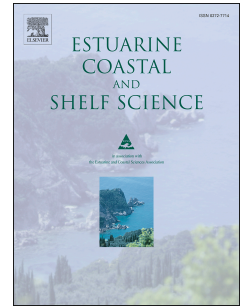


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## Trophic flows, kelp culture and fisheries in the marine ecosystem of an artificial reef zone in the Yellow Sea

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### Abstract

This study evaluates the ecosystem structure and function of the nearshore reefs in the Lidao coastal ecosystem of northern China, a region of intensive kelp aquaculture, and fisheries enhancements, including the deployment of artificial reefs and release of cultured marine species. An Ecopath model, with 20 functional groups representing 81 species, was developed for a representative area in the region and Ecosim was used to explore two scenarios for alternative fishing practices and surrounding aquaculture activities. The mean trophic levels (TLs) of the functional groups ranged from 1.0 for the primary producers (phytoplankton, benthic algae and seagrass) and detritus to 4.14 for Type III fishes (fishes found in the water column above the artificial reefs, e.g., *Scomberomorus niphonius*). The mean transfer efficiency through the whole system was 11.7%, and the ecosystem had a relative low maturity, stability and disturbance resistance, indicating that it was at a developing stage. Nearly half of the total system biomass (48.9% of 620.20 t km<sup>-2</sup> year<sup>-1</sup>), excluding detritus, was comprised of benthic finfish and invertebrates. The total yield from all fisheries (86.82 t/km<sup>2</sup>/year) was dominated by low trophic level

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