

BEAM TRAWL SURVEYS FOR BLACK SEA RAPA WHELK GUIDELINES AND METHODOLOGIES

(Modified from “draft Technical guidelines for scientific surveys in the Mediterranean and the Black Sea” of GFCM, and revised after a test survey participated by experts from five Black Sea countries)

1. Vessel characteristics

A beam trawl survey on the Black Sea rapa whelk (*Rapana venosa*) should be carried out with a commercial or a research vessel equipped with an engine of at least 186 kW (250 HP) to be able to tow the sampling gear at a constant speed. Trawling speed during each operation should be between 1.5 to 2.0 knots. The speed of the beam trawl should be monitored continuously; care should be given to remain at a constant speed and report in case of deviation. In addition, detailed information on the haul (e.g. latitude, longitude, duration of the haul, depth, speed, direction, etc.) should be monitored and reported (as in Appendix 1.1).

2. Sampling gear

In the implementation of the survey, a Turkish design beam trawl described in a recent article (Kaykaç *et al.*, 2014)¹ should be used. All hauls should be undertaken using this beam trawl gear and the net, as specified in the design. Detailed information of the gear is provided below.

The most important specifications of this gear are as follows:

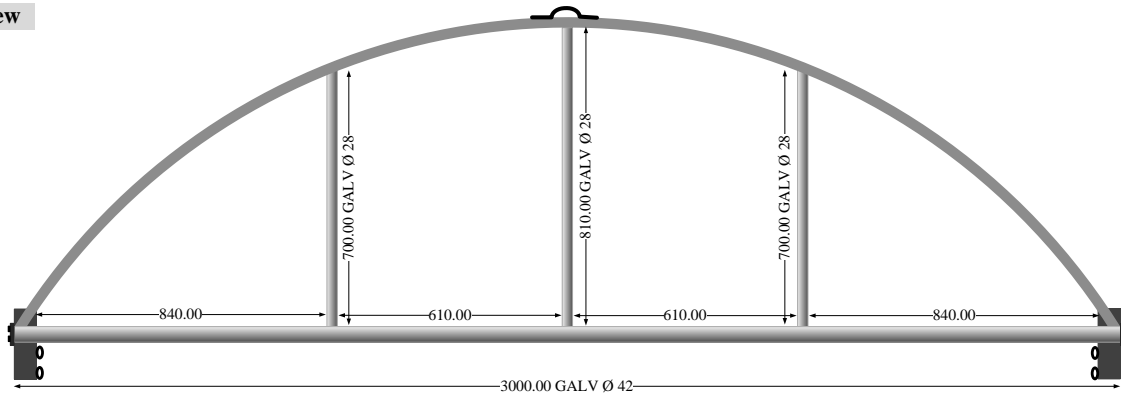
- It is able to work in all areas and at all depths (from 5 to 35 m).
- Its selectivity is as low as possible to have a good representation of the population structure.

The mesh size of the cod end should be 72 mm (diamond, stretch).

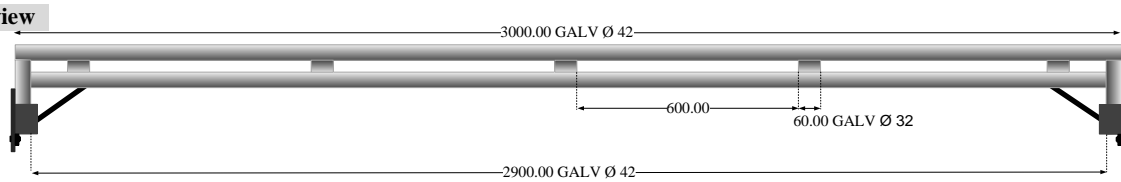
The nets should be made of good-quality polyamide netting (nylon).

¹ Kaykaç, M. H., Zengin, M., Özcan-Akpınar, İ., Tosunoğlu, Z., 2014. Structural characteristics of towed fishing gear used in the Samsun coast (Black Sea). *Ege J Fish Aqua Sci* 31(2): 87-96. doi: 10.12714/egejfas.2014.31.2.05.

