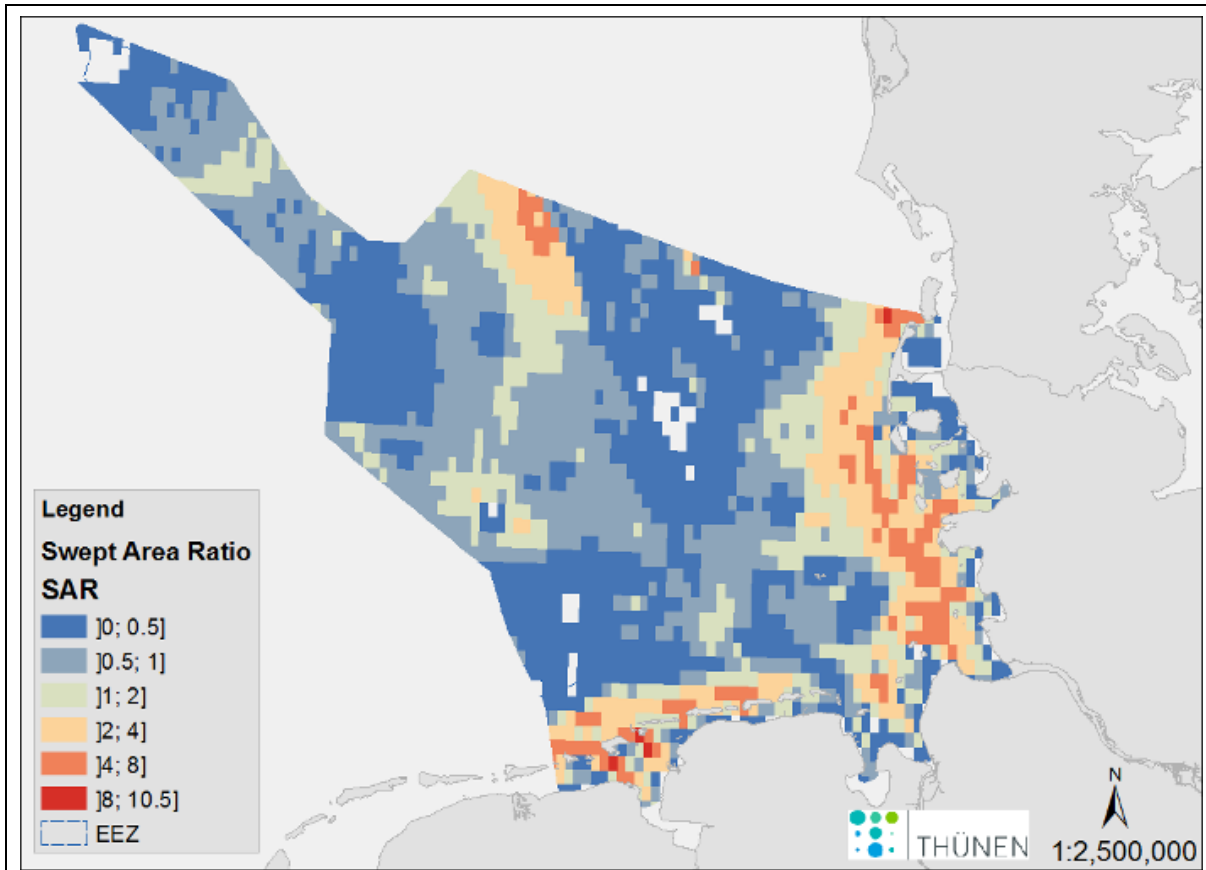


Swept Area Ratio and interannual Variation (2012-2016)

GENERAL OVERVIEW	
Dataset name: <i>Footprint of bottom trawling in the German EEZ of the North Sea (2012-2016)</i>	
Project: <i>North Sea – Observation and Assessment of Habitats (NOAH)</i>	
Co-Principal Investigator: Rabea Diekmann, Ulrike Kleeberg (Web Services) [HZG]	
Contact: <i>Thünen Institute of Sea Fisheries, Herwigstraße 31, 27572 Bremerhaven gerd.kraus@thuenen.de</i>	
DATASET SPECIFICATIONS	
Dataset Parameter(s) and supplied Unit(s): <small>extend if necessary</small> <i>Swept Area Ratio (unitless)</i>	
Date(s) available: <i>2012-2016</i>	
Validated: <i>Yes</i>	Version Date: <i>28.02.2018</i>
Current State: <i>final</i>	
Format: <i>ESRI shape- /layer file</i>	
Citation: <i>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.</i>	
DATASET DETAILS	
Abstract <i>The footprint of bottom trawling was estimated from Vessel monitoring by satellite (VMS) data, linked to the corresponding logbook information (German fleet) or the European fleet register (international fleet), respectively. It is quantified as annual swept area ratio, which is the ratio between the cumulative area touched by trawls and the size of the respective grid cell (0.05°*0.05°). Thus, a swept area ratio of 1 means that an area equivalent to the size of the grid cell was fished over one year. We considered the gear-specific footprints of four major gear groups: otter trawls, demersal seines, beam trawls and dredges. Further, the swept area ratio is averaged over a period from 2012-2016 and thus represents the overall picture of fishing pressure to the seafloor in those years.</i>	



Acquisition and Processing Description:

The swept area ratio was calculated with data from three different sources: The Vessel Monitoring by Satellite (VMS), German logbook data and the European Fleet Register (<http://ec.europa.eu/fisheries/fleet/index.cfm>). Within the German EEZ, VMS data from all vessels larger than 12m length is accessible (since 2012). In order to distinguish between gear types, either logbook information or the primary gear of each ship was taken from the fleet register as well as ship length and engine power. 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.

Notes and Limitations:

The swept area ratio can only be an approximate value to quantify the pressure of bottom trawling on the seafloor. First, calculations were based on the assumption that all vessels, where logbook information was missing, used exclusively their primary gear listed in the fleet register. 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). Here data were averaged over a period of five years (2012-2016). Any long-term changes, such as area closures due to construction of offshore windfarms, may be not yet visible. The map should be interpreted together with information about the interannual variation (CV).