

ICES Eggs and Larvae Dataset

1 Background

Fish egg and fish larvae data have been collected in the ICES community for a long time for use in stock assessments and management of stocks and spawning areas. The collection of the data is generally organized by ICES coordinated international survey expert groups. In 2010 WGDIM acknowledged the lack of an international database that would store data collected in ichthyoplankton surveys conducted in the ICES community.

Therefore, an action plan was suggested for ICES Data Centre for creating such a database. In 2010-2011 such a database was developed by ICES Data Centre. The Eggs and Larvae database ensures storage of survey data on an international level, providing an overview of available fish egg and larvae survey data collected and providing a unified portal for scientific access to the ichthyoplankton survey data. Datasets from the surveys were provided to ICES by the responsible expert groups. The final stage of producing an operational database and online system were carried out by the ICES Data Centre.

2 Dataset Overview

This database contains data of mainly ICES coordinated international ichthyoplankton surveys. It consists of data from various ichthyoplankton surveys with different target species and spatial and temporal coverage. The database contains haul information data as well as the raw data on eggs and larvae.

Currently, the following data are stored in the database:

- North Sea cod and plaice egg surveys (2004, 2009)
The survey is aimed at studying cod and plaice spawning grounds by means of egg distribution in the North Sea. The program was steered by the WGEGGS until 2012 and is currently steered by WGEGGS2.
- Atlantic eel (*Anguilla anguilla* and *A. rostrata*) surveys (1902-2007)
The dataset includes data gathered from various surveys conducted in different times in North Atlantic. The surveys were focused on different stages of eel larvae and the spawning area in the Sargasso Sea. The ICES group in charge of the eel larvae data is WGEEL.
- The International Herring Larvae Surveys (1967-present)
The ICES programme of international herring larval surveys in the North Sea and adjacent areas is in operation since 1967. The main purpose of this programme is to provide quantitative estimates of herring larval abundance, which are used as a relative index of changes of the herring spawning-stock biomass in the assessment. The collection of the herring larvae data is the responsibility of WGIPS.
- Mackerel and horse mackerel eggs
A survey is carried out every 3 years in the north eastern Atlantic. The year after the Atlantic survey, a mackerel egg survey is conducted in the North Sea. The survey creates a basis for the stock assessment of Atlantic and

North Sea mackerel and management plan for Atlantic horse mackerel. The group responsible for the survey is WGMEGS.

Currently, the egg and larvae dataset has almost one million of measurements.

2.1 Quality assurance

As outlined in the WGDIM 2011 report, the working groups collecting the data on ichthyoplankton (WGEGGS, WGMEGS, IBTSWG, WGIPS) are responsible for the content and quality control. Therefore, each dataset is quality checked by the responsible ICES expert group.

3 Dataset and Database notes

3.1 Species name resolution and STAGE information

Currently, the WoRMS (World Register of Marine Species: <http://www.marinespecies.org>) species names are used in the Eggs and Larvae database. WoRMS is the taxonomic backbone of OBIS (Oceanbiogeographic Information System: <http://www.iobis.org>) and the Aphia IDs provide a mechanism through which it is possible to merge the ICES historical data with other worldwide marine databases. If a taxa could not be resolved to species level, it was resolved to the finest taxonomic level possible based on the taxonomic group information found in the survey documentation.

Stage information has been provided by the responsible expert groups. This field includes information on which developmental (egg/larvae) and maturity stage was recorded in the dataset. Appendix A provides details of the stages recorded in the database.

3.2 Working Group on North Sea Cod and Plaice Egg Surveys in the North Sea (WGEGGS)

The North Sea cod and plaice egg surveys have been conducted in 2004 and 2009 and will be continued in 2013 alongside the MIIK herring larvae sampling during the IBTS survey. The surveys were originally directed at cod and plaice, but also supply data of other winter spawning North Sea fish.

The surveys are conducted with Gulf III or VII plankton torpedo's, Bongo nets or CUFES. With the Gulf's and Bongo's double oblique hauls are conducted through the water column till 5m above the sea floor or a maximum of 200m depth. The CUFES sampling is a continuous sampling at 5m depth. The mesh size of all sampling equipment is 280 µm. During the sampling temperature and salinity are measured. Flowmeters are used to measure the amount of water filtered while sampling.

The database contains the haul information data, position, time, duration, water volume, depth, temperature and salinity. Eggs and larvae in the samples were counted. All eggs > 1mm were measured and identified to species where possible. Eggs < 1 mm are counted and in 2004 measured and identified as well. There is large overlap in size some gadoids, including cod, and other species, thus identification by eye is not possible. For these, genetic analysis was used to identify

the species. All eggs that are measured and identified were also staged following the stage descriptions in Appendix A. Larvae in the samples were identified to species, measured and development stage assigned.

