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29 January-1 February 2008

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Executive summary

The planning group of the North-east Atlantic continental slope survey (PGNEACS) met with the objective of reviewing existing deepwater surveys that are carried out in the Northeast Atlantic and exploring the feasibility of incorporating these surveys into a single coordinated NEA slope survey with a common survey strategy and standardised protocols. Following a review of the existing surveys the conclusion was reached that PGNEACS could accommodate two categories of surveys depending on their level of coordination and standardisation. The first level would include surveys that are fully standardised in their methodology in order to produce common abundance indices for the main deepwater species roundnose grenadier, black scabbardfish, deep-water sharks, bluemouth redfish and greater forkbeard and other species as appropriate. At the second level of coordination, surveys with the same scientific objectives would be coordinated by PGNEACS but not fully standardised due to practical and scientific reasons. Using this classification, a single slope survey is planned whereby there will be an annual deepwater trawl survey along the continental slope in quarter 3 and 4, from ICES area VI west of Scotland to VIII Bay of Biscay. This survey will combine the existing Scottish and Irish deepwater trawl surveys which for the purpose of international coordination will be spatially adjusted to improve coverage along the continental slope between VI and VIII. Both surveys are already operating with the same trawl gear and used agreed and standardised methodologies. In addition the survey will include a deepwater component of the French IBTS survey which will sample depths between 500 and 1800m at three sampling regions in the Bay of Biscay between the Goban Spur and the Landes Plateau. For the extension of the survey into IXa, it was noted that trawl gears are not appropriate for sampling and a longline survey is proposed that will be scientifically coordinated by PGNEACS. The possibility of making a number of longline stations in the northern areas for further comparability will be explored. A number of northern trawl surveys in area II and V could potentially complement PGNEACS and the group recommends that these surveys will be coordinated among themselves either by PGNEACS or within a separate planning group.

The primary aim of the coordinated PGNEACS survey area is to obtain abundance indices of deepwater species that are assessed by WGDEEP and WGEF. For this purpose, survey strategies and methodologies were agreed between the participating countries. The trawl survey will operate at selected sites of the Northeast Atlantic continental slope and carry out depth transect with 2 hour hauls at four different depth strata (500, 1000, 1500 and 1800m) to obtain fish catches. For the longline survey, fishing hauls will be randomly set within each cell of a regular grid established for the Portuguese continental slope. The intended sampling effort will be of two fishing sets per day of ca. 10 hours each. Fish catches from both types of surveys will be species id, weighed and measured. Abundance indices will be relative and in the first instance area specific with the aim to combine overall abundances in the future. For data management purposes the group proposes to use the DATRAS database for the trawl survey data. In addition to abundance indices, biological data will be used in biodiversity studies, biological and ecological investigations of deepwater fisheries and population indicators. The surveys will also include a strong multidisciplinary component. Fish trawling will be carried out during the daytime and the acquisition of environmental and ecological data will occur during night time. While some of these parameters will be project based, PGNEACS agreed on a set of basic environmental data that will be collected routinely. In addition the group

requests advise from expert groups such as WGDEC, WGDEEP and WGEF on additional datasets that should be collected on a routine basis.

1 Introduction

1.1 Terms of reference

The **Planning Group on the North-east Atlantic continental slope survey** [PGNEACS] (Chair: Leonie Dransfeld,* Ireland), was established and met in Galway, Ireland from 29 January–1 February 2008 to:

- a) review existing NE deep-water & slope surveys in terms of sampling strategy, protocols and intercomparability;
- b) based on a) suggest a plan for coordinating internationally an annual or regular survey of the north-east Atlantic continental slope from ICES Subareas VI in the north to Subareas IX and X in the south and area CECAF 34.1.1, commencing 2009.
- c) suggest suitable survey design, technology, sampling effort and sampling protocols for the proposed survey in order to provide the following future data to WGDEEP, WGEF and WGDEC and other ICES Expert Groups as appropriate:
 - i) abundance indices for roundnose grenadier, black scabbardfish, deep-water sharks, bluemouth redfish and greater forkbeard and other species as appropriate;
 - ii) biological parameters for the key species;
 - iii) biodiversity indices for fish communities and benthos as appropriate;
 - iv) data on habitat mapping (video/TV) of identified seamounts and other vulnerable habitats;
 - v) fish /environment interaction in the deepwater habitats;
 - vi) seabird and marine mammal distribution
 - vii) samples for genetic and contaminant studies
- d) develop and standardize methods for the computation of abundance indices;
- e) review existing databases for bottom trawl surveys such as DATRAS for the management and storage of data from the survey;
- f) co-ordinate the production and dissemination of species identification and maturity keys for the proposed deepwater survey.

1.2 Structure of report

The structure of the meeting and the report closely follow the terms of references. The first part deals with the review of existing deepwater surveys, how they compare and whether they would be potential candidates for the incorporation into an internationally coordinated deepwater survey. Included in this section is a proposal how existing surveys can be adapted to form part of the international NEACS (Northeast Atlantic Continental Slope) Survey. Levels of coordination are discussed as well as a proposal for new surveys to complete the spatial coverage along the continental slope. The second part of the report consists of a detailed description of methodologies and protocols to be used in order to collect fish samples, carry out biological sampling, produce abundance indices and manage the fisheries data. The final part of the report provides strategies and plans on how to collect additional data

as specified in the terms of references. For full details on the agenda of the meeting please see annex 2.

1.3 Participants

A full list of participants is given in annex 1.

2 Review of existing surveys and planning of the 2009 NEACS survey (ToRs a & b)

2.1 ToR a) Review of the existing NEA deep-water & slope surveys in terms of sampling strategy, protocols and intercomparability

Several existing NEA deepwater surveys have the potential to be coordinated under the umbrella of PGNEACS. These were reviewed by the group and their objectives, sampling strategy and intercomparability was discussed. An overview of these surveys is given in the following section. In addition table 1.1 gives details on their spatial and temporal extent, their frequency and the data that is collected. This table is a modification of the table presented by WGDEEP 2007 and contains the surveys that are considered within this planning group (for further details please refer to ICES 2007).

2.1.1 The FRS (Scottish) deepwater survey

The FRS deep-water survey dates back to 1996 although strictly comparable data are available from 1998 onwards with the advent of the current research vessel FRV Scotia. From 1998 through 2004 a biannual survey covered a core area from between 55 to 59 ° N with a depth stratification at 500, 1000, 1500 and 1800 m (Figure 1). Additional stations have also been trawled at intermediate depth strata, most notably at 750m. Since 2005 the survey became annual and while retaining its core survey stations on the shelf slope began to expand its geographic scope to the eastern flank of Rockall bank and to the Anton Dohrn seamount and Rosemary bank. The survey takes place in September and is usually in the region of 14 days.

The survey uses a Jackson BT184 bottom trawl with rock-hopper groundgear, Morgere ovalfoil 1700 kg doors (area 5.82 m) and 100 m sweeps. Flotation is provided by 8 inch titanium floats rated to 2500 m. Mesh size on the cod-end is 20 mm. The net is monitored using Scanmar sensors to give headline height, depth and distance of wings and doors. A bottom contact sensor is attached to the ground-gear to assess when the gear is on the seabed. A data logger (StarOddi high pressure Centi DST) is also attached to the headline to record temperature at depth.

The main objective of the survey is to obtain data on the composition, distribution and abundance of the continental slope fish species between depths of 500 – 1800 m. The survey has other multidisciplinary objectives including hydrographic deployments and TV/video surveys of the shelf slope, Rockall and the seamounts for the purposes of mapping Nephrops distribution and habitat types such as coral reefs. In addition collection of biological material for otolith and genetic studies is regularly undertaken.

2.1.2 The Irish Deepwater Survey

The Irish deepwater survey has been conducted since 2006 and covers ICES areas VIa and VIIc. It aims to characterise the different components of the slope and deepwater ecosystem in a multidisciplinary fashion. The primary aim is to produce abundance indices of shelf edge, slope and deepwater fish communities and further to study

their distribution patterns and biological parameters across depth transects at three target sites in the north-east Atlantic. It further aims to collect biological information on the main deepwater species including length, weight, maturity, sex ratio and feeding. The vessel carries out fishing hauls in the three study areas indicated in Figure 2. These areas were selected after analysis of fishing tows carried out during the Irish deepwater survey programme in the 1990s.

The gear used is a Jackson trawl with heavy groundgear (D-gear) and Scanmar net monitoring sensors. The doors used are also Morgere ovalfoil 1700 kg doors (area 5.82 m), but the floats are 11" titanium floats. Bottom contact sensors are planned to be used on the Irish survey from 2008 onwards. The hauls are carried out along the slope with an effective fishing time for each haul of two hours. CTD transects are carried out at night from 250 to 2000m. Also sediment grabs are carried out using Hammon and Shipek grabs. Two sub-areas are located on the western continental slope (Vidal Bank and Donegal) and one area on the northern slope of the Porcupine Bank (N. Porcupine). During the 2006 survey depths fished were 500m, 750m, 1000m and 1500m. In 2007 the 750m stratum was dropped and the survey was extended to 1800m. Since 2006 the surveys have been coordinated with the Scottish deepwater survey that covers the slope in area IVa from 55° to 58.5°N at the same time.

