

ICES PGEGGS Report 2007

ICES Living Resources Committee

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Report of the Planning Group on North Sea Cod and Plaice Egg Surveys in the North Sea (PGEGGS)

By Correspondence



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1 Executive summary

The Planning Group on North Sea Cod and Plaice Egg Surveys (PGEGGS) was set up to address the fact that there had never been a complete ichthyoplankton survey of the North Sea. In particular, the need to monitor commercial fish spawning areas was identified by the Expert Panel which followed the Bergen Ministerial Meeting. Although spawning grounds can be monitored to some extent by adult trawl surveys, ichthyoplankton surveys have a number of potential advantages. Since individual fish spawn thousands of eggs it is often more reliable to sample the eggs rather than the adult fish and surveying spawning grounds of species producing planktonic eggs is also not restricted by bottom-type so a more complete spatial coverage can be achieved. In addition, if the area can be repeatedly surveyed over the spawning period, an estimate of total annual egg production can be made. When combined with fecundity data, such estimates are useful as additional stock assessments and can act as a validation of stock assessments made using standard methods based on commercial fisheries data.

Because of the current poor state of the cod and plaice stocks, it was decided to focus on those species. Given the scale of the proposed ichthyoplankton survey it was hardly surprising that it took several years to organise but finally in 2004 the field-work was undertaken. This work has now resulted not only in the most complete maps of cod and haddock spawning areas in the North Sea ever produced but also distribution maps of several other species of interest, in an egg-production estimate for plaice in the southern North Sea and new insights into the relationship between hydrography and fish egg and larval distributions.

Clearly a single survey, even of the scale undertaken is of limited value since we need to build up a picture of changes over time. This is especially relevant as we are most probably entering a period of rapid environmental change that may exacerbate the conservation challenges of dealing with low stock sizes for valuable species such as cod and plaice.

Following a meeting of PGEGGS in Copenhagen (22–24 November 2005) and the adoption of the latest ToR, the group was asked to work by correspondence to begin planning for a repeat survey in 2009. Because PGEGGS relies upon national support to undertake field work, the countries who participated in the 2004 survey, plus France, were contacted.

2 Opening of the meeting

There was no physical meeting of PGEGGS between September 2006 and June 2007.

3 Adoption of the agenda

The ToRs for September 2006 – June 2007 (Annex 2) were that PGEGGS should work by correspondence to:

- a) produce published outputs based on data collected during the 2004 North Sea Egg Surveys, and prepare for publication as an *ICES Cooperative Research Report*;
- b) investigate and report on long-term archiving of the survey data at the ICES Data Centre;
- c) undertake initial planning for a North Sea ichthyoplankton survey in 2009.

PGEGGS should report by 30 June 2007 for the attention of the Living Resources and the Resource Management Committees. This delivery date was delayed by one month to allow sufficient responses to the request for 2009 survey support.

4 Participants

A list of participants is given at Annex 1 of this report. As work progresses towards the next survey in 2009, participants from each country may change. However, Annex 1 presents the contact details of the current corresponding representatives of each country as well as those persons involved in PGEGGS to date.

5 Overall aims

PGEGGS is currently at an intermediate stage between the successful survey of 2004 and the next recommended survey in 2009. The ToRs therefore refer to making full use of the results obtained in 2004 and progressing the initial planning of a possible survey in 2009.

6 Progress with publications of results from the 2004 survey (ToR a)

The ICES Cooperative Report was published in May 2007 as Taylor, N., Fox, C. J., Bolle, L., Dickey-Collas, M., Fossum, P., Kraus, G., Munk, P., Rolf, N., van Damme, C., and Vorbach, M. 2007. Results of the spring 2004 North Sea ichthyoplankton surveys. ICES Cooperative Research Report, 285. 59 pp. This report contains results for all species except those identified using gene-probes which have previously been published as Fox, C., Taylor, M., Dickey-Collas, M., van Damme, C. J. G., Bolle, L., Daan, N., Rohlf, N., Kraus, G., Munk, P., Fossum, P., and Bailey, N. 2005. Initial results from the 2004 ichthyoplankton survey of the North Sea. International Council for the Exploration of the Seas, ICES CM 2005/AA:04, 40 pp.

