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Stichting DLO
Centre for Fishery Research (CVO)

The Kennisbasis WOT Fisheries Programme carried out in 2011
Final Report

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Summary

The KBWOT Fisheries programme is core to the maintenance and development of the expertise that underpins the statutory obligations of fisheries monitoring and advice for the Netherlands. As the WOT obligations of the Netherlands change over time, the KBWOT programme remains flexible and responsive to developments and innovations in methods and policy needs. The core principles of the programme are maintaining expertise whilst being forward looking, ensuring value for money and strong collaboration with client ministries. The programme operates through long term projects (multiannual) and annual projects in response to scientific and societal needs. The KBWOT fisheries programme must operate within the context of the reform of the Common Fisheries Policy (CFP), the development of the EU marine strategy framework directive (MSFD) and the EU Maritime Policy.

In 2011 the KBWOT fisheries programme consisted of 14 projects. The programme centred on the research into the changes in marine ecosystems, the impact of fisheries on ecosystems and changing fisheries management. It also focused on maintaining and developing key expertise for the fisheries WOT programme and international exchange of scientists and technology to bring added value to the Dutch WOT fisheries programme.

The programme managed to combine operational research, aimed at some immediate challenges to EL&I, with more broad strategic research aimed at future policy development and research needs of EL&I. In the field of fisheries, many of these future needs come from existing or upcoming EU directives. Examples of operational research projects include an investigation mixed fisheries and targeting flatfish with MSY exploitation, investigating the impact of top predators on forage fish in the North Sea and building food web models that link fisheries with fish and benthos. Whereas work on the spawning habitat of mackerel, analysis of otolith shape, investigations of the long term growth and genetics of eel and research into fish reproduction illustrate the more strategic approach. KBWOT fisheries also provided resources to maintain the expertise that is required to carry out the WOT fisheries programme. Thus resources were given to projects that standardise fish ageing and maturity estimation techniques (maintaining standards in both are crucial to the maintenance of the quality of fish stock assessments). Likewise, the fisheries acoustic expertise and shellfish surveying techniques within WUR were underpinned through the programme.

Of the 14 projects funded in 2011, eleven were carried out in collaboration with European and North American partners. This provided a large amount of added value to the programme, as resources and expertise from other countries contribute to the WUR research strategy. Added value was also increased by combining KB funds with those from EU FP7 and Cost action projects (see FACTS). There is a component of the programme devoted specifically to international collaboration. This ensures that IMARES stays at the cutting edge of scientific developments and at the centre of fisheries research in Europe. This project, called international exchange, enabled IMARES colleagues to participate in studies of larval fish mortality, predator-prey interactions, ecosystem modelling, regime shifts in the North Sea, fisheries induced evolution, developing new methods for fish stock assessments, improving survey and fishing technologies, evaluating management measures for various fish stocks, marine biodiversity and surveying fish plankton, marine biodiversity.

The programme was also very productive in terms of publications, presentations and developing new methods or tools for fisheries research. Over 38 international presentations were given at working groups and symposia. 19 new methods or codes were developed including new approaches for investigating fish distributions, food webs, benthic linkages to fisheries, surveying shellfish, optical methods for investigating spawning origin of marine fish, new target strength estimates for acoustic surveys and methods to estimate the distribution and overlap of sea mammals and their prey.

Samenvatting

Het KB programma voor de WOT visserij levert de middelen voor het onderhoud, de ontwikkeling van kennis en expertise die nodig is om de WOT-visserij uit te voeren. Uitgangspunt van het programma is het handhaven van expertise waarbij tevens naar de toekomst wordt gekeken. Andere uitgangspunten zijn een kost effectieve programmering van het onderzoek en goede contacten met klant ministeries. Het programma bestaat uit zowel meerjarige als eenjarige projecten welke anticiperen op wetenschappelijke en maatschappelijke kennisbehoeften. Het is het noodzakelijk dat het KBWOT-programma flexibel blijft, kan inspelen op nieuwe beleidsbehoeften en de ontwikkelingen en innovaties in methoden en anticipeert op de hervorming van het gemeenschappelijk visserijbeleid, de ontwikkeling van de EU mariene strategie kaderrichtlijn (KRM) en het maritieme beleid van de EU.

Het KB-WOT visserijprogramma is geprogrammeerd rond een aantal thema's. In 2011 werden 14 projecten uitgevoerd rond 4 thema's: ecosysteem benadering van visserijbeheer, MSY beheersdoelstelling voor Noordzee platvis, onderhoud van kernexpertises en ontwikkeling en uitwisseling van kennis in internationaal verband. Door het uitwisselen van wetenschappers en technologie op internationaal niveau wordt een aanzienlijke toegevoegde waarde verkregen.

In het programma dat in 2011 is uitgevoerd, zijn we erin geslaagd om onderzoek, gericht op urgente vragen van EL&I te combineren met meer breed strategisch onderzoek gericht op de toekomst. Op het gebied van visserijbeheer zijn vooral bestaande of in ontwikkeling zijnde EU-richtlijnen richting gevend aan de te ontwikkelen toekomstige kennisbehoefte. Voorbeelden van onderzoeksprojecten gericht op actuele vragen waren gericht op de MSY (Maximum Sustainable Yield) benadering die sinds kort internationaal wordt toegepast op het beheer van visbestanden, onderzoek naar de impact van toppredatoren op prooivis in de Noordzee en het ontwikkelen van voedselketenmodellen met relaties tussen de visserij, vis en benthos. Meer strategische projecten waren gericht op de paaicondities van makreel, identificatie van subpopulaties aan de hand van de vorm van otolieten, historische veranderingen in de groei en genetica van paling en onderzoek naar de voorplantingsstrategie van vis.

Een deel van het KBWOT visserij budget wordt gebruikt voor het onderhouden van de expertise die nodig is de WOT visserij programma uit te voeren zoals standaardiseren, harmoniseren en verbeteren van technieken voor de bepaling van de leeftijd en geslachtrijpheid van vissen. Het handhaving van internationale normen hierbij zijn cruciaal voor de kwaliteit van toestandsbeoordeling van visbestanden en daarmee voor de kwaliteit van de advisering ten aanzien van het beheer. Ook de ontwikkeling en vernieuwing van akoestische expertise, die gebruikt wordt bij bestandsopnamen op onderzoeksvaartuigen, is ondersteund door het programma.

Van de 14 projecten die in 2011 werden gefinancierd (zie bijlage 1), werden er 11 uitgevoerd in samenwerking met Europese en Noord-Amerikaanse partners. Dit leverde een grote hoeveelheid toegevoegde waarde voor het programma omdat op deze wijze middelen en expertise uit andere landen bijdroegen aan het strategische WUR onderzoek. De toegevoegde waarde werd ook verhoogd door het combineren van KB fondsen met die uit het EU KP7 en COST. Een onderdeel van het programma is specifiek gewijd aan internationale samenwerking. Dit zorgt ervoor dat WUR op het snijvlak van wetenschappelijke ontwikkelingen en in het centrum van het visserijonderzoek in Europa blijft. Dit project, genaamd "international exchange", stelde WUR collega's in staat om deel te nemen aan de studies over sterfte van vislarven, predator-prooi interacties, ecosysteem modellering, regime verschuivingen in de Noordzee, visserij geïnduceerde evolutie, ontwikkeling van nieuwe methoden voor toestandsbeoordelingen van visbestanden, verbetering van survey- (inclusief plankton surveys) en visserij technologieën, evaluatie van de beheersmaatregelen voor de verschillende vis bestanden en mariene biodiversiteit.

Het programma was ook productief in de vorm van publicaties, presentaties en het ontwikkelen van nieuwe methoden en hulpmiddelen voor het visserijonderzoek. Er zijn meer dan 38 internationale presentaties gegeven voor werkgroepen en symposia. Bovendien zijn 19 nieuwe methoden of modellen ontwikkeld met inbegrip van nieuwe benaderingen voor de verspreiding van vis, voedselketens, relaties tussen benthos en visserij, bestandsopnamen voor schelpdieren, optische methoden om de subpopulaties van vis te kunnen onderscheiden, nieuwe toepassingen voor akoestische survey algoritmen, en een nieuwe benadering om de impact van bruinvissen op populaties van kleine vissoorten (prooivis) te schatten.

1 Introduction to The KB WOT Fisheries Programme

The KBWOT Fisheries programme is a core to the maintenance and development of expertise to underpin the statutory obligations of the Netherlands in fisheries monitoring and advice. It is an annually reviewed multiannual programme with clear objectives and deliverables. As the WOT obligations of the Netherlands change over time, the KBWOT fisheries programme remains flexible and responsive to developments and innovations in methods and policy needs. The core principles of the programme are maintaining expertise whilst being forward looking, ensuring value for money and strong collaboration with client ministries. The KB WOT fisheries programme operates within the overall WUR KB programmes. Within WUR, kennisbasis is classified in seven themes. The kennisbasis for the WOT related to fisheries is in theme 4: “groen-blauwe ruimte” which translates to use of the green and blue space.

The fishery WOT tasks cover the advice and actions required to support the national and European fishery policy. They cover commitments to the CFP (Common Fisheries Policy), national freshwater policy, the Habitats Directive, the Water Quality Directive and the Marine Strategy Framework Directive where relevant to fisheries. The tasks include the collection of information and data, the development of understanding and the provision of evidence based advice. It is necessary to anticipate the future needs of EL&I and the EU when developing the structure of the kennisbasis WOT programme. Importantly for the kennisbasis programme, the EU is attempting to move towards a gradual implementation of the ecosystem considerations into fishery management and the next reform of the CFP. This is also true for the national policy.

The KBWOT Fisheries programme has an active policy of underpinning the key-expertise required to carry out the statutory tasks, and of encouraging the further development the expertise needed to complete those tasks. The development and maintenance of this knowledge and expertise base is an integral part of the IMARES plan. The programme covers issues such as the fisheries data collection framework (DCF) but also considers the reform of the common fisheries policy (CFP) and the fisheries component of marine strategy framework directive (MSFD). It is hoped that the programme will combine operational research, aimed at some immediate challenges to EL&I, with more broad strategic research aimed at future policy development and research needs of EL&I. In the field of fisheries, many of these future needs come from existing or upcoming EU directives.

In a practice the KB WOT resources are used to innovate, develop and expand the knowledge in the research areas covering fishery dynamics, fish biology, sampling strategies, populations, ecology and management systems (simulations and advice). Also to maintain and underpin key expertise to carry out the WOT programme and improve the efficiency of carrying out the WOT tasks. In addition the programme strives to maintain/enforce the scientific reputation of the research organisation carrying out the statutory tasks and build international links and to add research value via co-finance initiatives.

2 The Programme in 2011

The research priorities for 2011 were based on the perceived needs of the WOT programme. Within these research priority areas, the maintenance of key expertise necessary to WOT takes priority, followed by the development and innovation required for future WOT work, then part of the available resources can be used for strategic purposes using added research value via co-financing of other funding sources.

Importantly a proportion of the KBWOT budget was reserved for a specific project that EL&I and IMARES viewed as important to the long term strategic needs of managing the North Sea fisheries. This project was set up to investigate MSY management of mixed flatfish fisheries.

It is crucial for the provision of robust science that the research be cutting edge and innovative. EL&I requires advice and services that can stand international scrutiny and also be forward looking. Therefore innovation is an important core component of the KB WOT programme. For the maintenance of the scientific reputation of IMARES and for quality control of the research; scientific, peer reviewed, publications are essential. A small part of the KB-WOT budget will be used for stimulating publishing of research which supported the WOT programme. Also a small part of the budget is reserved for exchange of scientists with scientific institutes abroad.

