Swedish Agency
for Marine and
Water Management

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ANNUAL REPORT

FOR

THE SWEDISH NATIONAL PROGRAMME FOR

COLLECTION OF FISHERIES DATA 2012

Under

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

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) 2012 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 2012. 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 2012 and the datacollection could be undertaken with only minor adjustments which are explained in the report.

List of derogation valid for 2012.

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)
LHM_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.
Spurdog (*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 is:

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Responsible authority

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Inspection and Enforcement Department
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SE- 404 39 Göteborg
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https://www.havochvatten.se/en/start.html

Partners:

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

Institute of Marine Research (**IMR**)
Swedish University of Agricultural Sciences
Turistgatan 5
SE-453 30 Lysekil, Sweden
Tel + 46 18 67 10 00

Institute of Freshwater Research (**IFR**)
Swedish University of Agricultural Sciences
Stångholmsvägen 2
SE-178 93 Drottningholm, Sweden
Tel + 46 18 67 10 00

Institute of Coastal Research (**ICR**)
Swedish University of Agricultural Sciences
PO Box 109
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Tel + 46 18 67 10 00

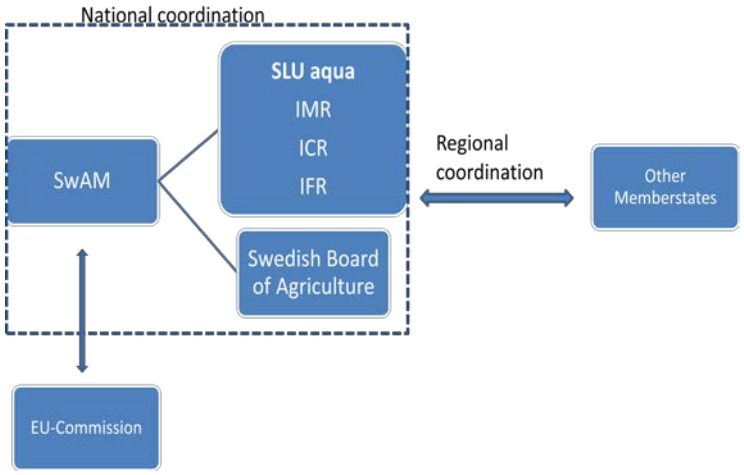
County Administrative Board
SE-871 86 HÄRNÖSAND

Tel + 46 611 34 90 00

County Administrative Board
SE-971 86 LULEÅ
Tel + 46 920 96 000

Swedish Board of Agriculture
Department of Rural Development
Rural Analysis Division
SE-551 82 Jönköping, Sweden
http://www.jordbruksverket.se/

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

National coordination has been undertaken in different fora.
A steering group for the DCF related work within SLU aqua had five meetings during 2012 using videolink. The members of the group are representing and responsible for developing the different parts of DCF (like sampling and analyses of; surveys, market, metiers, quality standards of biological parameters, sampling design, datamanagement). There are 10 participants in the group and the National Correspondent is responsible for these meetings. The main outcome was to establish a forum for cooperation and coordination on a national level. The work done in the different parts of DCF are synthesized within this group which also give input and guidance in developing work. The flow of information works more smooth and the involvement of more people have decreased the gap between the “data collectors” and the “data users”.

No physical coordination meeting with all partners was arranged in 2012. However, the national correspondent communicates important news to the responsible authority and to the persons involved in DCF on a regular basis (trips every second week to SwAM). A network of people is informed about guidelines and deadlines, progress of DC-MAP etc.

II.B Regional and International co-ordination

II.B.1 Attendance of international meetings

The international meetings planned for 2012 and eligible under DCF are listed in table II.B.1. WKMATCH and WGISUR were not attended as planned due to 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 (2012)	**Regional Database: Review of the Data Policy Document** **NC to give feedback on the Datapolicy 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 DATAPOLICY DOCUMENT AND SUPPORT 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 LiaisonMeeting could review the derogations and where appropriate put forward a list of derogations that could be approved to cover métiers 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 RECOMMNEDATION
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 RECOMMENATION 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 the 1 st of January 2011 the Swedish fishing fleet consisted of 1359 registered vessels, with a combined gross tonnage of 33 thousand GT and total power of 178 thousand kW. The average age of the vessels was 31 years. The size of the Swedish fishing fleet has followed a decreasing trend between 2008 and 2012. The number of vessels decreased by 10 % (or 150 vessels) whiles the total GT and kW of the fleet declined by 24 % and 16 %, respectively during the period.

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 table below briefly describes the number of vessels per segment in Sweden in 2011.

Segment	No. Vessels (2011)	Gross tonnage	KiloWatts
Passive gear 0-10 m	613	1 926	33 020
Passive gear 10-12 m	141	1 593	18 540
Passive gear >12 m	22	640	4 181
Trawler 0-12 m	80	874	12 459
Trawler 12-18 m	82	2 955	20 044
Trawler 18-24 m	44	5 131	16 920
Trawler > 24 m	49	16 967	50 956
Inactive 0-10 m	281	626	11 434
Inactive 10-12 m	33	284	4 693
Inactive >12 m	14	1 944	5 900
	1 359	32 940	178 146

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 vendace. 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.

The total number of fishing enterprises in the Swedish fleet was 1089 in 2011. The vast majority of fishing enterprises, 80 %, owned a single vessel and 20 % of enterprises owned two to five fishing vessels. Only one fishing enterprises owned six or more fishing vessels.

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

Further stratification in data collection

Sweden uses a further stratification of the fishing fleet than required by the DCF in order to provide better final estimates. All sampling for economic variables is made in census.

Vessels in fleet segments are divided by economic activity where all vessels are divided into two groups, one with a low level of economic activity and one group with regular economic activity. The threshold is calculated as twice the yearly Swedish price base amount. Data on the economic activity level groups are collected and estimated separately. It is important to point out that data on all vessels are collected and estimated and in the end aggregated together. The use of a threshold is in order to provide better estimates.

For some segments a further stratification based on target species is used. Demersal trawlers are for some length classes divided into four groups based on vessels targeting crustaceans, shrimp, vendace or other species (mostly cod and/or flatfish). The different segments of passive gears are divided into vessels targeting crustaceans, cod, salmon (including trout), eel or other species. The reason behind this is that some species is high price species and the economics of these kinds of fisheries is highly different from fisheries targeting other species.

Estimation of total income, gross operational costs, assets, debt and crew wages

Gross operational costs and total income for the segments are collected through a census survey by Statistics Sweden. If the coverage rate is less than 70 per cent an evaluation of the representativeness of the data has to be conducted. The following is a description of how Statistics Sweden collects the data, corrects for missing data and evaluates the representativeness.

Total income, gross operational costs, assets, debt and crew wages is estimated in the same way and therefore the estimation description only describe how total income is collected.

Census data from financial accounts has been collected by Statistics Sweden. Statistics Sweden matches economic data from tax declarations by enterprises to individual vessels. In some cases this may not be possible if a declaration is missing or if the deviation between declared income and income from fisheries is too large to be reliable. Statistics Sweden corrects for non-responses and missing observations with a correction factor. The correction factor is the quota between average value of landings for all vessels in the segment and the average landings value for all vessels with process able data. Statistics Sweden also evaluates the representativeness of the data.

$$cf = \frac{\overline{V_j}}{\overline{V_l}}$$

where

cf = Correction factor

$\overline{V_j}$ = Average landings value in segment j

$\overline{V_l}$ = Average landings value among vessels with process able data

The declared income is estimated as the average declared income of vessels with process able data multiplied with the correction factor multiplied with the number of vessels in the segment.

$$I_j = \bar{I}_j \times cf \times N_j$$

where

I_j = Total declared income in the segment j

$\bar{I}_j$ = Average declared income in the segment j

N_j = Number of vessels in segment j

Estimation of individual income items

Value of landings per segment is compiled from sales, notes, landings declarations logbooks and monthly journals (coastal journals) which are all kept by the Swedish Agency of Marine and Water Management. The compilation is exhaustive.

Fishing rights were not transferable in Sweden during 2008 neither temporarily nor permanent. No income from fishing rights did exist in 2008. The system fishing right system was introduced in November 2009 but no trades were recorded during 2009. During 2010 the trading started and price information of quotas were collected by a separate mail questionnaire send to all vessels that had traded quotas (trade register kept the Swedish Agency of Marine and Water management). From 2012 and onwards the data on quota-prices has been be registered and collected directly from the quota register (2012 data). The total cost and income of quota sales is also collected in the cost questionnaire (see further on under section Estimation of individual cost items)).

In total 63 vessels traded quotas in 2010. The questionnaire was sent to all of them and 84 % responded. The results shows that only 4 (8 %) of the responding vessels actually had economic cost for buying and 10 (20%) of the responding vessels had incomes from selling quotas. Concluding that most of the trades were performed without including money (clean trades, gifts, etc.). The turn-over from the trades was weighted by number of vessels to compensate for the non-response. Due to the low numbers of trades including money and that one vessel stands for around 60 % of the turn-over the figures must be handled with care.

Direct subsidies are compensation for temporary fishing stops regarding cod fishing in the Baltic Sea from the European Fisheries Fund (EFF). Records were kept at the Swedish Board of Fisheries which was the authority responsible for the EFF but from the 1 July 2011 the Swedish Board of Agriculture is responsible for the EFF. The collection is exhaustive.

Other income for a specific vessel is estimated as total income for the specific vessel, as compiled by Statistics Sweden, minus value of landings for the specific vessel.

Estimation of individual cost items

In order to allocate numerical values to individual cost items (including costs and incomes from fishing right sales) an allocation key for each segment is estimated. The allocation key is estimated through a census survey by the Swedish Agency for Marine and Water Management.

The allocation key is estimated as the percentage of the gross operational costs for the individual cost:

$$p_{ij} = \frac{\bar{c}_{ij}}{\sum_{i=1}^{5} \bar{c}_{ij}}$$

where

$\bar{c}_{ij}$ = weighted mean in the sample for costs item i for segment j

p_{ij} = percentage of gross operational costs related to the individual cost item i for segment j

$i =$ cost item where 1 = fuel costs, 2 = repair & maintenance costs, 3 = variable costs, 4 = non-variable costs, 5 = fishing rights cost

$j =$ Segment e.g. PTS VL40XX

The weighting scheme applied to cost item is

$$\bar{c}_{ij} = \left(\frac{\sum c_{ij}}{n_j} \right) \times W_j$$

where

c_{ij} = observation on cost item i for segment j in the sample from the survey

n_j = number of observations in the sample

W_j = weigh calcutaled as $W_j = \frac{\bar{D}_{pj}}{\bar{D}_{sj}}$, where $\bar{D}_{pj}$ = average number of days at sea for segment j in the population and $\bar{D}_{sj}$ = average number of days at sea for segment j in the sample

Values for individual costs items for individual segments are calculated as:

$$\hat{c}_{ij} = GOC_j \times p_{ij}$$

where

$\hat{c}_{ij}$ = estimated (fitted) value of individual costs item i for segment j

$GOC_j =$ Gross operational costs for segment j as estimated by Statistics Sweden

Fuel consumption for a segment is estimated using a Horvitz-Thompson-type estimator

$$\hat{F}_j = N_j \times \bar{f}_j \times W_j$$

where

$\hat{F}_j$ = Estimated fuel consumption for segment j

N_j = Total number of vessels in the segment

$\bar{f}_j$ = average fuel consumption in sample for segment j

W_j = is the same weight used in the estimation for individual costs items.

