

# **Stichting DLO Centre for Fisheries Research (CVO)**

## **KB WOT Fisheries 2015 - Maintaining Excellence and Innovation in Fisheries Research**

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## Summary

The KB WOT Fisheries programme is essential to the maintenance and development of the expertise which are needed for the Dutch statutory obligations in fisheries monitoring and advice. The contents of the KB WOT Fisheries programme for 2015 reflects the needs of the research developments the WOT fisheries programme. The strength of the KB WOT Fisheries programme is the bottom up approach which calls for projects and thus allowing innovation. As this can also be seen as a risk to missing research priorities, part of the programme also calls for specific projects relevant to IMARES and EZ needs. The KB WOT Fisheries programme will fund 14 projects in 2015 which will focus on remote sensing of fish and shell fish, the interaction of ecology and fisheries and new techniques for surveys and development of assessment methods. The programme will increase the ability of the WOT programme to ensure that fisheries advice is responsive to ecological change.



## Samenvatting

Het KB WOT programma voor Visserijonderzoek onderhoudt en ontwikkelt de expertise die nodig is voor de uitvoering van de Nederlandse Wettelijke Onderzoekstaken voor de visserij. Het KB WOT programma in 2015 weerspiegelt de onderzoekbehoeften van het WOT visserij programma. De kracht en innovatie van het programma komt voort uit de bottom-up benadering waarbij onderzoekers van IMARES uitgenodigd worden om, binnen vastgestelde kaders, projecten voor te stellen. Echter een gevolg van deze benadering kan zijn dat niet alle kennisbehoeften, die van strategisch belang zijn voor een goede uitvoering van de Wettelijke Onderzoekstaken, beantwoord worden. Om die reden vraagt het programma ook aan verschillende onderzoekers om specifieke projecten te ontwikkelen. Het KB WOT visserij programma financiert in 2015 14 projecten op het gebied van remote sensing van vis en schelpdieren, interactie tussen ecologie en visserij, nieuwe technieken voor het uitvoeren van surveys en ontwikkeling van methodes voor bestandsschattingen. Het KB WOT onderzoek geeft het WOT Visserij programma de mogelijkheid om internationale standaards te hanteren bij het uitvoeren van de WOT taken en de adviezen voor het beheer van de visserij aan te passen op ecologische veranderingen.

## 1 Introduction

The KennisBasis (KB) WOT Fisheries programme has been developed to maintain and develop expertise, necessary to carry out the statutory obligations of the Netherlands in fisheries monitoring and advice on fishery management. As the statutory obligations of the Netherlands and particularly fishery management changes over time, the KB WOT Fisheries programme needs to be pro-active and respond to these changes. At the same time the programme needs to incorporate and stimulate method innovations and expertise developments. As a result the KB WOT Fisheries program is a yearly reviewed and thus a flexible multiannual programme. Despite the flexibility the KB WOT Fisheries programme has clearly defined project objectives and deliverables.

The main task of the KB WOT Fisheries programme is underpinning expertise for the statutory tasks. IMARES also holds the maintenance and development of this expertise in its strategy. The KB WOT Fisheries programme is thus collaboration between CVO, IMARES and the Ministry of EZ. The expertises developed in the programme are necessary for the needs of the fisheries research and advice as well as the fisheries Data Collection Framework (DCF), the Common Fisheries Policy (CFP) and the Marine Strategy Framework Directive (MSFD).

The developed current KB WOT Fisheries programme has a top-down direction of the research with allowing bottom-up input. Yearly a call for proposals is developed to allow bottom-up submission of projects. Areas of research include integrated assessments of the ecosystem (particularly the demersal and benthic communities of the southern North Sea), multispecies and maximum sustainable yield (MSY) considerations in fisheries management, development of acoustic survey and plankton survey techniques and fish aging, ecosystem change, remote sensing of the ecosystem, bycatch and discarding of marine organisms and the development of management plans for fisheries. Turning existing standard surveys into more ecosystem monitoring expeditions is also stimulated.

The programme is managed by a delegated programme leader and head of CVO, who review the programme on a yearly basis and meet with civil servants from EZ. The programme produces two annual reports, 1) with the results of the previous year and 2) with the programme for the following year. The KB WOT fisheries programme is embedded in a larger KB programme established by Wageningen UR.

This report describes the framework for the 2015 programme and the proposed research which will be carried out in 2015.



## 2 The embedding of KB WOT Fisheries

In the period 2010-2014 the KB WOT Fisheries operated within theme IV: "Sustainable development of the green-blue space". Within Wageningen UR, the new KB programme for the period 2015-2019 is being developed. At the time of writing of this project the new themes of the Wageningen UR KB programme have not been approved yet. The KB WOT Fisheries programme in 2015 will most likely operate within the new theme 'Planet Earth Management'. The goal of the theme 'Planet Earth Management' is to amongst others to come to sustainable use of natural resources and increase the knowledge on marine resource management. The KB WOT fisheries programme would fit into this overarching theme, though it is important to realise that the KB WOT (fisheries) programme(s) main objective is to develop and maintain expertise to carry out the statutory tasks. This objective seems however to be missing in any of the new suggested themes of the Wageningen UR KB programme.

The KB WOT Fisheries programme is developed to cover the tasks required for the national and European fisheries policy. The (future) policy needs originate mainly from the existing and upcoming EU directives. This includes commitments relevant for fisheries for the Common Fisheries Policy (CFP), national freshwater policy, habitats directive, water quality directive and the Marine Strategy Framework Directive (MSFD). The collection of information and data are required through long-term data collection programmes. At the same time it is also necessary to develop and maintain understanding of the marine and freshwater environment and ecology. Combining the data collection with increased understanding of the marine and freshwater system will give the possibility to deliver strong science-based advice. To answer these tasks the KB WOT Fisheries programme has to react to present needs, but also anticipate on the future needs of the national and European fisheries policies.

High quality data collections are vital to develop reliable science-based advice for fisheries management and policy. The data needs to be collected according to international agreed and developed scientific protocols and keys. This can only be achieved through science based on international collaboration and peer-reviewed science. Scientists must be aware of recent trends across the world in their research fields, any new developments in methodologies and must be internationally credible themselves. Part of the KB WOT programme is therefor used to for international travel to exchange scientific developments both within and outside the Netherlands. Also staff swaps on an international level within KB WOT projects and statutory task surveys are encouraged.



### 3 International nature of KB WOT Fisheries

The majority of projects within the KB WOT Fisheries programme are carried out in collaboration with national or European partners. In 2014 one project scientists collaborated with Australian scientists. These collaborations provide a large amount of added value to the programme, as resources and expertise from other institutes and countries contribute to the KB WOT Fisheries and IMARES research.

One part of the KB WOT Fisheries programme is devoted specifically for international collaboration, participation in meetings and workshops, namely the project 'International exchange'. This ensures and allows IMARES scientists to remain at the cutting edge of research developments and the centre of fisheries research in Europe and around the globe. The programme also encourages exchange of knowledge but also scientists through publications, presentations and developing new methods or tools for fisheries research.



## 4 Structure of the KB WOT Fisheries programme

### 4.1 Management team

The KB WOT Fisheries programme is managed in collaboration between IMARES and CVO. The daily management of the programme is currently delegated to Cindy van Damme, IMARES. She is supported by Sieto Verver (head CVO) and Rian Schelvis-Smit (IMARES).

### 4.2 Financing

The WOT fishery programme was evaluated in 2010 by the Ministry of EZ and it was agreed to allocate an annual budget to this programme in order to maintain and develop expertise needed to carry out the WOT. The content of the WOT and the conditions for expertise development and are laid down in long term agreement (Uitvoeringsovereenkomst) between DLO and the Ministry of EZ. The KB WOT Fisheries expertise programme in 2015 is financed from the research budget earmarked for the KB programme. The available budget in 2015 for KB WOT fisheries is € 588.000,- (without WUR charges amounting 11k€ since 2013). In 2015 the WOT and KB WOT for fisheries will be evaluated again and a new agreement will need to be established.

### 4.3 Reviewing of submitted proposals

The themes for the KB WOT Fisheries programme are decided by the management team of this programme. The proposals from IMARES scientists are submitted to the different themes. The management team is supported by a review team to advise which proposals should be granted for the programme. 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 proposals receive a mark from each reviewer. The means of these marks is then used to rank the submitted proposals, ensuring relevance for the WOT programme.

