Grant Agreement no: 817669

Acronym: MEESO

Project title: Ecologically and economically sustainable mesopelagic fisheries

H2020 project
Call: H2020-BG-2018-2020 (Blue Growth)
Topic: LC-BG-03-2018

Starting date: September 1, 2019
Duration: 48 months

D1.1

Title: Report on available data standards per data type

Date: April 2020

Organization name of lead participant for this deliverable:
International Council for the Exploration of the Sea (ICES)

Dissemination level		
PU	Public	X
CO	Confidential, only for members of the consortium (incl. the Commission Services)	

Deliverable number:	D1.1
Deliverable title:	Report on available data standards per data type
Work package:	WP1
Lead participant:	ICES

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Keywords
Mesopelagic fisheries, Acoustic survey, Trawl survey, data management, meta-data catalogue

Executive Summary
The Data management workshop is part of the MEESO project task 1.1-Identification of appropriate data standards and 1.2-Establish a meta-data catalogue for data resources. The objective of the workshop was to review and consolidate a model for storing and extracting acoustic, biotic and hydrography data at the ICES Data Centre. ICES Data Centre will support the submission, processing and storage of this data in the ICES-coordinated Acoustic Surveys database and Oceanography database. During the first day of the workshop, the Acoustic portal was introduced to the participants, the basic structure, the data model as well as the main data flow for data submissions, including an introduction to the ICES Vocabularies and basic concepts of data validation. Afterwards, the formats of both acoustic and biotic formats submitted to this database were explained in detail, and some tests files were used as case studies for problem solving during data validation. The Oceanographic database was presented to participants.

During the second day of the workshop, Cruise Summary Report for reporting field experiments cruises was introduced. The ICES metadata catalogue was presented along with guidelines on how to insert new metadata records, how to validate them and make them INSPIRE compliant.

In the workshop the ICES Data Centre staff went through several hands-on exercises of data file preparation and error identification and solving in order to prepare participants to better deal with their own submissions.

The ICES Data Centre in partnership with the MEESO project is working to facilitate a data collection and provide metadata information of the data, this is the part of the deliverables D1.1 Report on available data standards per data type. This workshop has been a ground work for Following major task of D1.2 and D1.3 for metadata catalogue for data resources and transferring data to international data collection. In order to ensure a smooth transition from data collection to a submission with international data standards to ensure consistency of quality most of the aspect considered in this workshop.

During the workshop several action points were defined for all the project partners related to identifying the different data types they will be dealing with and to homogenize the structure for the records in the ICES metadata catalogue.

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1. ICES Acoustic Trawl Data Portal

Data Portal

Figure 1 shows a schematic view of the ICES Acoustic Trawl Data Portal where processed acoustic data (acoustic data associated to an acoustic category) and associated biotic trawl data gets uploaded into the ICES Acoustic Database.
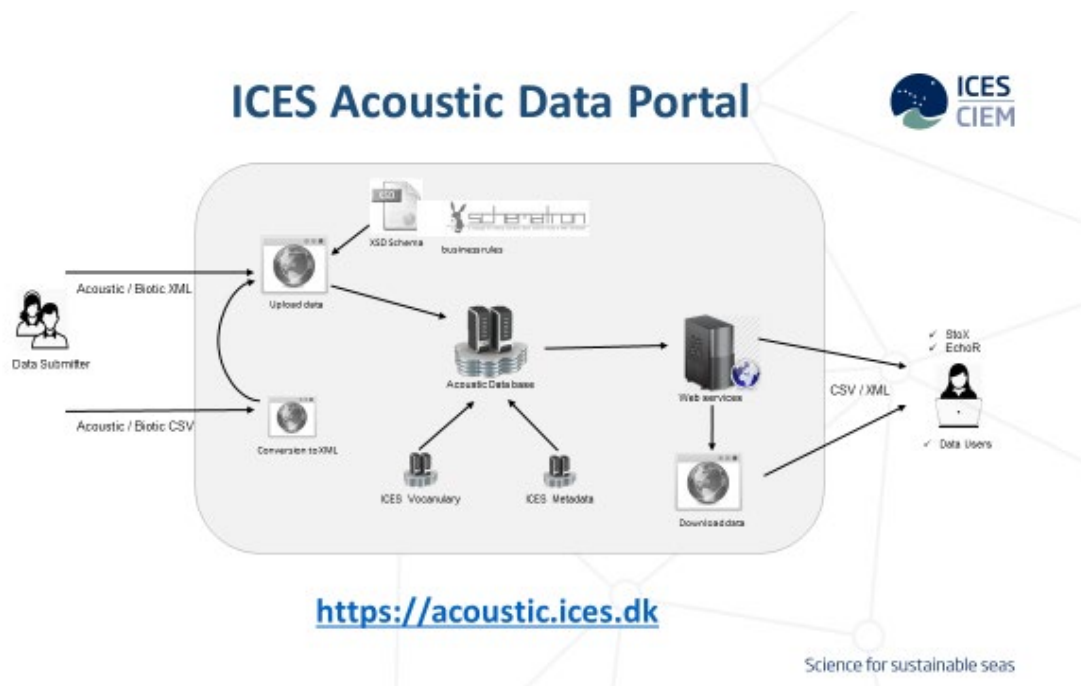
Figure 1 ICES Acoustic Data Portal

Data can be uploaded as either CSV or XML and gets converted/validated on the fly using XSD schemas and schematron rules as well as controlled vocabularies. The controlled vocabularies are managed through ICES vocabulary server while metadata are served through ICES metadata catalogue. Output from the system is data files that can be directly passed into the abundance indices estimation software's like StoX and EchoR.

Data Format

The acoustic data format consists of two parts – an Acoustic and a Biotic part. The acoustic part of the format is based on the SISP 4 – *A metadata convention for processed acoustic data from active acoustic systems* developed by ICES Working Group on Fisheries Acoustics, Science and Technology (WGFAST), while the biotic part of the format is based on the ICES Database of Trawl Surveys (DATRAS).

The data format description can be found as a link from the acoustic portal or by the direct link https://ices.dk/marine-data/Documents/Acoustic/ICES_Acoustic_data_format_description.zip

Data Model

ICES Acoustic data model is illustrated in Figure 2.