Estimation of Engaged crew and FTE's

Engaged crew is estimated for each stratum using a Horvitz-Thompson-type estimator:

$$\hat{E}_j = \frac{N}{n}\sum_{k=1}^{n} e_{kj}$$

where

$\hat{E}_j$ = Estimated number of engaged crew in segment j

e_{kj} = observation in the sample for vessel k on the number of engaged crew for segment j

N = Total number of vessels in segment
n = Total number of observations in a stratum

FTE's are calculated according to:

$$FTE = ((totEC \times DAS \times hAS) + (aveCT \times hOS \times w)) / FTh$$

where

FTE = Full time equivalents per vessel
$totEC$ = Total engaged crew per vessel
DAS = Days at sea per vessel
hAS = Number of working hours per day at sea, engaged crew and vessel. A working day is assumed to be 6 hours for vessels fishing with passive gears and 12 hours for vessels fishing with active gears.
$aveCT$ = Averaged crew per fishing trip and vessel
hOS = Average number of working hours in onshore per crew member, week and vessel
w = Number of working weeks per year and vessel
FTh = Number of working hours in a year for a full time employee. For national FTE's the number of working hours in year is assumed to be 1800 and for harmonised FTE's the number of hours is assumed to be 2000.

Estimation of Imputed value of unpaid labour

Imputed value of unpaid labour is calculated as the difference between labour costs given by the income tax declaration and the number of FTE's (harmonised) times an assumed yearly minimum salary (Including Social Costs):

Imputed Value of Unpaid Labour = Labour cost – FTE (harmonised) x Yearly Minimum Salary (Including Social Costs)

Vessels displaying a positive difference are able to pay the crew a minimum wage for the time they work and are therefore removed. For all the vessels displaying a negative difference the labour costs

are lower than what is expected based on assumed yearly minimum salaries. The sums of the negative differences are summarized for each segment and the absolute numbers of the sums are the imputed value of unpaid labour.

Assumed minimum wages 2009 (including social costs equal to 40 %) were 252 000 SEK for vessel shorter than 24 meters and 336 000 SEK for vessel longer than 24 meters. Excluding social costs the corresponding salaries are 180 000 SEK and 240 000 SEK. The wages are assumed to increas with 3 % yearly from 2009 to 2011.

Estimation of Capital value and cost

The estimation of value of physical capital and annual depreciation costs will be based information on insurance value given by the questionnaire survey. The insurance value is estimated by divided the vessels into two groups, one less then 24 meters and one for vessels larger than 24 meters. A regression analysis for each group will then be run based on the following formulas (formula for 2010 data is examplified bellow):

Vessels less than 24 meter
LN Insurance value = $\beta_0 + \beta_1 * \text{LN age} + \beta_2 * \text{LN kW} + \beta_3 * \text{LN length} + \beta_4 * D_{DTS} + \beta_5 * D_{FPO} + \beta_6 * D_{HOK} + \beta_7 * D_{DFN} + \beta_8 * D_{PGP} + \beta_9 * D_{CRU} + \beta_{10} * D_{PRA} + \beta_{11} * D_{VEN} + \varepsilon$
Vessels 24 meter and over
LN Insurance value = $\beta_0 + \beta_1 * \text{LN age} + \beta_2 * \text{LN kW} + \beta_3 * \text{LN length} + \beta_4 * D_{PTS} + \beta_5 * D_{CRU} + \beta_6 * D_{PRA} + \varepsilon$

where D equals dummy variables for dominant fishing gear or target species. Target species are CRU = Crustaceans, PRA = Prawns and VEN = Vendace. Number of variables in the regressions has varied between different years.

Based on the results of the regressions fitted values of insurance values are calculated for each vessel.

All vessels are divided into three groups:
Vessels fishing with passive gears
Vessels fishing with active gears with a length under 24 meters
Vessels fishing with active gears with a length over 24 meters

For each group the gross tonnage and insurance value is summarized for each individual building year. The sum of insurance value for each building year is divided by the sum of gross tonnage for each building year to obtain the depreciated price per capacity unit for each building year. Based on the depreciated price capacity unit a linear regression with a exponetial form is carried out to estimate the price per capacity unit for the current year of interest. The estimation equation is:

$$PPC_t = \beta_0 e^{\beta_1 t} + \varepsilon$$

where

$PPC_t =$ Price per capacity unit for building year t
$t =$ building year

And the price per capacity unit for example 2011 data is calculated as:

$$\hat{PPC}_{2011} = \hat{\beta}_0 e^{\hat{\beta}_1 2011}$$

The exponetial form is used to compensate for digressive depreciation.

When calculating the depreciated replacement values the price per capacity unit for 2011 is used. Whten calculating the depreciated historical values price per capacity unit for 2011 is deflated using time series of the consumer price index. Both types of capital value calculations use the template connected to the PIM methodology in the capital valuation report (No FISH/2005/03).

Capital costs and the value of capital for each segment are calculated by extracting the values for each of the three large groups from the template and are reweighted to distribute them to individual segments according to the weighting scheme:

$$Cap_j = Cap_G \times \frac{\sum kW_j}{\sum kW_G} \times \frac{\sum Age_G}{\sum Age_j} \times \frac{Num_j}{Num_G}$$

where

Cap = Capital value or capital costs depending on which variable to be calculated
kW = Engine power
Age = Age of vessel
Num = Number of vessels

The subscript j refers to the segments e.g. DFN VL1218. The subscript G refers to the groups described earlier for which total capital value and capital costs are estimated i.e. vessels fishing with passive gears, vessels fishing with active gears under 24 meter and vessels fishing with active gears over 24 meters.

Pelagic fishing rights became transferable in Sweden by the 1st of November 2009. The first transactions of fishing right took place in January 2010. Since no transactions of pelagic fishing rights took place during 2009 the fishing right had no market value in 2009. For 2010 the value of pelagic fishing rights were surveyed by a census mail questionnaire. The results from the 2010 data survey performed late 2011 shows that only 10 vessels sold and 4 vessels bought fishing rights (84 % response rate) with including money transfers. The values of the fishing rights were in 2010 due to the low number of money transfers not possible to value and report due to secretary reasons. For 2011 data collected during 2012 income and costs from sales of fishing right was included in the cost questionnaire. The data does not hold for a more straight forward valuation of the rights. A comprehensive work on how to make this valuation is under progress as a separate project with cooperation with JRC (Ispra).

Estimation of in-year investments

In-year investments for a segment is estimated using a Horvitz-Thompson-type estimator

$$\hat{II}_j = N_j \times \bar{ii}_j \times W_j$$

where

$\hat{II}_j$ = Estimated fuel consumption for segment j

N_j = Total number of vessels in the segment

$\bar{ii}_j$ = average fuel consumption in sample for segment j

W_j = is the same weight used in the estimation for individual costs items.

Financial position

Is calculated as debt, as compiled by Statistic Sweden, divided by estimated vessel replacement value.

Fishing enterprises

Number of enterprises consisting of different amount of vessels is compiled from the fleet register kept by the Swedish Board of Fisheries.

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

As seen in table III.B.1 the final data delivered to the Swedish Agency for Marine and Water Management from Statistics Sweden shows that the Swedish data has improved remarkably last years. Compared to two year old Annual report 2010 where 3 out of 18 segments displayed a coverage rate higher than 70 per cent (7 segments is over 65 per cent) now in Annual report 2012, all except one segment displays a higher achieved sample rate than 70 per cent (4 segments is over 80 per cent).

Reasons for non-response may be several, such as missing observations and outliers (as defined by the acceptance criteria established by Statistics Sweden). Statistics Sweden conducts an analysis of non-responses and correct for this by using a correction factor based on income from fisheries (supplied by the Swedish Agency of Marine and Water Management) and total income from the Statistics Sweden data bases.

Survey data has been collected by the Swedish Board of Fisheries through questionnaires. The aim has for 2012 (2011 data) been total coverage. Only one segment displays an achieved sample number less than 70 per cent; passive gear over 12 meter (cluster name DFN1218). The achieved sample rate is 68 %, which higher than what was the aim in the national programme and in fact data from just one vessel is missing for the segment to be over the 70 per cent threshold.

Clustering was necessary due to confidentiality reasons. The clustering scheme can be seen in table III.B.2. Clustering has been made with segments similar to other segments. Sweden has had the aim to present as much data as possible un-clustered.

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

In 2012 the economists did not attend the RCM meetings, instead the Planning Group on Economic Issues (PGECON) met for the first time 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. The recommendations made by the group and relevant for Sweden are listed below.

Source	Recommendation	Action
PGECON (2012)	**Definition variable "direct subsidies" Specification of what "direct subsidies" should include and what it should exclude . Guidelines to be adjusted by DG MAREand followed accordingly by MS.**	SWEDEN HAS FOLLOWED THE PROCESS OF NEW GUIDELINES ON DIRECT SUBSIDIES

III.B.4 Actions to avoid shortfalls

The general trend in surveys both domestically and international is decreasing response rates in surveys. The Swedish Agency of Marine and Water Management is continuously looking in to

different possibilities of raising the response rate. In 2010 the Swedish Board of Fisheries put an information provider obligation regarding surveys of the economic performance of the fishing fleet into place. A failure to respond to economic surveys under the DCF may lead to economic sanctions. There was no need to use sanctions the final response rate of the survey was well above 80 per cent. With a decreasing fleet the possibility to use probability sampling is decreasing and Sweden has 2012 started to sample all (census) to get enough data and still keeping some level of segmentation.

III.C Biological - metier-related variables

THE BALTIC SEA

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

Results of the sampling in 2012 in relation to what was planned are presented in tables III.C.3, III.C.4, III.C.5 and III.C.6.

Longline fisheries targeting demersal fish (LLS_DEF_0_0_0), subdivision 25-29,32
Sweden fell short to sample 7 out of 12 trips in this fishery. This was due to a combination bad weather and shortage in staff. Landings constitute almost exclusively cod and are sampled within a stock specific sampling program (see section III.E). Discard rates are relatively low in this fishery (~ 10%).