The review team for the KB WOT 2015 proposals consisted of:

- Sieto Verver, head CVO
- Frans van Beek, deputy head CVO
- Cindy van Damme, KB WOT Fisheries programme manager, IMARES
- Pauline Kamermans, senior scientist department Delta, IMARES
- Adriaan Rijnsdorp, senior scientist department Fisheries, IMARES
- Ingrid Tulp, senior scientist, department Fish, IMARES
- Han Lindeboom, senior adviser, IMARES



## 5 The programme for 2015

The programme for 2015 has the following themes:

1. Ecosystem approach
2. Maintaining Quality
3. International Exchange
4. MESMERISE

The programme is a result of excellent projects which have been submitted to an annual call for proposals. International collaboration, exchange and teamwork are a high priority. Also projects that propose to publish their results in international peer reviewed literature are thought to be important. The four themes are described as follows:

### 5.1 Ecosystem Approach

An open call for proposals was put forward with this theme. The ecosystem approach is core to the 'green' knowledge infrastructure of EZ and also to the development of fisheries management in the Netherlands and the EU. This approach requires novel and innovative methods to address the interaction and impact of fisheries on the ecosystem. The KB WOT definition of ecosystem approach is broad and this will be reflected by the breadth of proposals funded through this theme (from ecosystem functioning, to impact of fisheries on the ecosystem, to the interaction of fisheries, the ecosystem and society). Project proposals are invited that provide information or tools for the ecosystem approach to fisheries management and also research projects that make the ecosystem approach operational. Proposal are also encouraged that explore the science and concepts behind the objectives relating to descriptors of Good Environmental Status (GES) as they apply to fish and shellfish. The projects must progress our understanding further with regards to the descriptors and the final deliverables are expected to be peer reviewed papers.

### 5.2 Maintaining Quality

This was a closed call to specific invited expert leaders in IMARES for projects that maintain the present expertise base and quality control routine techniques and skills. IMARES needs to maintain core competencies to deliver and internationally approved WOT programme. These core competencies include age reading of fish, fish stock assessments, acoustic survey techniques, shellfish surveying, discard monitoring and biological data collection, but also developments of storage of these data. Courses, workshops and exchanges are an important part of maintaining and developing core skills. The choice of areas to receive funding is made by the KB WOT Fisheries programme management team.

### 5.3 International Exchange

Under this theme, budget is reserved to participate and exchange expertise in international research networks (primarily [ICES](#)). Funds will be allocated by the KB WOT programme management to participate in meetings and workshops that are considered important for the WOT Fisheries statutory tasks. With this theme KB WOT Fisheries ensures IMARES scientists stay up to date with international developments and participate in the international science developments by presenting IMARES research. The value of KB WOT Fisheries programme is increased by project financing and technology or expertise transfer from international partners.

## 5.4 MESMERISE

MESMERISE is a long term multi-annual EU project on innovation and development of acoustic survey techniques and expertise. This theme was co-financing for the specific H2020 MESMERISE project proposal. In the end the MESMERISE project proposal was not granted by the EU. Thus the budget reserved in this theme was allocated to the acoustic project submitted under the theme 'Maintaining Quality'.

## 5.5 Call for proposals

36 proposals were submitted to the KB WOT 2015 call (see annex 1). Of those the following 14 projects were granted.

Proposal no	Theme	Title	Project leader	Agreed finance <sup>1</sup>
3		Programme management	van Damme	€ 27,676
4	3	International exchange	van Damme	€ 143,775
7	2	Fish ageing	Bolle	€ 60,308
9	1	FUSION (Fisheries information from using VMS and acoustics in combination)	Fässler	€ 29,700
2	2	Underpinning Acoustics	Fässler	€ 58,500
15	2	Improved accuracy and error estimates in shellfish stock assessments	Troost	€ 49,730
26	1	Validation of discard data from the Dutch self-sampling program	Verkempynck	€ 33,440
21	1	Seeing the forest for the trees	Poos	€ 11,240
1	2	Development of automated data upload to DATRAS	de Boois	€ 19,410
28	1	SPI-FISH: Benthic impacts of fishing trawls	Teal	€ 31,200
34	1	Unravelling the hidden in SAM (how to better understand the importance of the process error in a state space assessment model)	Brunel	€ 15,840
20	1	RIBS (Relationships between intertidal benthos and shrimp fisheries in the Wadden Sea and the Dutch coastal zone)	Tulp	€ 38,090
35	2	An assessment of a currently used method to stun and kill fish during surveys	Vis	€ 35,091
13	2	CLUPID: Clupeoid larvae identification	van Damme	€ 34,000
<b>Total</b>				€ 588,000 <sup>2</sup>

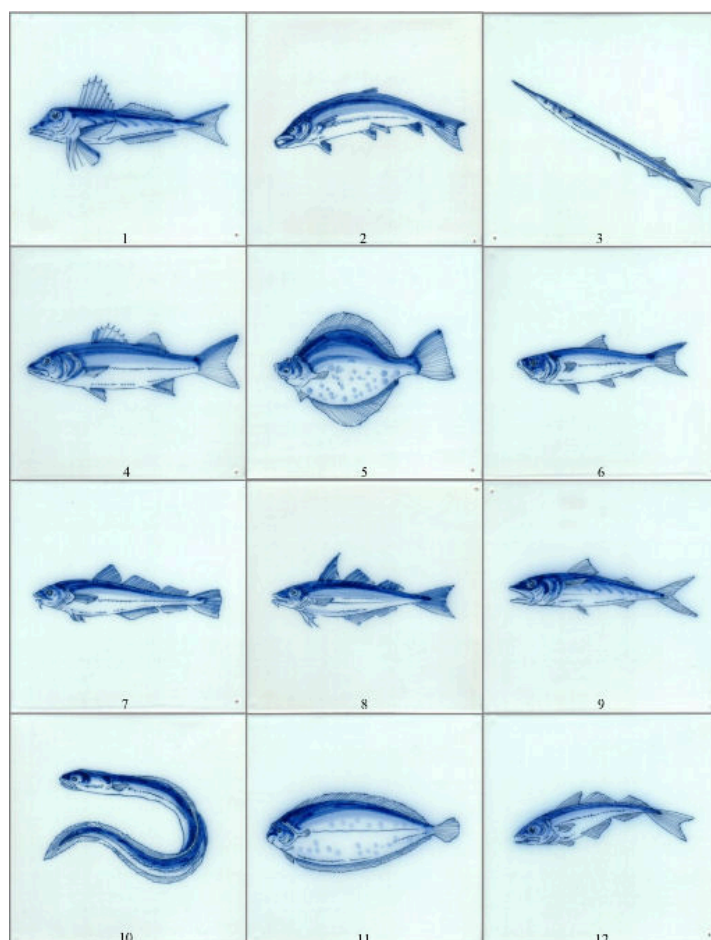
Many of the other proposals were also of good quality but could not be granted because of limited resources.

<sup>1</sup> Amounts are excluding VAT.

<sup>2</sup> The total budget thus being €588,000,-. Which when combined with the WUR charges fulfils the budget of €598,000,-.

## 6 Conclusion

The KB WOT Fisheries programme will fund 14 projects in 2015. This year the KB WOT fisheries programme is balanced with remote sensing (fish and shell fish acoustics) and ecology but also new techniques and methods for surveys, monitoring and assessment. One specific project focusses on reducing pain of fish when caught during the surveys in light of the new (inter)national regulation for the use of animals in experiments. Exchanging knowledge and techniques with international scientist is an important part of the programme. The 2015 projects will increase the ability of the WOT programme to ensure that fisheries advice is responsive to ecological change.



## 7 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.

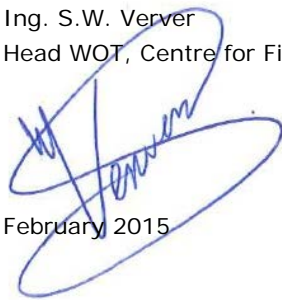
## Signature

CVO Report : 15.002  
Project number : 4301900373

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

Signature:

Date: February 2015

A handwritten signature in blue ink, appearing to be 'S.W. Verver', is written over the text 'Approved by:'. The signature is stylized and loops around the text.


