

Stichting DLO Centre for Fisheries Research (CVO)

The KB WOT Fisheries Programme carried out in 2014

Cindy van Damme

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Charles Bentley - A Dutch Fishing Vessel In Choppy Waters

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Summary

The core of the KB WOT Fisheries programme is maintenance and development of the expertise needed to carry out the statutory obligations of the Netherlands in fisheries monitoring and advice. The KB WOT is a flexible program which responds to changes over time in WOT requirements and fisheries management and policy needs. While maintaining the core expertise and flexibility the KB WOT programme also strives to be innovative and participate in research development. The programme operates 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.

The KB WOT fisheries programme is established annually and positioned around a number of themes. In 2014 15 projects were successfully completed. However, of the 17 originally projects that were funded three were terminated, because samples could not be collected (two) or staffing problems (one). The remaining funding of these projects was used for a new project on innovative shellfish mapping. The programme centred on the research into the changes in marine ecosystems, the impact of fisheries on ecosystems, development of tools for electronic monitoring and method development for assessment of marine resources. It also focused on the central element of the KB WOT programme, maintaining and developing key expertise for the fisheries WOT programme. Thus a large part of the budget was used for projects that standardise fish ageing, provide quality control of ichthyoplankton and shellfish monitoring and fish tagging, development of fisheries acoustics techniques and expertise. These topics are crucial to the continuance of the quality of fish stock assessments.

Of the 15 projects funded in 2015, seven were carried out in collaboration with European and or worldwide collaborators. This provided a large amount of added value to the programme, as resources and expertise from other countries contribute to the KB WOT programme. Another large part of the KB WOT resources is specifically dedicated to international collaboration and exchange of methods and techniques. This ensures that IMARES researchers remain at the forefront of scientific developments and at the heart of European and international fisheries research.

The programme was also very productive in terms of publications, presentations and developing new methods or tools for fisheries research. Over 15 international presentations were given at working groups and symposia, and international and national reports written. 6 new methods or models were developed, 1 peer reviewed publication published and 2 scientific publications prepared.



Samenvatting

De kern van het KB programma voor WOT Visserij is het onderhouden en ontwikkelen van de expertise welke nodig is om de wettelijke verplichtingen van Nederland op gebied van visserij monitoring en advies uit te voeren. Het KB WOT programma blijft flexibel om te kunnen inspelen op veranderingen in nationaal en internationaal visserij beheer en beleid, maar ook ontwikkelingen in visserijmethoden. Daarnaast probeert het programma toekomst gericht en innovatief te zijn om te kunnen deelnemen aan wetenschappelijke ontwikkelingen. Het KB WOT programma opereert binnen het kader van de Common Fisheries Policy (CFP), de EU Marine Strategy Framework Directive (MSFD) en het EU Maritime Policy.

Het KB WOT Visserij programma wordt jaarlijks vastgesteld en gepositioneerd rond een aantal thema's. In 2014 zijn 15 projecten succesvol uitgevoerd. Maar van de 17 projecten die aan het begin van 2014 gehonoreerd zijn konden er drie niet uitgevoerd worden, omdat monsters niet verzameld konden worden (twee) of omdat het personeel met de benodigde kennis niet beschikbaar was. Het overgebleven budget van dit project is gebruikt om een nieuw project voor het ontwikkelen van een nieuwe methode voor het monitoren van schelpdierbanken. Het KB WOT programma was gericht op onderzoek naar veranderingen van het marine ecosysteem, de invloed van visserij op het ecosysteem, ontwikkeling van methoden voor elektronisch monitoren en ontwikkeling van methoden voor assessment van visbestanden. Een ander focuspunt was de kern van het programma, het onderhouden en ontwikkelen van kern expertises voor het WOT programma. Een groot deel van het budget was daarom ook toegekend aan projecten voor het standaardiseren van leeftijdsbepaling van vis, kwaliteitscontrole van ichthyoplankton en schelpdier monitoring en vismerkgegevens, ontwikkeling van akoestische technieken en expertise. Deze onderwerpen zijn cruciaal voor het onderhouden van de kwaliteit van assessment van visbestanden.

Van de 15 projecten die gefinancierd zijn in 2014 zijn er zeven uitgevoerd in samenwerking met Europese en/of wereldwijde instituten. Dit zorgde voor extra toegevoegde waarde aan het KB WOT programma omdat middelen en kennis van andere landen bijdragen aan het programma. Een deel van het KB WOT programma was specifiek ingezet voor samenwerking en uitwisseling van methoden en technieken. Dit zorgt ervoor dat IMARES in de frontlinie blijft van wetenschappelijke ontwikkeling en in het hart van Europees en internationaal visserij onderzoek.

Het programma heeft ook weer geresulteerd in een aantal publicaties, presentaties en het ontwikkelen van nieuwe methoden en hulpmiddelen voor visserijonderzoek. Meer dan 15 internationale presentaties zijn gegeven tijdens werkgroepen en symposia en internationale en nationale rapporten geschreven. 6 Nieuwe methoden of modellen zijn ontwikkeld, 1 peer reviewed wetenschappelijk artikel gepubliceerd en 2 wetenschappelijke manuscripten zijn opgezet.

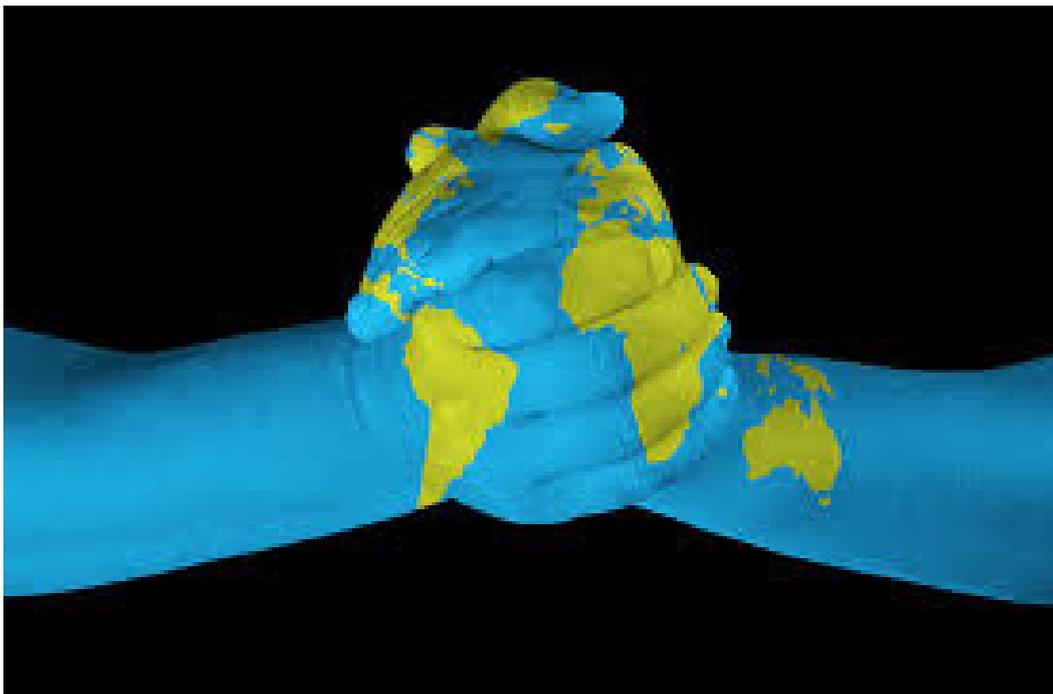


1 Introduction

The KennisBasis (KB) linked to the (WOT) Fisheries programme is a multiannual programme which is annually reviewed. It is a research programme with clearly defined objectives and deliverables and the annual review allows flexibility in the programme. The KB WOT fisheries programme operates within the overall WUR KB programme and in the period 2011-2014 it was embedded within the theme IV: "Sustainable development of the green-blue space". The main objective of the KB WOT fisheries programme is the maintenance and development of expertise which are essential to carry out the statutory obligations of the Netherlands in fisheries monitoring and advice on fishery management. The statutory tasks of the Netherlands change over time and the KB WOT fisheries programme needs to be flexible to respond to these changes. However, fisheries methods and policy needs are also evolving. Thus the programme needs to be proactive and forward looking while maintaining and developing the key expertise.

The statutory obligations comprise the advice and actions needed to carry out the national and European fishery policies. It comprises the fisheries relevant commitments to the CFP (Common Fisheries Policy), national freshwater policy, the Habitats Directive, the Water Quality Directive and the Marine Strategy Framework Directive (MSFD). This not only includes the data and information collection but also developing, understanding and the provisioning of scientific advice. With the development of the yearly KB WOT programme, the necessity to anticipate the developments and future needs of EZ and the EU is evident. As such, the EU move towards a gradual integration of fishery management into an Integrated Marine Policy through the CFP is important for the structuring of the KB WOT programme.

The KB WOT main objective is to maintain and underpin key expertise necessary to carry out the WOT programme and as such improves the efficiency with which these WOT tasks are carried out. The programme is a combination of operational research that is aimed at immediate challenges for the ministry, together with more strategic research, aimed at future policy development and research needs. The KB WOT resources are used to innovate and enlarge the expertise in the research areas of fishery dynamics, fish biology, monitoring, marine and freshwater ecology and management systems. In addition the KB WOT programme tries to stimulate scientific output of the scientists involved in carrying out the statutory tasks and building international links is an important priority of the programme.



2 The programme in 2014

The research priorities for the 2014 programme were based on the apparent requirements of the WOT programme. The maintenance and development of key expertise, essential to carry out the statutory tasks, takes priority, followed by exchange of scientific knowledge in international networks and the development and innovation required for current and future WOT work. The remaining funds can be utilized for strategic purposes.

Provision of robust science and advice can only be achieved with excellent and innovative research in the KB WOT programme. The results of monitoring programmes and delivered advice for national and international fisheries management needs to be able to withstand international review. International scrutiny and quality control can only be accomplished with international exchange of knowledge and developments and publication of research in international scientific, peer reviewed, papers. A considerable part of the KB WOT budget is reserved for exchange of science. A small part of the resources is used for stimulation of scientific publishing of research which supports the WOT fisheries programme.

2.1 Research themes

The research areas which were considered high priority for the KB WOT fisheries programme in 2014 were:

1. Ecosystem approach (to fishery management)
2. Maintaining Quality (in data collection)
3. International Exchange (of expertise)

2.2 Rationale for the choice of research themes

The marine and freshwater ecosystems are continuously developing and changing, and consequently the relative significance of parts of an ecosystem can vary over time (e.g. a move from demersal to pelagic production of fish in the North Sea). Some changes are fluctuations caused by regular cycles, e.g. the Atlantic Multidecadal Oscillation, while others occur due to longer time change and seem to be more permanent. Identified as one major cause of long term change is climate change. A consequence of this is that the productivity of marine and freshwaters systems fluctuates over a range of temporal scales. Good management of the ecosystems and its resources requires a good understanding of the variability, causes thereof and the extent of these changes. Also these natural changes interact with human impact and this makes the fisheries system dynamic, if sometimes unpredictable. Only a good understanding will allow assessment of risks, the probability of stock recovery or over exploitation, and analyses and discrimination between natural and anthropogenic effects on the ecosystem.

Also management of marine and freshwater resources is continuously developing. The EU has moved from fish stock management to management of the fisheries, including measures to regulate fishing effort and reduce discards. The management now also includes the effect of fishing on the ecosystem. Fisheries impact on the environment has been studied and the available knowledge is significant. However, there still exists a need for further knowledge increase to aid management of marine and freshwater resources. For EU regulations, e.g. MSFD, member states are required to start monitoring programmes for a number of selected descriptors, ecosystem elements which are sensitive to fishing activities. From 2105 onwards, landing obligations (discard ban) will be established and extended in the coming years.

Part of the KB WOT budget is reserved to support these international duties and projects are requested and selected which deal with these specific needs of the WOT fisheries programme. KB WOT resources are also invested to develop new approaches to management and management models. As well as mechanisms that need to be found to underpin the management of the 'data poor' stocks. Peer reviewed

manuscripts will ensure quality control of the research on these topics and will increase the scientific status of IMARES.

An important element of the KB WOT is the maintenance and quality control of the expertise basis and development of routine techniques, skills and methods needed carry out the statutory obligations. This includes age reading, maturity assessment, stock assessment, acoustic techniques and data collection. Courses, workshops and exchanges, usually coordinated by ICES, are an important part of maintaining and developing core skills. (Inter) national exchange of experience and techniques is a crucial element of the development of fisheries science within the EU. These workshops and symposia are also key for the creation of new innovative products and methods, hence the staff involved in the WOT tasks need to participate in these meetings.

2.3 Projects funded through the KB WOT fisheries programme in 2014

Yearly, scientists are invited to submit proposal to several themes which are selected by the KB WOT management team. The proposals are reviewed and judged for relevance for the WOT statutory tasks, development of relevant new methods, relevance for the IMARES research strategy and scientific relevance. The projects in the table below were funded in 2014. The annual reports of each project are attached to the end of this report.

