INTISARI

PEMODELAN DATA HASIL TANGKAPAN *PURSE SEINE* PELAGIS BESAR PERIODE 2015-2024 MENGGUNAKAN *RANDOM FOREST* DAN ARIMA

Produksi ikan pelagis memiliki peranan strategis dalam mendukung perekonomian nasional, ketahanan pangan, dan keberlanjutan sumber daya laut Indonesia, khususnya di Wilayah Pengelolaan Perikanan Negara Republik Indonesia (WPPNRI) 572 dan 573 di Samudra Hindia. Produksi hasil tangkapan di kedua wilayah tersebut menunjukkan fluktuasi musiman yang signifikan, dipengaruhi oleh faktor operasional (jumlah kapal aktif dan intensitas penangkapan), dinamika biologis (musim migrasi dan pemijahan ikan), serta kebijakan pemerintah seperti moratorium kapal eks-asing, pembatasan alat tangkap, penerapan Penangkapan Ikan Terukur (PIT), sistem pemantauan kapal (VMS), dan dampak pandemi COVID-19. Hasil analisis menunjukkan bahwa total tangkapan pelagis besar tertinggi selama periode 2015 hingga 2024 terjadi di perairan WPPNRI 573 (Samudra Hindia Selatan Jawa hingga Nusa Tenggara), yang memiliki intensitas penangkapan lebih tinggi dibandingkan WPPNRI 572 (Samudra Hindia Barat Sumatera). Dari lima spesies ikan pelagis yang diteliti cakalang (*Katsuwonus pelamis*), tuna mata besar (*Thunnus obesus*), tuna sirip kuning (*Thunnus albacares*), layang (*Decapterus spp.*), dan tongkol (Auxis spp., *Euthynnus spp.*). Terlihat ikan cakalang mendominasi hasil tangkapan di kedua wilayah, diikuti oleh tuna sirip kuning dan tuna mata besar. Penelitian ini bertujuan membandingkan kinerja model *Random Forest* dan *AutoRegressive Integrated Moving Average* (ARIMA) dalam memprediksi hasil tangkapan bulanan ikan pelagis besar selama 2015 hingga 2024. Evaluasi dilakukan menggunakan *Root Mean Square Error* (RMSE) dan *Normalized RMSE* (NRMSE). Hasil menunjukkan bahwa model ARIMA memiliki keterbatasan dalam menangkap pola musiman yang *non-stasioner* dan *non-linear*, dengan kesalahan prediksi relatif tinggi (*RMSE/Mean* > 30%), sedangkan model *Random Forest* memberikan hasil yang lebih akurat (*RMSE/Mean* < 20%) dan adaptif terhadap variasi data fluktuatif, khususnya pada spesies bernilai ekonomi tinggi seperti cakalang, tuna mata besar, dan tuna sirip kuning. Temuan ini menegaskan bahwa penerapan model pembelajaran mesin berpotensi menjadi alat strategis dalam mendukung pengelolaan perikanan pelagis besar yang adaptif, berbasis data, dan berkelanjutan di perairan Indonesia.

Kata kunci: *logbook*, kapal PSPB, pengelolaan perikanan, *random forest*, ARIMA, *machine learning*, samudera Hindia

ABSTRACT

MODELING OF LARGE PELAGIC PURSE SEINE CATCH DATA FOR THE 2015-2024 PERIOD IN FMA 572 AND 573 USING RANDOM FOREST AND ARIMA

Pelagic fisheries play a strategic role in supporting Indonesia's national economy, food security, and the sustainability of marine resources, particularly within the Fisheries Management Areas of the Republic of Indonesia (FMA) 572 and 573 in the Indian Ocean. The production of fish catches in these two regions shows significant seasonal fluctuations influenced by operational factors (number of active vessels and fishing intensity), biological dynamics (migration and spawning seasons), as well as government policies such as the moratorium on ex-foreign vessels, fishing gear restrictions, the implementation of Measured Fishing (PIT), the Vessel Monitoring System (VMS), and the impacts of the COVID-19 pandemic. The analysis results show that the highest total catch of large pelagic fish during the period 2015 to 2024 occurred in the waters of WPPNRI 573 (the southern Indian Ocean, from Java to Nusa Tenggara), which has higher fishing intensity compared to WPPNRI 572 (the western Indian Ocean off Sumatra). Among the five pelagic fish species studied skipjack (*Katsuwonus pelamis*), bigeye tuna (*Thunnus obesus*), yellowfin tuna (*Thunnus albacares*), scad (*Decapterus* spp.), and mackerel tuna (*Auxis* spp., *Euthynnus* spp.). Skipjack dominates the catch in both regions, followed by yellowfin tuna and bigeye tuna. This study aims to compare the performance of the Random Forest and AutoRegressive Integrated Moving Average (ARIMA) models in predicting the monthly catch production of large pelagic fish during 2015 to 2024. The evaluation was carried out using Root Mean Square Error (RMSE) and Normalized RMSE (NRMSE). The results indicate that the ARIMA model has limitations in capturing non-stationary and non-linear seasonal patterns, resulting in relatively high prediction errors (RMSE/Mean > 30%), whereas the Random Forest model provides more accurate results (RMSE/Mean < 20%) and is more adaptive to fluctuating data variations, particularly for high economic value species such as skipjack, bigeye, and yellowfin tuna. These findings confirm that the application of machine learning models has strong potential as a strategic tool to support adaptive, data-based, and sustainable management of large pelagic fisheries in Indonesian waters.

Keywords: logbook, PSPB vessel, fisheries management, random forest, ARIMA, machine learning, Indian Ocean