2.1.3 The French IBTS survey

The French part of the western IBTS is a GOV bottom trawl survey carried out yearly from mid-October to early December. It covers the Bay of Biscay and the Celtic Sea, and aims to produce abundance and recruitment indices of the main demersal species in the area (hake, monkfishes, megrim). Population and fish community indicators are computed for all species properly sampled by the survey. About 160 bottom tows per year are done down to 550 m as shown in Figure 3. The continental slope in the Bay of Biscay and Southern Celtic Sea has a rugged bottom, most of which cannot be sampled from standardised bottom tows.

2.1.4 Norwegian Greenland halibut survey

Since 1994 the Institute of Marine Research in Norway has conducted an annual bottom trawl survey in August to explore the main distribution area of the adult Greenland halibut (*Reinhardtius hippoglossoides*) stock on the continental slope between 68° and 80° N, and to estimate numbers and biomass of the fishable stock. The survey lasts four weeks and includes approx. 180 bottom trawls taken at fixed stations down to 1350 m depth. After inclusion of the 400-500 m depth zone in the surveyed area in 1998, deep-sea redfish (*Sebastes mentella*) are also targeted. Species other than Greenland halibut and deep-sea redfish make up approximately 10% of the total catch weight. The most important deep-sea species in addition to the two target species, are greater silver smelt (*Argentina silus*), grenadier (*Macrourus berglax*) and some skates. The spatial extent of the survey is shown in Figure 4.

2.1.5 Norwegian greater silver smelt survey

A trawl-acoustic survey is carried out by Norway in March-April covering lower parts of the continental shelf (below 350m) from approx 68° N and southwards along the Norwegian coasts into the inner part of Skagerrak (Figure 4). The survey was conducted annually during the periods 1980–1983 and 1989–1994, and again in 2007 in order to map and establish abundance indices of greater silver smelt and other deep-water resources. In 2008 the survey will be skipped in favour of an experimental survey aimed at estimating TS-values and improving sampling gear in order to

improve future surveys. The sampling may possibly be extended to include bottom, semi-pelagic and pelagic trawls, as well as deep-towed multi-frequency transducer, but decision on this will be based on results from the experimental survey in April 2008.

2.1.6 IPIMAR – historic deep bottom trawl surveys.

From 1994 to 2002 IPIMAR conducted, at least, a yearly deep-water trawl survey along the Portuguese continental slope. Several constraints rendered 1996 and 1999 surveys impossible to perform and in the remaining years only in 1995 and 1997 all the coast was surveyed. The objective of the survey was to estimate the abundance of deep sea resources off the Portuguese mainland coast, identify the species of the total catch, collect biological data for several of the target species, including : bluemouth (*Helicolenus dactylopterus*), greater fork-beard (*Phycis blennoides*), gulper shark (*Centrophorus granulosus*), leafscale gulper shark (*Centrophorus squamosus*), Blue and red shrimp (*Aristeus antennatus*), deepwater rose shrimp (*Parapenaeus longirostris*) and collect length and weight information of less frequent species. From 1994 – 2000 a stratified random sampling strategy was used whereby strata were defined according to depth and geographic area and at least two hauls were performed in each stratum. From 2000 onwards, sampling hauls were performed in each vertex of a square grid with 5 nautical miles (nm) side. An example grid as adopted for the Algarve coast is shown in Figure 5. From 2003 onwards, this type of survey was discontinued, since the deepwater resources with more importance for Portugal, namely black scabbardfish and deep-water sharks, were not adequately sampled in these surveys.

2.1.7 IPIMAR - experimental deepwater surveys

IPIMAR carried out some experimental surveys using different fishing gears and essayed both on the shelf and on the slope. Among them were two different longline surveys in September 2003 using i) floating (FL) and ii) bottom longliner (BL).

2.2 Intercomparability and potential coordination of existing surveys

Following discussions on the formation of a single, internationally coordinated deepwater survey along the continental slope of the NEA, it was felt that full coordination and standardisation might not be achievable for all participating surveys. In this case coordination and standardisation would have to occur at several levels in order for different types of surveys to be included into PGNEACS. These levels of coordination would be as follows:

- The first and highest level of coordination would be full standardisation of methods to address stock specific fisheries with the aim to produce combined abundance indices. Surveys included at this level aim to standardise their gear as well their methods and protocols as much as possible in order to produce data on deepwater fish abundance indices to the end-user that are comparable and can be combined.
- The second level of coordination within PGNEACS would include surveys that for logistical or scientific reasons cannot reach the first level of full standardisation. It would entail the spatial, temporal and scientific coordination of these surveys. Surveys that would be coordinated on this level within PGNEACS would need to be spatially complementing, have the same primary objectives and provide data to the same end user. For surveys to be included on this level of coordination it was decided to apply following criteria: The surveys need to be annual, are carried out along the

continental slope of the NEA and should aim to build up a time series of abundance indices for deepwater species that are assessed by the WGDEEP, WGEF or other assessment working groups as appropriate. There should also be a commitment of the survey to provide the scientific data to the ICES community in a specified format such as DATRAS but that can encompass the diversity of fishing gears employed.

The Scottish and the Irish deepwater trawl surveys already display a high level of scientific coordination and standardisation. Both surveys are carried out concurrently in September along the continental slope between area VIa and VIIc, whereby Scotland is covering sites along the slope between 55° to 59° N and Ireland is covering the slope between 53.5° to 57° N. When the Irish survey commenced in 2006, the fishing gear as well as the sampling strategy and methodology that was used by Scotia was adopted as closely as possible. Where the two surveys were spatially overlapping (55° to 57° N) comparative tows were conducted in 2006 and 2007. In addition, exchange of scientific personnel and a joint workshop on species identification and biological sampling methods were carried out to ensure compatibility between the surveys. Following the outline of the two levels of coordination within NEACS, these two surveys would be carried out on the first level of coordination, i.e. on the level of technical standardisation.

The French IBTS survey has currently no deepwater strata and will need to be modified to sample deeper waters. If gear and methods can be adapted, a specific deepwater component of the French IBTS survey could be coordinated on the first level, i.e. with the aim to have full technical standardisation.

The Greenland halibut survey carried out by Norway in ICES division II is an example of northern surveys that fit the criteria for the incorporation into NEACS on the second level, in that it has the potential to provide abundance indices for deepwater species, it is carried out at the same time as the deepwater surveys further south and as it covers the slope in area II, it is spatially complementing to PGNEACS. With modifications to its depth strata and a southern extension it has the potential to be incorporated into the NEACS survey.

2.3 Planning of the 2009 NEACS survey (ToR b)

The following section describes a proposal for the coordination of an international annual survey of the north-east Atlantic continental slope from ICES Subareas VI in the north to Subareas IX in the south commencing 2009. In addition, suggestions are given of how a survey in the northern area (II) could be coordinated.

2.3.1 Trawl survey in ICES Subareas VI, VII and VIII

In the central study area, i.e. from Subareas VI to VIII there will be a coordinated and standardised bottom trawl deepwater slope survey. This survey consists of the Scottish and Irish deepwater surveys and an extension of the French IBTS survey into deep water (from 500m to 1800m). The proposed spatial coverage of this survey is shown in Figure 6. The Scottish component of this survey will cover three sampling regions in area VIa. These are from north to south “the Flannan”, “St. Kilda” and the “Vidal Bank”. The Irish component of the survey will cover three sites in ICES divisions VIa, VIIc and VIIk. These three sampling regions are named from north to south: “Donegal”, “North Porcupine” and “Southwest Porcupine”.

NEACS in the Bay of Biscay and on the western slope of the Celtic sea is carried out as an extension of the current French part of the western IBTS. The continental slope

in the Bay of Biscay and Southern Celtic Sea has a rugged bottom, most of which cannot be sampled from standardised bottom tows. It is therefore proposed to sample a few flat areas with parallel tows from 500 m down to 1800 m. Three sampling regions are defined with (approximate coordinates) and shown in Figure 6: the Landes Plateau (43°40'–44°30'N; 2°–3°W), the Meriadzek Terrace (47°–47°40'N; 7°40'–8°30' W) and the Northern Goban (50°–51°N; 10°30'–11°30'W).

Doing the NEACS survey as an extension of western IBTS allows reducing significantly the steaming time. However it has some serious technical implications, which have not been fully solved so far. The GOV trawl used in western IBTS is not appropriate to sample the slope, it is too fragile and it is different from the trawls used in Irish and Scottish survey carried out further north. The intention is to acquire the same deepwater trawl as used in the Scottish and Irish deepwater surveys. Therefore, the trawl and doors should be changed at sea; this was already done on R/V *Thalassa* but may be difficult in rough weather. Western IBTS is carried out in winter when daylight is short. As daylight might not be the main factor for catch rate of slope species, the group felt that deepwater tows could be carried out over a 12 hours period. The rest of the day being allocated to other operations such as finding appropriate trawl paths, CTD stations and video records. On the basis of 2 hours tows, 3 tows per days (during the 12 hours) can be carried out. It is proposed to allocate 5 days to NEACS, providing a yearly sample of 15 tows.