BAS No	Title	Project leader	Research Theme	Planned	Realised
KB-14-012-039	Program management 2014	Cindy van Damme		€25.200,-	€26.200,-
KB-14-012-041	International Exchange	Cindy van Damme	3. International exchange	€120.000,-	€147.489,-
KB-14-012-042	Underpinning acoustics	Sascha Fässler	2. Maintaining Quality	€44.911,-	€44.911,-
KB-14-012-044	Fish ageing	Loes Bolle	2. Maintaining Quality	€50.000,-	€52.000,-
KB-14-012-046	CCTV segmentation	Daniel Benden	1. Ecosystem Approach	€26.940,-	€26.940,-
KB-14-012-047	HERCATCH	Cindy van Damme	2. Maintaining Quality	€49.120,-	€49.120,-
KB-14-012-049	Has trawling turned the Dutch seafloor into a high-production fish farm?	Tobias van Kooten	1. Ecosystem Approach	€29.800,-	€29.800,-
KB-14-012-050	Bycatch: bane or boon?	Tobias van Kooten	1. Ecosystem Approach	€19.200,-	€19.280,-
KB-14-012-051	Discriminating between horse mackerel landings using GCxGS-MS ¹	Aukje Coers	1. Ecosystem Approach	€33.880,-	€8.676,-
KB-14-012-052	PELSPA	Sascha Fässler	1. Ecosystem Approach	€24.960,-	€25.220,-
KB-14-012-053	Interdependence of perch and pikeperch ²	Nicola Tien	1. Ecosystem Approach	€ 24.000,-	€9.243,-
KB-14-012-054	Larval time series in stock assessment	Niels Hintzen	1. Ecosystem Approach	€19.600,-	€19.600,-
KB-14-012-055	STAMPOT	Sven Gastauer / Ben Scoulding	1. Ecosystem Approach	€26.340,-	€26.416,-
KB-14-012-056	Analysis tagging experiments: seasonal growth patterns	Adriaan Rijnsdorp	1. Ecosystem Approach	€12.174,-	€12.237,-
KB-14-012-057	Making fish tagging data available to everyone	Ingeborg de Boois	2. Maintaining Quality	€15.275,-	€15.275,-
KB-14-012-060	Novel Stratification Approach	Karin Troost	2. Maintaining Quality	€46.600,-	€46.600,-
KB-14-012-061	BLUEfeed ¹	Sven Gastauer	1. Ecosystem Approach	€20.000,-	€0,-
KB-14-012-062	Innovative Mussel mapping	Karin Troost	1. Ecosystem Approach		€29.500,-

The total KB WOT budget €588.000,- was expended in 2014.

¹ Project could not be carried out due to problems with collection of samples

² Project could not be carried out due to staffing problems

3 Highlights of the programme

3.1 2011-2014

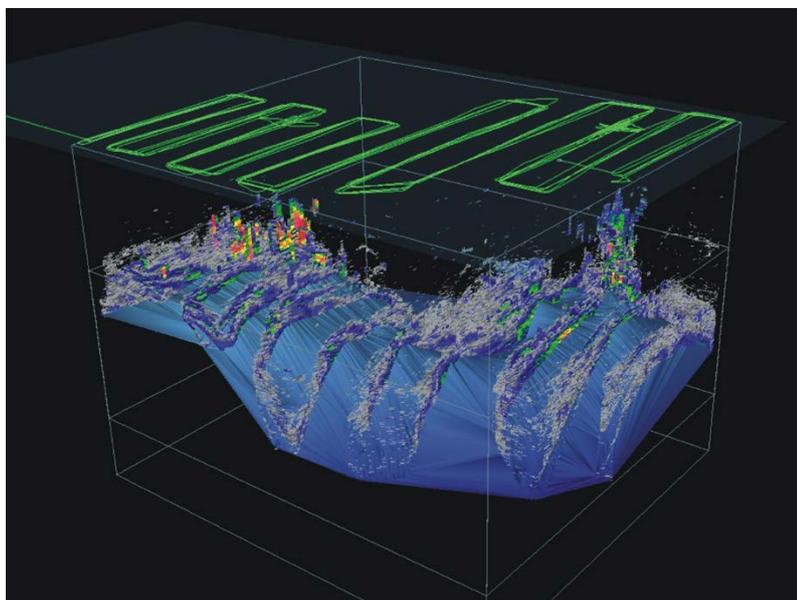
In 2014 the WUR KB programme theme IV: "Sustainable development of the green-blue space" ended. In the period 2011-2014 the KB WOT fisheries programme was embedded in this theme. During this period the KB WOT fisheries programme was diverse and contained many important findings. To disseminate results of the KB programme developed, partly funded by KB WOT fisheries, a calendar for 2015 showing examples of the recent marine research, this included (KB) WOT fisheries projects. There were many important project results in the period 2011-2014 and highlights of these have been described in the individual year reports. Examples of two topics of which projects have been carried out in more than one year over the period 2011-2014 are:

3.1.1 *Underpinning acoustics and Novel insights*

Acoustic surveys are an important technique to monitor stocks of pelagic fish species, such as herring and blue whiting, as well as benthic shellfish stocks. In recent years knowledge and techniques have been developed to improve and extend acoustic methodologies.

To use acoustics in fisheries monitoring it is important to know in what way and how much sound a species reflects in order to identify fish species on an echogram and estimate the size of the stock. New techniques have been developed to identify the reflection of different fish species. Acoustic reflection from fish is mostly reflected by the swim bladder. Pelagic fish migrate up and down through the water column. Water pressure varies with depth and because of the higher pressure at depth the swim bladder of a fish decreases. This has effect on the amount of sound that is reflected, a small swim bladder reflects less sound. As a result of an IMARES research project it is currently possible to correct for water pressure on the reflection of herring depending on the height in the water column. More importantly in this project the reflection at depth was also corrected for background noise in the reflection of the swim bladder.

In 2011 the reflection of boarfish was estimated for the first time. A 3D picture of the boarfish swim bladder was constructed based on MRI-scans. This made it possible to estimate the reflection of this organ. Since 2011 a commercial boar fish fisheries has developed. However this acoustic development was not merely useful for the estimation of the size of the boar fish stock. The fisheries was also interested to recognise boar fish on echograms to be able to avoid catching boar fish while fishing for mackerel and horse mackerel. Boar fish has many spiky fin rays which can easily damage the mackerel and horse mackerel in the catch.



In this period KB WOT resources were also utilised to identify and exclude planktonic organisms on the acoustic echograms. This was also done for two reasons: It is currently possible to filter out plankton and this improves the reflections of fish. This is a huge improvement for the assessment of fish stocks. Secondly, EU has moved from fish stock management to sustainable and ecosystem management. Plankton is an important part of the marine and fresh water ecosystems as producers and as food for many organisms, including commercial fish and shellfish species. With the move in management it has become important to have a reliable method to estimate the size and amount of plankton in the water.

Acoustics can be used for fish and plankton identification, but also for the mapping of the sea floor and as a result estimate the size of shell fish stocks living on or in the top layer of the sea bottom. Use of multi-beam technology has been further developed for the estimation of the stock size of razor clams. This allows for the possibility to monitor a large area of sea floor in a short time period and reduces the amount of bottom samples to be taken considerably. A considerable improvement in the efficiency of the WOT shell fish surveys.

In 2012 IMARES took the initiative to organize an acoustic symposium. The objective of this symposium was to exchange knowledge, developments and techniques between national institutes. After two productive editions in 2012 and 2013, this symposium has advanced to an international gathering where scientists from outside the Netherlands want to present and share the results and developments of their acoustic research.

These developments funded by KB WOT research have made it possible for IMARES to currently perform acoustic surveys for herring, blue whiting, sprat and greater sandeel, but also razor clams and *Spisula subtruncata*. The developments in acoustic reflection have all been added to the R library "Acousta" allowing other scientists to utilise IMARES developments.

The importance of acoustic techniques in monitoring natural resources has been acknowledged by the Ministry of EZ. In 2014, it was decided to refit its major research vessel Tridens in particular with regard of the most advance new acoustic equipment. In the recent period KB WOT resources have made it possible to further develop acoustic expertise at IMARES. IMARES is currently a recognised international acoustic expert.

3.1.2 Fish ageing

A key expertise for the statutory tasks is fish ageing. Age estimation of the fish is essential for all age-structured population dynamic research, such as estimation of fish stock size needed for fisheries advice. Maintenance and development of this skill is achieved through international calibration, training and quality assurance.

IMARES is qualified to determine age of the following species: herring, sprat, mackerel, horse mackerel, blue whiting, cod, haddock, whiting, greater argentine, plaice, sole, turbot, brill, dab, flounder, lemon sole, pikeperch, perch, bream and roach. In recent years maintenance of this expertise has been achieved by (inter)national calibration and education of new age readers. IMARES not only participates in international calibration but has also organised and established a number of exchanges and workshops for fish ageing of various species. IMARES also played a major role in the development of international used methods, such as the 'otolith line', for the production of thin coupes of otoliths (ear bones used for age estimation) and 'WebGR' (a web-based tool for calibration exercises on age reading and maturity staging from images).

Not only age reading itself, but also standardisation of the collection of data and the use of age data in assessment of fish stocks have been established by IMARES scientists in cooperation with international colleagues.

3.2 2014

In 2014 again a diverse program was established. Originally 17 projects were rewarded at the start of 2014. However, two projects could not be carried out because samples could not be collected to carry out the research (horse mackerel discriminating and blue whiting feeding). For a third project the available experts were fully booked for other obligations. The budget which was freed with the terminated projects was awarded to a new project 'Innovative Mussel Mapping'. In total 15 projects were carried under the KB WOT fisheries programme in 2014.

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3.2.1 Tools and method development

Image analyses is a technique which rapidly advancing and will be utilised more and more in the near future in monitoring. Closed circuit television (CCTV) is currently used on board trawlers to monitor (by)catches. In 2014 methods have been developed to easily segment and analyse electronic monitoring (EM) footage (such as CCTV) collected for various WOT samplings. Software has been developed to speed up EM analyses and ensure long-time data storage.

Images from satellites can also be utilised to aid the monitoring of shellfish beds. A method has been developed to identify shellfish beds in the Wadden Sea with the use of satellite data. This data will give a general overview of the distribution of shellfish beds, allowing for a better and more accurate planning of shellfish sampling during WOT surveys.

Tools have been developed using the R programming package for analyses of fish tagging and acoustic data. Statistical analysis methods for acoustic data collected on fishing vessels were developed and tested. These methods will also be relevant for many marine data with similar (subjective non-random) sampling patterns.

A new method has been develop which allows for direct use of the raw data from herring larvae surveys into the SCAI index calculation. Data can now be directly assessed from the recently established ICES egg and larval database without a smoothing of the data before the actual index calculation. In this way it is easier for the herring assessment to incorporate changes in the relative importance of the different spawning grounds and better understand the effect of environmental changes on larvae distribution.

3.2.2 Standardisation of techniques, data accessibility and quality control

Advances were continued in a pan European approach to fish ageing of flatfish (sole, plaice and dab), pelagic fish (herring, sprat, mackerel, horse mackerel and blue whiting) and haddock and whiting. IMARES participated in two meetings organised by ICES where methods, for the use of age and other data collected from otoliths can be used for (new) assessment purposes, were discussed.

Historical data contain a lot of information which can be of use in the future. Therefore it is important that historically collected data remain accessible. In 2014 four projects were directed to data base storage and quality control of time-series of data. In the past century several hundred thousands of fish has been tagged for various purposes. The database in which these data were stored was not maintained and the tagging data were not accessible for many years. In 2014, KB WOT funded projects focused on storage of historic tagging and recapture data and the possibility to store data for future tagging experiments in the IMARES database.

Work was also undertaken to quality check the long time-series of herring larvae surveys data. In an international project a quality control routine was setup for use on different ichthyoplankton survey data checks. Next to data quality checking also catchability and performance under different circumstances of ichthyoplankton sampling gears were tested. Recent developments, to increase quality control of data collection during the plankton sampling, proved only to have minor influence on the performance of the gears.

Manuals and protocols for the WOT shellfish surveys have been updated and advances were made for proper data storage of data collected in these surveys.

3.2.3 *Recent publications resulting from the KB WOT fisheries programme*

The peer reviewed publications resulting from the KB WOT Fisheries programme in 2014:

PD van Denderen, NT Hintzen, AD Rijnsdorp, P Ruardij, T van Kooten (2014). Habitat-specific effects of fishing disturbance on benthic species richness in marine soft sediments. *Ecosystems* 17 (7), 1216-1226.

In addition the below manuscripts for submission are in preparation:

2014

Wolfshaar & Kooten Manuscript (in prep). Undersized bycatch may promote the growth of harvestable fish'.

Fässler et al (in prep). Deriving 'behavioural' parameters from acoustic fishing vessel data.

2013

Fässler et al. (submitted). Year class strength and subpolar gyre affect blue whiting length distribution on the spawning grounds: mechanisms of population regulation.

Fässler et al. (submitted). Opportunistically recorded acoustic data reveal patterns in mackerel dynamics in the North Sea during the feeding season.

Fässler et al. (submitted). Pelagic fish in the gateway to the Wadden Sea: abundance and behaviour in relation to the tide.

Damme et al. (in prep). Can the standard IBTS-MIK survey provide reliable data on herring recruitment and spawning locations.

Fässler et al. (in prep). Depth-dependent finite element models of herring (*Clupea harengus*) target strength using magnetic resonance imaging (MRI) of swim bladders.

Fässler et al. (in prep). Information on pelagic fish stocks around the British Isles derived from acoustic data collected on commercial fishing vessels.

Fässler et al. (in prep). Herring habitat quality from acoustically derived zooplankton abundance in the Northern North Sea.