Bottom trawl fisheries targeting demersal fish (OTB_DEF_>=105_1_110), subdivision 22-24
The trawl fishery in subdivision 22-24 is sampled to a lesser extent compared to what was planned (4 sampled trips out of 8 planned). The trawl fishery in subdivision 25-32 is at the same time sampled in excess of the plan (23 trips instead of 16 trips). The main reason for this is that it sometimes is difficult to predict in what subdivision the fishery will take place when a trip is planned. It is the same vessels that are involved in both fisheries. In a future NP these fisheries will be sampled within one samplingframe.

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 National Programme. The fishery have however been very limited (or nonexistent) in some of the subdivisions in some quarters implying that the planned no of trips to be sampled was not achieved.

Trawl fisheries targeting small pelagic fish (OTB_SPF_16-31_0_0), subdivision 30-31
Shortfall of 4 trips due to reduced fishing activity in the beginning of the year partly caused by heavy ice conditions. Also, for one of the fishermen participating, logistic problems disturbed 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 and WKMERGE into account. This work continued in 2012 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.

Meantime, and for the sake of the annual report, Sweden have 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 I and the results 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

Source	Recommendation	Action
RCM Baltic (2011)	**To ensure possibilities for adequate sampling of biological and métier related data including landings in foreign MS, national institutes need to have online access to national logbook data and national VMS data.**	SLU aqua- do not have direct online access to logbook and VMS data, but receive annual data sets from SwAM. Improvements and smooth handling of this dataflow are being discussed.
RCM Baltic (2011)	**MS should upload all landing data into FishFrame allowing the RCM to analyse the possible needs for bilateral agreements.** **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.**	All landings data are uploaded into FishFrame by Sweden. In bilateral agreements, Sweden includes details of sampling, compilation and data submission.
RCM Baltic (2011)	**MS to look into discard sampling program according to WKACCU 2008 guidelines (12 aspects).**	Swedish catch sampling scheme has improved by implementing some of the 12 aspects listed.
RCM Baltic (2012)	**Métier related variables: Routines for establishing bilatereal 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	**Sampling of Métier related variables including foreign landings : Requirement of on-line information on fleet**	SWEDEN HAS PUT THIS REQUEST FORWARD TO THE RESPONSIBLE

(2012)	**behavior. National institutes to get access to online logbook and VMS data.**	AUTHORITY. THIS WILL BE DISCUSSED FURTHER IN THE PROCESS OF DC-MAP TO FIND A WAY TO THE EXISTING ROUTINES.
RCM Baltic (2012)	**1. MS should upload all landing data into the Regional Data Base allowing the RCM toanalyse 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.**	1. all national landings data are uploaded each year, together with sampling data, following DCF regulations 2. follow-up to be fullfilled by RCM Baltic 2013 3. Updated bilateral agreements are in place with Denmark, Germany, Poland and Finland.

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 National Programme. To some degree this is inherent to the time lag between the compilation of the National Programme 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. 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.

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

THE NORTH SEA AND EAST ARCTIC

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

Results of the sampling in 2012 in relation to what was planned are presented in tables III.C3, IIIC.4, IIIC.5 and IIIC.6. 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 National Programme.

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. Since the data from the metier sampling presently primarily is used to produce estimates of discards metiers with high and/or variable levels of discards are prioritised. 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 demersal fish and crustacean (OTB_MCD_90-119_0_0)_IIIaS
In accordance with regulation 850/98 is the minimum mesh size for most demersal fish species as well as Nephrops 90 mm in the Skagerrak. 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). These problems became more transparent when moving towards a probability based vessel selection procedure.

Trawl fisheries targeting crustaceans (OTB_CRU_35-69_0_0), IIIa, IV
Sweden fell short to sample 3 out of 12 planned trips in this fishery. This was due to a combination bad weather and shortage in staff.

Trawl fisheries targeting crustaceans (OTB_CRU_35-69_2_22), IIIa, IV
This metier is more or less exclusively catching *Pandalus*. Sweden run a self-sampling programme for the metier in which Institute of Marine Research are buying unsorted samples of catches from randomly selected commercial vessels. The random selection of vessels resulted, as in 2011, in some problems such as e.g fishermen forgetting to bring samples (or parts of samples/information) ashore. 4 out of the 12 planned trips were thereby not sampled.

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 45 out of planned 96 trips were sampled by buying unsorted samples of landings in the harbours/markets. The assumption for the planned number of trips is that the fishery is conducted all year around in both Kattegat and Skagerrak. A main reason for the deviation is that the fishery was limited in Kattegat (IIIaS) and during the second and third quarter. 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 (18 trips instead of 12) compared to the plan.

Pot fisheries targeting crustaceans (FPO_CRU_0_0_0), IIIa

Sweden fell short to sample 4 out of 12 planned trips in this fishery. This was due to a combination bad weather and shortage in staff.

Fyke net fisheries targeting catadromous species (FYK_CAT_0_0_0)
Expected total no. 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 and WKMERGE into account. This work continued in 2012 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.

Meantime, and for the sake of the annual report, Sweden have 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 I and the results 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

Source	Recommendation	Action
RCM NS&EA (2011)	RCM NS&EA recommends that each MS should send a representative to WKPICS to discuss data collection and the methods used to raise this data for assessment use and that WKPICS adds this to its ToR.	Sweden participated in WKPICS 2011.
RCM NS&EA (2011))	MS should make sure that their landings abroad are included in their FishFrame upload allowing the RCM to analyse the possible needs for bilateral agreements. 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 ensures that landings abroad are included in the Regional Database upload. In bilateral agreements, Sweden includes details of sampling, compilation and data submission.
RCM NS&EA	MS to fill update metier descriptions already compiled by RCM NS&EA 2010 and using the	Sweden updated the metier descriptions before the RCM

(2011))	standard template complete descriptions for any new metiers identified. Updated and new files to be uploaded by Fishing Ground co-ordinators.	NS&EA 2012.

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 is difficult to predict spatial and temporal fishing patterns for some metiers at the time of writing the National Programme. To some degree this is inherent to the time lag between the compilation of the National Programme 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.

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

National mail screening surveys
A new national mail screening survey was carried out during spring 2011 regarding recreational fisheries 2010. During 2012 planning of a new national survey started. The new survey will be performed periodically three times a year with start during 2013. The data will be collected according to created metiers.

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. Data on fecundity was collected by a recreational brood stock fishery in River Dalälven, Sub-division 30.

Catches in 2012 was estimated according to surveys performed in 2011. In 2011 a survey was performed to estimate recreational catch at the coast and the sea. Quarterly catch was estimated at sea by use of a modified method of that described in Anon 2003. Recreational fishery at the coast only occurs in quarter 2 and 3. Collection of river data is carried out annually in accordance with routines described in the pilot study (Anon 2003). Summarized data of catches are delivered to the relevant ICES group (WGBAST).

Cod
The monitoring of cod catches on Swedish tour boats in the Sound between Denmark and Sweden started in 2011 as a pilot study. The study was repeated in 2012. The captain reports catch in kg from each fishing trip and staff from the Institute of Marine research and the university of Lund carried out control weighting and length measurement of all catch from a limited number of fishing trips .The Sound was chosen for this monitoring study as it was considered the only area with significant Swedish recreational tour boat fishing for cod. (Øresland, V. 2012).

Three of the twelve Swedish tour boats that operated in the Sound during 2012 would/could not report catches. One of these started fishing in 2012 and was therefore not included as only number of trips was available. Out of 20 planned trips for control, 15 trips were done. During the control trips 1720 kg was measured by IMR while the crew from the tour boats estimated the catch 1641 kg in total which is 5 % lower than the control. The average of the 15 individual controls showed an overestimate of only 0.03%, indicating that the estimates on all trips are accurate.

Table. 1. Annual cod catch in kg from 9 out of 12 Swedish tour boats operating in the Sound in 2012

2012	No trips	Total catch	Mean catch	No planned trips	No sampled trips	Commercial catch	% tour catch of tour + com. catch
Jan-March	190	11950	63	5	1		
Apr-June	350	23508	67	5	4		
July-Sept	483	40810	84	5	7		
Oct-Dec	227	12649	56	5	3		
TOTAL	**1250**	**88917**	**71**	**20**	**15**	**372000**	**19**

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

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 meiter based data.

Salmon
A survey directed towards recreational salmon fishermen was carried out in a large northern salmon river. The result from this survey gives further information of the need for annual surveys and closer collaboration with organisations that are managing the fishery in this and other similar organised rivers. There are no deviations from NP proposals.

Cod

There were no large differences between 2012 and 2011 data collected at the tour boats. However, mean catch per trip has decreased by 15 % in 2012. The proportion of the tour boat catches in relation to the sum of tour boat and Swedish commercial catches in the Sound has increased slightly mainly due to reduced commercial catch. Since 3 tour boats are missing in the study during 2012 it is likely that the real proportion of the tour boat catches might be close to 25 %. So far, tour boat catches are not considered in stock assessment work for cod.

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

No recommendations regarding recreational fisheries were brought up in the RCM 2012 (Anon 2012a).

III.D.4 Actions to avoid shortfalls

National mail screening surveys
A new national mail screening survey was carried out during spring 2011 regarding recreational fisheries 2010. No deviations from the NP proposal. During 2012 planning of a new national survey started. The new survey will be performed periodically three times a year with start during 2013. The data will be collected according to created metiers

Salmon
There is a plan to carry out better designed and larger surveys to improve the poor quality of the catch data in some rivers.

Cod
The shortfall in number of trips in quarter 1 and 4 was related to a mix of shortage in staff and bad weather. The results from the achieved control trips are indicating that the estimated done by the tour boats are quite accurate.

THE NORTH SEA AND EAST ARCTIC

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.

The Swedish Board of Fisheries 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 and 2012, 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 meiter based data.

Cod
While the Sound (area IIIb, between Sweden and Denmark) have been considered to be the only area with significant Swedish recreational fishing for cod, all effort for sampling data was put in that area and reported in section III.D Baltic Sea.

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

No data to be reported. No deviation from NP proposal

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

No recommendations regarding recreational fisheries was brought up in the RCM 2012.

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

THE BALTIC SEA

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

All stocks sampled during 2012 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 strategy has 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.

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 analyzed according to length, weight and age. Sampling strategy on surveys and onboard 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 onboard fishing vessels, the length can be given an age by using an Age-Length-Key.

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. In table III.E.3 the column “planned minimum number “ presented for discard and survey sampling refers to the results from 2008. Therefore, percent achievement can therefore vary and look like it´s over – or under sampled.

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.