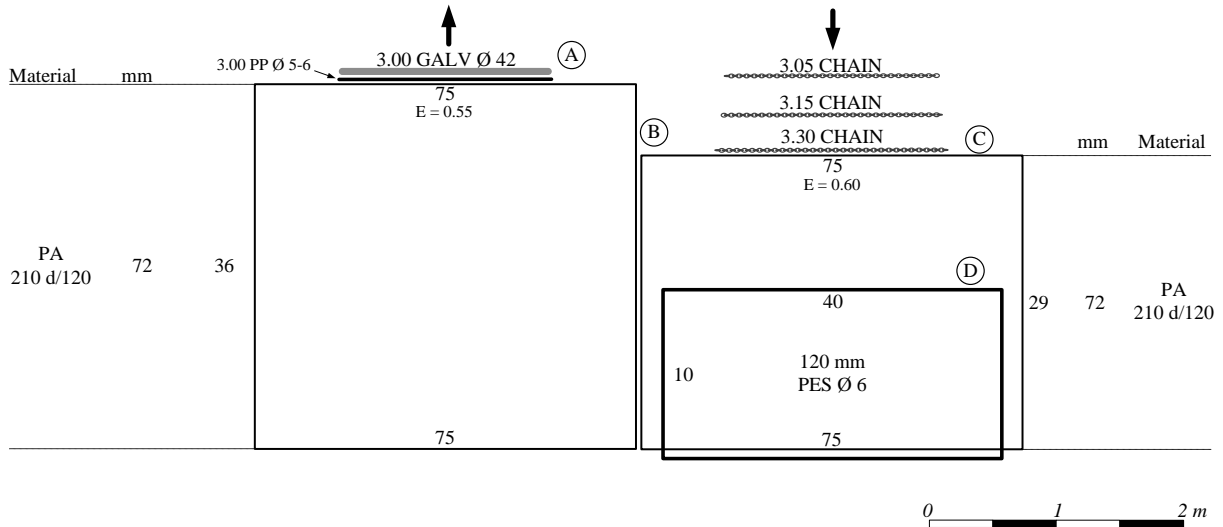
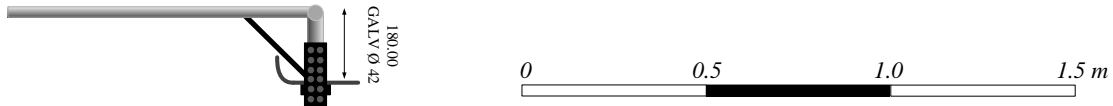
Top view