## Annex 1. The Proposals submitted to the call KB WOT Fisheries 2015

Approved proposal




Not approved proposal



Project 1 	Development of automated data upload to DATRAS
Project leader	Ingeborg de Boois
Theme	2. Maintaining Quality
<b>Motivation and Project aims</b>	
Problem definition	IMARES WOT survey data (BTS, IBTS, and in near future also DYFS and SNS) are stored at ICES, in the ICES Database on Trawl Surveys (DATRAS). As the information is also stored in frisbe at IMARES, all minor changes made in frisbe should be done in DATRAS too. This is currently however not easily possible, as data to DATRAS have to be submitted manually, and only complete sets by survey, year and quarter including all data types (haul, length and age information) can be submitted. The current system leads to major differences between the two datasets.
Objective(s) of the project	Facilitate easy synchronisation of DATRAS from frisbe, without as little manual handling as possible.
Expertise needed	Database to database communication, knowledge of frisbe, knowledge of DATRAS.
Expertise developed	Knowledge on communication from database to database/webserver to webserver, which can be used for other projects where databases should communicate.
Why should this be funded by KB WOT?	The data considered are statutory task data.
What other potential funding sources have been considered?	WOT Surveys over the years for manual upload, but this is not doable.
International objective of research	DATRAS should be the main source of information for the international community to extract data on fish trawl survey catches.
<b>Work plan</b>	
Broad description of the project including expected results	IMARES personnel will together with ICES Data Centre investigate the best possibilities for automated (re)submission of data from frisbe to DATRAS.
Approach and time schedule	Jan 2015: Virtual start-up meeting with ICES Data Centre, setting the goals and milestones Jan-Apr 2015: investigation of possibilities for automated data (re)submission Apr 2015: Virtual meeting with ICES Data Centre on progress, and decision on the way forward May-Aug 2015: technical development Sep 2015: Physical meeting between IMARES/ICES Data Centre alongside ICES ASC, in Copenhagen Sep-Oct 2015: testing, evaluation, improvement Oct-Dec 2015: implementation
Output/deliverables	Software, coherent data in frisbe and DATRAS
Dissemination of findings being addressed	The results of the exercise will be presented in the ICES data and Information Group (DIG)


Utility of the developed products and expertise	The expertise on database communication can be used in other projects (e.g. Informatie Huis Marien, other ICES databases where IMARES data are stored). Furthermore, automated (re)submission means that less detailed knowledge on DATRAS is needed at IMARES, and that the data are always synchronised.
What are the potential risks to the project's success?	The main risk is that there is no technical solution to carry out automated (re)submission.
<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Ingeborg de Boois (DATRAS expertise, survey data expertise), Peter van der Kamp, Daniël Benden (programming expertise, webserver to webserver expertise)
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	no
Involvement parties outside WUR (names and expertise)	ICES Data Centre (Vaishav Soni, Carlos Pinto, Anna Osypchuk): DATRAS expertise, programming expertise
<b>Relevance</b>	
What is the market/ target audience	International marine scientists working with the DATRAS data
Economical relevance	no
Social relevance	no
Scientific relevance	Yes, data quality of DATRAS will be improved
Relevance to ministry EZ	Upload to international databases is one of the criteria for the statutory task surveys. Although there are no criteria on the data quality, it is assumed that data quality has to be as good as possible, and updates should be applied to all databases as soon as possible.
<b>Summary (UK)</b>	Dutch survey data are stored at IMARES (frisbe) and at ICES Data Centre (DATRAS), but due to the complexity of the current re-submission methodology it is time-consuming to update DATRAS after every small modification in frisbe. This project should result in near real-time automated updates to DATRAS
<b>Samenvatting (NL)</b>	Op dit moment worden IMARES WOT survey data opgeslagen op IMARES (frisbe) en bij ICES (DATRAS). Door de huidige methode van aanleveren van updates aan DATRAS is het niet mogelijk om iedere kleine wijziging in frisbe snel door te voeren in DATRAS. Dit project moet resulteren in een bijna real-time update van DATRAS als gegevens in frisbe zijn gewijzigd.

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79	70	5530.00
CAT III	99	120	11880.00
CAT IV	122		0.00
CAT V	143		0.00
CAT VI	172		0.00
<b>Total Personnel</b>	17410.00		
<b>Material costs</b>			
Facilities			
Specific costs			
Travel costs	1000.00		
Project equipment	1000.00		
Other material costs			
<b>Total Material Costs</b>	2000.00		
<b>Total project budget needed</b>	19410.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	19410.00		

Project 2 	Underpinning Acoustics
Project leader	Sascha Fässler
Theme	2. Maintaining Quality
<b>Motivation and Project aims</b>	Fish abundance measurements using
Problem definition	Fish abundance measurements using acoustic methods are an important source of information for standard fish stock assessment but also for monitoring purposes of the wider ecosystem. In order to maintain the quality of the information provided, it is important to invest into the development of the methods.
Objective(s) of the project	Maintenance and expansion of hydro acoustic work within IMARES
Expertise needed	hydro acoustic scattering theory, acoustic data processing, optical techniques, electromechanical engineering
Expertise developed	Pelagic ecosystem monitoring
Why should this be funded by KB WOT?	Monitoring of the pelagic ecosystem is a key component of the statutory tasks (WOT) to deliver data underpinning policy drivers such as MSFD, CFP and DCF. Hydro acoustics is THE major sampling tool for this. The continuing project aims to maintain and develop acoustic ecosystem monitoring techniques. The project will for example build up an identification library of pelagic ecosystem components and the results will therefore improve efficient characterisation of ecosystem components. It will keep the methods at the most current state and explore alternative ways to assist in-house research
What other potential funding sources have been considered?	
International objective of research	To maintain and raise the IMARES active acoustics profile on a national and international level.
<b>Work plan</b>	
Broad description of the project including expected results	With the shift in survey focus towards an ecosystem approach, utilise acoustic survey data for providing answers to research questions not directly related to classical 'single species' stock assessment. For example the ecosystem components library can be used by survey scientists to improve ecosystem description.
Approach and time schedule	Q1/Q2: work on papers for Acoustic Symposium. Processing existing raw acoustic data from surveys and fishing trips, building up the acoustic identification library and hosting it at a central location. Q3/Q4: BioAcoustics Day, testing the library during surveys at sea.
Output/deliverables	<ul style="list-style-type: none"> <li>- Continuation of the "Biocoustics Day" workshop in 2015 to develop collaborations within the hydroacoustic work covered at IMARES. Support contributions/ participation of IMARES personnell.</li> <li>- Contributions for the ICES Acoustics Symposium.</li> <li>- Acoustic identification library for different fish species and plankton groups</li> </ul>
Dissemination of findings being addressed	
Utility of the developed products and expertise	The project contributes to the strategic areas highlighted by the KBWOT team. The identification library will be used during pelagic WOT ecosystem surveys to better and more effectively characterise the ecosystem.
What are the potential risks to the project's success?	


<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Sascha Fässler (fisheries acoustics), Ben Scoulding (fisheries acoustics), Bram Couperus (fisheries acoustics), Dirk Burggraaf (electrical engineering), Kees Bakker (electrical engineering), Erwin Winter (telemetry), Ben Griffioen (fisheries acoustics), Dick de Haan (passive acoustics), Daniel Benden (database)
Is the appropriate capacity available?	
Involvement parties within WUR (names and expertise)	
Involvement parties outside WUR (names and expertise)	collaborators abroad working in the same field at IMR, IFREMER, MSS, CEFAS, MI and NOAA; contractual collaboration with PhD student Sven Gastauer (Curtis University, Australia)
<b>Relevance</b>	
What is the market/ target audience	Pelagic ecosystem monitoring scientists
Economical relevance	Hydro acoustics is becoming increasingly relevant as primary tool for integrated ecosystem monitoring to aid management.
Social relevance	monitoring to guarantee GES and sustainable resource exploitation (MSFD, CFP)
Scientific relevance	Acoustic methods are a vital monitoring method. Products as the ecosystem component library will make acoustic data analyses more efficient.
Relevance to ministry EZ	guarantee quality of pelagic monitoring work (WOT, DCF)
<b>Summary (UK)</b>	Underpinning Acoustics is part of a multiannual project that aims to maintain and develop hydro acoustic survey techniques. In the process of moving towards integrated ecosystem monitoring there is a need for consistent and efficient characterisation of different ecosystem components. The project will make use of existing acoustic data to build up an identification library of pelagic ecosystem components.
<b>Samenvatting (NL)</b>	Dit onderzoek is onderdeel van een meerjarig project dat fundamenteel is gericht op handhaving en ontwikkeling van akoestische onderzoekstechnieken. In het streven naar geïntegreerde ecosysteem monitoring is er een behoefte aan een consistente en efficiënte karakterisatie van verschillende ecosysteem componenten. Het project zal gebruik maken van bestaande visserij-akoestische gegevens om een identificatie-bibliotheek van pelagische ecosysteem componenten op te bouwen.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	79		0.00
CAT III	99	353	34947.00
CAT IV	122		0.00
CAT V	143		0.00
CAT VI	172		0.00
Total Personnel	34947.00		
Material costs			
Facilities			
Specific costs			
Travel costs	53.00		
Project equipment			
Other material costs			
Total Material Costs	53.00		
Total project budget needed	35000.00		
Financing through other resources			
Finance needed from KBWOT	35000.00		