A manuscript was submitted on the spawning patterns of cod to Nature in 2006 but was not accepted although reached the review stage. It is planned to resubmit the paper to Proceedings of the Royal Society Series B. Discussions with Peter Wright (FRS) have led to a significant development. In the original analysis there was a major mismatch between spawning areas identified from the egg surveys (close to historical patterns) and those identified on the basis of Q1 IBTS data raised by maturity (indicating most egg production in the northern North Sea). This discrepancy appears to be due to the maturity at age of North Sea cod in 2004 being substantially younger than assumed by the assessment Working group. When IBTS catches are raised using new maturity data collected by P Wright, there is essential matching in the location of spawning grounds between the two methods. This does however suggest that the majority of eggs being produced are from first time spawning fish with possible implications

for egg and larval quality. It also implies a possible evolutionary impact of fishing on age of maturity of North Sea cod which may be hard to reverse.

Further manuscripts describing the egg based plaice biomass estimate and relationship between hydrography and egg and larval distributions have been promised by PGEGBS members.

7 Progress with archiving of 2004 data (ToR b)

Substantial progress on this issue has not been achieved. Clive Fox contacted the ICES data management team to discuss this issue. The response was that if data could be got into a form suitable for inclusion in DATRAS then it could be imported relatively easily. Unfortunately the data from these surveys are complex due to the sub-sampling, use of genetic probes and other issues such as species coding. The ideal approach to this problem would be for Clive Fox to spend a week at ICES to work with the database team to translate the data into a suitable format. However, funding this is an issue since Clive Fox is no longer employed in a government fisheries laboratory. We recommend that this issue is reviewed if there is a physical meeting of PGEGBS in 2007/2008 and action initiated to ensure long-term archiving of the data.

8 Undertake initial planning for a North Sea ichthyoplankton survey in 2009 (ToR c)

Representatives of the various participating countries from 2004 plus another who has expressed interest (France) were contacted (Annex 3). Responses have been generally positive but in several cases will be dependent upon securing national ministry funding.

COUNTRY	RESPONSE
England	Verbal commitment to provide up to 21 days ship time, support for sample analysis and gene-probe work not yet given
Scotland	14 days seetime plus sample analysis offered
Germany	Samples from herring larval survey can be analysed for plaice eggs (03.01. – 17.01.09) Potential of additional seetime subject to negotiation with funders
France	- 24/24h CUFES, one sample per hour or half-hour during the month of February (during the French IBTS survey). - might be able to provide fish egg identification staff (conditional to PhD student, decision known in July) - will be able to provide quantitative data (no of eggs/m3). - will be able to provide comparison data with about 50–60 vertical trawls using plankton net (using the same mesh as the CUFES)
Netherlands	Lobbying funders for support, IMARES support the survey
Denmark	Wish to be kept informed but unsure if can provide support at present
Norway	Willing to provide same level of seetime and staff support as in 2004

We concluded that there is sufficient interest and potentially resources to enable an egg and larval survey of the North Sea to be conducted in 2009.

We therefore reiterate the recommendations from the previous PGEGBS report and recommend that a physical meeting is convened in late 2007 or early 2008 to move forward the planning process.

- a) A North Sea ichthyoplankton survey should be conducted every five years for the purpose of monitoring changes in spawning grounds in relation to environment. The next survey should therefore take place in 2009.
- b) That PGEGBS should begin the process of planning for such an exercise in 2009.

- c) That every effort be made to undertake sufficient repeat surveys to allow estimation of total egg production for target species (cod and plaice).
- d) That at least three repeat surveys of cod eggs be undertaken in the northern North Sea to explore the reproductive contribution of the mature cod which are supposed to be clustered in that area.
- e) That renewed efforts be made to standardise plankton sampling gear to be used on such surveys.

Annex 1: List of participants

NAME	ADDRESS	PHONE	EMAIL
Clive Fox (Chair)	Scottish Association for Marine Science Dunstaffnage Marine Laboratory, Oban, Argyll PA37 1QA	+44 1631 559423	clive.fox@sams.ac.uk
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* indicates representative contacted concerning national commitment to a survey in 2009.