2.1 Research Areas

The following areas were considered high priority to KBWOT Fisheries in 2011:

1. Ecosystem Approach
2. MSY targets for North Sea flatfish
3. Maintaining Quality in WOT
4. International Exchange

2.2 The rationale for the choice of research areas

The productivity of the sea changes over a range of temporal scales. These changes interact with anthropogenic pressure to make the fisheries system dynamic and sometimes unpredictable. There have been many recent, well documented, changes in the aquatic ecosystems, some are inter-annual variability and some are trends over time. Different parts of an ecosystem can become stronger or weaker with time (e.g. a move from demersal to pelagic production of fish in the North Sea). Some of these changes reflect regular cycles (e.g. salt waters flows into the Baltic, or the Atlantic Multidecadal Oscillation) whereas others are trends associated with longer term change. Some of these changes have been attributed to climate change. An understanding of the cause, variability and magnitude of change is important for a manager. This understanding will allow a proper assessment of risk, an analysis of the probability of stock recovery (or what is over exploitation), and hopefully to distinguish between anthropogenic and non-anthropogenic effects on the ecosystem.

IMARES, in recent years, has developed a significant amount of knowledge on the impact of fisheries on the ecosystem. However there is still a need for further knowledge to assist managers. In 2010, EU legislation will oblige Member States to establish a programme to monitor a number of elements in the ecosystem which are sensitive to fishing. Also EU legislation is under development to reduce the amount of discarding. Resources from kennisbasis have been used to prepare for this international obligation. As this is a wide research area, projects will be carefully selected to address specific needs of the WOT programme. The research will also contribute to the scientific status of IMARES and to our quality control

through peer reviewed publications. Also the EU is beginning to insist that mechanisms be found for the management of “data poor” stocks.

In many ways current fisheries management needs to change. The EU has recently progressed from the management of fish stocks to fisheries management. The EU, and national governments, are also expecting greater flexibility in the provision of advice and the terms in which the advice is given. The obligation for biological and economic data collection of fish and fisheries data by the Member States has been adjusted accordingly. The international advisory framework for fisheries is in a state of flux and is looking at new possibilities for managers, and this includes the management of fishing effort as well as catch. The Kennisbasis WOT resources will be used to develop new approaches to management and management models. Resources are also required for the development and adjustment of data collection, data storage and data access. The research will also contribute to the scientific status of IMARES and to our quality control through peer reviewed publications.

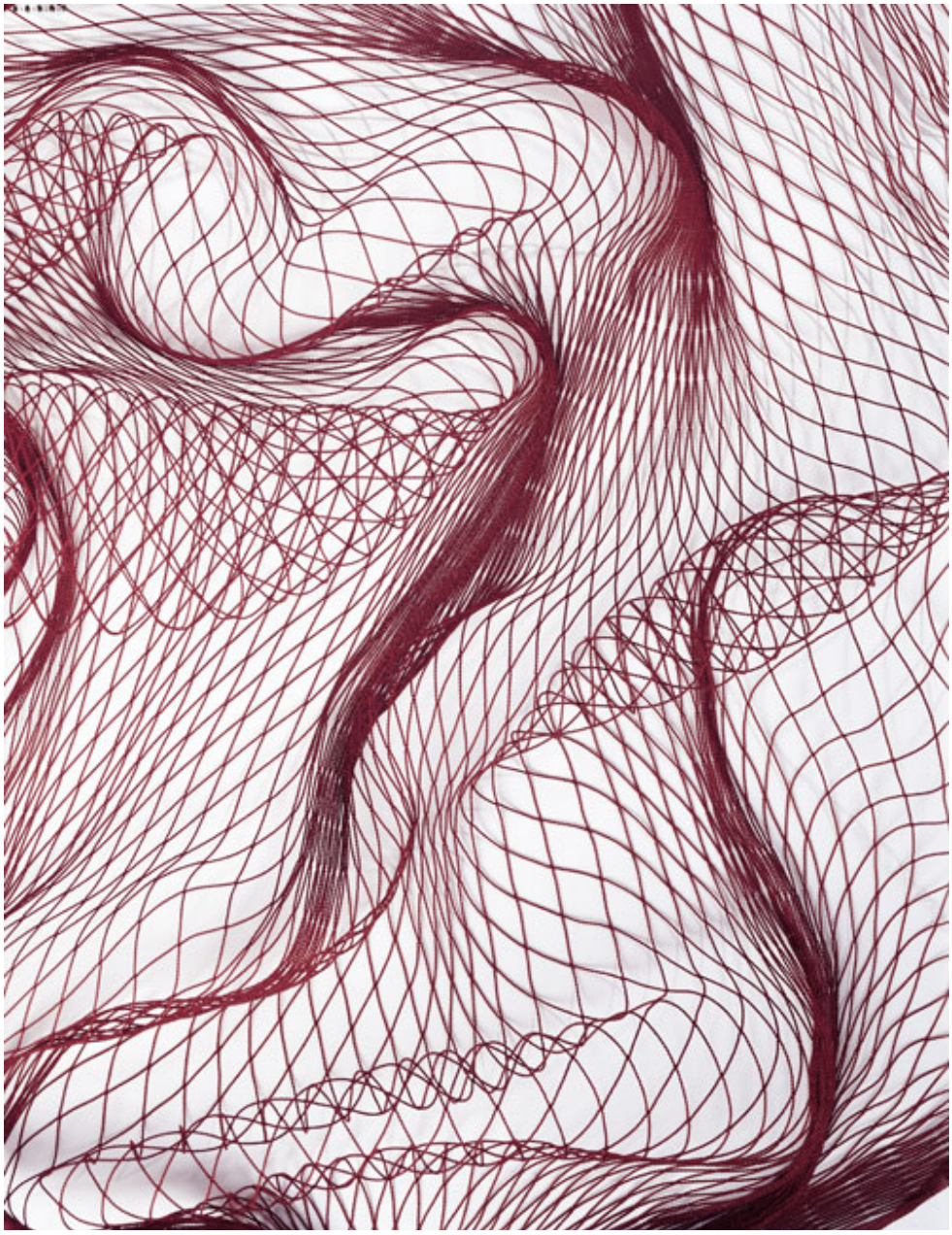
Further, kennisbasis resources will be put aside for the maintenance and quality control of the present expertise base and routine techniques and skills needed for WOT. IMARES needs to maintain core competencies. This covers age reading, stock assessments, acoustic techniques and data collection. Courses, workshops and exchanges are an important part of maintaining and developing core skills. The sharing and gaining of experience is a core part of the development of fisheries science within the EU, through study and working groups and workshops usually coordinated by ICES. These study groups also produce new innovative products and methods, thus it is crucial that those working for WOT remain active in these fora.

2.3 Projects funded through KB WOT Fisheries in 2011.

The following projects were funded in 2011 by KBWOT Fisheries. The annual reports are attached to the end of this report.

BAS No	Title	Project leader	Research Theme
KB-14-012-001-IMARES	Forage Fish Interactions (FACTS)	Dickey-Collas	1. Ecosystem Approach
KB-14-012-002-IMARES	Effects resource competition	Kooten, van	1. Ecosystem Approach
KB-14-012-003-IMARES	Changes in eel populations	Dekker	1. Ecosystem Approach
KB-14-012-004-IMARES	Modelling the spawning habitat	Brunel	1. Ecosystem Approach
KB-14-012-005-IMARES	Structure in fish populations	Overzee, van	1. Ecosystem Approach
KB-14-012-006-IMARES	Impact on benthic productivity	Rijnsdorp	1. Ecosystem Approach
KB-14-012-007-IMARES	Fish Ageing	Bolle	3. Maintaining Quality
KB-14-012-008-IMARES	Quality Shellfish Surveys	Troost	3. Maintaining Quality
KB-14-012-009-IMARES	Underpinning acoustics	Fassler	3. Maintaining Quality
KB-14-012-010-IMARES	International Exchange	Dickey-Collas	4. Int. exchange
KB-14-012-011-IMARES	WKMSFLAT: staging of flatfish	Damme, van	3. Maintaining Quality
KB-14-012-012-IMARES	Programme Management	Dickey-Collas	NA
KB-14-012-013-IMARES	North Sea demersal fisheries	Poos	2. MSY flatfish targets
KB-14-012-014-IMARES	Biomass North Sea mackerel	Dickey-Collas	1. Ecosystem Approach

The total budget over €621000 was expended in 2011.



3 The Highlights of the Programme

The diversity and breath of the programme ensures that there are many highlights and benefits to WOT, WUR and EL&I.

3.1 Science for Fisheries Management

The project researching mixed flatfish MSY targets in the North Sea contributes directly to the ecosystem approach to fisheries management and the development of mixed fisheries management plans. Using multispecies management strategy evaluations (MSE) seasonal patterns in fishing effort and catchability were estimated and tested in a range of scenarios, including seasonal closures. This was the first time that MSE were built that included evaluating the by-catch of rays and cod, and impact on the seabed. This work was published in Marine Ecology Progress series and showed that once you consider multispecies fisheries, the impact of fishing may not be intuitive and will be different from single species approaches. In 2012, this project will be supplemented by the new EU FP7 project MYFISH which explores Maximum Sustainable Yield beyond the boundaries of single species advice.

These findings were further supported by another project that considered the ecological resources required by plaice and sole, relative to their market value. In a conceptual model, it was found that targeting either plaice or sole will impact the alternative species and thus management should always consider the impact of measures on both species at the same time.

An understanding of the ecosystem requires a holistic approach, thus the project FACTS has provided very useful insights into how the impact of fisheries compare to the other predators in the system. Harbour porpoises take more forage fish than seals out of the North Sea and as a proportion of total removals compared to fishing is increasing. Birds take a very minor amount of fish out of the North Sea compared to fisheries. In terms of value (euros), the removals by cod, whiting and saithe are much higher than the other predators.

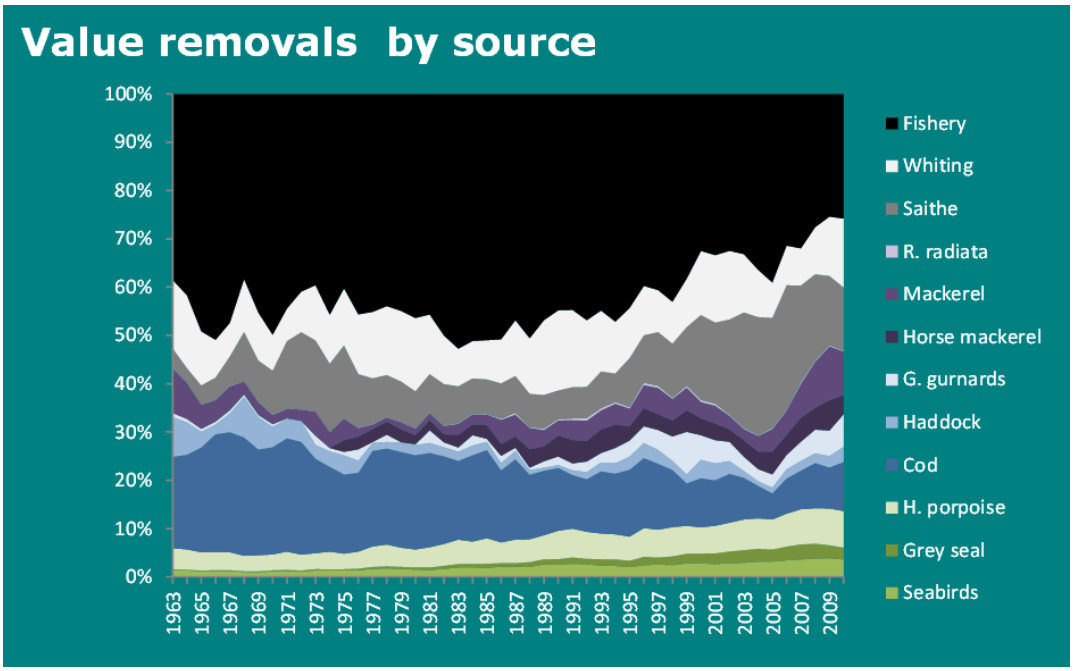


Figure from the FACTS project- value of fish removed from the North Sea.