Fässler et al. (in prep). The distribution of blue whiting west of the British Isles” and “Vertical migration of mesopelagic fish west of the British Isles.

Wolfshaar, K. van de et al. (in prep). Temporal and spatial changes in flatfish nursery quality.

Next to the above peer reviewed manuscripts results of the KB WOT projects were also disseminated in other ways. There were also 15 internal and international reports and presentations 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.

Troost et al. (in prep). Internal document on comparison between regular and adapted dredge, including data analysis and workshop outcomes

Hintzen et al. (in prep). Updating herring larval index abundance (LAI) estimates and including this data in the North Sea herring assessment.

Davaasuren et al. (in prep). Map of the Wadden Sea showing the estimated locations and presence of the mussel beds, as identified on Landsat-8 images.

Report of the Working Group on Integrating Surveys for the Ecosystem Approach (WGISUR). ICES CM 2014\SSGESST:03, Nota 14. IMA0299.IB.mb

First Interim Report of the Working Group on Integrated Assessments of the North Sea (WGINOSE). ICES CM 2014/SSGRSP:05; Report of the Workshop to develop recommendations for potentially useful Food Web Indicators (WKFooWI). ICES CM 2014\ACOM:48, Nota 14. IMA0357-KvdW-Ics

Report of the Working Group on Integrative Physical-Biological and Ecosystem Modelling (WGIPEM). ICES CM 2014/SSGSUE:06, Nota 14. IMA0553.KW.mb

Report of the Working Group on Crangon Fisheries and Life History (WGCRAN). ICES CM 2014/SSGEF:08, Nota 14. IMA0513.JS.mw;

Report of the Working Group on Fisheries Acoustics, Science and Technology (WGFAST). ICES CM 2014/SSGESST:07, Nota 14. IMA0644 SF-bc

First Interim Report of the ICES-FAO Working Group on Fishing Technology and Fish Behaviour (WGFTFB). ICES CM 2014/SSGESST:08

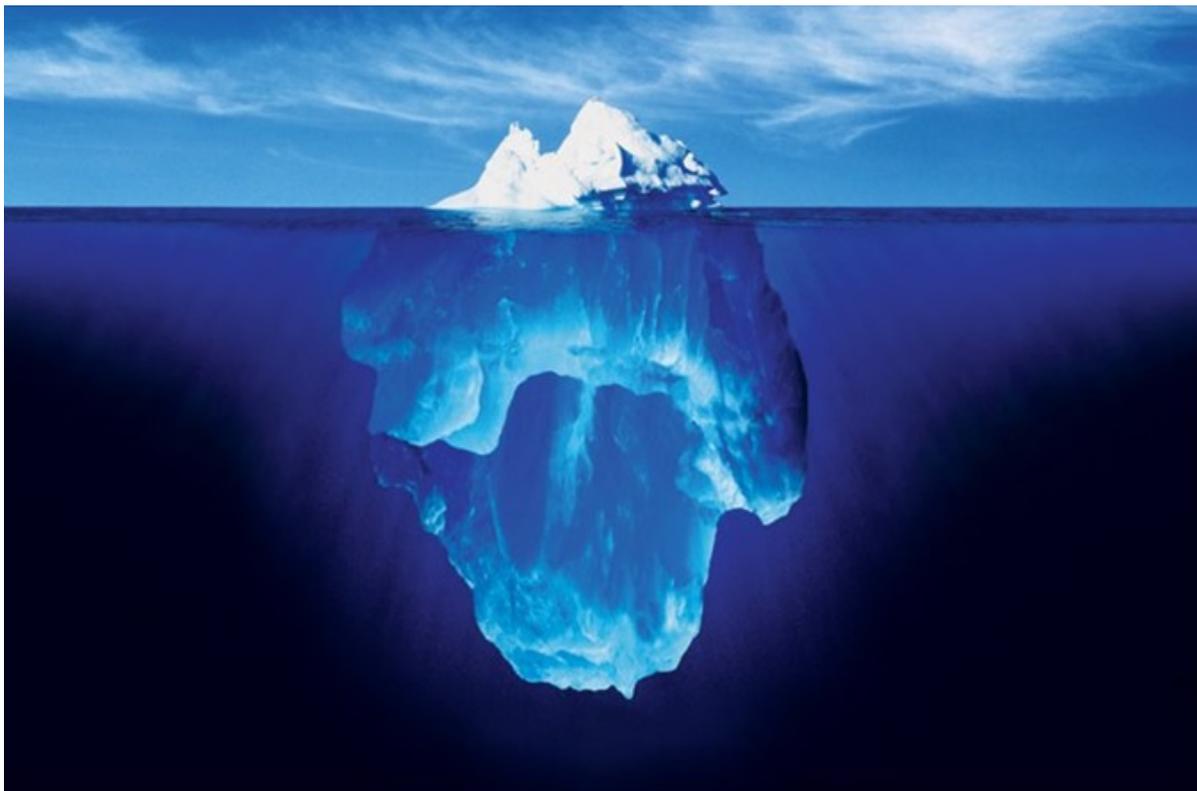
Report of the ICES Data and Information Group (DIG). ICES CM 2014/SCICOM:02, Nota 14. IMA0502-IdB-Ics

Wolfshaar, K.E. van de, 2014. Report of the Working Group on the Value of Coastal Habitat for Exploited Species (WGVHES). Nota 14. IMA0825-KvdW.ro

Damme, C.J.G. van ,and I. Pennock 2014. Report on the ICES Workshop on the Identification of Clupeoid larvae (WKIDCLUP), 1-5 September 2014, at TI, Hamburg, Germany. Nota 14. IMA0762.CvD.Ics

4 International partnership and collaboration

Due to its character, fisheries research is highly international. Fish do not stick to man-made artificial boundaries in the water. Management of the fisheries is international by default and embedded in the European fisheries policies. As a consequence many of the statutory tasks are undertaken in association with research institutions outside the Netherlands. Specifically the monitoring at sea, sampling of catches and method and model development. But also the analyses of data, fish stock or ecosystem assessments and provision of advice are carried out in international context. Evidently, international collaboration is the basis for the required expertise to carry out and maintain the high standards of the WOT tasks. All international cooperation funded by KB WOT fits the objectives and priorities of the WOT programme. In 2014, 15 projects were carried out, of these 7 were in collaboration with scientists from international institutes. Through this, resources and expertise from other countries contribute added value to the KB WOT programme. One project is specifically allocated to international exchange of science. This project made it possible for IMARES colleagues to participate in studies of 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, egg production methods and surveying ichthyoplankton. Over 15 international presentations were given at working groups and symposia. Through the KB WOT Fisheries programme IMARES scientists joined forces with scientists from institutes from all over the world, including: Belgium, Canada, Denmark, Estonia, Finland, France, Germany, Iceland, Ireland, Latvia, Lithuania, Norway, Portugal, Russia, Spain, Sweden, United Kingdom, United States of America, Austria, Italy, Greece, Australia, Greenland and the Faroe Islands.



5 Conclusion

The KB WOT Fisheries programme was very productive in 2014, but three projects were terminated because the objectives of these could not be met. The 15 projects carried out in 2014 were successful and produced good results and developments, from maintaining quality in fish ageing, fish tagging, shellfish and ichthyoplankton sampling to more strategic research in fisheries acoustics, electronic and satellite monitoring, effect of beam trawling on bottom fauna and developing methods for fish stock assessments. There was also a large amount of added value to the programme in 2014 through international and/or inter-institute collaboration and participation in meetings, workshops and symposia.

The KB WOT Fisheries programme resources were used to:

- Exchange and developed knowledge and methods and cooperate with (inter)national colleagues.
- Made historical data collections accessible and ensured proper future storage for data.
- Maintain and develop expertise needed for the WOT Fisheries programme.
- Develop new methods and ideas to provide better understanding and improve efficiency in carrying out WOT Fisheries tasks.
- Stimulate dissemination of results in (peer-reviewed) publications and on (inter)national fora.



Édouard Manet Still-life with fish (1864)

6 Quality assurance

CVO utilises an ISO 9001:2008 certified quality management system (certificate number: 127538-2012-AQ-NLD-RvA). This certificate is valid until 15 December 2015. The certification was issued by DNV Certification B.V.

Signature

CVO Report: 15.008

Project number: 4311300001

Approved by: Ing. S.W. Verver
Head WOT, Centre for Fisheries Research

Signature:

A handwritten signature in blue ink, appearing to be 'S.W. Verver', written in a cursive style.

Date: December 2015



Annex 1. Annual Reports of KB WOT Fisheries Projects 2014

Title	1. Program management
Number	4301900373
Project leader	Cindy van Damme
Other researchers in WUR	Sieto Verver, Frans van Beek and Rian Schelvis
Researchers outside WUR	None
BAPS number	KB-14-012-039-IMARES
Budget	25.200,-
Goals of project	To manage and develop the KBWOT Fisheries theme within WUR KB theme 4.
Target group for research	Fisheries advice and research

PROGRESS 2014

Results	<p>Main results: The KB WOT fisheries programme ran according to plans.</p> <p>Products: A report with the planned program and a report with the results of the program.</p>
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.
Science publications	
General publications	<p>The planning report for KB WOT fisheries 2015, and the final report for KB WOT 2013.</p> <p>1) The KB WOT Fisheries Programme carried out in 2013. CVO report: 14.004 2) KB WOT Fisheries 2015 - Maintaining Excellence and Innovation in Fisheries Research. CVO report: 15.002.</p>
Other outputs	A programme of research in 2014, and preparations for 2015.
Any links to Wageningen University projects?	None
What is relevant for EZ fisheries or ecosystem management?	<p>The KB WOT 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 EZ.</p> <p>A review of the wider KB programme, including KB WOT fisheries, took place end of 2014, results of this review are not available yet.</p>
Describe collaboration with any partners outside WUR (national)	None

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	Fisheries managers and research coordinators in EZ.
Summary and Conclusions of Project	This project manages the KB WOT fisheries programme within the WUR KB IV theme 'Groene en blauwe ruimte'. It has produced a report with the results of the program in 2013 and a report with the proposed program for 2015.
Dutch summary and conclusions	Dit project beheert het KB WOT visserij programma binnen het WUR KB IV thema 'Groene en blauwe ruimte'. In 2014 zijn er twee rapporten gepubliceerd, met de resultaten van het programma uit 2013 en het geplande programma voor 2015.

INTERNATIONAL

Was the project part of an international network?	The management of the KB WOT fisheries programme is a national project. However, in preparing the planning of the yearly programme international collaboration is a major topic.
Who were the international partners?	None.
Has the project been associated with international funding sources (EU, DGIS etc) or research programmes?	Not in 2014.
How much funding came from these sources?	
How did the project position IMARES internationally?	The programme places IMARES in a strong position in fisheries and marine science.

Title	2. Calendar
Number	4308511010
Project leader	Tinka Murk
Other researchers in WUR	Loes Bolle, Karin van de Wolfshaar, Ineke Pennock and Cindy van Damme
Researchers outside WUR	
BAPS number	KB-14-012-039-IMARES-1
Budget	1.000,-
Goals of project	To contribute to a calendar for 2015 promoting marine science work, including projects carried out with KB WOT fisheries funding.
Target group for research	Marine scientists, fisheries managers, ministry EZ.

PROGRESS 2014

Results	Products: A calendar for 2015 promoting marine science work, including projects carried out with KB WOT fisheries funding.
Did the work follow plans (science or financial)?	Yes
Developed expertise	
Science publications	
General publications	Calendar
Other outputs	
Any links to Wageningen University projects?	The calendar includes projects of KB WOT fisheries, but also IMARES and Marine projects of the Wageningen University.
What is relevant for EZ fisheries or ecosystem management?	Promoting the projects funded by (KB) WOT fisheries.
Describe collaboration with any partners outside WUR (national)	None

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	None
Summary and Conclusions of Project	A week calendar promoting marine science work, including projects carried out with KB WOT fisheries funding has been produced and send to clients and collaborators.
Dutch summary and conclusions	In 2014 is er een weekkalender voor 2015 gemaakt welke een foto en uitleg geeft over verschillende marine projecten, waaronder projecten die via KB WOT visserij gefinancierd worden.

INTERNATIONAL

Was the project part of an international network?	No
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?	This calendar promotes the Marine Science work carried out by IMARES.

Title	3. International Exchange
Number	4301900372
Project leader	Cindy van Damme
Other researchers in WUR	Ingeborg de Boois, Lorna Teal, Karen van de Wolfshaar, Ingrid Tulp, Sascha Fässler, Bob van Marlen, Adriaan Rijnsdorp, Jan Jaap Poos, Ineke Pennock, Marloes Kraan and David Miller
Researchers outside WUR	
BAPS number	KB-14-012-041-IMARES
Budget	147.489,-
Goals of project	To fund participation in international science networks and ICES meetings.
Target group for research	IMARES and ICES scientists and technicians and the fisheries science community.

