



Species-level variability in mysticete downsweep vocalisations

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ABSTRACT

The Australian EEZ supports ten mysticete species that use its productive waters for feeding and breeding, each emitting downsweeping calls that overlap acoustically. To hone in on Eastern Indian Ocean pygmy blue whale (EIOPBW) downsweeps, we compared two approaches: a spectrogram correlator leveraging known EIOPBW templates, and a neural network trained on generic blue whale D-calls with subsequent clustering. Expert bioacousticians then vetted all candidate detections. Our analysis revealed that downsweep calls form a continuous spectrum of acoustic variation rather than discrete clusters, and many EIOPBW variants closely resemble downsweeps of other species, complicating species-level assignment based solely on call shape. Nonetheless, mapping detections against seasonal and geographic expectations for EIOPBWs improved confidence in species attribution. We highlight key obstacles—including ambient noise fluctuations, detection algorithm limitations, and subjective biases in manual review—and propose integrating probabilistic labeling, sophisticated spectral transforms, propagation modeling, and shared call libraries to enhance future monitoring efforts. Until such advances are realized, successful passive acoustic surveys will require blending automated tools with ecological context and human expertise.