The programme funded (via International exchange) participation by Dutch research scientists in the international forum that is evaluating the pulse trawl. Through the ICES study group on electric trawling, Dutch research was presented and reviewed by scientists from Belgium, Germany, Scotland, Russia and Lithuania. This has profiled recent progress on understanding the effects of pulse trawling on non-target species.

The programme also funded (via International exchange) participation in the new working group on developing techniques for an integrated assessment of the North Sea (ICES WGINOSE). This working group is cross disciplinary and is looking at how to advise on a regional level about the status of the ecosystem and associated anthropogenic impacts. It proposes to take fisheries advice to a different level, by embedding it into an approach that can address the demands of the marine strategy framework directive (MSFD) and requirements of OSPAR.

3.2 Novel Insights

Mackerel spawning habitat in the north east Atlantic is determined by bathymetry (approx. 200m depth) and water temperature (between 10-14°C). This initial study suggests that the warming of more northern areas may result in mackerel moving further north to spawn. More complex models are now being developed to further test if the apparent shift in spawning distribution is a response to increasing sea temperatures. In a separate project Bayesian methods were developed to estimate the biomass of the spawning stock of North Sea mackerel from acoustic surveys and egg surveys. This project started mid-2011, and initial results suggest that the biomass of spawning mackerel in the North Sea has increased in recent years. It is planned to give substantive results by mid-2012 to the ICES assessment working group on widely distributed stocks.

Recent research, funded by KBWOT fisheries, showed that the natural mortality experienced by herring in the North Sea has changed in the last forty years. This is caused by the changes in the cod and saithe populations. This work was incorporated directly into the new stock assessment method for North Sea herring and has had a dramatic effect on our understanding about the stock dynamics. It has also challenged our current thinking about how to fish herring at maximum sustainable yield.

New approaches to determining target strength of fish in acoustic methods were developed. These are now able to account for the effect of water pressure on the target strength of herring. The first ever estimate of target strength for boarfish (*Capros aper*) was made in 2011. This has been incorporated into the international acoustic survey for boarfish which is a developing new industrial fishery. Also work on the properties of acoustic back scatter and swim bladders of fish has brought IMARES to the fore in the acoustic research community. IMARES now carries out acoustic surveying of herring, blue whiting, sprat and smelt and is working with the commercial fishing industry to explore mechanisms to avoid catching boarfish.

From a fisheries perspective, it is assumed that stocks are discrete units and that specific stocks can be exploited independently of each other or at least catches can be assigned to the stock of origin. This assumption is fundamental to single species advice. In reality, however, this assumption is often violated and may pose problems affecting fish resources, fisheries, stock assessment and management. Participation in a workshop on the implications of stock structure in assessment allowed Dutch scientists to test the implications of stock structure across scales of complexity through the use of models. This work showed that stock assessment scientists need to ensure that biological information gets incorporated or considered in the assessment and management of the stock. A mismatch between management and biological units can affect the fish resource, stock assessment, fishery, and management. Any mismatch will lead to a strong potential for overexploitation of spawning components, resulting in a loss of productivity or even extirpation of certain components. Fisheries may be affected by a misperception of stock productivity and the appropriate scale of management; with the potential for a loss of yield when spatial structure is ignored.

Boarfish

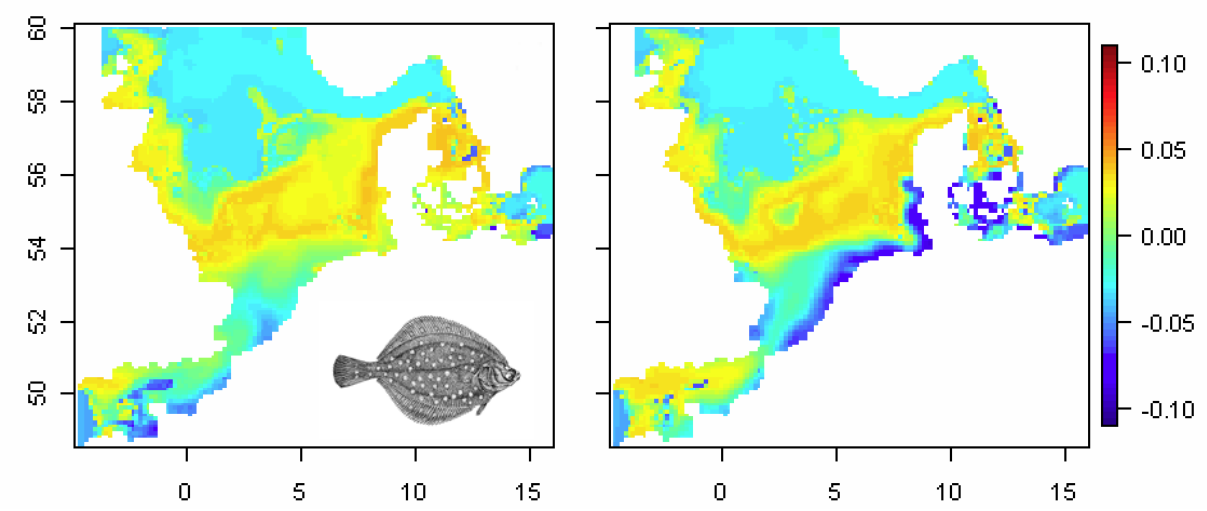
3.3 Tools and method development

Tools have been further developed to investigate the sub-stock structure of North Sea herring by the shape of otoliths. An international workshop was held with participants from Norway, UK, Denmark and Ireland to test the new techniques and also scrutinise the IMARES results. A collection of baseline otoliths from various locations across the North Atlantic is also being built up.

Dynamic ecosystem models were developed that allow the distribution of fish and fisheries to be determined in relation to the benthos. These are linked to food web approaches and will form the basis of the next stage of investigations into the impact of fishing in a variable ecosystem. This work will be further pursued through a new EU FP7 project. Further conceptual modelling also provided code for generic modelling of fisheries, fish and their resource requirements.

A method for the extraction of DNA from eel otoliths was developed. Genetic algorithms for migration studies in flat fish were also developed. These are linked to the growing list of dynamic energy budgets (DEB) models for North Sea species being compiled by IMARES.

Code was developed for the R library *acousa* to facilitate analysis of international acoustic surveys.



Potential growth rates in august 1989 (left) and 2002 (right) of 40cm plaice showing that adult plaice need to move further offshore to grow in 2002. Based on DEB models linked to ecosystem models.

3.4 Standardisation of techniques and quality control

Advances were continued in a pan European approach to fish ageing and maturity staging of flatfish (sole, plaice, dab and flounder), pelagic fish (herring, mackerel and blue whiting) and eel. IMARES is at the centre of drives to standardise monitoring of these variables, which form the most important input data in stock assessments.

Likewise IMARES is building consensus on methods to survey shellfish. Successful workshops were held to improve and standardised techniques for shellfish stock assessment, describing habitats, using acoustic techniques and on taxonomy and aging of shellfish.

A workshop held and lead by IMARES also showed that there are severe problems in the identification of clupeid larvae. Researchers from across Europe were tested on their identification skills and struggled to reliably distinguish between herring and sprat larvae. The ability to do this is crucial for the provision of robust indices for the stock assessment of herring. Further training and work is now being planned on a European scale.

3.5 Recent Publications resulting from KBWOT Fisheries

The following peer reviewed publications resulted from the KB WOT Fisheries programme in 2011:

Aarts, Brasseur, Rindorf, Smout, Dickey-Collas, and Matthiopoulos (2011). Spatial selection of Sandeel (*Ammodytes marinus*) by Grey seals (*Halichoerus grypus*) ICES CM 2011/ I:02

Petitgas P, Alheit J, Peck MA, Raab K, Irigoien X, Huret M, van der Kooij J, Pohlmann T, Wagner C, Zarraonaindia I & Dickey-Collas, M (2012). Anchovy population expansion in the North Sea Marine Ecol Prog Series 444: 1–13

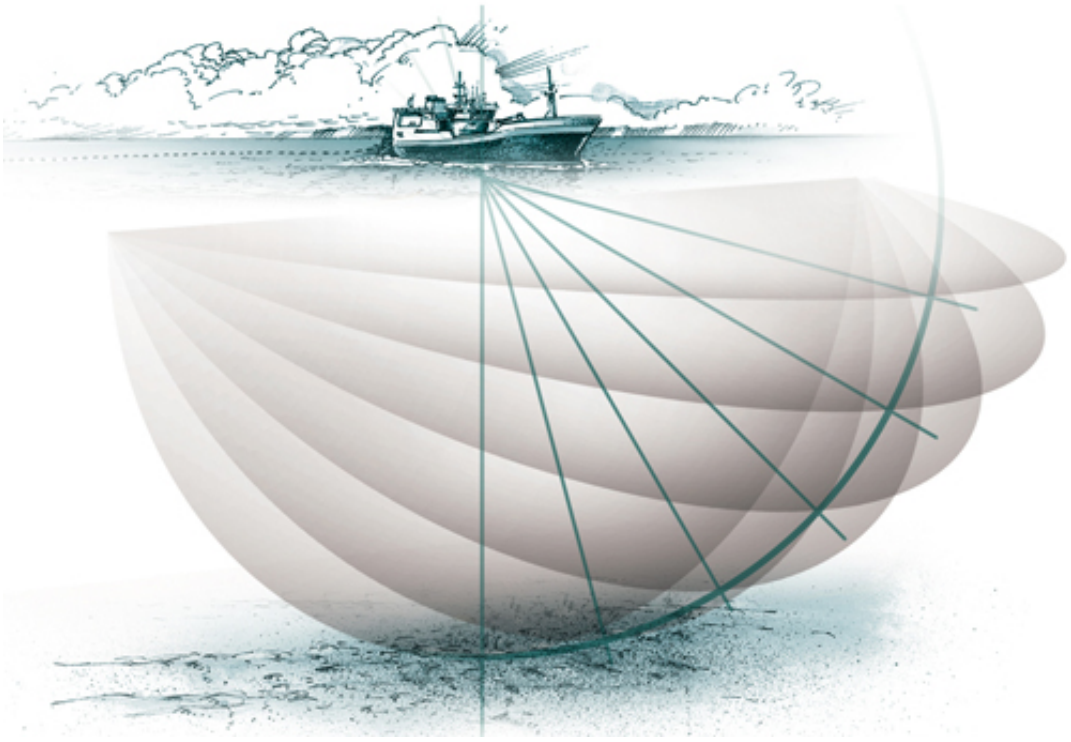
Raab, K Nagelkerke LAJ, Boerée, C; Rijnsdorp AD Temming A Dickey-Collas M (2011). Anchovy (*Engraulis encrasicolus*) diet in the North and Baltic Seas. J Sea Res 65 131–140.

Rijnsdorp, Overzee and Poos (2012). Ecological and economic trade-offs in the management of mixed fisheries: a case study of spawning closures in flatfish fisheries. Marine Ecology Progress series.

Schaerlaekens D.G., Dekker W., Wickström H., Volckaert F.A.M. & Maes G.E. 2011 Extracting a century of preserved molecular and population demographic data from archived otoliths in the endangered European eel (*Anguilla anguilla* L.), Journal of Experimental Marine Biology and Ecology 398(1-2): 56-62.

Scheidat, Aarts, Verdaat, 2012. Using aerial surveys to estimate density and distribution of harbour porpoises in Dutch waters. J Sea res. 67: 1-7.

In addition a further fifteen manuscripts for submission are in preparation. There are also over 35 internal and international reports from projects, workshops and expert group meetings which were partially financed through KB WOT Fisheries and contribute directly to the development of WOT fisheries monitoring and advice.



4 International Partnership and Collaboration.

By its very nature, and due to its embedding in the European Fisheries Policy, fisheries research is highly international. Fish do not observe virtual man-made boundaries. Thus many of the WOT tasks must be carried out in collaboration with research organisations from abroad. In particular the research at sea, the sampling of the catches, the development of methods and models and also the international advisory process itself. Thus it is evident that international cooperation is often required to develop the skills base to complete the WOT and maintain quality. All collaboration must conform to the aims and priorities of the WOT programme.

