Ocean noise

Ocean noise, stemming from human activities, disrupts crucial natural sounds essential for marine animals. In recent years, heightened awareness of marine environmental conservation has spurred extensive research on this issue. Many studies not only investigate noise sources but also assess its impact on marine organisms' communication, behavior, and physiology. Researchers employ metabolomics and bioscience techniques, along with passive acoustic monitoring that minimally affects marine life, to understand physiological changes in marine organisms, biodiversity, distribution, the soundscape, and trends in marine noise alterations.

Brandon L. Southall (2024) notes significant progress in understanding how noise exposure context affects behavioral responses, enhancing our knowledge of anthropogenic noise's impact on individual and group behavior. Methodological advancements have broadened the spatial and temporal scales of disturbance studies for various exposure scenarios in local populations. However, combined data from acute and chronic noise events suggest that 'all-or-nothing' thresholds are inadequate and inconsistent with avaiable contextual data. Significant differences between species, individuals, situational contexts, and temporal and spatial scales of exposure necessitate developing criteria for long-term, broad-scale impact assessments.

Chiu et al. (2024) highlight that low-molecular-weight metabolites and metabolomics offer unprecedented insights into the physiological changes in marine organisms due to noise exposure. Metabolomics bridges the understanding of underwater noise as an environmental stressor and dissects the complexities of marine life responses. Integrating metabolomics with genomics and proteomics provides a multi-layered understanding of biological responses, allowing precise identification of genes, proteins, and metabolic pathways affected by noise. Emerging bioinformatics tools enhance data analysis, visualization, and interpretation, offering innovative insights into the subtle yet profound effects of underwater noise.

Akamatsu et al. (2023) ingeniously use kayaks as silent, mobile platforms for passive acoustic surveys of small animals in coral reefs. Their methodology employs a rule-based detector for audio files, calculating pulse train numbers for damselfish and band energy at 8,000 Hz in rectangular meshes for snapping shrimp. Additionally, dives in coral reef areas recorded audio and images to verify damselfish species. Using GPS positions of survey trajectories, they successfully quantified and mapped the acoustic density of daselfish and snapping shrimp in coral reefs.

Fang et al. (2024) analyzed nearly a decade of passive acoustic monitoring data from western Taiwan's waters, before and during offshore wind farm development. Their results reveal significant correlations in the biophony component through automated acoustic indicators, identifying increased fish calls linked to rising sea surface temperatures and new moon phases. Literature review shows dolphins' behavioral responses to vessel transits, reducing call rates and simplifying frequency patterns during ship construction. These findings underscore the importance of comprehensive underwater acoustic surveys to harmonize wind farm development with ecosystems, mitigate auditory impacts, and inform regulatory and conservation efforts.

These studies offer diverse perspectives on investigating ocean noise and its impact on the ocean ecology. The scientific findings and emerging trends generated from this research provide governments and organizations with valuable insights to formulate effective environmental protection strategies.

Best regards,

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