Project 3 	Programme management
Project leader	Cindy van Damme
Theme	Management
<b>Motivation and Project aims</b>	
Problem definition	To manage and develop the KBWOT Fisheries theme.
Objective(s) of the project	Manage and develop the KB WOT Fisheries programme.
Expertise needed	
Expertise developed	
Why should this be funded by KB WOT?	Management of the theme is core to an effective and innovative programme.
What other potential funding sources have been considered?	None
International objective of research	Maintain IMARES at the centre of fisheries research in Europe and project our skills to arenas beyond the EU.
<b>Work plan</b>	
Broad description of the project including expected results	To manage and develop the KBWOT Fisheries theme. Reporting on the 2014 programme and a description and rationale for the 2016 programme.
Approach and time schedule	Q1: Write report on the results of the 2014 programme Q3: New call for proposals for the 2016 programme Q4: Establish new programme for 2016 from submitted proposals and write report with the programme description and rationale for 2016
Output/deliverables	2 reports – reporting on the 2014 programme and a description and rationale for the 2016 programme.
Dissemination of findings being addressed	Through a range of media and 2 reports – reporting on the 2014 programme and a description and rationale for the 2016 programme.
Utility of the developed products and expertise	A review of the functioning of KBWOT fisheries was carried out in 2010 (see report 10.IMA0283.mdc) which involved LNV (directorates AKV and Kennis), CVO, WUR and IMARES. This found that the programme was forward looking, viewed high quality innovative science as important and yet maintained the direction considered important by LNV. Thus the KBWOT programme appears to utilise the expertise available to DLO on fisheries and look to the future research needs of society. In November 2014 a review and evaluation of the programme 2010-2014 will take place.
What are the potential risks to the project's success?	Minimal
<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Sieto Verver, Frans van Beek, Rian Schelvis en Cindy van Damme
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	Close links to the KB programme. The new KB programme is currently under development.

Involvement parties outside WUR (names and expertise)	Close links through ICES, the EU STECF, PICES and FAO. Plus a network of marine researchers in Universities across Europe and North America.
<b>Relevance</b>	
What is the market/ target audience	
Economical relevance	
Social relevance	
Scientific relevance	To manage and develop the KBWOT Fisheries theme.
Relevance to ministry EZ	See utility of the developed products and expertise.
<b>Summary (UK)</b>	<p>This project is specifically to manage and develop the KBWOT Fisheries theme within WUR KB programme. We will report on the 2014 programme carried out and publish a description and rationale for the 2016 programme.</p> <p>A review of the functioning of KBWOT fisheries was carried out in 2010 (see report 10.IMA0283.mdc) which involved LNV (directorates AKV and Kennis), CVO, WUR and IMARES. This found that the programme was forward looking, viewed high quality innovative science as important and yet maintained the direction considered important by LNV. Thus the KBWOT programme appears to utilise the expertise available to DLO on fisheries and look to the future research needs of society.</p>
<b>Samenvatting (NL)</b>	<p>Dit project is er specifiek op gericht om het KBWOT visserij thema binnen WUR KB programma te beheren en te ontwikkelen. In 2015 wordt er gerapporteerd over het programma dat in 2014 is uitgevoerd en een rapport gepubliceerd met de beschrijving van het programma voor 2016.</p> <p>In 2010 is de functionering van KBWOT visserij programma, samen met LNV (directie AKV en Kennis), CVO, WUR en IMARES, geëvalueerd (zie het rapport 10.IMA0283.mdc). Deze evaluatie liet zien dat het programma vooruitstrevend was met hoog kwalitatief onderzoek, maar ook de richting had die LNV noodzakelijk achtte. Het KBWOT programma lijkt dus de visserij expertise die beschikbaar en nodig is bij DLO te leveren en vooruitstrevend te blijven om toekomstige vragen te kunnen beantwoorden.</p>

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79		0.00
CAT III	99	240	23760.00
CAT IV	122	8	976.00
CAT V	143	14	2002.00
CAT VI	172	4	688.00
<b>Total Personnel</b>	27426.00		
<b>Material costs</b>			
Facilities			
Specific costs			
Travel costs	250.00		
Project equipment			
Other material costs			
<b>Total Material Costs</b>	250.00		
<b>Total project budget needed</b>	27676.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	27676.00		

Project 4 	International exchange
Project leader	Cindy van Damme
Theme	3. International exchange
<b>Motivation and Project aims</b>	
Problem definition	To fund participation in international science networks and ICES meetings
Objective(s) of the project	To fund participation in international science networks and ICES meetings.
Expertise needed	
Expertise developed	
Why should this be funded by KB WOT?	These groups are core to the development of KBWOT and the expertise maintenance of IMARES, as not only a centre of excellence, but also an institute for innovation and world leader in fisheries research. The network provided by these groups provides great added value to the KBWOT resources.
What other potential funding sources have been considered?	WOT, IMARES R&D funds, etc. but these are the groups that most require KBWOT funding.
International objective of research	Maintain IMARES at the centre of fisheries research in Europe and project our skills to arenas beyond the EU.
<b>Work plan</b>	
Broad description of the project including expected results	To fund participation in international science networks and ICES meetings. In 2015 participation in 23 working groups and workshops will be funded (see the summary for group names).
Approach and time schedule	See ICES calendar for meeting dates <a href="http://www.ices.dk/news-and-events/meeting-calendar/Pages/default.aspx">http://www.ices.dk/news-and-events/meeting-calendar/Pages/default.aspx</a>
Output/deliverables	Formal working group's reports, internal IMARES reports of groups and collaborative manuscripts for peer reviewed journals.
Dissemination of findings being addressed	Through the ICES website, ICES theme sessions, symposia and through the ICES advisory system.
Utility of the developed products and expertise	
What are the potential risks to the project's success?	Over-commitment of staff
<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Various scientists
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	
Involvement parties outside WUR (names and expertise)	Mostly across the North Atlantic marine science community but now also with FAO and with scientists from countries involved in PICES (Japan, Korea, China).

<b>Relevance</b>	
What is the market/ target audience	International science networks and ICES
Economical relevance	
Social relevance	
Scientific relevance	Added value by participating in collaborative international projects and groups.
Relevance to ministry EZ	These groups are core to the development of expertise and the network provided by these groups provides great added value to the KBWOT resources.
<b>Summary (UK)</b>	<p>This project is specifically to fund participation in international science networks and ICES meetings. These groups are core to the development of expertise and the maintenance of IMARES as not only a centre of excellence but also an institute for innovation and world leader in fisheries research. The network provided by these groups provides great added value to the KBWOT resources.</p> <p>In 2015 participation will be funded in international science networks and ICES meetings: Data and Information Group, Working Group on Fisheries-Induced Evolution, Workshop on the Value of Coastal Habitats for Exploited Species, Working Group on Fishing Technology and Fish, Working Group on Fisheries Acoustics and Technology, Working Group on Integrating Surveys for the Ecosystem Approach, Working groups on cod and plaice eggs surveys in the North Sea, Working Group on Biological Parameters, Working group on Crangon Fisheries and Life History, Working Group on Integrative Physical-biological and Ecosystem Modelling, Workshop on Maturity Staging of Mackerel and Horse Mackerel (<i>Scomber scomber</i> and <i>Trachurus trachurus</i>), Workshop on scrutinisation procedures for pelagic ecosystem surveys, Working Group on Electrical Trawling, Workshop on Egg staging, Fecundity and Atresia in Horse mackerel and Mackerel, Working Group on Integrated Assessments of the North Sea.</p> <p>Results will be published in formal working group's reports, internal IMARES reports of groups and collaborative manuscripts for peer reviewed journals. Results will be disseminated through the ICES website, theme sessions at the ICES Annual Science Conference, international symposia and through the ICES advisory system.</p>
<b>Samenvatting (NL)</b>	<p>In dit project worden internationale uitwisseling en samenwerking gestimuleerd en wordt specifiek deelname aan internationale onderzoeksnetwerken en ICES groepen gefinancierd. Deze groepen zijn belangrijk voor de ontwikkeling van het KBWOT programma en zorgen ervoor dat IMARES een belangrijk instituut blijft met innovatie en excellente kennis op het gebied van visserijonderzoek. Het netwerk dat deze groepen vormen levert veel extra waarde aan het KBWOT visserij programma.</p> <p>In 2015 wordt deelname aan de volgende netwerken en ICES groepen gefinancierd: Data and Information Group, Working Group on Fisheries-Induced Evolution, Workshop on the Value of Coastal Habitats for Exploited Species, Working Group on Fishing Technology and Fish, Working Group on Fisheries Acoustics and Technology, Working Group on Integrating Surveys for the Ecosystem Approach, Working groups on cod and plaice eggs surveys in the North Sea, Working Group on Biological Parameters, Working group on Crangon Fisheries and Life History, Working Group on Integrative Physical-biological and Ecosystem Modelling, Workshop on Maturity Staging of Mackerel and Horse Mackerel (<i>Scomber scomber</i> and <i>Trachurus trachurus</i>), Workshop on scrutinisation procedures for pelagic ecosystem surveys, Working Group on Electrical Trawling, Workshop on Egg staging, Fecundity and Atresia in Horse mackerel and Mackerel, Working Group on Integrated Assessments of the North Sea.</p> <p>Resultaten van de bijeenkomsten zullen worden gerapporteerd in de formele werkgroep rapporten, interne IMARES rapporten en gezamenlijke wetenschappelijke manuscripten in peer-reviewed tijdschriften. Resultaten worden verspreid via de ICES website, thema sessies op de ICES jaarvergadering, internationale symposia en het ICES advies-systeem.</p>