2.3.2 Extension of NEACS into Subarea IX

Bottom trawl surveys for deepwater fisheries west of the Portuguese coast were discontinued in 2003, due to the fact that the deepwater resources with more commercial importance for Portugal, namely black scabbard fish and deep-water sharks, were not adequately sampled in these surveys. Yields from trawl gears are expected to be very low and thus cannot be used as abundance indicators. The species are usually caught by the commercial fleet in grounds not suitable for trawling. Furthermore, deep-water species show a very steep vertical distribution, being associated with areas of very irregular sea floor morphology. In these areas, trawl gears are not appropriate for sampling. As a consequence, it is proposed to use longline gears instead. In the depths surveyed by longline gear during experimental surveys, the results were promising. Several deep-water species were caught, indicating that the fishing technique used should be adequate to obtain abundance estimates of the targeted species.

Hence in this area it is proposed to carry out a long line survey which would be scientifically coordinated by PGNEACS at level two as it would not have technical standardisation with the trawl survey in the central area of NEACS. The main objective of the survey would be to produce abundance estimates for black scabbardfish and deep-water sharks using longline (most appropriate fishing gear for the target species). A sampling grid proposal for deep-water species to be adopted by surveys in the Portuguese continental slope is illustrated in Figure 7. In order to investigate the possibility of combining abundance indices between the trawl survey in the central area and the longlining survey in IXa in the future it will be necessary to carry out comparative studies between the trawl gear and longlining.

2.3.3 Possible Extension of NEACS into area II, V

With reference to the present awareness of climate change, it is important to consider similar coordinated surveys in areas further north, i.e. in Icelandic, Faroese and Norwegian waters. In these areas several surveys are targeting species like Greenland

halibut and deepwater redfish for abundance estimation. These are examples of deepwater species that are dealt with by other ICES WGs than WGDEEP and WGEF (i.e. AFWG and NWWG). PGNEACS suggests two possible options of how the northern surveys could be coordinated:

- The ToRs for PGNEACS could be expanded to include coordination also of these northern surveys, as well as provision of data to both AFWG and NWWG in addition to WGDEEP, WGDEC and WGEF.

Another planning group could be established to coordinate the surveys in the northern area. In the latter case, it will be necessary to have some coordination between the two planning groups, as e.g. concurrent or joint meetings.

3 Survey design and methodology for NEACS

3.1 Code of Conduct in sensitive deep-water environments

Deepwater ecosystems can contain fragile communities of organisms such as corals and sponges that are vulnerable to damage by trawling. In recent years a number of deepwater areas have been closed to fishing. Deepwater research surveys should attempt to minimise any adverse affects on fragile communities. To this end a code of conduct is being developed and will be adopted by the NEACS.

3.2 Fishing gear and net monitoring system for trawl survey

The Scottish and Irish surveys both use a Jackson BT184 bottom trawl with a cod-end mesh size of 20 mm. Ground gear differs slightly with Scotland using rock-hopper groundgear and Ireland using heavy groundgear (D-gear). The design of the Jackson Trawl is shown in Figure 8. Morgere ovalfoil 1700 kg doors (area 5.82 m) and 100 m sweeps are used. Flotation on the Scottish gear is provided by 8 inch titanium floats rated to 2500 m, while the Irish gear uses 11 inch titanium floats (this has already been referred to in section 2.1.1 and 2.1.2). It is proposed that France will standardise gear accordingly.

In terms of a net monitoring system, requirements for this survey would be to have an adequate system to be suitable for operating at the maximum depth of 1800 m. This system should provide for accurately assessing the time of touch down of the net, the net geometry to allow the estimation of the swept area. Alternative approach to bottom contact sensors and trawl eyes would be to monitor the bottom contact by collecting a series of photographs during the process of the fishing haul. It is recommended that during the individual surveys, gear parameters are collected for each tow so that they can be evaluated in future survey meetings.

3.3 Fishing gear for the longline survey

For longline survey the gear will be adapted from the traditional longline used by the commercial boats in Portugal. The main characteristics of this gear are: bottom longline with mainline detached from the seabed by floats. It will be composed by 2000 gangeons spaced about 4.15 m apart, each 1.50 m long fitted with hooks number 5. Connected to each hook there is a piece of brass wire 120 to 150 mm long to prevent loss of catches from fish biting.

3.4 Sampling procedures – fishing trawl tows

In each area transects of trawl hauls will be carried out. In each transect hauls will be depth stratified at 500m, 1000m and 1500m and 1800 meters. Trawling will be along

the contour, with a buffer zone of ca. 100m–125m depth with the intent to stay to the central depth as closely as possible.

Effective fishing time for each haul is two hours. The start of fishing time is defined by time when the bottom contact sensor touches down or the trawl eye detects the bottom – the end of fishing time is when the winches start hauling. There can be quite a lot of variability in the time lag of when the winches start hauling and when the vessel stops fishing, hence the vessel's crew should try to adopt the same procedure every year of how to operate the vessel during hauling.

Information on clean fishing tows are derived from seabed mapping information, clean tows registered during past deepwater surveys and information from OSADENA as available. During the course of the time series it is envisaged that a library of clean tows will be build up that are used during the survey.

3.5 Sampling procedures – long line fishing

Fishing hauls will be randomly set within each cell of the regular grid established for the Portuguese continental slope. The regular grid is presented in Figure 7. The total number of fishing hauls will depend on available budget and the required level of precision for species abundance estimates. The gear will be settled each day during the morning and retrieve late in the afternoon. Each fishing haul will have an approximate duration of 10 hours. The intended sampling effort will be of two fishing sets per day. Achieving this target will, however, depend on operational and weather conditions.

3.6 Fish sampling

All the catch is sorted and identified to species level. In case of difficulties with species identification, specimens will be tagged and stored for further identification. Each species is sampled in order to quantify the total weight and also the total number of each species present in the haul. For the majority of species this is done by recording a length measurement for each individual fish. This creates a length frequency distribution as well as the total abundance for each species. There are regularly instances where either a species, or indeed a number of species, are too numerous for all fish to be measured. In this scenario a subsample will be taken – after sorting to species level - by weight and then raised in order to calculate the total abundance of a species within a haul. In order to ensure a random sample is indeed representative of the catch (and the population), a systematic approach to sub-sampling the catch is important. However, the precise means by which a random sub-sample of the catch is achieved will vary somewhat according to constraints imposed by vessel design, space and layout of the fish processing area.

In the case of MI - a decision is made on what proportion of the sorted boxes will be kept aside and mixed to provide the final random sample, depending on the range of lengths in the sorted catch. Sorted boxes of fish should be taken to represent all parts of the catch evenly throughout the sorting process. As the sorted boxes for a species arrive at the weighing station two empty fish boxes are placed side by side on the floor. The weighed sample being kept is upturned onto the two empty boxes and therefore essentially split. The next retained sample is also split and the mixed boxes on the floor are likely full at this stage. The process is repeated until the desired sample size for measuring is achieved in a final split. This is then weighed and sent for measuring as the sub-sample, or in the case mentioned where it is still a species mix it is first sorted completely and the fractions used to raise up to the original catch.

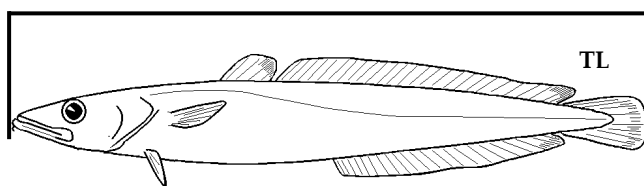
The method is completely adaptable, simple and should avoid major bias if the initial sorting is reasonable and, more importantly, the nth box retained is kept constant throughout the sort.

In the case of the FRS survey, where the catch is brought from the hopper, down the conveyer and into individual basins for sorting, it is important to make sure that each time a basin is filled to be sorted it is completely emptied before the next load of fish is taken in. In the case of numerically dominant species such as the roundnose grenadier, that have to be sub-sampled it is important to make sure that the sub-sample is selected from baskets filled throughout the sorting process.

3.7 Measurement types for deepwater species

Due to the great variety of body shapes of deep-water fish species and the fragility of their tails and fins some species are not measured to total length.

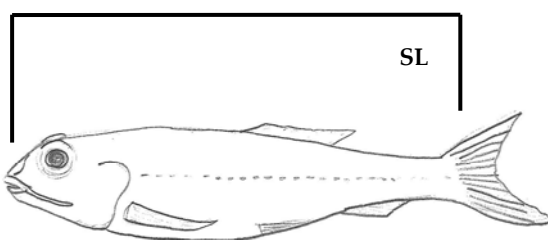
The majority of species encountered during the deepwater surveys are measured to the centimetre below using total length as the length qualifier (TL) (see diagram directly below). There are however some exceptions. Listed below are the species groupings that are not measured using total length complete with details of the length measurement collected for each. Table 2 summarises the measurement type for each species grouping displayed below.



