In-Air and Underwater Hearing Abilities of Seabirds

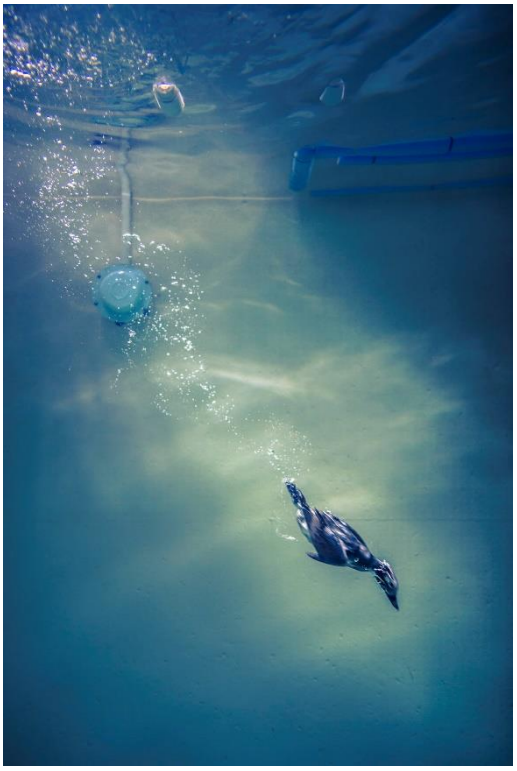
https://www.usgs.gov/centers/pwrc/science/air-and-underwater-hearing-abilities-seabirds?qt-science_center_objects=0#qt-science_center_objec

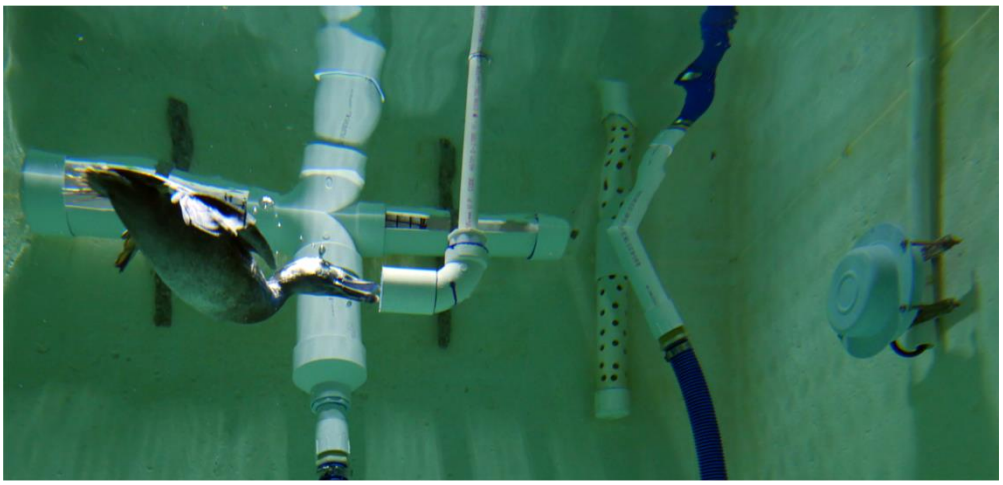
As diving foragers, sea ducks are vulnerable to underwater anthropogenic activities, including naval sonar activity and gillnet fisheries. Bycatch in gillnets is a principle driver of mortality for sea ducks, killing hundreds of thousands of seabirds annually. To reduce gillnet bycatch, underwater hearing tests were conducted on affected sea duck species to assist with possible development of mitigation strategies via acoustic deterrent devices. These data will be used to provide recommendations for appropriate acoustic deterrent devices to keep birds away from dangerous anthropogenic interactions. Additionally, knowledge of underwater hearing sensitivities of these species is important for informing management decisions regarding sources of noise pollution that may be harmful.

The Challenge: Underwater noise pollution from anthropogenic activities such as offshore energy construction, naval sonar activity, and commercial shipping can impact aquatic animals. Introduction of anthropogenic noise sources can mask communication, displace animals from preferred foraging or breeding habitat, disrupt predator-prey interactions, and cause hearing loss. Many seabirds spend a significant portion of their lives under the water, and most likely have sensory adaptations to facilitate their aquatic lifestyles. Sound may even be used as a tool to alert and deter these animals of dangerous areas. For instance, acoustic deterrent devices (“pingers”), have been used to reduce bycatch of marine mammals in gillnet fisheries. Despite mortalities of hundreds of thousands of seabirds a year in these fisheries operations, pingers have not been explored as an option to reduce seabirds bycatch. Without any measurements of underwater hearing abilities, it is impossible to explore the role of acoustics in the lives of seabirds.

The Science: Hearing tests were conducted on several species of seabirds at USGS Patuxent Wildlife Research Center. Hearing abilities were measured both in air and underwater, using an electrophysiological method called the Auditory Brainstem Response, as well as a behavioral approach in which the birds are trained to respond to sounds of varied frequency and intensity. The underwater hearing data obtained from surf scoters, long-tailed ducks, and common eiders suggest that these species share a common range of auditory sensitivity, from 1.0 – 3.0 kHz.

The Future: The underwater hearing sensitivity data will be used to provide recommendations for appropriate specifications for seabird targeted acoustic deterrent devices, intended to reduce mortalities associated with bycatch. Additionally these data provide insight into sources of anthropogenic noise pollution that these species may be more vulnerable to due to sensitivity overlap.





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Några andra referenser om dykande fåglars förmåga att utnyttja hörseln under vatten och eventuellt påverkas av antropogent undervattenbuller

Hansen, K. A., Larsen, O. N., Wahlberg, M., & Siebert, U. (2016). Underwater hearing in the great cormorant (*Phalacrocorax carbo sinensis*): Methodological considerations (p. 010015). Presented at the 168th Meeting of the Acoustical Society of America, Indianapolis, Indiana. https://doi.org/10.1121/2.0000267.

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Pichegru, L., Nyengera, R., McInnes, A. M., & Pistorius, P. (2017). Avoidance of seismic survey activities by penguins. *Scientific Reports*, *7*(1). https://doi.org/10.1038/s41598-017-16569-x

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