WGEGGS and WGEGGS2 are the ICES EG responsible for these surveys and more information and analysis of the results can be found in the EG's reports on the ICES website. Results have also been published in various scientific journals:

Fox, C. J., Taylor, M., Dickey-Collas, M., Fossum, P., Kraus, G., Rohlf, N., Munk, P., et al. 2008. Mapping the spawning grounds of North Sea cod (*Gadus morhua*) by direct and indirect means. *Proceedings of the Royal Society B: Biological Sciences*, 275: 1543-1548.

Taylor, N., Fox, C. J., Bolle, L., Dickey-Collas, M., Fossum, P., Kraus, G., Munk, P., et al. 2007. Results of the spring 2004 North Sea ichthyoplankton surveys. The distribution of fish eggs and larvae from the international ichthyoplankton survey. 60 pp pp.

Munk, P., Fox, C. J., Bolle, L. J., Damme, C. J. G. v., Fossum, P., and Kraus, G. 2009. Spawning of North Sea fishes linked to hydrographic features. *Fisheries Oceanography*, 18: 458-469.

Damme, C. J. G. v., Bolle, L. J., Fox, C. J., Fossum, P., Kraus, G., Munk, P., Rohlf, N., et al. 2009. A reanalysis of North Sea plaice spawning-stock biomass using the annual egg production method. *ICES J. Mar. Sci.*, 66: 1999-2011.

Nash, R. D. M., Wright, P. J., Matejusova, I., Dimitrov, S. P., O'Sullivan, M., Augley, J., and Höffle, H. 2012. Spawning location of Norway pout (*Trisopterus esmarkii* Nilsson) in the North Sea. *ICES Journal of Marine Science: Journal du Conseil*, 69: 1338-1346.

3.3 Atlantic eel (*Anguilla anguilla* and *A. rostrata*) larvae database in ICES

In this database you can find data on eel larvae (leptocephalus and glass eel) catches by haul collected at scientific cruises in the North Atlantic including the Sargasso Sea, since 1902. The database contains e.g. the data collected by Johannes Schmidt at his famous expeditions in the 1920s to the Sargasso Sea, revealing that this is the spawning place for eel. Catches are given in number by length and species, *A.a* or *A.r*, often determined by myomer/vertebrae counts, for each haul as well as technical details of the hauls including gear type, mesh size, depth fished, etc.

The data has been collated from the literature in an Excel file by J. D. McCleave, USA. He has kindly allowed ICES to publish the database on the ICES Homepage, for the benefit of ICES' and other scientists. The ICES Data Centre has transferred the Excel data into the ICES database format, which allows a multitude of extraction facilities to be applied to the data.

A technical note on the data from J.D. McCleave can be found at appendix B.

Results have also been published in various scientific journals, see appendix B for a list of references.

3.4 The International Herring Larvae Surveys

The ICES programme of international herring larval surveys in the North Sea and adjacent areas, is in operation since 1967. The main purpose of this programme is to provide quantitative estimates of herring larval abundance, which are used as a relative index of changes of the herring spawning-stock biomass in the assessment. The larvae surveys are carried out in specific periods and areas, following autumn and winter spawning activity of herring from north to south. Catch data together with specific information like haul position, survey area etc. are reported to the ICES International Herring Larvae database annually. The database contains information about the surveys conducted since 1972.

3.5 The Mackerel and Horse Mackerel Egg Surveys

The working group on mackerel and horse mackerel egg surveys (WGMEGS) coordinates the Mackerel and Horse Mackerel Egg Survey in the Northeast Atlantic and the Mackerel Egg Survey in the North Sea, both of which are carried out triennially. Egg data collected from both surveys provide an estimate for the strength of the SSB of both the western and North Sea stocks of Atlantic mackerel (*Scomber scombrus*) and a relative abundance index of horse mackerel (*Trachurus trachurus*) spawning stocks in the Northeast Atlantic. The surveys are divided into 3 geographical component areas, the western, southern and the North Sea. In the western area the mackerel egg survey has been running continuously on a triennial basis since 1977 and since 1992 has also sampled the southern spawning component. It typically takes place between February and July and aims to cover the entire spawning area from Cadiz in the south up as far as NW Scotland in the North and since 2010 up to the waters around the Faroe Islands and southeast of Iceland. The egg survey in the North Sea has been running since 1968.

A comprehensive description of the survey protocols, analysis techniques together with the methods used for calculating the egg abundance estimates can be found in the WGMEGS survey manual which is contained within Annex 5 of the 2012 WGMEGS.

