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ANNUAL REPORT

FOR

THE SWEDISH NATIONAL PROGRAMME FOR

COLLECTION OF FISHERIES DATA 2013

Under

Council Regulation (EC) No 199/2008
Commission Regulation (EC) No 665/2008
Commission Decision 2010/93/EU

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I General framework

The Swedish National Programme (NP) 2011-2013 for collection of fisheries data refers to the Community and National Programme defined in Article 3 and 4 of Council Regulation 199/2008, to Article 1 of Commission Regulation 665/2008 and the Annex of Commission Decision 2010/93/EU. The Annual Report (AR) 2013 on the Swedish NP refers to Article 7 of Council Regulation 199/2008, to Article 5 of Commission Regulation 665/2008 and to the Annex of Commission Decision 2010/93/EU. The report year is 2013. If the reference year differs from the report year, it is stated in the sections.

This AR is based on the Guidelines for the Submission of Annual Report on the National Data Collection Programmes (...) Version 2013, and follows the layout and content of the NP 2011-2013. No major methodological changes appeared during 2013 and the data collection could be undertaken with only some adjustments which are explained in the report.

List of derogation valid for 2013.

Title of derogation	**NP proposal section**	**Type of data variables**	**Region**	**Derogation approved or rejected**	**Year of approval or rejection**	**Reason / justification for derogation**
Eel FYK CAT 0 0 0	III.C.5	Metier	Baltic	approved	2011	Exemp. rule 2010/93/EU (Ch III sec B/B1/5)
GNS_SPF_32-109_0_0	III.C.5	Metier	Baltic	approved	2011	Exemp. rule 2010/93/EU (Ch III sec B/B1/5)
GNS_FWS_0_0_0	III.C.5	Metier	Baltic	approved	2011	Exemp. rule 2010/93/EU (Ch III sec B/B1/5)
FPO_FWS_0_0_0	III.C.5	Metier	Baltic	approved	2011	Selected by effort only, landing 17 tonnes.
GNS_FWS_0_0_0	III.C.5	Metier	Baltic	approved	2011	Exemp. rule 2010/93/EU (Ch III sec B/B1/5)
FYK CAT 0 0 0	III.C.5	Metier	NS & EA	approved	2011	See *)
OTB_DEF_>=120_0_0	III.C.5	Metier	NS & EA	approved	2011	Exemp. rule 2010/93/EU (Ch III sec B/B1/5)
OTB_DEF_<16_0_0	III.C.5	Metier	NS & EA	approved	2011	Exemp. rule 2010/93/EU (Ch III sec

						B/B1/5)
PTM_SPF_32-69_0_0	III.C.5	Metier	NS & EA	approved	2011	Exemp. rule 2010/93/EU (Ch III sec B/B1/5)
LHP~~M~~_FIF_0_0_0	III.C.5	Metier	NS & EA	approved	2011	Exemp. rule 2010/93/EU (Ch III sec B/B1/5)
LLS_DEF_0_0_0	III.C.5	Metier	NS & EA	approved	2011	Exemp. rule 2010/93/EU (Ch III sec B/B1/5)
GNS_DEF_120-219_0_0	III.C.5	Metier	NS & EA	approved	2011	Exemp. rule 2010/93/EU (Ch III sec B/B1/5)
PS_SPF 32-69 0_0	III.C.5	Metier	NS & EA	approved	2011	Exemp. rule 2010/93/EU (Ch III sec B/B1/5)
OTB_CRU_35-69_0_0	III.C.5	Metier	NS & EA	approved	2011	Exemp. rule 2010/93/EU (Ch III sec B/B1/5)
Cod (*Gadus morhua*) maturity sampling sd 22-24	III.E.5 Baltic	Stock	Baltic	approved	2011	Sweden not covering this area according to WGBIFS
Salmon (*Salmo salar*)	III.E.5	Stock	Baltic	approved	2011	Maturity not used in WGBAST, therefore not sampled.
Dogfish (*Squalus acanthias*)	III.E.5	Stock	NS & EA	approved	2011	< 200 tonnes.
Haddock (*Melanogrammus aeglefinus*)	III.E.5	Stock	NS & EA	approved	2011	Only sampled in surveys due to low landings.
Mackerel (*Scomber scombrus*)	III. E.5	Stock	NS & EA	approved	2012	Below 200 tonnes, agreement with UK.

*) i) the target species (eel) is sampled within a stock specific sampling scheme, ii) by-catch and discard estimates are unreliable due to crab predation in the gears and iii) probable termination of the fishery in 2012.

II National data collection organisation

II.A National correspondent and participating institutes

The National correspondent representing Sweden

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Partners

Swedish University of Agricultural Sciences (SLU) http://www.slu.se/en/,
Department of Aquatic resources (SLU Aqua) within which the following institutes participate:

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SE-551 82 Jönköping, Sweden
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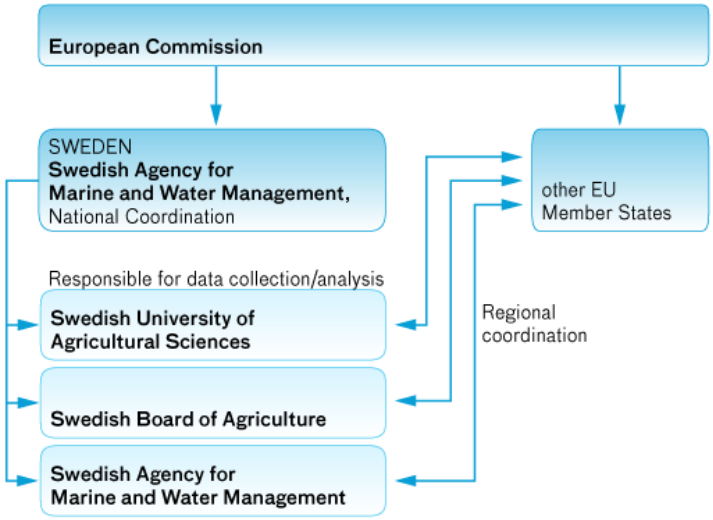
The Swedish organization of DCF work:



A website has been established to inform involved partners, the EU Commission and the public about the Swedish implementation of the EU Data Collection framework in accordance with Commission Regulation (EC) 665/2008 article 8(2):
http://www.havochvatten.se/en/start/environmental-research/-data-collection-framework.html

A national coordination meeting with all partners was arranged in November 2013, to which the Commission was invited (see protocol from this meeting in Annex 1). In addition, information and

important news was communicated by the NC during the year to the responsible authority and to the persons involved in DCF on a regular basis. The main issues dealt with was reporting on progress of the DC-MAP, the upcoming EMFF and ongoing data collection work including information on guidelines and deadlines for reporting to the Commission.

Also, a workshop was arranged at SwAM in December 2013 to discuss issues related to data management. All partners were represented at the workshop.

II.B Regional and International co-ordination

II.B.1 Attendance of international meetings

The international meetings planned for 2013 and eligible under DCF are listed in table II.B.1. SGVMS, WKLIFE3, WKMULTI and Economists workshop - 2 were not attended as planned because unfortunate circumstances for the persons notified for these meetings.

II.B.2 Follow-up of regional and international recommendations

Source	Recommendation	Action
RCM NS&EA (2013)	**RCM recommends that MS document their interpretation of trips, samples and sampling events and describe what the TripID and SampleID represent in there uploaded data.** **MS to provide a summary document of their interpretation of these key fields in the upload data formats.**	SWEDEN WILL PROVIDE SUMMARY DOCUMENTS UPON REQUEST.
RCM NS&EA (2012)	Regional Database: Review of the Data Policy Document NC to give feedback on the Data policy document to the relevant RCM chair and to the RDB-SG before 15th of November 2012. The Commission to forward the request to the NC's.	SWEDEN HAS READ THE DATA POLICY DOCUMENT AND SUPPORTS THE CONTENT. THIS FEEDBACK HAS NOT BEEN SENT TO THE RCM CHAIR SINCE NO FORMAL REQUEST HAS BEEN SENT TO THE NC´S.
RCM NS&EA (2012)	RCM NS&EA 2012 recommends to review the summaries on the derogations reached during RCM NS&EA 2011, to provide a final list of current derogations. From these lists the Liaison Meeting could review the derogations and where appropriate put forward a list of derogations that could be approved to cover metiers across all RCM's.	SWEDEN INCLUDED A LIST OF DEROGATIONS IN AR 2012.
RCM NS&EA (2012)	Access to data hold in RDB-FishFrame is restricted to persons with a password. Different roles are defined within the system and different users have access to a certain level of data and functionalities. To facilitate future regional coordination work it is recommended that members in the RCMs are given a specific role in the system in accordance with their needs.	SWEDEN SUPPORTS THIS RECOMMENDATION
RCM NS&EA (2012)	Where it was identified that bilateral agreement is required, according to the rules agreed upon at the RCM NS&EA 2011 and endorsed by the LM8 and STECF 11-19, MS are requested to establish or update a bilateral agreement on sampling of landings abroad.	SWEDEN HAS ESTABLISHED BILATERAL AGREEMENTS WITH SEVERAL MS
RCM NS&EA (2012)	RCM NS&EA recommends that the Oostende declaration is reviewed by RCM NA, RCM Baltic, the Liaison meeting and STECF EWG 12-15 as the appropriate framework for proposing, carrying out and reporting on regionally coordinated data collection from commercial marine fisheries under the proposed DC MAP.	SWEDEN SUPPORTS THE IDEAS IN THE OOSTENDE DECLARATION.
RCM Baltic (2012)	The RCM Baltic 2012 recommends that landings should not be sampled abroad by landings countries as these data cannot be used but should be compensated by the flag countries by a higher sampling level in the flag country.	SWEDEN HAS FOLLOWED THIS RECOMMENDATION AND HAS ESTABLISHED AGREEMENTS WITH OTHER MS.

RCM Baltic (2012)	RCM Baltic recommends that some standard reports should be established in FF that present overview of sampling intensities in maps, tables and figures. The reports would give the regional coordination, assessment working groups and other end users an overview of the quality of the data in an efficient way.	SWEDEN SUPPORTS THIS RECOMMENDATION AND IS ACTIVELY TAKING PART OF THE WORK IN THE RDB STEERING GROUP.
RCM NS&EA (2011)	The RCM NS&EA recommends that that all MS respond to the data call in 2012 from the chair of RCM NS&EA and load their data to FishFrame or make it available in the FishFrame format. This data call will include Commercial Landings (CL), Commercial Effort (CE) and Commercial Samples (CS) records for 2010 and 2011.	SWEDEN HAS UPLOADED ALL REQUESTED DATA IN FF.
RCM BALTIC (2011)	1. MS should upload all landing data into the Regional Data Base allowing the RCM to analyse the possible needs for bilateral agreements. 2. The RCMs should each year perform an analysis on landings in foreign countries and conclude were bilateral agreements needed to be made. MS should set up agreements, fixing the details of sampling, compilation and submission of data in each case when it is indicated by the RCM that a bilateral agreement is needed. To include the agreed analysis in FishFrame would be very convenient and time saving. 3. MS should set up agreements, fixing the details of sampling, compilation and submission of data in each case it is concluded by the RCM that a bilateral agreement is needed.	SWEDEN HAS UPLOADED ALL RELEVANT DATA TO THE RDB

Sweden participates in the regional Co-ordination Meetings (RCMs) for the Baltic and the North Sea & Eastern Arctic. Apart from regional agreements established at the RCMs, Sweden has established bilateral agreements with Denmark, Finland, Germany, Poland and UK sampling foreign-flag vessels, see NP.

For follow-up of STECF recommendation, see section VII.

III Module of evaluation of the fishing sector

III.A General description of the fishing sector

In 2013 the Swedish fishing fleet consisted of 1 299 registered vessels, with a combined gross tonnage of 32 thousand GT, a total power of 171 thousand kW and an average age of 32 years. The size of the Swedish fleet decreased between 2008 and 2013; the number of vessels decreased by 14% and GT and kW decreased by 29% and 19% respectively (Table 5.55). The major factors causing the fleet to decrease include entry barriers, bad profitability, scrapping campaigns, introduction of transferable fishing rights and natural wastage due to age.

In 2013, the number of fishing enterprises in the Swedish fleet totaled 1,035, with the vast majority (80%), owning a single vessel. Only 20% of the enterprises owned two to five fishing vessels. Total employment in 2012 was estimated at 1 663 jobs, corresponding to 942 FTEs. The level of employment decreased between 2008 and 2012, with total employed decreasing by 16% and the number of FTEs decreasing by 17% over the period. The major factors causing employment to decrease include of course the decreasing fleet size but also less labor intensive vessels. The table below describes Swedish national fleet structure, activity and production trends: 2008-2013.

Variables	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
All vessels	1507	1471	1415	1359	1322	1299
Inactive vessels	359	339	351	328	303	317
Average vessel age (years)	30,85	31,53	31,35	30,64	31,5	32,22
GT (thousand tonnes)	43,03	41,7	38,62	32,94	29,53	30,47
Engine power (thousand kW)	211,8	207,9	196,4	178,2	169,1	170,7
No. Enterprises (N)	1211	1181	1134	1089	1055	1035
Total employed (N)	1980	1758	1765	1679	1663	---
FTE (N)	1133	1019	990	974	942	---
Average wage per FTE (thousand €)	24,7	24,3	28,3	28,0	33,7	---
Days at Sea (thousand days)	102,75	96,64	85,11	83,67	78,9	77,53
Fishing Days (thousands)	102,75	96,64	85,11	83,67	78,9	77,53
Energy consumption (million litres)	41,38	62,22	54,13	40,9	47,37	---
Fuel consumption per tonne landed (litre/tonne)	193,29	312,07	264,77	236,09	347,15	---
Landings weight (thousand tonnes)	214,05	199,34	204,43	173,21	136,48	---
Landings value (million €)	114,39	100,36	103,34	116,39	124,23	177,52

In 2013 the Swedish fleet spent a total of around 78 thousand days at sea. The total numbers of days at sea decreased by around 24% between 2008 and 2013. The major factors causing the decrease include lower quotas and increasing catch per effort. The quantity of fuel consumed in 2012 totaled around 47 million litres, a decrease of around 24% from 2009, driven by fewer days at sea and increased fuel efficiency.

The total volume landed by the Swedish fleet in 2012 was 137 thousand tons of seafood, with a landed value of €124 million. The total volume decreased while the value of landings increased over the

period analysed. The highest landed value (€124 million) by the national fleet was achieved in 2012. The total landed value followed the price statistics; in particular lobster and prawn prices, which increased from 2010. Landed value was also strongly affected by currency exchange and landings weight. In terms of landings weight, decreasing quotas (particularly on pelagic species such as herring and sprat) affects the results. The major factors causing the increase in value are prices as quotas have decreased.

No major changes occurred in the fishing sector during 2008-2012. The Swedish management has succeeded to decrease some of the over-capacity. A funded scrapping campaign during late 2009 and beginning of 2010 and an introduction of an ITQ-system in the pelagic fishery have shown to be successful. There has been a small increase of the fleet after 2011 due to new rules that private fishing-right owners must register their vessels. But the traditional fleet has continued to decrease after 2011. The Swedish fleet consists of a majority of small vessels fishing with passive gear and a smaller number of larger ships mainly using trawls. Most demersal and pelagic trawlers have their home port on the Swedish west coast. Pelagic trawlers on the west coast mostly target herring, sprat and mackerel. Pelagic trawlers operating in the northern part of the Baltic Sea mainly target vendance. Demersal trawlers in the Baltic Sea mostly target cod whereas demersal trawlers on the west coast mostly target Norway lobster and shrimp. Vessels using passive gears are spread along the entire coastline. Geographically, the activities are concentrated to ICES divisions IIIa and IIId and to some extent, divisions IVa and IVb.

III.B Economic variables

SUPRA REGION: BALTIC SEA, NORTH SEA AND EASTERN ARCTIC, AND NORTH ATLANTIC

III.B.1 Achievements: results and deviation from NP proposal

No shortfalls and/or deviations exist in relation to what was stated in the NP.

III.B.2 Data quality: results and deviation from NP proposal

As seen in table III.B.1 the final data delivered to SwAM from Statistics Sweden shows that the Swedish data has improved remarkably last years. Compared to three year old Annual report 2010 where 3 out of 18 segments displayed a coverage rate higher than 70 per cent now in Annual report 2013, all except two segments displays a higher achieved sample rate than 70 per cent (all 7 segments is now over 65 per cent).

No deviation from NP proposal.

III.B.3 Follow-up of regional and international recommendations

In 2013 the Swedish economists did attend the Planning Group on Economic Issues (PGECON) to deal with a broad range of issues considered relevant for the improvement of the collection of economic data and for the evolution of the DCF. There were no new guidelines or recommendations relevant for improvement of the Swedish DCF.

III.B.4 Actions to avoid shortfalls

No shortfalls to be reported and therefore no actions to be taken.

III.C Biological - metier-related variables

THE BALTIC SEA

III.C.1 Achievements: results and deviation from NP proposal

Results of the sampling in 2013 in relation to what was planned are presented in tables III.C.3, III.C.4, III.C.5 and III.C.6.

In Sweden is it common that vessels are involved in more than one fishery. This makes it difficult to select vessels to sample in a true random way, as it is impossible to predict what fishery a given vessel is involved in at a given time. ICES WKPICS and SGPIDS have further recommended that sampling frames should be based on groups of vessels instead of fisheries/metiers and that fisheries/metiers should be considered as statistical domains. Sweden did thereby change the sampling plan for 2013 in accordance with these recommendations. This meant, in the Baltic Sea, that gillnets and longlines were sampled within one frame (as vessels regularly switch between those gears) and that demersal trawlers in eastern and western Baltic were sampled within one frame (as it is the same vessels fishing in both areas). The changes are indicated in red in the table III.C.3 and III.C.4.

Longline fisheries targeting demersal fish (LLS_DEF_0_0_0), subdivision 22-24
Sweden did not plan to sample this fishery but ended up sampling 3 trips as the vessels to a large degree are the same as the ones fishing with gillnets in the area. The longline fishery, which has increased in this area during recent years, was included in the same sampling frame as the gillnet fishery.