The Acoustic part of the data format consists of six record types: the five metadata record types *Instrument*, *Calibration*, *Data Acquisition*, *Data Processing*, and *Cruise*; and one data record type *Data*, which is the combination of Log, Sample and Data entities in the data model below. Metadata record EchoType in the model is optional, and is used only if the *Data* record is reported with EchoTypes. When the SaCategory is used for data reporting, the record EchoType should be excluded from the reporting format.
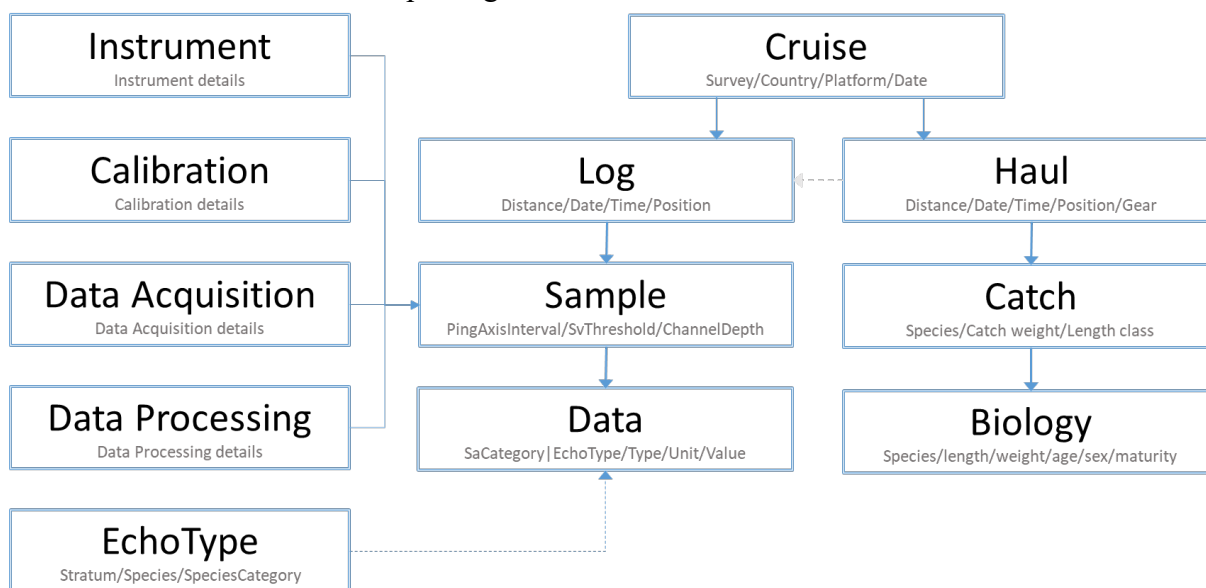
Figure 2 ICES Acoustic Data Model

The Biotic part of the data format consists of four record types: one metadata record *Cruise*; and three data record types *Haul*, *Catch*, and *Biology*.

Controlled Vocabularies

Both the acoustic and the biotic parts of the format contain fields that rely on controlled vocabularies. The vocabularies are accessible via the ICES vocabulary server https://vocab.ices.dk. If a given code does not exist, or if code relations are missing in the related vocabulary lists, an error will be raised during validation. A new vocabulary item and an associated code, or a code relation can be requested via acoustic@ices.dk.

Data Validation

Besides validation against controlled vocabularies a number of validation rules are applied and tested for during data submission. These consist of a mixture of CSV, XSD and Schematron rules which both can be general or specific in nature towards a given surveys. All current validation rules can at any time be viewed through https://acoustic.ices.dk/validationrules and new validation rules can be created as seen fit.

Data Submission

Acoustic and Biotic data within the Acoustic database can be managed through the Acoustic portal at https://acoustic.ices.dk/submissions (Figure 3).

Survey Code	Country Code	Platform Code	Start Date	End Date	Cruise localID	Acoustic Submission Date	Biotic Submission Date
Select Filt	Select Filt	Select Filt			Select Filter		
PELTIC	GB	74E9	2018-10-16	2018-10-22	CEND2018	2018-12-10 17:18	
CSHAS	IE	45CE	2018-10-09	2018-10-25	45CE2018CSHAS	2018-11-15 10:32	2018-12-17 16:06
6aSPAWN	NL	64T2	2018-09-12	2018-09-18	NL6aSPAWN2018	2018-11-22 01:41	2018-11-21 12:36
WESPAS~H…	IE	45CE	2018-07-03	2018-07-24	45CE2018WESPAS_2	2018-12-03 10:09	2018-08-15 16:55
HERAS	GB-SCT	748S	2018-06-29	2018-07-19	0918S	2018-12-03 17:33	2018-12-02 15:51
HERAS	DE	06SL	2018-06-29	2018-07-19	06SL750	2018-11-28 17:17	2018-12-05 13:58
HERAS	NL	64T2	2018-06-25	2018-07-20	NLHERAS2018	2018-12-01 17:30	2018-12-17 15:05
HERAS	DK	26D4	2018-06-25	2018-07-10	26D4201806	2018-11-06 11:31	2018-12-03 14:22
WESPAS	IE	45CE	2018-06-10	2018-06-28	45CE2018WESPAS_1	2018-08-02 18:45	2018-07-19 10:44
BASS	EE	67BC	2018-05-25	2018-05-31	67BC714201805		2019-01-09 07:45

Go to page: 1 Show rows: 10 1-10 of 70 ◀ ▶

Submit file

Figure 3 Browse submissions

In the submission process, a submitted XML file will be validated directly against the XML schema and schematron rules, while a submitted comma-separated file will be converted on the fly into the XML format to allow validation.

Files that successfully pass the data validation can be uploaded to the Acoustic Database. If validation for some reason fails and errors are found during validation, a detailed validation error report will be produced, so that the submitter can correct the errors before resubmitting.

View on Map

At https://acoustic.ices.dk/ViewOnMap data within the acoustic data portal can be viewed on a map as seen on Figure 4.
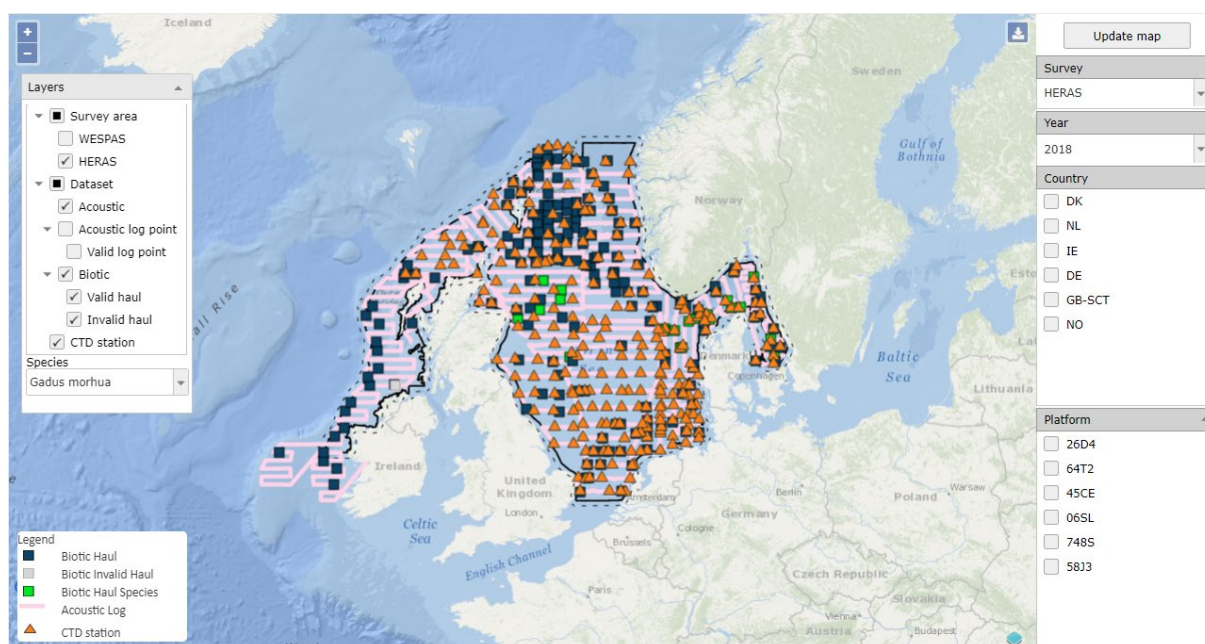
Figure 4 View on Map

Both the acoustic and biotic data within the data portal can be filtered by Survey, Year, Country and/or Platform. Valid/Invalid data can be displayed and species within the biotic data can be highlighted. Even CTD data collected during a given cruise can be viewed, if they have been submitted to ICES Oceanographic Data Portal.

