FACTSHEET: Research surveys acoustic Atlantic (Survey_acou_Atlantic)

Version: [v1, 02/02/2023]

Sampling protocol: Survey_acou_Atlantic

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

Start of sampling: 2004 (International Blue whiting spawning stock survey IBWSS)

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 working group on widely distributed species (WGWIDE). The main target species can be found in Table 1 in http://data.europa.eu/eli/dec_impl/2021/1168/oj. The most up to date insight in data use can be found in the advice sheets per species.

Sampling design and method

The survey takes place annually in March/April west of Ireland, and is coordinated by the ICES working group on international pelagic surveys (WGIPS). The survey is carried out by vessels from different countries. The EU contribution is done with a Dutch and an Irish research vessel. Other EU countries with a sampling obligation contribute financially, and in some cases with personnel.

The design has traditionally been aimed at reducing the effects of double counting of the northward migrating spawning aggregation. The overall design uses stratified transects with a random start (random latitude) to ensure transect coverage is not replicated but randomized between years. Survey stratification is based on statistical rectangles with a range of 1 degree in latitude and 2 degrees in longitude. The survey design follows a variable transect spacing, ranging from 30 nm in areas historically containing less dense aggregations, to 7.5 nm in the core survey area.

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 mounted in the drop keel of the research vessel. Several operating frequencies are used during the survey (18, 38, 120 and 200 kHz) for echotrace recognition purposes. The 38 kHz data is used to generate the abundance estimate. All frequencies are calibrated directly prior to and – sometimes - after the survey.

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 and their catch fraction is weighed. 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 head-set 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.

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 at evenly spread out stations up to a maximum depth of 1,100m in open water along survey tracks, maximally 30 nm apart.

In the lab
Otoliths are read on board from the whole otolith. After the survey, images are taken from the otoliths. The age information is added to the Billie file.

Post-processing data
Echo integration and further data analyses are carried out in national laboratories for the area they cover using MAREC LSSS.
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 dataportal (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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