World Academy of Science, Engineering and Technology
International Journal of Marine and Environmental Sciences
Vol:14, No:04, 2020

Planktivorous Fish Schooling Responses to Current at Natural and Artificial Reefs

Authors : Matthew Holland, Jason Everett, Martin Cox, Iain Suthers

Abstract : High spatial-resolution distribution of planktivorous reef fish can reveal behavioural adaptations to optimise the balance between feeding success and predator avoidance. We used a multi-beam echosounder to record bathymetry and the three-dimensional distribution of fish schools associated with natural and artificial reefs. We utilised generalised linear models to assess the distribution, orientation, and aggregation of fish schools relative to the structure, vertical relief, and currents. At artificial reefs, fish schooled more closely to the structure and demonstrated a preference for the windward side, particularly when exposed to strong currents. Similarly, at natural reefs fish demonstrated a preference for windward aspects of bathymetry, particularly when associated with high vertical relief. Our findings suggest that under conditions with stronger current velocity, fish can exercise their preference to remain close to structure for predator avoidance, while still receiving an adequate supply of zooplankton delivered by the current. Similarly, when current velocity is low, fish tend to disperse for better access to zooplankton. As artificial reefs are generally deployed with the goal of creating productivity rather than simply attracting fish from elsewhere, we advise that future artificial reefs be designed as semi-linear arrays perpendicular to the prevailing current, with multiple tall towers. This will facilitate the conversion of dispersed zooplankton into energy for higher trophic levels, enhancing reef productivity and fisheries.

Keywords : artificial reef, current, forage fish, multi-beam, planktivorous fish, reef fish, schooling
Conference Title : ICOC 2020 : International Conference on Oceanography and Climate
Conference Location : Tokyo, Japan
Conference Dates : April 23-24, 2020