2. ICES Acoustic Data Format

In Figure 5, a CSV example of the acoustic data format can be seen.

Instrument	Header	InstrumentFrequency	InstrumentTransducerLocation	InstrumentTransducerManufacturer	InstrumentTransducerModel	InstrumentTransducerSerial
Instrument	Record	38	AB	Simrad	ES38B	31342
Calibration	Header	CalibrationDate	CalibrationAcquisitionMethod	CalibrationProcessingMethod	CalibrationAccuracyEstimate	CalibrationReport
Calibration	Record	2016-06-29	SS	calibration.exe	0.06	
DataAcquisition	Header	DataAcquisitionSoftwareName	DataAcquisitionSoftwareVersion	DataAcquisitionStoredDataFormat	DataAcquisitionPingDutyCycle	DataAcquisitionComments
DataAcquisition	Record	ER60	2.4.3	RAW	continuous pinging at 0.6 per second	
DataProcessing	Header	DataProcessingSoftwareName	DataProcessingSoftwareVersion	DataProcessingTriwaveCorrection	DataProcessingChannelID	DataProcessingBandwidth
DataProcessing	Record	LSSS	1.11.0	NA	ChannelID2	2.43
Cruise	Header	CruiseSurvey	CruiseCountry	CruisePlatform	CruiseStartDate	CruiseEndDate
Cruise	Record	HERAS~CSHAS	IE	45CE	2016-06-27	2016-07-22
Data	Header	LogDistance	LogTime	LogLatitude	LogLongitude	LogOrigin
Data	Record	1	2016-07-04T19:13	58.35	-2.423	start
Data	Record	1	2016-07-04T19:13	58.35	-2.423	start
Data	Record	1	2016-07-04T19:13	58.35	-2.423	start
Data	Record	1	2016-07-04T19:13	58.35	-2.423	start
Data	Record	1	2016-07-04T19:13	58.35	-2.423	start
Data	Record	1	2016-07-04T19:13	58.35	-2.423	start
Data	Record	2	2016-07-04T19:19	58.35	-2.392	start
Data	Record	2	2016-07-04T19:19	58.35	-2.392	start
Data	Record	2	2016-07-04T19:19	58.35	-2.392	start
Data	Record	2	2016-07-04T19:19	58.35	-2.392	start
Data	Record	2	2016-07-04T19:19	58.35	-2.392	start
Data	Record	2	2016-07-04T19:19	58.35	-2.392	start
* NOTE:	Separate fields by comma, not tab.					
	Separate decimals by point.					
	Do not use commas or semicolons in the text fields					
	mandatory field					
	optional field					

Figure 5 CSV example of the Acoustic Data Format

In the acoustic data format description package downloadable from the acoustic data portal, the included *Acoustic.csv.xlsx* file provides a detailed description of the CSV format for the Acoustic part of the data format, while the file *Acoustic.csv* shows an actual example of data.

As seen from the descriptions, each record type should have only one header line and at least one associated record. Typically, a data file will contain one header and one related record for each of the metadata record types, while a data record type will have one header followed by any number of the data records. Reporting format can be customized by the submitters, where only mandatory fields and used optional fields need to be included, i.e., optional fields not in use can be left out of the data file together with their headers.

During the workshop, the ICES Acoustic Data Format was discussed in theory and practice with a number of generated with introduced errors which needed to be identified and corrected by using the portal.

This project has received funding from the EU
H2020 research and innovation programme
under Grant Agreement No 817669

3. ICES Biotic Data Format

The biotic data format in the ICES Acoustic data portal is largely based on DATRAS surveys data format.

A full description of the Acoustic data portal biotic format can be found in Annex 2 downloadable here, and also available from the Acoustic Data Portal mainpage.

The biotic format is divided in four record types: Cruise, Haul, Catch and Biology (see Figure 2, Acoustic database data model).

The Cruise record type corresponds to the same record type as in the Acoustic format, and identifies the Survey, the country, the platform and the date.

The Haul record type is largely related to the DATRAS HH records, and this records define a large number of haul related variables, location, duration, depth of the haul, gear features and severla other environmental conditions. There are up to 45 different fields in the Haul record type, of which only 13 are mandatory for submission.

The Catch record type describes the species caught in the haul. The catch can be described in several ways depending on the survey design and the fields available in the Catch record type are meant to be able to cover most instances. There are 21 fieds in this record type. The first nine are mandatory, five of these are key fields to identify the cruise and haul, and the other fours mandatory fields define the species and the category identifier. The categories can define qualitative sizes (small, medium...), weights and/or sexes, used to divide the catch.

The following twelve non mandatory fields define the units used, the subsampling applied and the numbers for each category.

As previously stated, these fields are very similar to DATRAS format, in this case to HL record type and in several cases the biotic format in the Acoustic data portal represents a simplification of the corresponding DATRAS field.

During the workshop we presented three reporting examples with increasing complexity, in which catches were reported categorised by weight, catches reported with length distribution, and catches reported categorised by weight with a length distribution of each category. These three reporting examples can be seen in Annex 3.

During the workshop the participants were walked through these examples and their specificities, so the main relations between subsampling variables were fully understood.

In the case of reporting length distribution, there are two alternate options, one of them reports the lenght distribution in the Catch records, while the other reports the length distribution together with some other biological characteristic in the Biology records. The selection of one or the other will depend on the complexity of the sampling design, and they are both valid.

The Biology record type consists of 23 fields, of which ten are mandatory, and of those, the first seven are key fields to link with the Cruise, Haul and Catch records. Only Length

information is mandatory in this Record type, and related to this, information on sex, maturity, age, genetic flagging etc can be reported if included in the sampling design.

In the second part of this session, the participants were requested to practice uploading several test files to the database. In these tests, different errors were found, from vocabulary errors to errors involving mistakes in subsampling reporting. The aim of this exercise was to familiarise the participants with the most common problems when submitting a dataset for the first time, and also to understand where to find the information to fix those issues.

This exercise took about two hours, and by the end of it, all participants had succesfully solved all issues in the test files.

