessment of the Sakhalin gray whale population and its relationship to gray whales in other areas. Western Gray Whale Advisory Panel, 18th meeting, November 17-19, 2017. WGWAP-18/24. Attached as Exhibit 35.

[161] This total is the combined estimate of non-calf WNP gray whales in the Sakhalin and Kamchatka feeding areas. This estimate differs, however, from the 320-410 non-calf WNP gray whale abundance estimate for the same feeding areas provided by Cooke et al. (2017) (Cooke, J.G., D.W. Weller, A.L. Bradford, O. Sychenko, A.M. Burdin, A.R. Lang, and R.L. Brownell, Jr. 2017. Population assessment update for Sakhalin gray whales, with reference to stock identify. International Whaling Commission, Scientific Committee, SC/67a/NH/11.). The reason for this discrepancy is unknown. *See* Exhibit M-0075 to Declaration of Jonathan Scordino (May 15, 2019).

[162] Carretta et al *supra* note 36.

[163] According to Urban et al. (2019), as of the winter-spring 2019, 54 WNP gray whales have now been documented in the Mexican lagoons. Urban, J.R., D. Weller, S. A. Martínez, O. Tyurneva, A. Bradford, A. Burdin, A. Lang, S. Swartz, O. Sychenko, L. Viloria-Gómora, and Y. Yakovlev. 2019. New information on the gray whale migratory movements between the western and eastern North Pacific. International Whaling Commission, Scientific Committee, SC/68A/CMP/11 Rev 1. AWI cited to this paper in its direct testimony (AWI referred to it as SC/68A/CMP/12 by mistake) but, at the time, could not provide a copy of the paper as an exhibit due to the IWC Scientific Committee rules. That paper is attached as Exhibit 36. AWI cited two other papers (i.e., Ronzón-Contreras et al. 2019. Gray whales' body condition in Laguna San Ignacio, BCS, Mexico during 2019 winter breeding season, International Whaling Commission,

Bickham testimony at e.g., pg. 18. He cites to the International Whaling Commission and its range-wide review of gray whales in support of his opinion. Such a structure would benefit NMFS's and the Tribe's position, as any take of a WNP gray whale would, according to Dr. Bickham, not be of conservation concern since it would only be a member of a feeding group associated with the much larger ENP gray whale population. *See* Bickham testimony at pg. 27. Despite his claims of two separate WNP stocks, he ultimately concludes that the WNP does constitute a population stock under the MMPA. *See* Bickham testimony at pg. 30. Mr. Scordino agrees with Dr. Bickham's proposed WNP stock structure but concludes that the WBS should remain designated as a population stock under the MMPA, and that the WFG should also be designated as a population stock, at least until more data is collected. Scordino testimony at pg. 101.

59. Such information, regardless of its merit, is irrelevant to the current proceedings and should be disregarded by the ALJ in assessing whether NMFS has met its burden of demonstrating that a waiver is warranted). NMFS has designated the entire WNP gray whale population as a population stock under the MMPA (Carretta et al., 2019b). This designation was first made in 2014 based on the findings of Weller et al. (2013).[164] Furthermore, the WNP gray whale is designated as "endangered" under the ESA (*see* 50 CFR 224.101) with its range identified as "Western North Pacific (Korean) gray whales." This determination for WNP gray whales was made in 1994 at the same time that ENP gray whales were delisted from the ESA (59

Scientific Committee, SC/68A/CMP/13 and Martinez-Aguilar, S., E. Mariano-Meléndez, N. López-Paz, F. Castillo-Romero, G.A. Zaragoza-Aguilar, F. Castillo-Romero, J. Rivera-Rodriguez, S. Swartz, L. Viloria-Gómora, and J.R. Urbán. 2019. Gray Whale (*Eschrichtius robustus*) stranding records in Mexico during the winter breeding season in 2019. International Whaling Commission, Scientific Committee, SC/68A/CMP/14) in its direct testimony that it also, at that time, was not able to provide to the ALJ for the same reasons. Those papers are submitted with this testimony as Exhibits 37 and 38.

[164] Weller et al *supra* note 48.

Fed. Reg. 31094). Regardless of any scientific evidence and despite any concurrence by the IWC Scientific Committee to the suggestion of a two-stock WNP structure including a WFG, the WNP gray whales are already designated as a population stock and listed as endangered by NMFS. Until these designations change, there is no basis for raising this in the context of this MMPA proceeding.

60. Furthermore, since the Makah Tribe has only applied for an MMPA waiver for the ENP gray whale population, the ALJ does not have to determine if NMFS has met its burden to issue a waiver for the WNP stock. Nevertheless, the ALJ needs to consider the WNP stock in the context of the proposed rules and the sufficiency of the rules to reduce the risks to WNP gray whales that are likely to occur as a result of any waiver issue that would permit a hunt of ENP gray whales. When viewed in this context, the proposed rules are insufficient and the risk analysis by Moore and Weller (2018), as discussed in both the Moore and Weller declarations, is out-of-date and insufficient to support a finding that the proposed waiver and hunt will not pose a risk to the WNP stock.