4 GIS Mapping Facility

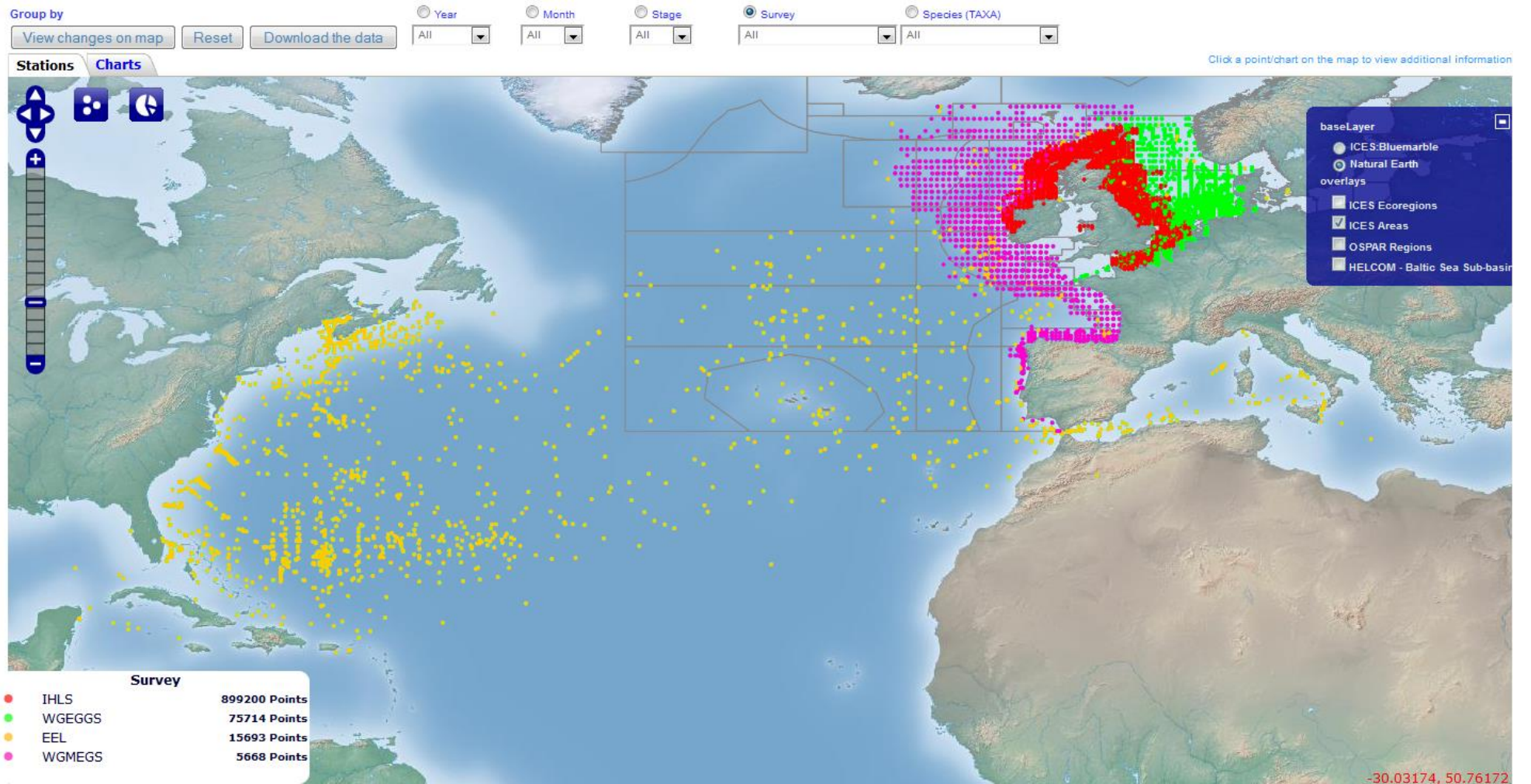


Figure 2 – A screenshot showing measurements collected (Grouped by Survey).