Bottom trawl fisheries targeting demersal fish (OTB_DEF_>=105_1_110), subdivision 22-24
Bottom trawl fisheries targeting demersal fish (OTB_DEF_>=105_1_110), subdivision 25-29, 32
The trawl fisheries in western (subdivision 22-24) and eastern (subdivision 25-32) was sampled to a lesser extent compared to what was planned (14 sampled trips out of 24 planned). The main reason for this is that the bottom trawl fishery for cod more or less collapsed during the second part of the year. Catches were very low and the caught fish was in bad condition resulting in low prices. Many vessels stayed in port and Sweden did not catch their quota (e.g. 86% of the landings of eastern Baltic cod originated from quarter 1 and 2). It was thereby difficult to fulfil the sampling target during the second part of the year.

Trawl fisheries targeting small pelagic fish (PTM_SPF_32_104_0_0), subdivision 22-24
Trawl fisheries targeting small pelagic fish (PTM_SPF_16_31_0_0), subdivision 25-29, 32
The assumption for the planned number of trips is that the fishery is conducted all year around in the main subdivisions (24, 25, 27, 28 and 29). The assumption is expressed in the NP. The fishery have however been very limited (or non-existent) in some of the subdivisions in some quarters implying that the planned no of trips to be sampled was not achieved.

Pound nets targeting catadromous species (FPN_CAT_0_0_0)

The pound net fishery in subdivision 24 was not sampled (0 trips out of 2 planned). Eel landings from this area were reduced sharply in recent years to less than 1500 kg in 2012 and no fisherman could be recruited for sampling.

Trawl fisheries targeting small pelagic fish (OTB_SPF_16-10~~431~~_0_0), subdivision 30-31
Shortfall of five trips was first due to heavy ice conditions in January and February. Secondly, later in the season, the fishing activity was reduced because there was no demand for herring in the market and therefore it was not possible to perform planned sampling.

Set gillnet targeting small pelagic fish (GNS_SPF_16-119~~<110~~_0_0)
The shortfall of two trips was caused by logistics problems during part of the fishing season for one of the fishermen that participated in the sampling.

Trap net fisheries targeting anadromous species (FPO_ANA_0_0_0)
Shortfall of four trips due to that the salmon fishery was closed early in the fishing season. The closure was concluded by SwAM in order to follow assessed EC TAC.

III.C.2 Data quality: results and deviation from NP proposal

Sweden initiated in 2009 a work to improve the designs of the metier sampling programmes taking the outcomes of WKACCU, WKMERGE, WKPICS and SGPIDS into account. This work continued in 2013 and includes identification of proper sampling frames, probability based ways to select primary sampling units and documentation of non-responses. At the same time we are trying to sort out some of the logistical problems that arise from the new more statistically sound sampling designs. The new designs will improve the possibilities to evaluate possible bias and thereby also accuracy.

Sweden has for a number of years been waiting for the outcome of the COST project to get tools for estimation of quality indicators such as CVs. During 2009 Sweden started to work with the tools provided in order to i) investigate if and where the tools can be used to evaluate the Swedish data and ii) evaluate the Swedish sampling wherever possible. Unfortunately it became evident that the COST tools were not suitable for the Swedish sampling design (at least not directly) in many cases. This means that the evaluation on if and how the COST tools could be used is an ongoing work and the analysis has not been finalised yet. Proper calculation of CVs also requires a proper sampling design, which is what we are trying to achieve.

Meanwhile, for the sake of the annual report, Sweden has calculated mCVs for *length frequencies* of different species and stocks (Table III.C.5). Details regarding the estimation of precision (mCV) are presented in Annex II and the results are reported in table III.C.5. Overall the required precision target for length compositions was fulfilled. The COST tools have been used to estimate CVs for *volumes* of discards (Table III.C.5) were appropriate.

III.C.3 Follow-up of regional and international recommendations

No recommendations regarding metier related variables relevant for Sweden was brought up in the RCM Baltic 2013 (ICES 2013a).

Source	Recommendation	Action
RCM Baltic (2012)	**Metier related variables: Routines for establishing bilateral agreements. MS to upload all landing data into the RDB allowing the RCM to analyse the possible needs for bilateral agreements. MS should set up agreements**.	SWEDEN HAS UPLOADED ALL DATA TO THE RDB AS REQUESTED. ONE BILATERAL AGREEMENT IDENTIFIED DURING RCM 2012 (WITH FINLAND) HAS NOT BEEN FINALISED YET BUT IS UNDER DEVELOPMENT.
RCM Baltic (2012)	**Sampling of metier related variables including foreign landings: Requirement of on-line information on fleet behaviour. National institutes to get access to online logbook and VMS data.**	SWEDEN HAS PUT THIS REQUEST FORWARD TO THE RESPONSIBLE AUTHORITY. THIS WILL BE DISCUSSED FURTHER IN THE PROCESS OF DC-MAP TO FIND A WAY TO THE EXISTING ROUTINES.

III.C.4 Actions to avoid shortfalls

One of the main reasons for inconsistencies between planned no of trips to be sampled and what is achieved, is that it is sometimes difficult to predict spatial and temporal fishing patterns for some metiers at the time of writing the NP. To some degree this is inherent to the time lag between the compilation of the NP and the sampling year. To a certain degree the problem can be reduced by implementation of proper sampling frames where the metiers can be seen as domains instead of strata. This is something that Sweden is working on and will continue to work on the forth coming years.

When planning the sampling of the coastal fisheries, we will in the future take into consideration to plan on shore sampling to a higher extent due to the risk of unpredictable impact of bad weather conditions.

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III.C.1 Achievements: results and deviation from NP proposal

Results of the sampling in 2013 in relation to what was planned are presented in tables III.C3, IIIC.4, IIIC.5 and IIIC.6.

In Sweden is it common that vessels are involved in more than one fishery. This makes it difficult to select vessels to sample in a true random way, as it is impossible to predict what fishery a given vessel is involved in at a given time. ICES WKPICS and SGPIDS have further recommended that sampling frames should be based on groups of vessels instead of fisheries/metiers and that fisheries/metiers should be considered as statistical domains. Sweden did thereby change the sampling plan for 2013 in accordance with these recommendations. Most demersal trawlers in Skagerrak and Kattegat are involved in more than one fishery. We thereby created one frame (instead of four) for trawlers in Skagerrak and one for trawlers in Kattegat (instead of two). The total number of planned trips did not change. The changes are indicated in red text in the table III.C.3 and III.C.4 and also summarized in the table below.

Fishery	Area	Sampling frame NP	Sampling frame 2013	Trips to sample NP	Sampling plan 2013
Trawlers with sorting grid targeting *Pandalus*	IIIa	NSKS1	NSKS1	16	56
Trawlers targeting *Pandalus*	IIIa	NSKS2		12	
Trawlers targeting demersal fish and *Nephrops*	IIIaN	NSS345		16	
Trawlers with sorting grid targeting *Nephrops*	IIIaN	NSS6		12	
Bottom trawlers without sorting grid	IIIaS	NKS7	NKS7	12	24
Trawlers with sorting grid targeting *Nephrops*	IIIaS	NKS8		12	

A main overall reason for deviations from what was planned is that it sometimes can be difficult to predict fishing pattern (or changes in fishing pattern) by metier for the sampling year at the time of compilation of the NP. Numbers of trips for the demersal trawl fisheries, without sorting grid, targeting *Nephrops* and fish have for example decreased to one third compared to the reference years in the NP.

Further, a large proportion of the Swedish fleet fishing for demersal species and crustaceans are further relatively small (<24 m). Most of them avoid being at sea in bad weather (or do not want to bring observers in bad weather due to safety conditions). This means that after prolonged period of bad weather Sweden sometimes are lagging behind in sampling of all fisheries and need to prioritise trips in the end of the quarter.

Deviations from aim on a metier basis are expressed below.

Trawl fisheries targeting demersal fish and crustacean (OTB_MCD_90-119_0_0)_IIIaN
Trawl fisheries targeting crustaceans (OTB_CRU_35-69_0_0), IIIa, IV
In recent years there has been a considerable decline in these fisheries (less than half of the trips compared to the reference year). It was not possible to reach the sampling targets for these fisheries primarily due to the pronounced decline in activity but also due to problems with unwillingness to take observers at sea. Non response rates were high (75-80%).

Trawl fisheries targeting demersal fish and crustacean (OTB_MCD_90-119_0_0), IIIaS
Trawl fisheries with sorting grids targeting Nephrops (OTB_CRU_70-89_2_35), IIIaS
These fisheries were sampled in the same sampling frame. The overall sampling target was reached (25 trips sampled compared to 24 trips planned). Compared to the NP was however the grid fisheries sampled in excess while the amount of sampled trips for the conventional fishery did not reach the target. This is an outcome of the random trip selection process and is primarily caused by the decline in the conventional fishery/increase in the grid fishery (Table III.C.3)

Trawl fisheries targeting small pelagic fish (PTM_SPF_32-69_0_0), IIIa
Purse seine fisheries targeting small pelagic fish (PS_SPF_16-31_0_0), IIIa
In the trawl fishery 69 out of planned 96 trips were sampled by buying unsorted samples of landings in the harbours/markets. The overall number of conducted trips by the fleet has further decreased (table III.C.3) considerably compared to the reference years. The purse seine fishery which is targeting the same species (sprat and herring) has in relative terms (not the same decrease in fishing trips compared with the reference years) become more important. This fishery are thereby sampled in excess (29 trips instead of 12) compared to the plan.

Fyke net fisheries targeting catadromous species (FYK_CAT_0_0_0)
Expected total number of trips to be sampled by MS is supposed to be NA and not 10 in tables III.C.3 and III.C.4 and this has been corrected. The reason for the change in NP is that the minimum landing size for eel was increased, which indirectly led to the closure of this fishery, hence, not possible to sample. Increased minimum landing size was one of the actions taken in the Swedish Eel Management Plan set up according to Council Regulation (EC) No 1100/2007 establishing measures for the recovery of the stock of European eel.

III.C.2 Data quality: results and deviation from NP proposal

Sweden initiated in 2009 a work to improve the designs of the metier sampling programmes taking the outcomes of WKACCU, WKMERGE, WKPICS and SGPIDS into account. This work continued in 2013 and includes identification of proper sampling frames, probability based ways to select primary sampling units and documentation of non-responses. At the same time we are trying to sort out some of the logistical problems that arise from the new more statistically sound sampling designs. The new designs will improve the possibilities to evaluate possible bias and thereby also accuracy.

Sweden has for a number of years been waiting for the outcome of the COST project to get tools for estimation of quality indicators such as CVs. During 2009 Sweden started to work with the tools provided in order to i) investigate if and where the tools can be used to evaluate the Swedish data and ii) evaluate the Swedish sampling wherever possible. Unfortunately it became evident that the COST

tools were not suitable for the Swedish sampling design (at least not directly) in many cases. This means that the evaluation on if and how the COST tools could be used is an ongoing work and the analysis have not been finalised yet. Proper calculation of CVs also requires a proper sampling design, which is what we are trying to achieve.

Meanwhile, for the sake of the annual report, Sweden has calculated mCVs for *length frequencies* of different species and stocks (Table III.C.5). Details regarding the estimation of precision (mCV) are presented in Annex II and the results are reported in table III.C.5. Overall the required precision target for length compositions was fulfilled. The COST tools have been used to estimate CVs for *volumes* of discards (Table III.C.5) were appropriate.

III.C.3 Follow-up of regional and international recommendations

No recommendations regarding metier related variables relevant for Sweden was brought up in the RCM NS&EA 2013 (ICES 2013b).

III.C.4 Actions to avoid shortfalls

One of the main reasons for inconsistencies between planned no of trips to be sampled and what is achieved is that it is sometimes difficult to predict spatial and temporal fishing patterns for some metiers at the time of writing the NP. To some degree this is inherent to the time lag between the compilation of the NP and the sampling year. To a certain degree the problem can be reduced by implementation of proper (and robust) sampling frames where the metiers can be seen as domains instead of strata. This is something that Sweden is working on and will continue to work on the forth coming years. Sweden will further continue to develop the sampling designs in order to reduce some of the logistical problems that have risen after implementing a more random selection of trips to sample.

Sweden had, during 2013, problems with high non-response rates, particularly in Skagerrak (IIIaN). Sweden will during 2014 work on an action plan to improve the situation.

III.D Biological - Recreational fisheries

THE BALTIC SEA

III.D.1 Achievements: results and deviation from NP proposal

According to the Data Collection Frame Work, DCF 2010/93/EU, member states shall evaluate the quarterly weight of the recreational catches of cod, salmon, eel and sharks for the Baltic Sea. For Sweden, salmon and cod are reported while recreational fishery for eel is not allowed according to regulation (FIFS 2004:36) and therefore no data has been collected.

The only species of sharks in the Baltic to be considered here is dogfish and it is rarely in the Baltic Sea. The SwAM has banned all recreational fisheries after dogfish since 1 April 2011 (FIFS 2004:36). This means that dogfish is now completely protected in Swedish waters and no sampling for data is therefore planned or conducted.

National mail screening surveys

A new national mail screening survey was carried out during 2013 regarding recreational fisheries 2013. The new survey is performed periodically three times a year with start during 2013. The data will be collected according to created recreational metiers. Unfortunately data from this new survey is not available until May 2014.

Salmon

Biological sampling of recreational salmon and sea trout catches was carried out during the fishing season in two rivers in the Gulf of Bothnia and one river in the Main Basin. The monitored variables include smolt-age, sea-age, sex, origin (wild/reared) and size at capture (weight and length). These data are an integral part of the assessment of the spawning run composition and the effects of the fishery. Due to economic constraints, sampling of fecundity was not prioritized in 2013 as it is not necessary to sample fecundity every year according to ICES (ICES 2012a).

Within Swedish recreational fisheries, salmon is caught through angling, brood stock and traditional fishing in rivers, with trap nets along the coast and in offshore troll fishing. Catches from coastal trap net fishing and offshore troll fishing are estimated according to surveys performed every fourth year. In 2013, catches were estimated based on the last surveys done in 2011. The trap net survey maps the number of trap nets along the coast (Anon 2011) while the last trolling survey was an inventory of the fishery, indicating a high fishing pressure (Persson et al. 2013). Collection of river catches is carried out annually in accordance with routines described in Anon (2003). Summarized data of catches are delivered to the relevant ICES group (WGBAST).

Cod

The monitoring of cod catches made on Swedish tour boats operating in the Sound between Denmark and Sweden started in 2011 as a pilot study. The study was repeated in 2012 and 2013 (including controls from 2012) and is now an ongoing survey. The Sound was chosen for this monitoring study as it was, and still is, considered the only area with significant Swedish recreational tour boat fishing for cod. The captains report the cod catch from all their fishing trips during the entire year. The Institute of Marine Research (IMR) and the University of Lund carry out control weighting and length measurement of all cod catches from a limited number of fishing trips. Captains' weight estimates are divided by the IMR control weights for cod in order to estimate the potential under- or over-estimate of cod catches by the captains (see below).

In 2013, ten out of the eleven Swedish tour boats that operated in the Sound reported their catches. Data in table below describe the captains´ own data (catches in kg from 10 out of 11 Swedish tour boats operating in the Sound in 2013) and are not corrected for one missing boat and overestimations of cod weight by captains. Fishing trips were normally half a day long and commercial catch is reported annual in the Sound in 2013 from Swedish fishing boats.

2013	**No. trips**	**Mean catch per trip**	**Total catch**	**Commercial catch**	**No. planned controls**	**No. accepted controls**	**% tour catch of tour + commercial**
Jan-March	225	80	18079		5	3	
April-June	429	94	40379		5	2	
July-Sept	571	127	72629		5	4	
Oct-Dec	236	47	11188		5	0	
Total	**1461**	**97**	**142275**	**379707**	**20**	**9**	**27**

Both weight- and length measurements were made during the nine controls (see table below). No controls were carried out during the last quarter. Five controls were planned for each quarter. The University of Lund could only carry out three of ten planned controls as these are made voluntarily, while IMR could only carry out six (accepted) controls out of ten planned controls. The missing controls were cancelled due to bad weather and one control had too low catch in order to be accepted (<30 kg).

2013	No. cod	Mean length (cm)	Mean weight (g)
Jan-March	127	56.5	2038
April-June	216	52.0	1447
July-Sept	526	52.7	1379
Oct-Dec	0		
Total	**869**	**53.1**	**1493**

III.D.2 Data quality: results and deviation from NP proposal

National mail screening surveys
A new national mail screening survey was planned during late 2012 and performed during 2013. The design of the survey has been changed compared to earlier surveys in order to get a better coverage of active recreational fishermen and metier based data.

Salmon
There are no deviations from NP proposal. There is an overall need for annual fishery surveys and closer collaboration with organisations that are managing recreational fisheries on salmon.

Cod
The goal is to include all tour boats in the survey. So far this has not been achieved (one boat missing in 2013). The captains are not obliged to report catches but they appear to be increasingly positive to reporting and IMR arrange annual meetings for captains and crew where survey results and data quality are discussed. Missing boat catches can easily be estimated from the mean catch of participating boats. Control weight- and length estimates by IMR are only included in the survey if the catch is at least 30 kg. In 2013, 9 out of 10 weight controls were accepted. In 2013, the mean of the 9 captains´ estimate/control weights was 1.25 (25 % overestimate; min: 1.02; max: 1.77; St. dev.: 0.23). This was much higher than in 2012 (2 % overestimate, 12 controls). One reason for this result might be that the high catches in 2013 made estimations more difficult. Nevertheless, estimations can never be completely correct, which is why we have controls. The number of accepted controls compared to the number of fishing trips (9/1461) was low and should be increased. Presenting the captains´ estimates, the number of missing boats and the control data allows for future corrections when these data are to be used. This is important since recreational fishing data for the western Baltic cod stock comes from different kind of surveys made in Germany, Denmark and Sweden allowing for, e.g. the WGRFS and the relevant ICES stock assessment group (WGBFAS) to combine and correct data as they wish. All cod survey data are stored at IMR.

III.D.3 Follow-up of regional and international recommendations
No recommendations regarding recreational fisheries were brought up in the RCM 2013.

III.D.4 Actions to avoid shortfalls

National mail screening surveys
No deviations from the NP proposal.

Salmon
Quality assurance work and development of recreational fisheries surveys started in 2013.

Cod
The ten controls planned for the University of Lund are undertaken on a voluntary basis and no actual action can be taken for the missing out of seven controls. The missing, out of controls from IMR, was caused by bad weather.

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III.D.1 Achievements: results and deviation from NP proposal

For the North Sea only cod are to be reported while recreational fishery for eel and sharks is not allowed according to regulation (FIFS 2004:36) in Sweden and therefore no data has been collected.

