

Response to Expand PMNM Scientific Talking Points

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<p>Papahānaumokuākea Marine National Monument (PMNM) expansion from 50 miles to the 200 mile EEZ line adds 485,507 mi² to the current 139,818 mi² existing area. This increase the protected area 5 fold to 625,325 mi² making it the world’s largest marine protected area (MPA)</p>	<p>This is correct, but is not a scientific talking point.</p>
<p>Only 2% of oceans are currently strongly protected, far short of 30% recommendation by for legacy resource availability for future generations (1)</p>	<p>Define “strongly protected,” as MSA and other federal laws (ESA, MMPA, NEPA, NHPA) provide strong protection. The citation (1) by O’Leary et al 2016, is an article financed by Pew. This citation states that their <i>“findings do not represent explicit recommendations for what global targets should be but rather offer perspective on political targets.”</i></p> <p>This is clearly a disproportionate conservation burden for Hawaii. Why would Hawaii sacrifice the sustainable use of its pelagic resources for the whole United States to achieve the 30% goal and for a mere 0.3% increase in the international target? This clearly violates the tenets of conservation equity.</p>
<p>The NWHI have the highest density of ocean predators in the world</p> <ul style="list-style-type: none"> • Sharks thrive in NWHI, area keystone species in decline, and whose protection is required for a functioning reef system (2) • Data shows sharks travel well beyond 50nm PMNM boundary, and expansion is needed as a buffer for their protection (3)(4) • Commercial fishing bycatch in NWHI is one shark for every two bigeye tuna 	<ul style="list-style-type: none"> • Define “functioning reef system” and how many sharks, where, and which ones are needed. The citation for this point (2) is for reef sharks (which are protected within the existing monument boundary). • Some species of sharks are highly migratory and do not limit themselves to only 200 miles, and would be exposed to potentially greater fishing effort outside the EEZ; the citation for this bullet point (3) refers to tiger sharks, and includes locations outside the EEZ as well as within the expansion area. • 95% of sharks are released alive

	(NOAA)
<p>NWHI is largest repository of seabirds in the world and global populations have declined by 70% since 1950 (5)</p> <ul style="list-style-type: none"> • GPS satellite tracking shows foraging range outside current PMNM boundaries 	<p>The decline is global and not in the NWHI; The Hawaii longline fishery pioneered seabird mitigation measures in 2002 to reduce interactions with Laysan and black-footed albatrosses. As a result of these measures, sea bird interactions were reduced by 70-90 percent^{i,ii}). These two species of albatrosses have stable or increasing populationsⁱⁱⁱ.</p> <ul style="list-style-type: none"> • GPS satellite tracking shows most of the foraging range outside of the 200 mile EEZ, making these seabirds potentially susceptible to potentially increased fishing effort
<p>MHI have highest rate of endemism in the world at 23%, while endemism in NWHI increases to 46% (6)</p> <ul style="list-style-type: none"> • Surveyed areas around Kure Atoll within PMNM show 100% endemism at depths of 100m 	<p>The “deep coral reefs” described here are more widely known as mesophotic coral ecosystems (MCEs). MCEs are considered deeper extensions of coral reef ecosystems found at 30 to 150m depths. Whereas it is true that Kane and colleagues showed that there is high endemism of MCE associated fishes, claiming this to be the highest in the world is rather a stretch^{iv}. The authors themselves specifically highlighted that “the study only surveyed slopes, ledges, or other distinguishing reef fish habitat features at depths between 30 and 90 m, and therefore the endemism estimates are not comparable to other fish habitat types at the same depths”. This means that their estimates only apply to a similar habitat type at that depth range. Reefs within the PMNM do not demonstrate the scientific interest of the expansion area.</p>
<p>World’s oldest living animal, a black coral, found in the NWHI is 4265 years old (8)</p> <ul style="list-style-type: none"> • Underwater seamounts rise up more than 14,000 ft from bottom of ocean, many seamounts extremely high in biodiversity and largely undocumented 	<p>The black coral is <i>Leiopathes</i>, which is not harvested for jewelry in Hawaii. The specimens dated in (8) were harvested from Makapuu and Lanikai deep-sea coral (DSC) beds (Oahu, HI), Keahole Point DSC bed (Big Island, HI), and Cross Seamount (18°40’N, 158°10’W), not within the proposed expansion area. From 8: <i>Leiopathes</i> “has been found south of Australia and throughout the equatorial and northwest Pacific,” not only in</p>