Sampling of eel in freshwater:
Fyke net fisheries (FYK_CAT_0_0_0) in inland (fresh) waters are targeting eel mostly in the (near) silver phase, and to a lesser extent in the yellow phase. This fishery is found in all major lakes (to a much lesser extent in smaller lakes and rivers) flowing into the Baltic and the Skagerak/Kattegat (North Sea) areas. Since all Swedish inland waters now belong to a single Eel Management Unit, and data will only be applied at the national scale, the sampling in inland waters will not be stratified spatially. Consequently, sampling inland waters will only be described in full under this section.

Landings in inland waters are just over 100 t. By-catch and discards in this fishery occurs, but this does rarely involve species under international management. Sampling is therefore concentrated on eel only, i.e. Scheme 2/3, with 100% of samples focused on Group 1 species. Our approach has been to collect six (6) samples of 125 (5*25 cm-classes) eels each for length, weight, life-stage (yellow, half-silver and silver) and sex. That sums up to 750 eels per year. The proportion of males in Swedish freshwaters is close to nil, thus they are not considered as significant in this context. As this fishery targets mainly silver eels we have not considered separate samples for the very few yellow eels landed. Sampling once a year during peak season in each lake seems appropriate at this stage to explore the spatial variation. All eels are aged and as a matter of practicality, weight, sex and maturity are measured in all eels at the same time. As spawner quality issues have been raised by EIFAAC/ICES WGEEL we include our routine analysis of prevalence and intensity of the swim-bladder parasite *Anguillicoides crassus* in this programme.

A total of 750 silver eels were planned to be sampled in 2012 and subsequently analysed with regard to length, weight, sex, maturity stage (silver index), age (growth) and infestation rate (prevalence and intensity) of the swim-bladder parasite *Anguillicoloides crassus*. Silver eels were to be taken from the peak season in the pound net fisheries in four lakes. The lakes chosen as representatives for the whole commercial fishery for eel in freshwater were Vänern, Mälaren, Hjälmaren and Ringsjön. Only the three first lakes were sampled in 2012.

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 new Commission Regulation valid for 2009-10, it is 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 major implications for the Swedish monitoring system. In line with the ICES-definitions, Sweden established three index rivers - two in the Gulf of Bothnia (Rivers Vindelälven and, Sävarån) and one in the Main Basin (River Mörrumsån), instead of the single partial small index river in use earlier (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 Swedish University of Agriculture. These bodies are used as subcontractors and they also 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 salmon management plan that is expected to replace the old SAP plan (1997-2010). As SLU-Aqua will not own any of the investments in fishladders, it will be considered as subcontracting costs.

The activities in salmon index rivers 2012 are as described in the text table below.

River	Smolt count	Adult count	Electro-fishing
Ume/Vindelalven, Sub-div. 31, a large river	Smolt trap (fyke net) operated	New built fishladder with counter and smolt leader used	No
Sävarån, Sub-div. 31, a small river	Smolt trap (smolt wheel) operated	Counting of ascending spawners using sonar equipment	Yes
Mörrumsån, Sub-div. 25, midsize river	Smolt trap (smolt wheel) operated	Use of existing fishladder (counter with camera)	Yes

In addition to the monitoring of the index rivers, operation of a fishladder in River Kalixälven and electrofishing is included in the NP. A new counter (with camera) for river Kalixälven was purchased in 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 covering all Swedish surveys (SERS). Other data are also collected and kept in databases that are partly operated by the SLU-Aqua.

Deviations in sampling:

Eel (*Anguilla anguilla*) freshwater
One of the lakes (Ringsjön) was not sampled since there were some problems with cooperation with the sampler.
The planned pilot-study of length measuring of 12 000 silver eels, were not accomplished in neither 2011 nor in 2012 as the asked fishermen did not co-operate as expected.

Eel (*Anguilla anguilla*) sd 22-24
The contracted fisherman in SD 24 did not catch enough eel during the season to accomplish the target no. of eels to be sampled from FPN_CAT_0_0_0 . There were no other fishermen in this subdivision fishing with pound nets.

Herring (*Clupea harengus*) sd 22-24
Fishing for herring in the area is conducted mainly in quarter 1, 2 and 4. Therefore the planned number should be adjusted to (600* 3 = 1800), which would increase the percent achievement to 73 %. Only a few Swedish vessels are actively fishing in the area and most of the landings take place during night time which reduces the sampling opportunities. Also, some landings are delivered straight to purchaser, with the consequence that no sampling could be performed. Since staff from the control department actively focused on control of cod fishery during 2012, the number of samples collected from the pelagic fishery decreased.

Herring (*Clupea harengus*) sd 25-29, 32
Number of herring sampled for weight, sex and maturity in surveys was 81 % of planned numbers. Sampling is done according to the manual and the number of individuals depends on the amount caught during the planned hauls. The planned numbers refer to historical results in 2008.
The major part of the fishery is taken place in sd25. This change in fishing effort have also impact on sampling, and the planned sampling levels in sd 26,27, 28 and 29 could not be fulfilled due to this.

Herring (*Clupea harengus*) sd 30-31
Only sampling of commercially caught fish from GNS_SPF_<110_0_0 was included in planned minimum number. Achieved number (N total 2067 consisted of N Commercial 1164 and N survey BIAS Sweden part 903) and therefore the number achieved was higher than planned numbers.

Cod *(Gadus morhua*) sd 25-32
Number of cod sampled for weight, sex and maturity in surveys was 86 % of planned numbers. Sampling is done according to the manual and the number of individuals depend on the amount caught during the planned hauls. The planned numbers refer to historical results in 2008.

Salmon (*Salmo salar*)
Achieved number of samples at sea from the commercial trap net fisheries (FPO_ANA_0_0_0) was lower than planned 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.
Reduced number of samples from trap net fishery was partly compensated for in sampling at market from the commercial LLD fishery in South Baltic. Since this sampling aggravate sampling based on fishing ground some samples may originate from SD 24.

Sprat (*Sprattus sprattus*) IIIb-d
While both herring and sprat is caught in the pelagic fishery, the plan is to collect both sprat and herring from the same samples. In quarter 1 and 2 full number of individuals could be collected but from the other two quarters there were few individuals of sprat in the samples which lowered the total number.

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 methods are described in Annex I. For surveys, only data collected during quarter one was included in the analyses.
Note that Sweden has provided sufficient length measurements and age samples to the relevant ICES working groups for assessment purposes. The deviations in sampling described in section above explanes the differences between planned and achieved sampling.

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" and "maturity at age". However, for the variable weight at age, the estimated CV values did not reach required target, except for salmon in SD 25-29, 32 and sprat SD22-32. CV values for eel in inland waters are reflecting samples from 2011 since the age reading is lagging one year. The precision target was not reached for the variable "Sex-ratio at age", but the values are close to 2.5 % for most species. For herring in sd30-31 and salmon, CV estimates only include individuals from the commercial sampling.

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

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

Sampling of pelagic species, (*Clupea harengus*, *Sprattus sprattus*)
The same fishing pattern 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.

Salmon (*Salmo salar*)
Planned number of samples from the trap net fisheries (FPO_ANA_0_0_0) was not possible to achieve since it was closed with short notice. However, in the future, it could be possible to fulfill the planned stock sampling under the same circumstances by e.g. granting exemption from the closure for fishermen as well as increase sampling intensity by expand number of fishermen participating in sampling.

Eel (*Anguilla anguilla*) in freshwater
In order to minimise the risk of missing eel samples or opportunities to get the planned length data from some sites, continuous and intense contact with the fishermen involved will be prioritised. A feedback to the fishermen in the form of a simple report seems to work well. As we have failed twice with the samples from Lake Ringsjön, representing medium sized but productive lakes in Southern Sweden, we have to put even more emphasize to those samples.

THE NORTH SEA AND EAST ARCTIC

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

All stocks sampled during 2012 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 strategy has 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.

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 herring, sprat, cod, eel and witch 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 analyzed according to length, weight and age. For species landed ungutted also sex and maturity was sampled. For nephrops and pandalus no information on age is collected

Sampling strategy on surveys and onboard 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 onboard fishing vessels, the length can be given an age by using an Age-Length-Key.

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. “Planned minimum number “ presented for discard and survey in table III.E.3 refers to historical data and consequently percent achievement can therefore vary and look like it´s over – or undersampled.

Deviations in sampling:

Herring (*Clupea harengus*) IIIa
The assumption for the planned number of trips is that the fishery is conducted all year around in both Kattegat and Skagerrak, (650 individuals /quarter and area). A main reason for the deviation is that the fishery was limited in Kattegat (IIIaS) and during the second and third quarter. Sampling of herring was covered in Skagerrak in all other quarters and full sampling was performed in Kattegat in quarter 1. No sampling was performed in Kattegat in quarter 3 and 4 since there was a misunderstanding at the landing site where the samples are taken, and problems with collaboration at another landing site where the major part of the landing took place.

Cod (*Gadus morhua*) IIIaS
Sampling was performed in all quarters but due to very low landings during 2012 (in total 31 tonnes) planned sampling level was simply not possible to reach. For cod collected in the sea sampling programs, number of trips rather than number of individuals are the levels to be achieved.

Norway lobster (*Nephrops norvegicus*) FU3 and FU4
In Kattegat (FU 4) 4-5 different boats were sampled each quarter and in Skagerrak (FU3), 7-9 different boats were sampled each quarter during 2012. Since the sampling scheme is based on kg, the number of individuals depends on the individual size of the *Nephrops*. In 2012 many of the catches consisted of large individuals and therefore the number decreased accordingly.

Plaice (*Pleuronectes platessa*) IIIa, Norway Pout (*Trisopterus esmarki*), Saithe (*Pollachius virens*)
These species are 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.

Witch flounder (*Glyptocephalus cynoglossus*) IIIa
Over-sampling for length@age at surveys. The number of individuals depends on the amount caught, for variables only sampled at surveys. No of samples is following the manual. The planned number is based on historical data from 2008.

Northern shrimp (*Pandalus borealis*) IIIa
Over-sampling (156%) of sex-ratio@length and maturity@length is caused by more individuals per kg in samples compared to planned. No extra samples taken. No extra costs involved.

Sprat (*Sprattus sprattus*) IIIa
Only the variable "maturity" in market sampling was under-sampled (85%) and is caused by that maturity stage could not be determined for all sampled individuals.

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 methods are described in Annex I. 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 and regarding weight, the deficient results can be explained by the huge variation in weight of the sampled fish.

Note that Sweden has provided sufficient length measurements and age samples to the relevant ICES working groups for assessment purposes. The deviations in sampling described in section above explanes the differences between planned and achieved sampling.