SwAM has banned all recreational fisheries after several species of sharks since 1 April 2011. The TAC in the North Sea, Skagerrak and Kattegat is 0 tonnes for 2011, 2012 and 2013 and captured sharks will quickly be put back in undamaged condition. This means that sharks is now completely protected species in Swedish waters and no sampling or collection of data is therefore planned.

National mail screening surveys
A new national mail screening survey has been planned during late 2012 and spring 2013 regarding recreational fisheries 2013. The design of the survey has been changed compared to earlier surveys in order to get a better coverage of active recreational fishermen and metier based data.

Cod
Two tour boats operated in the Kattegat during spring and summer 2013. In 2013, one of the boats joined the survey and the captain reported 72 fishing trips (April to August) and a total catch of 1338 kg. No controls were made as priority was given to controls in the Sound.

III.D.2 Data quality: results and deviation from NP proposal

Collection of cod on board tour boats in the Kattegat area was not planned in the NP for 2013 since this is rather new phenomenon. In order to get some knowledge about the fishing pattern, one boat was included in the data collection as a pilot study. There is no data to be reported and no deviation from NP proposal.

III.D.3 Follow-up of regional and international recommendations

No recommendations regarding recreational fisheries were brought up in the RCM 2013.

III.D.4 Actions to avoid shortfalls

No shortfalls to be reported and therefore no actions to be taken.

III.E Biological - stock-related variables

General Remarks

To get catch-in-numbers (CANUM) and weight-in-catch (WECA) by age group, sampling of the landings is undertaken. Simple random sampling was used for pelagic stocks, cod, eel and flounder. The simple random sampling means that a fixed number of individuals were sampled randomly within market size category (if sorted) /unit (unit =area, quarter and gear) independent of landing size. All individuals in a sample were analysed according to length, weight and age. Sampling strategy on surveys and on board fishing vessels differs from market sampling and was performed as follows: all individuals (or a sub sample) were length measured and a fixed number per length class was sampled for age, sex, maturity and weight. For stocks sampled on surveys and on board fishing vessels, the length can be given an age by using an Age-Length-Key. Samples of herring and sprat were collected by Denmark according to the bilateral agreements and number of individuals collected is included in table III.E.3.

Reasons for *over- and undersampling*:

International survey manuals give guidelines on number of individuals / length class to be sampled for age, sex and maturity. These were followed and the actual sampled number is therefore dependent on the amount of catch. The indications of the planned minimum numbers of individuals to be measured for the different variables are based on experiences with the Swedish sampling scheme and survey catches from 2008. Also, for sea sampling, number of trips and not number of individuals are the basis for planning. Therefore, percent achievement can vary and look like it is over- or undersampled. In the cases for oversampling e.g. *Gadus morhua* in sea sampling in the Baltic, *Trisopterus esmarki* and *Pollachius virens* in IIIa is done without any additional costs. However, minor additional costs occur in the home laboratory in form of additional staff time for age reading.

For some stocks, the planned sample sizes have not been achieved. In surveys this is seen for some stocks, e.g. *Clupea harrengus* in sd 25-29 +32, *Sprattus sprattus* in sd 22-32 and *Pleuronectes platessa* in IIIa. This is due to the general rule to collect stock-related variables for a certain number of individuals per length class and area. If only very few length classes occur during the survey, this rule can lead to undersampling compared to planned numbers. Undersampling of *Clupea harrengus* and *Sprattus sprattus* in the Baltic was seen for the market sampling due to low fishing in some quarters, and missing out of sampling occasions.

THE BALTIC SEA

III.E.1 Achievements: results and deviation from NP proposal

All stocks sampled during 2013 for biological variables, age, length, weight, sex and sexual maturity are listed in table III.E.3. The variables are collected from different sources like survey, market or sea sampling and different sampling strategies have been used. For most stocks, the sampling sources are listed separately in order to keep track on the contribution of the different sources to the total. General reasons for over- and undersampling are explained above under “General remarks”. Oversampling did not cause significant additional costs.

Sweden is obliged to sample ten stocks in the Baltic Sea. Sweden also samples *Anguilla anguilla* in Inland freshwater and *Salmo salar* from rivers.

Anguilla anguilla (freshwater): The species was sampled according to plan.

Anguilla anguilla sd 22-24: The fishing activity with pound nets has decreased in sd 24 and therefore the stock sampling of the pound net fisheries was not possible to fulfil.

Anguilla anguilla sd 25-29, 32: Fewer age samples than planned were collected due to the length homogeneity of the catches and is a consequence of the stratified sampling method applied.

Clupea harengus sd 22-24: Fishing for herring in the area is conducted mainly in quarter 1 and 4, and the planned number should be adjusted to (600* 2 = 1200), which would increase the percent achievement to 71 %. The sampling was not conducted as planned by the staff from the control and enforcement since they actively focused on control of cod fishery during 2013, and therefore the number of samples collected from the pelagic fishery decreased.

Clupea harengus sd 25-29, 32: Number of herring sampled for weight, sex and maturity in surveys was 77 % of planned numbers. Sampling is done according to the manual and the number of individuals sampled depends on the amount caught during the planned hauls and number of length groups. See also section General remarks. Samples collected at market reached 83% of the planned numbers. Most of the fishing is conducted during quarter one in all subdivisions (25, 26, 27, 28 and 29). In quarter two, three and four the major part of the fishery is taken place in sd 25 and planned number of samples in sd 26, 27, 28 and 29 could not be fulfilled due to lower intensity in fishery.

Clupea harengus sd 30-31: The species was sampled according to plan. However, additional 1386 individuals were collected during BIAS by Finland and the age reading was divided between Sweden and Finland.

Gadus morhua sd 22-24: Number collected in market sampling was according to plan but the number sampled at sea was above planned number but with no additional cost involved. The number of samples collected during surveys was according to plan.

Gadus morhua sd 25-32: Number collected in market sampling was according to plan but the number sampled at sea was above planned number but with no additional cost involved. The number of samples collected during surveys was according to plan.

Salmo salar sd 30-31: Achieved number of salmon from the sea-sampling was lower than planned in the commercial trap net fisheries (FPO_ANA_0_0_0) in sd 30-31. The reason was the closure of the salmon fishery early in the fishing season, and also low numbers of salmon in individual catches. The closure was conducted by SwAM in order to follow assessed EC TAC.

Salmo salar sd 25-29: No market sampling of salmon was performed by Sweden since the Swedish long line fishery has been closed by SwAM in order to protect the wild Baltic salmon populations. This decision was made on a national level.

Achieved sampling of biological variables (length, weight, age, sex) in the recreational fishery was lower than planned. This can be explained by the increasing trend of catch and release. For example, in the River Mörrumsån the proportion of released fish has increased with around 36% the last seven

years. Another explanation to the low sample number is the high water temperatures of last year. When water temperature is too high, salmons get severely damaged by the sample procedure.

Fish count of ascending adult salmon with sonar system was not possible in the River Sävarån during 2013 because of economic restrictions.

Salmo salar, River monitoring of wild salmon and sea trout stocks
In 2006-2008, river monitoring of Swedish wild salmon stocks was included in the NP. The monitoring consisted of annual electrofishing surveys of salmon and sea trout parr in wild salmon rivers, running of a smolt trap for emigrating smolts and maintaining counting of ascending salmon and sea trout spawners in fishladders in three rivers. In the Commission Regulation valid for 2009-10, it was stated that countries should establish salmon index rivers, as defined by ICES, for counting of smolts, numbers of ascending spawners and estimating densities of parr. Because Sweden has a major part of the Baltic salmon rivers, this had considerable implications for the Swedish monitoring system. In line with the ICES-definitions, Sweden established three index rivers - two in the Gulf of Bothnia (River Vindelälven and River Sävarån) and one in the Main Basin (River Mörrumsån), instead of the single partial small index river in use earlier (River Sävarån).

Establishment of salmon index rivers is normally associated with major costs, because basic facilities are needed for the counting activities, but also because costs for running these investigations are substantial. In order to handle the new demands it was necessary to decrease the amount of monitoring in other non-index rivers. Furthermore, SLU Aqua co-operates with other bodies, both private companies and regional and local agencies and local organizations as well as another department at the SLU. These bodies are used as subcontractors and they contribute with considerable amounts of money to the index river projects. SLU Aqua is responsible for project management, and in some cases also detailed planning and reporting of results. These projects are seen as important parts of the new multi annual salmon management plan (COM (2011)0470 – C7 0220/2011 – 2011/0206(COD)) that is expected to replace the Salmon Action Plan (1997-2010), but has not yet been decided. The activities in salmon index rivers 2013 are as described in the table below. Due to economic constraints there was no adult count in the River Sävarån in 2013.

River	Smolt count	Adult count	Electrofishing
Ume/Vindelälven, Sub-div. 31, a large river	Smolt trap (fyke net) operated	Fishladder with counter, camera and smolt leader used	Yes
Sävarån, Sub-div. 31, a small river	Smolt trap (smolt wheel) operated	No	Yes
Mörrumsån, Sub-div. 25, midsize river	Smolt trap (smolt wheel) operated	Fishladder (counter with camera) used	Yes

In addition to the monitoring of the index rivers, operation of a fish ladder in River Kalixälven and electrofishing in additional non-index rivers is included in the NP. A new counter (with camera) for River Kalixälven was purchased and operating since 2011, as planned.

Data from river monitoring are reported to the relevant ICES Working Group (WGBAST). Results from electrofishing surveys are collected in a national database (SERS) covering all Swedish surveys. Adult count data from fish ladders on in total five rivers are also collected and kept in databases that are partly operated by the SLU Aqua.

Sprattus sprattus IIIb-d: Most of the fishing is conducted in quarter one. Hardly any fishing was taken place in quarter three and only low intensity fishing was conducted in quarter two and four. The sampling possibilities were affected by the fishing pattern and planned numbers could not be fulfilled.

III.E.2 Data quality: results and deviation from NP proposal

So far, there has only been possible to use the COST tool for analysing CV for some parameters, also, COST has not been developed to deal with survey data. Therefore, Sweden developed new R-scripts using boot-strap for calculating CV on length, weight, sex and maturity by age and the script used is presented in Annex II. For surveys, only data collected during quarter one was included in the analyses. The deviations in sampling described in section above explain the differences between planned and achieved sampling.

The achieved CV´s are reported in table III.E.3. For most species, the required precision target (CV) was well fulfilled for the variables "Length at age" and "maturity at age". However, for the variable weight at age, the estimated CV values did not reach required target, except for herring, cod and sprat collected in market sampling. The precision target was not reached for the variable "Sex-ratio at age", having a range between 0.03 and 0.10.

For eel, CV for "Sex-ratio at age" and "Maturity at age" has not been calculated, since the eel fishery indirectly is stratified on sex and maturity and catches are strongly dominated by females. For flounder, CV "for Sex-ratio at age" has not been calculated since sexes have been separated in the CV estimates following that females and males respectively differ substantially in their growth and thereby in their abundance in the catches (and sampling).

III.E.3 Follow-up of regional and international recommendations

No recommendations regarding stock related parameters variables relevant for Sweden were brought up in the RCM Baltic 2013 (ICES 2013a).

Source	Recommendation	Action
RCM Baltic (2011)	For institutes collecting small volumes of age samples for certain species and when new species are to be sampled, task sharing of age reading is necessary in order to optimise the use of age reading expertise. The RCM Baltic recommends the following MS to investigate their capability to read relevant age samples of interested MS: (1) Germany: plaice (2) Denmark: plaice, dab and sole (3) Poland: flounder and turbot (4) Sweden: eel and salmon (5) Finland: salmon The suggested coordination should be discussed, agreed and decided by the National Correspondents so the first agreements could be established before December 2011.	SWEDEN FOLLOWED THE RECOMMENDATION AND NOTIFIED THE CHAIR OF RCM BALTIC THAT SWEDEN IS WILLING TO SHARE THE EXPERTISE IN AGE READING OF SALMON. THE CHAIR OF WGEEL NOTIFIED THAT NO TASK SHARING IN AGE READING OF EEL SHOULD START BEFORE THE WORKING GROUP HAS DECIDED IF AGE BASED ASSESSMENT IS APPROPRIATE FOR EEL OR NOT. OTOLITHS SHOULD STILL BE COLLECTED BY MS.

III.E.4 Actions to avoid shortfalls

Clupea harengus sd 22-24 and sd 25-29+32. The same fishing pattern, e.g. low or no landings in quarter 2 and 3 and the change in how and when fish are landed was similar to the year before. To improve the system for collecting samples, an agreement has been signed between SLU Aqua and SwAM to make sure that in all occasions where a control of landing is taken place (within the organisation of SwAM), a sample for biological analyses will be performed and sent to SLU Aqua.

Sampling of *Salmo salar*. Planned number of samples from the trap net fisheries (FPO_ANA_0_0_0) was not possible to reach because the fishery was closed with a short notice in the beginning of the season. Also, the pre-selected individual fishermen´s catch was low in numbers of salmon. To fulfil the planned stock sampling in the future we plan to increase sampling intensity by increasing number of fishermen that collect age samples. Another possibility would be to, if the same circumstances appear, grant exemptions from the closure for fishermen taking part in the sampling. The poor result in the CV estimate for "Sex-ratio at age" in the salmon stock sampling might be explained by the fact that the two sexes are not caught in equal proportions in the trap net fishery and if so, no action can be taken.

To increase the number of biological samples within the recreational fisheries, sampling intensity during appropriate environmental conditions must improve through different management measures. For example, sampling could become better organized at local fishing organisations' landing stations.

If count of ascending adult salmon in the River Sävarån shall be performed it is important that the economic restrictions are withdrawn.

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III.E.1 Achievements: results and deviation from NP proposal

All stocks sampled during 2013 for biological variables, age, length, weight, sex and sexual maturity are listed in table III.E.3. The variables are collected from different sources like survey, market or sea sampling and different sampling strategies have been used. For most stocks, the sampling sources are listed separately in order to keep track on the contribution of the different sources to the total. General reasons for over- and undersampling are explained above under "General remarks". Oversampling did not cause significant additional costs.

Sweden is obliged to sample thirteen stocks in the North Sea region.

Anguilla anguilla IIIa*:* The species was sampled according to plan.

Clupea harengus IIIa: This species was slightly oversampled during the surveys by 140 %. The number of individuals depends on the amount caught. The amount sampled in market was 85% of planned numbers. Sampling is stratified on subdivision. In sd 20 fishing and sampling was conducted in all quarters but with lower intensity in quarter two. In sd 21 no fishing was taken place in quarter three and with a low intensity in quarter two. This was reflected in number of individuals since no samples were possible to collect in quarter two and three.

Gadus morhua IIIaN: The species was slightly oversampled during surveys (app 158 %) but under-sampled at market and in sea sampling compared to the planned numbers. Fishing was taken place in quarter one, two and three. Sampling was performed according to plan in quarters with fishing activity.

Gadus morhua IIIaS: The species was slightly oversampled during surveys (153 %) but undersampled at market and in sea sampling compared to the planned numbers. Sampling was performed in the quarters with fishing and that was in quarter one and two only, in total 32 tonnes were landed in 2013. Since there was very low fishing activity, also number of sampling occasions in the sea sampling was limited. Planned sampling level was simply not possible to reach.

Glyptocephalus cynoglossus IIIa: The species was sampled according to plan in survey. Individuals are also sampled in sea sampling or at market. Since the landings of this species were only 166 tonnes the planned number of 1500 individuals is quite extensive (500 individuals per fishing quarter). The planned numbers were set to achieve a good biological sample for biological parameters as the basis for stock assessment of this stock in WGNEW and WGNSSK. Due to the low landings the number of samples could not be fulfilled.

Melanogrammus aeglefinus IIIa: This species was sampled according to plan.

Nephrops norvegicus FU3 and FU4: Only half of the number of trips was sampled due to problems with access to vessels and therefore only half of the number of individuals was sampled.

Pandalus borealis IIIa: This species was sampled according to plan.

Pleuronectes platessa IIIa: This species was under-sampled compared to the plan. The sampling is following the manual and the number of individuals depends on the amount caught. The planned number is based on historical data from 2008.

Sprattus sprattus IIIa: The species was sampled according to plan in surveys, but reached 63 % of the planned numbers in market sampling. This can be explained by no fishing in quarter two and three. Sampling was performed according to plan in quarters with fishing activity.

Trisopterus esmarki IIIa: The species is oversampled compared to planned numbers. The species is only sampled at surveys and the sampling is following the manual. The number of individuals depends on the amount caught. The planned number is based on historical data from 2008.

Pollachius virens IIIa: The species is over-sampled compared to planned numbers. The species is only sampled at surveys and the sampling is following the manual. The number of individuals depends on the amount caught. The planned number is based on historical data from 2008.

III.E.2 Data quality: results and deviation from NP proposal

So far, there has only been possible to use the COST tool for analysing CV for some parameters, also, COST has not been developed to deal with survey data. Therefore, Sweden developed new R-scripts using boot-strap for calculating mCV on length, weight, sex and maturity by age and the script is

presented in Annex II. For surveys, only data collected during quarter one was included in the analyses.

The achieved CV´s are reported in table III.E.3. For all species, the required precision target (CV) was well fulfilled for the variables "Length at age". For the variable "sex-ratio at age" and "weight at age" the estimated CV values did not reach required target.

The deviations in sampling described in section above explain the differences between planned and achieved sampling.

III.E.3 Follow-up of regional and international recommendations

No recommendations regarding stock related parameters variables relevant for Sweden were brought up in the RCM NS & EA 2013 (ICES 2013b).

Source	Recommendation	Action
RCM NS&EA (2012)	**Stock related variables: Potential bilateral agreements on sampling of landings abroad.** **MS are requested to establish or update a bilateral agreement on sampling of landings abroad.** **MS to evaluate the need for such an agreement based on the overview provided by the RCM NS&EA.**	SWEDEN HAS ESTABLISHED AGREEMENT WITH ALL MS THAT ARE IDENTIFIED.

III.E.4 Actions to avoid shortfalls

Clupea harengus, *Sprattus sprattus and Gadus morhua in* IIIa: Since planned numbers in table III.E.3 is based on fishing all year round, and in reality fishing is taken place only in two to three quarters this appears as undersampling in % achievement in the table. The only action to be taken is to change planned numbers in the table.