	<p>the Hawaiian Islands.</p> <ul style="list-style-type: none"> • The average depth in the proposed monument expansion is 4,882 m. While seamounts comprise the shallower area in the potential expansion area, biological productivity is much higher on seamounts that are 1,000 m or shallower. These constitute only 0.1% of the area. While it may be true that there is potential for scientific discoveries at unexplored seamounts, these explorations can occur now, and in fact with less bureaucracy than if the monument was expanded. Bottom line: monument expansion is not necessary to study biodiversity and endemism on seamounts, and in fact may hinder it.
<p>PMNM expansion lies in the temperate zone, not tropics, and spans more than 1200 miles</p> <ul style="list-style-type: none"> • Climate change and bleaching are happening worldwide, but in temperate zone a temperature increase over time will actually make a better coral habitat • Adult corals are sessile but reproduce by mobile larvae, and mapping of larvae in NWHI (9) shows larvae spend much of their time in expansion area before recruiting back to coral reefs nearshore • Future of coral reefs dependent on recruitment of genetically diverse larvae back to new areas within NWHI • The bigger the protected area, the more genetic diversity, chances of extinction are minimized 	<ul style="list-style-type: none"> • The implementation of an expanded NWHI monument will have absolutely no impact on climate change and biodiversity. The Hawaii longline fishery fishes in the epi-pelagic and meso-pelagic layer of the water column catching a range of pelagic predatory fish. Removal of this fishery will not slow the effects of ocean acidification, protect large expanses of reefs nor maintain the biodiversity needed to buffer or ameliorate the effects of ocean acidification. • Studies have shown for 4 species of coral investigated that there is a high initial rates of mortality then a constant rate and progressively will increase after 100 days. Mortality of larvae will increase once the energy reserves are consumed after 100 days^v; • Not all larvae are equal and they differed depending on the day they were released. Proponents assume that all larvae utilize the area outside the monument boundary^{vi} • Tracking study of coral larvae showed strong larval aggregation associated with front, slicks, oceanographic

	<p>features found in proximity to islands, reefs and coastal headlands^{vii}. These areas are well within the existing monument boundaries</p> <ul style="list-style-type: none"> • The studies cited in the Pu‘uhonua document in support of this and similar statements focus on nearshore coral reef ecosystems, which are already protected within the existing 50 nm monument boundary. These studies focusing on coral reefs cannot be generalized to pelagic environments in the 50-200 nm potential expansion area. Further, the Pu‘uhonua document provides no evidence that large MPAs provide climate resilience in pelagic environments. Recent mass bleaching events in MPAs such as the Great Barrier Reef suggest that MPAs do not sufficiently protect marine environments from climate change impacts. • The citation (9) on larvae says that the dispersal is very limited and makes an assumption of the pelagic larvae duration, and not the location. Moreover the study (9) clearly shows that larval flow is predominantly from the MHI to the NWHI, and that the MHI cannot expect any substantial subsidy (i.e. spillover and recruitment) from the NWHI
<p>Reduced traffic to PMNM reduces exposure of noise pollution which affects marine mammals, fishes, and larval recruitment, as well as reduces potential for invasive species introduction</p>	<p>The only reduction in vessel traffic would be fishing vessels, a relatively minor component of ocean noise compared to the military exercises and ship traffic in the area.</p> <p>The potential for invasive species introduction is a concern but is not alleviated by the expansion of a monument because the vectors for introduction (military, shipping, foreign vessel traffic) will continue under expansion.</p>
<p>Female fish that are older and of larger size produce a higher number, and a higher quality</p>	<p>This citation refers to North Atlantic bluefin tuna, a species not found in Hawaii. While a</p>

<p>of eggs (10)</p>	<p>Bagland 1976 study suggests that fecundity of bluefin increases with size^{viii}, (10) is a tagging study that investigates migration patterns, mixing rates, spawning areas, and stock structure of the North Atlantic bluefin tuna species only, not fecundity or egg quality of females.</p>
<p>Marine Protected Areas (MPAs) deliver substantial new economic benefits</p> <ul style="list-style-type: none"> • Numerous studies show that social and economic benefits of establishing and operating MPAs sizably exceed their costs, from 3:1 for 10% protection, up to 20:1 for 30% protection (11) 	<ul style="list-style-type: none"> • We are unaware of demonstrated economic benefits for the existing monument. This may be true for areas that are easily accessible by ecotourists, which is not the case for the proposed expansion area. • Although marine protected areas (MPAs) are widely used as a management tool for small-scale insular areas, applicability of this approach to a large open ocean habitat has yet to be demonstrated. Scale, remoteness, and consistency of protection are all factors that affect enforcement which has yet to be proven effective in the existing monument. It is presumptuous to claim that by expanding the current boundaries, management of the area (including all the components required for effective area based management) will improve. • It is premature to assume that a large ocean MPA will be effective in conserving highly migratory species. One of the stocks mentioned that would benefit from the expansion is the tuna which is a pan-pacific stock. Even if a stock is overfished, MPA implementation may not improve overall stock abundance or increase harvest unless catch is simultaneously reduced in the areas outside the MPA. • There is an implicit assumption that is the open ocean environment has a static nature, of the open ocean environment which is inaccurate. While traditional designs are effective in static habitats, many important pelagic habitats are neither fixed nor predictable. Thus,