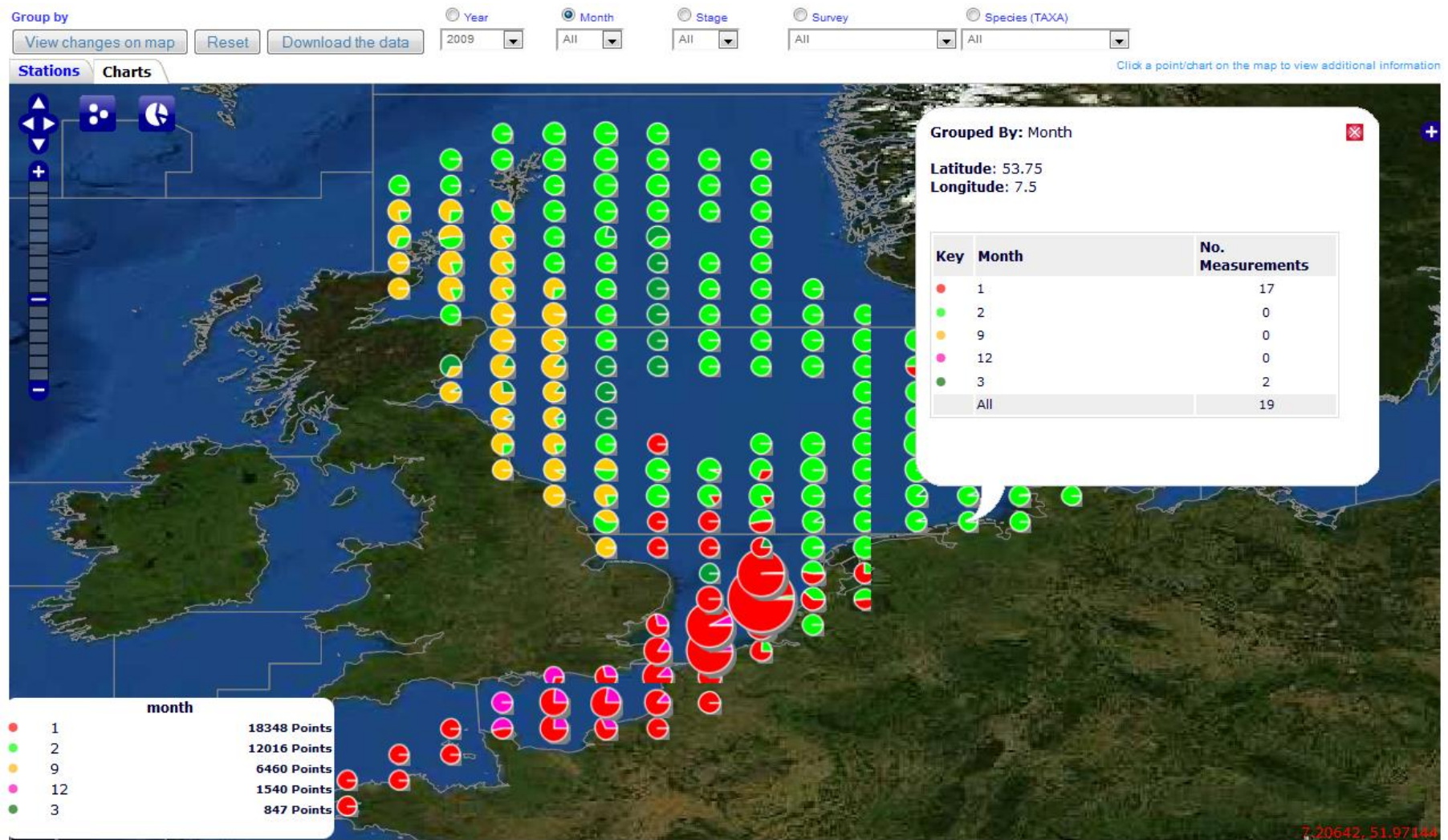


Figure 3 – A screenshot showing measurements collected during 2009 as aggregated Charts (Grouped by Month).

5 Acknowledgments and data citation

5.1 Data Citation

Please acknowledge Eggs and larvae dataset as well as the relevant survey when using the data:

ICES. Atlantic Anguilla surveys (1863-2007). Available online at <http://eggsandlarvae.ices.dk>. Consulted on 2012-05-26.

Names of the surveys to cite can be found on the Eggs and Larvae page, upon download, or in this document.

Please refer to the ICES Data policy for terms and conditions of data usage and rights. <http://info.ices.dk/datacentre/datapolicy.asp>

5.2 Acknowledgements

ICES is very thankful to the following Expert groups and individuals for their participation in this project:

ICES WGDIG
ICES WGEEGS
ICES WGEEL

6 Appendices

Appendix A

| Code | Description | CodeGroup |
|----------|---|-----------|
| EG | Egg | STAGE |
| EL-EG_1 | E&L surveys: egg - combination of stages 1A and 1B | STAGE |
| EL-EG_1A | E&L surveys: egg from fertilisation until cleavage produces a cell bundle where ind.cells are invisible | STAGE |
| EL-EG_1B | E&L surveys: egg formation of blastodisc and subsequent thickening at one pole | STAGE |
| EL-EG_2 | E&L surveys: egg from the first sign of primitive streak until closure of blastopore | STAGE |
| EL-EG_3 | E&L surveys: egg growth of embryo from 1/2 to 3/4 around egg circumference | STAGE |
| EL-EG_4 | E&L surveys: egg growth of embryo from 3/4 to full egg circumference | STAGE |
| EL-EG_5 | E&L surveys: egg growth of embryo until the tail touches the nose or beyond | STAGE |
| EL-EG_U | E&L surveys: egg stage unknown | STAGE |
| EL-LV_1 | E&L surveys: nephrops larvae rudimentary pleopods present but no supra-orbital spines | STAGE |
| EL-LV_2 | E&L surveys: nephrops larvae supra-orbital spines appear but no uropods | STAGE |
| EL-LV_GE | E&L surveys: glass eels (eels) | STAGE |
| EL-LV_LC | E&L surveys: leptocephalus (eels) | STAGE |
| IM | Immature/sub-adult | STAGE |
| JV | Juvenile | STAGE |
| LV | Larvae | STAGE |

Appendix B

Explanation of Atlantic *Anguilla* database (metadata)