Of the 14 projects funded in 2011, eleven were carried out in collaboration with European and North American partners. This provided a large amount of added value to the programme, as resources and expertise from other countries contribute to the WUR research strategy. Added value was also increased by combining KB funds with those from EU FP7 and Cost action projects (see FACTS). There is a component of the programme devoted specifically to international collaboration. This ensures that IMARES stays at the cutting edge of scientific developments and at the centre of fisheries research in Europe. This project, called international exchange, enabled IMARES colleagues to participate in studies of larval fish mortality, predator-prey interactions, ecosystem modelling, regime shifts in the North Sea, fisheries induced evolution, developing new methods for fish stock assessments, improving survey and fishing technologies, evaluating management measures for various fish stocks, marine biodiversity and surveying fish plankton. Over 38 international presentations were given at working groups and symposia.

The strength of this cooperation is that knowledge and technology transfers are carried out in a more cost effective manner with efficiencies of scale. It also reduces the risk of IMARES “reinventing the wheel” when dealing with novel requests and new situations.

Through the KBWOT Fisheries programme IMARES scientists collaborated with scientists from over 35 institutes from a wide range of countries including: Belgium, Canada, Denmark, Estonia, Finland, France, Germany, Iceland, Ireland, Latvia, Lithuania, Norway, Poland, Portugal, Russia, Spain, Sweden, United Kingdom, United States of America, Austria, Switzerland, Italy, Greece, Georgia, South Africa, Australia, Greenland and the Faroe Islands.

5 Conclusions

The KB WOT Fisheries programme was very productive in 2011. Almost all research targets and objectives were met. There was large amount of added value to the programme through either co-financing or international/inter-institute collaboration. In 2010, the programme leadership had discussions with fisheries managers and research directors from LE&I to look at the future of the KBWOT fisheries research. This led to the current approach and a stronger collaboration between EL&I and IMARES on development and targeting of future research needs, whilst maintaining the strategy for the science direction of IMARES.

The programme for 2012 has been published and some of the 2011 projects will continue in 2012.

This programme is performed within Kennisbasis Onderzoek (KB) / Beleidsondersteunend onderzoek (BO) / Wettelijke onderzoekstaken (WOT) of EL&I-programmes.

Signature

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Approved by: Drs. F.A. van Beek
Head WOT, Centre for Fishery Research

Signature: 

Date: March 2012

Annex 1. Annual Reports of KBWOT Projects 2011

Title	1. FACTS
Number	KB-14-012-001/4301101701
Project leader	Mark Dickey Collas
Other researchers in WUR	Thomas Brunel, Geert Aarts, Tobias van Kooten, Tim Schellekens, Kristina Raab (PhD)
Researchers outside WUR	The EU 7th framework project FACTS.– 15 institutes from 8 different European states; Denmark, Germany, Norway, UK, France, Spain, Norway, Finland.
Length of project	1-1-2010 t/m 31-12-2012
Budget	19.000,-
Goals of project	FACTS will develop and disseminate advice on the consequences of various forage fish harvest strategies to the ecosystem including their economic implications.
Target group for research	Fisheries Managers

PROGRESS 2011

Results	Main results :- cod and herring can co-occur at the same time in the North Sea, the recent anchovy expansion was caused by an expansion of the local Dutch stock, anchovy are more generalist feeders than herring or sprat, sea birds take a minor component of forage fish in the North Sea, cod, whiting and saithe are the principle predators. Harbour porpoises take more forage fish than seals, better estimates of cetacean abudance and distribution trends in the North Sea.
	Products :- One ICES workshop on predator prey interactions of forage fish. 2 papers on sea mammals, 1 on cod and herring interactions (conceptual), one on anchovy, feeding and one on anchovy expansion in the North Sea.
Did the work follow plans (science or financial)?	Yes both financially and scientifically.
Developed expertise	Modelling and analysis of spatial distributions. Modelling of interactions of fish.
	Workshop findings: The impacts of top predators on marine ecosystems are complex and cannot be generalized easily. Some top predators have, though, in different systems been shown to consume as much forage species as fisheries, and hence (even if overlap does not prove the existence of competition) must be accounted for in an ecosystem-based approach to fisheries management. Others appear to have little impact. Management approaches are currently being developed, but key processes especially in predator/prey encounter and predator selectivity are still unexplained.
	Has anything been developed for the market? No, but knowledge base has been developed for managers.
Science publications	Aarts, Brasseur, Rindorf, Smout, Dickey-Collas, and Matthiopoulos (2011). Spatial selection of Sandeel (Ammodytes marinus) by Grey seals (Halichoerus grypus) ICES CM 2011/ I:02 Scheidat, Aarts, Verdaat, submitted. Using aerial surveys to estimate density and distribution of harbour porpoises in Dutch waters. J Sea res. Petitgas P, Alheit J, Peck MA, Raab K, Irigoien X, Huret M, van der Kooij J, Pohlmann T, Wagner C, Zarraonaindia I & Dickey-Collas, M (2012). Anchovy population expansion in the North Sea Marine Ecol Prog Series 444: 1–13 Raab, K Nagelkerke LAJ, Boerée, C; Rijnsdorp AD Temming A Dickey-Collas M (2011). Anchovy Engraulis encrasicolus diet in the North and Baltic Seas. J Sea Res 65 131–140.

General publications	None
Other outputs	Workshop report for ICES. http://www.ices.dk/iceswork/asc/2011/themesessions/Titles/TS-I%20report.pdf
Any links to Wageningen University projects?	Linked with AFI through co-supervision of PhD student Raab
What is relevant for EL&I fisheries or ecosystem management?	This project is designed to aid fisheries management by investigating management objectives for fisheries.
Describe collaboration with any partners outside WUR (national)	None

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	The PFA, the pelagic freezer trawler association
Summary and Conclusions of Project	This project has one more year to run. So far the dynamics of herring, sprat, sandeel and anchovy in the North Sea has been explored.
Dutch summary and conclusions	Dit project heeft nog een jaar te lopen. Tot nu toe de dynamiek van de haring, sprot, zandspiering en ansjovis in de Noordzee is onderzocht.

INTERNATIONAL

Was the project part of an international network?	Yes, both ICES and the EU FP7 project FACTS
Who were the international partners?	The EU 7th framework project FACTS.– 15 institutes from 8 different European states; Denmark, Germany, Norway, UK, France, Spain, Norway, Finland.
Has the project been associated with international funding sources (EU, DGIS etc) or research programmes?	Yes
How much funding came from these sources?	300,000
How did the project position IMARES internationally?	We are in the centre of the research drive on forage fish.

FINANCIEEL & UREN

(in 1.000 euro's)	Begroot 2011 (geld)	Begroot 2011 (uren)	Gerealiseerd 2011 (geld)	Gerealiseerd 2011 (uren)
Kennisbasis	19.000,-			
R&D en Licentie ed.			Bedrag*	
Anders, nl ….			Bedrag*	
Totaal			Bedrag*	
Toelichting budget				

* = gebaseerd op (en aangeleverd door) financiële administratie via BAS

Title	2. Effects of resource competition on the dynamics of simple flatfish assemblages under harvesting
Number	KB-14-012-002/4301900330
Project leader	Tobias van Kooten
Other researchers in WUR	Karen van de Wolfshaar, Tim Schellekens, Jan Jaap Poos
Researchers outside WUR	
Length of project	1-1-2011 t/m 31-12-2011
Budget	18610,-
Goals of project	A scientific paper and a presentation
Target group for research	Scientific audience, NSRAC stakeholders

PROGRESS 2011

Results	Main results : Simultaneous harvesting of species competing for resources changes the competitive interaction strength, such, that the competitively superior species may be driven to extinction due to harvesting aiming at the inferior species.
	Products : parameterized model, internal report in 2011. (presentation at congress in 2012.)
Did the work follow plans (science or financial)?	Due to time constraints the budget was not fully spent and a full paper was not written yet. Despite that, a model was developed and parameterized, and a manuscript was written, which will be improved and submitted in 2012
Developed expertise	Insight in the relationship between resource competition and simultaneous harvesting of commonly co-occurring flatfish species
	Has anything been developed for the market? no
Science publications	In prep
General publications	
Other outputs	
Any links to Wageningen University projects?	
What is relevant for EL&I fisheries or ecosystem management?	The gained knowledge on ecosystem functioning may aid sustainable use of marine systems and hence aid long term economic viability of marine resources
Describe collaboration with any partners outside WUR (national)	

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	
Summary and Conclusions of Project	Simultaneous harvesting of species competing for resources changes the competitive interaction strength between the species. This effect can be such, that the competitively superior species may be driven to extinction due to intense harvesting aiming at the inferior species, especially when the market prices differ. Single stock management could lead to overexploitation of competing species. Harvesting strategies based on single-stocks may therefore be inappropriate for managing competing species that occur simultaneously in catches.
Dutch summary and conclusions	Het gelijktijdig vangen van soorten die concurreren om voedsel verandert de concurrentie kracht van die soorten. Dit effect kan zo sterk zijn dat de sterkste concurrent de competitie verliest indien de zwakste concurrent een hogere marktwaarde heeft en daarom intensief bevist wordt. 'Single-stock' management kan leiden tot over-exploitatie van concurrerende soorten. Visserij strategien gebaseerd op 'single-stock' kunnen daarom ongeschikt zijn voor het beheer van concurrerende soorten die gelijktijdig worden gevangen.

INTERNATIONAL

Was the project part of an international network?	no
Who were the international partners?	
How much funding came from these sources?	
How did the project position IMARES internationally?	

FINANCIEEL & UREN

(in 1.000 euro's)	Begroot 2011 (geld)	Begroot 2011 (uren)	Gerealiseerd 2011 (geld)	Gerealiseerd 2011 (uren)
Kennisbasis	42100,-	400	18210,-	204
R&D en Licentie ed.			Bedrag*	
Anders, nl			Bedrag*	
Totaal			Bedrag*	
Toelichting budget	Due to time constraints not all budget was spent.			

* = gebaseerd op (en aangeleverd door) financiële administratie via BAS

Title	3. Long term demographic, phenotypic and genetic changes in European eel populations
Number	KB-14-012-003/4301900331
Project leader	Willem Dekker
Other researchers in WUR	
Researchers outside WUR	
Length of project	1-1-2011 t/m 31-12-2011
Budget	20.000,-
Goals of project	To disentangle the likely causes of the decline of the European eel stock (anthropogenic or natural), to analysis an invaluable historical otolith collection for genetic variation at neutral and adaptive markers, and potential trends in growth (also under influence of eutrophication, temperature, etc) during the past decades.
Target group for research	

PROGRESS 2011

Results	Main results : Most practical work (reading otoliths, extracting and analysing genetic material) has been completed. Analysis started, first publication published.
	Products :
Did the work follow plans (science or financial)?	Analysis of local stock dynamics is begun, but not completed yet.
Developed expertise	
	Has anything been developed for the market?
Science publications	Schaerlaekens D.G., Dekker W., Wickström H., Volckaert F.A.M. & Maes G.E. 2011 Extracting a century of preserved molecular and population demographic data from archived otoliths in the endangered European eel (Anguilla anguilla L.), Journal of Experimental Marine Biology and Ecology 398(1-2): 56-62.
General publications	
Other outputs	
Any links to Wageningen University projects?	
What is relevant for EL&I fisheries or ecosystem management?	
Describe collaboration with any partners outside WUR (national)	

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	
Summary and Conclusions of Project	
Dutch summary and conclusions	

INTERNATIONAL

Was the project part of an international network?	no
Who were the international partners?	KU Leuven, D. Schaerlaekens, F. Volckaert, G. Maes Fiskeriverket Stockholm, H. Wickström
Has the project been associated with international funding sources (EU, DGIS etc) or research programmes?	no
How much funding came from these sources?	KBWOT financed only the internal partner, that is: a minor fraction of the total.
How did the project position IMARES internationally?	In the international discussions on causes and consequences of the stock decline, Imares is mostly involved in management advice. This study addresses the more fundamental questions on the causes.