Norway lobster (*Nephrops norvegicus*) IIIaN
Sweden had, during 2013, problems with high non-response rates, particularly in Skagerrak (IIIaN). Sweden will during 2014 work on an action plan to improve the situation.

III.F Transversal variables

III.F.1 Capacity

III.F.1.1 Achievements: results and deviation from NP proposal

No shortfalls and/or deviations exist in relation to what was stated in the NP.

III.F.1.2 Data quality: results and deviation from NP proposal

No shortfalls and/or deviations exist in relation to what was stated in the NP.
Capacity data was collected exhaustively in the fleet register (Database Fartyg 2). All transversal data is reported un-clustered.

III.F.1.3 Actions to avoid shortfalls

No shortfalls to be reported and therefore no actions to be taken.

III.F.2 Effort

III.F.2.1 Achievements: results and deviation from NP proposal

No shortfalls and/or deviations exist in relation to what was stated in the NP.

Data was acquired as defined in Appendix VIII of the Commission decision 2010/93/EC. All spatial data used to calculate time in area for vessels reporting in logbook, was based on best information from VMS, AIS (where applicable), Effort reports, logbook and inspection information (sighting etc.). The spatial data was stored trip by trip with information for each record on vessel, position (long./lat.), and time and data source. Information on activity and gear onboard was linked to each trip.

Vessel not obliged to keep logbook reported their effort information in the monthly coastal journal. Data on gear capacity and activity was collected as well as information on days at sea/fishing days. For simplicity reason calendar day was used instead of 24-hour periods for the calculation of activities of vessels under 8m/10m without logbook.

Effort calculation related to static gear did not include time in port since it was almost impossible to calculate with any precision. In small scale fisheries different vessels could be used for setting gears and collecting gears or collecting catch from gears. It is also possible that gears belonging to two different vessels (on territorial waters) is set by only one of the vessels and later collected by each vessel. In order to have conformity with management effort calculations, fishing days for static gears was calculated in accordance with management provisions for calculating effort for static gears. Thus, calculating of fishing days included time when a vessel was out of port with gears on board or in sea, without just being transiting.

The table below describes effort data collected and reported 2008-2013.

Variable	Data sources and methodologies
Days at sea	Spatial data sources (described above) and coastal journals for vessels without logbook
Hours fished.	Effort data in logbook (haul by haul records) information
kW * Fishing Days	Fleet register and logbook/coastal journal
GT * Fishing days	Fleet register and logbook/coastal journal
Number of trips	Logbook/Coastal journal (gear information)
Number of rigs	Logbook/Coastal journal (gear information)
Number of fishing Operations	Logbook/Coastal journal
Number of nets, Length	Logbook/Coastal journal
Number of hooks, Number of lines	Logbook/Coastal journal
Numbers of pots, traps	Logbook/Coastal journal
Soaking time	Logbook/Coastal journal

III.F.2.2 Data quality: results and deviation from NP proposal

No shortfalls and/or deviations exist in relation to what was stated in the NP.

Effort data derived from the same datasets used to monitor quotas and effort limitations. Comprehensive validations were made during the database entry process (logbook, landing declarations, sales notes, Coastal journals, effort reports). Spatial data from logbook, VMS, effort reports, sightings etc. were compiled trip by trip. The trip information was crosschecked in order to verify catch and effort area information in the logbook and to calculate time in different effort areas. Cross-checking of effort information in the monthly coastal journals was not made on a trip by trip basis and not on a regular basis.

III.F.2.3 Follow-up of regional and international recommendations

No relevant recommendations have been made about the collection of effort data.

III.F.2.4 Actions to avoid shortfalls

No shortfalls to be reported and therefore no actions to be taken.

III.F.3 Landings

III.F.3.1 Achievements: results and deviation from NP proposal

No shortfalls and/or deviations exist in relation to what was stated in the NP.

Data was acquired as defined in Appendix VIII of the Commission decision 2010/93/EC. The table below describes landing data collected and reported 2008-2013.

Variable	Data sources and methodologies
Value of landings total and per commercial species	Logbook/Landing declaration, Coastal Journal and sales notes. Since all quantity in a landing does not necessarily end up in a sales note, an average price for the species landed was used instead of the corresponding sales note. For monthly coastal journals an average for the month was used. The average prices were based on species, landing location and landing date.
Live weight of landings total and per species	Logbook/Landing declaration and Coastal Journal. National conversion factors (same as for quota calculation) were used to calculate live weight from product weight.
Prices by commercial species	Sales notes
Conversion factor per species	National conversion factors (same as for quota calculation) were used to calculate live weight from product weight (only for AR).

III.F.3.2 Data quality: results and deviation from NP proposal

No shortfalls and/or deviations exist in relation to what was stated in the NP.

Landing data derive from the same datasets used to monitor quotas. Comprehensive validations were made during the database entry process (logbook, landing declarations, sales notes, Coastal journals, effort reports). Catch, landing and sales data as well as spatial data from logbook, VMS, effort reports, etc. was compiled trip by trip. The trip information was crosschecked in order to verify catch and catch area information in the logbook. Crosschecking of information in the monthly coastal journals was not made on a trip by trip basis and not on a regular basis.

III.F.3.3 Follow-up of regional and international recommendations

No related recommendations have been made about the collection of landings data.

III.F.3.4 Actions to avoid shortfalls

No shortfalls to be reported and therefore no actions to be taken.

III.G Research surveys at sea

III.G.1 Achievements: results and deviation from NP proposal

During 2013, Sweden has as planned undertaken six surveys in the Baltic Sea, Kattegat and Skagerrak. The Danish R/V DANA was chartered for five Swedish surveys during the year and complemented with R/V Hålabben in the Sound. For the UWTV survey a smaller Vessel Asterix was used.

Sweden also participated as planned in the joint survey in area IIa. Details for this survey will be presented by Denmark.

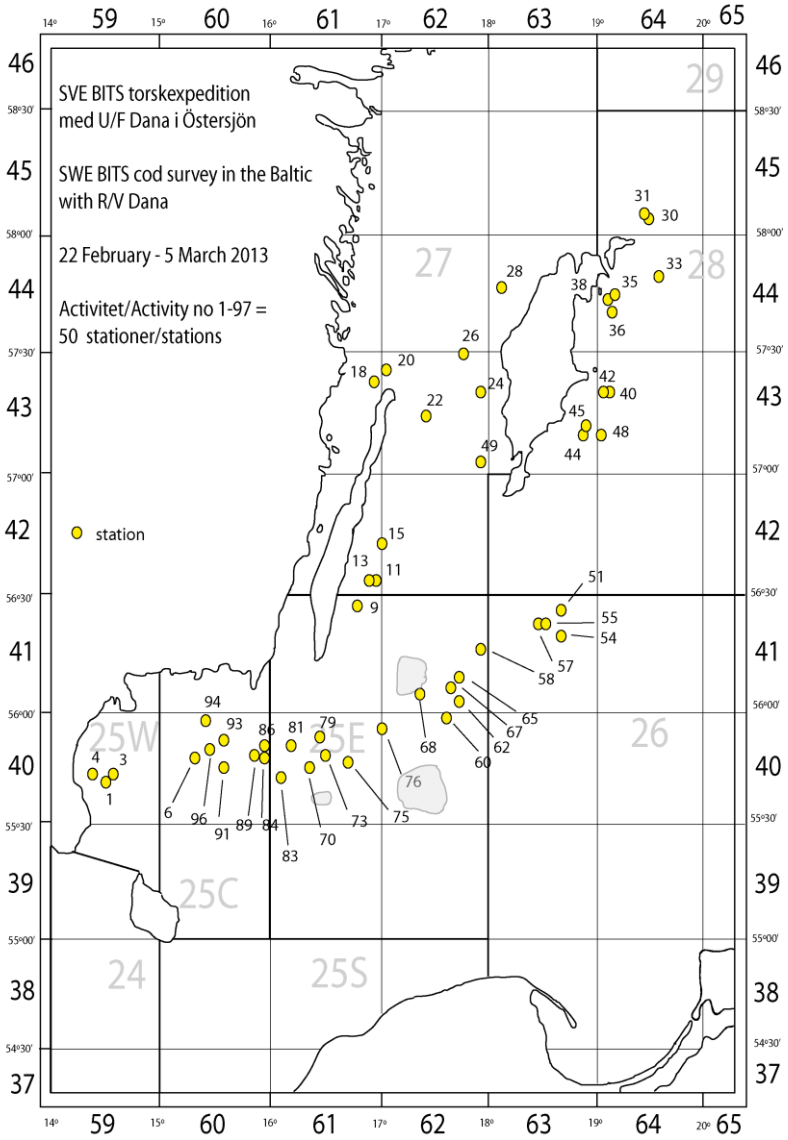
A description of the different surveys undertaken in 2013 follows below and a summary is also presented in table III.G.1.

The Baltic International Trawl Survey (BITS) first and fourth quarter
The main aim of the survey is to estimate cod recruitment indices and cod abundance in the different Sub-Divisions in the Baltic. The survey has also the purpose to follow the development of flounder and other flatfish populations. The BITS survey is coordinated by the ICES Baltic International Fish Survey Working Group (WGBIFS).

All Swedish survey data are stored in "Fish sample database" (SLU) and sent to ICES DATRAS database for international data storage. The present surveys provide data to the ICES Baltic Fisheries Assessment Working Group (WGBFAS) and ICES Baltic International Fish Survey Group (WGBIFS).

BITS first quarter
In the Baltic Sea, the survey was conducted by the Danish R/V Dana during the period 22/2 – 5/3 using the TV3 demersal trawl according to the BITS manual (ICES., 2013b). Hålabben used a down scaled TV3 930 trawl, to 30 % of original size, on the 15-16 of January. Overall, 52 valid fish hauls (49 with Dana and 3 with Hålabben) were made (including four fictitious hauls which were not trawled because the oxygen concentration close to the bottom was <1.5 ml/l) and covered parts of sd 23, 25, 26, 27 and 28 this year. During the survey with Dana, acoustic data were continuously recorded. For the Baltic Sea, the fish hauls were randomized from the Tow Database and these hauls were completed within 12 days at sea (Map1). The three fish hauls in the Sound are stationary and were completed in two days at sea indicated in Map 5.

In the Baltic Sea, almost all cod (totally 41 598) were measured and otoliths from 977 individuals were taken. From the catch of flounder (totally 6 235), otoliths were taken from 1 442 individuals. Overall, 21 fish species were caught during the survey and the catch was dominated by herring, cod, sprat and flounder, in terms of weight. In the Sound, individual weight and maturity stage of 339 cod and 22 plaice was measured and otoliths were taken. In total 13 species were caught.

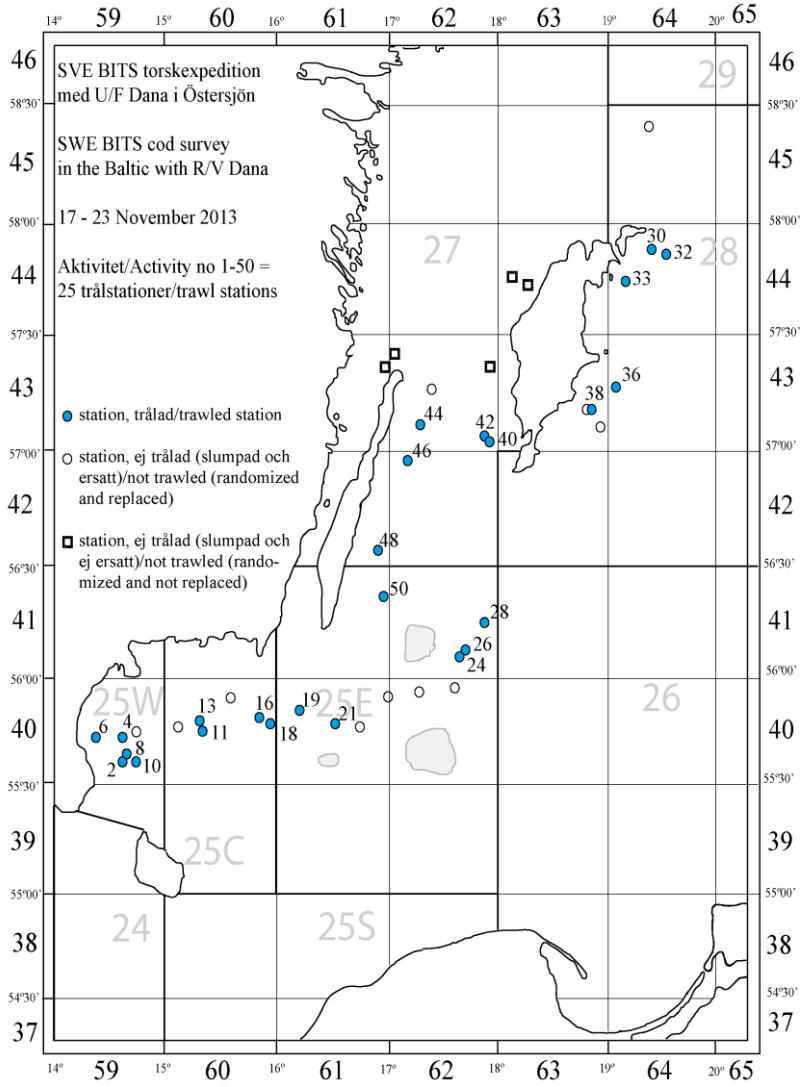


Map 1. Trawl stations BITS first quarter survey 2013. Station no. 38 is invalid.

BITS fourth quarter

In the Baltic Sea, the survey was conducted by the Danish R/V Dana during the period 17-23/11 using the TV3 demersal trawl according to the BITS manual (ICES 2013c). In the Sound, the survey was conducted by Hålabben during 21-22 of August using a down scaled TV3 930 trawl, to 30 % of original size. Overall, 29 valid fish hauls (25 with Dana and 4 with Hålabben) were made (including six fictitious hauls which were not trawled due to oxygen concentration close to the bottom was <1.5 ml/l) and covered parts of sd 23, 25, 27 and 28 this year. During the survey with Dana, acoustic data were continuously recorded. For the Baltic Sea, the fish hauls were randomized from the Tow Database and these hauls were completed within eight days at sea (Map 2). Nine stations in the Baltic Sea could not be visited cause of the Swedish Armed Forces prohibition. Four of these stations could be replaced while five stations could not be trawled or replaced. The Swedish Armed Forces have a number of selected areas within 12nm from the Swedish coastline where foreign research vessels (as Dana) are prohibited to enter. The four fish hauls in the Sound are stationary and were completed in two days at sea and indicated in Map 6.

In the Baltic Sea, almost all cod (totally 21 864) were measured and otoliths from 664 individuals were taken. From the catch of flounder (totally 5 998), otoliths were taken from 656 individuals. Overall, 18 fish species were caught during the survey and the catch was dominated by herring, cod, flounder and sprat, in terms of weight. In the Sound, individual weight and maturity stage of 205 cod and 40 plaice was measured and otoliths were taken. In total 12 species were caught.



Map 2. Hauls with TV3L demersal trawl, BITS fourth quarter survey 2013 with DANA.

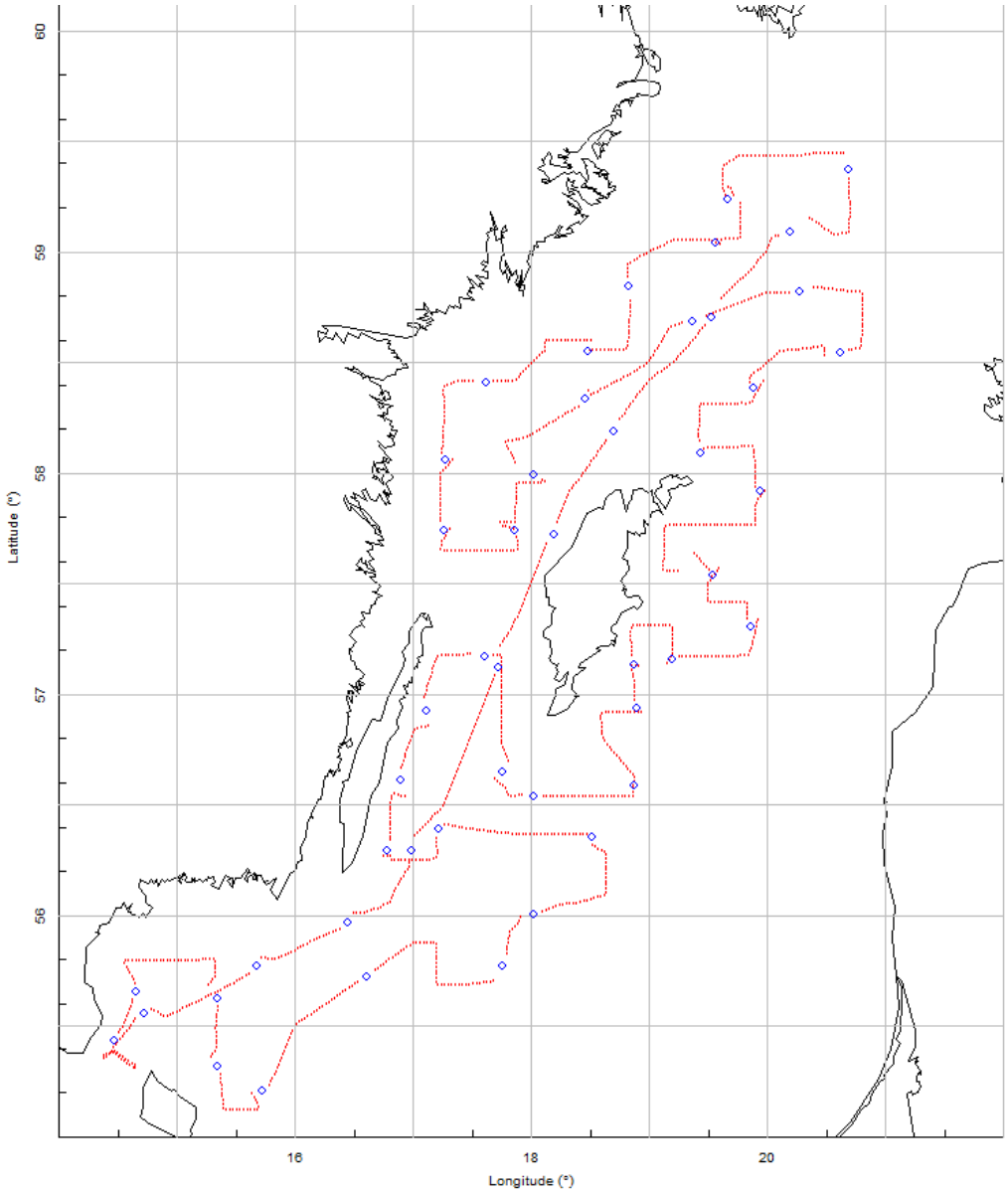
BIAS Baltic International Acoustic Survey

The main objective of the survey is to assess clupeoid resources in the Baltic Sea.

