



HYDROACOUSTIC APPLICATION FOR ESTIMATING ZOOPLANKTON ABUNDANCE IN THE SOUTHEASTERN WATERS OF PARI ISLAND

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**DEPARTMENT OF MARINE SCIENCE AND TECHNOLOGY
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ABSTRACT

MUHAMMAD RAVELINO. Hydroacoustic Application for Estimating Zooplankton Abundance in The Southeastern Waters of Pari Island. Supervised by HENRY MUNANDAR MANIK and ADRIANI.

This study evaluated the application of hydroacoustic technology for estimating zooplankton abundance in the southeastern waters of Pari Island using a 200 kHz Single Beam Echosounder and a 20 μm mesh size plankton net. Acoustic backscatter was recorded stationary at 14 stations using Echoview 4.0, resulting in volume strength (SV) ranging from -75 to -71 dB covering integrated zooplankton distributed over 0-55 meters depth were derived and compared with laboratory counts of zooplankton abundance (208.33 - 828.61 ind/L). The hydroacoustic measurements revealed clear vertical scattering layers and spatial gradients of zooplankton that coincided with variations in temperature, salinity, and sound speed, indicating heterogeneous but productive coastal conditions. However, SV showed only a weak positive correlation toward net-based zooplankton abundance ($R^2 = 0.15$), indicating suitable nature of hydroacoustic approach for spatial estimation of zooplankton distribution. Integration of hydroacoustic with plankton-net sampling remains essential for quantitative assessment, while the combined approach provides a useful basis for future near-real time zooplankton assessment in supports of coastal ecosystem management in the Jakarta Bay

Keywords: backscattering strength, hydroacoustic, Pari Island, zooplankton abundance

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ABSTRAK

MUHAMMAD RAVELINO. Aplikasi Hidroakustik untuk Studi Pendugaan Kelimpahan Zooplankton di Tenggara Pulau Pari. Dibimbing oleh HENRY MUNANDAR MANIK dan ADRIANI.

Penelitian ini mengevaluasi penerapan teknologi hidroakustik untuk menduga kelimpahan zooplankton di perairan tenggara Pulau Pari menggunakan Single Beam Echosounder 200 kHz dan jaring plankton diameter mesh 20 μm . Hamburan balik direkam secara stasioner menggunakan Echoview 4.0 di 14 stasiun, dan volumenya (SV) berkisar dari -75 hingga -71 dB terintegrasi untuk kedalaman 0-55 meter. Sampling zooplankton menghasilkan kelimpahan sebesar 208,33 - 828,61 ind/L. Pengukuran hidroakustik mengungkapkan adanya lapisan hambur balik yang jelas dan gradien spasial zooplankton yang dipengaruhi suhu, salinitas, dan kecepatan rambat suara di air. Namun, korelasi SV dengan kelimpahan zooplankton menunjukkan nilai positif yang rendah ($R^2 = 0,15$), menunjukkan bahwa pendekatan hidroakustik cocok untuk menduga distribusi spasial zooplankton. Oleh karena itu, integrasi teknologi hidroakustik dengan pengambilan sampel plankton tetap penting untuk pendugaan kuantitatif, sementara pendekatan terintegrasi memberikan dasar pengembangan masa depan pemantauan *near-real time* yang mendukung pengelolaan ekosistem pesisir di Teluk Jakarta.

Kata kunci: *backscattering strength*, hidroakustik, kelimpahan zooplankton, Pulau Pari



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HYDROACOUSTIC APPLICATION FOR ESTIMATING ZOOPLANKTON ABUNDANCE IN THE SOUTHEASTERN WATERS OF PARI ISLAND

MUHAMMAD RAVELINO

Undergraduate Thesis
as one of the requirements for obtaining the title
Bachelor of Marine Science (with Honors) at
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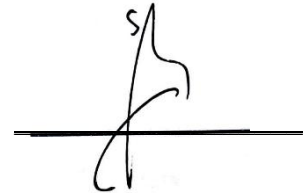
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FOREWORD

Praise and gratitude be to Allah subhanaahu wa ta'ala for all his gifts so that this scientific work was successfully completed. The theme chosen in the research which was carried out from August 2024 to October 2025 was Marine Acoustics, Instrumentation, and Robotics, with the title "Hydroacoustic Application for Estimating Zooplankton Abundance in The Southeastern Waters of Pari Island".

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May this scientific paper will be useful for those in need and for the advancement of science.

Bogor, February 2026

Muhammad Ravelino



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