Annex 2: Terms of Reference for 2006–2007

The **Planning Group on North Sea Cod and Plaice Egg Surveys** [PGEGBS] (Chair: C. Fox, England) will meet by correspondence during 2006–2007 to:

- a) produce published outputs based on data collected during the 2004 North Sea Egg Surveys;
- b) investigate long-term archiving of the survey data at the ICES Data Centre;
- c) undertake initial planning for a North Sea ichthyoplankton survey in 2009.

PGEGBS will report by 30 June 2007 for the attention of the Living Resources and the Resource Management Committees.

Supporting Information

PRIORITY:	The current activities of this Group will ensure that the results of the 2004 North Sea Egg Survey are widely publicised and made available to interested groups such as REGNS. The planned 2009 surveys are important in that they will confirm finding from 2004 in relation to locations of cod spawning and further investigate whether cod in the northern North Sea are actively spawning. It is also planned to attempt to produce an egg production estimate for plaice in the southern North Sea. These results are important in relation to on-going management issues with these two key commercial stocks. Consequently, these activities are considered to have a very high priority.
SCIENTIFIC JUSTIFICATION AND RELATION TO ACTION PLAN:	Action Plan: 1.2.1, 1.2.2, 1.8, 1.10 Terms of reference a) The rationale for establishing coordinated international North Sea ichthyoplankton surveys was presented in the report of PGEGBS which met in IJmuiden from 24–26 June 2003 and endorsed by the LRC. A successful survey was planned and undertaken in 2004 under the direction of PGEGBS. The results confirmed reduced egg production for plaice compared with earlier surveys and raised important scientific questions regarding effective cod spawning areas. It is now vital that these results are made available to as wide an audience as possible and that data are made available to other WGs such as REGNS. Term of reference b) Particularly for cod the 2004 results need to be confirmed and in particular the apparent low egg production of northerly areas investigated. The situation should be monitored by regular surveys. Because of the cost of undertaking such surveys, PGEGBS has recommended that they be undertaken every 5 years. Monitoring spawning areas of main fish species has been recommended as a high priority for Ecosystem Based Approach to Management by the Bergen Declaration Meeting of Scientific Experts.
RESOURCE REQUIREMENTS:	The additional resource required to undertake additional activities by correspondence is negligible.
PARTICIPANTS:	See Annex 1
SECRETARIAT FACILITIES:	None.
FINANCIAL:	No financial implications.
LINKAGES TO ADVISORY COMMITTEES:	Data are required by the ICES Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak, and REGNS.
LINKAGES TO OTHER COMMITTEES OR GROUPS:	Links should be established with the Working Group on Zooplankton Ecology since additional plankton samples could be collected during the surveys at minimal extra cost. The value of such additional sampling should be explored in conjunction with WGZE.
LINKAGES TO OTHER ORGANIZATIONS:	No formal linkages

Annex 3: Copy of letter requesting support

DIRECTOR: PROFESSOR GRAHAM SHIMMIELD FRSE



SCOTTISH
ASSOCIATION
for MARINE
SCIENCE

To:-

From:- Dr Clive Fox
ICES Planning Group on Egg Surveys (PGEGGS)
c/o Scottish Association for Marine Science
Dunstaffnage Laboratory, Oban
PA37 1QA

Dear

1. In 2004 your laboratory participated in an ichthyoplankton survey to map the spawning areas of cod and plaice in the North Sea co-ordinated by the PGEGGS Expert group of ICES.
2. This major exercise was successfully undertaken and a preliminary report can be found at ICES CM 2005/AA:04. A data report is shortly to be released under the ICES Co-operative Research Series and peer reviewed manuscripts are being prepared for submission.
3. Under PGEGGS current TORs we are tasked with exploring, by correspondence, the practicalities of organising a second survey in early 2009.
4. A major issue to be resolved is whether sufficient temporal and spatial coverage can be attained to estimate and compare cod egg production levels in spawning grounds in the northern North Sea with those in the central and southern North Sea.
5. The purpose of this letter is to ascertain whether sufficient support exists at a national level to make it worth convening a full planning meeting this autumn.
6. I would be extremely grateful if you could indicate in writing if
 - a. Your national administration/laboratory will support the proposed 2009 survey
 - b. An approximate indication of how much research vessel time you may contribute (between Jan – April 2007)
 - c. Whether your institute is able and willing to provide post-cruise, plankton analysis staff
7. In cases where you are no longer responsible for PGEGGS within your organisation, I would be extremely grateful if you could pass this letter to the appropriate person.