4. ICES Oceanographic Data Portal

At https://ocean.ices.dk the oceanographic data portal can be found where hydrochemistry data can be downloaded (Figure 6)
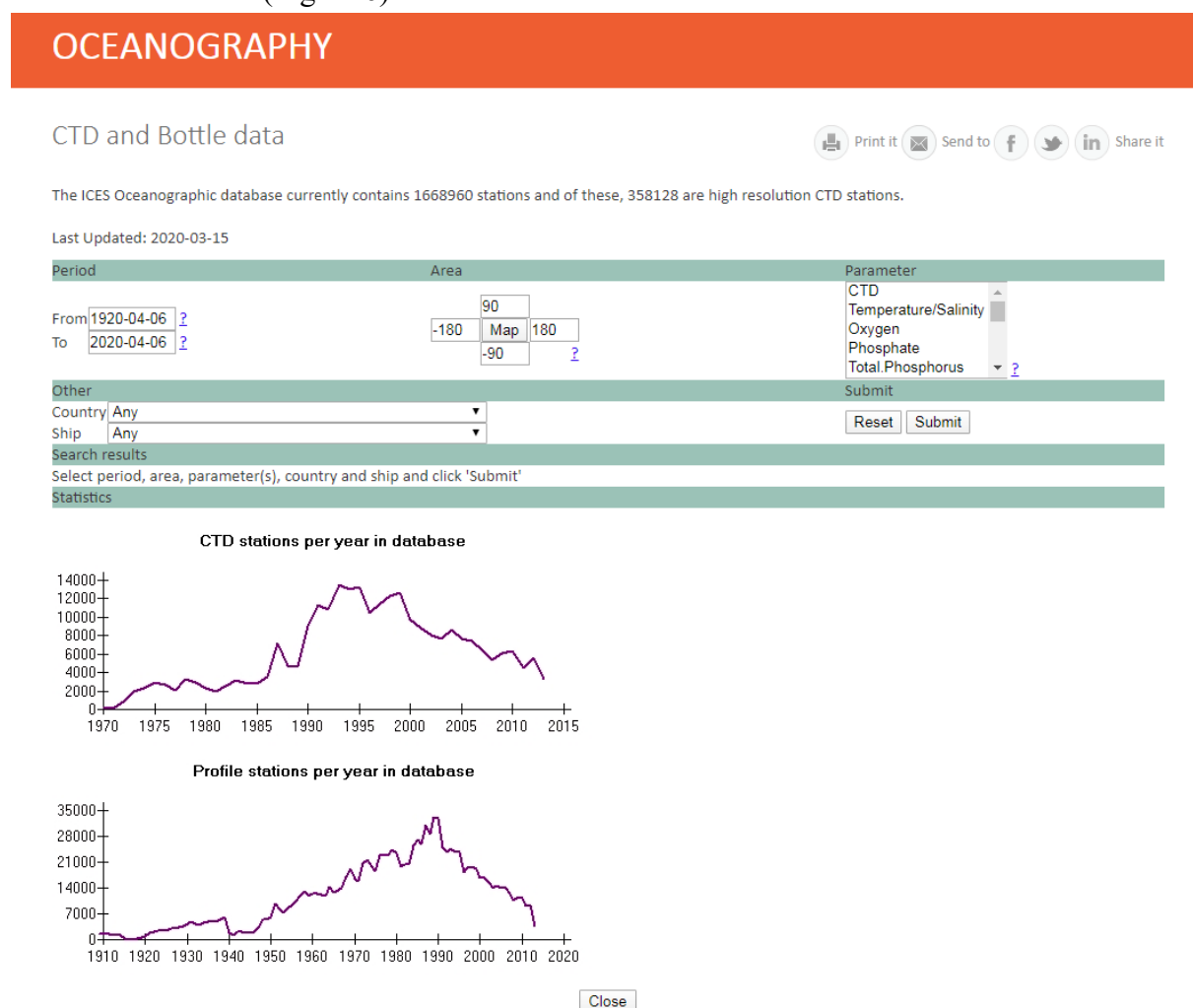
Figure 6 CTD and Bottle data downloadable from the Oceanographic Data Portal

Oceanographic data can be submitted in any format as long as it well described and structured consistently.

- Temperature
- Salinity
- Oxygen
- Phosphate, Total Phosphorus
- Silicate
- Nitrate, Nitrite, Ammonium, Total Nitrogen
- Hydrogen Sulphide
- pH, Alkalinity
- Chlorophyll a
- Secchi depths

Data from acoustic surveys will show up on the acoustic data portal map and the future development is the profiles can be viewed directly through the acoustic portal.

5. Cruise Summary Reports (CRS)

Cruise Summary Reports (CSR = former ROSCOPs) are the usual means for reporting on cruises or field experiments at sea. Traditionally, it is the Chief Scientist's obligation to submit a CSR to his/her National Oceanographic Data Centre (NODC) no later than two weeks after the cruise. This provides a first level inventory of measurements and samples collected at sea. Currently, the Cruise Summary Reports directory covers cruises from 1873 until today from more than 2000 research vessels: a total of nearly 53 000 cruises, in all European waters and global oceans. This also includes historic CSRs from European countries, which have been loaded from the ICES database from 1960 onwards.

Figure 7 Cruise Summary Report search interface at ICES

In Figure 7 the Cruise Summary Report search interface at ICES https://ocean.ices.dk/csr can be seen and at https://www.seadatanet.org/Metadata/CSR-Cruises these are currently been maintained.

ICES Acoustic Data Portal are relying on CSR's for metadata related to cruises.

6. ICES Metadata Catalogue

All data generated or used for the MEESO project have to be publicly available and easily discoverable. For that reason, all underlying datasets have to be accompanied by metadata records that are going to be stored in the Metadata catalogue maintained by ICES. The catalogue can be found under this url: http://gis.ices.dk/geonetwork. The catalogue supports all the common standards for metadata (ISO19115, ISO19119, ISO19139 etc.) and it has all INSPIRE functionalities enabled (validation, editor, viewer).

Metadata are important for the project for a number of reasons. They provide information on where and how to access the data in question. For example which institute is providing them, what format are they in or how they can be used. Furthermore, generating metadata records and storing them within a single catalogue will significantly increase the accessibility and discoverability of the data with the use of key words, DOIs and persistent urls. This is especially important for data that are not hosted by ICES as they can still be accessed through their metadata via a single portal.

A significant part of the workshop held in the ICES secretariat was devoted on metadata. The first part of the workshop was a short presentation on the basics of metadata, their functionality and how they are linked with the INSPIRE directive. Since all data are required to be followed by metadata some points for discussion were raised on how to move forward. Those are mostly about how to structure the records in case there are many similar datasets that need to be described, how many and what type of users are required to access the catalogue and some content related issues (key words, INSPIRE themes). The second part was an attempt to do some practical work using the ICES metadata catalogue. A template to be used specifically for the project has been created. The template aims to facilitate the data submitters to edit and validate their records according the INSPIRE directive requirements. The catalogue offers a relatively user friendly editor to add or edit records and run validation checks.

Figure 8Metadata editor interface

As it is still an early phase of the project and most of the datasets that are going to be used have not yet been identified. Thus, more metadata records will be created as the project is progressing. The ICES Secretariat will continue to support and guide the data submitters throughout the process.

Annex 1. List of participants and Agenda

List of participants

Name	Institute	Email
Adriana Villamor	ICES	Adriana.villamor@ices.dk
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Agenda

Tuesday 18 February - How to get acoustic and biotic data into ICES Acoustic Trawl data portal and hydro chemistry data into ICES Oceanography data portal.

9:00   Workshop opens/Housekeeping
9:15   Adoption of Agenda
9:30   Introduction of Participants
9:45   Introduction to ICES Acoustic Trawl Data Portal (Hjalte Parner)
10:30   Coffee break
11:00   ICES Acoustic Data Format in theory and practice (Hjalte Parner)
13:00   Lunch
14:00   ICES Biotic Data Format in theory and practice (Adriana Villamor)
16:00   Coffee break
16:30   ICES Oceanography Data Portal and Format in theory and not in practice (Hjalte Parner)
17:00   End of day

<u>Wednesday 19 February</u> - How to describe metadata for cruises and datasets used within the project.

09:00 Cruise Summary Report (Hjalte Parner)
10:00 Introduction to ICES Metadata Catalogue (Periklis Panagiotidis)
11:00 Coffee break
11:30 ICES Metadata Catalogue … to be continue.
13:00 Lunch
14:00 Next steps
15:00 End of workshop

Annex 2. Biotic data format description

Headers in bold correspond to Key fields.

"*" at the field status means that the field is mandatory to report at certain conditions. Read the field definition for more information.