The CV script used was designed to handle age disaggregated data and therefore no CV was calculated for Nephrops and Pandalus which is not based on age.

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

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

Herring (*Clupea harengus*) IIIa
There is already a good cooperation with most of the landing sites and with the coast guard taking the samples for IMR. This is maintained with weekly communication and visits at the landing site. Since some new landing sites has appeared and no cooperation has been established yet, this will be looked into and started.
To add an extra platform 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.

Cod (*Gadus morhua*) IIIaS
Sampling directly at the auction by the staff has in general been very successful and cost effective and Sweden will continue with the sampling setup.

Norway lobster (*Nephrops norvegicus*) IIIaN
Sampling of Nephrops has been successful in respect of number of boats sampled. Instead the planned number might be reduced since the size of the nephrops seems to be bigger which means less individuals per kg.

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 national programme.

Capacity data was obtained from the fleet register. In order to segment the data accordingly the main gear type used. The dominance criteria to allocate each vessel to a segment were based on the number of fishing days used with each gear.

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 national programme.
Capacity data was collected exhaustively in the fleet register (Database Fartyg 2). All transversal data is reported un-clustered

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 national programme.

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 on-board 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.

Variable Data sources and methodologies	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 national programme.

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 base and not on a regular base.

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.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 national programme.

Data was acquired as defined in Appendix VIII of the Commission decision 2010/93/EC.

Variable Data sources and methodologies	Variable Data sources and methodologies
Value of landings total and per Commercial species	Logbook/Landing declaration, Coastal Journal and salesnotes. Since all quantity in a landing does not necessarily end up in a salesnote, 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 (no demanded 2010)
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 national programme.

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 base and not on a regular base.

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

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

III.G Research surveys at sea

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

During 2012, Sweden has as planned undertaken five surveys in the Baltic Sea, Kattegat and Skagerrak. The Danish R/V DANA was chartered for all Swedish surveys during the year and complemented with R/V Hålabben in the Sound.

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

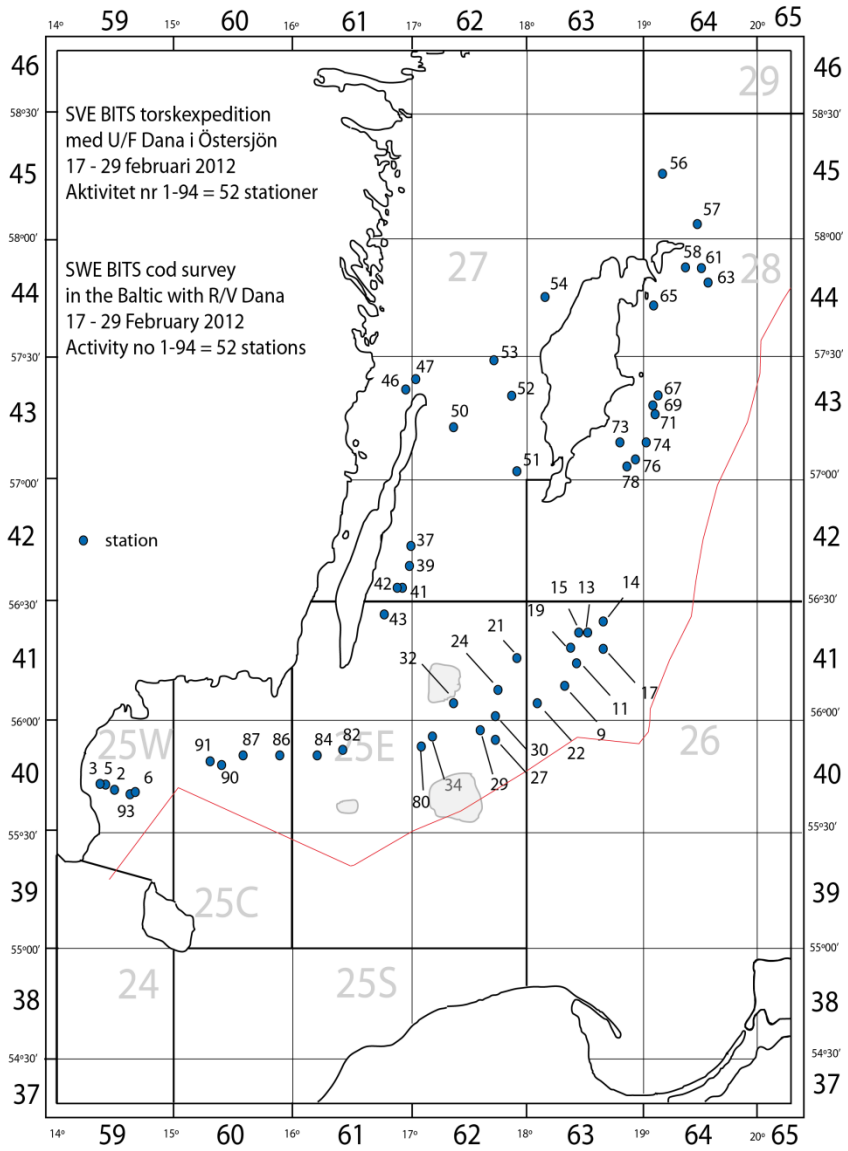
A description of the different surveys undertaken in 2012 follows below and a summary is also presented in table III.G.1.

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
The survey was conducted during the period 15/2 – 1/3 using the TV3 demersal trawl according to the BITS manual (Anon., 2010). Hålabben used a down scaled TV3 930 trawl, to 30 % of original size, on the 25-26 of January. Overall, 52 valid fish hauls (50 with Dana and 2 with Hålabben) were made (including eight 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 whole survey, acoustic data were continuously recorded. The fish hauls were randomized from the Tow Database and these hauls were completed within 16 (Dana) and 2 (Hålabben) days at sea (Map1). The two fish hauls in the Sound are stationary and indicated in Map 4.

Almost all cod (totally 15 499) were measured and otoliths from 877 individuals were taken. From the catch of flounder (totally 6 677), otoliths were taken from 1 306 individuals. Overall, 20 fish species were caught during the survey and the catch was dominated by herring, sprat, cod and flounder, in terms of weight. In the Sound, individual weight and maturity stage of 170 cod and 18 plaice was measured and otoliths were taken. In total 15 species were caught.



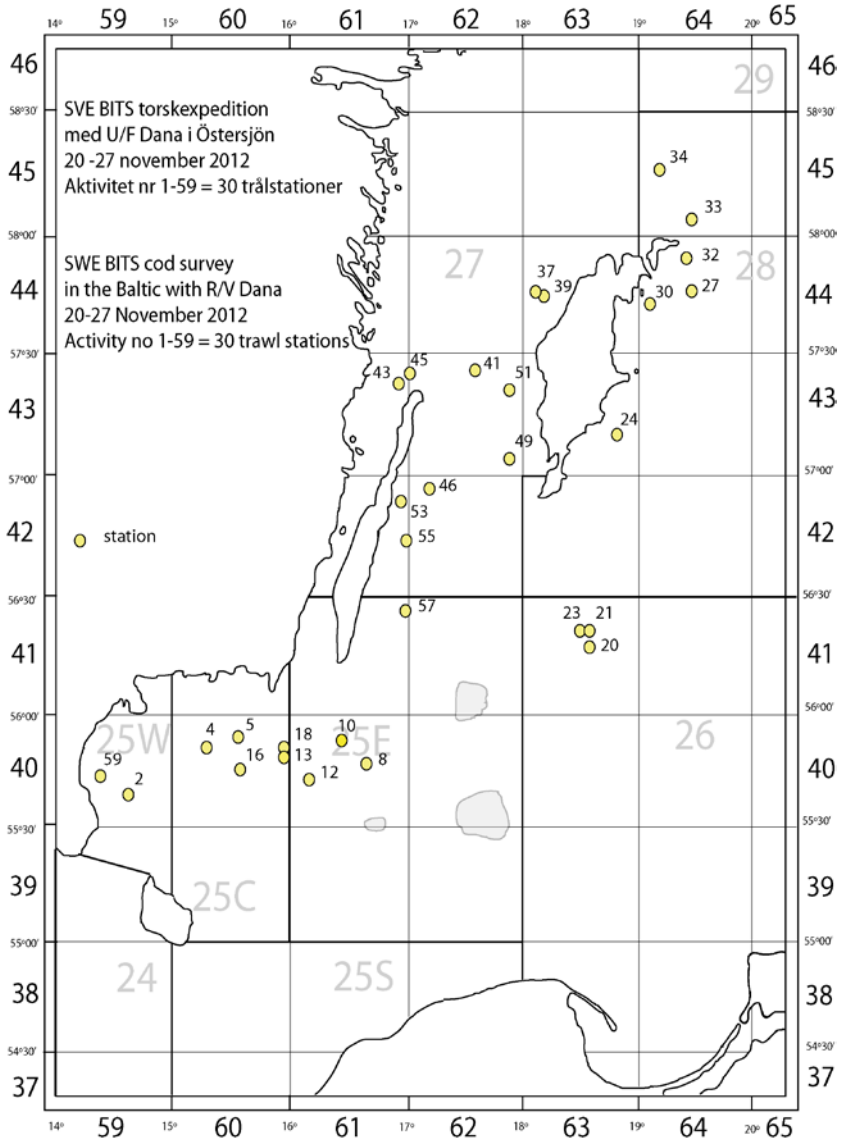
Map 1. Trawl stations BITS first quarter survey 2012.

BITS fourth quarter

The survey was conducted during the period 20-27/11 using the TV3 demersal trawl according to the BITS manual (Anon., 2012a). Sweden was assigned 30 randomly selected hauls in SD 25, 27 and 28 from the Tow Database. These hauls were realized during this survey within 8 days at sea. Hålabben trawled in the Sound SD 23 on the 10th and 11th of September with the same gear as in January.

Overall, DANA made 30 valid hauls with TV3L demersal trawl (Map 2) (including 12 fictitious hauls which were not trawled due to oxygen concentration close to the bottom was <1.5 ml/l). During the whole survey, acoustic data were continuously recorded. Hålabben made 2 valid hauls on the stations indicated in Map 4.

Of the 17 011 cod caught, a majority was measured and otoliths were taken from 616 individuals. Flounder, of which 1 946 were caught, was also analysed and otoliths were taken from 844 individuals. Overall, 16 fish species were caught in the Baltic during the survey and the catch was dominated by herring, cod, sprat and flounder, in terms of weight. Onboard Hålabben individual weight of 205 cod and 40 plaice were recorded and their otoliths were stored. In total 12 different species were caught.



