

<b>Sampling protocol:</b> Survey_dem
<b>Sampling objective(s):</b> data collection for fishery-independent timeseries for by trawling
<b>Start of sampling:</b> 1969 (Sole Net survey SNS_NLD), 1970 (International bottom trawl survey IBTS_Q1, Demersal Young fish survey DYFS), 1985 (Beam trawl survey BTS)
<b>Sampling ongoing:</b> yes
<p><b>Data use</b></p> <p>Primary data use: data from commercial fish species as well as elasmobranchs is used as tuning series in single stock assessments. The data users are stock coordinators in ICES Herring assessment working group (HAWG) and ICES Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK), as well as ICES Working Group on Elasmobranch Fishes (WGEF). The main target species can be found in Table 1 in <a href="http://data.europa.eu/eli/dec_impl/2021/1168/oj">http://data.europa.eu/eli/dec_impl/2021/1168/oj</a>. It should however be noted that survey data of more species is used in stock assessments. The most up to date data use can be found in the advice sheets per species.</p> <p>Secondary users are OSPAR for the MSFD assessments, as well as the ICES Working Group on Integrated Assessments of the North Sea (WGINOSE).</p> <p>Other users are individual scientists or institutions interested in the fish and macrobenthos composition in the North Sea, Scheldt basins, and Wadden Sea.</p>
<p><b>Sampling design and method</b></p> <p>The surveys take place annually, and are all coordinated by an ICES working group. IBTS_Q1 is coordinated by the International bottom trawl survey working group, and the BTS, DYFS and SNS_NLD by the Working group on beam trawl surveys.</p> <p>Sampling design is described in detail in the (inter)national survey protocols. Gears are standardised, so the data per survey can be used as a timeseries. International spatial coverage has remained constant over time for DYFS, IBTS_Q1 and SNS_NLD. For BTS, the spatial coverage has been extended in 1998.</p> <p>In short, the trawl surveys follow the following stratifications:</p> <p>BTS: systematic, one or multiple hauls per ICES rectangle. In case of one haul per rectangle the location is in the centre of the rectangle. The survey covers the North Sea from the Belgian/Dutch border to the Moray Firth (Scotland). <a href="#">manual</a></p> <p>DYFS: fixed, hauls evenly spread over depth strata, per DYFS area. The survey covers the continental coast from the Belgian/Dutch border to Esbjerg (Denmark), as well as the Dutch Wadden Sea and Scheldt basins.</p> <p>IBTS_Q1: systematic, two hauls per ICES rectangle. <a href="#">manual</a></p> <p>SNS_NLD: fixed, stations on fixed positions along transects parallel with or perpendicular to the coast. The survey covers the nearshore areas from Scheveningen (Netherlands) to Esbjerg (Denmark).</p> <p>The beam trawl surveys BTS, DYFS and SNS are designed for demersal (mainly flatfish) species, and the used gears are mainly suitable for these. The IBTS_Q1 is designed for demersal (roundfish) species and for herring and sprat. During all surveys the complete catch composition is recorded.</p>

- The BTS gear is an 8 meter beam trawl rigged with 4 chains and 4 ticklers, and 40 mm mesh in the codend. In the central and western North Sea a flip-up rope is added to the gear, to prevent catching boulders.
- In the DYFS two sizes of beam trawls with 20 mm codend mesh are used: a 6 meter beam trawl with bobbin and one tickler and in the coastal zone, and a 3 meter beam trawl with a bobbin and one tickler in the Wadden Sea and Scheldt basins.
- During the IBTS\_Q1 an otter trawl is used, the so-called GOV ('Grand ouverture verticale') at daytime. At nighttime, ichthyoplankton sampling takes place (see Survey\_plankton\_NorthSea).
- The SNS\_NLD is conducted with a 6 meter beam trawl with 4 ticklers and 40 mm codend mesh.

### **Sampling protocol and data capture**

#### *In the field*

The trawl hauls are processed in a similar manner across the surveys: 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), cephalopods, *Cancer pagurus*, *Nephrops norvegicus*, *Homarus gammarus*, *Maja squinado*, *Lithodes maja*, *Crangon crangon* (DYFS only). Other species are counted and, depending on the survey, weighed. For a selection of species listed in the (inter)national protocols, biological information is collected; individual length, weight, sex and maturity information is collected and otoliths are taken.

Length measurements 'to the 1 cm or 0.5 cm (herring, sprat) below' 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 in-house developed software (TRIHIP/IHIP) to the exchange format required for Billie, so redundancy in data entry is minimised.

Individual length measurements 'to the mm below' 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 determined by opening the body cavity. Stomach samples are taken if relevant, see factsheet Stomach. Depending on the vessel, individual fish information is entered directly into Billie, or written down on paper and soon after entered to the Billie file with length measurements.

On each trawl station a measurement of temperature and conductivity (CTD) is taken. During IBTS\_Q1 and BTS a downcast with a Seabird CTD is done. During SNS\_NLD and DYFS a CTD (Valeport or Hydrolab) is attached to the net, registering temperature and conductivity during the haul. Turbidity is measured in the DYFS Wadden Sea and Scheldt basins using a CTD. Water transparency is measured using Secchi disks during DYFS, SNS\_NLD.

Seafloor litter is also sorted from the catch, see factsheet [Survey litter](#).

### *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 belonging to the concerning haul.

### *Post-processing data*

Billie files are not post-processed, only quality checked (see Data quality)

Post-processing of CTD information is described in a separate factsheet [Survey\\_CTD](#).

## **Data quality**

### *Quality assurance procedure*

Quality checks are conducted upon data 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) and consistency in text variables (e.g. station coding, crew members).

### *Quality checked parameters*

IBTS\_Q1, BTS, DYFS, SNS\_NLD:

- 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, temperature, salinity, water transparency;
- 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

### *Additional checks*

- IBTS\_Q1: door spread, kite dimensions, vertical net opening;
- BTS: number of chains in the gear

## **Data storage**

National database: Billie files are submitted to the national database FRISBE. The relevant aspects of this database are described in [Proc\\_databases](#).

International database: IBTS\_Q1, BTS, DYFS and SNS\_NLD data is stored in the ICES database DATRAS (<https://www.ices.dk/data/data-portals/Pages/DATRAS.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 submission deadlines for DATRAS can be found here: <https://www.ices.dk/data/data-portals/Pages/DATRAS-deadlines.aspx>

## **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 manuals can always be found via <https://www.ices.dk/data/data-portals/Pages/DATRAS-Docs.aspx> --> Survey manuals

- BTS: de Boois, I. J., Burt, G., Lecomte, J.-B., Masnadi, F., Panten, K., Raat, H., Sigurdsson, G. M., Thorlacius, M. 2023. ICES Survey Protocols – Offshore beam trawl surveys, coordinated by Working group on Beam Trawl Surveys (WGBEAM). ICES Techniques in Marine Environmental Sciences Vol. 69. 70 pp. <https://doi.org/10.17895/ices.pub.21603336>
- DYFS: international manual in progress (expected end 2023)
- IBTS\_Q1: ICES. 2020. Manual for the North Sea International Bottom Trawl Surveys. Series of ICES Survey Protocols SISP 10-IBTS 10, Revision 11. 102 pp. <https://doi.org/10.17895/ices.pub.7562>
- SNS\_NLD: international manual in progress (expected end 2023)

**Review frequency full documentation:** national manual is annually reviewed; the international manuals approx. every three years

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**Factsheet latest update:** 25/01/2023

**Factsheet latest review:** 25/01/2023