

Assessing trophic linkages in and around offshore wind farms using two high-speed optical sensors

Tim Dudeck, Marc Hufnagl, Dominik Auch, André Eckhardt, Klas-Ove Möller, Justus van Beusekom, Bettina Walter, Christian Möllmann, and Jens Floeter

University of Hamburg, Institute for Hydrobiology and Fisheries Science, Hamburg, Germany (tim.dudeck@uni-hamburg.de)

In search for clean, renewable energy sources European countries have built and planned numerous Offshore Wind Farms (OWF) in the North Sea region. While some research has been carried out on their influence on marine mammals and bottom-dwelling organisms, less is known about fish and lower trophic levels in these areas. Yet, marine mammals purposely seek these structures and there are indications that there are higher chances of fish encounters. However, the local bottom-up effects probably driving these aggregations of higher trophic level organisms are poorly understood. In this study we show preliminary results of primary and secondary production in and around German OWFs in the North Sea using a Laser Optical Particle Counter and a Video Plankton Recorder. With the two sensors working simultaneously on the TRIAXUS system at high speed, we were able to investigate and ground-truth size-spectrum changes on a very high spatial resolution making it possible to detect OWF effects from local to larger scales. Our results show new possibilities in OWF research and the necessity to collect highly resolved field data for meaningful results in these dynamic environments. Furthermore, the use of size spectra simplifies the integration of energy flow through low and medium trophic levels into biogeochemical models by using only a single automatically measurable variable such as size.