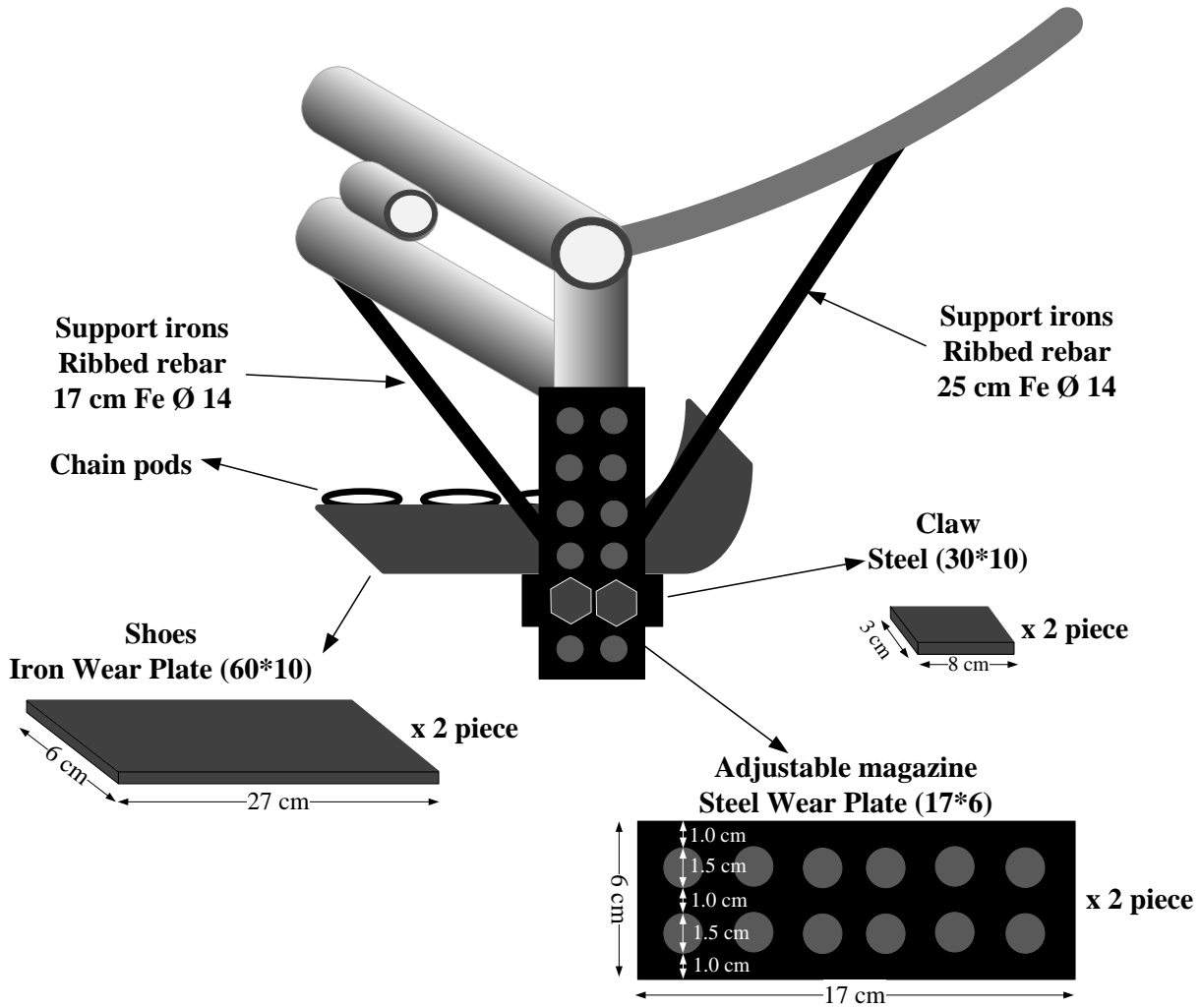
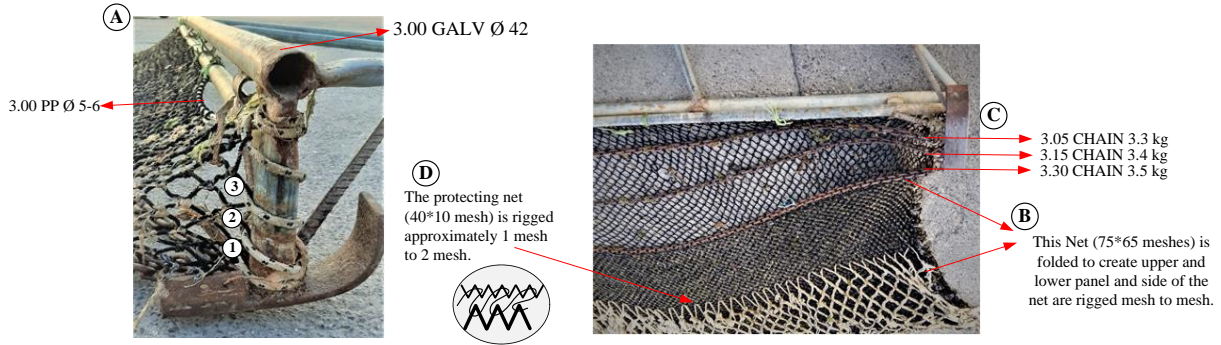