3.7.1 Smoothheads and Searsids (Alepocephalidae and Searsidae)

SL- Standard Length. Measurement taken from the tip of snout/anterior point of head to the end of the fleshy caudal peduncle.

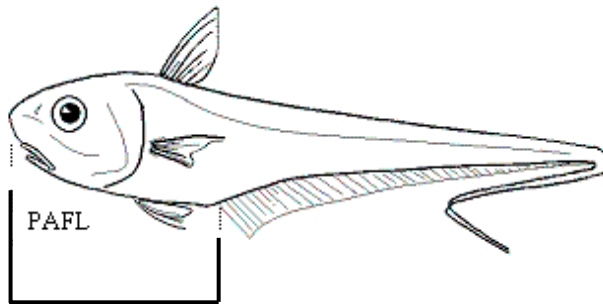
Not to be confused with TL which includes the caudal finrays.



All smoothheads and searsids are measured to the nearest whole cm below.

3.7.2 Grenadiers (Macrouridae)- PAFL – Pre Anal Fin Length

Measurement taken from the tip of the snout to the first anal finray. (see diagram below).

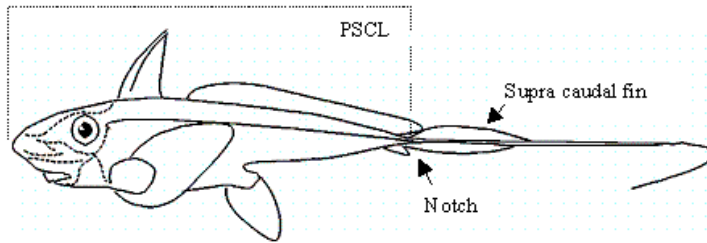


All grenadiers are measured to the nearest 0.5cm below.

3.7.3 Chimaeridae (Rabbitfish) – PSCFL – Pre Supra Caudal Fin Length

Applies to all Rabbitfish except Rhinochimaeridae. (see diagram below).

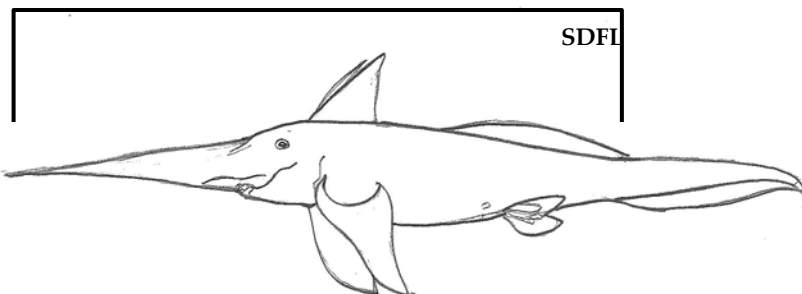
Measured from the tip of the snout to the point just before the start of the supra caudal fin.



3.7.4 Rhinochimaeridae (Longnose rabbitfish) – SDFL – Second Dorsal Fin Length

These species contain no supra caudal fin so length measurement is taken from the tip of the snout to the end of the second dorsal fin. (see diagram below)

Applies to Straightnose rabbitfish (*Rhinochimaera atlantica*) and Bentnose rabbitfish (*Harriota raleighana*).



All Chimearidae and Rhinochimaeridae are measured to the nearest whole cm below.

Several issues regarding length measurements have been identified and should be further considered:

- A measuring bias was identified when sampling certain species to a precision level of the half centimetre. However due to very slow growth rates of many deepwater species, it is important to keep this resolution, especially for juvenile stages. This should not cause problems so long as any subsequent analysis takes this into account. Thus species, for which the problem arises, will be flagged in the database to indicate that there can be a bias on the size range due to half centimetre measuring.
- Extended storage/preservation can affect length measurement. It is therefore recommended that the catch should be measured within a few hours of being brought onboard.

3.8 Additional biological sampling

Currently, the existing deepwater surveys are carrying out different biological sampling regimes in terms of weight measures, maturity stage determination and collection of otoliths, scales etc for age determination. In terms of age determination of deepwater fish collected on the surveys the group notes that aged based assessment which require aged structured abundance indices from the survey are difficult to foresee for most species. Hence the group decided that the best approach to take for prioritizing and committing to a biological sampling programme for the survey is to request feedback from the assessment working groups on their requirements in terms of biological parameters on a stock by stock basis. PGNEACS therefore recommends that a ToR is given to WGDEEP and WGEF to review the biological parameters that should be collected on the NEACS survey by stock in addition to those specified by PGNEACS. In the meantime the countries participating in the surveys will continue their collection of data to the resolution they have carried out before with some common prioritization that are agreed by all. These are:

- Length measurements for all species
- Length measurements by sex for chimeras and elasmobranches
- Length, weight, and sex for all elasmobranchs

4 Abundance indices, their computation and data management (ToRs c-i, d & e)

4.1 TOR c) Survey design and protocols to provide abundance indices for deepwater species

One of the main objectives of the NEACS survey is to obtain abundance indices. The intention is to get relative abundance indices per sampling region. These can be further aggregated in a weighted index over regions for use as a population or stock index. However, optimisation of the sampling plan and improved knowledge of the stock distribution and identity may imply revision of the weighting to calculate the aggregate index. Therefore the formulas given in the section should be considered preliminary. Abundance and biomass indices can be calculated and aggregated in the same way.

The sampling regions proposed in the survey planning cover the continental slope from the North West of Scotland down to the southern Bay of Biscay with a standardized trawling survey. The main deepwater fishing area west of Portugal is covered by longline surveys.

The abundance and species composition of the deepwater fish community depend upon the geographical area and the depth. At the species level, the abundance and

length distribution vary with these factors too. Therefore abundance indices should be stratified by these two factors. Abundance indices per individual area and depth are important as indices of local variation/depletion. However, the combination of indices per area and depth into a stratified index of the population or stock abundance is required to carry out stock assessment by non-spatial dynamic population model as was attempted so far by WGDEEP for roundnose grenadier, blue ling and red (blackspot) seabream.

4.2 TOR d) Develop and standardize methods for the computation of abundance indices

Case of the slope west of the British Isles, Celtic Sea and Bay of Biscay:

Based upon survey catch per swept area per strata, abundance indices will be computed for each stratum (for example 500, 1000, 1500, 1800 m depth along the slope west of the British Isles). These will be raised to the surface areas of the corresponding depth intervals (250–750 m; 750–1250 m; 1250–1650 m; 1650–1950 m, in the case of the west of the British Isles slope) and then combined into a stratified abundance index for the continental slope from the north of ICES division VIa to the south of division VIIIb (southern Bay of Biscay).

Abundance index for sampling region i is defined as:

$$R_i = \sum_{j=1}^{J_i} \sum_{k=1}^{K_{ij}} \frac{C_{ijk} \cdot a_{ij}}{d_{ijk} \cdot A_i \cdot K_{ij}} ;$$

where:

C_{ijk} is catch in numbers in trawl k , within depth interval j , of sampling region i ,

d_{ijk} is towed distance (in nm) of trawl ijk ,

a_{ij} is area of depth interval j (in squared nm) within sampling region j ,

A_i is area of sampling region i within all J_i depth ranges considered,

K_{ij} is number of hauls in depth interval j of sampling region i .

In addition to this rather straightforward stratified index, exploratory modelling of the fish density may be required to combine regional indices in population or stock indices.

For the computation of abundance indices from the longline survey, a short experimental survey (duration of 5 days) will be carried out in a geographic restricted area in order to define and adjust a model to standardize the abundance estimates of species, specially for black scabbardfish and for the two main deep-water sharks species, from the two fishing gear methods: longline and deep-water trawl (preferentially with one of gears used by one of the participants). Design, as well as, model based abundance estimators will be used for the main species. Post-stratified abundance estimates by depth and geographic area will be determined.

For some species treated by WGDEEP, which depth distribution extend over the shelf such as greater forkbeard, bluemouth and ling, abundance indices from shelf surveys (western IBTS in the Cantabrian Sea (Spain) Bay of Biscay (France), Celtic Sea (France and Ireland), Porcupine Bank (Spain), North and west of Ireland (Ireland), Scottish IBTS) should provide additional abundance indices to WGDEEP. Details on

additional surveys that can give abundance indices for species of interest are given in tables 3 and 4.

In addition to abundance and biomass indices to be input in stock models readily available, other population indicators that are not taken into account by population model used so far by WGDEEP should be computed. The most useful indicators are length indicators (length distribution, mean length, quantile of the length distribution per geographical area and depth strata) which can be combined with abundance indices to provide qualitative populations diagnostics (Rochet *et al.* 2003, 2005).

Additional indicators such as the sex ratio from chondrichthyes might also be of interest to stock diagnostics. Based on preliminary analysis of FRS survey to the west of Scotland, the interest of the depth of peak abundance as an indicator of population depletion should also be investigated (WGDEEP 2007).

As for most species the length frequency distribution varies according to depth. Therefore length indicators should be computed by geographical area and depth strata. Bigger-deeper trends were described for some species while for roundnose grenadier the length distribution changes is a quite complicated manner with depth (Gordon, 1979).