Map 2. Hauls with TV3L demersal trawl, BITS fourth quarter survey 2012 with DANA

BIAS Baltic International Acoustic Survey

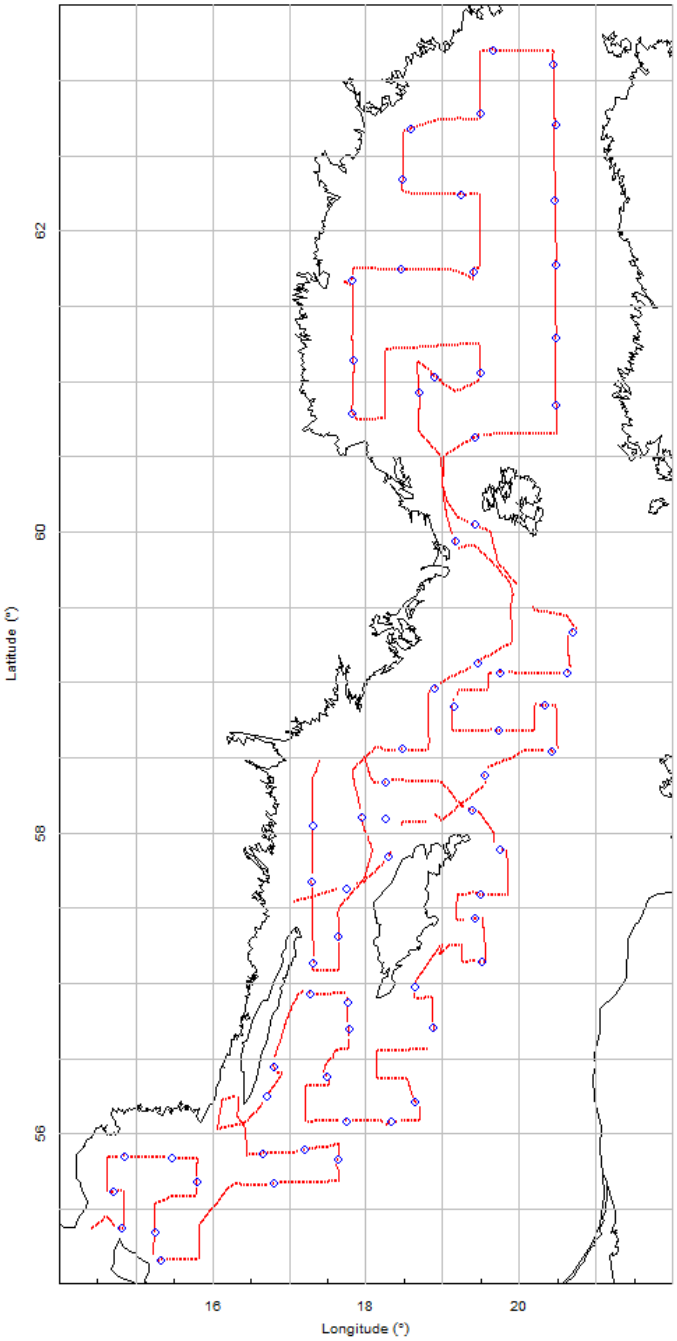
The main objective of the survey is to assess clupeoid resources in the Baltic Sea.

The R/V Dana cruise started 03/10 from Hirtshals with transit to Gåsöfjärden for calibration and boarding of the scientific crew. The cruise ended 22/10 in Copenhagen after in total 20 days at sea. All trawl hauls were made using the Fotö pelagic trawl with 6 mm mesh bar in the codend. In total 71 trawl hauls were carried out and the cruise covered ICES subdivision 27, 30 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 4 218 herring and 2 080 sprat.

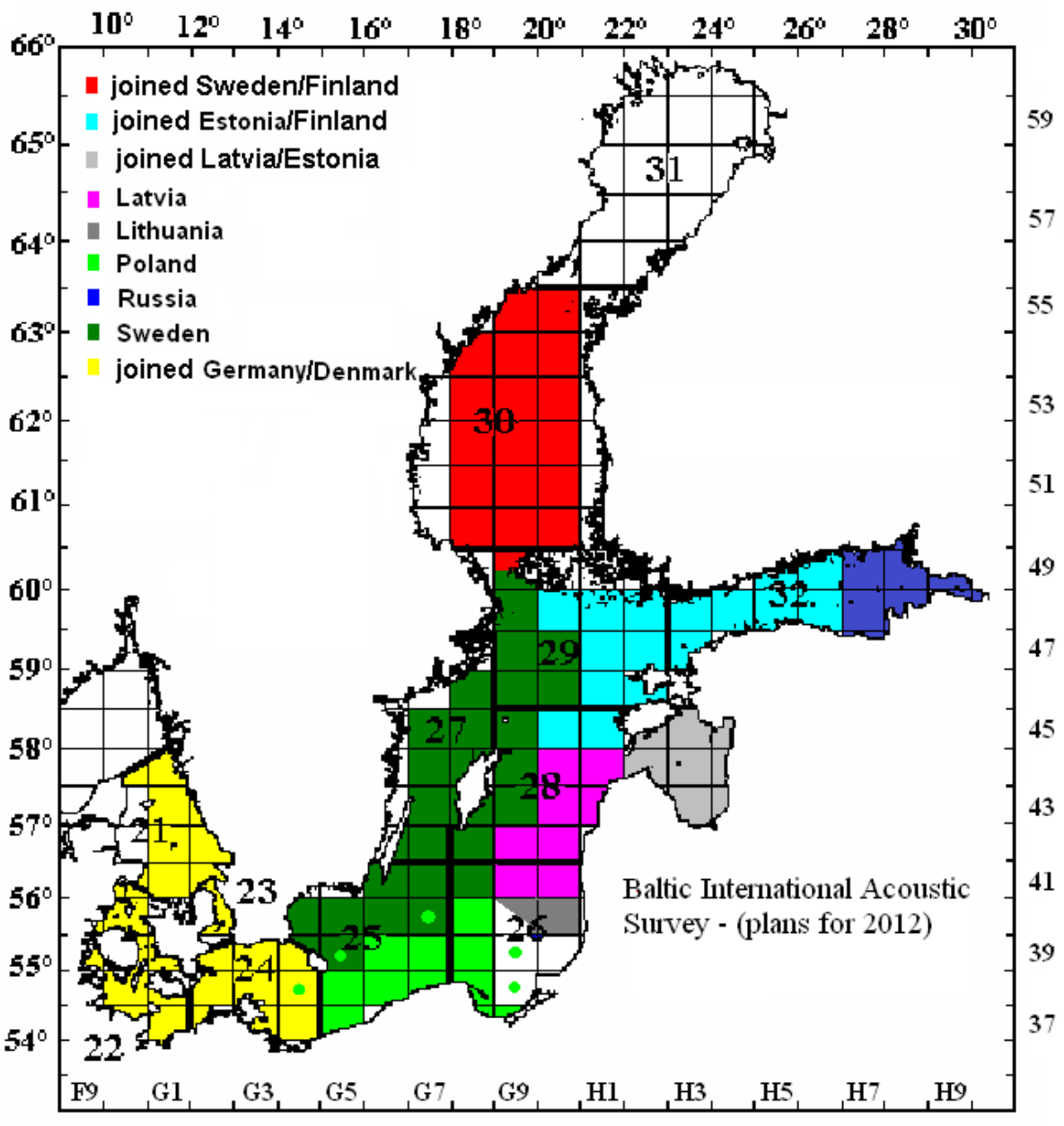
The surveys in September/October are coordinated within the frame of the Baltic International Acoustic Surveys (BIAS) and run in collaboration with Finland that is responsible for the sub-area SD30. Finland will present the results for SD30 in more detail in their own national report. Data are stored in “Fish sample database” (SLU) and sent for international data storage to WGBIFS in the

BIAS database. The present survey provides data to the ICES Assessment Working Group (WGBFAS). Data is also available to be uploaded in FishFrame.

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 1441 nautical miles of acoustic data collection and approximately 52 hauls. The achieved number of nautical miles was 1492 and 51 hauls was made. Unfortunately there was an error in the table where the originally planned figures was reported, it stated 2000 nautical miles and 50 hauls, thus the number of planned acoustic data collection should have been 550 less than written in that table. The Swedish BIAS survey achieved 104% of the number of needed acoustical data and 98% of the hauls that should have been made in the Swedish area SD 25 to 29.



Map 3. Survey grid and trawl positions of R/V Dana during BIAS survey 2012



Map 4. Survey plan map for BIAS survey 2012 (WGBIFS)

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

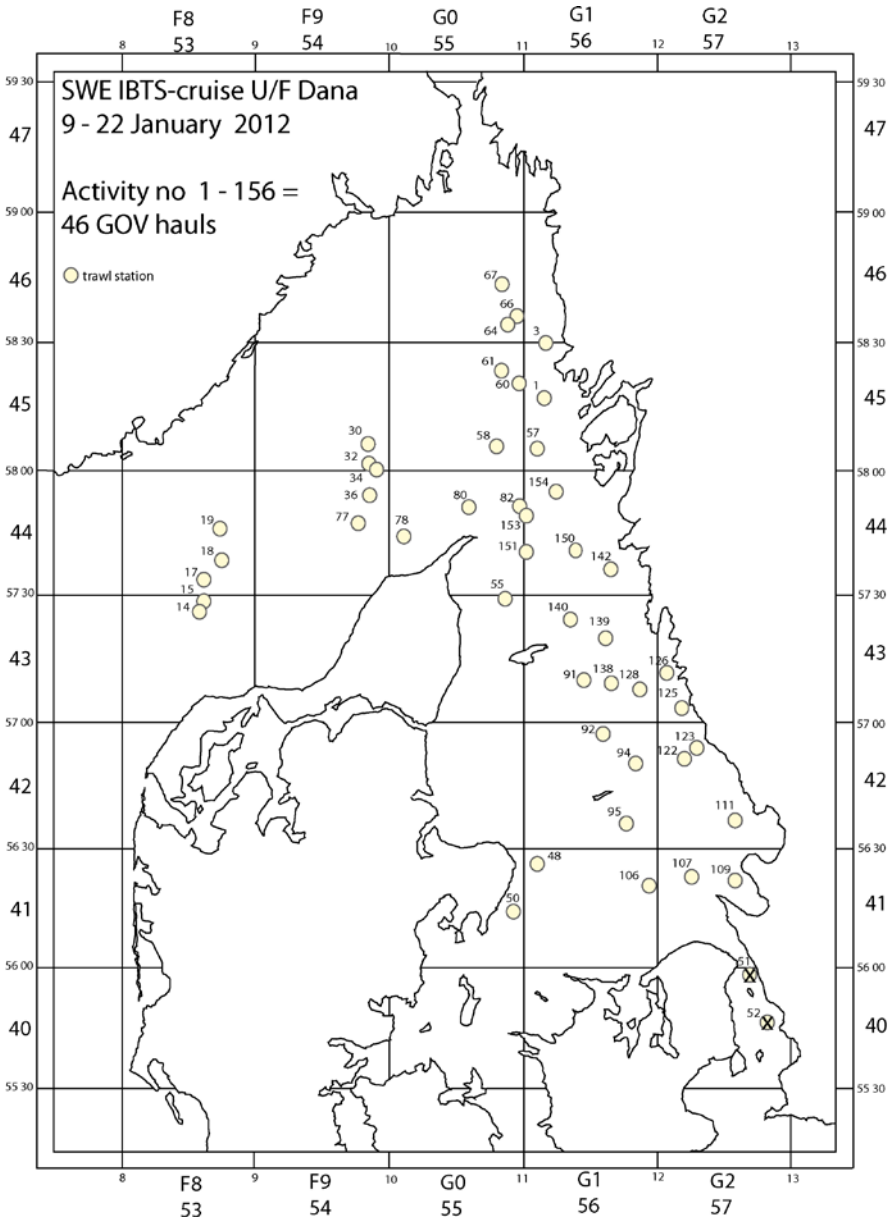
The main aim of the survey is to estimate abundance of commercial (cod, haddock, whiting, Norway pout, herring, sprat, saithe and mackerel) and noncommercial fish. Moreover, the otoliths of the commercial species are stored and subsequently analysed in order to assess abundance by age, in particular 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 using R/V Dana between 8-23/1 and the GOV demersal trawl according to the IBTS manual (Anon., 2006). In total, 46 valid hauls were towed during this survey within 16 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 58 valid trawl hauls with catches of 957 herring larvae and two eel larvae and several other species.

