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The characterisation of underwater noise at facilities holding marine mammals

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Abstract

*A collaborative effort was undertaken to delineate underwater noise levels within holding enclosures at marine mammal facilities. Ambient noise levels were measured under normal operating conditions in the enclosures of 14 participating facilities. Facility habitats varied from ocean environments to fully enclosed pools. The means and standard errors of the noise pressure spectral densities measured across all pools were similar to those measured in natural coastal environments with relatively low presence of anthropogenic noise. Highest levels of noise in land-based pools were generally at frequencies < 2 kHz and primarily due to the operation of water treatment/filtration systems. Noise levels in land-based pools were comparable to or lower than semi-natural and natural systems at higher frequencies because of the presence of biological noise sources in these systems (eg snapping shrimp [*Alpheus *spp]). For odontocete enclosures, the whales themselves were often the greatest source of sound at frequencies where the whales have their best hearing (~40–100 kHz). The potential for facility ambient noise to acoustically mask odontocete communication signals and echolocation clicks appears to be low. In general, when noise was elevated it was at frequencies outside the typical frequency ranges of whistles and echolocation clicks, and where odontocetes have poor hearing sensitivity. Occasional noise issues were found; it is therefore recommended that facilities periodically assess enclosure noise conditions to optimise animal management and welfare.*

Keywords: *animal enclosures, animal welfare, bottlenose dolphin, California sea lion, marine mammals, noise*