FINANCIEEL & UREN

(in 1.000 euro's)	Begroot 2011 (geld)	Begroot 2011 (uren)	Gerealiseerd 2011 (geld)	Gerealiseerd 2011 (uren)
Kennisbasis	20.000,-	110	20.000,-	110
R&D en Licentie ed.			Bedrag*	
Anders, nl ….			Bedrag*	
Totaal			Bedrag*	
Toelichting budget				

* = gebaseerd op (en aangeleverd door) financiële administratie via BAS

Title	4. Modelling the spawning habitat of the Northeast Atlantic mackerel to understand the recent changes in Distribution
Number	KB-14-012-004 / 4301900332
Project leader	Thomas Brunel
Other researchers in WUR	Cindy van Damme Geert Aarts
Researchers outside WUR	Finlay Burns (Marine Scotland)
Length of project	1-1-2011 / 31-12-2011
Budget	19.000,-
Goals of project	The distribution of the spawning mackerel and its temporal variation are well documented. The aim of this project would be to define the environmental characteristics of the spawning habitat of mackerel, to investigate the relationship between the recent changes in spawning distribution and timing, and the changes in environmental conditions.
Target group for research	none

PROGRESS 2011

Results	Main results : The analysis of the mackerel egg survey showed that the probability of presence of eggs is related to bathymetry (probability increases from the shore to a maximum value at around 200m of depth and then decreases slowly, until a depth of 4000m at which point the probability drops to very low values). The second factor affecting the probability of presence of eggs is sea surface temperature. The probability is low at low temperature (8°c) and increases until a maximum value for temperatures between 10 and 14°C and decreases at warmer temperature.
	Products : A data base compiling all the mackerel egg survey data (1997-2010) A set of scripts to model the spawning habitat, based on GAM, or based on classification trees
Did the work follow plans (science or financial)?	Yes, except for a small under-spending of the money
Developed expertise	Developed an expertise on species distribution modelling (theory and analytical tools)
	Has anything been developed for the market? NO
Science publications	None
General publications	None
Other outputs	Data base and model (scripts) to develop further this work
Any links to Wageningen University projects?	No, but a student from Wageningen university continues this work for his master's thesis
What is relevant for EL&I fisheries or ecosystem management?	That the recent changes in the distribution of NEA mackerel can potentially be related to temperature changes. But a more thorough examination of all the potential factors affecting mackerel spawning distribution has to be carried out to confirm this.
Describe collaboration with any partners outside WUR (national)	none

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	none
Summary and Conclusions of Project	A large part of the project time was used to contact the relevant people to get access to the Mackerel egg survey data, to build a single dataset from raw data from the individuals survey, and clean the dataset. The spawning habitat was modelled on the basis of presence/absence data. Both method used (GAM and boosted regression trees) indicated that the probability of presence of egg was related to sea temperature by a dome shape relationship. This suggest that change in spawning distribution can be caused by temperature changes. However, the influence of other environmental factors, as well as the potential mitigating effect of density dependence were not investigated.
Dutch summary and conclusions	

INTERNATIONAL

Was the project part of an international network?	The project was not formally part of an international network. However, the results of the project will be presented to ICES during the Ad Hoc Group on the Distribution and Migration of Northeast Atlantic Mackerel in May 2012.
Who were the international partners?	Members of the ICES working group on mackerel egg survey.
Has the project been associated with international funding sources (EU, DGIS etc) or research programmes?	no
How much funding came from these sources?	
How did the project position IMARES internationally?	The question of the changes in mackerel distribution is politically sensitive, and a special ICES group was created to deal with it. Most of the participants provided data to describe the changes but IMARES was the only institute analysing such data to understand which are the drivers of the distribution changes. This project positioned IMARES has a leading institute in the development of the knowledge on mackerel ecology.

FINANCIEEL & UREN

(in 1.000 euro's)	Begroot 2011 (geld)	Begroot 2011 (uren)	Gerealiseerd 2011 (geld)	Gerealiseerd 2011 (uren)
Kennisbasis	19.000,-	200	18.936,-	168
R&D en Licentie ed.			Bedrag*	
Anders, nl ….			Bedrag*	
Totaal			Bedrag*	
Toelichting budget				

* = gebaseerd op (en aangeleverd door) financiële administratie via BAS

Title	5. Refining a tool for investigating spatial and substock structure in marine fish populations
Number	KB-14-012-005/4301900333
Project leader	Harriet van Overzee
Other researchers in WUR	Stijn Bierman, Ineke Pennock, Silja Tribuhl, Mark Dickey-Collas, Cindy van Damme
Researchers outside WUR	Audrey Geffen (University of Bergen) Lotte Clausen (DTU-Aqua, Denmark) Henrik Mosegaard (DTU-Aqua, Denmark) Norbert Dankers (Universiteit van Amsterdam)
Length of project	1-1-2011 t/m 31-12-2011
Budget	37000,-
Goals of project	Refining an optical tool to distinguish between the spawner types of herring by using otolith shape. Encourage cooperation with international team that is working on otolith shape analysis. Communication of our work into the scientific community.
Target group for research	The scientific community

PROGRESS 2011

Results	Main results : We have refined our methods, hosted an international workshop on otolith shape discrimination, presented our work at an international symposium, ICES theme session for ASC 2012, started writing up work into manuscript.
	Products : 1. An international workshop at IMARES to scrutinize current methods and agree upon methods for discrimination statistics. The workshop also encouraged further cooperation and communication between partners. 2. A presentation on “Refining an optical tool for investigating spatial and substock structure in marine fish populations” at the ICES ASC 2011 in the theme session “Applications of optical and image based technologies in the ecosystem approach to fisheries management”. 3. ICES theme session for ASC 2012 “Beyond routine ageing: otoliths and other bony structures as windows into fisheries, fish ecology, and the environment”. 4. Manuscript in progress – During this project work was conducted on writing up the results.
Did the work follow plans (science or financial)?	Most products planned within this project were delivered. We did not succeed in publishing the manuscript. This project has shown that writing up the results is still a lot of work. However, progress has been made with the manuscript and work will continue.
Developed expertise	Expertise in the development of optical techniques for the recognition of fish has been further developed.
Science publications	Manuscript in progress.

General publications	
Other outputs	A scientific presentation given at ICES ASC 2011, an international workshop, ICES theme session for ASC 2012.
Any links to Wageningen University projects?	No
What is relevant for EL&I fisheries or ecosystem management?	The ecosystem approach requires an understanding of population dynamics at a different resolution than currently supplied by conventional stock assessments. Within this project methods have been further developed and agreed upon to investigate spatial and substock dynamics in commercially exploited fish, with herring as a case study.
Describe collaboration with any partners outside WUR (national)	The software needed for the optical technique (ImageJ) has been further developed by Norbert Visscher (Universiteit van Amsterdam) to speed up the processing of the otoliths, and provide an alternative simpler method which produces the similar results.

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	
Summary and Conclusions of Project	An optical technique that is able to distinguish between the spawner types of herring by using otolith shape has been refined within this project. This project also enabled us to further cooperate with an international team and present our work to the scientific community. The image analysis software that is needed for this optical technique has been further developed to generate, automatically for large numbers of images, Elliptical Fourier descriptors as well as distances and angles between four landmarks on each otolith. These shape measurements can be used in the discrimination between spawning components. Otolith shape analysis is a low cost, fast and efficient method to determine stock identity. The analysis software is open source and freely available. This methodology can be used to determine the share of the different spawning components in the catch over time (and may have potential uses with other species).
Dutch summary and conclusions	Binnen dit project is een optische techniek verder ontwikkeld waarmee het paaitype van een haring middels zijn gehoorsteentje bepaald wordt. Daarnaast hebben we nauw samengewerkt met een internationaal team die gespecialiseerd is in dit werk. Met behulp van speciale software (*Image analysis software*) kan in korte tijd voor een grote hoeveelheid gehoorsteentjes een aantal metingen gedaan worden. Deze metingen omschrijven de vorm van de gehoorsteentjes en worden gebruikt om het paaitype van een vis te bepalen. De ontwikkelde methode is goedkoop, snel en efficiënt en de software die gebruikt wordt is voor iedereen toegankelijk. De methode kan gebruikt worden om het aandeel van de verschillende paaicomponenten in de vangsten door tijd heen te bepalen. Wellicht zou deze methode ook voor andere vissoorten gebruikt kunnen worden.

INTERNATIONAL

Was the project part of an international network?	Yes
Who were the international partners?	University of Bergen (Norway), DTU-Aqua (Denmark)
Has the project been associated with international funding sources (EU, DGIS etc) or research programmes?	No
How much funding came from these sources?	-
How did the project position IMARES internationally?	This work contributes to the developing Common Fisheries Policy (CFP), and to the biodiversity descriptors of the Marine strategy framework directive (MSFD). It also has the potential to inform scientist in North America via ICES.

FINANCIEEL & UREN

(in 1.000 euro's)	Begroot 2011 (geld)	Begroot 2011 (uren)	Gerealiseerd 2011 (geld)	Gerealiseerd 2011 (uren)
Kennisbasis	37000	320	36380	310
R&D en Licentie ed.			Bedrag*	
Anders, nl ….			Bedrag*	
Totaal			Bedrag*	
Toelichting budget				

* = gebaseerd op (en aangeleverd door) financiële administratie via BAS

Title	6. Trawling impact on benthic productivity and biodiversity
Number	KB-14-012-006/4301900334
Project leader	Adriaan Rijnsdorp
Other researchers in WUR	Daniel van Denderen (MSc); dr. Tobias van Kooten
Researchers outside WUR	
Length of project	1-1-2011 t/m 31-12-2011
Budget	29350,-
Goals of project	To develop and apply ecosystem models of the functioning of benthic ecosystem to assess the impact of trawling.
Target group for research	

PROGRESS 2011

Results	Main results : We have constructed different models, aiming to understand the response of benthic species to bottom trawling and the indirect effects of trawling on the food availability for benthivorous fish.
	Products : 1) PhD proposal 2) Review: Evaluating marine protected areas through food web interactions between benthic communities and fish 3) Model: stage-structured benthic model comprising of 2 competing species 4) Model: Conceptual food web model between predators (fish) and prey (benthos) based on a Lotka-Volterra framework
Did the work follow plans (science or financial)?	The project is used to start a PhD-project at Wageningen University (AFI), that will be based in Ijmuiden to lay the scientific basis to integrate benthic ecosystem in fisheries management. This research area is topical at the national and international level. The work has contributed to the international research proposal submitted to the FP7 call in November 2011 on this topic.
Developed expertise	
	Has anything been developed for the market?
Science publications	Manuscripts on both product 2 and 4 (see results) are in preparation
General publications	
Other outputs	
Any links to Wageningen University projects?	
What is relevant for EL&I fisheries or ecosystem management?	Knowledge on the functioning of benthic ecosystems and the impact of bottom trawling is required to evaluate management scenarios with regard to fishing techniques and spatial management (MPA's, Natura 200 sites).
Describe collaboration with any partners outside WUR (national)	

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	
Summary and Conclusions of Project	There is great public concern about the negative impact of fisheries on the ecosystem, in particular the impact of bottom trawl fisheries on the benthic ecosystem. It has been suggested that frequent trawling could possibly disturb benthic communities and change species composition. A fraction of the benthic biomass forms the diet of benthivorous fish which are targeted by the fisheries, and the indirect effects of trawling on the benthic ecosystem could hence affect the food availability for the target fish species. How this would affect the food availability for fish is highly uncertain. In our study we have constructed food web models to understand the implications of trawling and the functioning of marine protected areas for benthic communities and fish.
Dutch summary and conclusions	Negatieve gevolgen van visserij op mariene ecosystemen heeft geleid tot grote publieke bezorgdheid, met name vanwege effecten van trawlvisserij op het benthische ecosysteem. Verschillende studies hebben gesuggereerd dat frequent trawlen kan leiden tot een verstoring van benthische gemeenschappen en een verandering in soortensamenstelling. Een klein deel van de benthische biomassa vormt het dieet van commerciële benthivore vis. Trawlvisserij heeft hierdoor een indirect effect op de voedselbeschikbaarheid van deze commerciële vis. Hoe dit de voedselbeschikbaarheid voor vis zal veranderen is onzeker. Via voedselweb modellen hebben wij geprobeerd deze voedselinteracties tussen vis en benthos te begrijpen voor zowel een gebied met trawlvisserij als in een marien reservaat.