PROGRESS 2014

Results	<p>Main results:</p> <p>IMARES active participation and contribution to 17 international workshops and study groups on fisheries, fish ecology, stakeholder involvement, evolutionary effects of fishing, development of new survey methods and age reading organised by ICES. This brought in added value and technology transfer to the Netherlands. IMARES personnel participated in the following networks and ICES groups: Data and Information Group, Working Group on Integrative Physical-biological and Ecosystem Modelling, Working Group on Fisheries-Induced Evolution, Workshop on the Value of Coastal Habitats for Exploited Species, Working Group on Methods of Fish Stock Assessments, Working Group on Fishing Technology and Fish, Working Group on Electrical Trawling, Working group on Atlantic Fish Larvae and Egg Surveys, Working Group on Fisheries Acoustics and Technology, Working Group on Integrating Surveys for the Ecosystem Approach, Workshop on DATRAS data Review Priorities and checking Procedures, Working Group on Cod and Plaice egg surveys in the North Sea, Workshop to develop recommendations for potentially useful Food Web Indicators, Workshop on the identification of Clupeoid larvae, Workshop on Statistical Analysis of Biological Calibration Studies, Workshop on Regional Seas Commissions and Integrated Ecosystem Assessment Scoping.</p> <p>IMARES personnel was invited and participated in the international Daily Egg Production Workshop organised by and held in Australia.</p> <p>Products:</p> <p>Report of the Working Group on Integrating Surveys for the Ecosystem Approach (WGISUR). ICES CM 2014\SSGESST:03, Nota 14.IMA0299.IB.mb; First Interim Report of the Working Group on Integrated Assessments of the North Sea (WGINOSE). ICES CM 2014/SSGRSP:05; Report of the Workshop to develop recommendations for potentially useful Food Web Indicators (WKFooWI). ICES CM 2014\ACOM:48, Nota 14.IMA0357-KvdW-Ics; Report of the Working Group on Integrative Physical-Biological and Ecosystem Modelling (WGIPEM). ICES CM 2014/SSGSUE:06, Nota 14.IMA0553.KW.mb, Report of the Working Group on Crangon Fisheries and Life History (WGCRAN). ICES CM 2014/SSGEF:08, Nota 14.IMA0513.JS.mw; Report of the Working Group on Fisheries Acoustics, Science and Technology (WGFAST). ICES CM 2014/SSGESST:07, Nota 14.IMA0644 SF-bc; First Interim Report of the ICES-FAO Working Group on Fishing Technology and Fish Behaviour (WGFTFB). ICES CM 2014/SSGESST:08; Report of the ICES Data and Information Group (DIG). ICES CM 2014/SCICOM:02, Nota 14.IMA0502-IdB-Ics; Nota 14.IMA0825-KvdW.ro; Nota 14.IMA0762-CvD-Ics; ICES-SCICOM 2014</p>
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	Interim Report of the Working Group on Fisheries-Induced Evolution (WGEVO). 7-11 July 2014. IJmuiden, the Netherlands. ICES CM 2014/SSGSUE:04 REF. SCICOM & ACOM, CVO/15.IMA007.AR.jd; ICES-ACOM. 2014. Report of the Workshop on Statistical Analysis of Biological Calibration Studies (WKSABCAL). 13-18 October 2014, Lisbon, Portugal. ICES CM 2014/ACOM: 35 REF. PGCCDBS; ICES-SSGESST 2104. Report of the Workshop on Integrated DATRAS Products (WKIDP). 7–9 October 2014, ICES Headquarters, Copenhagen ICES CM 2014/SSGESST:17 REF. ACOM, DIG, SCICOM
Did the work follow plans (science or financial)?	Yes, meetings were selected and attendance was planned.
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	Each group has produced a report which is published on the ICES website: http://www.ices.dk/community/groups/Pages/default.aspx
General publications	Besides the ICES reports, an IMARES nota is published after each meeting with the main findings of the meeting and results that are of importance for IMARES and the ministry of EZ.
Other outputs	
Any links to Wageningen University projects?	None
What is relevant for EZ fisheries or ecosystem management?	Products and expertise central to the development and research of fisheries in the Netherlands.
Describe collaboration with any partners outside WUR (national)	Mostly across the North Atlantic marine science community but now also with FAO and with scientists from countries involved in PICES (Japan, Korea, China) and scientists from Australia.

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Non scientific partners	None
Summary and Conclusions of Project	<p>IMARES active participation and contribution to 17 ICES lead workshops and study groups on fisheries, fish ecology, stakeholder involvement, evolutionary effects of fishing, development of new survey methods and age reading. This brought in added value and technology transfer to the Netherlands.</p> <p>IMARES personnel participated in the following networks and ICES groups: Data and Information Group, Working Group on Integrative Physical-biological and Ecosystem Modelling, Working Group on Fisheries-Induced Evolution, Workshop on the Value of Coastal Habitats for Exploited Species, Working Group on Methods of Fish Stock Assessments, Working Group on Fishing Technology and Fish, Working Group on Electrical Trawling, Working group on Atlantic Fish Larvae and Egg Surveys, Working Group on Fisheries Acoustics and Technology, Working Group on Integrating Surveys for the Ecosystem Approach, Workshop on DATRAS data Review Priorities and checking Procedures, Working Group on Cod and Plaice egg surveys in the North Sea, Workshop to develop recommendations for potentially useful Food Web Indicators, Workshop on the identification of Clupeoid larvae, Workshop on Statistical Analysis of Biological Calibration Studies, Workshop on Regional Seas Commissions and Integrated Ecosystem Assessment</p>

	<p>Scoping.</p> <p>IMARES personnel was invited and participated in the international Daily Egg Production Workshop organised by and held in Australia.</p>
Dutch summary and conclusions	<p>IMARES actieve deelname en bijdrage aan 17 ICES workshops en studiegroepen over de visserij, vis ecologie, belanghebbenden betrokkenheid, evolutionaire effecten van de visserij, de ontwikkeling van nieuwe onderzoeksmethoden en leeftijd aflezen. Dit bracht toegevoegde waarde en de overdracht van kennis en technologie naar Nederland.</p> <p>Personeel van IMARES heeft in 2013 deelgenomen aan onderstaande netwerken en ICES groepen:</p> <p>Data and Information Group, Working Group on Integrative Physical-biological and Ecosystem Modelling, Working Group on Fisheries-Induced Evolution, Workshop on the Value of Coastal Habitats for Exploited Species, Working Group on Methods of Fish Stock Assessments, Working Group on Fishing Technology and Fish, Working Group on Electrical Trawling, Working group on Atlantic Fish Larvae and Egg Surveys, Working Group on Fisheries Acoustics and Technology, Working Group on Integrating Surveys for the Ecosystem Approach, Workshop on DATRAS data Review Priorities and checking Procedures, Working Group on Cod and Plaice egg surveys in the North Sea, Workshop to develop recommendations for potentially useful Food Web Indicators, Workshop on the identification of Clupeoid larvae, Workshop on Statistical Analysis of Biological Calibration Studies, Workshop on Regional Seas Commissions and Integrated Ecosystem Assessment Scoping.</p> <p>IMARES personeel was uitgenodigd en heeft deelgenomen aan de internationale Daily Egg Production Workshop georganiseerd door en gehouden in Australia.</p>

INTERNATIONAL

Was the project part of an international network?	Yes, part of ICES.
Who were the international partners?	Institutes and universities from Australia, 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.

Title	4. Underpinning acoustics
Number	4301900382
Project leader	Sascha Fässler
Other researchers in WUR	Bram Couperus, Sven Gastauer, Ben Scouling, Dick de Haan and Ben Griffioen
Researchers outside WUR	Collaborators working in the same expertise field at IMR, IFREMER, MSS, CEFAS, MI and NOAA
BAPS number	KB-14-012-042-IMARES
Budget	44.911,-
Goals of project	The project aims to maintain and develop acoustic expertise in the Netherlands. Apart from improving data flow, the project will also serve to answer ad hoc research questions where contributions are needed at short notice (e.g. new monitoring needs for mackerel, properties of boarfish, or multidisciplinary surveys in the Marsdiep). It will keep the methods at the most current state and explore alternative ways to assist in-house research.
Target group for research	Pelagic ecosystem monitoring

PROGRESS 2014

Results	<p>Main results:</p> <ul style="list-style-type: none"> -Organising Netherlands BioAcoustic Day 2014 -Developing prototype camera system to improve acoustic monitoring of the pelagic ecosystem (used by colleagues in many other projects since) -Contributing to acoustic work required for mackerel benchmark assessment <p>Products:</p> <ul style="list-style-type: none"> -Contributing to scientific papers about: blue whiting distribution in relation to environmental drivers; mackerel distribution in the North Sea; small pelagic fish in the Marsdiep; blue whiting survey data -Contributing to presentations given at international fora (WGFAST) on: zooplankton abundance from multifrequency acoustic data; blue whiting distribution; mesopelagic fish distribution; mackerel information from opportunistically recorded data -Maintaining analysis software versions (LSSS & Comsol Multiphysics)
Did the work follow plans (science or financial)?	<p>Financially: yes</p> <p>Scientifically: some adjustment of planned items covered</p>
Developed expertise	Improved acoustic data analysis techniques
Science publications	Contributed to 4 scientific manuscripts: 2 in draft stage, 2 submitted
General publications	
Other outputs	
Any links to Wageningen University projects?	No
What is relevant for EZ fisheries or ecosystem management?	Pelagic ecosystem monitoring capabilities are being maintained at a high quality level by collaboration with institutes abroad and developing of new techniques in-house. Methods are developed to deliver useful information from acoustic data (e.g. mackerel assessment).
Describe collaboration with any partners outside WUR (national)	Collaboration is mainly by sharing expertise and knowledge via electronic communication or contributing to joint publications.

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	
Summary and Conclusions of Project	The project allowed on-going maintenance and development of acoustic expertise at IMARES. It built and maintained links within IMARES and other national and international institutes. With the shift in survey focus towards an ecosystem approach, the project utilised acoustic survey data for providing answers to research questions not directly related to classical 'single species' stock assessment.
Dutch summary and conclusions	Het project zorgde voor instandhouding en ontwikkeling van akoestische deskundigheid bij IMARES. In het project zijn nieuwe links binnen IMARES en met andere nationale en internationale instituten gelegd. Met de verschuiving van de focus van surveys naar een ecosysteembenadering zijn binnen dit project akoestische surveygegevens gebruikt voor het verstrekken van antwoorden op onderzoek welke niet rechtstreeks gerelateerd is aan de klassieke 'één species' bestandsschatting.

INTERNATIONAL

Was the project part of an international network?	No.
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?	

Title	5. Fish ageing
Number	4301900376
Project leader	Loes Bolle
Other researchers in WUR	Peter v.d. Kamp, Ineke Pennock, Ruben Hoek, André Dijkman, Jan Beintema, Marcel de Vries, Peter Groot, Kees Groeneveld, Betty van Os, Gerrit Rink, Thomas Pasterkamp, Norie van Meeren, Corrina Hinrichs and Margreth Roling
Researchers outside WUR	International partners within ICES (no partners in the Netherlands)
BAPS number	KB-14-012-044-IMARES
Budget	52.000,-
Goals of project	Expertise management of age determination of fish through training, international standardisation and quality improvement
Target group for research	Fisheries scientists & marine ecologists

PROGRESS 2014

Results	<p>Main results:</p> <ul style="list-style-type: none"> • International calibration: Initiation of sole exchange (coordinated by IMARES & ILVO), participation in mackerel exchange (2nd reader, 1st reader in 2013), whiting exchange (2 readers) and horse mackerel exchange (1 reader). • Education: Training of new age readers completed for dab, haddock, plaice and cod; training of new age readers for sprat, blue whiting and horse mackerel progressed. Training of new age readers for herring and whiting initiated. • Other: Task-sharing between Norway and Netherlands attempted (swop whiting/plaice otoliths tested), but rejected by Norway due to unbalanced effort. Bi-lateral exchange with Germany for juvenile plaice otoliths from inshore surveys. Database input of old, not yet digitised age data (dab in BTS). Overview historic otolith and scale collections held by IMARES for WKGIC report. Participation in WKGIC (1 person, financed by int. exchanges). Contribution to WKSABCAL. Participation in WKSABCAL (1 person, financed by int. exchanges). <p>Products: See general publications</p> <p>Results of international calibration exercises are documented in reports and summarised in the annual ICES PGCCDBS report.</p>
Did the work follow plans (science or financial)?	Yes
Developed expertise	Maintenance of key expertise fish ageing
Science publications	
General publications	<ul style="list-style-type: none"> • ICES (2014) Report of the Planning Group on Commercial Catches, Discards and Biological Sampling (PGCCDBS), 17-21 February 2014, Horta, Portugal. ICES CM 2014/ACOM 34 • ICES (2014) Report of the Workshop on Statistical Analysis of Biological Calibration Studies (WKSABCAL). ICES CM 2014/ACOM: 35 • ICES (draft) Growth-increment chronologies in marine fish: climate-ecosystem interactions in the North Atlantic (WKGIC). • Ulleweit, J. (2014) Small Scale Otolith Exchange for North East Atlantic Mackerel (<i>Scomber scombrus</i>) 2014 <p>Expected soon:</p> <ul style="list-style-type: none"> • Final report dab exchange 2013 • Report sprat exchange 2013 • Report whiting exchange 2014 • Report horse mackerel exchange 2014
Other outputs	
Any links to Wageningen University projects?	No
What is relevant for EZ fisheries or ecosystem management?	Almost all international fish population dynamic research, whether for scientific publications or for fisheries management advice, is based on age structured analysis. Hence maintenance of the expertise fish ageing is of great importance.
Describe collaboration with any partners outside WUR (national)	Planning Group for Commercial Catches, Discards and Biological Sampling (PGCCDBS) calls for international workshops and exchanges when considered necessary. Furthermore PGCCDBS facilitates international collaboration and tuning of protocols for procedures, training and quality control.