Front view

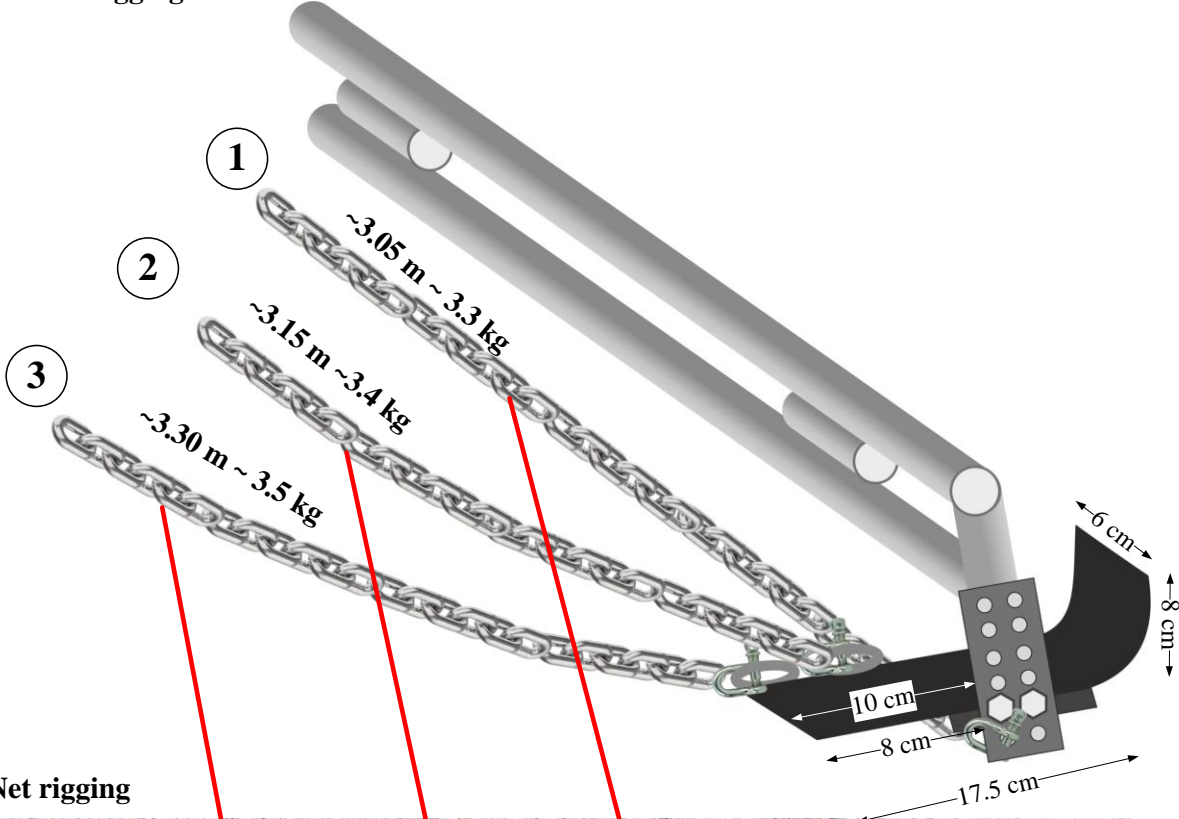


Side view





Chains rigging



Net rigging



Rapa whelk beam trawl warp length (m) and towing speed (knot) according to most common working depths (5-30 m) and various ground characteristics (sandy, muddy and gravel).

Depth (m)	Warp length (m)	Towing speed (knot)
5	70-90	3
10	90-110	3
20	140	2.5
30	185	2
40	230	2
50	275	2

3. Rigging, warp diameter and length

In the implementation of the survey, a single beam trawl should be used. The gear should be trawled from the aft of the vessel. The warp length depends onto depth as specified in the Table above. Adaptations can be made by the skipper to ensure that the gear fishes well and is in good contact with the bottom. The chief scientist decides, in accordance with the skipper, when the circumstances are no longer appropriate to deliver valid hauls. The beam trawl should be equipped with DST Logic Temperature and Depth Recorders.

4. Survey design

To reduce the variance of the estimated biomass and abundance indices, a depth-stratified sampling design should be adopted as distribution of rapa whelk is controlled by the depth. Therefore, the following depth strata should be adopted:

- 5-15 m
- 15-25 m
- 25-35 m

Minimum number of recommended stations to be visited per survey in each country:

Country	Minimum no. stations recommended
Bulgaria	50
Georgia	20
Romania	50
Turkey	160
Ukraine	45

It is recommended that 90 percent of the stations are distributed evenly throughout the study area within the identified bathymetric stratum, prior to the first cruise assuring that each stratum is proportionally represented. The remaining stations are advised to be placed around the stations where rapa whelk exhibit high density, taking the results of the work being carried out into account. It is also recommended to avoid officially designated sensitive habitats and military zones in the selection of the sampling stations. It is advisable to control the bottom condition to understand if the area is suitable for trawling or gather information from local fishers. To avoid covariance between fishing stations in the adjacent strata, stations

should be separated by at least 5-10 miles (ICES, 2010). Before the survey, the surface area and the number of fishing hauls for each identified stratum should be identified based on previous experience. Once identified and selected, the same stations should be visited every year.