4.3 TOR e) Review existing databases for bottom trawl surveys such as DATRAS for the management and storage of data from the survey

The DATRAS database is used by ICES to store data from those surveys that fall under the IBTS remit. This data is then made available, both to the public, and, at a higher resolution, to Expert Groups working in the relevant areas. While data from individual surveys can be collected and stored in many different ways e.g. on Access, Excel or in-house databases, data compiled by DATRAS must be in a standard format. Data must be uploaded using defined, mandatory headings. An automated data checking programme is used whenever data is uploaded to ensure all data conforms to the requirements.

ICES was approached to determine whether they would be willing to host PGNEACS-coordinated survey data in the event of the DATRAS format being chosen as the standard data format for deepwater surveys. ICES indicated that this would be possible, conditional on the data being of suitable quality.

Different countries' survey data are at different stages of compatibility with DATRAS.

- Ireland: Irish deepwater survey data is collected in line with IBTS protocols. Therefore, these data should be acceptable once processed in a similar manner to the Irish Groundfish Survey (IGFS), which is already stored on DATRAS by ICES.
- Scotland: Data is stored in an in-house database. Work would be required to extract data in a compatible format. However, this is not considered to be an insurmountable problem.
- France: As the French deepwater extension would be an extension of their IBTS survey, this data should also be suitable for DATRAS.

Possible survey extensions:

- Norwegian Greenland halibut survey/Greater Silver Smelt surveys: These surveys store data on an in-house database. The information is collected using electronic measuring boards. It should be possible to extract

information from the database into the DATRAS format, although some work will be required.

- Portuguese long-line survey: The Portuguese survey is the only proposed coordinated survey to use longlines. The current DATRAS database was specially designed to accommodate information from trawl surveys. In order to include and further compare catch yields between longline and trawl gears it will be necessary to introduce some changes to the data structure existent in DATRAS to contain data on aspects relevant to longline gears, such as mainline length, number of hooks and bait. However, this is not likely to occur in the short-term.

Having examined existing databases, it is considered that DATRAS is the best example of a central database that can be used as a data repository for the deepwater trawl survey data. PGNEACS recommends that when coordinated surveys begin, all necessary data is collected in a manner consistent with this format by each country.

PGNEACS recommends that an individual take charge of ensuring that current surveys database/extractions can be made compatible with DATRAS prior to the first coordinated survey in 2009. After this, it should be relatively routine for each national lab to carry out this procedure on their own. An example of the work required is to ensure that all countries use the same identification codes (e.g. TSNs) for each species, as different systems are currently in use.

5 Additional data (ToR c iii-vii)

5.1 Biodiversity indices for fish communities and benthos as appropriate

Species identification and careful sorting of the catch is critical. Currently, identification of the deepwater species is largely dependent upon the experience of the scientists. Identification keys with linked photographs for some groups such as Macrourids and Chondrythians have been produced and these will be expanded and updated for use on NEACS surveys. In the past, identification workshops have been held and it is recommended that this be continued at regular intervals (annually). The aim would be to identify rare problematic species through collaboration with expert taxonomists and to teach new scientific personnel the common species with particular attention paid to those that are easily misidentified and or easily confused, e.g. the spiny eels (Notacanthidae). PGNEACS also recommends that a species reference collection be developed. Specimens should be fixed first in formalin and then stored in ethanol. Final storage will be with museums. All very rare or unidentified species should be preserved within a few hours of capture. Coded tags will be used for identification and a reference data base constructed. For fragile specimens it is recommended that they be frozen inside a plastic bag containing seawater. For other larger specimens freezing and storage in a labelled polythene bag is adequate. In some cases, preservation in formalin may be preferable (if they are destined for a museum, for example).

Currently the way in which the data is collected should facilitate the production of indices of species diversity. However, more complex indicators, for example based on trophic levels, taxonomic or functional groups may need to be considered in the future. In such cases agreement on appropriate groupings will need to be reached.

The NEACS survey will focus on the benthic and benthopelagic fish species, however, mesopelagic (midwater) species are captured by the trawl as it descends and ascends. This causes a problem because numbers will not be representative of

true abundance. Consequently only their presence can be used in a meaningful way and as such they should be excluded from the compilation of indices that utilize measures of abundance or species evenness. In addition, mesopelagic species are often very difficult to identify due to their soft bodies and vulnerability to damage in the trawl. However, as a minimum they should be identified to family level.

There is a significant by-catch of invertebrates and benthos which should be sorted from the catch and retained. It is recommended that one member of the scientific crew is trained in identification of invertebrate fauna and is delegated to identify at least to the level of family and record the presence. As the trawl does not sample these organisms adequately there is probably little to be gained from any abundance estimates. Rare, unusual or unidentifiable specimens should be kept and preserved and contact made with museums as to their biological value.

All large sessile invertebrates (hard corals, soft corals and sponges) should be recorded and a sample kept if the species is unusual or unidentifiable. PGNEACS will request that WGDEC provides a list of priority species for which information is needed.

5.2 Data on habitat mapping (video/TV) of identified seamounts and other vulnerable habitats

Surveying of habitats by video can be accommodated under the NEACS. FRS has undertaken 'drop-frame' TV work on Rockall, the shelf slope and seamounts in the Rockall Trough and plans to continue doing so. IFREMER has the capacity to undertake such surveys and MI may develop this facility in the future. It is suggested that any habitat mapping is project based rather than a routine aspect of the NEACS.

5.3 Fish/environment interaction in the deepwater habitats

Physical data: The minimum requirement of the NEACS is to record bottom temperature and depth of the sampled area. Usually this will be recorded with a data logger attached to the trawl (most often headline). Such loggers should ideally be calibrated with a CTD profile for quality assurance.

There is much potential to collect valuable hydrographic information from the NEACS. In particular from areas that would complement national monitoring stations such as the Ellett line to the west of Scotland. CTD transects may utilize time when fishing operations are suspended. Based on advice from oceanographers the NEACS will aim to carry out CTD transects focused on relatively small areas of the shelf slope (at each 200 m contour from 200 m–2000 m) and be repeated on an annual basis. Note that the transect would have to be over a relatively steep part of the shelf slope in order to complete the transect overnight.

There are also a number of automated oceanographic information sources including ADCP data and thermosalinograph data. It was recommended that all automated data from each NEACS cruise be deposited in its original format in a central data bank from which the oceanographers can access.

5.4 Seabird and marine mammal distribution

Seabird and marine mammal observers have participated in deepwater surveys in the past. This opportunity should be kept open and participation encouraged if it can be accommodated.

5.5 Genetic/parasite/contaminant sampling

At present genetic, parasite and contaminant sampling is primarily project driven whereby laboratories request particular sample collection. However, as with otolith collections, such samples could be developed as indicators of ecosystem state. It might therefore be sensible to plan ahead for this and design a long-term sampling strategy. It is therefore recommended to get direction from WGDEEP and WGEF on whether routine sampling for genetics should be carried out and if so, what species should the focus be on. Similarly advice will be sought with respect to contaminant sampling.

5.6 Combined geo-database for GIS analysis

In the long-term it will be useful to have all the various sources of data spatially referenced within a database that can be interrogated using Geographic Information Systems software (e.g. ARC GIS). The best way to implement this will be discussed in future meetings. This would allow different information sources to be cross referenced and linked across whatever spatial scale is required for investigation and research.

6 Species ID (ToR f)

6.1 ToR f) Co-ordinate the production and dissemination of species identification and maturity keys for the proposed deepwater survey

Since 2004 FRS MARLAB has been developing several field identification keys for some of the more abundant species groupings encountered on the deepwater survey. The species groupings currently included are listed below:

- Grenadiers (Macrouridae)
- Deepwater Eels
- Rabbitfishes (Chimaeridae and Rhinochimaeridae)
- Deepwater Sharks

The intention is to expand and broaden these keys to incorporate additional species from these groupings that may be present in the expanded survey area (44° - 59°N) . Scientists from both the Irish deepwater and the French IBTS survey will trial the identification keys in 2008 and subsequently report back on their effectiveness and applicability. Finlay Burns from FRS MARLAB in Aberdeen has been nominated as the coordinator for this and therefore all submissions of new images/suggestions should be directed to him. It is recommended that institutes nominate an individual who will liaise with the coordinator. The development and evolution of these keys is seen as an ongoing process and will be regularly reviewed and updated to include new species as well as to include improved images/text for existing species. The platform for this will be PGNEACS as well any dedicated ID workshop session. In the medium term it is also the intention of the group to expand the list to include some of the other major species groupings such as the Smoothheads (*Alepocephalidae*).

In addition, IPIMAR and FCUL had submitted or published the following papers:

Species identification:

Hydrolagus lusitanus **reference** Moura, T., Figueiredo, I., Machado, P.B., Almeida, C., Gordo, L.S. 2005. A new deep-water chimaerid species, *Hydrolagus lusitanicus* n. sp., from off mainland Portugal with a proposal of a new identification key for the genus *Hydrolagus* (Holocephali: Chimaeridae) in the NE Atlantic. *Journal of Fish Biology* 67:742-751.