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 kalibratie, 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, that are involved in fish ageing (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?	
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).

Title	6. CCTV segmentation
Number	4301900386
Project leader	Daniel Benden
Other researchers in WUR	Edwin van Helmond and Bram Couperus
Researchers outside WUR	
BAPS number	KB-14-012-046-IMARES
Budget	26.940,-
Goals of project	Automate the screening of closed circuit television (CCTV) video. CCTV is currently used on board trawlers to monitor (by)catches. Methods have been developed to easily segment and analyse electronic monitoring (EM) footage collected for various WOT samplings. Software has been developed to speed up EM analyses and ensure long-time data storage.
Target group for research	All CCTV video projects within IMARES.

PROGRESS 2014

Results	<p>Main results: Software has been developed and implemented to analyse CCTV video images of catch processing on board of fishing vessels. The software is in use.</p> <p>Products: Software product</p>
Did the work follow plans (science or financial)?	Yes
Developed expertise	Image Analysis
Science publications	
General publications	
Other outputs	Software for analyses and storage of data
Any links to Wageningen University projects?	Not currently, but software can be used or further developed for use with any CCTV or EM samplings.
What is relevant for EZ fisheries or ecosystem management?	Improvement of WOT monitoring of commercial catches. Implementation of innovative monitoring techniques and methods in WOT projects.
Describe collaboration with any partners outside WUR (national)	None

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	None
Summary and Conclusions of Project	<p>The utility of Electronic Monitoring (EM) in data collection programmes is expanding rapidly in recent years. EM is using closed circuit television (CCTV) to remotely monitor catches and discards on commercial fishing vessels. Large amounts of video footage are collected and have to be analysed. Typically for EM monitoring, the collected footage contains long intervals without any interesting information, this is the case in situations when the EM system is recording periods between hauls and the crew handling the catch on board. Currently this filtering process is done either by hand or semi-automatic with the help of additional collected sensor data. In both cases, the EM Interpret, software made by Archipelago is used to separate the video footage. These approaches are labour intensive and depend on the availability of sensor data. The goal of this project was to automate the segmentation of the footage into interesting parts (fish on the conveyor belt) and uninteresting parts (no fish on the conveyor belt). The first results show that the software is able to identify the parts of the footage where there is a catch on the conveyor belt. Some false positives are found, where for instance suitcases are put on the conveyor belt. The results can be viewed in the software of Archipelago.</p>
Dutch summary and conclusions	<p>Het gebruik van video monitoring in op visserij schepen ten behoeve van het vergaren van data voor onderzoek is de laatste jaren snel toegenomen. Dit onderzoek produceert grote hoeveelheden video data. Maar een klein deel van deze video is interessant, in het grootste gedeelte van de opnamen gebeurt niets aan boord en dus niet interessant. Voorheen werd de video handmatig of half automatisch gefilterd. Dit gebeurt met de EM interpreter software van Archipelago. Dit proces is erg arbeidsintensief, daarom is het doel van dit KBWOT project om dit proces voor een deel te automatiseren. De software herkent de</p>

	interessante delen uit de video (delen met vis) en de niet interessante delen (zonder vis). Uit de eerste resultaten blijkt dat dit correct gebeurd, wel zijn er nog 'false positives'. Er worden soms ook stukken video uitgefilterd die een ander object bevatten dan vis (b.v. een koffer). De resultaten kunnen zichtbaar worden gemaakt in de software van Archipelago.
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INTERNATIONAL

Was the project part of an international network?	No
Who were the international partners?	
Has the project been associated with international funding sources (EU, DGIS etc) or research programmes?	
How much funding came from these sources?	
How did the project position IMARES internationally?	

Title	7. HERCATCH
Number	4301900374
Project leader	Cindy van Damme
Other researchers in WUR	Kees Bakker, Dirk Burggraaf, Ineke Pennock and Ruben Hoek
Researchers outside WUR	Richard Nash (IMR, Norway), Mark Payne (DTU-Aqua, Denmark), Clive Fox (SAMS, UK) and Steve Coombs (Spartel, UK)
BAPS number	KB-14-012-047-IMARES
Budget	49.120,-
Goals of project	To compare performance and catchability of herring larvae and fish eggs of different plankton sampling gears used in standard ICES surveys.
Target group for research	Fisheries scientists

PROGRESS 2014

Results	<p>Main results:</p> <p>MIKey and Gulf VII are developed to sample small fish larvae and fish eggs. The MIK net and survey are developed to monitor larger herring larvae. Overall the MIK net catches smaller numbers of larvae at length compared to MIKey and Gulf VII. Catchabilities between MIK, MIKey and Gulf VII plankton samplers were compared, with big differences in catchability of numbers of larvae at length between the gears. In recent years in the MIK survey increasing numbers of small herring larvae are caught. With the results of the comparison in catchability we are able to convert the numbers caught in the MIK to numbers in the Gulf VII and add to the current Gulf VII herring larvae index.</p> <p>Performance trials are done on the volume filtered and consistency in the measurements of volume filtered. The flowmeters used for measuring volume filtered were shown to be very stable. There are differences though in the amount of volume filtered measured depending on the position within the gear opening the flowmeters are mounted. Mostly these differences are small. However, this shows it is important for the standardisation of international surveys that institutes should report in the results of their surveys, the position where the flowmeters were mounted.</p> <p>New developments, (e.g. use of Seabird CTD inside the MIK net to monitor the real-time position in the water column) have now been shown to only have a minor effect on the flow pattern and thus performance of the plankton gears.</p> <p>Products:</p> <p>Presentations at international meeting and symposia, ICES HAWG (Denmark), WKDEPM (Australia), LFC (Canada), ICES WGALES (Spain) of the results of catchability. Report and scientific paper with the results of the comparison trials and performance trials in progress.</p>
Did the work follow plans (science or financial)?	The first plan was to carry out the performance testing in a flume tank. However, this was not possible since the flume tanks could not gain a high enough water speed. Instead the performance testing was done from a vessel in the Lake Grevelingen.
Developed expertise	Performance of the different plankton sampling gears. Catchability comparison for herring larvae and fish eggs of MIK, MIKey and Gulf VII plankton samplers.
Science publications	Presentations at various international meetings and symposia.
General publications	
Other outputs	
Any links to	No

Wageningen University projects?	
What is relevant for EZ fisheries or ecosystem management?	<p>In the statutory tasks of the Netherlands, EZ carries out 4 herring larvae surveys yearly for assessment of the North Sea herring. The catchability comparison gives the possibility to add extra information collected in the MIK survey to the herring index gained from the Gulf VII monitoring.</p> <p>The performance testing showed that it is important where flowmeters are mounted in the gear and this can have an influence on the volume filtered measured and thus on assessment of the number of larvae in the water column. The performance testing also showed that the new developments of the plankton samplers have only a minor influence on the performance.</p>
Describe collaboration with any partners outside WUR (national)	None

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	None
Summary and Conclusions of Project	<p>In this project catchability of herring larvae and fish eggs was compared between three different types of plankton samplers. Catchability was different, with MIKey and Gulf VII catching considerable larger numbers of larvae compared to MIK. However with the results of this project it is possible to convert the numbers of small larvae in the MIK so this extra information can be added to the index gained with the Gulf VII monitoring. Performance testing of the gears showed that the flow pattern differs over the inlet of the plankton samplers. For a good comparison and index calculation it is important that the different institutes supply information on the position the flowmeters are mounted. Performance testing also showed that the new developments IMARES has carried out in recent years on the gears have only a minor influence on the performance of the gears.</p>
Dutch summary and conclusions	<p>In dit project is de vangbaarheid van haring larven en viseieren tussen drie verschillende plankton bemonsteringstuigen vergeleken. Vangbaarheid was duidelijk verschillend, waarbij MIKey en Gulf VII aanzienlijk grotere aantallen larven vingen ten opzichte van het MIK net. Maar met de resultaten van dit project is het mogelijk om het aantal kleine larven in de MIK te converteren zodat deze extra informatie kan worden toegevoegd aan de index die wordt bepaald met de bemonstering van de Gulf VII.</p>

INTERNATIONAL

Was the project part of an international network?	Yes, the herring larvae surveys are ICES coordinated and results of the project were and will be presented in ICES meetings.
Who were the international partners?	IMR, Norway; DTU Aqua, Denmark; SAMS, UK; and Spartel, 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?	This project put IMARES at the forefront of ichthyoplankton sampling.

Title	8. Has trawling turned the Dutch seafloor into a high-production fish farm?
Number	4301900377
Project leader	Tobias van Kooten
Other researchers in WUR	P.D. van Denderen
Researchers outside WUR	P. Ruardij (NIOZ)
BAPS number	KB-14-012-049-IMARES
Budget	29.800,-
Goals of project	Test recent model predictions which show that side effects of trawling on benthic macro-invertebrates can stimulate the production of fish.
Target group for research	Fellow scientists.

PROGRESS 2014

Results	<p>Main results: Habitat-dependent effects of beam trawling on species richness. Results show a negative relationship between trawling intensity and species richness. Richness is also negatively related to sediment grain size and primary productivity, and positively related to biomass. The negative effects of trawling on richness are limited to relatively species-rich, deep areas with fine sediments. No effect of bottom trawling on species richness in shallow areas with coarse bottoms is found. These condition-dependent effects of trawling suggest that protection of benthic richness might best be achieved by reducing trawling intensity in a strategically chosen fraction of space.</p> <p>Products: Peer-reviewed publication PD van Denderen, NT Hintzen, AD Rijnsdorp, P Ruardij, T van Kooten (2014). Habitat-specific effects of fishing disturbance on benthic species richness in marine soft sediments. <i>Ecosystems</i> 17 (7), 1216-1226. http://link.springer.com/article/10.1007/s10021-014-9789-x/fulltext.html</p>
Did the work follow plans (science or financial)?	Yes
Developed expertise	Structural equation models
Science publications	PD van Denderen, NT Hintzen, AD Rijnsdorp, P Ruardij, T van Kooten (2014) <i>Ecosystems</i> 17 (7), 1216-1226.
General publications	
Other outputs	
Any links to Wageningen University projects?	Developed method has been applied in Friese Front and Oestergronden in BO KRM project. PhD project on effects of trawling on biodiversity at the WUR of P.D. van Denderen.
What is relevant for EZ fisheries or	Effects of bottom trawling on biodiversity.

ecosystem management?	
Describe collaboration with any partners outside WUR (national)	P. Ruardij (NIOZ, modelling)

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	
Summary and Conclusions of Project	<p>Around the globe, marine soft sediments on continental shelves are affected by bottom trawl fisheries. In this study, we explore the effect of this widespread anthropogenic disturbance on the species richness of a benthic ecosystem, along a gradient of bottom trawling intensities. We use data from 80 annually sampled benthic stations in the Dutch part of the North Sea, over a period of 6 years. Trawl disturbance intensity at each sampled location was reconstructed from satellite tracking of fishing vessels. Using a structural equation model, we studied how trawl disturbance intensity relates to benthic species richness, and how the relationship is mediated by total benthic biomass, primary productivity, water depth, and median sediment grain size. Our results show a negative relationship between trawling intensity and species richness. Richness is also negatively related to sediment grain size and primary productivity, and positively related to biomass. Further analysis of our data shows that the negative effects of trawling on richness are limited to relatively species-rich, deep areas with fine sediments. We find no effect of bottom trawling on species richness in shallow areas with coarse bottoms. These condition-dependent effects of trawling suggest that protection of benthic richness might best be achieved by reducing trawling intensity in a strategically chosen fraction of space.</p>
Dutch summary and conclusions	<p>We onderzochten het effect van bevissing op de soortenrijkdom van de bodem van het Nederlands Continentaal Plat. We gebruikten een dataset van 80 monsters die 6 jaar lang elk jaar bemonsterd waren. Bevissing werd gereconstrueerd aan de hand van satellietgegevens van vissersschepen. Met behulp van een structural equation model hebben we onderzocht hoe bevissing gerelateerd is aan soortenrijkdom, en hoe totale biomassa, primaire productiviteit, waterdiepte en korrelgrootte van het sediment deze relatie beïnvloeden. Onze resultaten laten een negatieve relatie tussen bevissing en soortenrijkdom zien. Soortenrijkdom is ook negatief gerelateerd aan korrelgrootte en primaire productiviteit, maar positief aan biomassa. Nadere analyse laat zien dat de negatieve effecten van bevissing op soortenrijkdom alleen voorkomen in gebieden die soortenrijk zijn, met een slibbige bodem op grotere diepte. In andere gebieden vonden we geen effect van bevissing op soortenrijkdom.</p>

INTERNATIONAL

Was the project part of an international network?	No
Who were the international partners?	
Has the project been associated with international funding sources (EU, DGIS etc) or research programmes?	
How much funding came from these sources?	
How did the project position IMARES internationally?	Peer reviewed paper, presentations at a number of conferences.

