Bottom trawling footprint on the world's continental shelves

Bottom trawlers land around 19 million tons of fish and invertebrates annually, almost one-quarter of wild marine landings. The extent of bottom trawling footprint (seabed area trawled at least once in a specified region and time period) is often contested but poorly described. We quantify footprints using high-resolution satellite vessel monitoring system (VMS) and logbook data on 24 continental shelves and slopes to 1,000-m depth over at least 2 years. Trawling footprint varied markedly among regions: from 50% in some European seas. Overall, 14% of the 7.8 million-km² study area was trawled, and 86% was not trawled. Trawling activity was aggregated; the most intensively trawled areas accounting for 90% of activity comprised 77% of footprint on average. Regional swept area ratio (SAR; ratio of total swept area trawled annually to total area of region, a metric of trawling intensity) and footprint area were related, providing an approach to estimate regional trawling footprints when high-resolution spatial data are unavailable. If SAR was ≤0.1, as in 8 of 24 regions, there was >95% probability that >90% of seabed was not trawled. If SAR was 7.9, equal to the highest SAR recorded, there was >95% probability that >70% of seabed was trawled. Footprints were smaller and SAR was ≤0.25 in regions where fishing rates consistently met international sustainability benchmarks for fish stocks, implying collateral environmental benefits from sustainable fishing.

General information
State: Published
Organisations: National Institute of Aquatic Resources, Section for Ecosystem based Marine Management, Section for Monitoring and Data, Section for Marine Living Resources, Wageningen IMARES, Technical University of Denmark, Marine Scotland Science, University of Tasmania, University of Washington, CSIRO, NOAA, Consejo Nacional de Investigaciones Científicas y Técnicas, Food and Agriculture Organization of the United Nations, Institute of Marine Research, University of Queensland, University of Rhode Island, Louisiana State University, Department of Agriculture, Forestry and Fisheries of the Republic of South Africa, Queensland Department of Agriculture, Fisheries and Forestry, Thunen-Institut, Ministry for Primary Industries, Institutos de Fomento Pesquero, Marine Institute, Universidad Nacional de la Patagonia San Juan Bosco, Bangor University, University of Colorado Boulder, Swedish University of Agricultural Sciences, Department of Primary Industries and Regional Development, Government of Western Australia, Institute of Marine Biological Resources and Inland Waters, Department for Agriculture, Forestry and Fisheries, Agri-Food and Biosciences Institute Northern Ireland, Department of Primary Industries, Queensland, Hellenic Centre for Marine Research, Cefas Weymouth Laboratory, University of Rome Tor Vergata, Consiglio Nazionale delle Ricerche, International Council for the Exploration of the Sea, South Australian Research and Development Institute, NIWA, Instituto Portugués do Mar e da Atmosfera, Institute for Agricultural and Fisheries Research


Pages: E10275-E10282
Publication date: 2018
Peer-reviewed: Yes

Publication information
Journal: Proceedings of the National Academy of Sciences of the United States of America
Volume: 115
Issue number: 43
ISSN (Print): 0027-8424
Ratings:
BFI (2019): BFI-level 2
Web of Science (2019): Indexed yes
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 8.59 SJR 6.092 SNIP 2.626
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 8.56 SJR 6.576 SNIP 2.642
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 8.84 SJR 6.814 SNIP 2.691
Web of Science (2015): Indexed yes