	<p>pelagic protected areas will require dynamic boundaries and extensive buffers. In addition, the protection of far-ranging pelagic vertebrates will require dynamic MPAs defined by the extent and location of large-scale oceanographic features.</p> <ul style="list-style-type: none"> • In any protected area design, the ecological boundaries must be considered in order for it to be effective. Identifying ecological boundaries in large open ocean environment is difficult given its dynamic nature and the constantly changing oceanographic conditions. • The use of MPAs for highly migratory species in an open ocean context through the expansion has 4 out of 5 shortcomings identified by Agardy and colleagues: inappropriately planned or managed MPAs; MPAs that fail due to the degradation of the unprotected surrounding ecosystems; MPAs that do more harm than good due to displacement and unintended consequences of management; and MPAs that create a dangerous illusion of protection when in fact no protection is occurring.
<p>Hawaii fisheries will likely be unaffected by expansion of PMNM</p> <ul style="list-style-type: none"> • The area under consideration for expansion is not a major fishing ground according to data from NOAA. Historically, less than 10% of the fleet's landings have been caught in this area, dipping down to 5% of total landings in 2014. Meanwhile, approximately 70% of the catch (79% in 2014) has historically been caught entirely outside of the EEZ • Hawaii longline catch quotas are set by Western Central Pacific Fisheries Commission, so PMNM expansion will not reduce catch 	<ul style="list-style-type: none"> • A fishing ground that provides up to 10% of catch is a major fishing ground. Longline fisheries follow the fish and in some years the best fishing has been in the NWHI. • Monument expansion would displace Hawaii longline vessels to the high seas where they would face competition from foreign vessels and increased operating costs to access fishing grounds farther from Hawaii. • Removing the Hawaii fishing vessels from the US EEZ around the NWHI would reduce the 'eyes on the water' that provide additional monitoring of illegal foreign fishing.

	<ul style="list-style-type: none">• The longer trips could reduce seafood quality for Hawaii consumers. Monument expansion would displace small longline fishing vessels and concentrate them into the EEZ around the main Hawaiian Islands.• Further, there may be increased importation of fish from countries have Illegal Unreported and Unregulated (IUU) fishing such as China and slave fishing such as Thailand and Indonesia, including illicit sex and incarceration. This also includes the adulteration of tuna with Carbon monoxide to maintain the appearance of freshness.• There is no analysis or data to support the statement that the Hawaii longline fishery will not be impacted by Monument expansion. Whether or not the Hawaii longline quotas are set by the WCPFC has no bearing on closing access to fish in the NWHI. Further, the fleet is a mix of small (50ft) to large (90ft) vessels. The larger vessels can range further offshore, while smaller vessels need access to fishing grounds nearer to Hawaii. Closing the NWHI will thus remove access for the smaller vessels in the fleet and restrict them to the US EEZ around the Main Hawaiian Islands or to fish offshore on the high seas with the safety at sea issues that this entails.• The fact that effort can shift out of the NWHI is indicative that the expanded closure will have no impact on highly mobile tuna stocks, which will move beyond the closure boundary to be caught by Hawaii and Asian longline fleets. Indeed, the Hawaii fleet may have to work harder to compete with the Asian fleets, whereas it is protected by the US EEZ around the NWHI and MHI. Moreover, major closures on the high seas have already been tested by the WCPFC and did not result in
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	reductions to bigeye fishing mortality.
Areas within expansion area highlighted as potential sites for future deep sea mining (12)	The Prime Ferromanganese Crust Zone of the Central Pacific does extend through areas of the proposed expansion (12). Deep water mining leases within the EEZ and associated permits must undergo a rigorous federal environmental review process under existing requirements.

ⁱ Gilman E, Brothers N, Kobayashi DR. 2007. Comparison of three seabird bycatch avoidance methods in Hawaii-based pelagic longline fisheries. *Fisheries Science* 73(1):208-210.

ⁱⁱ Van Fossen L. 2007. Annual report on seabird interactions and mitigation efforts in the Hawaii longline fishery for 2006. Honolulu: National Marine Fisheries Service, Pacific Islands Regional Office.

ⁱⁱⁱ Arata, J.A., P.R. Sievert, and M.B. Naughton. 2009. Status assessment of Laysan and black-footed albatrosses, North Pacific Ocean, 1923–2005: U.S. Geological Survey Scientific Investigations Report 2009-5131, 80 pages.

^{iv} Kane, Corinne, Randall K. Kosaki, and Daniel Wagner. 2014. High levels of mesophotic reef fish endemism in the Northwestern Hawaiian Islands. *Bulletin of Marine Science* 90.2: 693-703.

^v Graham, E. M., A. H. Baird, and S. R. Connolly. "Survival dynamics of scleractinian coral larvae and implications for dispersal." *Coral reefs* 27.3 (2008): 529-539.

^{vi} Edmunds, P., R. Gates, and D. Gleason. "The biology of larvae from the reef coral *Porites astreoides*, and their response to temperature disturbances." *Marine Biology* 139.5 (2001): 981-989

^{vii} Willis, Bette L., and James K. Oliver. "Direct tracking of coral larvae: implications for dispersal studies of planktonic larvae in topographically complex environments." *Ophelia* 32.1-2 (1990): 145-162.

^{viii} Baglin, R. 1976. A preliminary study of the gonadal development and fecundity of the western Atlantic bluefin tuna. *Int. Comm. Conserv. Atl. Tunas, Coll. Vol. Sci. Pap.* 5(2): 279–289.