Title	9. Bycatch: bane or boon?
Number	4301900378
Project leader	Tobias van Kooten
Other researchers in WUR	Karen van de Wolfshaar
Researchers outside WUR	
BAPS number	KB-14-012-050-IMARES
Budget	19.200,-
Goals of project	Show how discarding of undersized fish (as coupled to harvesting of marketable sizes) changes growth patterns, and under which conditions it can increase the production of harvestable biomass in a fish stock.
Target group for research	Fellow scientists

PROGRESS 2014

Results	<p>Main results: Undersized bycatch and mortality on other juvenile stages (such as by other fisheries, for example mortality of plaice through shrimp fisheries) can affect the abundance and size distribution of these populations in unexpected ways. Hence, this study reveals a novel mechanism by which fisheries affect their target species, or by which different fisheries interact with each other.</p> <p>Products: Scientific manuscript, to be submitted soon.</p>
Did the work follow plans (science or financial)?	Yes
Developed expertise	Stage-structured modelling, population dynamic effects of undersized bycatch.
Science publications	Manuscript in progress: 'Undersized bycatch may promote the growth of harvestable fish'.
General publications	
Other outputs	Presentation at international symposium 'size based methods in fisheries' in Denmark.
Any links to Wageningen University projects?	
What is relevant for EZ fisheries or ecosystem management?	Undersized bycatch is generally seen as a wasteful practice, and a lot of effort is put into avoiding it. We show that this may not always be the case. Under certain circumstances, undersized bycatch may be a mechanism promoting the production of harvestable fish.
Describe collaboration with any partners outside WUR (national)	

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	
Summary and Conclusions of Project	Undersized bycatch and mortality on other juvenile stages (such as by other fisheries, for example mortality of plaice through shrimp fisheries) can affect the abundance and size distribution of these populations in unexpected ways. Hence, this study reveals a novel mechanism by which fisheries affect their target species, or by which different fisheries interact with each other.
Dutch summary and conclusions	Bijvangst van ondermaatse vis wordt in het algemeen als zeer onwenselijk gezien, en veel onderzoek is gericht op het voorkomen er van. Wij laten juist zien dat ondermaatse bijvangst onder bepaalde omstandigheden een wezenlijke bijdrage kan leveren aan de productie van grotere vis.

INTERNATIONAL

Was the project part of an international network?	No
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?	Strengthens our position as experts in stage-based population and community models.

Title	10. Discriminating between horse mackerel landings using GCxGS-MS
Number	4301900385
Project leader	Aukje Coers
Other researchers in WUR	Michiel Kotterman, Christiaan Kwadijk and Ruben Verkempnyck
Researchers outside WUR	
BAPS number	KB-14-012-051-IMARES
Budget	8.648,-
Goals of project	To develop a method to discriminate between horse mackerel stocks in the North Sea and Atlantic.
Target group for research	Fisheries scientists and managers.

PROGRESS 2014

Results	<p>Main results: Samples were collected, but when the analysis of the samples started it turned out that the samples were not collected from the various stock spawning grounds. Hence samples for validation were not available and the project was terminated.</p> <p>Products:</p>
Did the work follow plans (science or financial)?	Yes, it was planned to collect samples, but the right samples could not be collected and the project could not proceed further.
Developed expertise	None
Science publications	None
General publications	None
Other outputs	None
Any links to Wageningen University projects?	None
What is relevant for EZ fisheries or ecosystem management?	Horse mackerel from the North Sea and Atlantic aggregate at certain times of the year. It is not possible to discriminate the stocks visually. But the stocks are managed separately, so it is important to find a way to discriminate the stocks.
Describe collaboration with any partners outside WUR (national)	

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	
Summary and Conclusions of Project	Horse mackerel from the North Sea and Atlantic aggregate at certain times of the year. It is not possible to discriminate the stocks visually. But the stocks are managed separately, so it is important to find a way to discriminate the stocks. The goal of this project was to find a chemical method to easily discriminate the stocks. However, samples could not be collected from the various spawning grounds and the project was terminated.
Dutch summary and conclusions	Horsmakreel uit de Noordzee en de Atlantische Oceaan komen samen in bepaalde tijden van het jaar. Het is niet mogelijk om de horsmakrelen visueel te onderscheiden. Maar voor het beheer worden de stocks wel afzonderlijk onderscheiden, dus is het belangrijk om een manier te vinden om de vissen te kunnen onderscheiden. Het doel van dit project was een chemische methode te vinden om onderscheid te maken. Helaas bleek dat het niet mogelijk was om monsters te verzamelen van de verschillende paaigronden. Om die reden is het project is beëindigd.

INTERNATIONAL

Was the project part of an international network?	No
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?	

Title	11. PELSPA
Number	4301900383
Project leader	Sascha Fässler
Other researchers in WUR	Thomas Brunel
Researchers outside WUR	Pierre Petitgas (IFREMER)
BAPS number	KB-14-012-052-IMARES
Budget	24.960,-
Goals of project	Developing tools for analyses of acoustic data. The project made use of acoustic data collected in previous & ongoing IMARES science-industry projects to get quantitative information out of them. The data provide information on migration/distribution of important pelagic fish stocks (herring, horse mackerel, blue whiting) over a wider time period.
Target group for research	Spatial modellers & monitoring scientists.

PROGRESS 2014

Results	<p>Main results :</p> <p>Fisher simulator: Simple scripts with geostatistical analysis techniques (conditional simulation) were developed for fishing vessel acoustic data</p> <p>Fish distribution maps based on simulated survey results were created as a basis for further testing of the fisher simulator.</p> <p>Products :</p> <p>The fisher simulator model was further developed by taking into account realistic parameters based on fishing vessel observations.</p> <p>Presentation of methodology at relevant survey working group WGIPS</p>
Did the work follow plans (science or financial)?	yes
Developed expertise	Spatial analysis methods for selectively sampled data.
Science publications	To-be-submitted draft paper on deriving 'behavioural' parameters from acoustic fishing vessel data; early draft paper on combining fishing vessel and survey data.
General publications	
Other outputs	
Any links to Wageningen University projects?	No
What is relevant for EZ fisheries or ecosystem management?	Methods were investigated to combine scientific survey and fishing vessel acoustic data; the fisher simulator can be used to test the potential to derive abundance indices from fishing vessel data.
Describe collaboration with any partners outside WUR (national)	Information sharing during method development.

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	
Summary and Conclusions of Project	Statistical analysis methods for acoustic data collected on fishing vessels were developed and tested. These methods will also be relevant for many marine data with similar (subjective non-random) sampling patterns. The expertise may contribute towards standardisation of the whole methodology as data source to inform resource management and assessment. Further steps such as improved species recognition and habitat or bottom mapping from the data will follow.
Dutch summary and conclusions	Statistische methoden voor het analyseren van akoestische gegevens verzameld op en door commerciële vissersvaartuigen zijn ontwikkeld en getest. Deze methoden zijn ook relevant voor analyse van mariene data met soortgelijke (subjectieve, niet-random) bemonsteringspatronen. Deze expertise kan bijdragen tot de standaardisatie van de methodologie voor gebruik als gegevensbron voor management en bestandsschattingen. Verdere stappen zoals verbeterde soort herkenning en habitat of bodem beschrijving via deze data zal in de toekomst ontwikkeld worden.

INTERNATIONAL

Was the project part of an international network?	No
Who were the international partners?	
Has the project been associated with international funding sources (EU, DGIS etc) or research programmes?	
How much funding came from these sources?	
How did the project position IMARES internationally?	

Title	12. Interdependence of perch and pikeperch
Number	4301900375
Project leader	Nicola Tien
Other researchers in WUR	Karen van de Wolfshaar
Researchers outside WUR	
BAPS number	KB-14-012-053-IMARES
Budget	9.243,-
Goals of project	<p>Many fish stocks in lake IJssel/Marker are suffering from depletion, including perch and pikeperch. Management is single stock oriented, but there is strong interdependence between key commercial stocks. Is the recovery of the separate stocks influenced by the dynamics of the other stocks? Should management first focus on the recovery of a subselection of the stocks?</p> <p>Develop a theoretical model for pikeperch and perch in the lake IJssel/Marker, that takes their intraguild predation (IGP), cannibalism and their shared food source smelt into account. Investigate how the population dynamics are interdependent. Investigate how visibility conditions (via the attack rates) influence the IGP interactions. Compare results to biological data for the two lakes (which have different histories in visibility development). Publish in a peer reviewed journal.</p>
Target group for research	Fishermen, ministries (EZ and I&M), NGO's

PROGRESS 2014

Results	<p>Main results: The project was cancelled due to capacity problems. The theoretical biologist who was supposed to develop the model was booked into other projects. Other experts were not available.</p> <p>Products: A document with data accumulated so far. Mainly parameter values as found in literature.</p>
Did the work follow plans (science or financial)?	No
Developed expertise	
Science publications	
General publications	
Other outputs	
Any links to Wageningen University projects?	
What is relevant for EZ fisheries or ecosystem management?	
Describe collaboration with any partners outside WUR (national)	

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	
Summary and Conclusions of Project	The project could not be carried out due to capacity problems.
Dutch summary and conclusions	Het project kon wegens capaciteitsproblemen niet uitgevoerd worden.

Title	13. Larval timeseries in stock assessment
Number	4301900384
Project leader	Niels Hintzen
Other researchers in WUR	Cindy van Damme
Researchers outside WUR	Mark Payne (DTU Aqua, Denmark)
BAPS number	KB-14-012-054-IMARES
Budget	19.600,-
Goals of project	<p>Over the years, different methodologies have been developed to process the data collected during the herring larvae surveys, starting with the MLAI and in 2010 the introduction of the SCAI. Both approaches applied statistical methods to combine the larval abundances into one time-series, which was thereafter used as input to the North Sea herring stock assessment. One of the major drawbacks of this approach however is that the LAI data is smoothed twice, once in the statistical method and thereafter in the assessment, thereby losing its potential to be informative on changes in herring biological and the conditions they live in. For that reason, the current assessment model for North Sea herring was modified to allow incorporation of the LAI data.</p> <p>Also a quality check of the time-series of herring larvae surveys was carried out.</p>
Target group for research	Fisheries scientists and assessment biologists.

PROGRESS 2014

Results	<p>Main results:</p> <p>The results clearly show that the proportional contribution of each spawning area to total SSB changes markedly over time, which is relevant when addressing spatial management and the protection of unique spawning units. In addition, estimating proportional contributions inside the assessment model opens new possibilities in the treatment of other data sources in the assessment, such as acoustic and catch data. Information on spawner type can be embedded in the assessment as well, increasing our understanding on population units within the total North Sea herring stock.</p> <p>A new datasheet was compiled to allow for survey background information, such as weather conditions, flowmeters used, to be saved as well. This information is important to understand the larvae data and how to use them in the assessment.</p> <p>Products:</p> <p>Modified North Sea herring assessment model Datasheet to allow for storage of background information of the larvae surveys.</p>
Did the work follow plans (science or financial)?	Yes
Developed expertise	Increased knowledge in the herring assessment model.
Science publications	None
General publications	IMARES report (in preparation): Updating herring larval index abundance (LAI) estimates and including this data in the North Sea herring assessment.
Other outputs	Datasheet for storing background information of herring larvae surveys
Any links to Wageningen University projects?	No
What is relevant for EZ fisheries or ecosystem	North Sea herring is an important commercial stock. The modified assessment model allows for information on the different herring stocks to be incorporated in the assessment, and thus improving the assessment of North Sea herring.

management?	Quality control and the possibility of storage of background information of the larvae surveys allows for an improved time-series of survey data and better understanding of the actual data.
Describe collaboration with any partners outside WUR (national)	Mark Payne (DTU Aqua, Denmark) has been involved in the herring assessment. He developed the SCAI calculation and has been involved to help with the development of the modified assessment model.

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	None
Summary and Conclusions of Project	<p>Different methodologies have been developed to process the data collected during the herring larvae surveys, the MLAI and the SCAI. Both approaches applied statistical methods to combine the larval abundances into one time-series as input to the North Sea herring stock assessment. In both approaches however the LAI data is smoothed twice, once in the statistical method and thereafter in the assessment, thereby losing its potential to be informative on changes in herring biology and the conditions they live in. The current assessment model for North Sea herring was modified to allow direct incorporation of the LAI data. The results show that the proportional contribution of each spawning area to total SSB changes markedly over time. In addition, estimating proportional contributions inside the assessment model opens new possibilities in the treatment of other data sources in the assessment, such as acoustic and catch data.</p> <p>A quality check of the time-series of herring larvae surveys was carried out. A new datasheet was compiled to allow for survey background information, such as weather conditions, flowmeters used, to be saved as well. This information is important to understand the larvae data and how to use them in the assessment.</p>
Dutch summary and conclusions	<p>Verschillende methoden zijn ontwikkeld om de gegevens verzameld tijdens de haringlarven surveys op te werken, de MLAI en de SCAI. Beide statistische methoden combineren de larven aantallen in een tijdreeks als input voor de Noordzee haring bestandsschatting. In beide methoden worden de LAI gegevens echter twee keer gesmooth, eenmaal in de statistische methode en daarna in de bestandsschatting. Daardoor verliest de LAI data zijn informatief over veranderingen in de haring biologie en de omstandigheden waarin zij in leven. Het huidige model van de Noordzee haring bestandsschatting is aangepast zodat het mogelijk is om de LAI-gegevens direct in het model in te voeren. De resultaten tonen aan dat de proportionele bijdrage van elk paaigebied aan totale SSB aanzienlijk verandert door de tijd. Bovendien, opent dit nieuwe model het perspectief om ook andere gegevensbronnen, zoals akoestische en marktgegevens te gebruiken in de bestandsschatting.</p> <p>Een kwaliteitscontrole van de tijdsreeks van haringlarvensurveys is ook uitgevoerd. Er is een nieuwe datasheet ontwikkeld welke het mogelijk maakt om achtergrondinformatie van de surveys, zoals weersomstandigheden en welke stroommeters gebruikt zijn, op te slagen. Deze informatie is belangrijk voor een beter begrip van de larven gegevens en hoe ze te gebruiken in de bestandsschattingen.</p>

INTERNATIONAL

Was the project part of an international network?	Yes, the North Sea herring assessment is carried out with ICES.
Who were the international partners?	Mark Payne (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?	The project put IMARES in the forefront of North Sea herring assessment.