Trachipterus trachipterus **reference** Figueiredo, I., Moura, T., Gordo, L.S. 2007. Vertebrae counting—a way to resolve species identification of the genus *Trachipterus* (*Osteichthyes*: *Trachipteridae*). *Journal of the Marine Biological Association of the United Kingdom - Biodiversity Records*, 5719.

Maturity keys:

Black scabbardfish **reference** Gordo, L.S., Carvalho, D.S., Figueiredo, I., Reis, S., Machado, P.B., Newton, A. & Gordon, J. 2000. Escala de maturacao sexual do Peixe-espada preto: uma abordagem macro e microscopica. Celta Editora, Oeiras, 35pp.

Deep-water shark **reference** Figueiredo, I., Moura, T., Neves, A., Gordo, L.S. (in press). Reproductive strategy of leafscale gulper shark, *Centrophorus squamosus*, and Portuguese Dogfish, *Centroscymnus coelolepis*, on the Portuguese continental slope. *Journal of Fish Biology*.

Other species guides available are the FAO guides, which are available for most of the major species groupings. In addition the FNAM (Hureau *et al.*) guides are also useful and provide a comprehensive description of most of the species encountered although they are detailed scientific keys rather than field guides/ID keys.

7 References

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- Rochet, M.J., Trenkel, V.M., 2003. Which community indicators can measure the impact of fishing? A review and proposals. *Can. J. Fish. Aquat. Sci.*, 60, 1, 86-99.
- Rochet, M.J., Trenkel, V., Bellail, R., Coppin, F., Le Pape, O., Mahe, J.C., Morin, J., Poulard, J.C., Schlaich, I., Souplet, A., Verin, Y., Bertrand, J. 2005. Combining indicator trends to assess ongoing changes in exploited fish communities: diagnostic of communities off the coasts of France. *ICES J. Mar. Sci.*, 62, 8, 1647-1664.

8 Tables

Table 1 Current surveys reviewed during PGNEACS with their spatial and temporal extent, their frequency and the data that is collected (modified from WGDEEP, 2007).

Name of Survey	Country	Area	Depth Range	Period	Frequency	Demersal / Pelagic/ Benthic/ Ichthyoplanton (D / P / B/I)	Sampling gear	Abundance & Species	Data Types Collected														Survey effort				
									Biodiversity	Biological parameters	Ichthyoplanton	Morphometrics	Genetics	Diet & isotope studies	Basic hydrography	Habitat mapping	Benthos sampling	vulnerable habitats	Contaminant Studies	Parasitology studies	Cetaceans & seabirds	Closed Area Studies	Fish Behaviour studies	dedicated deepwater days	deep-water fishing hauls		
Western IBTS 4th quarter	UK, IRL, FR, ES, POR	VIa, VIIa, VIII, IXa	20-600m	Oct - Nov	A	D/B	T	Groundfish Survey (Gadoids + Pelagics)	A	A/P					O	A	A	?		A/P	P	A?		O	?	?	
FRS Deepwater survey	UK (Scotland)	Via	500-1900m	Sept	A	D/B	T	RNG, BSF,SK H, GFB,	A	A/P			O	O	O	A	A		O	A/P	P	A				12	20-30
Marine Institute Deepwater survey	IRL	VIa - VIIb & c	500-1500m	Sept	A	D/B	T	RNG, BSF,SK H, GFB	A	A/P				O	O	A	x	x					A			14	25
Silver smelt survey	NOR	IIa,IVa,IVb, IIIa	200-900	May	?	P/D	A + T	ARG	A	A/P					O	A										24	?
Greenland halibut survey	NOR/RUS	IIa, IIb	200-1000	August	A	D	T	GHL,RE B	A	A/P					O	A	A		O							22	200

A = Annual P = Periodic O = Occasional Sampling Gears: T = Bottom trawl, P= Pelagic trawl, A = accoustic, L= Longline, BUC = Baited underwater camera

Table 2. Measurement type for deepwater species groupings.

Species Grouping	Measurement Type	Measurement Increment (cm)
Smoothheads (<i>Alepocephalidae</i>)	Standard Length	1.0
Searsids (<i>Searsidae</i>)	Standard Length	1.0
Grenadiers (<i>Macrouridae</i>)	Pre Anal Fin Length	0.5
Rabbitfishes (<i>Chimaeridae</i>)	Pre Supra Caudal Fin Length	1.0
Longnose Rabbitfishes (<i>Rhinochimaeridae</i>)	Second Dorsal Fin Length	1.0
Other Species	Total Length	1.0

Table 3. Surveys from which abundance indices and other indicators should be provided.

STOCK	AREA	COUNTRY	EXISTING SURVEY	PERIOD	DEPTH RANGE
RNG BSF Sharks	VIa	Scotland FRS	Trawl	1998-	300-1900
	VII	Ireland	Trawl (5 cruises) Longline (5cruises)	1993-	
Red seabream GFB Alfonsino Some BSF data	X	Portugal (Azores)	Longline	1995-	?
Bluemouth Greater Forkbeard	VII, VIII Celtic Sea, Biscay	France, Spain (?), Ireland(?)	Western IBTS	1987-	30-550

Table 4. Other existing surveys with some data relevant to slope species.

AREA	COUNTRY	PERIOD	OBJECTIVE	STOCK DATA	DEPTH RANGE
VIIb and XIIb	Spain	2005-2006	Multidisciplinary Bathymetry Multibeam Distribution of DW habitats Trawling	Catch rate RNG BSF	
VIII-IX Cantabrian Sea	Spain	1983-			
Ixa Gulf of Cadix	Spain	1992-			
VII Porcupine	Spain	2001-		? (Argentina, blue whiting most abundant)	200-800 (1)
VII Porcupine (12-15°W; 51°-54°N)	Spain	2001-		GFB ALF ?	150-800(1)
Vb	Faeroes Groundfish survey	1994- (spring) 1996- (autumn)		Ling Blue ling Argentine	>500m
IXa	Portugal	1994-2002	trawling	fish and crustaceans	200-900
VII(Porcupine)	Ireland	2005 (one off)	Acoustic+trawl	Orange roughly	
XIIb	Russian	2005 exploratory (one off?)			
VIa (Hebridean slope)	Scotland (SAMS cruises)	1978-1999(?)	Archive/reference data several trawls		
VII (Porcupine Seabight)	England NHM		Archive/reference data several trawls		
VI, VII, VIII	Germany	Early 1980s	Archive/reference data		
VI, VII, VIII	England	1976-1978	Archive/reference data		
IXa	Portugal	1980s	Scientific longline cruise	BSF	

1) WGDEEP 2006 page 22

2) longline not efficient to catch BSF west of the BI (WGDEEP 2006, pp 210)

9 Figures

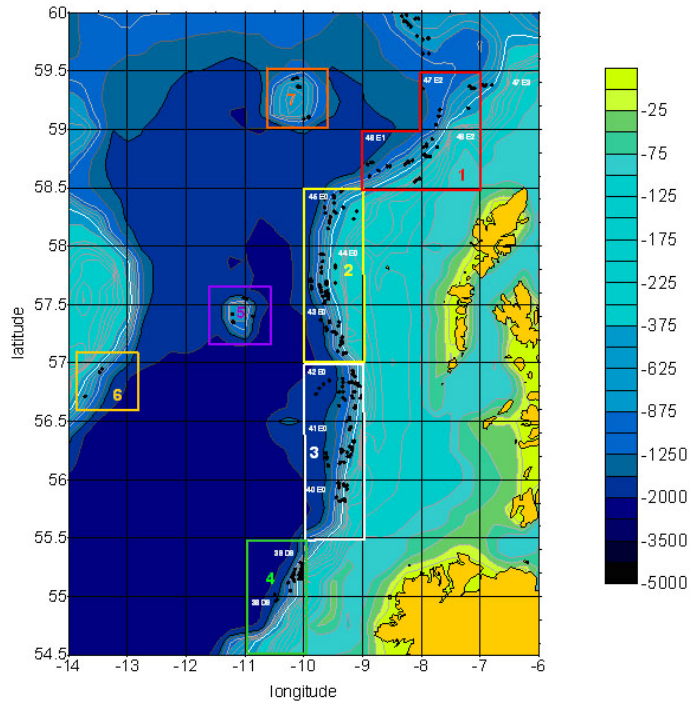


Figure 1. Sample area of the Scottish deepwater survey.