The area swept needs to be standardized, as the catchability of target species and sizes often depends on the duration of the haul. The haul duration should be 30 minutes. The duration begins when the gear settles on the bottom and ends when the vessel is stopped to retrieve the beam trawl. The duration may be shortened if, for instance, a large quantity of debris is encountered. If the haul needs to be stopped before the end of the standard duration, it can be considered valid if at least one-third of the time or of the distance has been successfully attained.

The hauls should be performed at a constant depth and should be rectilinear as far as possible. The gear should stay in good contact with the seabed during the entire haul. This can be checked by the depth profile available from the minilog data logger and reported.

The surveys should be conducted annually in spring (April-June) and autumn (September-October). Each country should choose the best sampling days within this period to carry out the survey. The sampling period of the survey selected by the country should be consistent from one year to another to reduce the “time-of-the-survey” effect on the time series (ICES, 2012).

It is **recommended** to conduct haul operations during daylight hours. The daylight period is defined as the time between 30 minutes after sunrise and 30 minutes before sunset.

5. Treatment of catches

Once the haul is completed and after the catch is secured on the deck, all finfish species, rays, sharks and commercially important crustaceans and bivalves should be sorted, counted and measured to the 0.5 cm below (B). For fish (bony fish and Elasmobranch) the length is the overall length, the tail being extended following its longer dimension. The measurement unit is the lower millimetre. For Crustaceans, the length is measured in terms of cephalo-thoracic length at the lower millimetre. For commercially important bivalves, the shell length at the lowest millimetre is recorded.

The weight of the remaining catch should be measured and recorded (A). When the quantity of the catch is too high, it is usually difficult to weigh the total weight of rapa whelk on board of a commercial vessel. In such cases, the catch should be placed in boxes (or buckets), the number of boxes (or buckets) should be counted, the total weight of a single box or bucket should be taken as precisely as possible and the total catch should be estimated accordingly.

If the total catch is too large to be measured (more than 10 kg), subsampling may be considered. In this case, at least 10 kg of rapa whelk should randomly be subsampled from the main catch. The subsample should not contain less than 100 individuals. The size of the individuals should be measured to the nearest 0.5 cm length class below and the individuals in each length class should be groups in different containers (Figure 3).



Figure 3. Sorting rapa whelk into length classes

Once the length of all individuals in the subsample is measured, the number of individuals in the container should be counted and recorded in the data record sheets (N1). The total weight of the rapa whelk in each container should be weighed and recorded in the data recording sheet as well (BW). The weight of the remnants (debris) should also be weighed and recorded (D').

A total of at least 20 individuals should be selected from the containers carrying the individuals separated into length classes for age determination. Care should be paid to equal representation of the length classes in the selection of the individual. The selected individuals should be cleaned using a wire brush to remove the material covering the shell surface and so that to improve the visibility of the spawning marks. The ages of these individuals should be determined following the protocol modified by Hulak. The shell length and shell width of each specimen selected for age reading should be measured to the nearest 1 mm. Shell length should be measured from the apex to the end of the siphonal canal.

Given that the shells of rapa whelk are usually covered with epibionts (such as algae, polychaeta tubes, tunicates, capsules, etc.), the total weight measured would likely be overestimated. In order to account for this bias, the epibiont biomass on rapa shells should be estimated in every habitat type encountered during the survey. To this end, the following procedure should be followed for each habitat type or when differences in the types of epibionts and/or in their quantity is recognized. The epibiont biomass should be estimated at least in three stations during the survey.

Epibiont biomass estimation: at least ten individuals should randomly be selected from each container and their brut (uncleaned) weight should be recorded (BW'). As there may be less than ten individuals in some length classes, the number of individuals selected from epibiont biomass estimation should also be recorded (N1'). After the cleaning of the epibionts, the net (cleaned) weight of the individuals should be recorded (NW'). As the rate of infestation by epibionts varies with size, the estimation of epibiont biomass should account for the size composition. The Excel sheet should be considered for the estimation of weight, abundance and length composition of the haul.

5. 1. Analyses of marine litter

Sort, count and weight of marine litter items should be carried out directly on-board on fresh material. A photo of litter should be systematically taken at each station.

5. 2. Other parameters

During a single trawl, depth-temperature throughout the tow should be recorded and monitored. A wide range of instruments can be used to measure temperature and salinity.

6. Data reporting and exchange format

Standard formats are defined for the storage and exchange of data produced by beam trawl surveys. Once collected, the basic information on hauls, catch and biological data should be reported using the templates found in Appendix 1.1.