INTERNATIONAL

Was the project part of an international network?	The project will become part of an international collaboration conditional on the funding of the proposal submitted to the FP7 call in November 2011.
Who were the international partners?	CEFAS (Lowestoft, England), University Bangor (Wales), MRI Bergen (Norway), IFREMER, CNR (Italy), University Aberdeen (Scotland)
Has the project been associated with international funding sources (EU, DGIS etc) or research programmes?	Project is a component of the IMARES coordinated research proposal submitted in the FP7 call Integrating benthic ecosystems in fisheries management (November 2011)
How much funding came from these sources?	
How did the project position IMARES internationally?	The project strengthen IMARES position in this research field.

FINANCIEEL & UREN

(in 1.000 euro's)	Begroot 2011 (geld)	Begroot 2011 (uren)	Gerealiseerd 2011 (geld)	Gerealiseerd 2011 (uren)
Kennisbasis	29350,-	262	29146,-	93
R&D en Licentie ed.			Bedrag*	
Anders, nl ….			Bedrag*	
Totaal			Bedrag*	
Toelichting budget				

* = gebaseerd op (en aangeleverd door) financiële administratie via BAS

Title	7. Fish Ageing
Number	KB-14-012-007/4301900335
Project leader	Loes Bolle
Other researchers in WUR	Ineke Pennock, Silja Tribuhl, André Dijkman, Jan Beintema, Marcel de Vries, Peter Groot, Kees Groeneveld, Thomas Pasterkamp, Betty van Os-Koomen
Researchers outside WUR	Age coordinators and age readers at various European institutes (see section international)
Length of project	1/1/2011- 31/12/2011
Budget	50.000
Goals of project	Maintenance of the key expertise fish ageing, by means of international calibration, training and QA procedures. Almost all population dynamic research carried by IMARES, whether for scientific publications or for fisheries management advice, is age structured. Hence maintenance of the expertise fish ageing is of great importance.
Target group for research	Age readers

PROGRESS 2011

Results	Main results : International calibration: Participation in and/or contribution to the North Sea sole exchange, the eel workshop, the age coordinators workshop, and the preparation of the North Sea turbot, brill and sprat exchanges. Education: Training of new age readers for turbot, brill, dab, mackerel & blue whiting.
	Products : Results of international calibration exercises are documented in reports and summarised in the annual ICES PGCCDBS report (see general publications below).
Did the work follow plans (science or financial)?	Yes
Developed expertise	Maintenance of key expertise fish ageing
	Has anything been developed for the market? No
Science publications	-

General publications	Finalisation of reports in prep: • Report of the Workshop on Age Reading of Mackerel [WKARMAC]. ICES CM 2010/ACOM:46 • Report of the Workshop on Age Reading of North Sea (IV) and Skagerrak-Kattegat (IIIa) Plaice [WKARP]. ICES CM 2010/ACOM:45 • Report of the Workshop on Age Reading of Dab [WKARDAB]. ICES CM 2010/ACOM:44 • Report of the horse mackerel exchange and workshop. CVO report 11.007 New reports: • Report of the Planning Group on Commercial Catches, Discards and Biological Sampling (PGCCDBS). ICES CM 2011/ACOM:40 • Report of the Workshop National Age Readings Coordinators (WKNARC). ICES CM 2011/ACOM 45
Other outputs	-
Any links to Wageningen University projects?	No
What is relevant for EL&I fisheries or ecosystem management?	IMARES needs to maintain its expertise in fish ageing to deliver an internationally approved WOT programme.
Describe collaboration with any partners outside WUR (national)	N.A.

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	None
Summary and Conclusions of Project	Key expertise fish ageing is crucial for all age structured population dynamic research, including stock assessments and hence fisheries management advice. Maintenance of this key expertise is achieved by international calibration, training and QA procedures.
Dutch summary and conclusions	De kernexpertise leeftijdsbepalingen van vissen is van essentieel belang voor alle leeftijds-gestructureerde populatie dynamisch onderzoek, zoals de toestandsbeoordelingen van visbestanden en daarmee de visserijadviezen. Onderhoud van deze kernexpertise wordt bewerkstelligd door internationale calibratie, training en kwaliteitsborging.

INTERNATIONAL

Was the project part of an international network?	Yes. An international fish ageing network is established through the ICES Planning Group on Commercial Catches, Discards and Biological Sampling (PGCCDBS)
Who were the international partners?	Research institutes throughout Europe, who are involved in fish ageing of fish species and stocks that are relevant for Dutch research and advice (e.g. ILVO in Belgium, IFREMER in France, DTU Aqua in Denmark, vTI in Germany, IMR in Norway, CEFAS and AFBI in the UK, The Marine Institute in Ireland).

Has the project been associated with international funding sources (EU, DGIS etc) or research programmes?	No
How much funding came from these sources?	N.A.
How did the project position IMARES internationally?	Fish ageing performance contributes to the standing of IMARES within international (ICES) network. International coordination and calibration of fish ageing contributes to the quality of ICES work (e.g. stock assessments).

FINANCIEEL & UREN

(in 1.000 euro's)	Begroot 2011 (geld)	Begroot 2011 (uren)	Gerealiseerd 2011 (geld)	Gerealiseerd 2011 (uren)
Kennisbasis	50000	608	47281	465
R&D en Licentie ed.				
Anders, nl ….				
Totaal				
Toelichting budget	-			

* = gebaseerd op (en aangeleverd door) financiële administratie via BAS

Title	8. Quality Shellfish Surveys
Number	KB-14-012-008/4301900336
Project leader	Karin Troost
Other researchers in WUR	Johan Craeymeersch, Marnix Poelman, Jeroen Jansen (all IMARES)
Researchers outside WUR	No
Length of project	1-1-2011 t/m 31-12-2011
Budget	40000,-
Goals of project	To maintain and where possible improve the quality of the WOT shellfish surveys: 1) to compare our techniques with those used abroad, 2) to set up in international network for knowledge exchange and cooperation, 3) to explore new techniques that may increase efficiency and accuracy, 4) to maintain skills in identifying bivalve shellfish and other commonly encountered species, and in aging cockles.
Target group for research	Invited to participate in the workshops: 1) International experts in the field of shellfish stock assessments, acoustic survey techniques and application of remote sensing data; 2) National experts in the field of bivalve (and other macrobenthos) taxonomy and aging. With the aim to improve skills of IMARES researchers and research assistants involved in stock assessments of bivalve shellfish.

PROGRESS 2011

Results	Main results : An international workshop on stock assessment techniques was held in November 2011. The workshop was very successful in achieving the set goals. Through the workshop, an international network of experts in the field of stock assessments was set up. All participants gave very positive responses, and said to have appreciated the contents, organization and acquaintance with other experts in stock assessment techniques. Possibilities for joint projects were discussed but have not yet led to actual project proposals, except for a proposal to validate results obtained with a multi-beam acoustic survey technique with results from the annual IMARES survey in the coastal zone (WOT Ensis/Spisula). The latter was proposed for KBWOT 2012 and granted. A workshop on bivalve taxonomy and aging was held in November 2011. The workshop was very successful in bringing together experts and research assistants in the WOT shellfish surveys and other projects involved in monitoring macrobenthic fauna. Results consisted of an enhanced expertise in ageing and determination of shellfish species (and other common benthic species) at IMARES. This workshop brought together experts of IMARES and NIOO-CEME, and marks the beginning of an active maintenance of existing expertise at IMARES.
	Products : 1) Workshop on stock assessment techniques November 3-4 2011, report approved by all participants but not published yet; 2) Workshop on bivalve taxonomy and aging November 21 2011, report incorporated with report on previous workshop and not published yet. A memo report on all activities in 2011 was sent to Mark Dickey Collas.
Did the work follow plans (science or financial)?	Yes, completely

Developed expertise	Workshop Stock Assessment Techniques: Maintenance of the quality of the shellfish stock assessments, and scope for improvement by exploring new techniques through: 1) Set-up of an international scientific network on stock assessment techniques; 2) overview of techniques used in different countries in different environments; 3) Ways to determine efficiency of sampling gear; 4) How to decide whether to use fixed or random stratified sampling grids; 5) Advantages of, and requirements for habitat mapping; 6) Possibilities for using new techniques such as acoustic techniques and remote sensing. Workshop Taxonomy and Aging: Maintenance of the quality of species identification and ageing of cockles, by sharing techniques within and between research groups.
	Has anything been developed for the market? NO
Science publications	NO
General publications	Report in preparation, including workshop presentations. Will be finished in January.
Other outputs	NO
Any links to Wageningen University projects?	NO
What is relevant for EL&I fisheries or ecosystem management?	Maintenance of the expertise in stock assessment techniques, and improvement of techniques, is highly important for the efficiency and accuracy of shellfish stock assessments necessary for the management of shellfish stocks and fisheries & ecosystem management.
Describe collaboration with any partners outside WUR (national)	International experts participated in both workshops. Experts from the USA, France, the UK, Germany, Belgium and Turkey, as well as Dutch experts from NIOZ and NIOO, participated in the workshop on stock assessment techniques. Experts from NIOO participated in the workshop on taxonomy.

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	NO
Summary and Conclusions of Project	The project was successful in bringing together experts in the field of stock assessment techniques, new techniques, and taxonomy. It directly led to a maintenance and improvement in identification and aging skills. The workshop on stock assessment techniques was very successful in setting up a network of experts. All aspects of the WOT shellfish stock assessments are critically analysed. The conclusions from both workshops are used to identify points for improvement in the WOT shellfish stock assessments. These recommendations will be published in the report.

Dutch summary and conclusions	Om de kwaliteit van de WOT schelpdiersurveys op peil te houden en waar mogelijk te verbeteren zijn binnen KBWOT 2 workshops gehouden in 2011. Een workshop met internationale experts op het gebied van schelpdier-bestandsschattingen was succesvol. Hiermee is een netwerk van internationale experts opgezet. Hierbinnen zijn alle aspecten van de schelpdiersurveys kritisch beoordeeld en hieruit zijn aanbevelingen voor de WOT surveys gekomen. Een workshop op het gebied van taxonomie van schelpdieren bracht Nederlandse experts samen en heeft geleid tot het op peil houden van technieken, en het samenbrengen van experts. De resultaten worden gerapporteerd in een IMARES rapport.

INTERNATIONAL

Was the project part of an international network?	NO but is set up an international network
Who were the international partners?	-
Has the project been associated with international funding sources (EU, DGIS etc) or research programmes?	NO
How much funding came from these sources?	-
How did the project position IMARES internationally?	IMARES initiated an international network of stock assessment experts and was thereby positioned as an expert in shellfish stock assessments. All participants were very enthusiastic and this project may therefore well lead to further cooperation.

FINANCIEEL & UREN

(in 1.000 euro's)	Begroot 2011 (geld)	Begroot 2011 (uren)	Gerealiseerd 2011 (geld)	Gerealiseerd 2011 (uren)
Kennisbasis	40000	200	39453	437
R&D en Licentie ed.			Bedrag*	
Anders, nl			Bedrag*	
Totaal			Bedrag*	
Toelichting budget				

* = gebaseerd op (en aangeleverd door) financiële administratie via BAS

Title	9. Underpinning acoustics
Number	KB-14-012-009/4301900337
Project leader	Sascha Fassler
Other researchers in WUR	Bram Couperus, Peter van der Kamp
Researchers outside WUR	Ciaran O'Donnell (Marine Institute, Ireland), Hector Peña and Gavin Macaulay (IMR, Norway), Geir Pedersen (CMR, Norway), Michael Jech (NOAA, USA), Mathieu Doray (Ifremer, France), Teunis Jansen (DTU-Aqua, Denmark), Paul Fernandes (Aberdeen University, UK)
Length of project	1-1-2011 t/m 31-12-2011
Budget	57700
Goals of project	'Underpinning acoustics' is part of a multiannual project that fundamentally aims to maintain and develop acoustic survey techniques. Apart from improving data collection, analysis and storage, the project will also serve to answer ad hoc research questions. It will keep the methods at the most current state and explore alternative ways to assist in-house research
Target group for research	Internal and external partners involved in using active underwater acoustic methods to monitor the aquatic environment and users of data produced from such methods.

