Submitted via https://www.regulations.gov/document?D=NOAA-NMFS-2016-0041-0006

August 25, 2017

Ms. Chelsey Young
NMFS Office of Protected Resources (F/PR3)
1315 East-West Highway
Silver Spring, MD 20910

Re: Proposed Endangered Listing Determination for the Taiwanese Humpback Dolphin Under the Endangered Species Act

Dear Ms. Young:

On behalf of the Center for Biological Diversity (the Center), Animal Welfare Institute (AWI), and WildEarth Guardians (Guardians), we submit the following comments on the proposal by the National Marine Fisheries Service (NMFS) to list the Taiwanese humpback dolphin (*Sousa chinensis taiwanensis*) as an endangered species under the Endangered Species Act (ESA) (82 FR 28802).

The March 2016 petition submitted by AWI, the Center, and Guardians sought an endangered or threatened designation for this distinct and isolated subspecies. The best available scientific and commercial information, including the draft status review report (Whittaker & Young 2017), shows that the Taiwanese humpback dolphin is currently at high risk of extinction throughout its limited range and warrants listing as an endangered species. We strongly support this proposal and urge NMFS to quickly finalize the proposal and formally list this critically imperiled species as endangered under the ESA.

Here we discuss new scientific and commercial information that further supports our original petition and adds additional information to the species status review and to the proposed rule that should be included in the final listing determination. The best scientific and commercial evidence clearly shows that the Taiwanese humpback dolphin is at extremely high risk of extinction. This unique subspecies is threatened by all of the five ESA listing factors (*i.e.*, the present or threatened destruction, modification, or curtailment of habitat or range; overutilization for commercial, recreational, scientific, or educational purposes; disease or predation; inadequacy of existing regulatory mechanisms; and any other natural or manmade factors affecting the species' existence).

The Taiwanese humpback dolphin is critically endangered due to multiple threats of anthropogenic origin (Whittaker & Young 2017). Studies show that these threats are widespread across the subspecies' range and are forecast to worsen in the near future, increasing the subspecies' extinction risk (Whittaker & Young 2017). Among the more concerning threats to the survival and recovery of this very small population are human activities associated with coastal development and fishing (Chen et al. 2017b; Wang & Araújo-Wang 2017; Wang et al. 2017). Because the Taiwanese humpback dolphin is a coastal species with a very small home range and is often associated with estuaries, it is especially susceptible to these anthropogenic threats.

Underwater noise from coastal and energy development

Taiwanese humpback dolphins are exposed to relatively high underwater noise levels across the heavily developed west coast of Taiwan that can be physically harmful and significantly affect individual behavior. Noise from percussive pile driving from coastal land reclamation projects, dock and sea wall construction, construction of foundation piles for wind turbines, and vessel traffic are characterized by high sound pressure levels that directly harm these dolphins (Wang et al. 2016; Chen et al. 2017a, 2017b). The near-future underwater pile driving and other activities associated with wind farm construction along the northwestern coast of Taiwan will undoubtedly change the already impacted soundscape for the Taiwanese humpback dolphin (Chen et al. 2017a). Intense noise from pile driving can cause temporary and permanent hearing threshold shifts and behavioral changes in dolphins (Kastelein et al. 2015; Graham et al. 2017). In addition, background noise from impulsive and non-impulsive sources can lead to acoustic masking that can affect communication among individuals and disrupt foraging by masking echolocation signals in dolphin and porpoises, including Taiwanese humpback dolphins (Chen et al. 2017a; Graham et al. 2017). Several offshore wind farms along the northwestern coast of Taiwan are already proposed and construction has begun for at least two (Chen et al. 2017b, 2017a). Unfortunately, only two studies have measured in-situ noise pressure levels from these types of activities to inform site-specific environmental impact analyses (Chen et al. 2017a, 2017b).