Prepared by J. D. McCleave, March 2011

- I. Organization of the Excel workbook "Atlantic *Anguilla* database;" the workbook database contains four Excel spreadsheets.
 - A. *Anguilla anguilla* leptocephali.
 1. This sheet contains all leptocephali with ≥ 112 myomeres or assumed to have ≥ 112 myomeres and considered to be *A. anguilla*, records of 22,612 specimens.
 - a) J. Schmidt labeled specimens with 112 myomeres as *Anguilla* sp. (cited in Boëtius and Harding (1985a,b).
 - b) Boëtius and Harding (1985a) and other recent authors also included specimens with ≥ 112 myomeres as *A. anguilla* in their tabulations.
 - B. *Anguilla anguilla* glass eels, records of 63 specimens.
 1. The intent was to include glass eels captured at sea, but no attempt was made to verify that the positions recorded are in fact in the sea as opposed to in estuaries.
 - C. *Anguilla rostrata* leptocephali.
 1. This sheet contains all leptocephali with ≤ 110 myomeres or assumed to have ≤ 110 myomeres and considered by all authors to be *A. rostrata*, 9633 records of specimens.
 2. This sheet also contains all leptocephali with 111 myomeres and considered to be intermediate and determined only as *Anguilla* sp., records of 101 specimens.
 - a) Boëtius and Harding (1985a) (and J. Schmidt) considered leptocephali with 111 myomeres to be *A. rostrata*.
 - b) Smith (1968) listed the myomere range for *A. rostrata* as 104-111 and that for *A. anguilla* as 111-119, indicating ambiguity at 111 myomeres. His list of 298 *A. rostrata* with myomeres counted contained no specimens with 111 myomeres.
 - c) Smith (1989) described *A. rostrata* as having "ca 103-111" myomeres and *A. anguilla* as having "112-119."

- d) However, Scoth and Tesch (1982), Kleckner et al. (1985), Kleckner and McCleave (1985), and Tesch and Wegner (1990) all considered leptocephali with 111 myomeres to be intermediate, i.e., *Anguilla* sp. designated as "I." That convention is used in this database.
- 3. This sheet also contains all leptocephali whose identity could not be established, usually because of specimen damage, i.e., *Anguilla* sp. designated as "U," records of 184 specimens.
- D. *Anguilla rostrata* glass eels, records of 285 specimens.
 - 1. The intent was to include glass eels captured at sea, but no attempt was made to verify that the positions recorded are in fact in the sea as opposed to in estuaries.

II. Explanation of spreadsheet column headings and column data.

- A. AGENCY/PERSON (col. A).
 - 1. When known, the name of the collector or holder of collections appears in this column.
 - 2. The designation "Danish" is applied to data tabulated in Boëtius and Harding (1985a) before the time of involvement Johannes Schmidt and after Schmidt's last research cruise.
 - 3. "NMFS" refers to collections made by the U.S. National Marine Fisheries Service.
 - 4. "Misc MCZ" refers to miscellaneous specimens housed at the Museum of Comparative Zoology at Harvard University (Cambridge, Massachusetts, USA).
 - 5. "Huntsman/ARC" refers to collections held at the Atlantic Reference Centre a collaboration between the Canadian Department of Fisheries and Oceans and the Huntsman Marine Science Centre (St. Andrews, New Brunswick, Canada).
 - 6. "WHOI" refers to collections not attributable to a person but made by scientists at the Woods Hole Oceanographic Institution (Woods Hole, Massachusetts, USA).
- B. SHIP/(Person) (Col. B).
 - 1. If known, the ship on which the specimens were collected is given.
 - 2. If a person collected specimens and transferred them to a collection identified in Col. A, the collector's name appears in parentheses. For example, G. Trombetta collected many specimens of *Anguilla anguilla* from shore and transferred these to J. Schmidt.
- C. CRUISE NUMBER (Col. C).
 - 1. If known, the ship's designated cruise number is given.
- D. STATION OR COLLECTION NUMBER (Col. D).
 - 1. If known, the ship's station number is included.

2. Alternatively, the repository's collection number is included.
 3. For the HUNTSMAN/ARC collections, the ARC catalog number (x) and the Huntsman field collection number (y) are given in the format xxxx/yyyy. Partial information is given as xxxx/ or /yyyy.
- E. LATITUDE and LONGITUDE (Cols E-J).
1. Latitude in degrees, latitude in minutes, North latitude, longitude in degrees, longitude in minutes, and East or West longitude of a tow's starting position are given in consecutive columns.
 2. If positions are approximate or estimated, that is noted in the COMMENTS (Col. AB).
- F. START DATE (Col. K).
1. The starting date of a tow, if known, is given in the format yyyy-mm-dd.
 2. If start date is known only to month or year, Col. K is left blank and partial date information is noted in the COMMENTS (Col. AB).
- G. START TIME (Col. L).
1. The starting time of a tow, if known, is given in 24-hour format hh:mm.
- H. LOC/UTC (Col. M).
1. Start time is designated as local time where the collection was made (LOC) or as Coordinated Universal Time (UTC), essentially equivalent to Greenwich Mean Time.
 2. In many cases, times recorded were not readily identified as LOC or UTC and the column is left blank.
- I. DURATION (Col. N).
1. Duration of a tow, if known, is given in minutes.
- J. SERIES NUMBER (Col. O).
1. If multiple tows were made at a station or if multiple nets were used on a single tow, series numbers may have been assigned to designate the multiplicity.
 2. Most, but not all, series numbers are attributable to the collections of J. Schmidt.
- K. MAX WIRE OUT (Col. P).
1. The maximum length of towing wire spooled out on a tow is given in meters if known from station data.
 2. If tows were stepped to fish at different depths, the maximum wire out is recorded in Col. P.
 3. Most, but not all, records of wire out are attributable to the collections of J. Schmidt and to other Danish collections.
- L. MAX DEPTH (Col. Q).