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58	50	2900.00
CAT II	79	200	15800.00
CAT III	99	820	81180.00
CAT IV	122	166	20252.00
CAT V	143	50	7150.00
CAT VI	172		0.00
<b>Total Personnel</b>	127282.00		
<b>Material costs</b>			
Facilities			
Specific costs			
Travel costs	16493.00		
Project equipment			
Other material costs			
<b>Total Material Costs</b>	16493.00		
<b>Total project budget needed</b>	143775.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	143775.00		

<b>Project 5</b>		<b>Jellyfish temporal and spatial trends in Dutch waters</b>
Project leader		Sarah Smith
Theme		1. Ecosystem Approach
<b>Motivation and Project aims</b>		
Problem definition		Worldwide, there is discussion on the potential increase of the number of jellyfish, with 'jellyfication of the oceans' as the ultimate doom scenario - a regime shift from fish-dominated to jellyfish-dominated seas. In the Dutch waters on occasion, shrimp fishermen recently had to cease fishing activities due to clogged nets by jellyfish blooms. It is not yet clear why 'jellyfish blooms' are detected more frequently. Some relate the perceived increase to: pollution and eutrophication (increase plankton); overfishing (removing predators); climate change (temperature and pH shift); increase in artificial substrates (e.g. wind farms). Others argue that the perceived increase is related to naturally occurring global oscillations. Whatever the reason jellyfish blooms can cause (social-economic) problems for ecosystems and human activities through negative effects on fisheries (clogging nets), the productivity of the seas (predation on fish eggs and larvae, competition for food with commercially important fish), on tourism, and industries (blocking cooling water intake). Knowledge on the abundance of jellyfish in Dutch coastal waters is limited and monitoring in the past has been insufficient, making it difficult to determine if jellyfish numbers are indeed increasing and to predict future temporal and spatial trends and assess the consequences.
Objective(s) of the project		The objective of the project is to determine if a trend in jelly fish abundance and related problems or fisheries exists for the Dutch coastal waters. This will be done by 1) Inventory of available data on jellyfish occurrences in IMARES yearly survey data since 1977, to determine the quality of the dataset and to identify trends of jellyfish occurrences in Dutch waters. 2) Interviews with Dutch fishermen on their perception of jellyfish occurrences and trend in Dutch waters.
Expertise needed		Fisheries, monitoring, jellyfish identification, sampling, modelling.
Expertise developed		Insight in the quality of the dataset on jellyfish, the trend of jellyfish occurrence in Dutch coastal waters, the necessity for future research.
Why should this be funded by KB WOT?		The results give insight into the need to assess possible future risks for marine ecosystems and Dutch fisheries.
What other potential funding sources have been considered?		As jellyfish blooms have been known to clog cooling water systems. If Dutch industries recognize such events and perceive them as a problem, funding possibilities will be looked into. On our initiative an inventory will be made for Dutch power plants during the KCC meeting in November 2014.
International objective of research		To contribute to the knowledge of jellyfish occurrence and trend on global scale and to the overall international database on jellyfish distribution.
<b>Work plan</b>		
Broad description of the project including expected results		Knowledge on jellyfish occurrence in the Dutch North Sea is limited. More research is needed to understand the role of jellyfish and jellyfish blooms in general and distribution in Dutch coastal waters. Analysis of the long IMARES survey data focussing on jellyfish occurrences may provide insight into trends in Dutch waters. Interviews with fishermen will identify their perception on jellyfish occurrence.
Approach and time schedule		1. Analysis of the IMARES survey dataset - January/February/March 2015 2. Interviews - Fishermen perception on jellyfish occurrence - March/April 2015 3. Publication of results - May/June/July 2015


Output/deliverables	Preferable a peer-reviewed paper, depending on the quality of the available data. If the quality of the data is not sufficient a report will be written.
Dissemination of findings being addressed	Preferable by peer-reviewed paper.
Utility of the developed products and expertise	As a basis to determine the necessity of further research and monitoring to assess possible future risks for marine ecosystems and Dutch fisheries (possible Dutch industries).
What are the potential risks to the project's success?	Insufficient amount or quality of available data. Unwillingness of fishermen to cooperate with the project.
<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Sarah Smith (project management; literature review); Edwin Foekema (peer-reviewed article); Ingeborg de Boois & IMARES intern (data analysis)
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	Not for now.
Involvement parties outside WUR (names and expertise)	Not for now.
<b>Relevance</b>	
What is the market/target audience	Dutch government; Dutch industry (cooling water systems)
Economical relevance	Economic impacts on fisheries, tourism, industry (cooling water systems)
Social relevance	Impacts on human health, fishery communities.
Scientific relevance	Insight in the need for further research.
Relevance to ministry EZ	Possible economic effects on the Dutch fisheries (fishermen needing to stop fishing due to clogging of nets) and possibly Dutch industries.
<b>Summary (UK)</b>	Knowledge on jellyfish in Dutch coastal waters is limited and monitoring in the past has been insufficient, making it difficult to predict future trends of jellyfish distribution. The present project aims to provide an inventory of the available data on jellyfish occurrences in IMARES survey data, to determine the quality of the dataset, to identify trends and to interview fishermen on their perception of jellyfish trends in Dutch waters. This will provide insight into the necessity of further research and monitoring on jellyfish populations and trends in Dutch waters.
<b>Samenvatting (NL)</b>	De laatste jaren zijn in de wetenschappelijke literatuur suggesties gepubliceerd dat de dichtheid van kwallen in de wereldzeeën toeneemt, met mogelijk grote gevolgen voor visserij, industrie en toerisme. Voor de Nederlandse wateren is kennis over kwallen beperkt en is onduidelijk of er sprake is van een trend. Het project heeft als doel de beschikbare gegevens in IMARES survey data (sinds 1977) te inventariseren en te bepalen of een trend in de dichtheden kan worden vastgesteld. Nederlandse vissers zullen worden geïnterviewd over hun perceptie van kwallen trends en bijbehorende problemen voor de visserij. Naar verwachting zal op deze wijze inzicht worden verkregen in de vraag of er in de Nederlandse wateren van een toename van de kwallen dichtheid sprake is en wat dit op termijn voor de visserijsector voor problemen kan opleveren.