It is widely recognized that intense and chronic exposure to noise can cause temporary or permanent hearing threshold shifts and physiological stress in dolphins (Mooney et al. 2009; Pirotta et al. 2015). Temporary threshold shift (TTS) is the temporary (often recoverable) reduction of hearing sensitivity, while permanent threshold shift (PTS) is the permanent and non-recoverable reduction of hearing sensitivity at certain frequencies after noise exposure (NMFS 2016). In the updated technical guidance for assessing the effects of anthropogenic sound on marine mammal hearing, NMFS identified a sound exposure level (SEL) of 178 dB re 1 μPa^2-s and a peak sound pressure level (SPL_{pk}) of 224 dB re 1 µPa as an underwater acoustic threshold for TTS for mid frequency cetaceans such as humpback dolphins (NMFS 2016). In addition, NMFS determined that a PTS for mid-frequency cetaceans may occur above 185 dB re 1 μPa^2-s (SEL) (230 dB re 1 µPa (SPL_{pk})) for impulsive and 198 dB re 1 μPa^2-s (SEL) for non-impulsive sounds (NMFS 2016). However, these are average thresholds, and the Taiwanese humpback dolphins could be more sensitive to noise than other mid-frequency cetaceans due to their shallower habitat preferences and restricted distribution (Chen et al. 2017b; Dares et al. 2017).

Specific management recommendations have already been developed to prevent the harmful effects of pile driving noise on this critically endangered subspecies. For example, Chen et al. (2017b) assessed the noise impacts on Taiwanese humpback dolphin from pile driving during the foundation construction of the first two wind turbines off the coast of Miaioli, Taiwan in 2016. The study found that the sound pressure level from pile driving in this project was less than 180 dB re 1 μPa^2-s (SEL) (< 190 dB dB re 1 µPa (SPL_{pk})) beyond 750 m from the noise source (Chen et al. 2017b). As mentioned above, NMFS determined that 178 dB is the underwater acoustic threshold for temporary threshold shifts for mid frequency cetaceans such as humpback dolphins. Based on these thresholds, the study recommended an exclusion zone of at least 750 m radius from pile driving project locations and the peak sound pressure level (SPL_{pk}) not to exceed 190-220 dB re 1µPa because this distance and exposure is unlikely to cause PTS in the Taiwanese humpback dolphin (Chen et al. 2017b, 2017a) based on the marine hearing impact guidance (NMFS 2016). An analysis has also suggested that

TTS can occur within the 750 m zone if animals remain within the area for hours (Chen et al. 2017a). This same study showed that at a distance of 1500 m from the noise source, modeled SPL was estimated to be at 158 dB re 1 μPa, which is below the threshold NMFS considers for significantly behavioral disturbance (160 dB re 1 μPa) for mid-frequency cetaceans such as humpback dolphins (Chen et al. 2017a). Thus, to evaluate potential behavioral disturbances of these subspecies, the authors also recommended an observation zone and passive acoustic monitoring for marine mammals that extends 1500 m from the noise source (Chen et al. 2017b).

These recommendations are extremely important since humpback dolphins use coastal habitats off the coast of Miaoli and Changhua, sites selected for construction of wind farms that include the installation of 34 (Miaoli) and 28 (Changhua) offshore wind turbines before 2020 (Chen et al. 2017a). An expert workshop held in April 2017, in which Naomi Rose of AWI participated, actually recommended a highly precautionary approach (more so than that found in Chen et al. 2017a & 2017b) to developing offshore wind farms in Taiwanese humpback dolphin habitat, which we support. This approach includes locating wind turbines away from areas where dolphins are found; using engineering practices that are "better-than-best" at reducing noise and disturbance during the construction; and reducing the threat of fisheries interactions now and during wind farm construction and operation, since construction may exacerbate the impact of fisheries by displacing fishing vessels inshore (into dolphin habitat), increasing the risk of entanglement.