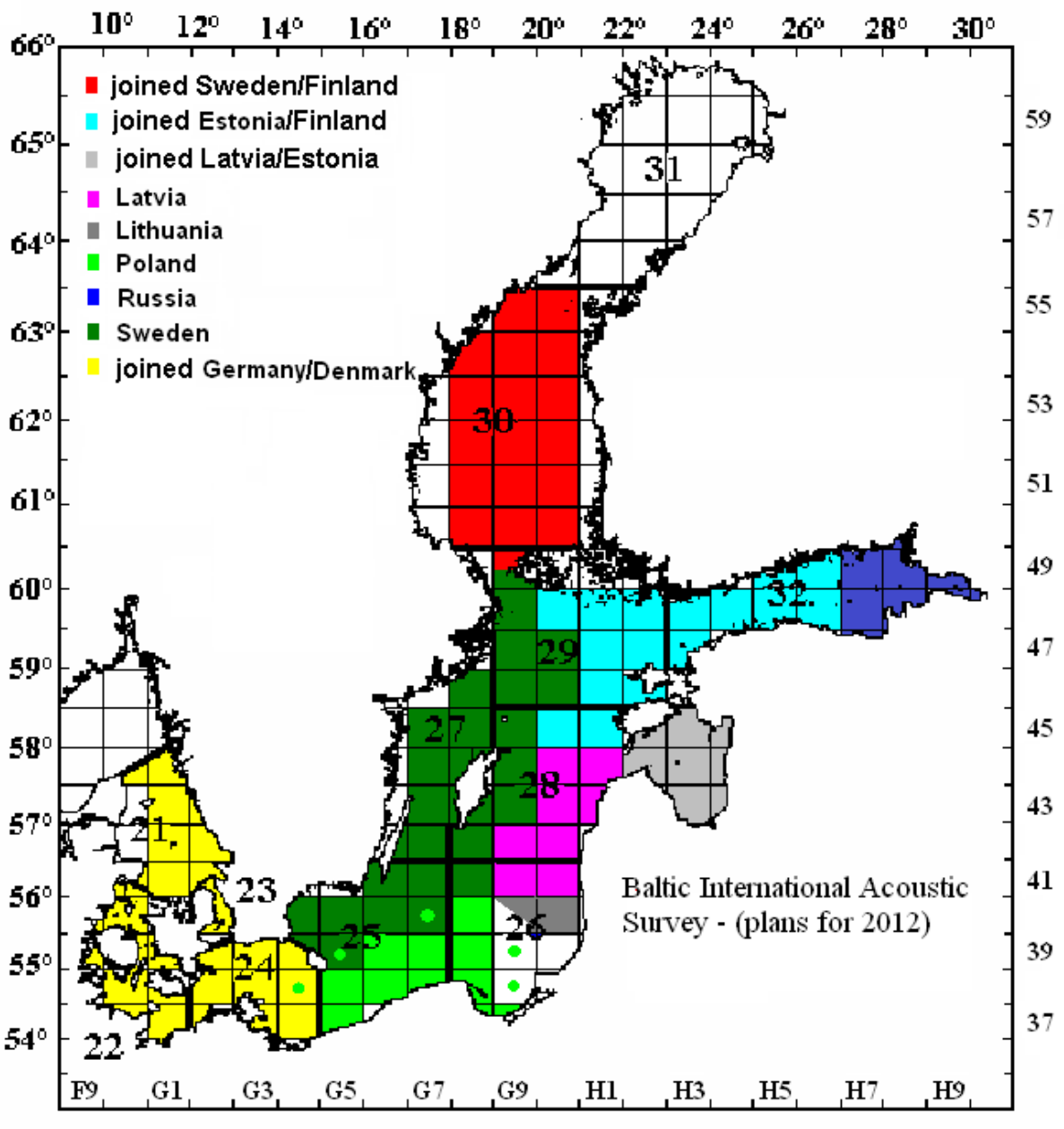
The R/V Dana cruise started 01/10 from Hirtshals with transit to Gullmarsfjorden for calibration and boarding of the scientific crew. The cruise ended 14/10 in Hirtshals after in total 14 days at sea. All trawl hauls were made using the Fotö pelagic trawl with 6 mm mesh bar in the codend. In total 48 trawl hauls were carried out and the cruise covered ICES subdivision 27 and parts of 25, 26, 28 and 29 (Map3). Sweden follows the recommendations given by WGBIFS that states that the maximum sampling effort should preferably be used and therefore produces an age key by taking otoliths from each ICES rectangle covered by the survey. Sampling of otoliths, weight and maturity was performed on 2072 herring and 1327 sprat.

The surveys in September/October are coordinated within the frame of the Baltic International Acoustic Surveys (BIAS). Data are stored in “Fish sample database” at SLU and sent for international data storage to the IBAS database that is maintained by WGBIFS. The present survey provides data to the ICES Assessment Working Group (WGBFAS).

The squares that were allocated to Sweden can be seen in green (sd 25-29, map 4). The area is around 23089 square nautical miles and should be covered by approximately 1341 nautical miles of acoustic data collection and approximately 48 hauls. The Swedish BIAS survey achieved 102% of the number of needed acoustical data and 100% of the hauls that should have been made in the Swedish area of 25 to 29.



Map 3. Survey grid and trawl positions of R/V Dana during BIAS survey 2013.



Map 4. Survey plan map for BIAS survey 2013 (WGBIFS).

The International Bottom Trawl Survey (IBTS) first and third quarter

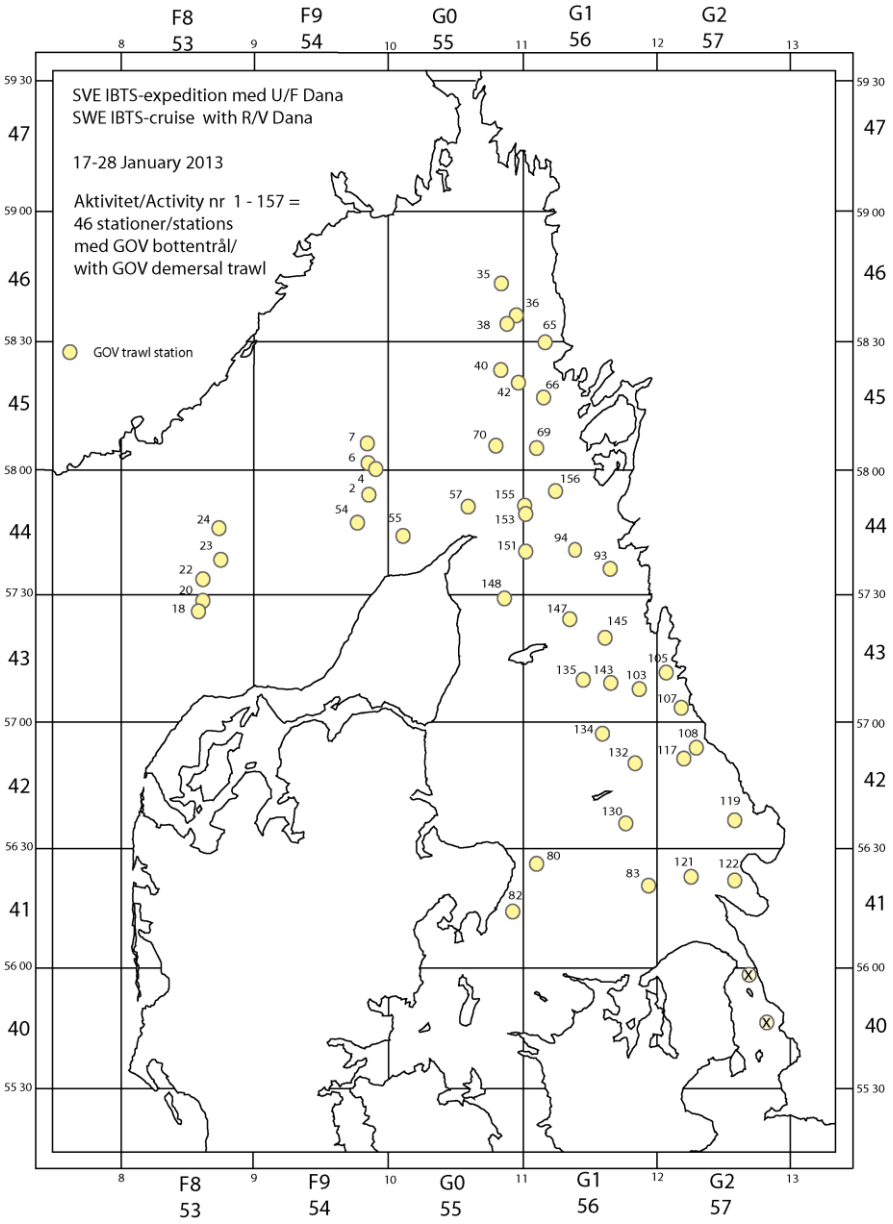
The main aim of the survey is to estimate abundance of commercial (cod, haddock, whiting, Norway pout, herring, sprat, saithe and mackerel) and non-commercial fish. Moreover, the otoliths of the commercial species are stored and subsequently analysed in order to assess abundance by age class, in particular for the recruiting year classes in the North Sea, Skagerrak and Kattegat. The IBTS survey is coordinated by the ICES International Bottom Trawl Survey Working Group.

All survey data are stored in “Fish sample database” (SLU) and sent to DATRAS, i.e. the ICES database, for international data storage. This survey currently provides data to the ICES Assessment working groups WGBFAS, HAWG and WGNSSK.

IBTS first quarter

The survey was conducted chartering the R/V Dana between 17-28/1 and using the GOV demersal trawl according to the IBTS manual (ICES 2012b). In total, 46 valid hauls were towed during this survey within 12 days at sea. The hauls with GOV demersal trawl were made in the Skagerrak/Kattegat area (Map 5). Larvae trawling with MIK trawl resulted in 61 valid hauls and catches consisted of 57 herring larvae, one eel larva and several other species.

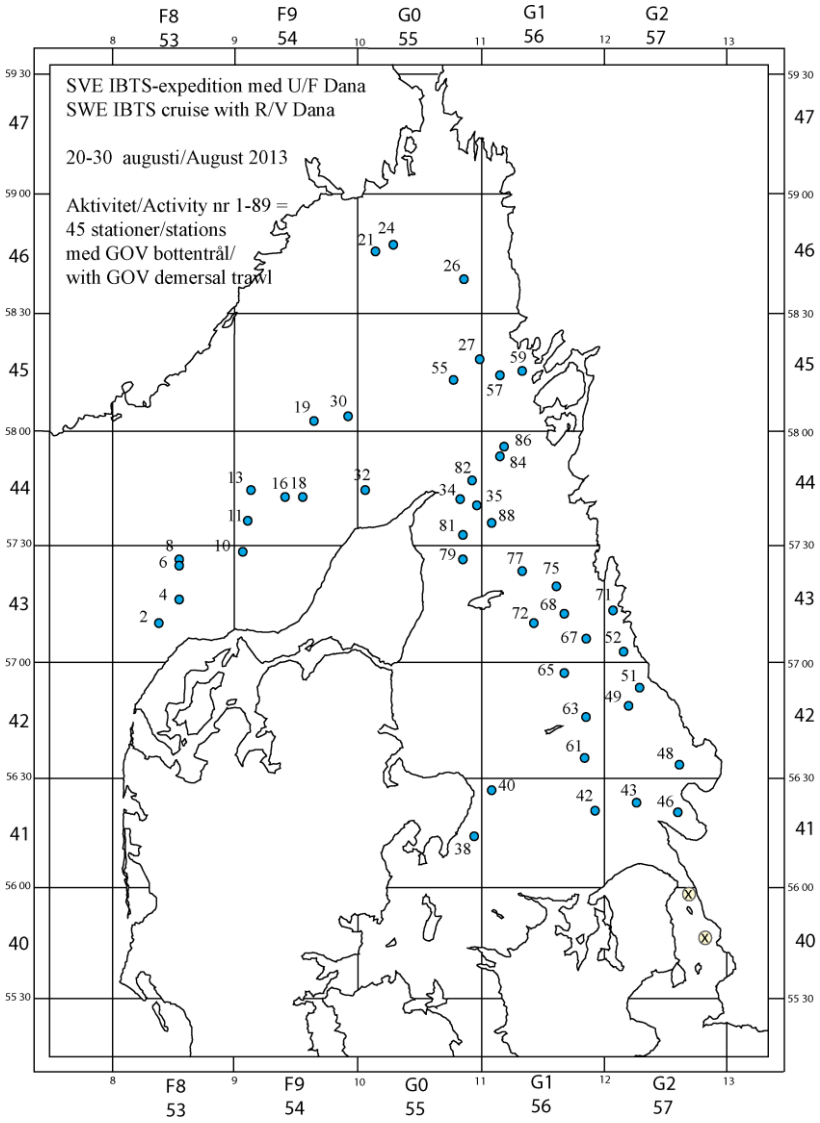
For the Kattegat and Skagerrak area, the biological sampling, including collection of otoliths for age analysis, was done on the most important fish species resulting in 65 fish species caught. In total 5 046 otoliths were collected from twelve different species.



Map 5. Hauls with GOV demersal trawl IBTS first quarter survey 2013. The two hauls taken during BITS first and third quarters in the Sound are indicated by a crossed circle.

IBTS third quarter

The survey was conducted chartering the R/V Dana during the period 20-30/8 and using the GOV demersal trawl according to the IBTS manual (ICES 2012b). All planned hauls could be made within eleven days at sea. In total 45 valid hauls were made. R/V Dana covered the Skagerrak/Kattegat area (Map 6) and the biological sampling, including collection of otoliths for age analysis, was done on the most important commercial species. In total 4 447 otoliths were collected from twelve different species. Overall 58 fish species were caught.



Map 6. Hauls with GOV demersal trawl IBTS third quarter survey 2013. The two hauls taken during BITS first and third quarters in the Sound are indicated by a crossed circle.

Underwater TV (UWTV) survey on *Nephrops* grounds

Uncertainty over landings figures and concern over some of the analytical assumptions upon which analytical assessments are based, has led to investigations into alternative approaches for providing *Nephrops* advice.

Nephrops stocks are limited to bottoms with suitable silty clay sediment where they live in burrows. This mud-burrowing species is protected from trawling while inside its burrow. Burrow emergence is known to vary with environmental (ambient light intensity) and biological (moult cycle, female reproductive condition) factors. Trawl surveys are therefore not ideal for *Nephrops*, and underwater TV (UWTV) has been developed as a means of estimating stock size from burrow densities.

The Marine laboratory in Aberdeen developed a fishery independent UWTV survey in early 1990´s in order to estimate stock size from burrow densities. UWTV consists of a video camera mounted on a sledge that is towed slowly (0.5-0.8 knot) on the bottom by a vessel. *Nephrops* burrows are counted and converted into densities using information on the width of the view of the camera and length of the tow. Mean weight from biological samplings are used to estimate stock biomass.

ICES Advisory Committee for Fisheries Management (ACFM) recommend that UWTV surveys should be used to provide biomass estimates for mud-burrowing animals like *Nephrops*.

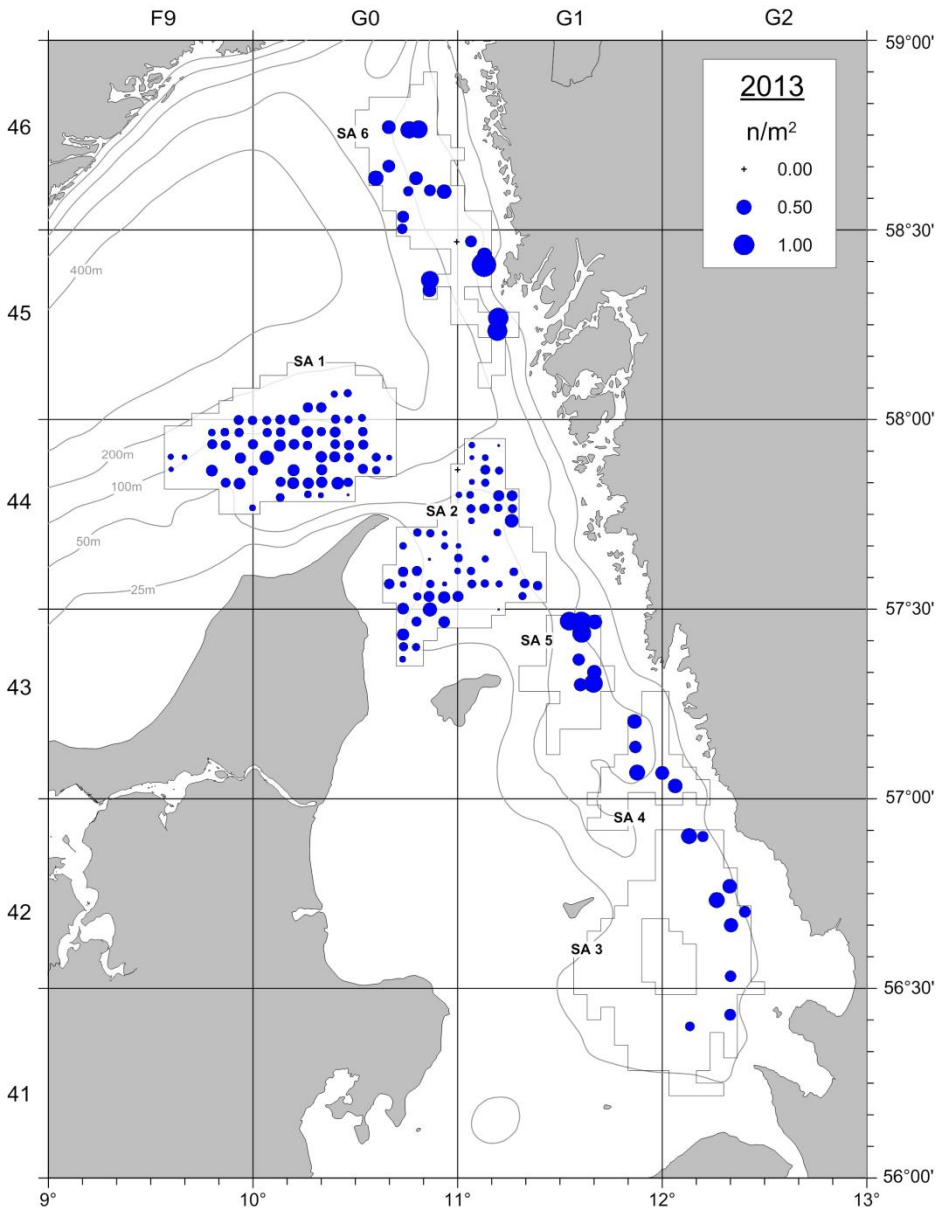
The Swedish and Danish *Nephrops* fishery has got an increasing economic importance in recent years and it was agreed that Denmark and Sweden start a joint UWTV survey at around 90 stations on *Nephrops* grounds in the Skagerrak and Kattegat.

