FACTSHEET: S Research surveys acoustic North Sea (Survey_acou_NorthSea)
Version: [v1, 02/02/2023]

Sampling protocol: Survey_acou_NorthSea

Sampling objective(s): data collection for fishery-independent timeseries for by acoustic recordings

Start of sampling: 1991 (North Sea herring acoustic survey NHAS)

Sampling ongoing: yes

Data use

Primary data use: acoustic estimates of (pelagic) commercial fish species are used as tuning index in single stock assessments. The data users are stock coordinators in ICES Herring assessment working group (HAWG). The main target species can be found in Table 1 in http://data.europa.eu/eli/dec_impl/2021/1168/oj. It should however be noted that survey data of more species is used in stock assessments. The most up to date insight in data use can be found in the advice sheets per species.

Secondary users are OSPAR for the MSFD assessments, as well as the ICES Working Group on Integrated Assessments of the North Sea (WGINOSE).

Sampling design and method

The North Sea herring acoustic survey takes place annually in July in the North Sea, and is coordinated by the ICES working group on international pelagic surveys (WGIPS). The survey is carried out by vessels from Denmark, Germany, Netherlands, Ireland, Norway and Scotland.

The survey follows a stratified, systematic, parallel transect design with random starting points. Survey stratification is based on ICES statistical rectangles with a range of 1 degree in latitude and 2 degrees in longitude. Each ICES rectangle should be covered with a minimum of one transect and with higher intensity where historically a high abundance or variability of abundance has been detected.

Species allocation of the acoustic records is impossible if no trawl information is available. The general rule is to make as many trawl hauls as time permits, especially if echotraces are visible on the echosounder after a blank period. The principal objective is to obtain a sample from the school or the layer that appears as an echotrace on the sounder. As fishing is only done to identify the fish school composition, with respect to species as well as to biological parameters (length, age, weight and maturity) there is no need to standardise the fishing gear.

Detailed information can be found in the international manual, paragraph 2.1.5.

Sampling protocol and data capture

In the field

Acoustic

The acoustic data are collected using a Simrad EK80 scientific echosounder with 38 kHz transducers mounted in the drop keel of the research vessel. The EK80 setup during the survey follows the international SISP manual.

Fish

The trawl hauls are processed in a similar manner: after the haul comes on board, the catch is sorted. Species are identified to the lowest taxonomic level possible, or relevant/achievable for the survey. Length measurements are done for all fish species (finfish and elasmobranchs). Other species are

counted their catch fraction is. For a selection of species biological information is collected. Individual length, weight, sex and maturity information is collected and otoliths are taken from species listed in the (inter)national protocols.

Length measurements are done using an analogue measuring board, of which the set-off is checked before the start of the survey. Wet weights are taken using electronic scales, to the gram or 5 grammes (depending on the sample size). Scales are maintained annually and calibrated at least daily. Data is entered in the computer directly, using a headset if the distance is too far to directly speak to each other. Software used for data entry is in-house developed: Billie. The majority of the trawl information (date, time, position, haul duration) is registered automatically, using an external GPS or the vessel's system information. This information is transformed by an in-house application developed with LABVIEW software (TRIHIP/IHIP) to the exchange format needed by Billie. This way redundancy in data entry is minimised.
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Individual length measurements for fish used for biological data collection are done using an analogue measuring board, of which the set-off is checked before the start of the survey. Individual wet weights are taken using electronic scales, to the gram. Scales are maintained annually and calibrated at least daily. Data is noted down on paper and entered in the computer directly after processing the fish. After the fish selected for biological sampling has been treated following national animal welfare conditions, the otoliths are collected, and sex and -if relevant- maturity is registered by opening the body cavity. Individual fish information is written down on paper and soon after entered to the Billie file with length measurements.

Environment details (temperature and salinity) are measured by CTD (Seabird SBE 911) casts taken on each transect at each 0.5 longitudinal degree. A vertical downcast sample is made up to bottom depth.

In the lab
Otoliths are embedded in resin and sliced. Images are taken from the otolith coupes. Age reading takes place from those images using the institute's (in-house further developed) version of SmartDots. The information is automatically added to the Billie file of the haul.

Post-processing data
Echo integration and further data analyses are carried out in national laboratories for the area they cover using MAREC LSSS (Large Scale Survey System).
Billie files are not post-processed, only quality checked (see Data quality)
Post-processing of CTD information is described in a separate factsheet Surveys_CTD.

Data quality
Quality assurance procedure
Quality checks are conducted upon processing at the institute, and before entry into the national database FRISBE. Standardised SAS scripts are used for the data quality checks (available upon request). Essentially, the trawl haul data are checked for outliers on numerical values (either by plotting or by providing minimum, mean, and maximum values), consistency in text variables (e.g. station coding, crew members).

Quality checked parameters
Acoustic recordings

Partitioning of data into the categories is to some extent a subjective process backed up with trawl data and so it is vital that an experienced scientist who has experience of this survey and area undertake the scrutinisation of echograms. Joint sessions of scientists from participating countries comparing echograms and scrutinisation procedures take place to ensure a standardized approach to the interpretation of echograms.

Billie files

- Haul information: survey code, vessel name, gear type, sampling date, time, shooting and hauling positions (map), crew members, station code, sample number, haul duration, distance towed;
- Species information: species list (expert judgement), maturity coding, sex coding, subsampling type coding, minimum and maximum length, subsampling factor, number measured, weight by species, measurement unit by species;
- Individual fish information: graphical check of weight at length, length at age

Data storage

National database: Billie files are submitted to the national database FRISBE. The relevant aspects of this database are described in Proc_databases.

There is no national database for acoustic data. On board the vessel there is a NAS drive staying permanently, powered through UPS (uninterrupted power supply). Additionally, there is a portable NAS drive that synchronises itself to the ship's NAS. After the survey the portable NAS is taken back to the institute, where the data is also copied to a local NAS at the institute. This local NAS also contains final postprocessed files (i.e. LSSS). Ultimately, the data is stored at a storage server that has a back-up scheme. The ultimate outputs are stored in the ICES database. There is a copy of the data uploaded to the international database at the institute's network drive.

International database: NHAS acoustic and biological data is stored in the ICES acoustic data portal (https://www.ices.dk/data/data-portals/Pages/acoustic.aspx)

Data availability

Institutional availability: accessibility of the national database FRISBE is described in Proc_databases, data is made available as soon as possible after the survey, mostly within 2 months after the sampling has finished.

Public availability: data is made available via https://www.ices.dk/data/data-portals/Pages/acoustic.aspx, in general quickly after data have been made available on a national level, but at least before the post processing meeting of the survey takes place.

Reference to full documentation:

National manual: CVO_h_003: Damme, C. van, U. Beier, I. de Boois, D. Burggraaf, B. Couperus, R. van Hal, T. Pasterkamp, J. Vrooman, 2023. Handboek bestandsopnamen en routinematige bemonsteringen op het water. Versie 17, maart 2023. CVO rapport 23.002

International manuals:

Links to the latest version of the manual can always be found via https://www.ices.dk/community/groups/pages/wgips.aspx --> Link to manual

ICES 2015. SISP 9 - Manual for International Pelagic Surveys (IPS). Series of ICES Survey Protocols (2012–2020). Report. https://doi.org/10.17895/ices.pub.7582

Review frequency full documentation: national manual is annually reviewed; the update frequency of the international manual is unknown.
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