

RINGKASAN

SUSI SULIAN DIA. Studi Kuantitatif Hubungan Hambur Balik Akustik dan Persentase Tutupan Karang *Encrusting* di Pulau Ajab Bintang Timur. Dibimbing oleh TRY FEBRIANTO dan ASEP MA'MUN.

Pentingnya ekosistem terumbu karang Indonesia, khususnya karang encrusting sebagai perekat struktural terumbu dan indikator kesehatan ekosistem, di tengah penurunan tutupan karang serta keterbatasan metode pemantauan konvensional yang mendorong kebutuhan teknologi non-invasif seperti hidroakustik di kawasan konservasi Pulau Ajab, Bintang Timur. Tujuan utama penelitian ini adalah menganalisis karakteristik nilai hambur balik akustik karang *encrusting* dan menguji hubungan kuantitatif antara *Surface Backscattering Strength* (SS) dengan persentase tutupan karang *encrusting* sebagai dasar pengembangan model pemantauan terumbu karang berbasis akustik. Penelitian menggunakan desain survei kuantitatif deskriptif dengan metode *purposive sampling*, pengukuran hambur balik menggunakan *single beam echosounder* Simrad EK-15 frekuensi 200 kHz, pengambilan citra bawah air transek 50×50 cm untuk analisis persentase tutupan dengan *PhotoQuad*, serta analisis hubungan SS–tutupan karang melalui regresi linear sederhana yang didukung uji homogenitas dan ANOVA menggunakan SPSS. Hasil menunjukkan rentang nilai SV berada pada nilai distribusi Q1 dengan rentang nilai antara -35,61 dB hingga -37,60 dB, dan distribusi nilai Q3 berada pada rentang -36,25 dB hingga -40,13 dB. Sedangkan rentang nilai SS berada pada nilai distribusi Q1 memiliki rentang nilai -29,80 dB hingga -31,66 dB dan pada Q3 memiliki rentang nilai -32,31 dB hingga -34,70 dB, dengan persentase tutupan karang *encrusting* berkisar 52–85%, serta hubungan positif signifikan antara SS dan tutupan karang ($p\text{-value} = 0,000$) dengan F hitung sebesar $475,103 > F$ tabel sebesar 4.28 dan persamaan regresi $y = 0,2819x - 51,546$ dan $R^2 = 95\%$ yang menegaskan bahwa peningkatan intensitas hambur balik permukaan sejalan dengan peningkatan tutupan karang meski masih dipengaruhi faktor lingkungan dan biologis lain. Kesimpulannya, parameter hambur balik akustik layak dimanfaatkan sebagai indikator kuantitatif kondisi karang *encrusting* dan metode hidroakustik Simrad EK-15 berpotensi menjadi alat monitoring terumbu karang yang efisien, cepat, dan non-invasif, dengan rekomendasi penelitian lanjutan berupa integrasi multi-frekuensi, penambahan stasiun dan musim pengamatan, serta penggabungan data akustik dengan citra bawah air dan parameter lingkungan untuk meningkatkan akurasi pemodelan dan generalisasi hasil.

Kata kunci: Echosounder SIMRAD EK-15, Hambur Balik, Hidroakustik, Karang *Encrusting*, Pulau Ajab

SUMMARY

SUSI SULIAN DIA. Quantitative Study of the Relationship between Acoustic Scattering Values and the Percentage of Encrusting Coral Cover on Ajab Island East Bintan. Supervised by TRY FEBRIANTO and ASEP MA'MUN.

The importance of Indonesia's coral reef ecosystems, particularly encrusting corals as structural binders of reefs and indicators of ecosystem health, amid declining coral cover and the limitations of conventional monitoring methods, has driven the need for non-invasive technologies such as hydroacoustics in the conservation area of Ajab Island, East Bintan. The main objective of this study is to analyze the acoustic backscatter characteristics of encrusting corals and to test the quantitative relationship between Surface Backscattering Strength (SS) and the percentage of encrusting coral cover as a basis for developing an acoustic-based coral reef monitoring model. The study used a descriptive quantitative survey design with purposive sampling, backscatter measurement using a Simrad EK-15 single beam echosounder with a frequency of 200 kHz, underwater imaging of 50×50 cm transects for percentage cover analysis using PhotoQuad, and analysis of the relationship between SS and coral cover through simple linear regression supported by homogeneity tests and ANOVA using SPSS. The results showed that the SV value range fell within the Q1 distribution, with values ranging from -35.61 dB to -37.60 dB, and the Q3 distribution ranged from -36.25 dB to -40.13 dB. Meanwhile, the range of SS values at the Q1 distribution was from -29.80 dB to -31.66 dB, and at the Q3 distribution, it ranged from -32.31 dB to -34.70 dB, with encrusting coral cover percentages ranging from 52–85%, and a significant positive relationship between SS and coral cover (p -value = 0.000) with a calculated F value of 475.103 > F table value of 4.28 and a regression equation of $y = 0.2819x - 51.546$ and $R^2 = 95\%$, confirming that an increase in surface backscatter intensity is in line with an increase in coral cover, although it is still influenced by other environmental and biological factors. In conclusion, the acoustic backscatter parameter is suitable for use as a quantitative indicator of encrusting coral conditions, and the Simrad EK-15 hydroacoustic method has the potential to be an efficient, fast, and non-invasive coral reef monitoring tool. with recommendations for further research including multi-frequency integration, adding observation stations and seasons, and combining acoustic data with underwater imagery and environmental parameters to improve modeling accuracy and generalization of results.

Keywords: Backscattering strength, Hydroacoustics, Encrusting coral, SIMRAD EK-15 echosounder, Ajab Island