1. The maximum depth of a tow is given in meters if known from station data.
 2. If tows were stepped to fish at different depths, the maximum depth is recorded in Col. Q.
- M. GEAR TYPE (Col. R).
1. Abbreviations for the types of collecting gear used are in this column.
 2. Insofar as possible, original designations by the collectors are used even though similar gear may have been designated differently by different collectors. For example, Schoth and Tesch (1982) described the Hamburger Planktonnetz (HP) as a modified Isaacs-Kidd Midwater Trawl (IKMT).
 3. Descriptions of the gear types are in section III of this document.
- N. SPECIES CODE (Col. S).
1. "A" designates *A. anguilla*.
 2. "R" designates *A. rostrata*.
 3. "T" designates *Anguilla* with 111 myomeres, here considered intermediate and included in the *A. rostrata* spreadsheet.
 4. "U" designates *Anguilla* that could not be identified to species, usually because of damage to the specimen and included in the *A. rostrata* spreadsheet.
- O. TOTAL LENGTH (Col. T).
1. Total length, if known, is given in millimeters.
- P. FREQ (Col. U).
1. The number (frequency) of individuals of the same total length (and the same number of myomeres (Col. W), if applicable) in a tow or other collection.
- Q. META (Col. V).
1. "m" designates a specimen described by the collector as metamorphosing from leptocephalus to glass eel.
- R. NUMBER OF MYOMERES (Col. W).
1. The total number of myomeres is given if known.
 2. In many cases, especially those attributable to J. Schmidt, the myomeres were only counted sufficiently to determine the species, i.e., myomeres were not counted exactly. Discussion of this point is in Boëtius and Harding (1985b).
- S. SURFACE TEMPERATURE (Col. X).
1. Surface temperature in degrees Celsius is given if known.
- T. SURFACE SALINITY (Col. Y).
1. Surface salinity is given if known.
- U. PRIMARY REFERENCE (Col. Z).
1. The primary reference is the main source of the data pertaining to the leptocephali.

2. The primary reference may also contain that data pertaining to the station.

V. SECONDARY REFERENCES (Col. AA).

1. The secondary references may be the main source of the data pertaining to the station.

a) For example, J. Schmidt published separate papers with great detail on the stations sampled on his major cruises.

b) For example, Tesch (1982) published the station data accompanying Schoth and Tesch (1982) and other papers on the distribution of leptocephali.

2. The secondary references may also contain original sources of data, where a better tabulation is cited as the primary reference.

W. COMMENTS (Col. AB).

1. Comments are used sparingly to provide explanation of situations not easily accommodated in the formats of other columns, e.g., incomplete collection dates and non-ship collections.

III. Key to gear types abbreviated in column R of the database.

| Gear symbol | Gear name | Mesh size(s), cm | Example literature source(s) |
|-------------|--|--------------------|------------------------------|
| Bongo | Bongo zooplankton sampler | 0.05 | Schnack et al. (1994) |
| EMT | Engel midwater trawl | | Kleckner et al. (1985) |
| SmHP | Hamburger Planktonnetz, 2.1 m ² , a modified IKMT | 0.085 | Schoth and Tesch (1982) |
| HP | Hamburger Planktonnetz, 6.2 m ² , a modified IKMT | 0.05 | Schoth and Tesch (1982) |
| 1.8MIKMT | Isaacs-Kidd midwater trawl, 1.8 m | | L. Van Guelpen (pers. com.) |
| 2MIKMT | Isaacs-Kidd midwater trawl, 2 m | | D. G. Smith (pers. com.) |
| 3MIKMT | Isaacs-Kidd midwater trawl, 3 m | 6.4, 1.3, 0.075 | Backus et al. (1969) |

