



Acoustic ecology of the critically endangered Burrunan dolphin: implications for conservation management in a noisy marine soundscape

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ABSTRACT

The Burrunan dolphin (*Tursiops australis*) is a critically endangered species endemic to southeastern Australia. Its two known resident populations, in Port Phillip Bay (PPB) and the Gippsland Lakes (GL), occupy acoustically complex, highly urbanised habitats. Relying heavily on sound for communication, navigation, and foraging, understanding the Burrunan dolphin's acoustic ecology is vital for developing effective conservation strategies in the Anthropocene. This study characterised the Burrunan dolphin vocal repertoire through analysis of 12,973 acoustic signals collected 2016–2023. Six whistle classes and four burst-pulse sound classes were identified, with significant regional variation observed. Signature whistles (SWs), recorded in GL 2021–2024, revealed 22 distinct contours. While individual matching to 57 photo-identified dolphins was inconclusive, SWs aligned with sighted social groupings. Further, a nine-station passive acoustic monitoring (PAM) array throughout PPB (2020–2023) produced over 300,000 five-minute recordings, enabling the first assessment of PPB's soundscape. Sound source classification and long-term average spectrograms (LTAS) revealed seasonal and diel variation. During the COVID-19 'anthropause', LTAS and power spectral density analyses showed declines in recreational boating and altered temporal activity, while shipping remained stable. Dolphin acoustic detections appeared resilient, yet continued anthropogenic noise exposure underscores the need for regionally informed conservation management.