The UWTV survey during 2013

The 2013 UWTV survey started with equipment of a hydraulic controlled cable drum on aft deck and a hydraulic controlled ramp in the stern of the R/V Asterix. A ramp by the stern simplifies the handling of the sledge and made it even possible to conduct the survey with one person on deck.

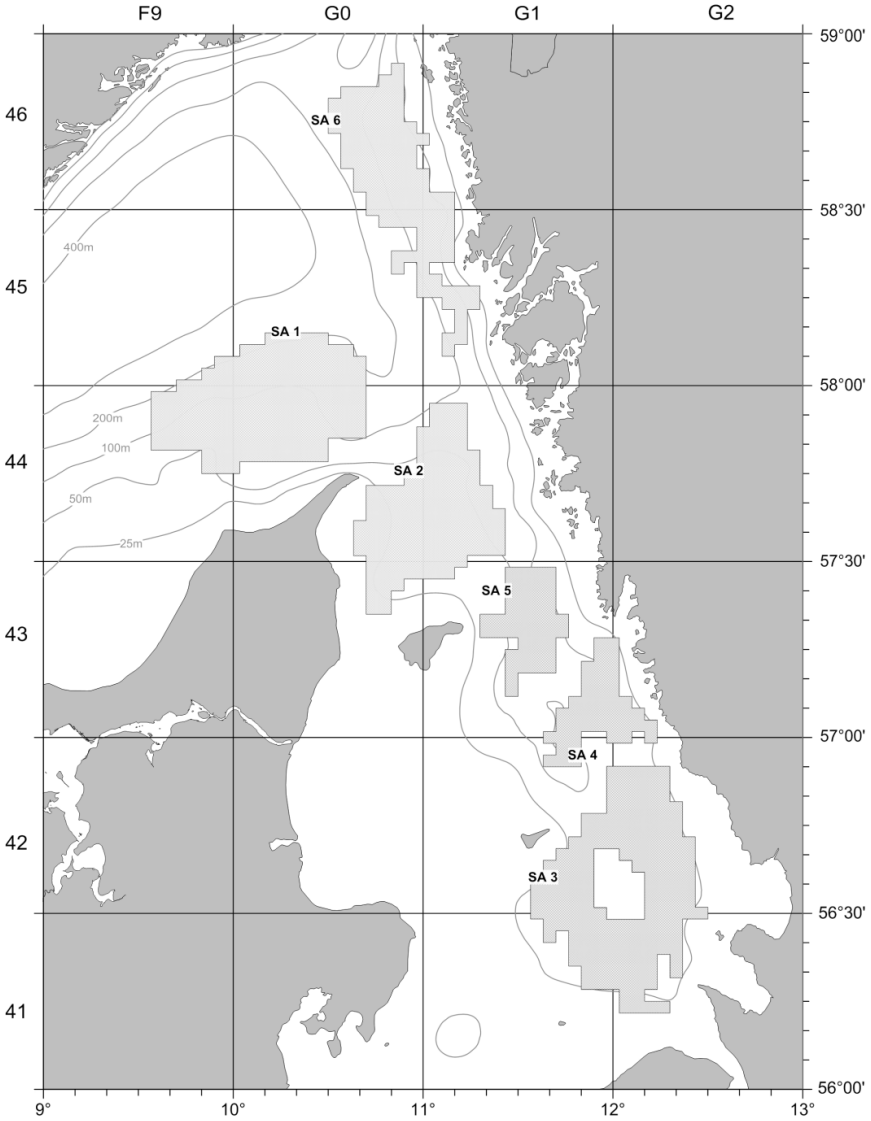
The 2013 TV survey was conducted during the period 3/6 – 28/6 using the Swedish sledge on the Swedish UWTV vessel and resulted in 40 valid hauls in IIIa (nine hauls in area 3, five in area 4, eight in area 5 and 18 hauls in area 6; table below and Map 7). Nine stations were on Danish waters after the permission to sample Danish waters ran out. Five stations were not sampled due to rocky bottoms, too much creels or other obstacles. Eleven out of total 15 days were not used due to bad weather/visibility conditions or reparations of equipment and the survey was carried out on only four days at sea.

Subarea	Area (km^2)	Number of valid sledge hauls (see Map 7)
1	3 079	
2	1 905	
3	2 462	9
4	676	5
5	670	8
6	1 289	18
IIIa	**10 081**	**40**



Map 7. Showing all visited sledge stations during 2013.

The distribution of the *Nephrops* stock in IIIa (Skagerrak and Kattegat) was estimated from Danish and Swedish VMS data from *Nephrops* trawler (>15 m) with landings consisting of at least 50% *Nephrops*. The *Nephrops* grounds in IIIa have been divided into six sub areas (SA) as shown in the map below (Map 8).



Map 8. The defined sub areas of the *Nephrops* stock in IIIa.

III.G.2 Data quality: results and deviation from NP proposal

Generally, the surveys are following the international manuals set up for the different surveys. These manuals therefore represent the state of the art for what it concerns the quality in the data collection and are annually updated during WGBIFS and IBTSWG, where Sweden is an active participant.

Sweden could not perform five stations (out of the 30 allocated) in the quarter 4 BITS survey 2013 because of the access prohibition to some areas by the Swedish Armed Forces to foreign vessels, as the Danish Dana. According to experts at SLU Aqua, this will likely not negatively affect the stock assessment for the Eastern Baltic cod stock. However, environmental monitoring and research could be negatively affected.

For the new UWTV survey deviation from the target of 90 hauls can be noted. Only four of the 15 days planned (40 of the 90 stations planned) were completed due to several reasons:

1) The cable to the sledge was broken and had to be shipped to Denmark for repairing (shortened).
2) The survey was understaffed (with short notice), resulting in postponement, which also resulted in the permission to visit Danish waters running out.
3) There were several periods of bad weather and wave conditions which resulted in a too jumpy sledge and extremely high turbidity and low visibility.

These reasons limited the possibility to reach the survey targets.

The quality of the *Nephrops* burrow counting is checked through exchange of *Nephrops* ground footage between countries and circulation of reference footage with different visibility, *Nephrops* density and burrowing species complexes. All institutes conducting UWTV-surveys are asked to use Linns CCC on station basis to check counter consistency.

III.G.3 Follow-up of regional and international recommendations

Source	Recommendation	Action
WGBIFS 2013	WGBIFS recommends that in 2014, Sweden will start participating to the BASS survey, covering at least the ICES Subdivision 27, and the issue is discussed during the RCM Baltic meeting in 2013	SWEDEN IS AWARE ABOUT THE NEEDS FOR PARTICIPATION IN THE BASS SURVEY. HOWEVER, SINCE IT IS NOT PLANNED IN THE SWEDISH NP 2014-2016 AND NO FUNDS IS IN PLACE SWEDEN NEED TO BRING THIS FORWARD IN TIME

~~Recommendations set up in the different survey working groups have been taken care of by the Swedish participants taken part in the meetings.~~

For the UWTV survey, a new yearly Working group on *Nephrops* Surveys (WGNEPS) has been established with Swedish participation to follow up of regional and international recommendations.

III.G.4 Actions to avoid shortfalls

Continuous discussion with the Swedish Armed Forces is ongoing at different levels to allow Sweden to complete all allocated trawl stations during the forthcoming BITS surveys.

The shortfalls in the UWTV survey in 2013 have been taken into account for 2014 in order to:

1) Use of a different cable tackle to avoid squeezing the cable in rough weather conditions.
2) The application to visit Danish waters has been extended to the period of May to August.
3) Weather conditions are usually (with exception for 2013) suitable for weather sensitive surveys during May to July.

IV Module of the evaluation of the economic situation of the aquaculture and processing industry

IV.A Collection of economic data concerning the aquaculture

IV.A.1 Achievements: results and deviation from NP proposal

The aquaculture population is presented in table IV.A.1, the planned sampling scheme and the results in table IV.A.2 and the results for individual variables in table IV.A.3.

Economic data for the reference year 2012 was collected and compiled by Statistics Sweden in cooperation with the Swedish Board of Agriculture and SwAM in 2014. Three sources of information were used:

(i) Income tax declarations (census data).
(ii) Questionnaire (Q1) sent to every aquaculture farm unit (census data).
(iii) Questionnaire (Q2) sent to a non-probability sample of 46 aquaculture enterprises. The survey was carried out in year 2008 and the results were reused for the reference years 2009 to 2012 (see section IV.A.2 for a description of possible shortfalls for the reference years 2009 to 2012 and actions undertaken to ensure good quality of data in forthcoming data collection).

All three parts were implemented and compiled by Statistics Sweden in 2014.

Reported segments- confidentiality

The planned segmentation, as presented in the NP 2008 and 2009, was made before the declaration of the Council Regulation (EC) No 199/2008 of 25 February 2008 and the Commission Decision of 6 November 2008. Therefore the final segmentation presented in the Technical Report 2010 and after is different from the one proposed in the NP 2009 - 2010. Moreover, due to confidentiality reasons some of the segments had to be merged into clusters. For example, the segment for salmon had to be merged with trout because the numbers of enterprises in the salmon segment were too few to be presented separately. In a similar way, mussels and oysters had to be merged due to confidentiality reasons.[1] The final clustering of segments is presented in the table below.

[1] The segment other shellfish (crayfish) as proposed in the National program was not included for reference year 2008 and 2009 but added for reference year 2010 and following years. For 2008 and 2009 it was not possible to give any reliable estimation on crayfish due to a non-updated register on crayfish farms.

Reported segment	No. of enterprises 2012	Farming technique/Species
Land based farms, on growing and combined (Salmon and Brown trout)	7	Land based farms, on growing (Salmon)
		Land based farms, combined (Salmon)
		Land based farms, on growing (Brown trout)
		Land based farms, combined (Brown trout)
Land based farms, on growing, other freshwater fish (Rainbow trout, Arctic char, Eel and other freshwater fish)	55	Land based farms, on growing (Arctic char)
		Land based farms, on growing (Eel)
		Land based farms, on growing (other freshwater fish)
		Land based farms, on growing (Rainbow trout)
Land based farms - Combined – Other freshwater fish (Rainbow trout)	11	Land based farms, combined (Arctic char)
		Land based farms, combined (other fresh water fish)
		Land based farms, combined (Rainbow trout)
		Hatcheries and nurseries (other fresh water fish)
Cages (Salmon and Brown trout)	7	Cages (Salmon)
		Cages (Brown Trout)
Cages, other freshwater fish (Rainbow trout and Arctic char)	39	Cages (Rainbow Trout)
		Cages (Arctic char)
Shellfish and farming techniques, long line (mussels and oysters)	4	Shellfish farming techniques , long line (mussels)
		Shellfish farming techniques , other (oysters)
Shellfish farming techniques, other technique, other shellfish (crayfish)	24	Shellfish farming techniques, other technique other shellfish (crayfish)

IV.A.2 Data quality: results and deviation from NP proposal

The planned sample is presented as a range in table IV.A.2. The second figure refers to census data (A) from both income tax declarations, administrative records and a questionnaire (Q1), sent to all aquaculture farmers. The first figure refers to a non-probability sample survey (C) by means of questionnaire (Q2).

Questionnaire Q1

The questionnaire (Q1) is sent out to all aquaculture farm units and farm units are clustered into enterprises. For each enterprise, the value of sales from Q1 is compared to income as reported in the income tax declarations. Enterprises that have more than 75 per cent of their income from aquaculture (income from tax declarations/sales value from Q1) are considered to have their *primary activity* in aquaculture. These enterprises represents the population for questionnaire Q2 (the cost allocation key survey), derived from income tax declarations combined with Q2, for all aquaculture activity in Sweden. By comparing the value of sales from Q1, which covers all aquaculture activity in Sweden, with income in tax declarations for the enterprises with aquaculture as their primary activity we obtain a figure, used to scale-up relevant variables. Using this method, variables can be assumed representative of all aquaculture activity in Sweden and comprise the same allocation between variables as for enterprises with aquaculture as their primary activity.

Questionnaire Q2

The primarily objective of Q2 is to create a cost allocation key for costs that are not specified in income tax declarations. The sample for the second questionnaire (Q2) is a non-probability sample based on a priori information that comes from questionnaire Q1 and income tax declarations, as described above. As a result, it could not be planned before the income tax declarations and the results of the first questionnaire (Q1, covering every farming unit) were compiled. Based on the results of the census data, Statistics Sweden selected a representative number of enterprises from each segment (clustered sample) for the second questionnaire (Q2). In order to ensure representativeness in terms of corporate size, structure and farming technique, Statistics Sweden decided on the appropriate sampling method and sample size for Q2. The survey (Q2) was undertaken in 2008. The population represents all active aquaculture enterprises in 2008 that have aquaculture as their primary activity and the sample for the questionnaire (Q2) represents 46 of these enterprises. The survey had a response rate of 65 per cent.

Possible shortfalls

Possible shortfalls in the methodology are primarily linked to Q2 and the reuse of the cost allocation key obtained in 2008 for the reference years 2009 to 2012. Moreover, data on crayfish enterprises under data collection scheme C in table IV.A.3, for reference year 2010 is estimated using the created cost allocation key for mussel companies. The likelihood of variability in cost allocations was, however, judged as relatively small considering the time span and presumed to have minor effects on the quality of data. To ensure high quality of data and to make it more practical for the respondents Q2 will be undertaken on a yearly basis and merged within the new program period. The improvements in the methodology also imply that separate cost allocation keys can be estimated for crayfish enterprises.

IV.A.3 Follow-up of regional and international recommendations

Sweden has undertaken the required actions to meet the general recommendations made at STECF Working Groups on Collection of Economic Data (EWG-11-14 and EWG 12-13).

IV.A.4 Actions to avoid shortfalls

- The methods used to collect the data for the reference year 2008 to 2012 are consistent and ensure full comparability.
- The questionnaire Q2 will be sent out on a yearly basis and merged with Q1 in the new program period to ensure good quality of data. This does not affect consistency or comparability of data.
- A population has been established by Statistics Sweden that accounts for yearly changes of new enterprises entering aquaculture production and others ending their production, causing natural changes in the population.
- Crayfish producers are not part of the population of 2008 and we still need to establish the correct number of farming units in order to cluster them into enterprises. The Swedish Board of Agriculture and SwAM have been working on this task and were able to include crayfish farming for the reference years 2009 to 2012. Crayfish enterprises will also be included in forthcoming data collection.

IV.B Collection of data concerning the processing industry

IV.B.1 Achievements: results and deviation from NP proposal

The planned sampling scheme and the results are presented in table IV.B.1 and results for individual variables are presented in table IV.B.2.

Data was collected and processed by Statistics Sweden through the SRU register which is maintained by Statistics Sweden and consists of income tax declarations in Sweden. Part of the data is also collected from the Statistical Business Register which is a central register consisting of information on all registered enterprises in Sweden. It is also maintained by Statistics Sweden. Data on two variables (energy costs and subsidies) were collected from answers from a questionnaires sent out by Statistics Sweden based on PPS-selection in the Statistical Business Register. The variables collected through questionnaires were energy costs and subsidies. The questionnaires are the base for estimating an allocation key for variables not included in the financial accounts. The questionnaire was sent to 12 firms out of which 11 firms responded. The frame population has 219 companies and Statistics Sweden ensures representativeness in terms of firm size and structure and decides on the appropriate sampling method and sample size for the questionnaire. The total sum of costs and total sum of income is unaffected according to Statistics Sweden. The data still holds for calculations such as gross value added and return on investment.

All data is collected, estimated and checked by Statistics Sweden which ensures the consistency of the final data.

The achieved sample rate is 100 % for variables collected through company/financial accounts by Statistics Sweden and 5 % for subsides collected by questionnaires by Statistics Sweden.

IV.B.2 Data quality: results and deviation from NP proposal

No shortfalls or deviations exist in relation to what was stated in the NP.

All data is collected, estimated and checked by Statistics Sweden which ensures the consistency of the final data. The achieved sample rate and respond rate is 100 % for variables collected through financial accounts by Statistics Sweden. Corresponding for subsides obtained from questionnaires the achieved sample rate is 5 % and the response rate 92 %. Comprehensive validations were made during the compilation of the data and figures were cross checked with other data sources when possible by Statistics Sweden.

A possible shortfall is that although data is collected, processed and ensured by Statistics Sweden, some variables are not available through financial accounts. The variables affected by this possible shortfall are subsidies and energy costs. The reason for this is that those variables were solely collected through questionnaires and there is a certain range of uncertainty of these variables and it is also difficult to control if they are correct.

IV.B.3 Follow-up of regional and international recommendations

No related recommendations have been made about the collection of economic data on the processing industry.

IV.B.4 Actions to avoid shortfalls

All data is collected, estimated and checked by Statistics Sweden which ensures the consistency of the final data. Moreover, in data collection from 2009 and onward the fish processing industry is a separate stratum, implying that the questionnaire to estimate subsidies and energy costs in 2011 has been sent out to 12 enterprises. The response rate was 92 %.

There are some shortfalls when it comes to subsidies, but it is not a good solution to obtain subsidies from the administrative records. The reason is that we are using Statistic Sweden’s standardized method to obtain the financial information for the processing industry and we do not see that we have any option to change this method. If the method was changed, the time series would be broken and we would lose comparability over the years.

