December 22, 2023

Submitted Electronically

Jolie Harrison, Chief
Permits and Conservation Division
Office of Protected Resources
National Marine Fisheries Service

Dear Jolie Harrison,

The National Marine Fisheries Service (NMFS) has received a request from Pacific Gas & Electric Company (PG&E) seeking authorization for the incidental take of marine mammals during construction related to a sediment remediation project in San Francisco Bay, California.

PG&E is proposing to remediate sediments impacted with polycyclic aromatic hydrocarbons (PAHs) in San Francisco Bay. The construction activities associated with this project that are expected to interfere with marine mammals are vibratory and impact pile driving. Vibratory and impact pile driving cause underwater noise that can negatively impact marine mammals in different ways. PG&E's request is for authorization to incidentally take seven species (eight stocks) of marine mammals by Level B harassment only, as seen in **Table 1**. It was noted that neither PG&E or NMFS expect serious injury or mortality to result from these activities, so there is no request for Level A harassment authorization.

Common Name	Scientific Name	Stock
Bottlenose Dolphin	*Tursiops truncatus*	Coastal California
Harbor Porpoise	*Phocoena phocoena*	San Francisco-Russian River
California Sea Lion	*Zalophus californianus*	United States

Northern Fur Seal	*Callorhinus ursinus*	California, Eastern North Pacific
Steller Sea Lion	*Eumetopias jubatus*	Eastern North Pacific
Harbor Seal	*Phoca vitulina*	California
Northern Elephant Seal	*Mirounga angustirostris*	California Breeding

Table 1: List of marine mammals and respective stocks that are expected to be impacted by construction activities in San Francisco Bay.

[1]

Turtle Island Restoration Network (TIRN) respectfully submits the following comments in regards to the notice to issue an incidental harassment authorization (IHA) to take marine mammals during the specified activities in San Francisco Bay.

1. Despite no authorization request for Level A harassment, harm inflicted upon vulnerable marine mammals during construction activities can lead to long-term disruptions and delayed mortality.

As defined by the Marine Mammal Protection Act (MMPA) [16 U.S.C. § 1362], Level A harassment is any act that injures or has the significant potential to injure a marine mammal or marine mammal stock in the wild, while Level B harassment is any act that disturbs or is likely to disturb a marine mammal or marine mammal stock in the wild by causing disruption of natural behavioral patterns, including, but not limited to, migration, surfacing, nursing, breeding, feeding, or sheltering, to a point where such behavioral patterns are abandoned or significantly altered.[2] While the supplementary information provided details supporting a request for Level B harassment takes of marine mammals, it failed to consider long-term impacts of underwater noise leading to disruptions and delayed mortality.

Marine mammals are especially vulnerable to underwater noise. Impulsive noise associated with activities, including pile driving, can negatively impact marine mammals in several ways. Pile driving is one of the most intense sources of anthropogenic noise within the marine

[1] NMFS, NOAA. Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Pacific Gas & Electric Sediment Remediation Project, San Francisco Bay. Available at https://www.federalregister.gov/documents/2023/11/27/2023-26012/takes-of-marine-mammals-incidental-to-specified-activities-taking-marine-mammals-incidental-to

[2] NOAA Fisheries. Marine Mammal Protection Act. 16 U.S.C. § 1362. Available at https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act

environment.[3] Sudden death or injury can occur as the result of single pulses of sound, while prolonged exposure can lead to serious auditory damage. Exposure to underwater noise can also cause non-fatal disruptions as a result of behavioral changes.[4] Historically, underwater noise has led to mortality events in some species of marine mammals. However, behavioral changes as a result of underwater noise is more commonly observed.[5] Odontocetes, like bottlenose dolphins and harbor porpoises, use echolocation to detect their prey. Underwater noise emitting from pile driving activities has been known to interfere with their ability to catch prey.[6] One study highlighted the behavior of two harbor porpoises exposed to underwater sound from pile driving while hunting. The results of the study indicated that high-amplitude pile driving sounds negatively impacted hunting in harbor porpoises by decreasing the success rate of catch and increasing the abandonment of the hunt.[7] Reducing the ability for marine mammals to effectively hunt inhibits prolonged survival and can lead to delayed mortality. Authorization of Level A harassment takes of marine mammals was not requested, however, due to limitations that may inhibit our ability to fully estimate and understand delayed mortality events resulting from underwater noise, it is important that these events are still considered.

Further research is needed to effectively determine the risks of disruptions and delayed mortality in marine mammals as a result of pile driving activities in San Francisco Bay. Additionally, NMFS must require PG&E to submit a request for authorization of incidental Level A harassment takes of marine mammals as outlined in the MMPA.

2. Further discussions are needed to understand the impact of underwater noise from pile driving on the ecosystem as a whole in San Francisco Bay.

As noted in the supplementary information, different prey species are expected to be displaced as a result of pile driving activity in San Francisco Bay. Underwater noise from pile driving can also change the way fish interact with one another and increase stress.[8] Impulsive noises from

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[3] Bailey, H., Senior, B., Simmons, D., Rusin, J., Picken, G., & Thompson, P. M. (2010). Assessing underwater noise levels during pile-driving at an offshore windfarm and its potential effects on marine mammals. *Marine pollution bulletin*, *60*(6), 888-897.