PROGRESS 2011

Results	Main results : Maintenance of acoustic survey methods in WOT surveys for blue whiting, North Sea and Atlanto-Scandic herring. Collaboration with international partners.
	Products : Presentations and paper drafts to be published in international peer-reviewed Journals (see below); R programme library "acousa" (repository hosted at: http://code.google.com/p/acousa/) to facilitate analysis of ICES coordinated surveys; participation as guest scientist on R/V Thalassa during the 2011 Bay of Biscay survey to get first-hand experience on the newest methods to survey the whole ecosystem; exploration of using a depth-dependent target strength in abundance estimates of the North Sea herring; MRI scans of boarfish swimbladders.
Did the work follow plans (science or financial)?	yes
Developed expertise	More detailed insight of how herring scatters sound at different water depths
	Investigation into the target strength of a newly targeted commercial species (boarfish, *Capros aper*)

Science publications	Draft papers: • "Constraints on the Kirchhoff-approximation and Kirchhoff-ray-mode fish swimbladder scattering models" • "Depth-dependent finite element models of herring (*Clupea harengus*) target strength using magnetic resonance imaging (MRI) of swimbladders" • "Utility of 18 kHz acoustic data for abundance estimation of Atlantic herring (*Clupea harengus*)" • "Target strength of boarfish (*Capros aper*) modelled by the KRM from MRI scans of swimbladders"
General publications	-
Other outputs	-
Any links to Wageningen University projects?	Assistance in the PhD project "ANT" smelt in the Ijsselmeer conducted by Marieke Keller (IMARES fish department)
What is relevant for EL&I fisheries or ecosystem management?	The developed expertise assisted and contributed strongly to develop future projects on the use of acoustic data to sample other parts of the ecosystem (KBWOT2012 project: "Habitat quality of forage fish from acoustic multifrequency information (HAQUAFAMI)"). Additionally, developed expertise on acoustic properties of boarfish helped develop a VIP proposal with the PFA to look into bycatch avoidance of boarfish.
Describe collaboration with any partners outside WUR (national)	-

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	-
Summary and Conclusions of Project	The project is part of a continuous project aiming at maintaining and expanding the expertise in active underwater acoustics at IMARES. It represents a fundamental part in building links to international partners, which allows IMARES to retain its position at the forefront of current research in the area.
Dutch summary and conclusions	

INTERNATIONAL

Was the project part of an international network?	yes
Who were the international partners?	Marine Institute (Ireland), IMR & CMR (Norway), NOAA (USA), Ifremer (France), DTU-Aqua (Denmark), Aberdeen University (UK)
Has the project been associated with international funding sources (EU, DGIS etc) or research programmes?	no
How much funding came from these sources?	-

How did the project position IMARES internationally?	The project helped to maintain international links by actively participating in on-going research. Without this contribution, IMARES would quickly lose its position and international network.

FINANCIEEL & UREN

(in 1.000 euro's)	Begroot 2011 (geld)	Begroot 2011 (uren)	Gerealiseerd 2011 (geld)	Gerealiseerd 2011 (uren)
Kennisbasis	57700	562	56554	573
R&D en Licentie ed.			Bedrag*	
Anders, nl ….			Bedrag*	
Totaal			Bedrag*	
Toelichting budget				

* = gebaseerd op (en aangeleverd door) financiële administratie via BAS

Title	10. International Exchange
Number	KB-14-012-010/4301900338
Project leader	Mark Dickey-Collas
Other researchers in WUR	de Boois, ter Hofstede, Miller, Hintzen, Pastoors, Röckmann, Rijnsdorp, van Marlen, Fässler, van Damme, Beare, Slijkerman, IMARES MT
Researchers outside WUR	None directly funded, but this project links IMARES directly into the ICES network
Length of project	1-1-2011 t/m 31-12-2011
Budget	118500,-
Goals of project	To fund participation in international science networks and ICES meetings. Workshop on Sexual Maturity Staging of Herring and Sprat, Working Group on Data and Information Management, Study Group on Biodiversity, Working Group on Fish Ecology, Working Group on Methods of Fish Stock Assessment, Working Group on Multispecies Assessment Methods, Working Group on operational oceanographic products for fisheries and environment, Study Group on the History of Fish and Fisheries, Working Group on Fishery Systems, Strategic initiative on Stock assessment methods, Working Group on Fisheries-Induced Evolution, Working Group on the Implications of Stock Structure, ICES-FAO Working Group on Fishing Technology and Fish Behaviour, Working Group on Fisheries Acoustic Science and Technology, Study Group on Electrical Trawling, Working Group on Integrating Surveys for the Ecosystem Approach, Workshop on the Identification of clupeoid, flatfish, gadoids and other fish larvae, Working Group on Integrated Assessments of the North Sea.
Target group for research	Fisheries managers, the fishing industry and other marine scientists

PROGRESS 2011

Results	
	IMARES active participation and contribution to 20 ICES lead workshops and study groups on fisheries, fish ecology, stakeholder involvement, evolutionary effects of fishing, development of new survey methods and age reading. See list of groups below. This brought in added value and technology transfer to the Netherlands
Did the work follow plans (science or financial)?	YES
Developed expertise	The developed expertise underpins IMARES research in technical measures, acoustic, fish identification, fish ecology, stock assessment methods, ageing and maturity determination in fish, pulse trawl, evolutionary effects of fishing, data provision, biodiversity and stock structure.

Science publications	Reports of: Workshop on Age Reading of European and American Eel Workshop of National Age Readings Coordinators Workshop on Sexual Maturity Staging of Herring and Sprat Working Group on Data and Information Management Study Group on Biodiversity Working Group on Fish Ecology Working Group on Methods of Fish Stock Assessment Working Group on Multispecies Assessment Methods Working Group on operational oceanographic products for fisheries and environment Strategic initiative on Stock assessment methods Study Group on the History of Fish and Fisheries Working Group on Fishery Systems Working Group on Fisheries-Induced Evolution Working Group on the Implications of Stock Structure ICES-FAO Working Group on Fishing Technology and Fish Behaviour Working Group on Fisheries Acoustic Science and Technology Working Group on Integrating Surveys for the Ecosystem Approach Workshop on the Identification of clupeid, flatfish, gadoids and other fish larvae Study Group on Calibration of Acoustic Instruments in Fisheries Science Study Group on Electrical Trawling Working Group on Integrated Assessments of the North Sea
General publications	See results of group reports at http://www.ices.dk/workinggroups/WorkingGroups.aspx
Other outputs	
Any links to Wageningen University projects?	No
What is relevant for EL&I fisheries or ecosystem management?	This programme is core to the maintenance of expertise and quality assurance for fisheries related applied research.
Describe collaboration with any partners outside WUR (national)	None

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	
Summary and Conclusions of Project	IMARES active participation and contribution to 20 ICES lead workshops and study groups on fisheries, fish ecology, stakeholder involvement, evolutionary effects of fishing, development of new survey methods and age reading. See list of groups below. This brought in added value and technology transfer to the Netherlands
Dutch summary and conclusions	IMARES actieve participatie en bijdrage aan de 20 ICES leiden workshops en studiegroepen over de visserij, vis ecologie, betrokkenheid van de belanghebbenden, de evolutionaire effecten van de visserij, de ontwikkeling van nieuwe onderzoeksmethoden en leeftijd lezen. Zie lijst van groepen hieronder. Dit bracht in de toegevoegde waarde en de overdracht van technologie naar Nederland

INTERNATIONAL

Was the project part of an international network?	Yes, part of ICES
Who were the international partners?	Institutes and universities from Belgium, Canada, Denmark (including Greenland and Faroe Islands), Estonia, Finland, France, Germany, Iceland, Ireland, Latvia, Lithuania, the Netherlands, Norway, Poland, Portugal, Russia, Spain, Sweden, the United Kingdom, and the United States of America. Plus links to FAO fisheries units.
Has the project been associated with international funding sources (EU, DGIS etc) or research programmes?	No, but underpins the research behind the Data Collection Framework (DCF Council Regulation (EC) No 199/2008 concerning the establishment of a Community framework for the collection, management and use of data in the fisheries sector and support for scientific advice regarding the Common Fisheries Policy.
How much funding came from these sources?	None
How did the project position IMARES internationally?	The project is crucial to maintain IMARES at the cutting edge and the centre of the European network of fisheries research organisations.

FINANCIEEL & UREN

(in 1.000 euro's)	Begroot 2011 (geld)	Begroot 2011 (uren)	Gerealiseerd 2011 (geld)	Gerealiseerd 2011 (uren)
Kennisbasis	118500	917	126354	1015
R&D en Licentie ed.			Bedrag*	
Anders, nl			Bedrag*	
Totaal			Bedrag*	
Toelichting budget				

* = gebaseerd op (en aangeleverd door) financiële administratie via BAS

Title	11. WKMSFLAT: Workshops on sexual maturity staging of flatfish; sole, plaice, dab, flounder, turbot and brill
Number	KB-14-012-011/4301900339
Project leader	Cindy van Damme
Other researchers in WUR	Ingeborg de Boois, Peter van der Kamp, Daniel Benden, Ineke Pennock, Ruben Hoek, Hanz Wiegerinck
Researchers outside WUR	Participants from 7 EU countries (Germany, Belgium, Sweden, UK, Latvia, Lituania, Poland) participating in the maturity staging workshops
Length of project	1-1-2011 t/m 31-12-2011
Budget	43.770
Goals of project	To collect images of gonads for macroscopic maturity staging and collect and prepare histological gonads samples to be used in the maturity staging workshops
Target group for research	ICES surveys and flatfish stock assessment groups

PROGRESS 2011

Results	Main results : Year round samples were collected for sole, plaice, dab flounder, turbot and brill
	Products :Gonadal images and histological preparations of gonads of sole, plaice, dab, flounder, turbot and brill
Did the work follow plans (science or financial)?	
Developed expertise	Maturity staging of flatfish
	Better understanding of gonadal development of female and male sole, plaice, dab flounder, turbot and brill through the year
	Has anything been developed for the market?
Science publications	Workshops reports
General publications	
Other outputs	
Any links to Wageningen University projects?	WOT surveys and flatfish stock assessment groups
What is relevant for EL&I fisheries or ecosystem management?	A better understanding of gonadal development and better macroscopic maturity staging of sole, plaice, dab flounder, turbot and brill. More reliable maturity data will be available for the international flatfish stock assessment groups
Describe collaboration with any partners outside WUR (national)	Besides IMARES scientists, scientists from 7 other EU countries (Germany, Belgium, Sweden, UK, Latvia, Lituania, Poland) participated in the workshops and collection of samples.

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	
Summary and Conclusions of Project	Year-round images of gonads were collected of female and male sole, plaice, dab flounder, turbot and brill. Of all fish also histological samples were collected. The pictures are used in international ICES workshops for macroscopic maturity staging of fish, to train new maturity stagers and to calibrate between expert maturity stagers. The histological samples are used to check the macroscopic maturity staging.
Dutch summary and conclusions	Het hele jaar door zijn er foto's van gonaden van zowel mannetjes als vrouwtjes van tong, schol, schar, bot, tarbot en griet verzameld. Van alle vissen werden ook histologische secties geprepareerd. De foto's worden gebruikt tijdens internationale ICES workshops voor het macroscopisch bepalen van de rijpheid van vis; voor het trainen van nieuwe rijpheid bepalers en het kalibreren tussen deskundige rijpheid bepalers. De histologische monsters worden gebruikt om te controleren of de macroscopische rijpheid bepaling correct is.