7. Data policy

Data emanating from national surveys should remain the property of the country executing the survey and data and information transmitted by countries should be treated by the GFCM Secretariat in accordance with all necessary measures to comply with GFCM security and confidentiality provisions.

Each country will be responsible for the quality and completeness of the data. Collected data should be submitted by countries every year following the Data Collection Reference Framework provisions (GFCM, 2018a).

Through its Secretariat, the GFCM will define and maintain high levels of protection for the data transmitted by countries complying with GFCM data submission requirements, as endorsed by the Commission. Data put at the disposal of dedicated expert groups will be treated in the same manner as data used by working groups on stock assessment: all participants should have access to the data needed to address the objectives of the meeting. The use of shared data outside the framework of GFCM or for purposes other than the objectives agreed upon should follow the existing GFCM data confidentiality rules.

Instructions

- Survey: insert the name of the survey.
- GSA: insert the code of the Geographical subarea (GSA)
- GEAR: insert the type of the gear (e.g. bottom trawl, pelagic trawl, etc.) and the main characteristics including the mesh size of the code-end.
- HAULS Number: identification number which shall be assigned to each fishing haul (e.g. progressive numbers from 1 to 30). Fishing hauls are made in the same position from year to year, the same number should be associated with a fishing haul every year.
- HAULS Identification CODE: identification code which shall be assigned yearly to each fishing haul (unique).
- Coordinates: Latitude (start and end) - insert the latitude at the beginning and at the end of each fishing haul. Data should be inserted in degree, minutes and seconds (e.g. 40°51'59"N). Longitude (start and end) - insert the longitude at the beginning and at the end of each fishing haul. Data should be inserted in degree, minutes and seconds (e.g. 124°4'58"W).
- DEPTH (m): insert the depth in metres, at the beginning and at the end, of each fishing haul.
- TIME: insert the time, at the beginning and at the end, of each fishing haul.
- Av. SPEED: insert the average speed maintained during the fishing haul.

Instructions

- Survey: insert the name of the survey.
- GSA: insert the code of the Geographical subarea (GSA)
- HAULS Number: insert the identification number which has been assigned to each fishing haul (as in Appendix 1.1.1).
- HAULS Identification CODE: insert the identification code which has been assigned to each fishing haul (as in Appendix 1.1.1).
- Temperature: Insert an average value of the sea temperature (both recorded on the sea surface and on the bottom) in °C with two decimals; NA if not available.
- Salinity: Insert an average value of the salinity (both recorded at the sea surface and on the bottom) in part per thousand ‰; NA if not available.

- Survey: insert the name of the survey.
- GSA: insert the code of the Geographical subarea (GSA).
- HAUL Identification CODE: insert the identification code which has been assigned to the identified fishing haul (as in Appendix 1.1.1).
- Species: insert the scientific name for all the species present in the catch composition.
- Subsample (y/n): for each species caught during the same fishing haul, indicate “Yes” if data (on weight and number) have been collected for a subsample, otherwise, indicate “No”.
- Multiplied by: indicate the number for which should be multiplied the subsample.
- Number: insert the total number of individuals present in the catch (or in the subsample) for the identified species
- Weight (kg): insert the total weight (in kilos) of the individuals present in the catch (or in the subsample) for the identified species.

Appendix 1.1.4 - Length data for rapa whelk

Survey									
Country			GSA						
HAUL Identification CODE			Date						
A: Total catch (all included)			Length class	Range	N1: frequency	BW1: Brut weight	N1': N cleaned	Brut weight	NW: Net weight
BC: Total weight of bycatch in the catch			1.0	1.000 - 1.499					
D' : Debris in the subsample			1.5	1.500 - 1.999					
			2.0	2.000 - 2.499					
			2.5	2.500 - 2.999					
			3.0	3.000 - 3.499					
			3.5	3.500 - 3.999					
			4.0	4.000 - 4.499					
			4.5	4.500 - 4.999					
			5.0	5.000 - 5.499					
			5.5	5.500 - 5.999					
			6.0	6.000 - 6.499					
			6.5	6.500 - 6.999					
			7.0	7.000 - 7.499					
			7.5	7.500 - 7.999					
			8.0	8.000 - 8.499					
			8.5	8.500 - 8.999					
			9.0	9.000 - 9.499					
			9.5	9.500 - 9.999					
			10.0	10.000 - 10.499					
			10.5	10.500 - 10.999					
			11.0	11.000 - 11.499					
			11.5	11.500 - 11.999					
			12.0	12.000 - 12.499					