V Module of evaluation of the effects of the fishing sector on the marine ecosystem

V.1 Achievements: results and deviation from NP proposal

In 2013 the data requirements for the indicators 1-4 proposed in the Commission Decision 2010/93/EC Appendix XIII was realized through the annual surveys. The data was collected in area IIIa in the first and third quarters and in area IIId in the first and fourth quarters 2013. The data collection was fishery independent and was carried out by the research vessel DANA using standard gear, thereby fulfilling the required precision level. The surveys are described in section III.G.1. Data on species, length frequencies and abundance was collected from all hauls including individual parameters such as age, length, sex and maturity from the target species of the survey following the sampling levels established in the manuals for the respective survey.

The economic indicator fuel efficiency of fish capture uses the variable cost of fuels as input. The collection is described in section III.B Economic variables. The survey conducted by the SwAM is exhaustive.

SwAM is collecting VMS and logbook information. SLU Aqua has access to the data upon request, but not online access.

In Sweden, VMS positions are reported once every hour for boats of 15m length or longer. Data can be aggregated at metier level 6 for environmental indicators 4, 5 and 6 and processed accordingly. The data are sent to SLU Aqua upon request and is not accessible online.

No shortfalls regarding the data collected.

V.2 Actions to avoid shortfalls

No action taken since there was no shortfalls in sampling.

VI Module for management and use of the data

VI.1 Achievements: results and deviation from NP proposal

The transmission of Swedish data to the different ICES working groups, EU expert groups and data calls are listed in table VI.1.

The development of databases during 2013 includes projects for the Fish sample database at SLU Aqua and projects for the data collection of economic and transversal data at the SwAM.
In order to decrease costs for licences and to streamline the databases used within SLU Aqua, the Fish sample database has to be upgraded from ADF 10 to ADF 1 before any further major development is taken place. This work has caused a lot of problems and man power during 2013. Therefore only minor development of reports and data entry routines has been possible to be launched.
However, the database is used for registration, storage, quality checking and with reporting functions for delivery of data to all data calls.

For the data collection of economic data the project to modernize and rebuild the existing systems including data entry and reporting continued. The development phases during 2013 covered:

Processing industry

- The responsibility for holding the primary data has been moved to another authority, The Swedish Board of Agriculture, during the autumn.

Aquaculture industry

- The responsibility for holding the primary data has been moved to another authority, The Swedish Board of Agriculture, during the autumn.

Fishing sector

- The development of the data entry routines has been finished during the year.
- Due to capacity shortage the development of the data warehouse has not proceeded as planned. The plan for 2014 includes further development of the data warehouse.

For the data collection of transversal data the project to modernize and rebuild the existing systems including data entry and reporting continued. The development phase during 2013 covered:

- Continued work with the design phase of the project. Additional design work is needed, but an incremental development of the system is ongoing.

The development of the systems has not proceeded as planned during 2013, mainly depending of capacity problem in the business staff. Key persons are involved in many different projects, related to the control reform and the new Common Fisheries Policy (CFP).

VI.2 Actions to avoid shortfalls

As a consequence of the migration of the Fish sample database in 2012, new expertise has to be trained within SLU. This was still not settled which caused a higher amount of time needed from IT consultants.

VII. Follow-up of STECF recommendations

The list of STECF EWG general recommendations has been considered regarding the recommendations relevant to MS.

Source	Recommendation to MS	MS action
STECF-EWG 13-14 Evaluation of MS Technical Report 2012	***All suggested corrections by chapters were listed in a separate table in the report. One of the tables deals with Sweden. Outstanding issues were sent to Sweden for further comments.***	SWEDEN ANSWERED ALL THE COMMENTS MADE ON THE AR 2012 AND SENT TO THE COMMISSION
STECF-EWG 12-08 2011 DCF AR Evaluation	***Economic variables*** ****Concerning table III.B.2 – should contain clustered segments*** ****Concerning table III.B.3- if a variable not applicable – should not be left blank, but marked "NA" in the table***	DONE
STECF-EWG 12-08 2011 DCF AR Evaluation	***Biological metier/ stock related variables*** ****Sampling frame code in table III.C.3 and III.C.4 corresponds*** **** Planned number of trips in NP and AR should match*** **** Definitions in accordance with 93/2010 (naming of metiers, fishing grounds, regions etc. should be followed***	DONE
STECF-EWG 12-08 2011 DCF AR Evaluation	***Transversal variables*** ****Table III.F.1 should be completed, also for censuses***	DONE
STECF-EWG 12-08 2011 DCF AR Evaluation	***Collection of data concerning aquaculture*** ****In table IV.A.1 farmed species should be specified***	DONE
STECF-EWG 12-08 2011 DCF AR Evaluation	***Collection of economic data, aquaculture and fleet*** ****If numbers of population segments in table III.B.1, IV.A.2 and IV.B.1 have been updated, it should be mentioned in the AR***	DONE
STECF-EWG 12-08 2011 DCF AR Evaluation	***General issues*** ****CV should be calculated and presented.***	METHODOLOGY FOR CV IS DESCRIBED IN III.E.2 AND R-SCRIPT USED FOR CV CALCULATIONS IN ANNEX II.
STECF EWG 11-19 DCF – Assessment of 2012 (NP)	***all MS to include a summary page giving a brief overview of the main revision made to the NP***	DONE
STECF- EWG 12-01 Review of proposed DCF 2014-2020 part 1	***Member States to set up at national or regional level, a system to encourage cooperation between control authorities and the National Programmes of the DCF. The cooperation system should address all issues of relevance for the collection and processing of data to be collected under the CR and the DCF***	IN DECEMBER 2013 SWEDEN ARRANGED A WORKSHOP AIMING TO INCREASE THE KNOWLEDGE AND TO ACHIEVE A MORE EFFICIENT DATA FLOW AND BETTER COOPERATION BETWEEN THE

		DCF PARTNERS. ONE OF THE OUTCOMES WAS TO SET UP AN OPERATIVE DATA MANAGEMENT GROUP, A FORUM TO INVOLVE KEY PERSONS TO DEAL WITH THE SEPARATE ISSUES. NO ACTION ON THE SPECIFIC ISSUE ON CR VS DC-MAP HAS BEEN TAKEN SINCE THE DC-MAP IS NOT IN PLACE.
STECF- EWG 12-01 Review of proposed DCF 2014-2020	***MS scientists to get access to online data from VMS and logbooks, as well as to data collected under the Control Regulation etc.***	IN DECEMBER 2013 SWEDEN ARRANGED A WORKSHOP AIMING TO INCREASE THE KNOWLEDGE AND TO ACHIEVE A MORE EFFICIENT DATA FLOW AND BETTER COOPERATION BETWEEN THE DCF PARTNERS. ONE OF THE OUTCOMES WAS TO SET UP AN OPERATIVE DATA MANAGEMENT GROUP, A FORUM TO INVOLVE KEY PERSONS TO DEAL WITH THE SEPARATE ISSUES. NO ACTION ON THE SPECIFIC ISSUE ON CR VS DC-MAP HAS BEEN TAKEN SINCE THE DC-MAP IS NOT IN PLACE.

VIII List of acronyms and abbreviations

Acronym/ Abbreviation	Explanation
ACOM	Advisory Committee
BIAS	Baltic International Acoustic Survey
BITS	Baltic International Trawl Survey
COST	Common Open Source Tool (software package for precision calculations)
CPUE	Catch per unit effort
CTD	Conductivity-Temperature-Depth probe
DATRAS	Database for trawl surveys
DCF	Data Collection Framework
DCR	Data Collection Regulation
EU	European Union
FTE	Full time employment
Funct.	Functional
FYK	Fish traps
GNS	Set nets/Gill nets
gt	Gross Tonnage
HAWG	ICES Herring Assessment Working Group
HELCOM	Helsinki Commission
IBTS	International Bottom Trawl Survey
IBTSWG	ICES International Bottom Trawl Survey Working Group
ICES	International Council for the Exploration of the Sea
ICR	Institute of Coastal Research
IFR	Institute of Freshwater Research
IMR	Institute of Marine Research
JRC	Joint Research Centre
kW	Kilowatt
LOA	Length overall
NA	Not applicable
NIPAG	The joint NAFO/ ICES Pandalus Working Group
NP	National Programme
OTB	Otter trawl bottom
OTM	Otter trawl midwater
PGCCDBS	ICES Planning Group on Commercial Catch, Discards and Biological Sampling
PTB	Two ship trawl bottom
PTM	Two ship trawl midwater
RCM	Regional Co-ordinating meeting
RCM Baltic	Regional Co-ordination Meeting for Baltic Sea
RCM NS & EA	Regional Co-ordination Meeting for North Sea and Eastern Arctic
SERS	Database for electrofishing
SLU	Swedish University of Agricultural Sciences
STECF	Scientific, Technical and Economic Committee for Fisheries

SwAM	Swedish Agency for Marine and Water Management
UK	United Kingdom
VMS	Vessel Monitoring System
WG	Working Group
WGBAST	ICES Baltic Salmon and Trout Assessment Working Group
WGECO	ICES Working Group on Ecosystem Effects of Fishing Activities
WGEEL	ICES Working Group on Eels
WGBFAS	ICES Baltic Fisheries Assessment Working Group
WGBIFS	ICES Baltic International Fish Survey Working Group
WGFAST	ICES Working Group on Fisheries Acoustic Science & Technology
WGNSSK	ICES Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak
WKCOST	ICES Workshop on implementation of the Common Open Source Tool (COST)

IX Comments, suggestions and reflections

In the guidelines for AR 2013 section "standard tables" it is stated that No cells should be deleted from the tables and no columns should be added. However, in table C.III.5 the column "precision (CV achieved on the volume of discard)" is missing in the table while it´s is included in the guidelines "description of fields in table III.C.5". Since the instructions were unclear, Sweden put in the calculated values and added an extra column in table III.C.5, column "U".

X References

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XI Annexes

Annex I

Protocol from the National Coordination meeting 6/11/2013

Background

In accordance with Commission Regulation ((EC) No 665/2008 article 3.2) a National Coordination meeting was held 6/11/2013 at the Swedish Agency for Marine and Water Management, Gothenburg. The European Commission was invited to participate to the meeting.

Meeting participants

Swedish Agency for Marine and Water Management:

Anna Jöborn, *Director of Science Affairs Department*

Bertil Håkansson, *Head of Division for Environmental Monitoring*

Mats Svensson, *Head of Division for Research and Environmental Objectives*

Anna Hasslow, *Analyst, Division for Environmental Monitoring*

Andreas Sundelöf, *Analyst, Division for Research and Environmental Objectives*

Mathias Lööw, *Analyst, Finance and Accounting Division*

Department of Aquatic Resources at the Swedish University of Agriculture Sciences:

Maria Hansson, *National Correspondent, Head of Division for Data collection and biological analyses*
Katja Ringdahl, *Head of Division for Environmental and management effects*
Johan Östergren, *Research Group Leader, Diadromous species*

Swedish Board of Agriculture:

Jörgen Fransson, *Head of Rural Analysis Division*

1. Introduction, aim of the group (Bertil Håkansson)
Presentations of meeting participants and information of the aim of the meeting.

2. Update of progress in DC-MAP (Maria Hansson, Katja Ringdahl)
Maria highlighted imported rights and obligations according to the current DCF. The need to improve possibilities for on board sampling was discussed.
Katja presented the progress in DC-MAP and pointed out e.g. implications for discard.

3. Suggestions for application procedures in EMFF (Anna Hasslow)

Anna presented present suggestions for applications procedures in EMFF. Discussions will further be taken with the Swedish Board of Agriculture in this matter.

4. NC- 2014 – routines, cooperation (Bertil Håkansson/Anna Jöborn, Anna Hasslow, Maria Hansson)

Bertil presented the request to move the National Correspondent-ship to the Swedish Agency for Marine and Water Management. Anna Hasslow is suggested to be the Swedish National Correspondent from 1/1/2104.

5. Summary (Bertil Håkansson)

Bertil summarized the meeting.

6. Next meeting

Next meeting was suggested to be during spring 2014.

Annex II

R scripts for calculating precision (CVs)

Introduction to estimation of precision (mCV) using the bootstrap method

One statistically way of estimating dispersion of a variable or a parameter is to make bootstrap samples of the original data (Efron & Tibshirani 1993). While waiting for the standard tool (COST) for analysing precision, Sweden has calculated mean CV (mCV) in the stock sampling in the NP of DCR and DCF using a bootstrap method. The results from the analyses have been used to adjust the sampling size as well as to improve and optimise the sampling scheme.

Starting year 2010, the mCV calculations in the stock sampling (species below) were performed in "R" (using our own written scripts). Also starting 2010, estimation of mCV in metier/fisheries sampling (length compositions in the coastal fisheries below) was performed in "R". Information regarding "R", see http://www.r-project.org/ .

R script for Estimation of precision (mCV) for length compositions in Coastal metiers/Fisheries Table III.C.5

DCF_length 1.7

```
#R-script för precisionsberäkningar av längdfördelning per fiskeri
#Örjan Östman 8 mars 2012, Kustlaboratoriet, SLU, Öregrund.
#orjan.ostman@ebc.uu.se

#Tar bort gamla variabler (OBS! Viktig)
rm(list=ls())

#Antal Bootstrap-körningar
T<-100

#Differensen mellan Längdklass i mm alt. cm och klassmitt.Obs! Kom-i-håg att använda "." om decimaltal!
Klassmitt<-0

#Txt-fil "L_Dist.txt" med slumpvis längdfördelning, K: 1-Längdklass (mm) 2-Antal
#Inga Headings. Inga tomma celler, Missing values ej tillåtna, men '0' går bra
Dist<-read.table("ELE_SD22-32.txt")



# Species, FG (Fishing ground), U_L_D (Unsorted_Landed_Discard), Other.
# Skriv in vilken kombination av art (species) samt FG (Fishing ground) det gäller,
# "U_L_D" notera här vad som ingår osorterat (U) eller landat (L) respektive discard (D).
# I Other - skriv i här om det t.ex. delas upp på ytterligare sätt.
```

```
# Notera att det måste stå ' runt dem, försök att använda korta beteckningar! För Species använd MAF-kod ex. 'GGG':
Species<-'XXX'
FG<-'X'
U_L_D<-'X'    #If Unsorted 'U', if Discard 'D', if Landings 'L'
Other<-''
Data<-c(Species, FG, U_L_D, Other)


#Här börjar själva beräkningar
ptm <- proc.time()
Dist<-Dist[ do.call(order, Dist) ,] #Sorterar längder i slumpprov
LengthSl<-Dist[,1]              #Längdklasser i slumpprov
LC<-length(LengthSl)            #Antal längdklasser i slumpprov
Kolumn<-length(Dist[1,])        #Antal Kolumner, ska vara 2

#Skapa relativa längdfördelningar
Sum_slump<-sum(Dist[,2]) #Antal individer i prov
LD_slump<-Dist[1,2]/Sum_slump #Andel ind i minsta längdklasser i slumpprov

#Andel ind i varje längdklass i slump respektive stratifierat prov
for (i in 2:LC) {
                LD_slump[i]<-Dist[i,2]/Sum_slump
                }

#Kumulativ sannolikhet
Dist[1,Kolumn+1]<-LD_slump[1]
for (i in 2:LC)  {
   Dist[i,Kolumn+1]<-LD_slump[i]+Dist[i-1,Kolumn+1]
                }
#Skapa tomma matriser
MedelL<-matrix(nrow=T, ncol=1)
Urval<-matrix(nrow=Sum_slump, ncol=1)
Urval<-data.frame(Urval)

#Bootstrap börjar
for (t in 1:T)  {
   #Plocka ut slumpvist lika många individer från prov med viktad längdfördelning
   for (i in 1:Sum_slump)  {
      s<-runif(1)
                                d<-data.frame(Dist)
                                dd<-d[d$V3>s,1]
                                Urval[i,1]=dd[1]
                                        }

   Urval=Urval+Klassmitt #Korrigera längdklass till klassmitt

                MedelL[t]<-mean(Urval) #Medellängd
```

```
}                #Bootstrap slutar

mLength<-mean(MedelL)
mLength<-round(mLength, digits=3)
CV_L<-100*(sqrt(var(MedelL))/mLength)
CV_L<-round(CV_L, digits=3)

(proc.time()-ptm)/60

N<-Sum_slump
Variable<-c('Species','FG','U_L_','Other','N','mCV_Length_Proc', 'mLength')
Out1<-c(Data,N, CV_L, mLength)
Out<-rbind(Variable, Out1)
Out
```