Fishing related impacts

Taiwanese humpback dolphins are directly affected by fisheries through bycatch and entanglement in fishing gear (Ross et al. 2010; Dungan et al. 2011; Slooten et al. 2013; Wang et al. 2017). Fishing-related impacts on the Taiwanese humpback dolphin are the most direct and immediate threat compared with other threats such as noise, habitat degradation, pollution, and lack of regulatory mechanisms (Wang et al. 2017). New studies show that interactions with fishing gear are prevalent with lethal consequences for this critically endangered humpback dolphin subspecies and thus unsustainable for the population (Wang & Araújo-Wang 2017; Wang et al. 2017).

Taiwanese humpback dolphins likely have the highest proportion of human-induced injuries for any small cetacean species (Wang et al. 2017). For example, a long-term photo-identification program on this subspecies determined that approximately 58% of individuals showed signs of human-caused injuries that could impact individual health condition, reproduction success, and survivorship, and thus, population growth (Wang et al. 2017). As discussed in the species status review and listing proposal, entanglement and mutilation caused by interactions with fishing gear directly harm individuals in the population and increase the extinction risk of the subspecies (Whittaker & Young 2017). Given the small population size and the potential impacts of removing even one individual (Araújo et al. 2014; Karczmarski et al. 2017), injury, entanglement, and mortality of Taiwanese humpback dolphins associated with fishery interactions is highly concerning and considerably increases extinction risk for this subspecies (Wang et al. 2017).

Injuries from fishing gear and vessel strikes are highly prevalent in the Taiwanese humpback dolphin population, especially in older individuals (Wang et al. 2017). Multiple injuries are observed more often in older than younger individuals, as the former have had more time to

accumulate injuries through the years (Wang et al. 2017). Older individuals could also be more susceptible to entanglement in fishing gear because accumulated scars (e.g., cuts, depressions) can be snagging points for fishing lines and nets. In addition, juveniles may show less prevalence of scars and fishing-gear interactions because mortality may have already eliminated a large proportion of this class and thus fishing interactions may have gone unnoticed (Wang et al. 2017). In fact, the lower-than-expected prevalence of head injuries on juveniles in comparison with adults indicates that juvenile mortality may be underestimated (Wang et al. 2017). If this is the case, higher juvenile mortality decreases population growth and increases extinction risk for the subspecies.

Mortality and injury from fishery interactions may be underreported and thus this threat could be grossly underestimated. Fatal injuries may go undetected, as these individuals likely sink after death or drift away from the Taiwan Strait, since they are rarely found stranded in coastal areas of the Eastern Taiwan Strait (Slooten et al. 2013; Wang et al. 2017). Furthermore, because Taiwanese humpback dolphins are legally protected in Taiwan, fishermen may be unlikely to report fishery interactions to prevent penalties and legal actions (Wang & Araújo-Wang 2017). In addition, ventral-section injuries, healed injuries, or relative small abrasions and cuts from fishing gear are difficult to detect from photographs or in-situ observations and thus they are often underestimated (Wang et al. 2017).

Long-term photographic identification monitoring programs can be crucial to identifying animals with signs of fishery interactions such as scars, mutilations, and injuries, and thus determining the actual impact level of this threat (Wang et al. 2015; Wang & Araújo-Wang 2017; Wang et al. 2017). This monitoring is particularly important because dead animals with signs of fishing impact have been difficult to detect across Taiwan's coastal waters (Wang et al. 2017). Given the several thousands of vessels that use gillnets and trammel nets in waters inhabited by humpback dolphins along the west coast of Taiwan (Slooten et al. 2013), it is highly likely that fishery interactions are frequently unreported and thus the problem may be worse than previously thought. Fortunately, among all the threats that this subspecies faces (e.g., pollution, noise, habitat degradation), fisheries impact is perhaps the easiest to understand and mitigate, since concrete actions can be established to reduce fishery interactions (Wang & Araújo-Wang 2017).

Modeling predicts local extinction as population declines and threats continue

The Taiwanese humpback dolphin needs stronger protection because extinction is imminent under current conditions. As the species status review and listing proposal discussed, population models for this subspecies predicted that local extinction is highly possible as the population continues to decline and threats remain unmanaged (Whittaker & Young 2017). The estimated maximum number of Taiwanese humpback dolphin individuals that can be removed from the population without depleting it (i.e., Potential Biological Removal (PBR)) is one individual every seven to eight years (Slooten et al. 2013). If adult females are removed, then the extinction risk considerably increases (Araújo et al. 2014). It is likely that current mortality rates are unsustainable based on fishing-related injuries (Wang et al. 2017).