Record Header	Field Header	Field Status	Field definition	Options	Example
Cruise	**Cruise**	mand.	Key field used to identify record type	Cruise	Cruise
(mand)	**Header/Record**	mand.	Key field used to identify header and record rows	Header, Record	Header
	CruiseSurvey	mand.	Survey - AC_Survey, see Options; multiple references are allowed - report with tilda '~'	http://vocab.ices.dk/?ref=1453	HERAS~CSHAS
	CruiseCountry	mand.	Country code based on ISO 3166 2-alpha standard - ISO 3166, see Options	http://vocab.ices.dk/?ref=337	DK
	CruiseOrganisation	opt.	Organisation code - EDMO, see Options	http://vocab.ices.dk/?ref=1398	703
	CruisePlatform	mand.	Platform code - SHIPC, see Options	http://vocab.ices.dk/?ref=315	26D1
	CruiseStartDate	mand.	Cruise start date using ISO 8611: YYYY-MM-DD		2016-01-01
	CruiseEndDate	mand.	Cruise end date using ISO 8611: YYYY-MM-DD	End date must be higher than the start date	2016-01-21
	CruiseLocalID	mand.	National cruise identifier		26D1201601
Haul	**Haul**	mand.	Key field used to identify record type	Haul	Haul
(mand.)	**Header/Record**	mand.	Key field used to identify header and record rows	Header, Record	Record
	CruiseLocalID	mand.	Reference to the CruiseLocalID in the Cruise record		26D1201601
	HaulGear	mand.	Biotic sampler - Gear, see Options	http://vocab.ices.dk/?ref=2	PEL
	HaulNumber	mand.	Sequential numbering of hauls during the cruise		12
	HaulStationName	mand.	Station number. National coding system, not defined by ICES		42E912
	HaulStartTime	mand.	Haul start time (GMT) using ISO 8601 format YYYY-MM-DDThh:mm or YYYY-MM-DD hh:mm		2016-01-01T14:55
	HaulDuration	mand.	Haul duration in minutes. Start time - the moment when the gear settles at the stated towing speed. Stop is defined as the start of hauling of the gear.		30
	HaulValidity	mand.	Haul validity code - AC_HaulValidity, see Options	http://vocab.ices.dk/?ref=1474	V
	HaulStartLatitude	mand.	Start fishing position: Degree.Decimal Degree of latitude		-0.4754
	HaulStartLongitude	mand.	Start fishing position: Degree.Decimal Degree of longitude.		56.7768
	HaulStopLatitude	opt.	Stop fishing position: Degree.Decimal Degree of latitude.		-0.4798
	HaulStopLongitude	opt.	Stop fishing position: Degree.Decimal Degree of longitude.		56.8312
	HaulStatisticalRectangle	opt.	ICES statistical rectangle area reference.		42E9
	HaulMinTrawlDepth	mand.	Minimum depth (positive value in metres) of the trawl headline. Report only min.depth for the same trawl depth, if different depths applied, report both min. and max. fields		25
	HaulMaxTrawlDepth	opt.	Maximum depth (positive value in metres) of the trawl headline		75
	HaulBottomDepth	opt.	Bottom depth in metres		150
	HaulDistance	opt.	Actual distance in metres between haul start and haul end point.		3560
	HaulNetopening	mand.	Mean value in metres of vertical net opening measurements		3.5
	HaulCodendMesh	opt.	Codend mesh size in mm		22
	HaulSweepLength	opt.	Length of sweep in metres		75
	HaulGearExceptions	opt.	Gear exceptions - AC_GearExceptions, see Options	http://vocab.ices.dk/?ref=1476	B

Record Header	Field Header	Field Status	Field definition	Options	Example
	HaulDoorType	opt.	Door type - AC_DoorType, see Options	http://vocab.ices.dk/?ref=1477	R
	HaulWarpLength	opt.	Length of warp in metres. Defined by fishing depth.		80
	HaulWarpDiameter	opt.	Warp diameter in millimetres.		20
	HaulWarpDensity	opt.	Warp weight in kg per linear meter of warp.		75
	HaulDoorSurface	opt.	Door surface area in square metres.		1.4
	HaulDoorWeight	opt.	Door weight in kilograms.		780
	HaulDoorSpread	opt.	Mean value in metres of door spread measurements.		15
	HaulWingSpread	opt.	Mean value in metres of wing spread measurements.		25
	HaulBuoyancy	opt.	Total buoyancy of the net floats in kilograms.		350
	HaulKiteArea	opt.	Kite area in square metres.		4.5
	HaulGroundRopeWeight	opt.	Ground rope total weight in kilograms.		450
	HaulRigging	opt.	Rigging is used in the beam trawl surveys.		
	HaulTickler	opt.	Number of ticklers in the Beam trawl surveys.		
	HaulHydrographicStationID	opt.	The national hydrographic station reference		204578902
	HaulTowDirection	opt.	Direction of towing in degrees. 360=direction from south to north.		184
	HaulSpeedGround	opt.	Ground speed of towing in knots.		4.5
	HaulSpeedWater	opt.	Trawl speed on water in knots.		5.5
	HaulWindDirection	opt.	Direction of wind in degrees. Calm=0, 360=direction from north to south.		340
	HaulWindSpeed	opt.	Speed of wind in metres/sec.		4.5
	HaulSwellDirection	opt.	Direction of swell in degrees. No movement=0, 360=direction from south to north.		240
	HaulSwellHeight	opt.	Height in metres of the formation of long wavelength ocean surface waves defined as swell		0.6
	HaulLogDistance	opt.	Distance linking to the acoustic data records		14500
	HaulStratum	opt.	AC_Stratum, see Options	http://vocab.ices.dk/?ref=1535	SURF
Catch	**Catch**	mand.	Key field used to identify record type	Catch	Catch
(mand.)	**Header/Record**	mand.	Key field used to identify header and record rows	Header, Record	Header
	CruiseLocalID	mand.	Reference to the CruiseLocalID in the Cruise record		26D1201601
	HaulGear	mand.	Reference to the HaulGear in the Haul record	http://vocab.ices.dk/?ref=2	PEL
	HaulNumber	mand.	Reference to the HaulNumber in the Haul record		12
	CatchDataType	mand.	Code R specifies that catch data are reported as recorded, sub-sampling factor can vary per sampling category - AC_CatchDataType, other codes are currently not allowed, see Options	http://vocab.ices.dk/?ref=1475	R
	CatchSpeciesCode	mand.	Official WoRMS AphiaID code of the species reported at the given record - SpecWORMS, see Options. Any valid code from http://www.marinespecies.org/ can be addded to the list - send the respective request to accessions@ices.dk	http://vocab.ices.dk/?ref=365	126417
	CatchSpeciesValidity	mand.	Species validity code for use in assessments (data with code 1only will be used) - AC_SpeciesValidity, see Options	http://vocab.ices.dk/?ref=1485	1
	CatchSpeciesCategory	mand.	Catch species sampling category identifier for sample categories by size and/or sex in the same haul. Each category can have a distinct subsampling factor. Report sequential numbers 1,2,3…10 per haul and species. If the sample was not split by categories, report 1 in this field.		1
	CatchSpeciesCategoryNumber	opt.*	Total number of fish of the given species and category in this haul. If no categorizing was performed, total number of fish of the given species per haul. **This field must be reported if length distribution is reported.**		7000
	CatchWeightUnit	opt.*	Unit for reporting of weight-related fields in this Catch record - AC_WeightUnit, see Options. **This field must be reported if any Weight fields are reported.**	http://vocab.ices.dk/?ref=1488	kg