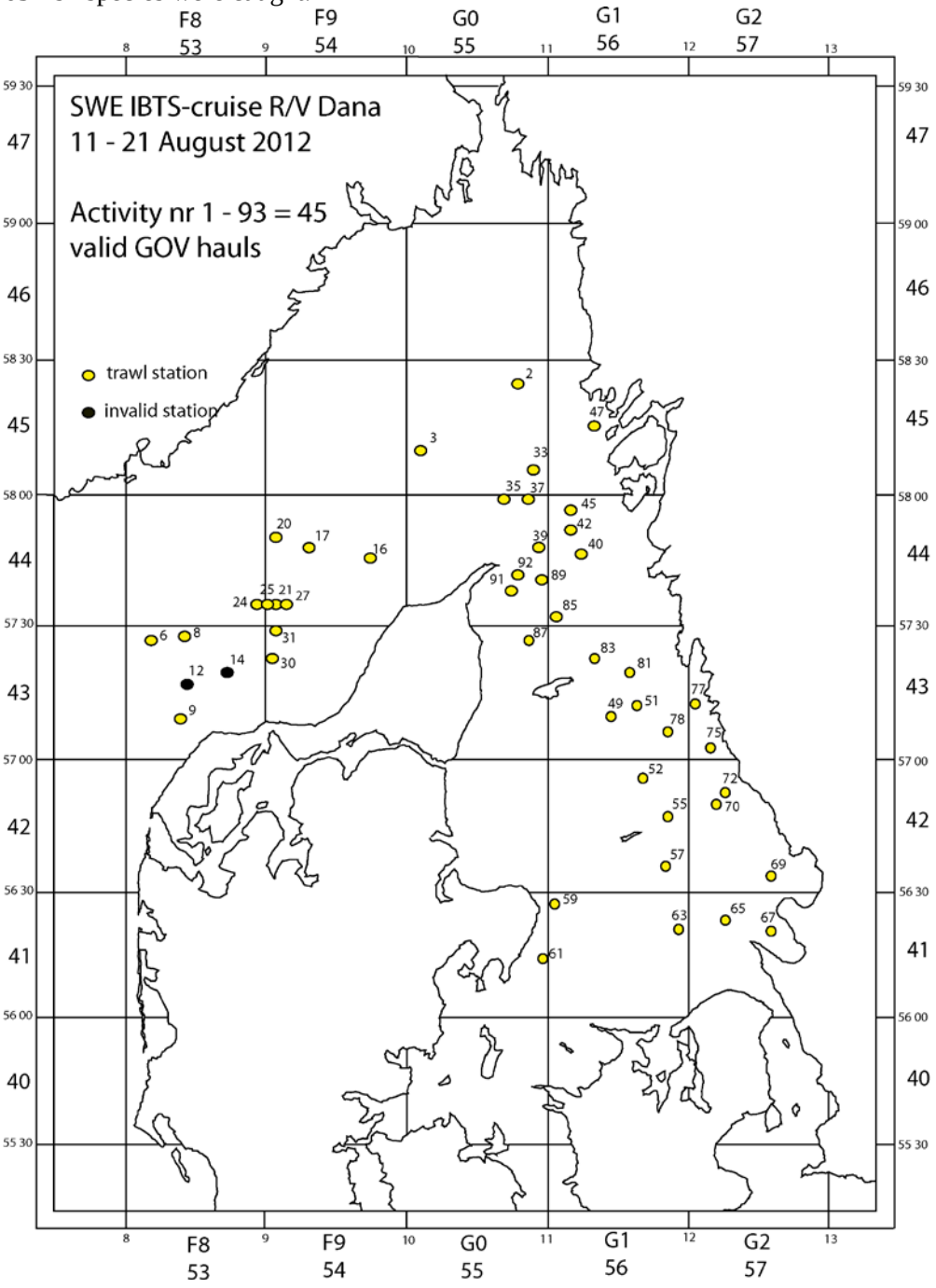
For the Kattegat and Skagerrak area, the biological sampling, which includes collection of otoliths for age analysis, was done on the most important commercial species. In total 5 371 otoliths were collected from nine different species. Overall 63 fish species were caught.



Map 5. Hauls with GOV demersal trawl IBTS first quarter survey 2012. The two hauls taken during BITS first and third quarter in the Sound are indicated by a crossed circle.

IBTS third quarter

The survey was conducted using R/V Dana during the period 10-22/8 and the GOV demersal trawl according to the IBTS manual (Anon., 2006). All planned hauls could be made within 13 days at sea. In total 45 valid hauls were made. R/V Dana covered the Skagerrak/Kattegat area (Map 6) and the biological sampling, which includes collection of otoliths for age analysis, was done on the most important commercial species. In total 4 398 otoliths were collected from 11 different species. Overall 63 fish species were caught.



Map 6. Hauls with GOV demersal trawl IBTS third quarter survey 2012.

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 lead 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*.

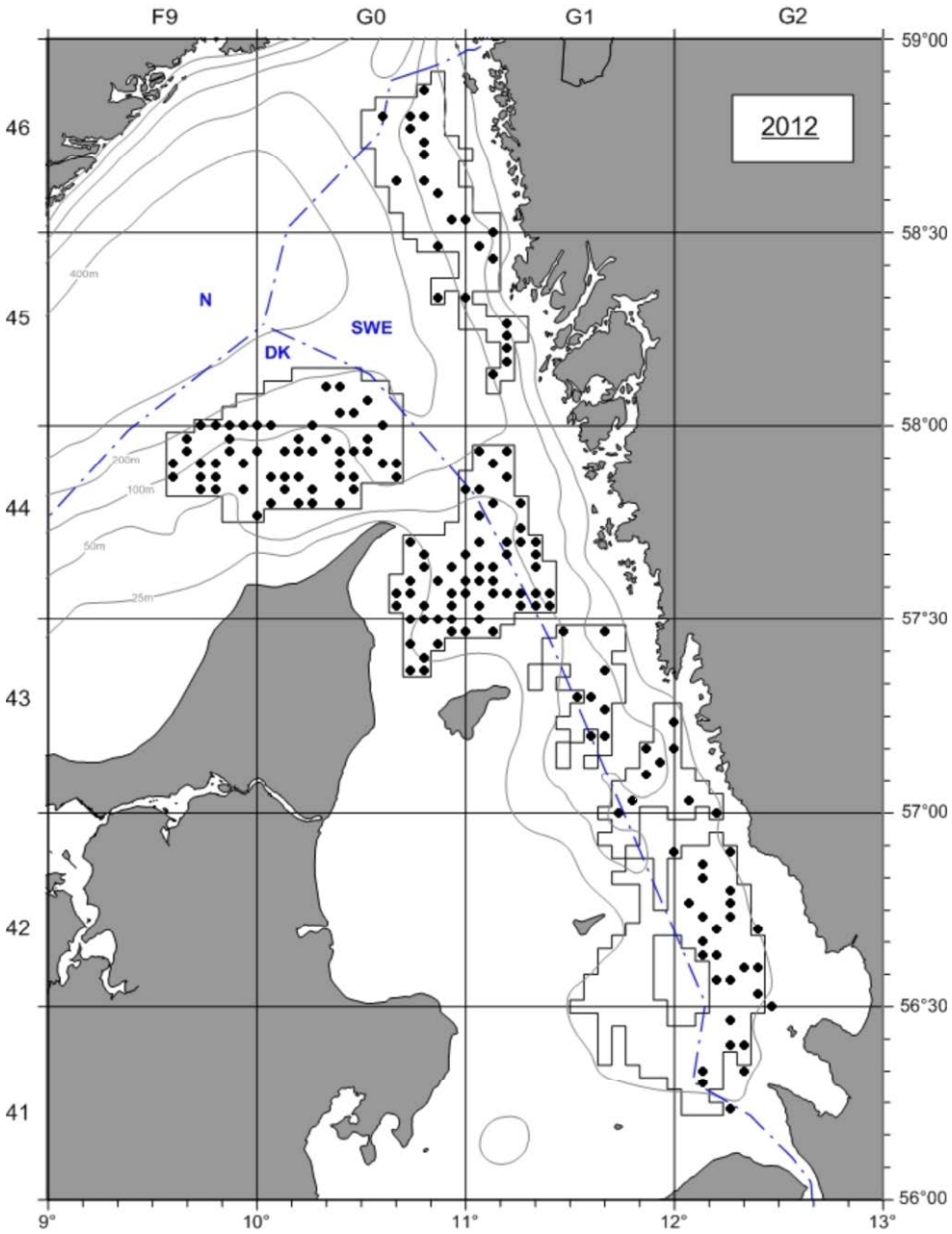
The Swedish and Danish *Nephrops* fishery has got an increasing economic importance in recent years and it was agreed that Denmark and Sweden start a joint UWTV survey at around 90 stations on *Nephrops* grounds in the Skagerrak and Kattegat.

The UWTV survey during 2012

The 2012 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 simplify the handling of the sledge and made it even possible to conduct the survey with one person on deck.