			12.5	12.500 – 12.999					
			13.0	13.000 – 13.499					
			13.5	13.500 – 13.999					
			14.0	14.000 – 14.499					
			14.5	14.500- 14.999					

Length data by fishing haul
Entry sheet: length data for fish and elasmobranchs

Appendix 1.1.5 - Length data (<i>rapa whelk, fish, and elasmobranchs</i>)							
Survey							
Country					GSA		
HAUL Identification CODE					Date		
TL (cm)	Species			TL (cm)	Species		
0				0			
0.5				0.5			
1				1			
1.5				1.5			
2				2			
2.5				2.5			
3				3			
3.5				3.5			
4				4			
4.5				4.5			
5				5			
5.5				5.5			
6				6			
6.5				6.5			
7				7			
7.5				7.5			
8				8			
8.5				8.5			
9				9			
9.5				9.5			
0				0			
0.5				0.5			
1				1			
1.5				1.5			
2				2			
2.5				2.5			
3				3			
3.5				3.5			
4				4			
4.5				4.5			
5				5			
5.5				5.5			
6				6			
6.5				6.5			

7				7			
7.5				7.5			
8				8			
8.5				8.5			
9				9			
9.5				9.5			
0				0			
0.5				0.5			
1				1			
1.5				1.5			
2				2			
2.5				2.5			
3				3			
3.5				3.5			
4				4			
4.5				4.5			
5				5			
5.5				5.5			
6				6			
6.5				6.5			
7				7			
7.5				7.5			
8				8			
8.5				8.5			
9				9			
9.5				9.5			
0				0			

✓ This template should be duplicated for the different species caught during the same fishing haul and for which length data (in centimetres) should be collected.

Instructions

- Survey: insert the name of the survey.
- GSA: insert the code of the Geographical subarea (GSA).
- HAUL Identification CODE: insert the identification code which has been assigned to the identified fishing haul (as in Appendix 1.1.1).
- Species: insert the scientific name of the identified species.

Appendix 1.1.6 - Age data						
Survey						
Country				GSA		
HAUL Identification CODE				Date		
Species						
Total weight in the catch				Weight of the sample		
No	Shell length (mm)	Shell (mm)	width	Age	Sex	Remark
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						

Instruction

- Survey: insert the name of the survey.
- GSA: insert the code of the Geographical subarea (GSA29).
- HAUL Identification CODE: insert the identification code which has been assigned to the identified fishing haul (as in Appendix 1.1.1).
- Species: insert the scientific name of the identified species.
- Length: for each identified specimen insert the shell length and width (in mm).
- Sex: if available, insert the sex of the identified specimen (M=male; F=female; U=undetermined; ND=not determined).

- Survey: insert the name of the survey. GSA: insert the code of the Geographical subarea (GSA).
- HAUL Identification CODE: insert the identification code which has been assigned to the identified fishing haul (as in Appendix 1.1.1).
- Total quantity of macroinvertebrates (estimation in kg): Total weight (or an estimate) of macroinvertebrates (macrobenthos) in kilograms taken during the same fishing haul.
- Percentage of macroinvertebrates in the total catch (%): total macroinvertebrates fraction (in percentage) cumulated during the same fishing haul.
- Composition by species: Whenever possible, insert the name of the macrobenthic species. When the specimens cannot be identified at the species level, the genus, family, order or taxa should be indicated. In cases where species identification is not possible (especially for sessile taxa), assignment of organisms to morphological groups according to their growth form (e.g. massive, tubular, globular, arborescent, stalked, fan-shaped, lollipop-shaped, cup-shaped) combined with information about their color, consistency (e.g. hard/soft) and photographic documentation.
- Total weight (kg): Insert the total weight in kilograms (or an estimate) for each identified species of benthic marine macroinvertebrates caught during the same fishing haul.
- Total number: Insert the total number (or an estimate) for each identified species of benthic marine macroinvertebrates caught during the same fishing haul.
- Photo(Y/N): insert “Yes” or “No” if a photo of the specimen has been taken and, if “Yes”, assign an identification code to the photo.