61. While consideration of the WNP stock structure is not relevant to these proceedings, consideration of the potential impact of a waiver (if issued), and the impacts of the proposed hunt (if permitted) on WNP gray whales is relevant. As noted, Carretta et al (2019b) reported that the current population abundance estimate for WNP gray whales is 290 (271 to 311). This is far higher than the WNP population abundance (non-calves) reported by Bettridge – 140 (Bettridge declaration at ¶ 22), Weller – 200 (Weller declaration at ¶ 36), Moore – 200 (Moore Declaration at ¶ 14a), and in the Proposed Rules – 200 (84 Fed. Reg. 13607). Carretta et al. (2019b) indicate that the WNP abundance estimate has increased from 155 in 2012 to 290 in

2016.[165] While this rate of increase (XXX percent annually) is biologically impossible, the new abundance estimate (which combines estimated non-calf gray whales counts from the Sakhalin and Kamchatka regions in Russia) is based on new analysis of all WNP photo-id data from 1994-1995 and 1997-2016 (Cooke 2017).[166]

62. If the current abundance estimate of WNP gray whales is 290 animals, then the risk analysis prepared by Moore and Weller (2018)[167] to examine the impact of a proposed Makah gray whale hunt on WNP gray whales is out-of-date. Furthermore, the risk analysis conducted by Moore and Weller (2018) rely on 37 percent of WNP gray whales migrating to the ENP during the winter. This is the lowest percentage of migrating WNP gray whales suggested by Cooke (2015)[168] who indicated that 37 to 100 percent of WNP gray whales could migrate to the ENP annually. It is unclear why Moore and Weller (2018) did not evaluate the potential for 100 percent of WNP gray whales to migrate to the ENP each winter which would have provide a more conservative evaluation of risk by assuming that the entire population could be potentially subject to harassment or lethal take if a hunt is authorized.

63. More importantly, such a revision should also ensure that a temporal factor is built into the analysis to calculate risk that an even-year hunt could take a WNP gray whale if any WNP gray whales shortstop their south or northbound migration to feed in the Makah U&A.

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[165] Carretta et al *supra* note 36 at 169 citing Cooke (2017) (see *supra* note 131).
[166] Cooke *supra* note 131.
[167] Moore, J.E., and D. W. Weller. 2018. Updated estimates of the probability of striking a western North Pacific gray whale during the proposed Makah hunt. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-SWFSC-605. Included as Exhibit 4-8 to the Moore Declaration. *See* Exhibit 4-8 to Declaration of Dr. Jeffrey Moore.
[168] Cooke, J.G. 2015. Implications of observed whale movements on the relationship between the Sakhalin gray whale feeding aggregation and putative breeding stocks of the gray whale. Paper SC/A15/GW02 presented to the Second Workshop on the Rangewide Review of the Population Structure and Status of North Pacific Gray Whales, 1-3 April 2015, La Jolla, CA, USA. *See* Exhibit M-0071 to Declaration of Jonathan Scordino (May 15, 2019).

The current risk analysis (Moore and Weller, 2018) and as described in the Weller and Moore declarations does not include a parameter to evaluate risk if a WNP gray whale stops to feed or otherwise lingers in the Makah U&A versus migrating directly through the hunt area. As noted in the COSEWIC Assessment, six gray whales, who were photographed in both Sakhalin and British Columbia (three of which originally identified at Sakhalin as first-year calves with their mothers) "were sighted off Vancouver Island in an area where some whales tend to linger and feed during the northbound migration" (Darling et al. 1998[169]; Weller et al. 2012[170]).[171] Considering the distance that WNP gray whales must migrate from the Mexican lagoons to Russia to return to their summer feeding area, it may be "advantageous" to "spend time feeding in the Pacific Northwest (e.g., Vancouver Island) prior to undertaking a westerly passage to Sakhalin" (Weller et al. 2012[172]).[173] If WNP gray whales are feeding off of Vancouver Island in Canada, it is illogical to think that they could not feed within the Makah U&A. These two examples demonstrate that some WNP gray whales may temporarily short stop their migration, particularly their northbound migration, to feed. If they were to do so within the Makah U&A from December 1 to May 31 of the following year during an even year hunt, the more time they are in the Makah U&A the greater the likelihood that they would be susceptible to a take.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing statements are true and correct to the best of my knowledge, information, and belief.

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[169] Darling et al *supra* note 125.
[170] Weller, D.W., A. Klimek, A.L. Bradford, J. Calambokidis, A.R. Lang, B. Gisborne, A.M. Burdin, W. Szaniszlo, J. Urbán, A. Gómez-Gallardo Unzueta, S. Swartz, and R.L. Brownell Jr. 2012. Movements of gray whales between the western and eastern North Pacific. Endangered Species Research 18:193-199. *See* Exhibit 3-57 to Declaration of Dr. David Weller (April 1, 2019).
[171] COSEWIC Assessment *supra* note 23 at 15.
[172] Weller et al. supra note 170.
[173] COSEWIC Assessment *supra* note 8 at 15.

Executed this 6th day of August, 2019.

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Donald (DJ) Schubert