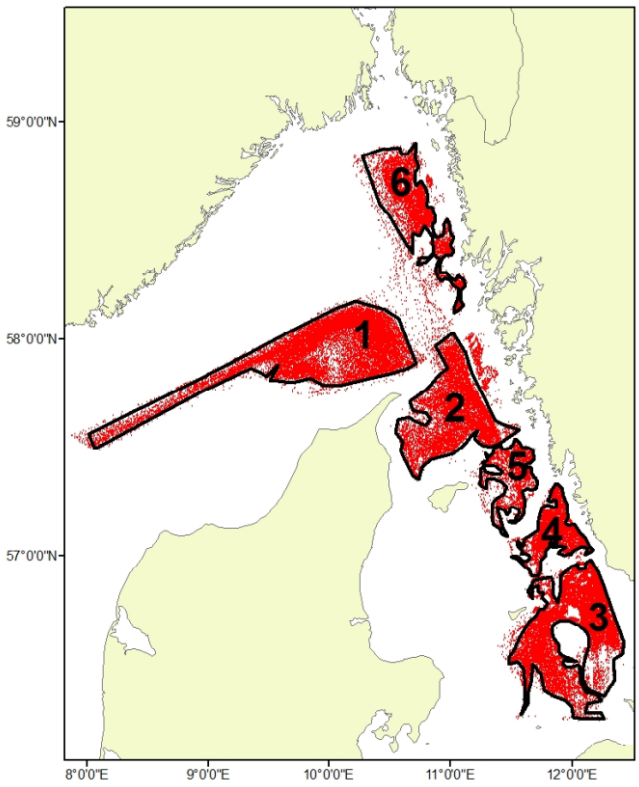
The 2012 TV survey was conducted during the period 8/5 – 30/5 using the Danish sledge on the Swedish UWTV vessel and resulted in 71 valid hauls in sub division IIIa (27 hauls in area 3, 9 in area 4, 8 in area 5 and 27 hauls in area 6) (Map 7). Four stations were considered not valid due to turbidity and low visibility. 6 out of total 15 days were not used due to bad weather conditions and the survey was carried out on 9 days at sea.

Subarea	Area (km^2)	Number of valid sledge hauls, See Map 7.
1	3 079	
2	1 905	
3	2 462	27
4	676	9
5	670	8
6	1 289	27
IIIa	10 081	71



Map 7. Showing all visited sledge stations during 2012.

The distribution of the *Nephrops* stock in IIIa (Skagerrak and Kattegat) was estimated from Danish and Swedish VMS data from *Neprops* trawler (>15 m) with landings consisting of at least 50% *Nephrops*. The *Nephrops* grounds in IIIa has been divided into six sub areas 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 establish the quality. Sweden is following the written manuals and is actively taking part in quality work done in the WGBIFS and WGIBTS.

For the new UWTV survey deviation from the target of 90 hauls can be noted and was due to bad weather conditions. This survey is rather sensitive to weather and wave conditions, which might limit the possibility of reaching targets.

Sweden had to redraw from its earlier economical support of the coverage of SD30 in the BIAS 2012 survey, and therefore is SD 30 not included in all of the figures presented by Sweden in this document or in the table report. The BIAS survey in SD30 was run as a joint survey with Finland but the results are analyzed and presented by Finland.

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

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

III.G.4 Actions to avoid shortfalls

A misunderstanding concerning permission for Sweden to visit Danish waters with the UWTV survey delayed the process and Sweden did not get the permission in time in the 2012 survey. Therefore, all 90 stations could not be taken during 2012. For coming years, the permission needed for conducting the survey will be organized and taken care of in due time before the survey.

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 2010 was collected and compiled by Statistics Sweden in cooperation with the Swedish Board of Agriculture and the Swedish Agency for Marine and Water Management in 2012. 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 and 2010 (see section IV.A.2 for a description of possible shortfalls for the reference years 2009 and 2010 and actions undertaken to ensure good quality of data in forthcoming data collection).

All three parts were implemented and compiled by Statistics Sweden in 2012.

Reported segments- confidentiality
The planned segmentation, as presented in the National Programme 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 is different from the one proposed in the National Programme 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. 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 2010	Farming technique/Species
Land based farms, on growing and combined (Salmon and Brown trout)	15	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)	42	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)	63	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)	33	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 and 2010. 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 (from 2011) and merged with Q1 (from 2012). 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, 2009 and 2010 are consistent and ensure full comparability.
- The questionnaire Q2 will be sent out on a yearly basis (from reference year 2011) and merged with Q1 (from reference 2012) 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 the Swedish Agency for Marine and Water Management have been working on this task and were able to include crayfish farming for the reference years 2009 and 2010. 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 which is maintained by Statistics Sweden. One variable where collected through questionnaires by Statistics Sweden based on PPS-selection in the Statistical Business Register. The variable collected through questionnaires is subsidies. The questionnaires are the base for estimating an allocation key for variables not included in the financial accounts. The questionnaire was sent to 15 firms and 13 firms responded. The frame population has 219 companies and Statistics Sweden ensures representativeness in terms of firm size and structure and decided on the appropriate sampling method and sample size for the questionnaireThe total sum of costs and total sum of income is unaffected. 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

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

No shortfalls or deviations exist in relation to what was stated in the national programme. 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 financial accounts by Statistics Sweden and 87% for the variable (subsidies) obtained from the allocation key survey. Comprehensive validations were made during the compilation of the data and figures were cross checked with other data sources when possible.
Verify. A possible shortfall is that although data is collected, processed and ensured by Statistics Sweden, some variables are not available through financial accounts. The variable affected by this possible shortfall is subsidies (as described above).

Furthermore, enterprises are sometimes confusing energy cost with raw material implying that Statistics Sweden has to make calculations and cross check other data sources to calculate an accuracy indicator for energy cost.

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 an own stratum, implying that the questionnaire to estimate subsidies and energy costs in 2010 has been sent out to 15 enterprises, compared to 12 during 2009. The response rate was 87 per cent and 83 per cent respectively. The Swedish Board of Agriculture is working on the task to obtain subsidies from administrative records rather than through a yearly survey.

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 2012 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 2012. 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 datacalls are listed in table VI.1.

The development of databases during 2012 included projects for the Fish sample database and the database for Coastal Fish at SLU and for the data collection of economic and transversal data at the Swedish Agency for Marine and Water Management (SvAM).

The development phases for the Fish sample database database during 2012 covered:

- Development of the data entry routines. The first release of the updated database was launched in June 2012 and the development has continued thereafter.
- Development of reports. The first set of updated reports was launched in June 2012 and thereafter the development has continued to cover the essential reports.

The development phases for the database for Coastal Fish during 2012 covered:

- Continued work with the conversion of old data
- Minor improvements of the data entry system.
- Rebuilding of the data warehouse for reporting of the fish sample data from Oracle to Microsoft platform

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 2012 covered:

Fishing sector

- Continued development of data entry routines. This work has been the main focus for the development of the system for the data collection of economic data during 2012.
- Minor development of a data warehouse for the reporting of economic data. During 2013 the focus will shift to the data warehouse development.

Processing industry

- Minor development has been done.

Aquaculture industry

- Minor development has been done.

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 2012 covered:

- Continued work with the design phase of the project. Additional design work is needed, but an incremental development of the system is planned to start latest during Q3 2013.

Also 2012, the project for the data collection of economic and transversal data suffered from shortage of business personal resources due to the reorganization that was made first of July 2011. Therefore these projects have not advanced as fast as planned and the number of working hours has not been as many as planned during 2012. Due to shortage of IT internal resources the costs for IT consultants has been higher than planned.

During 2012 a project was also set up to migrate the Biological databases from SwAM to SLU. The project was successful and the database is from 1st of January 2013 based at SLU. However, this project was not financed by DCF.

VI.2 Actions to avoid shortfalls

As a consequence of the reorganisation, the planning of staff was 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 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 métier/ 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 métiers, 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 tableIV.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 segements in table III.B.1, IV.A.2 ans 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 I.
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***	THE DISCUSSION HAS STARTED WITHIN SWEDEN AND A PROJECT WILL BE SET UP IN 2013 TO SEE HOW THIS COULD BE MET IN AN EFFECTIVE WAY ON A LEGAL BASIS.
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.***	THE DISCUSSION HAS STARTED WITHIN SWEDEN AND A PROJECT WILL BE SET UP IN 2013 TO SEE HOW THIS COULD BE MET IN AN EFFECTIVE WAY ON A LEGAL BASIS.

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
DCR	Data Collection Regulation
DCF	Data Collection Framework
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
JRC	Joint Research Centre
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
kW	kilowatt
LOA	Length overall
NIPAG	The joint NAFO/ ICES Pandalus Working Group
NP	National Programme
NA	Not applicable
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
WGBIFS	ICES Baltic International Fish Survey Working Group
WGBAST	Baltic Salmon and Trout Assessment Working Group
WGBFAS	ICES Baltic Fisheries Assessment Working Group
WGEEL	Working Group on Eels
WGECO	Working Group on Ecosystem Effects of Fishing Activities
WGFAST	ICES Working Group on Fisheries Acoustic Science & Technology
WGNSSK	ICES Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerak
WKCOST	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

Anon. 2003. Game and recreational fishery in Sweden. Pilot study. Report by the Swedish Board of Fisheries dated 10 October, 2003.

Anon. 2006. Manual for the International Bottom Trawl Surveys, Revision VII. Annex 1 IBTS North Sea Manual. ICES WGIBTS Report 2006.

Anon., 2010. Manual for the Baltic International Trawl Surveys. Addendum 1: WGBIFS BITS Manual 2010. ICES C.M. 2010/ SSGESST:07.

Anon 2012 a. Report of the 9th Liaison Meeting, Meeting between the Chairs of the RCMs, the chair of ICES PGCCDBS, the chair of PGMED, the ICES representative, the Chairs of STECF DCF EWG's and the European Commission, DG Maritime Affairs and Fisheries, Brussels, Belgium, 24th to 25th September 2012

Anon 2012b. Report of the Regional Co-ordination Meeting for Baltic Sea, 2012. Gdynia Poland , 10th to 14th September 2012.

Anon 2012c. Report of the Regional Co-ordination Meeting for the North Sea & East Arctic, 2012. Oostende, Belgium, 3rd to 7th September 2012.

FIFS 2004:36. Fiskeriverkets Författningssamling. Swedish legislation

Efron, B. & Tibshirani, R.J. 1993. An introduction to the Monographs on Statistics and Applied Probability no. 57. Chapman & Hall. 436 pp.

Øresland, V. (2012). Cod catches onboard Swedish tour boats in the Sound during 2011. Aqua reports 2012:2. Swedish University of Agricultural Sciences, Lysekil, 19 pp.

XI Annexes

Annex I

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
```