Record Header	Field Header	Field Status	Field definition	Options	Example
	CatchSpeciesCategoryWeight	opt.*	Weight of fish for the given species and category in the haul. If no categorizing was performed, total weight of the species per haul.		595
	CatchSpeciesSex	opt.	Sex category identifier. If no sample categorizing by sex was performed, leave the field blank - AC_Sex, see Options	http://vocab.ices.dk/?ref=1478	F
	CatchSubsampledNumber	opt.*	Number of measured fish in the given haul, species, category. **Must be reported if length distribution is reported.** If whole catch was measured, the number would be the same as SpeciesCategoryNumber.		20
	CatchSubsamplingFactor	opt.	Subsampling factor in the given category. Report 1 if no subsampling is applied. If f.ex. 1/6 of the catch was measured, report 6.		350
	CatchSubsampleWeight	opt.*	Weight of the subsampled fish per haul, species, and category. **This field must be reported if SpeciesCategoryWeight is reported.** If no subsampling was performed, the value would be the same as in the SpeciesCategoryWeight.		2
	CatchLengthCode	opt.*	Length code used for reporting of the Length class. Must be the same for the same species in the haul. Must be reported if species length distribution per haul and category is reported - AC_LengthCode, see Options	http://vocab.ices.dk/?ref=1486	mm
	CatchLengthClass	opt.*	Length class. **This field must be reported If species length distribution per haul and category is reported**		380
	CatchLengthType	opt.	Length measurement type - AC_LengthMeasurementType, see Options	http://vocab.ices.dk/?ref=1479	1
	CatchNumberAtLength	opt.*	Number of fish per length in the given species category in this haul. This field is not adjusted with the subsampling factor, so the sum of Numbers at Length would be equal to the SubsampledNumber. **Must be reported if length distribution is reported.**		5
	CatchWeightAtLength	opt.	Total weight of the category by length class		0.5
Biology	**Biology**	mand.	Key field used to identify record type	Biology	Biology
(recom)	**Header/Record**	mand.	Key field used to identify header and record rows		Record
	CruiseLocalID	mand.	Reference to the CruiseLocalID in the Cruise record		26D1201601
	HaulGear	mand.	Reference to the HaulGear in the Haul record	http://vocab.ices.dk/?ref=2	PEL
	HaulNumber	mand.	Reference to the HaulNumber in the Haul record		12
	CatchSpeciesCode	mand.	Species reference as reported in the Catch record	http://vocab.ices.dk/?ref=365	126417
	CatchSpeciesCategory	mand.	Reference to the SpeciesCategory in the Catch record.		1
	BiologyStockCode	opt.	ICES fish stock ID - ICES_StockCode, see Options	http://vocab.ices.dk/?ref=357	anf.27.1-2
	BiologyFishID	mand.	Fish identification number - running sampling number of the individual fish		5
	BiologyLengthCode	mand.	Length code of the reported individual length. **If length distribution on the catch level is reported, the code should be the same as in the respective parent Catch record** - AC_LengthCode, see Options	http://vocab.ices.dk/?ref=1486	mm
	BiologyLengthClass	mand.	Length class. **If length distribution on the catch level is reported, the value should be the same as in the respective parent Catch record**		380
	BiologyWeightUnit	opt.	Unit for reporting weight fields in Biology record - AC_WeightUnit, see Options	http://vocab.ices.dk/?ref=1488	gr
	BiologyIndividualWeight	opt.	Individual weight		145
	BiologyIndividualSex	opt.	Gender of the given specimen as defined by dissection - AC_Sex, see Options	http://vocab.ices.dk/?ref=1478	F
	BiologyIndividualMaturity	opt.	Maturity of the reported specimen. Requires dissection. - AC_MaturityCode, see Options	http://vocab.ices.dk/?ref=1480	65
	BiologyMaturityScale	opt.	Maturity scale used for reporting the maturity data - AC_MaturityScale, see Options	http://vocab.ices.dk/?ref=1481	M6
	BiologyIndividualAge	opt.	Age of specimen in years		7
	BiologyAgePlusGroup	opt.	If the older fish is grouped under the age plus group, flag the age used for grouping - AC_AgePlusGroup, see Options	http://vocab.ices.dk/?ref=1484	plusgroup

Record Header	Field Header	Field Status	Field definition	Options	Example
	BiologyAgeSource	opt.	Age reading source material - AC_AgeSource, see Options	http://vocab.ices.dk/?ref=1482	Scale
	BiologyGeneticSamplingFlag	opt.	Was genetic sampling of the species performed? - AC_SamplingFlag, see Options	http://vocab.ices.dk/?ref=1483	no
	BiologyStomachSamplingFlag	opt.	Was stomach sampling of the specimen performed? - AC_SamplingFlag, see Options	http://vocab.ices.dk/?ref=1483	yes
	BiologyParasiteSamplingFlag	opt.	Was parasite sampling of the specimen performed? - AC_SamplingFlag, see Options	http://vocab.ices.dk/?ref=1483	NA
	BiologyIndividualVertebraeCount	opt.	Vertebrae count as a stock identifier, if applicable		143

Annex 3. Biotic reporting examples described during the workshop

Example 1: Weight reporting

Cruise	Header	CruiseSurve	CruiseCoun	CruiseOrga	CruisePlatf	CruiseStartDate	CruiseEndDa	CruiseLocalID															
Cruise	Record	HERAS	DK	2195	26D1	22/06/2021	05/07/2021	26DA201606															
Haul	Header	CruiseLocal	HaulNumb	HaulNumb	HaulStation	HaulStartTime	HaulDuratio	HaulValidit	HaulStartL	HaulStartL	HaulStopLa	HaulStopL	HaulStatist	HaulMinTr	HaulMaxTr	HaulBottor	HaulDistan	HaulNetop	HaulCoden	HaulSweep	HaulGearEx
Haul	Record	67BC71420	EXP	1		20/10/2020 08:35	30	V	58.09167	21.48167	58.105	21.525	45H1	20		39	3056	16	12		
Catch	Header	CruiseLoca IID	HaulGear	HaulNumb er	CatchData Type	CatchSpeciesCode	CatchSpecie sValidity	CatchSpeci esCategor y	CatchSpeci esCategor yNumber	CatchWeig htUnit	CatchSpeci esCategor yWeight	CatchSpeci esSex	CatchSubs ampledNu mber	CatchSubs amplingFa ctor	CatchSubs ampleWei ght	CatchLeng thCode	CatchLeng thClass	CatchLeng thType	CatchNum berAtLeng th	CatchWeig htAtLengt h	
Catch	Record	67BC71420	EXP	1	R	126417	1	1		kg	1.637					0.0432					
Catch	Record	67BC71420	EXP	1	R	126417	1	2		kg	2.637					0.2432					
Catch	Record	67BC71420	EXP	1	R	126425	1	1		kg	816.883					0.0323					
Biology	Header	CruiseLocal	HaulGear	HaulNumb	CatchSpeci	CatchSpeciesCateg	BiologyStoc	BiologyFish	BiologyLen	BiologyLen	BiologyWe	BiologyIndi	BiologyIndi	BiologyIndi	BiologyMa	BiologyIndi	BiologyAge	BiologyAge	BiologyGer	BiologySto	BiologyPar
Biology	Record	67BC71420	EXP	1	126417	1		1	halfcm	70	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	EXP	1	126417	1		2	halfcm	70	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	EXP	1	126417	2		3	halfcm	80	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	EXP	1	126417	2		4	halfcm	85	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	EXP	1	126425	1		8	halfcm	70	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	EXP	1	126425	1		9	halfcm	70	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	EXP	1	126425	1		10	halfcm	70	gr		U		61	M6	0		Otolith	no	no	no

