NOAH
North Sea Observation and Assessment of Habitats

Fishing Effort Distribution of Small Beam Trawlers in 2012

GENERAL OVERVIEW
Dataset name: *International fishing effort distribution of small beam trawlers (<221kW, <24m) in the German EEZ of the North Sea in 2012*
Project: *North Sea – Observation and Assessment of Habitats (NOAH)*
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DATASET SPECIFICATIONS	
Dataset Parameter(s) and supplied Unit(s): extend if necessary *Swept Area Ratio (unitless)*	
Date(s) available: *2005-2013 (only 2011-2012 supplied)*	
Validated: *Yes*	**Version Date:** *11.02.2015*
Current State: *final*	
Format: *ESRI shape- /layer file*	
Citation: *Gerritsen HD, Minto C, Lordan C (2013) How much of the seabed is impacted by mobile fishing gear? Absolute estimates from Vessel Monitoring System (VMS) point data. ICES Journal of Marine Science, 70(3), 523-531.* *Hintzen NT, Bastardie F, Beare D, Piet G, Ulrich C, Deporte N, Egekvist J, Degel H (2012) VMStools: Open-source software for the processing, analysis and visualisation of fisheries logbook and VMS data. Fisheries Research 115–116, 31-43.*	

DATASET DETAILS

Abstract
International fishing effort distribution in 2012 was calculated for small beam trawlers (<221kW, <24m) in the German EEZ of the North Sea. It was quantified as swept area ratio, which is the ratio between the trawled area over one year and the size of the respective grid cell. Thus, a swept area ratio of 1 means that an area equivalent to the size of the grid cell was fished over one year. The swept area was calculated from data from Vessel monitoring by satellite (VMS) using the approximate width of the first gear of the ship, taken from the European Fleet register. Cell sizes were assigned using the nested grid approach following Gerritsen et al. (2013), with approximately 3552km² (corresponding to a resolution of 1°x0.5° at 55°N) as the coarsest and approximately

3.5km² as the finest resolution of grid cells, whereas the resolution depends on the amount of information (GPS data from fishing vessels) within a spatial grid.
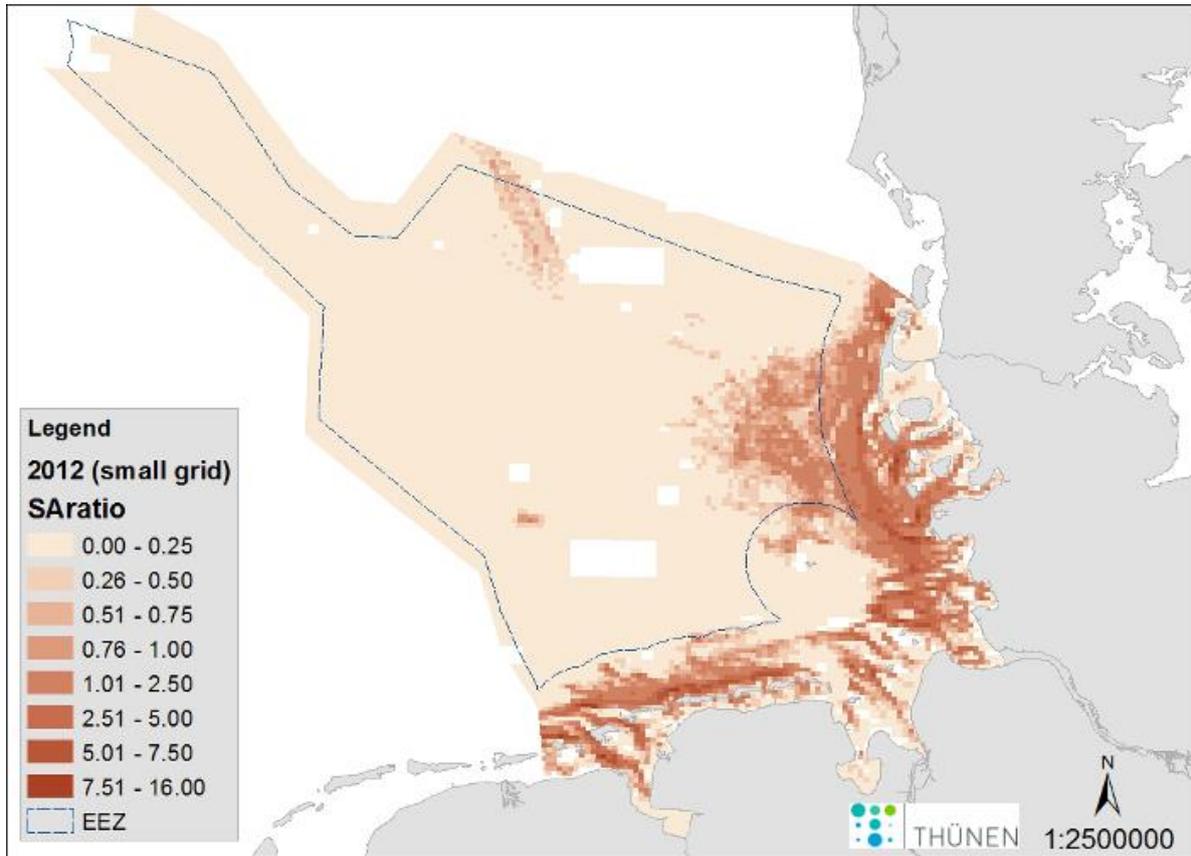
Acquisition and Processing Description:
The swept area ratio was calculated with data from two different sources: The Vessel Monitoring by Satellite (VMS) and the European Fleet Register (http://ec.europa.eu/fisheries/fleet/index.cfm). Within the German EEZ, VMS data from all vessels operating within this zone that are larger than 12m vessel length (EU regulation since 2008) is accessible. In order to distinguish between fishing methods, the primary gear of each ship was taken from the vessel register as well as ship length and engine power. We distinguished between small and large beam trawlers, i.e. between ships smaller than 24m vessel length and 221kW engine power and larger than that. The average beam widths of the two vessel size classes were calculated from observer protocols that were collected on commercial German beam trawlers in the past 10 years.
VMS-data were analysed using the VMStools package (Hintzen et al., 2012), which is available as add-on package for the R software (R Core Team 2013), and only position data, which were associated to fishing activities were used in the mapping process. Cell sizes were assigned using the nested grid approach following Gerritsen et al. (2013).

Notes and Limitations:
The swept area ratio can only be an approximate value to quantify the impact on the seafloor. First, calculations were based on the assumption that all vessels use exclusively their primary gear listed in the Fleet register. Further, gear types are usually further broken down into fishing métiers, specifying gear parameters and target species. Here, we could only distinguish between small and large beam trawlers. Small beam trawler represent to a large degree the coastal shrimp fishery. Effort in offshore areas is probably associated to plaice fishery. Large beam trawlers represent the flatfish fishery, mainly but not exclusively the fishery targeting sole.
Because gear designs differ not only in their size, which is considered as gear width, but also in their bottom contact (e.g. by tickler chains), the physical trawling impact is not equivalent to the

swept area ratio. Further, the swept area is not equivalent to the proportion of the cell that was impacted by the gear (unless fishing tracks do not overlap at all). The nested grid approach gives swept area ratios for each grid cell, which are however not equivalent in size. Locally the swept area ratio may be even larger when grid cells would be further broken down. However, this can be only done to a resolution of approximately 3.5km² because position data are usually only exact to 0.001°. Further, the VMS system sends position data approximately every 2 hours, and the track of the ship in between cannot be estimated with a high precision.