Population viability analyses, using different scenarios of bycatch mortality and habitat degradation, similar to current conditions, predicted a considerable decrease in population growth rate (in more than 76% of models), reaching one individual in less than 100 years (in 66% of models) (Araújo et al. 2014). In fact, population viability analyses using individual-

based models shows that the Taiwanese humpback dolphin may exhibit drastic population decline (>80%) within three generations under current conditions (Huang et al. 2014). Furthermore, extinction risk substantially increased when threats such as habitat loss were incorporated in the models (Huang et al. 2014).

These modeling studies suggested that habitat destruction—such as fragmentation and modification of coastal environments—may be the greatest threat to population growth and potential for recovery. However, direct and measurable impacts related to fishing activities have shown that injuries are prevalent and mortality may be underestimated. Therefore, fishing-related mortalities may be more important than previously thought (Wang & Araújo-Wang 2017; Wang et al. 2017). In any case, immediate actions are urgently needed to reduce impacts from local fisheries and to address other major threats that contribute to extinction risk.

Concrete actions are required to save the Taiwanese humpback dolphin from extinction

Several management regulations should be enforced to increase protection and facilitate population recovery of this subspecies, including but not limited to:

- Prohibiting the use of gillnets and trammel nets in nearshore waters;
- Rigorously enforcing the pre-existing ban on trawling within 3 nm of shore;
- Avoiding habitat fragmentation and coastal development that directly impacts the dolphins' preferred habitat;
- Establishing science-based exclusion zones around coastal and offshore development projects to protect the subspecies for temporary and permanent threshold shifts and displacement from important habitat;
- Limiting tourism focused on humpback dolphin-watching to shore-based platforms;
- Disclosing pollutant concentrations and other environmental data;
- Compensating affected fishers and supporting those transitioning to more wildlife-friendly fisheries or livelihoods.

The Taiwanese humpback dolphin requires stronger legal protection

Despite efforts by local and international groups, and scientists advocating for immediate conservation actions, there have been no real governmental efforts to mitigate existing threats and some of these threats have worsened over time. For example, the Taiwanese humpback dolphin is listed as a Level One Protected Species under Taiwan's Wildlife Conservation Act, which provides a legal framework for the delineation and management of species-specific "important habitat" and for related designation of "habitat refuges." However, as discussed in the petition and the species status review, enforcement of the law is ineffective (Wang et al. 2016). A conservation action plan was published 10 years ago, which began with a formal declaration of important habitat by the government (Wang et al. 2007). But this plan has proven to be ineffective in preventing population decline or reducing the magnitude of ongoing threats. No concrete governmental policies to mitigate existing threats have been realized.

Conclusion

Without protection, the Taiwanese humpback dolphin will certainly go extinct. Thus, the Center, AWI, and Guardians strongly support a comprehensive species protection plan, which includes the benefits that will accrue to the subspecies' conservation through a listing under the ESA. Therefore, we urge NMFS to list the Taiwanese humpback dolphin as endangered under the ESA. NMFS should work closely with the Taiwanese government and local agencies to facilitate species recovery. Listing the Taiwanese humpback dolphin under the ESA should increase collaboration between US and local scientists and managers, as well as leverage resources needed to protect this rapidly disappearing subspecies. There is no doubt that the Taiwanese humpback dolphin meets all the requirements to be listed as endangered under the ESA. This proposed listing would convey a strong conservation message internationally and help prevent the extinction of this imperiled species. Taiwan, with the support of NMFS, should do everything possible to help in the recovery of this endemic and charismatic dolphin, to prevent the extinction fate that other critically endangered small cetacean species of the world, such as the vaquita and baiji, have faced.

Thank you for your consideration of our comments.

Sincerely,

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