Example 2.a: Length distribution reported in Catch

Cruise	Header	CruiseSurve	CruiseCoun	CruiseOrga	CruisePlatf	CruiseStartDate	CruiseEndD	CruiseLocalID															
Cruise	Record	BIAS	EE	714	67BC	19/10/2022	#########	67BC71420081019															
Haul	Header	CruiseLocal	HaulGear	HaulNumb	HaulStation	HaulStartTime	HaulDuratio	HaulValidit	HaulStartL	HaulStartL	HaulStopLa	HaulStopL	HaulStatist	HaulMinTr	HaulMaxTr	HaulBottor	HaulDistan	HaulNetop	HaulCoden	HaulSweep	HaulGearEx	
Haul	Record	67BC71420	PEL	1		20/10/2022 08:35	30	V	58.09167	21.48167	58.105	21.525	45H1	20		39	3056	16	12			
Catch	Header	CruiseLoca IID	HaulGear	HaulNumb er	CatchData Type	CatchSpeciesCode	CatchSpeci esValidity	CatchSpeci esCategor y	CatchSpeci esCategor yNumber	CatchWeig htUnit	CatchSpeci esCategor yWeight	CatchSpeci esSex	CatchSubs ampledNu mber	CatchSubs amplingFa ctor	CatchSubs ampleWei ght	CatchLeng thCode	CatchLeng thClass	CatchLeng thType	CatchNum berAtLeng th	CatchWeig htAtLengt h	
Catch	Record	67BC71420	PEL	1	R	126417	1	1	189	kg	0.628062		13		0.0432	halfcm	70	1	2	0.0022	
Catch	Record	67BC71420	PEL	1	R	126417	1	1	189	kg	0.628062		13		0.0432	halfcm	80	1	5	0.0172	
Catch	Record	67BC71420	PEL	1	R	126417	1	1	189	kg	0.628062		13		0.0432	halfcm	85	1	3	0.0108	
Catch	Record	67BC71420	PEL	1	R	126417	1	1	189	kg	0.628062		13		0.0432	halfcm	90	1	3	0.013	
Catch	Record	67BC71420	PEL	1	R	126425	1	1	94024	kg	837.6619		133		1.1849	halfcm	60	1	22	0.1744	
Catch	Record	67BC71420	PEL	1	R	126425	1	1	94024	kg	837.6619		133		1.1849	halfcm	65	1	65	0.5625	
Catch	Record	67BC71420	PEL	1	R	126425	1	1	94024	kg	837.6619		133		1.1849	halfcm	70	1	46	0.448	
Biology	Header	CruiseLocal	HaulGear	HaulNumb	CatchSpeci	CatchSpeciesCateg	BiologySto	BiologyFish	BiologyLen	BiologyLen	BiologyWe	BiologyIndi	BiologyIndi	BiologyIndi	BiologyMa	BiologyIndi	BiologyAge	BiologyAge	BiologyGer	BiologySto	BiologyPar
Biology	Record	67BC71420	PEL	1	126417	1		1	halfcm	70	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	PEL	1	126417	1		2	halfcm	70	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	PEL	1	126417	1		3	halfcm	80	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	PEL	1	126417	1		4	halfcm	85	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	PEL	1	126425	1		8	halfcm	70	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	PEL	1	126425	1		9	halfcm	70	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	PEL	1	126425	1		10	halfcm	70	gr		U		61	M6	0		Otolith	no	no	no

Example 2.b: Length distribution reported in Biology

Cruise	Header	CruiseSurve	CruiseCoun	CruisePlatf	CruiseStart	CruiseEndD	CruiseOrga	CruiseLocalID													
Cruise	Record	IBWSS	IE	45CE	43550	43570		45CE2019IBWSS													
Haul	Header	CruiseLocal	HaulGear	HaulNumb	HaulStation	HaulStartT	HaulDurati	HaulValidit	HaulStartL	HaulStartL	HaulStopLa	HaulStopL	HaulStatist	HaulMinTr	HaulMaxTr	HaulBottor	HaulDistan	HaulNetop	HaulCoden	HaulSweep	
Haul	Record	45CE2019I	PEL	1	1	2023-03-28	31	V	55.16233	-10.4492	55.16233	-10.3928		500	530	2100		48	20	80	
Catch	Header	CruiseLoca IID	HaulGear	HaulNumb er	CatchData Type	CatchSpeci esCode	CatchSpeci esValidity	CatchSpeci esCategor y	CatchSpeci esCategor yNumber	CatchWeig htUnit	CatchSpeci esCategor yWeight	CatchSpeci esSex	CatchSubs ampledNu mber	CatchSubs amplingFa ctor	CatchSubs ampleWei ght	CatchLeng thCode	CatchLeng thClass	CatchLeng thType	CatchNum berAtLeng th	CatchWeig htAtLengt h	
Catch	Record	67BC71420	PEL	1	R	126417	1	1	189	kg	0.628062		13		0.0432						
Catch	Record	45CE2019I	PEL	1	R	126439	1	1	1614.321	kg	160.34		15	107.6214	1.489852						
Biology	Header	CruiseLocal	HaulGear	HaulNumb	CatchSpeci	CatchSpeci	BiologySto	BiologyFish	BiologyLen	BiologyLen	BiologyWe	BiologyIndi	BiologyIndi	BiologyIndi	BiologyMa	BiologyIndi	BiologyAge	BiologyAge	BiologyGer	BiologySto	
Biology	Record	45CE2019I	PEL	-12	126417	1		1	halfcm	240											
Biology	Record	45CE2019I	PEL	-11	126417	1		2	halfcm	240											
Biology	Record	45CE2019I	PEL	-10	126417	1		3	halfcm	245											
Biology	Record	45CE2019I	PEL	-9	126417	1		4	halfcm	250	gr	43	M		64	M6	3		Otolith	yes	
Biology	Record	45CE2019I	PEL	-8	126417	1		5	halfcm	255	gr	47	M		64	M6	5		Otolith	yes	
Biology	Record	45CE2019I	PEL	-7	126417	1		6	halfcm	255											
Biology	Record	45CE2019I	PEL	-6	126417	1		7	halfcm	255											
Biology	Record	45CE2019I	PEL	-5	126417	1		8	halfcm	260	gr	50	M		64	M6	3		Otolith	yes	
Biology	Record	45CE2019I	PEL	-4	126417	1		9	halfcm	260	gr	51	M		64	M6	5		Otolith	yes	
Biology	Record	45CE2019I	PEL	-3	126417	1		10	halfcm	260											
Biology	Record	45CE2019I	PEL	-2	126417	1		11	halfcm	265	gr	50									
Biology	Record	45CE2019I	PEL	-1	126417	1		12	halfcm	270											
Biology	Record	45CE2019I	PEL	0	126417	1		13	halfcm	270											
Biology	Record	45CE2019I	PEL	1	126439	1		1	halfcm	240											
Biology	Record	45CE2019I	PEL	1	126439	1		2	halfcm	240											
Biology	Record	45CE2019I	PEL	1	126439	1		3	halfcm	240											
Biology	Record	45CE2019I	PEL	1	126439	1		4	halfcm	245											
Biology	Record	45CE2019I	PEL	1	126439	1		5	halfcm	245											
Biology	Record	45CE2019I	PEL	1	126439	1		6	halfcm	245											
Biology	Record	45CE2019I	PEL	1	126439	1		7	halfcm	245											
Biology	Record	45CE2019I	PEL	1	126439	1		8	halfcm	245											
Biology	Record	45CE2019I	PEL	1	126439	1		9	halfcm	245											
Biology	Record	45CE2019I	PEL	1	126439	1		10	halfcm	245											
Biology	Record	45CE2019I	PEL	1	126439	1		11	halfcm	245											
Biology	Record	45CE2019I	PEL	1	126439	1		12	halfcm	250	gr	81	M		64	M6	3		Otolith	yes	
Biology	Record	45CE2019I	PEL	1	126439	1		13	halfcm	250	gr	60	M		64	M6	5		Otolith	yes	
Biology	Record	45CE2019I	PEL	1	126439	1		14	halfcm	250	gr	83									
Biology	Record	45CE2019I	PEL	1	126439	1		15	halfcm	250	gr	79									