| | | | |
|--------|--|--|--|
| | | 0.05 0.165 | Kleckner et al. (1983) McCleave and Kleckner (1987) |
| IKMT6 | Isaacs-Kidd midwater trawl, 6 m ² | 0.03 | Schnack et al. (1994) |
| MMT | Marinovich midwater trawl | 1.3, 0.38, 0.075 | Backus et al. (1969) |
| MKTN | Modified krill trawl net, 15.7 m ² | Cod end = 0.45 | Bast and Strehlow (1990) |
| MOC | Multiple opening-closing net, 1.4 m ² | | Schoth and Tesch (1982) |
| 10MMOC | Multiple opening-closing net, 10 m ² | 0.3 | Wiebe et al. (1976) Ring Group (1981) |
| 1MNN | Neuston net, 1 m ² | | Kleckner et al. (1985) |
| PELIK | Pelagic trawl with an IKMT mounted within | | van Utrecht and Holleboom (1985) |
| PPT | Pelagic trawl, Peterson | | Boëtius and Harding (1985a) |
| RMT1+8 | Rectangular midwater trawl, opening and closing, 1 m ² and 8m ² | 1 m ² = 0.032 8 m ² = 0.45, 0.1 | van der Spoel (1981) |
| 10MRMT | Rectangular midwater trawl, 10 m ² | | Kleckner et al. (1985) |
| C130 | Ring net, 1.3-m diam. | | Boëtius and Harding (1985a) |
| 0.3MRN | Ring net, 0.3-m diam. | | Eldred (1968) |
| 0.5MRN | Ring net, 0.5-m diam. | 0.0175 | Eldred (1968) |
| 1MRN | Ring net, 1-m diam. | | Kleckner et al. (1985) |
| 2MRN | Ring net, 2 m diam. | 0.05 or 0.165 | Castonguay and McCleave (1987) |

| | | | |
|--------|---|-------|---|
| MIK2 | Ring net, 3.5-m diam. | 0.056 | Munk et al. (2010) |
| 3MRN | Ring net, 3-m diam. | | Boëtius and Harding (1985a) |
| E300 | Ring net, 3-m diam. | | Schmidt (1929) |
| 1MCC | Ring net, cheese cloth, 1-m diam. | | Bowman (1913) |
| PS150 | Ring net, silk and stramin, 1.5-m diam. | | Schmidt (1919) |
| P150 | Ring net, silk, 1.5-m diam. | | Schmidt (1919, 1929) |
| P100 | Ring net, silk, 1-m diam. ^a | | Schmidt (1929) |
| S150 | Ring net, stramin, 1.5-m diam. | | Schmidt (1919, 1929) |
| S100 | Ring net, stramin, 1-m diam. ^b | | Schmidt (1919, 1929) |
| S200 | Ring net, stramin, 2-m diam. | | Schmidt (1919, 1929) |
| 0.5MS | Silk net, 0.5-m diam. | | Lea (1913) |
| 0.75MS | Silk net, 0.75-m diam. | | Lea (1913) |
| 1MS | Silk net, 1-m diam. | | Lea (1913) |
| 12FS | Silk net, 30.5-cm diam. fine | | Bowman (1913) |
| ST | Small trawl | | Bowman (1913) |
| 1.8MTT | Tucker trawl, 1.8 m | | Kleckner et al. (1985) |
| TT22 | Tucker trawl, 2 m x 2 m | | Ross et al. (2007) |
| YFT | Young fish trawl | | Bowman (1913), Lea (1913) |
| Y200 | Young fish trawl, 2-m diam. | | Schmidt (1929) Boëtius and Harding (1985a) |

| | | | |
|-----------|-------------------------------|--|-----------------------------|
| Y330 | Young fish trawl, 3.3-m diam. | | Boëtius and Harding (1985a) |
| PYFT | Young fish trawl, Peterson | | Bowman (1913) |
| 6ftx1in | (uncertain) | | Boëtius and Harding (1985a) |
| 1.5ftx1in | (uncertain) | | Boëtius and Harding (1985a) |

IV. Literature cited in Atlantic *Anguilla* database and in this document.

Backus, R. H., and J. E. Craddock. 1977. Data report for Atlantic pelagic zoogeography. Report number WHOI-77-4. Pp. 1-87. Woods Hole Oceanographic Institution, Woods Hole, Massachusetts.

Backus, R. H., and J. E. Craddock. 1980. Midwater fish data report: Cold core rings time series cruises Knorr 62, 65, and 71 and Endeavor 11. Report number WHOI-80-18. Pp. 1-187. Woods Hole Oceanographic Institution, Woods Hole, Massachusetts.

Backus, R. H., J. E. Craddock, R. L. Haedrich, and D. L. Shores. 1969. Mesopelagic fishes and thermal fronts in the western Sargasso Sea. *Marine Biology* 3:86-106.

Backus, R. H., G. W. Mead, R. L. Haedrich, and A. W. Ebeling. 1965. The mesopelagic fishes collected during cruise 17 of the R/V/ Chain, with a method for analyzing faunal transects. *Bulletin of the Museum of Comparative Zoology* 134:139-158.

Bast, H.-D., and M. Klinkhardt. 1987. Distribution of some mesopelagic fishes in the Iberian Basin (eastern central North Atlantic)-Part 1. *Wissenschaftliche Zeitschrift der Wilhelm-Pieck-Universität Rostock* 36:57-62.

Bast, H.-D., and B. Strehlow. 1990. Length composition and abundance of eel larvae, *Anguilla anguilla* (Anguilliformes: Anguillidae), in the Iberian Basin (northeastern Atlantic) during July-September 1984. *Helgoländer Meeresuntersuchungen*. 44:353-361.