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79		0.00
CAT III	99	170	16830.00
CAT IV	122		0.00
CAT V	143		0.00
CAT VI	172		0.00
<b>Total Personnel</b>	16830.00		
<b>Material costs</b>			
Facilities			
Specific costs	2800.00		
Travel costs	450.00		
Project equipment			
Other material costs	450.00		
<b>Total Material Costs</b>	3700.00		
<b>Total project budget needed</b>	20530.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	20530.00		

Project 6 	Balanced harvesting and the balance of nature
Project leader	Tobias van Kooten
Theme	1. Ecosystem approach
<b>Motivation and Project aims</b>	
Problem definition	Balanced harvesting, the unselective harvesting of all ecosystem components in proportion to their productivity, is currently promoted as a potential way to reduce ecosystem impact of fishing (Garcia et al. 2012, Law et al. 2012), while maintaining or even increasing catches (Jacobsen et al 2014). However, balanced harvesting potentially changes the strength of ecological interactions such as competition and predation between individuals and species, and there is mounting evidence that such interactions are important determinants of the state of marine ecosystems (Baum & Worm, 2009). Even small perturbations in the strength of these interactions can lead to substantial alterations of food web structure, with changes in species' size distributions and roles in the food web (Schellekens & van Kooten, 2012; van Denderen & van Kooten, 2013). If balanced harvesting as a management strategy implicitly introduces the risk of regime shifts, this is an important consideration for its applicability as a component of ecosystem-based fishery management.
Objective(s) of the project	To elucidate if and under which conditions (in terms of food web topology) balanced harvesting has the potential to cause large-scale changes in food web structure.
Expertise needed	population & community modelling
Expertise developed	effects of balanced harvesting
Why should this be funded by KB WOT?	Balanced harvesting is catching on internationally as a potential alternative to traditional selective harvesting. The advantages have been clearly demonstrated (Jacobsen et al 2014), but much less is known about potential risks of the approach. Such understanding is critical in moving towards operationalizing the concept.
What other potential funding sources have been considered?	none
International objective of research	To elucidate if and under which conditions (in terms of food web topology) balanced harvesting has the potential to cause large-scale changes in food web structure.
<b>Work plan</b>	
Broad description of the project including expected results	We will develop a generic food web model which describes a food web of multiple interacting size-structured species. We will use allometric principles to parameterize the model to reflect several fish assemblages, varying the food chain length (predation) and width (competition). In these food webs, we will simulate balanced harvesting and investigate which food web properties in- and decrease the risk of ecosystem disturbance by balanced harvesting.
Approach and time schedule	Modelling and writing results. Main body of work will be in 2nd quarter of 2015, with writing the manuscript in summer.
Output/deliverables	a peer-reviewed paper.
Dissemination of findings being addressed	Peer reviewed publication Presentation at an appropriate scientific forum (to be decided) Balanced harvesting is a 'hot' topic and hence a publication on this subject will likely generate international exposure for the researchers involved and the institute.
Utility of the developed products and expertise	Given the popularity of the concept, we consider it likely that in the future, we will be called upon to provide advice on the merits and flaws of balanced harvesting. This research puts us in a better position to answer such future calls.

What are the potential risks to the project's success?	The main 'risk' is that it turns out that balanced harvesting is actually always a good idea, and we find no risks. This will still be a publishable result. Hence, we consider the risks to be small.
<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Tobias van Kooten (PI) Karen van de Wolfshaar
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	none
Involvement parties outside WUR (names and expertise)	Not settled yet. Potentially: group of Prof. A.M. de Roos (University of Amsterdam) and group of Prof. K. H. Andersen (DTU Aqua).
<b>Relevance</b>	
What is the market/target audience	Scientific community/ICES (in particular WGECO, see forthcoming Terms of Reference). Indirectly: Ministry of Economic Affairs
Economical relevance	Unknown risks of balanced harvesting may jeopardize the fishing industry
Social relevance	Unknown risks of balanced harvesting may jeopardize both the fishing industry and other ecosystem services (nature, biodiversity)
Scientific relevance	Balanced harvesting is an important emerging concept and 'hot topic' in the fisheries scientific literature.
Relevance to ministry EZ	see 'utility of developed products and expertise' above
<b>Summary (UK)</b>	Balanced harvesting, the unselective harvesting of all ecosystem components in proportion to their productivity, is rapidly gaining popularity as a potential way to reduce ecosystem impact of fishing, while maintaining or increasing catch biomass. We study how balanced harvesting, in a size-structured multi-species context, can potentially cause large-scale shifts in food web state, including changes in harvestable species biomass. Such shifts may be expected based on available literature, but have not yet been explicitly documented. This is an important step towards operationalizing the concept of balanced harvesting.
<b>Samenvatting (NL)</b>	'Balanced harvesting' is het oogsten van alle componenten van een marien ecosysteem, proportioneel met de productiviteit van elke component. Dit concept wordt in toenemende mate gepropageerd als een manier om de ecosysteem-effecten van visserij te verminderen, waarbij vangsten op peil kunnen blijven of zelf kunnen stijgen. In deze studie onderzoeken we of en hoe balanced harvesting, in een voedselweb bestaande uit meerdere grootte-gestructureerde soorten, kan leiden tot grootschalige verschuivingen in de toestand van het voedselweb. Zulke verschuivingen zijn op basis van bestaande literatuur zeer goed denkbaar, maar zijn nog niet expliciet gedocumenteerd. Dit werk vormt een belangrijke stap naar het operationeel toepasbaar maken van 'balanced harvesting'.

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79		0.00
CAT III	99	100	9900.00
CAT IV	122	100	12200.00
CAT V	143		0.00
CAT VI	172		0.00
<b>Total Personnel</b>	22100.00		
<b>Material costs</b>			
Facilities			
Specific costs			
Travel costs	500.00		
Project equipment			
Other material costs			
<b>Total Material Costs</b>	500.00		
<b>Total project budget needed</b>	22600.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	22600.00		

Project 7 	Fish ageing
Project leader	Loes Bolle
Theme	2. Maintaining Quality
<b>Motivation and Project aims</b>	
Problem definition	The determination of fish age is a key expertise in fisheries research. Several ageing techniques are applied to different fish species Maintaining this key expertise requires training, exercise, international calibration, quality assurance and quality control. The WOT (and other) projects, in which age determinations are carried out, do not fund these quality maintenance issues. Therefore KBWOT funding is required.
Objective(s) of the project	Maintaining quality of age determinations
Expertise needed	(1) Coordinators with international contacts in the field of fish aging
Expertise developed	(2) Experienced age readers
Why should this be funded by KB WOT?	Fish ageing
What other potential funding sources have been considered?	IMARES needs to maintain its expertise in fish ageing to deliver internationally accepted quality. However, activities crucial for the maintenance of this expertise are not covered by WOT funding and have therefore been funded by KB-WOT since 2004.
International objective of research	WOT programme
<b>Work plan</b>	
Broad description of the project including expected results	The following 3 activities are essential for maintenance of the key expertise fish ageing: (1) Training of new age readers. This is urgently needed to enable replacement of several experienced readers who are nearing retirement. Furthermore, we aim at 2 age readers per species to ensure continuity and to avoid any delays in supplying age data. (2) International calibrations. PGCCDBS calls for international workshops and exchanges when considered necessary. Participation in these international calibration exercises is important for maintaining quality in fish ageing. The European laboratories take turns in organising the workshops and exchanges. (3) Development and implementation of national and international QA and QC.
Approach and time schedule	(1) Training: Throughout year. Experienced readers train new readers. Progress is pushed and tested by coordinators. (2) International calibrations: Throughout year. We only participate in workshops and exchanges for species/stocks that are relevant for NL. Specific for 2015: - Finalisation of sprat exchange (coordination by DK) horse mackerel exchange (FR & IT), whiting exchange (ENG) and sole exchange (BE & NL). - Initiation of dab exchange (coordination by DE & NL), turbot and brill exchange (BE) and herring exchange (?). - Workshops for dab (chairs from DE & NL) and horse mackerel (FR & IT) (3) Specific goal for 2015: an elaboration of the existing IMARES fish ageing manual (revised in 2013), to further document the quality control procedures.
Output/deliverables	(1) ICES reports of exchanges and workshops (2) Elaboration of IMARES manuals
Dissemination of findings being addressed	ICES reports of international exchanges and workshops are disseminated through PGCCDBS and the ICES website


Utility of the developed products and expertise	Almost all population dynamic research carried by IMARES, whether for scientific publications or for fisheries management advice, is age structured. Hence maintenance of the expertise fish ageing is of great importance to IMARES.
What are the potential risks to the project's success?	Insufficient prioritisation within the institute
<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Loes Bolle & Ineke Pennock - Coordinators. Jan Beintema, Gerrit Rink, Peter Groot, Kees Groeneveld, Thomas Pasterkamp, André Dijkman, Marcel de Vries, Betty van Os - Trainers. André Dijkman, Marcel de Vries, Betty van Os, Corrina Hinrichs, Norie van der Meeren, Magareth Roling, Ruben Hoek - Trainees.
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	n.a.
Involvement parties outside WUR (names and expertise)	Age readers and age reading coordinators from laboratories throughout Europe
<b>Relevance</b>	
What is the market/ target audience	Relevant for all projects involving fish ageing
Economical relevance	Sound fisheries advice
Social relevance	Sound fisheries advice
Scientific relevance	Age structured research (population dynamics, growth studies, etc.)
Relevance to ministry EZ	Almost all fish stock assessment models are age structured
<b>Summary (UK)</b>	The key expertise fish ageing is of crucial importance for all age-structured population dynamic research, such as stock assessments for management advice. Maintenance of this key expertise is achieved by training, exercise, international calibration, quality assurance and quality control.
<b>Samenvatting (NL)</b>	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 training, oefening, internationale kalibratie, kwaliteitsborging en kwaliteitscontroles.