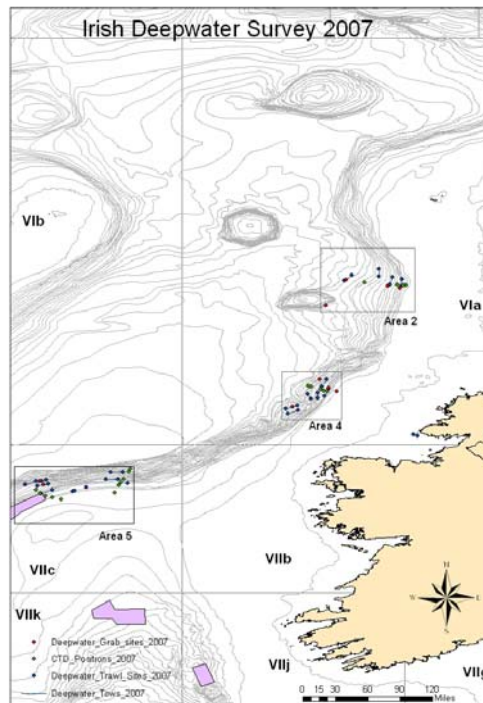


Figure 2. Sample area and haul position of the Irish deepwater survey.

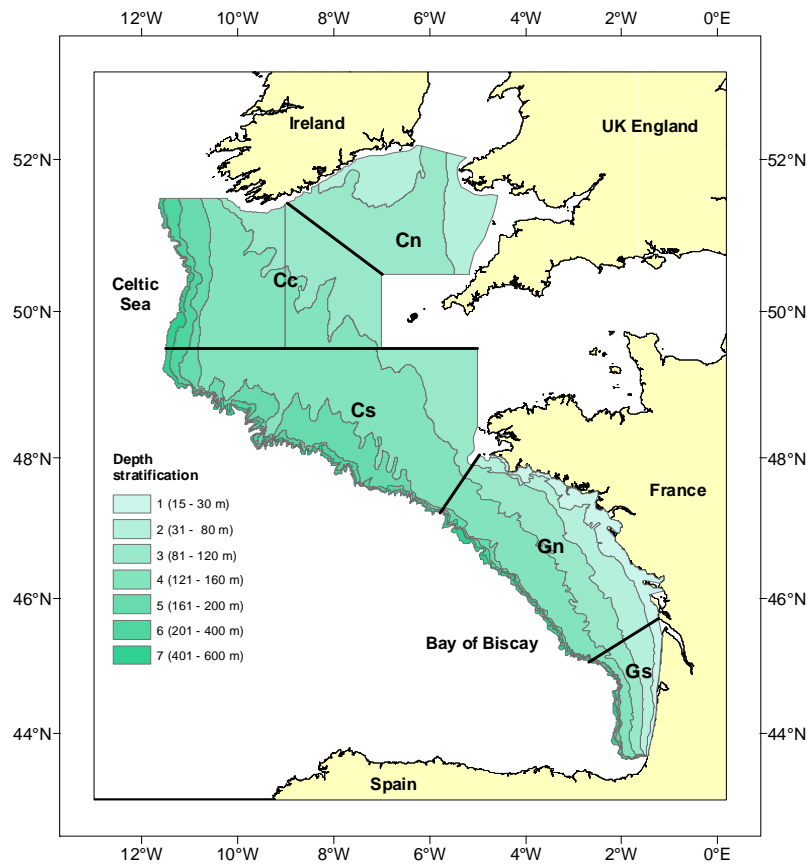


Figure 3. Chart of the French Western IBTS area and stratification. Gs (Biscay south); Gn (Biscay North); Cs (Celtic Sea South); Cc (Celtic Sea Central); Cs (Celtic Sea North). Depth strata 6 and 7 cover the upper slope with a small number of tows.

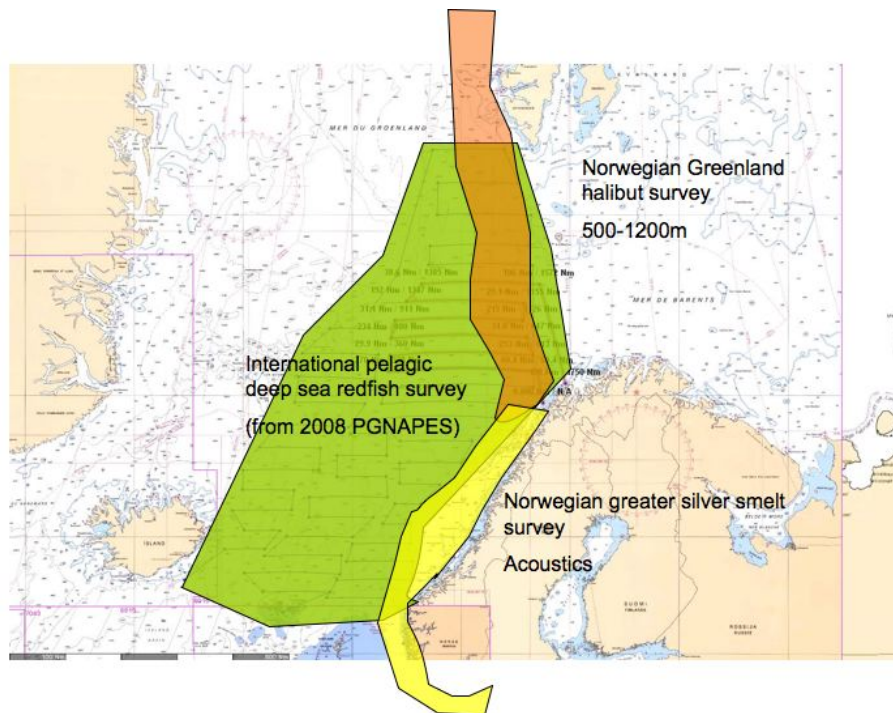


Figure 4. Sample area of the Norwegian Greenland halibut and silver smelt surveys.

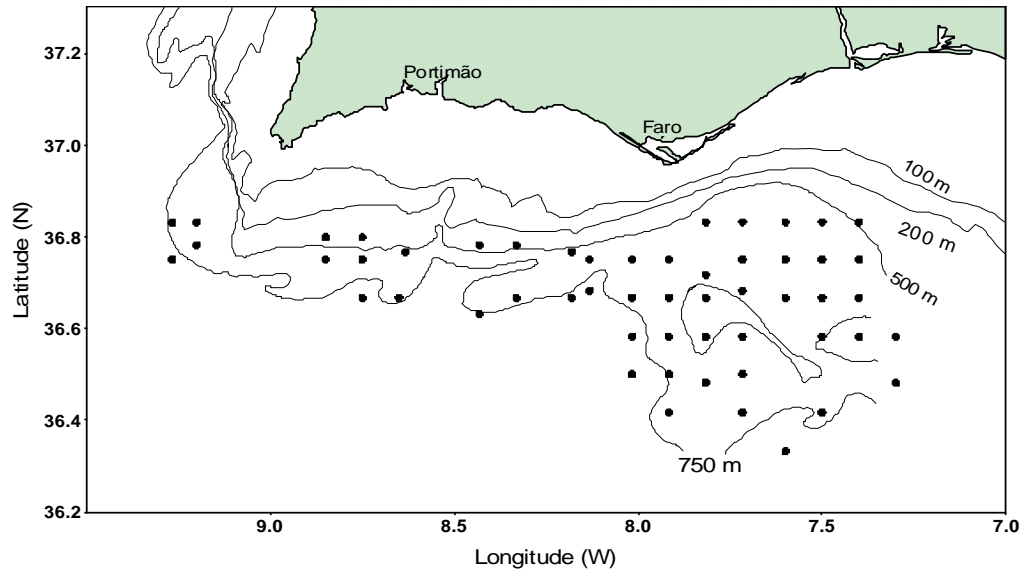


Figure 5. Sample area of Portuguese deepwater trawl survey.