[4] Thompson, P. M., Graham, I. M., Cheney, B., Barton, T. R., Farcas, A., & Merchant, N. D. (2020). Balancing risks of injury and disturbance to marine mammals when pile driving at offshore windfarms. *Ecological Solutions and Evidence*, *1*(2), e12034.

[5] Forney, K. A., Southall, B. L., Slooten, E., Dawson, S., Read, A. J., Baird, R. W., & Brownell Jr, R. L. (2017). Nowhere to go: noise impact assessments for marine mammal populations with high site fidelity. *Endangered species research*, *32*, 391-413.

[6] Branstetter, B. K., Bowman, V. F., Houser, D. S., Tormey, M., Banks, P., Finneran, J. J., & Jenkins, K. (2018). Effects of vibratory pile driver noise on echolocation and vigilance in bottlenose dolphins (Tursiops truncatus). *The Journal of the Acoustical Society of America*, *143*(1), 429-439.

[7] Kastelein, R. A., Huijser, L. A., Cornelisse, S., Helder-Hoek, L., Jennings, N., & de Jong, C. A. (2019). Effect of pile-driving playback sound level on fish-catching efficiency in harbor porpoises (Phocoena phocoena). *Aquatic Mammals*, *45*(4), 398-410.

[8] Herbert-Read, J. E., Kremer, L., Bruintjes, R., Radford, A. N., & Ioannou, C. C. (2017). Anthropogenic noise pollution from pile-driving disrupts the structure and dynamics of fish shoals. *Proceedings of the Royal Society B: Biological Sciences*, *284*(1863), 20171627.

pile driving activity has even had negative effects on the swim bladders and organs of fish.[9] In the supplementary information, salmon were identified as a prey species in the San Francisco Bay for different species of pinnipeds, including the California Sea Lion.[10] Decades of scientific studies have researched the physiological and behavioral effects of underwater noise on salmon species specifically.

A common injury that different species of salmon have faced as a result of underwater noise from pile driving is barotrauma. Barotrauma occurs when there are swift alterations in gas volume and rapid shifts in gas solubility within the blood and tissues of the fish. This occurs when pressure changes, with solubility increasing as the pressure rises and decreasing as the pressure decreases. Rapid changes in gas states and pressures can cause several complications, including emboli, tissue damage as a result of emboli, and tissue damage caused by the expansion of gas-filled organs. In some cases, gas-filled organs, like the swim bladder, can even rupture, inhibiting the fish's ability to remain buoyant. If these injuries are not immediately fatal, the fish may experience delayed mortality. Some of the most severe impacts of underwater noise can include bubbles in the gills or heart, leading to immediate death.[11]

Severe injury or mortality in fish caused by underwater noise associated with pile driving can change marine mammal predatory behavior and alter trophic cascades. In this case, we can expect to see the impacts of underwater noise transcending up through the trophic cascade and ecological food web in San Francisco Bay. When looking at an ecological food web or trophic cascade, we must also consider other marine species, including invertebrates. Several marine invertebrate species, including octopuses, crabs, and jellyfish, are known to experience different physiological and behavioral responses to underwater noise. Therefore, changes that occur with marine invertebrate populations can make further changes up the food chain. While marine mammals and fish have been observed to return to the areas once pile driving has concluded, the long-term effects of this underwater noise are unknown.[12]

With the entire ecosystem at risk of long-term changes due to underwater noise from pile driving, it is necessary to consider these risks when determining the long-term impact on marine mammals. Therefore, it is imperative that NMFS require PG&E to submit a request for

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[9] Casper, B. M., Smith, M. E., Halvorsen, M. B., Sun, H., Carlson, T. J., & Popper, A. N. (2013). Effects of exposure to pile driving sounds on fish inner ear tissues. *Comparative Biochemistry and Physiology Part A: Molecular & Integrative Physiology*, *166*(2), 352-360.

[10] NMFS, NOAA. Takes of Marine Mammals Incidental to Specified Activities; Taking Marine Mammals Incidental to Pacific Gas & Electric Sediment Remediation Project, San Francisco Bay. Available at https://www.federalregister.gov/documents/2023/11/27/2023-26012/takes-of-marine-mammals-incidental-to-specified-activities-taking-marine-mammals-incidental-to

[11] Halvorsen, M. B., Casper, B. M., Woodley, C. M., Carlson, T. J., & Popper, A. N. (2012). Threshold for onset of injury in Chinook salmon from exposure to impulsive pile driving sounds. *PLoS One*, *7*(6), e38968.

[12] Slabbekoorn, H. (2019). Noise pollution. *Current Biology*, *29*(19), R957-R960.

authorization of incidental Level A harassment takes of marine mammals as outlined in the MMPA.

Thank you for your time and consideration.

Sincerely,

Elizabeth Purcell
Environmental Policy Coordinator