Example 3: Weight categories and length distribution

Cruise

		CruiseSurve	CruiseCoun	CruiseOrga	CruisePlatf	CruiseStartDate	CruiseEndD	CruiseLocalID
Cruise	Header	CruiseSurve	CruiseCoun	CruiseOrga	CruisePlatf	CruiseStartDate	CruiseEndD	CruiseLocalID
Cruise	Record	BIAS	EE	714	67BC	19/10/2008	#########	67BC71420081019

Haul

		CruiseLoca	HaulGear	HaulNumb	HaulStatio	HaulStartTime	HaulDurati	HaulValidit	HaulStartL	HaulStartL	HaulStopLa	HaulStopL	HaulStatist	HaulMinTr	HaulMaxTr	HaulBottor	HaulDistan	HaulNetop	HaulCoden	HaulSweep	HaulGearE	HaulDoorT
Haul	Header	CruiseLoca	HaulGear	HaulNumb	HaulStatio	HaulStartTime	HaulDurati	HaulValidit	HaulStartL	HaulStartL	HaulStopLa	HaulStopL	HaulStatist	HaulMinTr	HaulMaxTr	HaulBottor	HaulDistan	HaulNetop	HaulCoden	HaulSweep	HaulGearE	HaulDoorT
Haul	Record	67BC71420	PEL	1		20/10/2023 08:35	30	V	58.09167	21.48167	58.105	21.525	45H1	20		39	3056	16	12			

Catch

		CruiseLoca IID	HaulGear	HaulNumb er	CatchData Type	CatchSpeciesCode	esValidity	CatchSpeci esCategor y	CatchSpeci esCategor yNumber	CatchWeig htUnit	CatchSpeci esCategor yWeight	CatchSpeci esSex	CatchSubs ampledNu mber	CatchSubs amplingFa ctor	CatchSubs ampleWei ght	CatchLeng thCode	CatchLeng thClass	CatchLeng thType	CatchNum berAtLeng th	CatchWeig htAtLengt h
Catch	Header	CruiseLoca IID	HaulGear	HaulNumb er	CatchData Type	CatchSpeciesCode	esValidity	CatchSpeci esCategor y	CatchSpeci esCategor yNumber	CatchWeig htUnit	CatchSpeci esCategor yWeight	CatchSpeci esSex	CatchSubs ampledNu mber	CatchSubs amplingFa ctor	CatchSubs ampleWei ght	CatchLeng thCode	CatchLeng thClass	CatchLeng thType	CatchNum berAtLeng th	CatchWeig htAtLengt h
Catch	Record	67BC71420	PEL	1	R	126417	1	1	189	kg	0.628062		13		0.0432	halfcm	70	1	1	0.0022
Catch	Record	67BC71420	PEL	1	R	126417	1	1	189	kg	0.628062		13		0.0432	halfcm	80	1	6	0.0172
Catch	Record	67BC71420	PEL	1	R	126417	1	1	189	kg	0.628062		13		0.0432	halfcm	85	1	3	0.0108
Catch	Record	67BC71420	PEL	1	R	126417	1	1	189	kg	0.628062		13		0.0432	halfcm	90	1	3	0.013
Catch	Record	67BC71420	PEL	1	R	126417	1	2	100	kg	0.724444		9		0.0652	halfcm	70	1	1	0.0022
Catch	Record	67BC71420	PEL	1	R	126417	1	2	100	kg	0.724444		9		0.0652	halfcm	80	1	5	0.0272
Catch	Record	67BC71420	PEL	1	R	126417	1	2	100	kg	0.724444		9		0.0652	halfcm	85	1	2	0.0208
Catch	Record	67BC71420	PEL	1	R	126417	1	2	100	kg	0.724444		9		0.0652	halfcm	90	1	1	0.015
Catch	Record	67BC71420	PEL	1	R	126425	1	1	94024	kg	936.2104		119		1.1849	halfcm	60	1	22	0.1744
Catch	Record	67BC71420	PEL	1	R	126425	1	1	94024	kg	936.2104		119		1.1849	halfcm	65	1	65	0.5625
Catch	Record	67BC71420	PEL	1	R	126425	1	1	94024	kg	936.2104		119		1.1849	halfcm	70	1	46	0.448
Catch	Record	67BC71420	PEL	1	R	126425	1	2	33200	kg	242.4451		39		0.2848	halfcm	60	1	12	0.0668
Catch	Record	67BC71420	PEL	1	R	126425	1	2	33200	kg	242.4451		39		0.2848	halfcm	65	1	14	0.058
Catch	Record	67BC71420	PEL	1	R	126425	1	2	33200	kg	242.4451		39		0.2848	halfcm	70	1	11	0.16

Biology

		CruiseLoca	HaulGear	HaulNumb	CatchSpeci	CatchSpeciesCateg	BiologySto	BiologyFish	BiologyLen	BiologyLen	BiologyWe	BiologyIndi	BiologyIndi	BiologyIndi	BiologyMa	BiologyIndi	BiologyAge	BiologyAge	BiologyGer	BiologySto	BiologyPar	BiologyIndi
Biology	Header	CruiseLoca	HaulGear	HaulNumb	CatchSpeci	CatchSpeciesCateg	BiologySto	BiologyFish	BiologyLen	BiologyLen	BiologyWe	BiologyIndi	BiologyIndi	BiologyIndi	BiologyMa	BiologyIndi	BiologyAge	BiologyAge	BiologyGer	BiologySto	BiologyPar	BiologyIndi
Biology	Record	67BC71420	PEL	1	126417	1		1	halfcm	70	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	PEL	1	126417	1		2	halfcm	70	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	PEL	1	126417	1		3	halfcm	80	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	PEL	1	126417	1		4	halfcm	85	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	PEL	1	126417	2		5	halfcm	70	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	PEL	1	126417	2		6	halfcm	70	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	PEL	1	126417	2		7	halfcm	90	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	PEL	1	126425	1		8	halfcm	70	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	PEL	1	126425	1		9	halfcm	70	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	PEL	1	126425	1		10	halfcm	70	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	PEL	1	126425	2		11	halfcm	65	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	PEL	1	126425	2		12	halfcm	65	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	PEL	1	126425	2		13	halfcm	70	gr		U		61	M6	0		Otolith	no	no	no
Biology	Record	67BC71420	PEL	1	126425	2		14	halfcm	70	gr		U		61	M6	0		Otolith	no	no	no