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58	72	4176.00
CAT II	79	392	30968.00
CAT III	99	196	19404.00
CAT IV	122		0.00
CAT V	143		0.00
CAT VI	172		0.00
<b>Total Personnel</b>	54548.00		
<b>Material costs</b>			
Facilities			
Specific costs			
Travel costs	5200.00		
Project equipment			
Other material costs	560.00		
<b>Total Material Costs</b>	5760.00		
<b>Total project budget needed</b>	60308.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	60308.00		

Project 8 	Investigation and implementation of electronic measuring devices
Project leader	Ruben Verkempynck
Theme	2. Maintaining Quality
<b>Motivation and Project aims</b>	
Problem definition	On several seagoing trips, the data import of length measurements is time consuming. Some examples: On pelagic trawler trips the observers records the measurements, then write these down and finally enters the information into a computer. On demersal observer trips, the observer measures the fish on board and enters data in Billie Turf (data input application) after the trip. This postponed data-entry leads to (1) delay in data availability and (2) high risk of errors. The introduction of electronic measurement devices was already tried some 15 years ago. Two factors were important to its failure: (1) the state of development of the electronic measurement devices and (2) limited pre-planned participation of users.
Objective(s) of the project	To investigate if, which and how electronic measuring devices (boards -fish and shrimp- and callipers (Nephrons)) can be used during IMARES seagoing and fresh water work, and potentially during many other projects.
Expertise needed	Expertise on (1) catch handling procedures at sea/in the field, (2) translation from the digital output of the measuring board to Billie Turf format, (3) data quality, (4) technical development of electronic equipment
Expertise developed	Use and development of electronic measuring boards
Why should this be funded by KB WOT?	The use of the electronic measuring boards overarches projects and involves most WOT projects as well as other IMARES projects. Data quality will improve and the dataflow will speed up.
What other potential funding sources have been considered?	Project funding, but as this is an overarching topic, this would be an administrative challenge.
International objective of research	The experiences with electronic measuring boards from Belgium, Germany, Norway, Finland, New Zealand, England and Scotland will be taken into account. Good data quality is crucial for the stock assessments. Germany and Belgium are collaboratively developing an open source system, which could be interesting for IMARES.
<b>Work plan</b>	
Broad description of the project including expected results	An investigation of the current electronic measurement systems, and their benefits and disadvantages, will be carried out (literature and international experiences). A choice will be made for a system, based on the IMARES work flows and practical issues (software, user friendliness of measuring board, weighing needed, measurement accuracy, battery capacity, future use, ability to use at sea, resistance, etc.), technical development and testing will take place.
Approach and time schedule	Jan-Feb: inventory of current systems, and proposal and decision on which system to use, why and how. Mar-Sep: development of system, software. Oct: testing. Nov-Dec: Final decision if, and which measurement device will be used with clear and straightforward guidelines to obtain this device.
Output/deliverables	Decision on use of electronic measurement devices, and if decision on a system is taken, software to transfer data to Billie Turf.
Dissemination of findings being addressed	A paper or report (depending on the final decision) will be written on the process and final decision, including a process evaluation.


Utility of the developed products and expertise	The new devices will be used during work on board, for WOT projects and other projects where field work is involved. A secondary benefit could be the improved selection of fish for ageing, which is important for the Law on animal testing (WoD).																																
What are the potential risks to the project's success?	As the project aims to investigate the possibility for an electronic measurement device, there will always be an outcome.																																
Project organisation																																	
Involvement IMARES (names and expertise)	<p>To get a good basis for the implementation (or rejection) of the system, it is proposed to install an advisory board next to the project group. The project group will carry out the main activities, the advisory board will be informed 6 times a year in a meeting, and will be involved in testing hard- and software. Project core group: Ruben Verkempynck, Daniël Benden (software), Dirk Burggraaf (hardware), Thomas Pasterkamp (user), and Douwe van den Ende (user). Advisory board: Josien Steenbergen, Ingeborg de Boois, Harriët van Overzee (all project leaders of projects involved), Ronald Bol, André Dijkman Dulkes, Betty van Os, Hanz Wiegerinck (all users)</p> <table><tr><td>activity</td><td>CATII</td><td>CATIII</td></tr><tr><td>internal meetings (all): 6x year</td><td>60</td><td>60</td></tr><tr><td>meeting external partners: 3 days</td><td>96</td><td>24</td></tr><tr><td>software development</td><td>80</td><td></td></tr><tr><td>inventory</td><td>32</td><td>8</td></tr><tr><td>projectmanagement</td><td></td><td>40</td></tr><tr><td>hardware development</td><td>80</td><td></td></tr><tr><td>users test</td><td>80</td><td>16</td></tr><tr><td>data test</td><td></td><td>32</td></tr><tr><td>reporting</td><td>20</td><td>40</td></tr></table>			activity	CATII	CATIII	internal meetings (all): 6x year	60	60	meeting external partners: 3 days	96	24	software development	80		inventory	32	8	projectmanagement		40	hardware development	80		users test	80	16	data test		32	reporting	20	40
activity	CATII	CATIII																															
internal meetings (all): 6x year	60	60																															
meeting external partners: 3 days	96	24																															
software development	80																																
inventory	32	8																															
projectmanagement		40																															
hardware development	80																																
users test	80	16																															
data test		32																															
reporting	20	40																															
Is the appropriate capacity available?	yes																																
Involvement parties within WUR (names and expertise)																																	
Involvement parties outside WUR (names and expertise)	TI, ILVO (Cefas, Marlab Scotland, IMR Norway)																																
Relevance																																	
What is the market/ target audience	All data users of the output, and all data collectors																																
Economical relevance																																	
Social relevance																																	
Scientific relevance	Data quality of field activities will be better guaranteed, data will be available sooner after the fieldwork, work alleviation of sea-going observers.																																
Relevance to ministry EZ	Data quality of field activities will be better guaranteed, data will be available sooner after the fieldwork.																																
Summary (UK)	This project will investigate if, which and how electronic measuring devices can be used during IMARES seagoing and fresh water work, and potentially during other projects.																																
Samenvatting (NL)	Dit project onderzoekt of, en welke en op welke manier elektronische meetinstrumenten (meetplank -vis en garnalen-, schuifmaat) kunnen worden gebruikt om de data kwaliteit te verhogen en het proces te versnellen.																																

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79	448	35392.00
CAT III	99	220	21780.00
CAT IV	122		0.00
CAT V	143		0.00
CAT VI	172		0.00
<b>Total Personnel</b>	57172.00		
<b>Material costs</b>			
Facilities			
Specific costs			
Travel costs	5000.00		
Project equipment	10000.00		
Other material costs			
<b>Total Material Costs</b>	15000.00		
<b>Total project budget needed</b>	72172.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	72172.00		

<b>Project 9</b>		<b>FUSION (Fisheries information from using VMS and acoustics in combination)</b>
Project leader		Sascha Fässler
Theme		1. Ecosystem Approach
<b>Motivation and Project aims</b>		
Problem definition		The move towards an ecosystem approach needs reliable, direct and quantitative data to estimate fish abundance and describe the impacts of fishing activities on the ecosystem. While the amount of required ecosystem parameters to be estimated increases, available resources remain idle. Although information necessary to estimate fish resources is at hand when combining VMS (spatial distribution) and acoustic data (abundance and biomass), due to extensive processing time of the latter data source, deriving indicators on fish resource abundance and ecosystem state is time consuming. Knowledge on how to estimate fish resource abundance from simple analyses of VMS requires knowledge of fisheries behaviour related to acoustically observed fish abundance, which is currently lacking.
Objective(s) of the project		The project will aim to develop methods to infer pelagic fish biomass from VMS data. This will be done using very high-resolution ( $\pm 1$ data point per second) spatial data of acoustic fish detections recorded on pelagic trawlers. These data will be converted into VMS-like information (decrease tempo-spatial resolution) to test whether VMS analysis of fishing behaviour can be linked to the fish biomass/school structure detected by echo sounders.
Expertise needed		VMS data analysis, spatial statistics, hydro acoustics, acoustic data processing
Expertise developed		spatial analysis methods to combine fishing fleet behaviour and fish biomass from acoustic and VMS information
Why should this be funded by KB WOT?		This is a typical investigative study supporting the data needs for fisheries research and ecosystem advice thereby covering the DCF, CFP and MSFD. It is INNOVATIVE by combining 2 expertise fields of IMARES (VMS monitoring / acoustic fishing vessel data), SUPPORTIVE by providing efficient data for fisheries and ecosystem management, and EXPLORATORY by developing new methods that may potentially use (abundant) VMS data to re-create information from (labour-intensive) acoustic fishing vessel products.
What other potential funding sources have been considered?		project funding (but the required budget exceeds project funds that are available)
International objective of research		The results of this project are potentially interesting for international communities such as ICES or other areas of the world where the same methods (VMS information & acoustic fishing vessel data) are available. This includes areas where funds are limited to monitor pelagic fisheries in detail (S. Pac.).
<b>Work plan</b>		
Broad description of the project including expected results		The project will make use of existing acoustic fishing vessel data sets. Together with research vessel observations, these will build the high-resolution spatial fish density data basis. These spatial data from the vessel trips (GPS) will be resampled (every 2 hours) to mimic a VMS data set. Standard & enhanced VMS analysis methods (developed in this project) will then be used to link fisheries behaviour (spatial fishing activity) to the acoustic data. The performance of the method is then based on how well it can be used to link the vessel activity to biomass, school size, or distribution of pelagic fish.
Approach and time schedule		Q1/Q2: collating/formatting acoustic fishing vessel data set
Output/deliverables		tuning/parameterising VMS methods to specific pelagic fishing behaviour