Title	14. STAMPOT
Number	4301900379
Project leader	Ben Scoulding
Other researchers in WUR	Daniel Benden
Researchers outside WUR	Sven Gastauer
BAPS number	KB-14-012-055-IMARES
Budget	26.340,-
Goals of project	Target strength modelling is important for the interpretation of acoustic data. The goal of this project is to further standardise target strength modelling of several fish species.
Target group for research	Scientific researchers and fisheries acousticians.

PROGRESS 2014

Results	<p>Main results: Several target strength models have been written in R which will form part of a model library. Models have an additional Bayesian component for optimisation of key modelling parameters. Development of methods and software capable of extracting morphological measurements of fish from CT scans.</p> <p>Products:</p>
Did the work follow plans (science or financial)?	The projects focus changed due to the original project leader leaving IMARES. Financial the project followed its plan.
Developed expertise	Interpretation of acoustic data
Science publications	The results will be incorporated in a scientific publication which will be submitted to a special acoustic edition of ICES journal in June 2015.
General publications	None
Other outputs	Part of the work will be presented at an ICES symposium in May 2015.
Any links to Wageningen University projects?	No
What is relevant for EZ fisheries or ecosystem management?	Acoustic monitoring is used for assessment of several commercial fish stocks (e.g. herring and blue whiting). Target strength modelling is important for correct interpretation of the acoustic data.
Describe collaboration with any partners outside WUR (national)	Exchange of method development with (inter)national scientists through meetings.

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	No
Summary and Conclusions of Project	Acoustic monitoring is used for assessment of commercial species. In order to identify species knowledge of the target strength of each species is vital. The models and methods developed in this project can be used to improve our knowledge of target strength for a number of different species (some with significant commercial value). These measurements may then be used to estimate the distribution and abundance of the species. The results from the study will contribute to future studies and provides us with an important stepping stone to better understanding the acoustic properties of important fish species.
Dutch summary and conclusions	Akoestische monitoring wordt gebruikt voor bestandsschattingen van commerciële vissoorten (o.a. haring en blauwe wijting). Het is belangrijk om van de individuele soorten de akoestische 'target strength' te kennen zodat ze geïdentificeerd kunnen worden op de akoestische echogrammen. De modellen en methoden welke in dit project ontwikkeld zijn kunnen worden gebruikt ter verbetering van onze kennis van de akoestische 'target strength' voor een aantal verschillende soorten (sommige met aanzienlijke commerciële waarde). Deze metingen kunnen vervolgens worden gebruikt om de verspreiding en abundantie van deze soorten in akoestische studies te bestuderen. De resultaten van deze studie zal bijdragen aan toekomstige studies en biedt ons een belangrijke opstap om meer inzicht te krijgen in de akoestische eigenschappen van belangrijke vissoorten.

INTERNATIONAL

Was the project part of an international network?	Yes
Who were the international partners?	Sven Gastauer. PhD student at Curtin University Australia, co-supervised by Sascha Fässler (IMARES)
Has the project been associated with international funding sources (EU, DGIS etc) or research programmes?	
How much funding came from these sources?	
How did the project position IMARES internationally?	

Title	15. Analysis tagging experiments: seasonal growth patterns
Number	4301900388
Project leader	Adriaan Rijnsdorp
Other researchers in WUR	Jan Jaap Poos, Ben Griffioen, Niels Hintzen and Loes Bolle
Researchers outside WUR	None
BAPS number	KB-14-012-056-IMARES
Budget	12.174,-
Goals of project	<ul style="list-style-type: none"> • Test the historical tagging data in frisbe database developed with support of KBWOT in 2014 (de Boois et al, project number 4301900387) • Analyse tagging data and develop R-scripts for general use (recapture patterns, estimates of migration and dispersion parameters, growth, mortality)
Target group for research	IMARES researchers

PROGRESS 2014

Results	<p>Main results:</p> <ul style="list-style-type: none"> • R-scripts have been developed to extract and explore tagging data. Scripts have been developed that present summary statistics and graphical output that allow the researcher to explore the data sets and to detect outliers. These R-scripts have been made available in the FLR-package (fisheries library in R). • R-scripts have been developed to analyse recapture data replacing the PASCAL programs developed by Frans van Beek and Adriaan Rijnsdorp in the 1990s. • A subset of the tagging data was extracted and analysed for the seasonal pattern in somatic growth. Results of this study were presented at the 9th International Symposium for Flatfish Ecology. <p>Products: Oral presentation / power point 9th International Flatfish Symposium, Cle Elum, Washington, USA. Title: Comparing seasonal growth from different flatfish Authors: Jan-Jaap Poos, Sandra Smit, Adriaan D. Rijnsdorp The aim of this study is to study the seasonality in somatic growth in four North Sea flatfish species sole (<i>Solea solea</i>), plaice (<i>Pleuronectes platessa</i>), turbot (<i>Scophthalmus maximus</i>), and brill (<i>Scophthalmus rhombus</i>) and explore the factors that explain the different seasonal patterns. Results suggest that the different species indeed have different seasonal growth. The differences in growth can be related to reproduction strategies and food availability for the different species. Periods of high growth are related to food availability and periods of low growth are related to the timing of spawning.</p>
Did the work follow plans (science or financial)?	Yes
Developed expertise	Through collaboration with younger colleagues the project contributed to the consolidation of expertise within IMARES and refreshed the memory among the researchers about the existence of this relevant data base.
Science publications	None (peer reviewed paper is in development)
General publications	None
Other outputs	Presentation given at international flatfish symposium.
Any links to	No

Wageningen University projects?	
What is relevant for EZ fisheries or ecosystem management?	Tagging data provide information on the spatial dynamics of fish species that are relevant to evaluate the (potential) effect of management measures, in particular measures related to spatial management, MPA's and Natura2000 areas on fish stocks and fisheries .
Describe collaboration with any partners outside WUR (national)	Database and analysis tools may be used in research collaboration: (1) FISHCONNECT (KU-Leuven, ILVO): Analysis of the link between nursery grounds and spawning areas contribute to the collaboration with KU-Leuven on the Connectivity in flatfish populations (LB, ADR); (2) Modelling spatial dynamics of flatfish: the seasonal movements estimated from the tagging experiments will be used to calibrate a spatially explicit model of the seasonal dynamics of plaice (JJP, NH, ADR); (3) Transponder experiments are expected to be continued in future years around the effect studies of windfarms and infrastructural changes in river systems; (4) tagging data and the developed scripts are relevant for two EU-projects submitted for funding (Marie Curie – FFISHPRESS; Horizon2020: CERES).

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	
Summary and Conclusions of Project	Software tools were developed and tested to extract and analyse data from the IMARES tagging data base comprising mark – recapture data of fish. The project showed that the data base, which comprises of over 50 thousand of recaptures of exploited species since the beginning of the 1900s, is now available for future use. The scripts developed under this project facilitate its use as it provides R-scripts to extract and explore data sets and R-scripts to estimate migration parameters. As a pilot, a subset of data was extracted and the seasonal pattern in growth was analysed.
Dutch summary and conclusions	Computer software is ontwikkeld en getest voor de analyse van merk-terugvangst gegevens uit de IMARES data base. Deze data base is in 2014 in een parallel project onder KBWOT ontwikkeld en omvat meer dan 50 duizend merk-terugvangst gegevens van een aantal geëxploiteerde vissoorten sinds 1900. De software modules maken het mogelijk om basale verkenningen en analyses uit te voeren. De modules zijn beschikbaar via een software bibliotheek waardoor de data base toegankelijk is voor een brede groep gebruikers.

INTERNATIONAL

Was the project part of an international network?	No
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?	The project strengthens IMARES position as a partner in international research projects dealing with marine spatial planning and management.
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Title	16. Making fish tagging data available to everyone
Number	4301900387
Project leader	Ingeborg de Boois
Other researchers in WUR	Peter van der Kamp, Corrina Hinrichs, Daniël Benden and Kees Groeneveld
Researchers outside WUR	-
BAPS number	KB-14-012-057-IMARES
Budget	15.275,-
Goals of project	Expand the IMARES database with fish tagging data. Currently it is not possible to analyse historical tagging data because they are not available in a database. This project will make it possible to import data of tagging and transponder experiments in frisbe and make those available to all IMARES scientists.
Target group for research	IMARES scientists

PROGRESS 2014

Results	<p>Main results :</p> <p>Tagging data are available in the IMARES database frisbe for all IMARES scientists.</p> <p>Products :</p> <ul style="list-style-type: none"> • Impact analysis database to add tagging data • Database tables and import module for tagging data • The available tagging data are imported in the frisbe database <p>A SAS code is developed to export the data from frisbe, and being tested.</p>
Did the work follow plans (science or financial)?	Yes
Developed expertise	Expertise on how to add tagging data, including recapture and release, into the current database framework. The current structure is also able to deal with e.g. transponder experiments.
Science publications	No
General publications	No
Other outputs	SAS code for data extraction.
Any links to Wageningen University projects?	No
What is relevant for EZ fisheries or ecosystem management?	Tagging data give insight in spatial behaviour of fish and population structure, see additional proposal for details (Rijnsdorp et al., project number 4301900388).
Describe collaboration with any partners outside WUR (national)	No

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	
Summary and Conclusions of Project	Data of fish tagging experiments have been made available in the IMARES database, which needed structural changes. Data can now be imported and extracted easily by IMARES scientists. The tagging data is being used in another – scientifically oriented- 2014 KBWOT project.
Dutch summary and conclusions	Gegevens van merkexperimenten bij vis zijn beschikbaar gemaakt in de IMARES database. Hiervoor moest de structuur van de database worden aangepast. De gegevens zijn in 2014 gebruikt in een ander –wetenschappelijk georiënteerd- KBWOT project.

INTERNATIONAL

Was the project part of an international network?	No
Who were the international partners?	No
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 shows that we have many tagging data readily available, which might be of use for e.g. fish migration studies.

Title	17. Novel Stratification Approach / Optimizing WOT program
Number	4301900381
Project leader	Karin Troost / Henrice Jansen
Other researchers in WUR	Johan Craeymeersch, Jeroen Wijsman, Margriet van Asch, Jack Perdon, Emiel Brummelhuis, Douwe van de Ende, Carola van Zweeden, and Kees Goudswaard
Researchers outside WUR	
BAPS number	KB-14-012-060-IMARES
Budget	46.600,-
Goals of project	<ol style="list-style-type: none"> 1) Comparison of regular and adapted trawled dredges to better understand operation and catch efficiency of each dredge. 2) Update of the manuals/protocols to improve internal procedures and to guarantee the quality of the WOT survey in the future. 3) Update database and increase accessibility of the data for external users
Target group for research	<ul style="list-style-type: none"> - External users interested in WOT Shellfish data - IMARES employees

PROGRESS 2014

Results	<p>Main results:</p> <ol style="list-style-type: none"> 1) Differences between the regular and adapted dredge have been analysed and discussed in an internal workshop. Outcomes have led to a set of questions and proposed procedures to further test the mechanisms behind the potential differences in operation and catch efficiency. This will be tested in a follow-up KBWOT project in 2015. 2) The manuals and protocols available through intranet have been updated on a number of topics, to match audit requirements and to guarantee the quality of survey data. Topics that have been updated include: responsibilities of assigned employees, correct ships used for each survey, licence application procedure, the new gear 'oesterhapper' has been included, and data entry instructions have been updated. Finally, texts have been critically reviewed and, where needed, changed to improve readability and clarity. 3a) To increase accessibility of the database within the institute, a general read out script (MS Access) was developed to automate the data request making the database more assessable. Additionally, most historical length-frequency distribution data has now been integrated into the database, thereby offering the potential for long-term analysis of coupled density/biomass plus length-frequency distributions. The demand for such data availability is increasing, for example in the context of the MSFD. 3b) Data from intertidal mussel beds in the Waddensea were not easily assessable or complex to process with common database programs which might easily lead to errors and misinterpretation. Data on mussel beds in the Wadden Sea have therefore been adapted for use in R, PCRaster or ArcGIS. By doing so the data becomes more accessible for external users. The original shapefiles are now available in grids with a size of 10x10m both for mussel and oyster data. <p>Products:</p> <ul style="list-style-type: none"> - Internal document on comparison between regular and adapted dredge, including data analysis and workshop outcomes - Updated manuals - Read-out script to automate the data request from database - Updated database (historical length-frequency distributions) - Easily accessible mussel bed data (grid files) at high resolution spatial scales for the Waddensea.
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Did the work follow plans (science or financial)?	After the change in focus (Oct, see revised proposal) all went following the plans.
Developed expertise	Increased awareness on the operation and catch efficiency of dredges. Grid files for mussel bed data in the Waddensea are now easily available for external users.
Science publications	None
General publications	- Internal document on the comparison between the regular and adapted dredge.
Other outputs	None
Any links to Wageningen University projects?	None
What is relevant for EZ fisheries or ecosystem management?	The quality of the data obtained with the bivalve survey (WOT Schelpdiersurvey) is essential for proper fisheries and ecosystem management. All tasks involved in this project aimed at improving the procedures during the survey, as well as post-survey data treatment to guarantee the quality of the WOT survey in the future. There is also an increasing demand for the results of the surveys from external partners, it is therefore important that survey data is easily available and will not lead to errors and misinterpretation. We have therefore been working on the accessibility of data from mussel beds in the Waddensea.
Describe collaboration with any partners outside WUR (national)	None existing.