INTERNATIONAL

Was the project part of an international network?	ICES
Who were the international partners?	Fisheries institutes from Germany, Belgium, Sweden, UK, Latvia, Lituania and Poland
Has the project been associated with international funding sources (EU, DGIS etc) or research programmes?	no
How much funding came from these sources?	
How did the project position IMARES internationally?	IMARES was the major contributor to the collection of gonadal images and histological samples. IMARES chairs the workshops for maturity staging on sole, plaice, dab flounder, turbot and brill.

FINANCIEEL & UREN

(in 1.000 euro's)	Begroot 2011 (geld)	Begroot 2011 (uren)	Gerealiseerd 2011 (geld)	Gerealiseerd 2011 (uren)
Kennisbasis	43.770	308	43348	429
R&D en Licentie ed.			Bedrag*	
Anders, nl ….			Bedrag*	
Totaal			Bedrag*	
Toelichting budget				

* = gebaseerd op (en aangeleverd door) financiële administratie via BAS

Title	**12. Programme Management**
Number	KB-14-012-012/4301900340
Project leader	Mark Dickey Collas
Other researchers in WUR	Frans van Beek, Rian Schelvis
Researchers outside WUR	None
Length of project	1-1-2011 t/m 31-12-2011
Budget	24000,-
Goals of project	To effectively and efficiently manage the KBWOT fisheries programme
Target group for research	Fisheries and marine environmental stakeholders.

PROGRESS 2011

Results	Main results : The programme ran according to plans
	Products : one planning report and one progress report.
Did the work follow plans (science or financial)?	Yes
Developed expertise	The programme has maintained and developed expertise to underpin the statutory task of the Netherlands in fisheries research.
	A review of the functioning of KBWOT fisheries was carried out in 2010 (see report 10.IMA0283.mdc) which involved LNV (directorates AKV and Kennis), CVO, WUR and IMARES. This found that the programme was forward looking, viewed high quality innovative science as important and yet maintained the direction considered important by LNV. Thus the KBWOT programme appears to utilise the expertise available to dlo on fisheries and look to the future research needs of society
Science publications	N/A
General publications	The planning report for KBWOT fisheries 2012, and the final report for KBWOT 2010. • The Kennisbasis WOT Fisheries Programme carried out in 2010 Final Report. CVO report: 11.005. April 2011. • Kennisbasis WOT Fisheries 2012- Maintaining Excellence and Innovation in Fisheries Research. CVO report:11.012. 5 Dec 2011.
Other outputs	A programme of research in 2011, and preparations for 2012
Any links to Wageningen University projects?	N/A
What is relevant for EL&I fisheries or ecosystem management?	The KBWOT Fisheries programme is fundamental to the maintenance and development of the expertise that underpins the statutory obligations of fisheries monitoring and advice for the Netherlands. The structure of the KBWOT Fisheries programme reflects the recent discussions on the research direction between IMARES, CVO and EL&I.
Describe collaboration with any partners outside WUR (national)	N/A

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	Fisheries managers and research coordinators in EL&I.
Summary and Conclusions of Project	The project manages the KBWOT fisheries programme
Dutch summary and conclusions	Het project beheert het KBWOT visserijprogramma

INTERNATIONAL

Was the project part of an international network?	By its very nature, and due to its embedding in the European Fisheries Policy, fisheries research is highly international. Fish do not observe virtual man-made boundaries. Thus many of the WOT tasks are carried out in collaboration with research organisations from abroad. In particular the research at sea, the sampling of the catches, the development of methods and models and also the international advisory process itself. Thus it is evident that international cooperation is often required to develop the skills base to complete the WOT and maintain quality. All collaboration must conform to the aims and priorities of the WOT programme.
Who were the international partners?	Through the KBWOT Fisheries programme IMARES scientists collaborated with scientists from over 35 institutes from a wide range of countries including: Belgium, Canada, Denmark, Estonia, Finland, France, Germany, Iceland, Ireland, Latvia, Lithuania, Norway, Poland, Portugal, Russia, Spain, Sweden, United Kingdom, United States of America, Austria, Switzerland, Italy, Greece, Georgia, South Africa, Australia, Greenland and the Faroe Islands
Has the project been associated with international funding sources (EU, DGIS etc) or research programmes?	Yes, the programme has co-financed EU projects.
How much funding came from these sources?	See separate projects
How did the project position IMARES internationally?	The programme p-laces IMARES in a very strong position.

FINANCIEEL & UREN

(in 1.000 euro's)	Begroot 2011 (geld)	Begroot 2011 (uren)	Gerealiseerd 2011 (geld)	Gerealiseerd 2011 (uren)
Kennisbasis	2400	194	23526	195
R&D en Licentie ed.			Bedrag*	
Anders, nl ….			Bedrag*	
Totaal			Bedrag*	
Toelichting budget				

* = gebaseerd op (en aangeleverd door) financiële administratie via BAS

Title	**13. Understanding the trade-offs in FMSY targets for North Sea demersal fisheries with particular reference to flatfish**
Number	KB-14-012-013/4301900341
Project leader	Jan Jaap Poos
Other researchers in WUR	Harriet van Overzee, Adriaan Rijnsdorp, Niels Hintzen, Lorna Teal, Christine Rockmann
Researchers outside WUR	
Length of project	1-1-2011 t/m 31-12-2011
Budget	104055
Goals of project	Our aim is to synthesize the progress in these different fields by linking the different models and derive a full ecosystem model, including the dynamics of the largest source of mortality for most species: the fishery. By doing so, we can exhibit the trade-offs in fisheries management aiming for F_{MSY} in the light of integrated food web interactions and fisheries dynamics.
Target group for research	The results of the project will contribute our knowledge of sustainable use of the ecosystems. The knowledge built up in the project can ultimately be used by the EU, improving the fisheries management of mixed fisheries systems.

PROGRESS 2011

Results	Main results : Two submitted publications, one of which is accepted in Marine Ecology Progress Series. Furthermore, there are two draft publications that are not yet ready for publication, but that will be submitted in 2012. The modelling techniques have been presented at several international symposia.
	Products: See main results
Did the work follow plans (science or financial)?	Work is lagging behind, mainly because of problems with availability of researchers, and the discussions about the funding at the start of the year.
Developed expertise	Genetic Algortihms for migration studies in combination with Dynamic Energy Budget theory. Run Length Encoding in Dynamic State Variable Modelling Size based selection in Dynamic State Variable Modelling Participatory modelling
	Has anything been developed for the market? No
Science publications	One manuscript has been accepted in Marine Ecology Progress Series entitled “Ecological and economic trade-offs in the management of mixed fisheries: a case study of spawning closures in flatfish fisheries”. The contribution of Jan Jaap Poos that partly came through the KBWOT funding is dutifully acknowledged. A second manuscript is currently under review at Marine Policy: “The added value of participatory modelling in fisheries management. What have we learned?”
General publications	None

Other outputs	The work on the migratory behaviour of plaice has been presented at two scientific symposia in 2011: the Marine Ecosystem Modelling Research Symposium held in Plymouth in June 2011, and the 8th International Flatfish Symposium held in Ijmuiden in November 2011. The work on fishers behaviour was presented at the American Fisheries Society Symposium in Seattle in September 2011.
Any links to Wageningen University projects?	None
What is relevant for EL&I fisheries or ecosystem management?	There is a science need within the Ministry of ELI for fisheries management in the southern North Sea. The call for MSY management by 2015 made clear that the trade-offs in fisheries management aiming for FMSY that result from the ecosystem complexities needs to be assessed. These trade-offs come from the spatial distributions of target species, incidental bycatch, the North Sea habitats, and the fishery. The reports delivered by the project can be used in the discussion about appropriate MSY targets.
Describe collaboration with any partners outside WUR (national)	None

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	
Summary and Conclusions of Project	The project continues in 2012. Summary and conclusions will be given at the end of the project.
Dutch summary and conclusions	

INTERNATIONAL

Was the project part of an international network?	In 2011, the work on the participatory modelling was done as part of the EU funded JAKFISH project. In 2012, IMARES will contribute in another EU funded research project called “MYFISH”.
Who were the international partners?	There are several European fisheries institutes participating in JAKFISH, in four fisheries case studies: two herring case studies in the North and the Baltic Sea, a Nephrops case study in the North Sea, and a Swordfish case study in the Mediterranean Sea.
Has the project been associated with international funding sources (EU, DGIS etc) or research programmes?	None
How much funding came from these sources?	None
How did the project position IMARES internationally?	

FINANCIEEL & UREN

(in 1.000 euro's)	Begroot 2011 (geld)	Begroot 2011 (uren)	Gerealiseerd 2011 (geld)	Gerealiseerd 2011 (uren)
Kennisbasis	104055	855	101729	959
R&D en Licentie ed.			Bedrag*	
Anders, nl ….			Bedrag*	
Totaal			Bedrag*	
Toelichting budget				

* = gebaseerd op (en aangeleverd door) financiële administratie via BAS

Title	**14. Biomass North Sea Mackerel**
Number	KB-14-012-014/4301900342
Project leader	Mark Dickey Collas
Other researchers in WUR	Sascha Fässler, Sven Gastauer (both IMARES)
Researchers outside WUR	IMR, Norway and Marine Scotland Science, in Aberdeen
Length of project	1-1-2011 t/m 31-12-2011
Budget	33325
Goals of project	The construct a time series of mackerel abundance in the North Sea
Target group for research	Fisheries managers of the North Sea, researchers of the North Sea ecosystem and pelagic fishers.

PROGRESS 2011

Results	Information from egg abundance and acoustic surveys suggest that the abundance of spawning mackerel has increased in recent years in the North Sea. A comparison of egg methods and acoustics methods is possible.
	Time series of egg abundance estimates and acoustic survey abundance to be taken to the ICES WGWIDE, the stock assessment working group.
Did the work follow plans (science or financial)?	No, the work was delayed due to problems getting the data from hosting laboratories (both in Norway and Scotland)
Developed expertise	Estimation of abundance through egg surveys and new methods for acoustic estimates of mackerel (using multi-frequency algorithm to extract mackerel schools and estimate abundance using 200Khz signal)
Science publications	None as yet, but manuscript planned
General publications	None
Other outputs	Two time series for stock assessment working groups
Any links to Wageningen University projects?	No
What is relevant for EL&I fisheries or ecosystem management?	The project can help inform the management of mackerel in the North Sea.
Describe collaboration with any partners outside WUR (national)	None

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	None
Summary and Conclusions of Project	Novel techniques in acoustics and egg abundance estimation were used to create two time series of the abundance of mackerel in the North Sea. Due to the late delivery of data, further analysis is still ongoing.
Dutch summary and conclusions	Nieuwe technieken in de akoestiek en de eiproductie schatting werden gebruikt om twee tijdreeksen van de overvloed van makreel in de Noordzee te creëren. Door de late aanlevering van gegevens, verdere analyse is nog gaande.

INTERNATIONAL

Was the project part of an international network?	Yes, with Scotland and Norway.
Who were the international partners?	IMR Norway and Marine Scotland Aberdeen
Has the project been associated with international funding sources (EU, DGIS etc) or research programmes?	No, although the information will be used by EU FP7 project FACTS.
How much funding came from these sources?	None
How did the project position IMARES internationally?	It will place IMARES at the centre of understanding mackerel in the North Sea, and comparing egg and acoustic estimates. No other institute is carrying out work like this.

FINANCIEEL & UREN

(in 1.000 euro's)	Begroot 2011 (geld)	Begroot 2011 (uren)	Gerealiseerd 2011 (geld)	Gerealiseerd 2011 (uren)
Kennisbasis	33325	317	32709	324
R&D en Licentie ed.			Bedrag*	
Anders, nl ….			Bedrag*	
Totaal			Bedrag*	
Toelichting budget				

* = gebaseerd op (en aangeleverd door) financiële administratie via BAS