Adaptation of fisheries sonar for monitoring schools of large pelagic fish: dependence of schooling behaviour on fish finding efficiency

Multibeam omnidirectional sonars are tools currently used by fishers, but also allow the monitoring of pelagic fish schools surrounding a platform. Multibeam processing methods now offer improved capacities for raw data storage. The Simrad SP90 sonar was used for the detection of fish schools associated with drifting fish aggregating devices (FADs), and digital systems developed for the acquisition and processing of volume backscattering echoes and position data. Data sampling methods were defined based on two modes: one for periods searching for FADs and associated schools, and one for school monitoring in drifting mode. Validation of the detection of several FAD-associated schooling species was made by simultaneous visual observations or/and cross-checking with echosounder recordings. The characteristics of schooling behaviour in the targeted fish species are fundamental for the correct interpretation of acoustic data. Sonar detection threshold is the result of a compromise between fish number, size, species and the nearest neighbour distance (NND) of individuals per dynamic structure (school or shoal). Tuna schooling dynamics mean that NND can sometimes be too large to allow the presence of these fish to be detected, despite their number. Sonar data should be analysed and interpreted in a holistic manner, in combination with behaviour pattern and dynamics of all species around the drifting FADs. An autonomous sonar buoy prototype equipped with 360° scanning sonar coupled to video cameras will increase our understanding of tuna behaviour around drifting or anchored objects. A similar methodology can be applied to different kinds of platforms, either anchored or in permanent positions. This would improve the monitoring of fish schools around artificial reefs, open sea aquaculture farms, and across estuaries, channels or straits; applications which are undoubtedly essential for progressive fisheries management.

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