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	None
Summary and Conclusions of Project	The quality of the data obtained with the bivalve survey (WOT Schelpdiersurvey) is essential for proper fisheries and ecosystem management. The current project focussed on optimization of the survey by updating survey manuals and data treatment procedures to guarantee the quality of the WOT survey now and in the future. The project also analysed two gear types (regular and adapted dredge) which has led to a set of questions and proposed procedures to further test the mechanisms behind the potential differences in operation and catch efficiency (approved KBWOT project in 2015). Spatial information from intertidal mussel beds is usually complex to process with common database programs. As the demand from external partners for these data is increasing it is important that the data is easily available in order to prevent errors and/or misinterpretation. High resolution spatial data from mussel beds in the Waddensea have therefore been adapted for use in R, PCRaster or ArcGIS, making the data easily available at a high resolution scale (10x10m grid size).
Dutch summary and conclusions	De kwaliteit van de WOT Schelpdiersurvey is van essentieel belang voor visserijmanagement en natuurbeheer. Dit project heeft zich gericht op de optimalisatie van de survey door de handboeken te updaten en de data analyse procedures aan te passen om zodoende de kwaliteit van de surveygegevens te waarborgen, nu en in de toekomst. Daarnaast zijn er twee typen tuigen vergeleken (reguliere en aangepaste schaaft) wat heeft geleid tot een lijst met vragen en voorstellen om de achterliggende mechanismen m.b.t. werking en vangst-efficiëntie te testen. Deze voorstellen zullen in een al gehonoreerd KB-WOT (2015) uitgevoerd worden. Ruimtelijke data van mosselbedden in intergetijdengebieden zijn vaak complex en lastig te analyseren met de gangbare database software. De vraag naar deze data neemt echter toe. Om de ruimtelijke

	GIS-data meer toegankelijk te maken voor derden zijn de mosselbanken in de Waddenzee dusdanig bewerkt dat zij geschikt zijn voor gebruik in programma's zoals R, PCRaster en natuurlijk ook in ArcGIS zelf.
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INTERNATIONAL

Was the project part of an international network?	No
Who were the international partners?	
Has the project been associated with international funding sources (EU, DGIS etc) or research programmes?	
How much funding came from these sources?	
How did the project position IMARES internationally?	

Title	18. BLUEfeed
Number	4301900380
Project leader	Sven Gastauer
Other researchers in WUR	Sascha Fässler, Thomas Pasterkamp, Ineke Pennock, Ruben Hoek and Cindy van Damme
Researchers outside WUR	None
BAPS number	KB-14-012-061-IMARES
Budget	0,-
Goals of project	The goal is to gain new insights into the feeding behaviour of blue whiting in relation to migration and spawning behaviour. This is relevant for the planning and interpretation of the blue whiting survey.
Target group for research	Fisheries scientists.

PROGRESS 2014

Results	<p>Main results: During the blue whiting acoustic survey in April 2014 blue whiting stomachs would be collected. However, all blue whiting in the catches had empty stomachs. It was unclear if the stomachs were emptied by the fish due to the stress of being caught in the net or if the blue whiting were not feeding during that period. It was thus decided to terminate the project.</p> <p>Products: None</p>
Did the work follow plans (science or financial)?	Yes, it was planned to collect samples during the April 2014 acoustic survey. However, all stomachs proved to be empty and the project was therefore terminated.
Developed expertise	None, because it is unclear if the stomachs were empty due to stress of being caught or if blue whiting does not feed during the spawning period.
Science publications	None
General publications	None
Other outputs	None
Any links to Wageningen University projects?	None
What is relevant for EZ fisheries or ecosystem management?	Blue whiting is an important commercial species. Any information will aid the management of the blue whiting stock.
Describe collaboration with any partners outside WUR (national)	None

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	
Summary and Conclusions of Project	The goal of the project was to determine feeding of blue whiting and maturation during the spawning period. It was planned to collect samples during the April 2014 blue whiting acoustic survey. However, all blue whiting in the catches had empty stomachs. It was unclear if the stomachs were emptied by the fish due to the stress of being caught in the net or if the blue whiting were not feeding during that period. It was thus decided to terminate the project.
Dutch summary and conclusions	Het doel van het project was om het foerageren van blauwe wijting gedurende de paaitijd te bepalen. Tijdens de blauwe wijting akoestische survey in april 2014 zouden monsters verzameld worden. Echter, alle blauwe wijtingen in de vangsten hadden een lege maag. Het was onduidelijk of de maaginhoud was opgebraakt door de vis te vanwege de stress van gevangen worden in het net of dat blauwe wijting niet eet gedurende de paaiperiode. Daarom is besloten het project te beëindigen.

INTERNATIONAL

Was the project part of an international network?	The April acoustic survey is part of the ICES coordinated blue whiting acoustic surveys.
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?	

Title	19. Innovative Mussel mapping
Number	4301900389
Project leader	Karin Troost / Mascha Dedert
Other researchers in WUR	Narangerel Davaasuren, Mascha Dedert and Douwe van den Ende
Researchers outside WUR	
BAPS number	KB-14-012-062-IMARES
Budget	29.500,-
Goals of project	Develop algorithm to use remote sensing (satellite data) to map presence of mussel and oyster beds, as a basis for field validation.
Target group for research	Ministry EZ, potentially institutes mapping mussels in Germany (3 institutes) and other countries.

PROGRESS 2014

Results	<p>Main results:</p> <ol style="list-style-type: none"> 1. Developed expertise on processing Landsat-8 images, as a new potential tool to identify the location and presence of the mussel beds in the Dutch Wadden Sea. 2. Results were validated against data from the field survey, showing the overall accuracy in 60%. 3. The results can be extended into entire area of the international Wadden Sea <p>Products:</p> <p>Map of the Wadden Sea showing the estimated locations and presence of the mussel beds, as identified on Landsat-8 images.</p>
Did the work follow plans (science or financial)?	The work plan followed the science plans, based on previous scientific experience generated in DELTA, WaLTER and KB project on development of automated tools for detailed monitoring of mussel and oyster beds using satellite data (2013). The implementation of financial arrangements went according the financial plan.
Developed expertise	<ol style="list-style-type: none"> 1. The new scientific expertise on processing and analysing the Landsat-8 data, from the new satellite sensor which become fully operational in 2013. 2. The lessons and challenges are learned are important for scientific community and for Ministry, as it is also applicable for new satellite sensors launched in end of 2014 and to be launched in the next 3-10 years. 3. The identification of the mussel beds and their location is important to use in pre-survey. This step is important as it will assist to structure the actual field survey and analyse changes in the mussel community, related with seasonal changes in the Dutch Wadden Sea. <p>For the market was developed algorithm to process the satellite images, which can generate overview of the Dutch Wadden Sea and to show the estimated/possible location of the mussel beds, to be used as reference during the actual field survey. This overview map will assist to save the time and effort during the actual survey.</p>
Science publications	
General publications	IMARES report in preparation
Other outputs	
Any links to Wageningen University projects?	Links to on-going WaLTER projects and on-going projects in the Yerseke.

What is relevant for EZ fisheries or ecosystem management?	Increased efficiency and accuracy. In some years only 40% of the beds can be mapped, especially in years with a high cover of mussel/oyster beds. If remote sensing is applied 100% of the beds can be mapped efficiently each year. This can also be applied to oyster beds in Wadden Sea, Oosterschelde and Westerschelde.
Describe collaboration with any partners outside WUR (national)	Ministry EZ, potentially institutes mapping mussels in Germany (3 institutes) and other countries.

SAMENVATTING VOOR KENNIS ONLINE

Non scientific partners	
Summary and Conclusions of Project	<p><u>Summary:</u></p> <p>Mapping of mussel beds in the Wadden Sea started for about 30 years ago. The Landsat TM and MSS-4 data is used to map sediments by grain size and composition. With the advances in satellite technology, the data from higher resolution, e.g. RapidEye in 5 meters and radar SAR TerraSAR-X mapped the changes along the Wadden Sea coast and appearance of mussel beds. The Landsat-8 belongs to Landsat series of satellites launched by National Aeronautics and Space Administration NASA (USA) on February 11, 2013. The mission continued spatial, spectral and temporal resolution of previous missions. The novel idea of this research is to use the information from new Landsat-8 satellite in detecting location and presence of the mussel and oyster beds on intertidal flats in the Dutch Wadden Sea. The study also explored a development of algorithm which can be used every year on new image series to generate the map, covering the entire area of the Dutch Wadden Sea in pre-survey. The research aims to develop algorithm to use remote sensing (satellite data) from new Landsat-8 sensor to map presence of mussel and oyster beds, as a basis for field validation.</p> <p><u>Conclusion:</u></p> <p>The developed products and expertise will allow IMARES to stay on top of scientific developments in this field. In combination with sufficient field validations extra information will be generated that can be widely applied in research. The demand for mussel bed contours by third (research) parties is already high. Overall, it will expand the expertise of IMARES and WUR concerning new, innovative methods on using satellite data from new sensors, e.g. Landsat-8. It is new application and the results and methods can be expanded into entire area of the international Wadden Sea. It is beneficial to use this technique as a tool in pre-survey, as it will assist to improve the time efficiency, reduce the time spent on mapping and allows shifting focus from (quantitative) mapping activities to more qualitative monitoring of shellfish beds. Challenges in mapping the locations of mussel and oyster beds during field surveys may include the constraint of the number of locations that can be visited each year and areas that are difficult to access. However, satellite data provide regular full synoptic views over large areas. Field surveys will continue to play an important role and it will remain an essential component and as a main validation instrument. It is advisable to use the combination of such advanced technology and surveying tools.</p>
Dutch summary and conclusions	<p><u>Samenvatting:</u></p> <p>30 jaar geleden is het in kaart brengen van de Waddenzee begonnen. De Landsat TM en MSS-4 gegevens wordt gebruikt om sediment in kaart te brengen op korrelgrootte en samenstelling. De vooruitgang in de satelliettechnologie, bijvoorbeeld RapidEye in 5 meter en radar SAR TerraSAR-X, maakte het mogelijk</p>

om met hogere resolutie gegevens, de veranderingen langs de kust van de Waddenzee en contouren van mosselbedden te volgen. De Landsat-8 behoort tot de Landsat reeks satellieten en is gelanceerd door de NASA (USA) op 11 februari 2013. Deze missie zorgde voor een vervolg van de ruimtelijke, spectrale en temporele resolutie van eerdere missies. De innovatie van dit onderzoek is het gebruik van de informatie van nieuwe Landsat-8-satelliet voor het opsporen van locaties en aanwezigheid van de mossel- en oesterbedden op intergetijden platen in de Waddenzee. In dit project is een algoritme welke jaarlijks een nieuwe kaart kan genereren van de Waddenzee voor de start van de survey. Met dit algoritme kan op basis van de satelliet teledetectiegegevens een kaart gecreëerd worden met aanwezigheid mossel- of oester bedden, welke als basis kan dienen voor het bemonsteringsplan van de survey.

Conclusies:

Door de ontwikkelde producten en expertise blijft IMARES aan de top van wetenschappelijke ontwikkelingen op dit gebied. In combinatie met voldoende validatie in het veld kan extra informatie gegenereerd worden die algemeen kan worden toegepast in onderzoek. De vraag naar mosselbed contouren door derden (onderzoek) is al hoog. Over het geheel genomen zorgt dit project voor het uitbreiden van de expertise van IMARES en WUR van een nieuwe, innovatieve methode voor het gebruik van satellietgegevens, zoals de Landsat-8. Deze nieuwe toepassing en methoden kunnen worden uitgebreid naar het hele gebied van de internationale Waddenzee. Deze methode maakt het mogelijk een kaart voor de survey te produceren, zodat de eigenlijke bemonstering zo efficiënt mogelijk kan worden uitgevoerd en zal de benodigde surveytijd verlagen. Tegelijkertijd kan de focus van de surveys van een kwantitatieve naar een meer kwalitatieve controle van schelpdierbedden verschuiven.

Uitdaging tijdens reguliere veldsurveys is dat er vanwege de beschikbare tijd slechts een beperkt aantal locaties elk jaar kan worden bezocht en moeilijk toegankelijk gebieden niet. Satellietgegevens bieden een regelmatig volledig synoptisch overzicht over grote gebieden. Veld bemonsteringen blijven belangrijk en essentieel als validatie van de satellietgegevens. Het is raadzaam om de geavanceerde satelliettechnologie en reguliere veldbemonsteringen te blijven combineren.

INTERNATIONAL

Was the project part of an international network?	Yes, long-term monitoring of the Wadden Sea, WaLTER
Who were the international partners?	WaLTER project consortium.
Has the project been associated with international funding sources (EU, DGIS etc) or research programmes?	No
How much funding came from these sources?	No
How did the project position IMARES	The implementation of this project will allow IMARES to stay on top of scientific developments in this field. The results and report has been already requested by

internationally?

WaLTER project partners and presentation sharing the experience will be made during the first international meeting of Remote sensing experts in March 2015, to be organised by WaLTER international consortium.