Yours sincerely

Dr Clive J Fox (clive.fox@sams.ac.uk)
Chair PGEGGS

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Annex 4: Recommendations

RECOMMENDATION	ACTION
1. A meeting of PGEGGS be convened for late 2007 or early 2008 to plan the 2009 surveys	Chair of PGEGGS to action if ToR adopted by LRC in September 2007
2. Working Group on Zooplankton Ecology	PGEGGS requests advice on the value of collecting additional zooplankton samples during future North Sea ichthyoplankton surveys in 2009.
3. PGEGGS to discuss issue of archiving North Sea ichthyoplankton survey data and to present an action plan	Chair of PGEGGS to action if ToR adopted by LRC in September 2007

Annex 5: Proposed Terms of Reference for 2007–2008

The **Planning Group on North Sea Cod and Plaice Egg Surveys** [PGEGGS] (Chair: C. Fox, Scotland) will convene a meeting in late 2007 or early 2008 (venue and dates to be decided) to:

- a) take forward planning for a North Sea wide ichthyoplankton survey in 2009;
- b) to consider the advice from WGZE on the value of collecting additional zooplankton samples during future North Sea ichthyoplankton surveys in 2009;
- c) prepare an action plan to ensure archiving of data collected in 2004.

PGEGGS will report by XXXX 2008 for the attention of the Living Resources and the Resource Management Committees.

Supporting Information

PRIORITY:	The proposed activities of this Group will ensure that the results of the 2004 North Sea Egg Survey are secured for the long-term and progress planning for a repeat survey in 2009. The planned 2009 surveys are important in that they will confirm findings from 2004 in relation to locations of cod spawning and further investigate the level to which cod in the northern North Sea are actively spawning. It is also planned to attempt to produce an egg production estimate for plaice in the southern North Sea. These results are important in relation to on-going management issues with these two key commercial stocks. Consequently, these activities are considered to have a high priority.
SCIENTIFIC JUSTIFICATION AND RELATION TO ACTION PLAN:	<p>Action Plan: 1.2.1, 1.2.2, 1.8, 1.10</p> <p>Terms of reference a)</p> <p>The rationale for establishing coordinated international North Sea ichthyoplankton surveys was presented in the report of PGEGGS which met in IJmuiden from 24–26 June 2003 and endorsed by the LRC. A successful survey was planned and undertaken in 2004 under the direction of PGEGGS. The results confirmed reduced egg production for plaice compared with earlier surveys and raised important scientific questions regarding effective cod spawning areas.</p> <p>Term of reference a) Particularly for cod the 2004 results need to be confirmed and in particular the apparent low egg production of in northerly areas investigated. The situation should be monitored by regular surveys. Because of the cost of undertaking such surveys, PGEGGS has recommended that they be undertaken every 5 years.</p> <p>Monitoring spawning areas of main fish species has been recommended as a high priority for Ecosystem Based Approach to Management by the Bergen Declaration Meeting of Scientific Experts.</p>
RESOURCE REQUIREMENTS:	No additional resources are requested at this stage
PARTICIPANTS:	See Annex 1 of PGEGGS Report
SECRETARIAT FACILITIES:	None.
FINANCIAL:	No financial implications.
LINKAGES TO ADVISORY COMMITTEES:	Data are required by the ICES Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak.
LINKAGES TO OTHER COMMITTEES OR GROUPS:	Links should be established with the Working Group on Zooplankton Ecology since additional plankton samples could be collected during the surveys at minimal extra cost. The value of such additional sampling should be explored in conjunction with WGZE.
LINKAGES TO OTHER ORGANIZATIONS:	No formal linkages