Beebe, W. 1931a. Bermuda oceanographic expeditions 1929-1930. Introduction. *Zoologica* XIII(1):1-14.

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- Boëtius, J., and E. F. Harding. 1985b. A re-examination of Johannes Schmidt's Atlantic eel investigations. Dana 4:129-162.
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Appendix C

Download field description

| Name of the field | Description |
|----------------------------|--|
| ID | Identifier |
| DateTime | Date of sampling |
| Latitude | Latitude, Station position |
| Longitude | Longitude, Station position |
| HaulLat | Hauling latitude in decimal degrees |
| HaulLon | Hauling longitude in decimal degrees |
| Stage | Eggs and Larvae stage |
| Species | Species latin name using WORMS vocabulary |
| Survey | The survey name |
| Num. counted | number of eggs counted |
| Length | Lenght |
| Volume Filter Internal | filtered volume internal flow meter |
| Volume Filter External | filtered volume external flow meter |
| Haul Num. | unique code for merging with haul data, derived from yearshipcruisehaul |
| Sample Num. | Haul number |
| Country | Country |
| Ship | Ship |
| Aperture | Aper = Aperture of mouth of gear in mm |
| E/W | E/W, Station position |
| FlowMeter Int. Calibration | calibration internal flow meter |
| FlowMeter Revs Int. | internal flow meter revolutions |
| FlowMeter Ext. Calibration | calibration external flow meter |
| FlowMeter Revs Ext. | external flow meter revolutions |
| Water Depth | Water depth (m) |
| Max Sampling Depth | The maximum depth of a tow is given in meters if known from station data |
| Haul Depth | maximum sampler depth in water column(m) |
| Haul Duration | Duration of a tow, if known, is given in minutes |
| NoMeas | Number of larvae measured from that sample |
| MeasYolk | Number of yolk-sac larvae measured from that sample |
| TotMeas | Number of total larvae measured from that sample |

| | |
|------------------------|--|
| Caught | Number of larvae caught in that sample |
| CaugYolk | Number of yolk-sac larvae caught in that sample |
| TotCaug | Number of total larvae caught in that sample |
| TotPerm2 | Total number of larvae per square meter |
| AbSmall | Number of larvae < 10 mm per square metre (<11 mm in Southern North Sea) |
| AbMedium | Number of larvae 10-15 mm per square metre (11-16 mm in SNS) |
| AbLarge | Number of larvae > 15 mm per square metre (> 16 mm in SNS) |
| AbYolk | Number of yolk-sac larvae per square metre |
| Area-code | Area-Code |
| Period | Nation and Sampling period |
| Sampling Period | Survey Time, Sampling period |
| Temp max sampler depth | Water temperature at maximum sampler depth |
| ICES Rec. Code | ICES rectangle and position code |
| Agency/Person | Can be an Agency or a person |
| Ship/Person | Can be the ship or a person |
| Cruise Number | If known, the ship's designated cruise number is given |
| Original SampleID | unique code for merging with haul data, derived from year ship cruise haul |
| Station Number | The station Number |
| Series Number | If multiple tows were made at a station or if multiple nets were used on a single tow, series numbers may have been assigned to designate the multiplicity |
| Wire Out | The maximum length of towing wire spooled out on a tow is given in meters if known from station data. |
| Meta | designates a specimen described by the collector as metamorphosing from leptocephalus to glass eel. |
| Primary Reference | The primary reference is the main source of the data pertaining to the leptocephali |
| Secondary Reference | The secondary references may be the main source of the data pertaining to the station |
| Num. of Myomeres | Number of Myomeres |
| Gear | gear efficiency |
| Net Opening | diameter of nosecone/intake |
| Temperature at surface | temperature at surface (5 m) |
| Temperature at 20m | temperature at 20m |
| Temperature at 50m | temperature at 50m |
| Temperature at 100m | temperature at 100m |
| Sub factor | Raisor factor |
| Salinity | Surface salinity |
| Salinity at 20m | Salinity at 20 m |

| | |
|------------------------|--|
| Bottom salinity | Bottom Salinity |
| DayNight | DayNight |
| Statrec | ICES sub divisions |
| haulval | HaulVal |
| bycspecreccode | By catch species |
| stdspecreccode | Standard species catch |
| speedwater | speed through the water |
| winddir | Wind direction |
| windspeed | Wind speed |
| thermocline | Thermocline |
| thclinedepth | depth of thermocline |
| Gear count | Num. Of gears |
| Gear Type | Gear Type |
| CTD model | CTD Model |
| Mesh size | mesh size of the net |
| Flow meter type | Flow meter type |
| Sub sample instruments | Sub sample instruments |
| Haul distance | Haul distance |
| Gear efficiency | gear efficiency |
| Identification | method of species identification (visual, geneprobe, etc.) |
| Preservation | Preservation of Samples |
| Diameter oil globule | diameter of the oil globule |
| Oil globules present | oil globules present/absent |
| Number oil globules | number of oil globules |
| Notes | comments |