R script for estimation of CV for weight, length, sex-ratio, maturity at age based on random samples (Table III.E.3)

```
#DCF_individ 1.5

#R-script för precisionsberäkningar av vikt/längd/Könsfördelning/Könsmognad
#för åldersprov med slumpvisa längdfördelningar.
#Örjan Östman 1 april 2011, Fiskeriverket, Kustlaboratorium, Öregrund.
#orjan.ostman@fiskeriverket.se

#Tar bort gamla variabler (OBS! Viktig)
rm(list=ls())

#Antal Bootstrap-körningar
T<-5

#Txt-fil "Individ.txt" med individprover från slumpvisa längdfördelningen, K: 1-Längdklass (mm) 2-
Vikt (g) 3-Ålder 4-Kön (1=hona, 0=hane) 5-Könsmogen (0=nej, 1=ja)
#Inga Headings. Inga tomma celler, Missing values måste vara ifyllda 'NA'
Strata<-read.table("Cod.txt")

#Species, SD, Q, Gear, Sex, Other. Skriv in vilken art (Species), SD, kvartal (Q), redskap (Gear), kön
(Sex), och om det är någon annan uppdelning (tex fiskare). Notera att det måste stå ' runt dem, försök
att använda korta beteckningar, tex 'FLE'. Använd vedertagna koder (DCF/LVL4 alt. MAF) ex. för
redskap (OTB) eller art (FLE):
Species<-'FLE'
SD<-'25'
Q<-'1'
Gear<-'OTB'
Sex<-'NA'
Other<-'No'
```

```
Data<-c(Species, SD, Q, Gear, Sex, Other)

#Här börjar själva beräkningar
ptm <- proc.time()
LengthSt<-sort(Strata[,1])  #Sorterar längder
n<-length(Strata[,1])        #Antal fiskar
Kolumn<-length(Strata[1,])   #Antal Kolumner, ska vara 5

Age<-Strata[,3]              #Åldersklasser i individprov
AgeS<-sort(Age)              #Sorterar åldersklasser
AgeC<-c(AgeS[1]:AgeS[n]) #Vektor med yngsta till äldsta åldersklass i stratifierat prov i steg om 1
AC=length(AgeC)              #Antal åldersklasser i AgeC

#Antal individer per åldersklass i åldersläst prov
nAge<-length(AgeS[AgeS<AgeC[2]])
AA<-AC-1
for (i in 2:AA) {
                             AntSum<-sum(nAge)
                             nAge[i]<-length(AgeS[AgeS<AgeC[i+1]])-AntSum
                                          }
AntSum<-sum(nAge)
nAge[AC]=n-AntSum

Strata[,Kolumn+1]<-1/n #Sannolikeheten att plocka ut varje individ, lika för alla

#Kumulativ sannolikhet
Strata[1,Kolumn+2]<-Strata[1,Kolumn+1]
for (i in 2:length(Strata[,1]))  {
   Strata[i,Kolumn+2]<-Strata[i,Kolumn+1]+Strata[i-1,Kolumn+2]
                }

#Skapa tomma matriser
MedelAge<-matrix(nrow=T, ncol=1)
MedelW<-matrix(nrow=T, ncol=AC)
MedelL<-matrix(nrow=T, ncol=AC)
MedelSex<-matrix(nrow=T, ncol=AC)
MedelMat<-matrix(nrow=T, ncol=AC)
AndelAge<-matrix(nrow=T, ncol=AC)
Urval<-matrix(nrow=n, ncol=Kolumn)
Urval<-data.frame(Urval)

#Bootstrap börjar
for (t in 1:T)  {
   #Plocka slumpvist ut lika många individer som totalt i provet
   for (i in 1:n)  {
      s<-runif(1)
                             d<-data.frame(Strata)
                             dd<-d[d$V7>s,]
```

```
                    Urval[i,]=dd[1,1:Kolumn]
                                }

        Age<-Urval[,3]          #Ålder av slumpvist utvalda individer
        MedelAge[t]<-mean(Urval[,3], na.rm=TRUE)        #Medelålder
        o<-order(Age)
        Urval<-rbind(Urval[o,])     #Sortera slumpvist utvalda i åldersordnin

        #Medel per Age classes
        Medel<-matrix(nrow=AC, ncol=5) #Skapa tom matris
        Atemp<-findInterval(AgeC[1], Urval[,3]) #Hitta antal av yngsta åldern
        if (Atemp>0) Medel[1,]<-mean(Urval[1:Atemp,], na.rm=TRUE)

        #Medel av längd, vikt, kön, mognad av yngsta åldern
        AntalAge<-Atemp         #Antal av yngsta ålder

        #Medel och antal för alla andra åldrar
        if (AC>1) for (i in 2:AC) {
    Atemp[i]<-findInterval(AgeC[i], Urval[,3])
    if (Atemp[i]>Atemp[i-1]) Medel[i,]=mean(Urval[(Atemp[i-1]+1):(Atemp[i]),], na.rm=TRUE)
      AntalAge[i]<-Atemp[i]-Atemp[i-1]
                    }

        #Räkna ut medel för varje åldersklass för detta bootstrapsteg
  MedelL[t,1:AC]=Medel[,1]
  MedelW[t,1:AC]=Medel[,2]
  MedelSex[t,1:AC]=Medel[,4]
  MedelMat[t,1:AC]=Medel[,5]
  AndelAge[t,1:AC]=AntalAge/n;
}           #Bootstrap slutar

#Medel och mCV av ålder i hela populationen från alla bootstrap-körningar
mA<-mean(MedelAge)
CV_A<-sqrt(var(MedelAge))/mA
mAC<-colMeans(AndelAge, na.rm=TRUE)

#Ta bort åldrar utan observationer
ii<-0
fi<-NA
for (i in 1:AC) {if (mAC[i]>0) ii=ii+1
                    if (mAC[i]>0) fi[ii]=i
                    }


  MedelW<-data.matrix(MedelW[,fi])
  MedelL<-data.matrix(MedelL[,fi])
  MedelSex<-data.matrix(MedelSex[,fi])
  MedelMat<-data.matrix(MedelMat[,fi])
```

```
   AndelAge<-data.matrix(AndelAge[,fi])
   mAC<-mAC[fi]
   AgeC<-AgeC[fi]
   nAge<-nAge[fi]
   AC<-length(AgeC)

#Skapa tomma vektorer
mW<-NA
CV_W<-NA
mL<-NA
CV_L<-NA
mSex<-NA
CV_Sex<-NA
mMat<-NA
CV_Mat<-NA
CV_AC<-NA

#Medel & mCV av längd, vikt, samt medel och SD av kön, mognad i hela populationen från alla
bootstrap-körningar
for (i in 1:AC) {
   ff<-order(MedelW[,i], na.last=NA)
   CV_AC[i]=sqrt(var(AndelAge[ff,i]))/mAC[i]
   mW[i]=mean(MedelW[ff,i])
   CV_W[i]=sqrt(var(MedelW[ff,i]))/mW[i]
   mL[i]=mean(MedelL[ff,i])
   CV_L[i]=sqrt(var(MedelL[ff,i]))/mL[i];
   mSex[i]=mean(MedelSex[ff,i])
   CV_Sex[i]=sqrt(var(MedelSex[ff,i]))
   mMat[i]=mean(MedelMat[ff,i]);
   CV_Mat[i]=sqrt(var(MedelMat[ff,i]))
                }

(proc.time()-ptm)/60

mAndelAge<-colMeans(AndelAge)          #Genomsnittlig åldersfördelning
CVvikt=sum(CV_W*mAndelAge)*100         #Viktad precision vikt
CVvikt=round(CVvikt, digits=3)
CVlangd=sum(CV_L*mAndelAge)*100        #Viktad precision längd
CVlangd=round(CVlangd, digits=3)
CVsex=sum(CV_Sex*mAndelAge)*100        #Viktad SD kön
CVsex=round(CVsex, digits=3)
CVmat=sum(CV_Mat*mAndelAge)*100        #Viktad SD mognad
CVmat=round(CVmat, digits=3)
CV_A=round(CV_A, digits=3)

Variable<-c('Species', 'SD', 'Q', 'Gear', 'Sex', 'Other', 'N','Weigth','Length', 'Sex','Mat', 'Age')
CV<-c(Data,n, CVvikt, CVlangd, CVsex, CVmat, CV_A)
```

```
#Utdata precision viktat medel
CV<-rbind(Variable, CV)
CV

CV_W=round(CV_W*100, digits=3)
CV_L=round(CV_L*100, digits=3)
CV_Sex=round(CV_Sex*100, digits=3)
CV_Mat=round(CV_Mat*100, digits=3)
CV_AC=round(CV_AC*100, digits=3)

#Utdata per åldersklass
CVage<-rbind(Species, SD, Q, Gear, Sex, Other, AgeC, nAge, CV_W, CV_L, CV_Sex, CV_Mat,
CV_AC)
CVage<-aperm(CVage)
CVage #Precision per åldersklass

mW<-round(mW, digits=3)
mL<-round(mL, digits=3)
mSex<-round(mSex, digits=3)
mMat<-round(mMat, digits=3)
mAC<-round(mAC, digits=3)

Mage<-rbind(Species, SD, Q, Gear, Sex, Other, AgeC, nAge, mW, mL, mSex, mMat, mAC)
Mage<-aperm(Mage)
Mage            #Medel per åldersklass
```

R script for estimation of CV for weight, length, sex-ratio, maturity at age based on length stratified samples (Table III.E.3)

```
#DCF_strata 1.5

#R-script för precisionsberäkningar av vikt/längd/Könsfördelning/Könsmognad
#för stratifierade åldersprov med slumpvisa längdfördelningar.
#Örjan Östman 1 april 2011, Fiskeriverket, Kustlaboratorium, Öregrund.
#orjan.ostman@fiskeriverket.se

#Tar bort gamla variabler (OBS! Viktig)
rm(list=ls())

#Antal Bootstrap-körningar
T<-5

#Txt-fil "Slump.txt" med slumpvis längdfördelning, K: 1-Längdklass (mm) 2-Antal
#Inga Headings. Inga tomma celler, Missing values ej tillåtna, men '0' går bra
#Alla längdklasser i det stratifierade provet måste ha ett värde>0 i slumpprovet
Slump<-read.table("Slump.txt")
```

```
#Txt-fil "Strata.txt" med individprover från stratifierade längdfördelning, K: 1-Längd 2-Längdklass 3-Vikt (g) 4-Ålder 5-Kön (1=hona, 0=hane) 6-Könsmogen (0=nej, 1=ja)
#Inga Headings. Inga tomma celler, Missing values måste vara ifyllda 'NA'
Strata<-read.table("Strata.txt")

#Species, SD, Q, Gear, Sex, Other. Skriv in vilken art (Species), SD, kvartal (Q), redskap (Gear), kön (Sex), och om det är någon annan uppdelning (tex fiskare). Notera att det måste stå ' runt dem, försök att använda korta beteckningar, tex 'FLE'. Använd vedertagna koder (DCF/LVL4 alt. MAF) ex. för redskap (OTB) eller art (FLE):
Species<-'FLE'
SD<-'25'
Q<-'1'
Gear<-'OTB'
Sex<-'NA'
Other<-'No'
Data<-c(Species, SD, Q, Gear, Sex, Other)

#Här börjar själva beräkningar
ptm <- proc.time()
LengthSt<-sort(Strata[,2]) #Sorterar längder i stratifierat prov
n<-length(Strata[,1]) #Antal individlästa fiskar
Kolumn<-length(Strata[1,]) #Antal Kolumner, ska vara 6
Slump<-Slump[ do.call(order, Slump) ,] #Sorterar längder i slumpprov
LengthSl<-Slump[,1]          #Längdklasser i slumpprov
LC<-length(LengthSl)         #Antal längdklasser i slumpprov

Age<-Strata[,4]              #Åldersklasser i individprov
AgeS<-sort(Age)              #Sorterar åldersklasser
AgeC<-c(AgeS[1]:AgeS[n])     #Vektor med yngsta till äldsta åldersklass i stratifierat prov i steg om 1
AC=length(AgeC)              #Antal åldersklasser i AgeC

#Antal individer per åldersklass i åldersläst prov
nAge<-length(AgeS[AgeS<AgeC[2]])
AA<-AC-1
for (i in 2:AA) {
                        AntSum<-sum(nAge)
                        nAge[i]<-length(AgeS[AgeS<AgeC[i+1]])-AntSum
                                }
AntSum<-sum(nAge)
nAge[AC]=n-AntSum

#Skapa relativa längdfördelningar
Sum_slump<-sum(Slump[,2]) #Antal individer i slumpprov
Sum_strata<-length(LengthSt)          #Antal individlästa fiskar
LD_slump<-Slump[1,2]/Sum_slump #Andel ind i minsta längdklasser i slumpprov
LD_strata<-findInterval(Slump[1,1], LengthSt)/Sum_strata #Andel ind i minsta längdklasser i stratifierat prov

#Andel ind i varje längdklass i slump respektive stratifierat prov
for (i in 2:LC) {
        LD_slump[i]<-Slump[i,2]/Sum_slump
        LD_strata[i]<-(findInterval(Slump[i,1], LengthSt)-findInterval(Slump[i-1,1], LengthSt))/Sum_strata
```

```
                }

#Vikta individer från stratifierat prov med hur vanliga i slumpprov
for (i in 1:length(Strata[,2]))  {
   index<-findInterval(Strata[i,2], LengthSl)
   #Strata[i,Kolumn+1]=Strata[i,Kolumn+1]*LD_slump[index]
   Strata[i,Kolumn+1]=LD_slump[index]/(LD_strata[index]*n)
                }
#Kumulativ sannolikhet
Strata[1,Kolumn+2]<-Strata[1,Kolumn+1]
for (i in 2:length(Strata[,1]))  {
   Strata[i,Kolumn+2]<-Strata[i,Kolumn+1]+Strata[i-1,Kolumn+2]
                }
check<-sum(Strata[,Kolumn+1])
if (check<1) Strata[,Kolumn+2]<-Strata[,Kolumn+2]/check

#Skapa tomma matriser
MedelAge<-matrix(nrow=T, ncol=1)
MedelW<-matrix(nrow=T, ncol=AC)
MedelL<-matrix(nrow=T, ncol=AC)
MedelSex<-matrix(nrow=T, ncol=AC)
MedelMat<-matrix(nrow=T, ncol=AC)
AndelAge<-matrix(nrow=T, ncol=AC)
Urval<-matrix(nrow=n, ncol=Kolumn)
Urval<-data.frame(Urval)

#Bootstrap börjar
for (t in 1:T)  {
   #Plocka ut slumpvist lika många individer från stratifierat prov men med viktad längdfördelning
   for (i in 1:n)  {
      s<-runif(1)
                                d<-data.frame(Strata)
                                dd<-d[d$V8>s,]
                                Urval[i,]=dd[1,1:Kolumn]
                                        }

                Age<-Urval[,4]#Ålder av slumpvist utvalda individer
                MedelAge[t]<-mean(Urval[,4]) #Medelålder
                o<-order(Age)
                Urval<-rbind(Urval[o,]) #Sortera slumpvist utvalda i åldersordnin

                #Medel per första åldersklass
                Medel<-matrix(nrow=AC, ncol=6) #Skapa tom matris
                Atemp<-findInterval(AgeC[1], Urval[,4])        #Hitta antal av yngsta åldern
                if (Atemp>0) Medel[1,]<-mean(Urval[1:Atemp,], na.rm=TRUE)  #Medel av längd, vikt,
kön, mognad av yngsta åldern
                AntalAge<-Atemp #Antal av yngsta ålder

                #Medel och antal för alla andra åldrar
                for (i in 2:AC) {
      Atemp[i]<-findInterval(AgeC[i], Urval[,4])
      if (Atemp[i]>Atemp[i-1]) Medel[i,]=mean(Urval[(Atemp[i-1]+1):(Atemp[i]),], na.rm=TRUE)
         AntalAge[i]<-Atemp[i]-Atemp[i-1]
```

```
                                    }
                    #Räkna ut medel för varje åldersklass för detta bootstrapsteg
    MedelW[t,1:AC]=Medel[,3]
    MedelL[t,1:AC]=Medel[,1]
    MedelSex[t,1:AC]=Medel[,5]
    MedelMat[t,1:AC]=Medel[,6]
    AndelAge[t,1:AC]=AntalAge/n;
}                   #Bootstrap slutar

#Medel och mCV av ålder i hela populationen från alla bootstrap-körningar
mA<-mean(MedelAge)
CV_A<-sqrt(var(MedelAge))/mA
mAC<-colMeans(AndelAge, na.rm=TRUE)

#Ta bort åldrar utan observationer
ii<-0
fi<-NA
for (i in 1:AC) {if (mAC[i]>0) ii=ii+1
                                                    if (mAC[i]>0) fi[ii]=i
                                                    }
    MedelW<-data.matrix(MedelW[,fi])
    MedelL<-data.matrix(MedelL[,fi])
    MedelSex<-data.matrix(MedelSex[,fi])
    MedelMat<-data.matrix(MedelMat[,fi])
    AndelAge<-data.matrix(AndelAge[,fi])
    mAC<-mAC[fi]
    AgeC<-AgeC[fi]
    nAge<-nAge[fi]
    AC<-length(AgeC)

#Skapa tomma vektorer
mW<-NA
CV_W<-NA
mL<-NA
CV_L<-NA
mSex<-NA
CV_Sex<-NA
mMat<-NA
CV_Mat<-NA
CV_AC<-NA

#Medel & mCV av längd, vikt, samt medel och SD av kön, mognad i hela populationen från alla
bootstrap-körningar
for (i in 1:AC) {
    ff<-order(MedelW[,i], na.last=NA)
    CV_AC[i]=sqrt(var(AndelAge[ff,i]))/mAC[i]
    mW[i]=mean(MedelW[ff,i])
    CV_W[i]=sqrt(var(MedelW[ff,i]))/mW[i]
    mL[i]=mean(MedelL[ff,i])
    CV_L[i]=sqrt(var(MedelL[ff,i]))/mL[i];
    mSex[i]=mean(MedelSex[ff,i])
    CV_Sex[i]=sqrt(var(MedelSex[ff,i]))
    mMat[i]=mean(MedelMat[ff,i]);
```

```
   CV_Mat[i]=sqrt(var(MedelMat[ff,i]))
                }

(proc.time()-ptm)/60

mAndelAge<-colMeans(AndelAge)          #Genomsnittlig åldersfördelning
CVvikt=sum(CV_W*mAndelAge)*100         #Viktad precision vikt
CVvikt=round(CVvikt, digits=3)
CVlangd=sum(CV_L*mAndelAge)*100        #Viktad precision längd
CVlangd=round(CVlangd, digits=3)
CVsex=sum(CV_Sex*mAndelAge)*100        #Viktad SD kön
CVsex=round(CVsex, digits=3)
CVmat=sum(CV_Mat*mAndelAge)*100        #Viktad SD mognad
CVmat=round(CVmat, digits=3)
CV_A=round(CV_A, digits=3)

Variable<-c('Species', 'SD', 'Q', 'Gear', 'Sex', 'Other', 'N','Weigth','Length', 'Sex','Mat', 'Age')
CV<-c(Data,n, CVvikt, CVlangd, CVsex, CVmat, CV_A)

#Utdata precision viktat medel
CV<-rbind(Variable, CV)
CV

CV_W=round(CV_W*100, digits=3)
CV_L=round(CV_L*100, digits=3)
CV_Sex=round(CV_Sex*100, digits=3)
CV_Mat=round(CV_Mat*100, digits=3)
CV_AC=round(CV_AC*100, digits=3)

#Utdata per åldersklass
CVage<-rbind(Species, SD, Q, Gear, Sex, Other, AgeC, nAge, CV_W, CV_L, CV_Sex, CV_Mat,
CV_AC)
CVage<-aperm(CVage)
CVage #Precision per åldersklass

mW<-round(mW, digits=3)
mL<-round(mL, digits=3)
mSex<-round(mSex, digits=3)
mMat<-round(mMat, digits=3)
mAC<-round(mAC, digits=3)

Mage<-rbind(Species, SD, Q, Gear, Sex, Other, AgeC, nAge, mW, mL, mSex, mMat, mAC)
Mage<-aperm(Mage)
Mage          #Medel per åldersklass
```