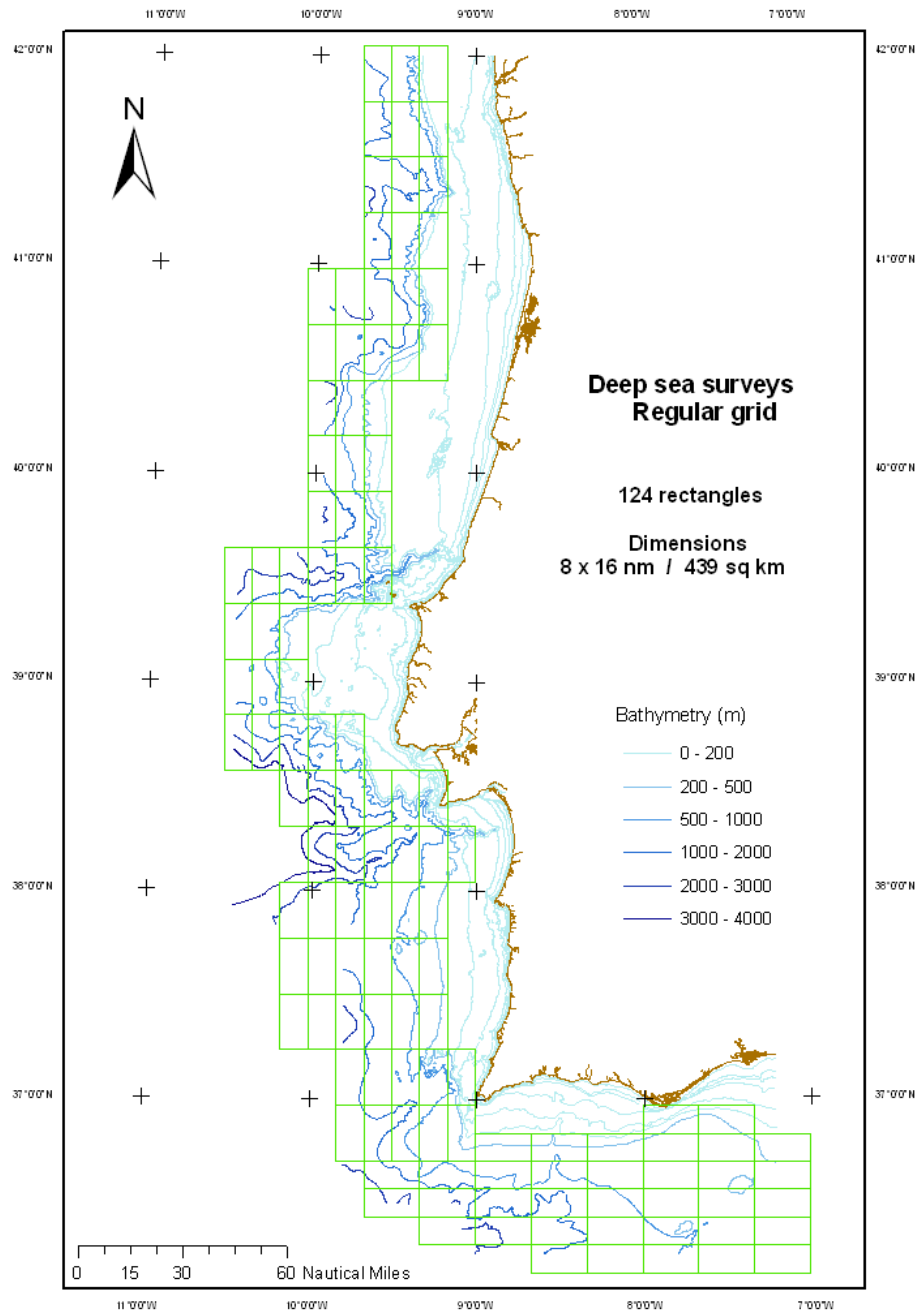


Figure 7. Proposed sample areas for the NEACS longline survey in IXa.

Annex 1: List of participants

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Annex 2: Agenda

PGNEACS

Meeting of the ICES Planning Group for the North-east Atlantic
Continental Slope Survey

Marine Institute, Galway

29th January -1st of February 2008

29 January am

Start 9.30h

General:

- Welcome and housekeeping issues
- Adoption of the agenda – additional items to be considered

Survey planning

TOR a) review existing NEA deep-water & slope surveys in terms of sampling strategy, protocols and intercomparability

- Short presentations about existing deepwater surveys that fall under the umbrella of PGNEACS e.g. Scottish, Irish survey – possibly others?
- Discussion on strategy, protocols and intercomparability of existing surveys

TOR b) based on a) suggest a plan for coordinating internationally an annual or regular survey of the north-east Atlantic continental slope from ICES Subareas VI in the north to Subareas IX and X in the south and area CECAF 34.1.1, commencing 2009.

- Discussion on spatial and temporal coordination of existing surveys
- Extension of Irish Survey into area VIIb/c western/southern Porcupine Bank
- Addition of new surveys into the coordination – such as Portuguese deepwater survey
- Discussion on the northern components survey of the survey – Norwegian/Icelandic, Faroe Islands.

29 January pm & 30 January am

Abundance Indices

TOR c) suggest suitable survey design, technology, sampling effort and sampling protocols for the proposed survey in order to provide the following future data to WGDEEP, WGEF and WGDEC and other ICES Expert Groups as appropriate:

- abundance indices for roundnose grenadier, black scabbardfish, deep-water sharks, bluemouth redfish and greater forkbeard and other species as appropriate;
- biological parameters for the key species;

TOR d) develop and standardize methods for the computation of abundance indices

TOR e) review existing databases for bottom trawl surveys such as DATRAS for the management and storage of data from the survey;

- **housing data of historic deepwater surveys**

30 January pm

Additional Data

TOR c) suggest suitable survey design, technology, sampling effort and sampling protocols for the proposed survey in order to provide the following future data to WGDEEP, WGEF and WGDEC and other ICES Expert Groups as appropriate:

- iii) biodiversity indices for fish communities and benthos as appropriate;
- iv) data on habitat mapping (video/TV) of identified seamounts and other vulnerable habitats;
- v) fish /environment interaction in the deepwater habitats;
- vi) seabird and marine mammal distribution;
- vii) samples for genetic and contaminant studies.

31 January am & pm

Species ID

TOR f) co-ordinate the production and dissemination of species identification and maturity keys for the proposed deepwater survey.

Laboratory session- Review of some deepwater specimen collected on the deepwater surveys 2007, where species id was problematic

1 February am & pm

Report writing & review of text.

PGNEACS will report by 26 February 2008 for the attention of the Living Resources Committee, and ACOM.

Annex 3: PGNEACS terms of reference for the next meeting

The **Planning Group on the North-east Atlantic continental slope survey** [PGNEACS] (Chair: Leonie Dransfeld,* Ireland), will meet in June 2009 to:

- a) review scientific and technical results of the existing NEA deep-water & slope surveys that are proposed to be incorporated into the PGNEACS survey with respect to
 - i) biological data obtained during comparative hauls,
 - ii) net parameters and fishing procedures,
- b) review funding, resource allocation and logistics for the international PGNEACS 2009.
- c) evaluate the possibility and advantage of extending the geographical coverage to include the continental slope from Scotland to Spitsbergen, as well as East-Greenland, Iceland and Faeroe Islands, and if appropriate, start the coordination between existing surveys in this northern region.
- d) review feedback from WGDEEP, WGEF and WEGDEC regarding the collection of biological and environmental samples for PGNEACS 2009.
- e) on the basis of ToR a) –d) agree upon the coordination and standardisation of the individual surveys participating in PGNEACS 2009 and finalise the survey programme for 2009 in terms of survey design, technology, sampling effort and sampling protocols.
- f) review progress on making the PGNEACS survey data compatible with DATRAS on this basis,
- g) host a deepwater species identification workshop that will standardise identification of deepwater species and review the use of compiled field id guides for deepwater species.

PGNEACS will report by xxx for the attention of the Living Resources Committee, and ACOM.

Annex 4: Recommendations

RECOMMENDATION	FOR FOLLOW UP BY:
<p>1. In relation to the inclusion of the northern surveys PGNEACS recommend that that effort first be made to coordinate and standardise these surveys. Such a coordinated northern survey may then either be included in the NEACS, or may be treated in a separate planning group. Such a northern survey group could meet concurrently with PGNEACS to discuss survey designs and evaluation of scientific results, but conduct separate sessions on survey standardisation and planning.</p>	<p>LRC, countries participating in northern deepwater surveys: Norway, Iceland, Faroe</p>
<p>2. PGNEACS recommends that NEACS in the Bay of Biscay and on the western slope of the Celtic sea is carried out as an extension of the current French part of the western IBTS. It is proposed to sample selected flat areas with parallel tows from 500 m down to 1800 m. Three sampling regions are defined with (approximate coordinates): the Landes Plateau (43°40' – 44°30'N; 2° – 3°W), the Meriadzek Terrace (47° – 47°40'N; 7°40' – 8°30' W) and the Northern Goban (50° – 51°N; 10°30' – 11°30'W). In order to standardise this deepwater component of the survey with the Scottish and Irish deepwater surveys it is recommended that the same deepwater fishing trawl is used.</p>	<p>France</p>
<p>3. PGNEACS recommends that a ToR is given to WGDEEP and WGEF to review the biological parameters that should be collected on the NEACS survey by stock in addition to those specified by PGNEACS.</p>	<p>LRC, WGDEEP, WGEF</p>
<p>4. PGNEACS recommends that when the coordinated trawl surveys begin, all necessary data is collected in a manner consistent with the DATRAS format by each country</p>	<p>All countries participating in NEACS</p>
<p>5. PGNEACS recommends that an individual take charge of ensuring that current surveys database/extractions can be made compatible with DATRAS prior to the first coordinated survey in 2009.. An example of the work required is to ensure that all countries use the same identification codes (eg. TSNs) for each species, as different systems are currently in use.</p>	<p>TBD – member of PGNEACS</p>
<p>6. PGNEACS recommends that WGDEC provides a list of priority species of large sessile invertebrates (hard corals, soft corals and sponges) for which information is needed.</p>	<p>WGDEC</p>
<p>7. PGNEACS recommends that species identification workshops will be held at regular intervals (annually).</p>	<p>PGNEACS, LRC</p>
<p>8. It is recommended that all automated hydrographic data from each NEACS cruise be deposited in its original format in a central data bank from which the oceanographers can access.</p>	<p>PGNEACS</p>
<p>9. It is recommended to get direction from WGDEEP and WGEF on whether routine sampling for genetics should be carried out and if so, what species should the focus be on. Similarly advice will be sought with respect to contaminant sampling.</p>	<p>WGDEEP, WGEF</p>