Dissemination of findings being addressed	Q3/Q4: evaluating method performance by sensitivity analyses ("goodness of fit") + paper writing
Utility of the developed products and expertise	analysis software, scientific paper & short report
What are the potential risks to the project's success?	the method combining the two data sets will produce unusable results (results with too high uncertainty to infer fish density from fishing behaviour)
<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Sascha Fässler (acoustic data processing, spatial statistics), Niels Hintzen (VMS data analysis, spatial statistics)
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	-
Involvement parties outside WUR (names and expertise)	collaborators at IMR, Ifremer, Peru (SNP)
<b>Relevance</b>	
What is the market/target audience	fisheries scientists, marine spatial planners, fisheries managers, fishing industry
Economical relevance	enhance project acquisition potential by increasing IMARES expertise in both VMS and fishing vessel acoustic data analyses
Social relevance	the methods will improve assessment of sustainable ecosystem use of pelagic fisheries through increased data potential of VMS information
Scientific relevance	development of spatial fishing analysis tools thereby building on existing and widening the scientific expertise base of IMARES
Relevance to ministry EZ	EZ has an interest to implement the ecosystem approach to fisheries by use of practically meaningful indicators. The project will investigate if these indicators can be provided in a simple, direct, objective, and repeatable manner.
<b>Summary (UK)</b>	Moving towards an ecosystem approach increases the need for quantitative, direct, simple, and reliable methods to assess the abundance of fish resources and the impacts of fishing activities on the ecosystem. Knowledge on estimating fish resource abundance from simple analyses of VMS could suffice, but it requires understanding of fisheries behaviour related to fish biomass. This study links the understanding of VMS fisheries behaviour to acoustically observed fish abundance and biomass during fishing trips.
<b>Samenvatting (NL)</b>	De transitie naar een ecosysteem benadering vereist kwantitatieve, directe, simpele en betrouwbare methoden om de visstand en de impact van visserij op het ecosysteem te bepalen. Kennis over hoe van VMS een schatting verkregen kan worden van vis biomassa kan hierin volstaan, maar dit vereist een studie naar visserijgedrag in relatie tot visstand. Deze studie koppelt visserijgedrag, in kaart gebracht met VMS, aan visstand en biomassa die geobserveerd is met akoestische technieken gedurende een visreis.

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79		0.00
CAT III	99	300	29700.00
CAT IV	122		0.00
CAT V	143		0.00
CAT VI	172		0.00
<b>Total Personnel</b>	29700.00		
<b>Material costs</b>			
Facilities			
Specific costs			
Travel costs			
Project equipment			
Other material costs			
<b>Total Material Costs</b>	0.00		
<b>Total project budget needed</b>	29700.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	29700.00		


<b>Project 10<sup>3</sup></b> 	<b>ECLIPSE (Ecosystem component library for improved pelagic fishing selectivity and monitoring)</b>
Project leader	Ben Scoulding
Theme	1. Ecosystem Approach
<b>Motivation and Project aims</b>	
Problem definition	The process of moving towards integrated ecosystem monitoring (including the increasing requirement to report on many more 'non-target' species) and also improving pelagic fishing selectivity as part of the landing obligation, puts increasing demands on data processing. There is a fundamental need for consistent and efficient characterisation of different ecosystem components from raw acoustic data, which is currently lacking.
Objective(s) of the project	The project will make use of acoustic data that were collected as part of different projects (e.g. with the pelagic industry or small surveys) and during WOT surveys, to build up an identification library of pelagic ecosystem components. The information therein is based on frequency-dependent scattering properties of different organisms, such as fish species and plankton groups. The results will improve efficient characterisation of ecosystem components. The library will be sustainable and flexible to add new species and train it with new data when these become available.
Expertise needed	acoustic data processing
Expertise developed	database management, implementation of identification library in acoustic data analysis
Why should this be funded by KB WOT?	The project contributes to improved ecosystem monitoring, which is a key component of the WOT (DCF) tasks of IMARES. Therefore, it gives answers to policy drivers linked to sustainable resource exploitation (CFP) and ecosystem status description (MSFD). It is innovative and supportive (combining data products from different sources to serve a common goal more effectively); and certainly exploratory as it is based on relatively new techniques, but would provide a basis (library) to build on in the future.
What other potential funding sources have been considered?	The content touches on WOT and individual project tasks, however there is no room in either of these to develop such an identification library where combined data products can feed in.
International objective of research	The resulting species identification library will be valuable to international science partners who are dealing with similar problems. Therefore IMARES will be attractive for international project initiatives.
<b>Work plan</b>	
Broad description of the project including expected results	Existing raw acoustic data and models of ecosystem components will be analysed and their scattering characteristics fed into a library. The library can be used by scientific survey analysis (LSSS) and fishing selectivity (SEAT) software (marec.no) available to IMARES and the pelagic industry. When more data become available (from future surveys & fishing trips) they can be processed and added to the library. As a result, the library can be used by survey scientists to improve ecosystem description.
Approach and time schedule	Q1/Q2: processing existing raw acoustic data from surveys and fishing trips. Building up the library and hosting it at a central location.
Output/deliverables	- Acoustic identification library for different fish species and plankton groups
Dissemination of findings being addressed	- report describing the methods to: build, maintain, and use the library

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<sup>3</sup> This project proposal has been requested to be incorporated in the proposal nr 2 'Underpinning acoustics'.

Utility of the developed products and expertise	- presentation to scientific & interested industry community
What are the potential risks to the project's success?	- short report/manual
<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Ben Scoulding (acoustics), Daniel Benden (database), Sascha Fässler (acoustics & data), Bram Couperus (acoustic surveys)
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	-
Involvement parties outside WUR (names and expertise)	-
<b>Relevance</b>	
What is the market/ target audience	ecosystem monitoring scientists and pelagic fishing industry
Economical relevance	The library will trigger joint projects with the pelagic industry and also international partners, thereby contributing to project acquisition
Social relevance	Improved ecosystem monitoring and fishing selectivity make fisheries more sustainable.
Scientific relevance	The library will make acoustic data analyses more efficient. The resulting processed data will contribute towards developing ecosystem models.
Relevance to ministry EZ	EZ has an interest to improve survey efficiency to deliver the required eco-system information and reduce discards through improved fishing selectivity
<b>Summary (UK)</b>	In the process of moving towards integrated ecosystem monitoring and improving pelagic fishing selectivity, there is a need for consistent and efficient (fast!) characterisation of different ecosystem components. The project will make use of existing acoustic data to build up an identification library of pelagic ecosystem components (fish species and plankton groups). The library will be sustainable and flexible to add new species and also feed in and train it with new data when these become available in the future.
<b>Samenvatting (NL)</b>	In het streven naar geïntegreerde ecosysteem monitoring en het verbeteren van de pelagische visserij selectiviteit, is er een behoefte aan een consistente en efficiënte karakterisatie van verschillende ecosysteem componenten. Het project zal gebruik maken van bestaande visserij-akoestische gegevens om een identificatie-bibliotheek van pelagische ecosysteem componenten (vissoorten en plankton groepen) op te bouwen. De opzet van de bibliotheek zal duurzaam en flexibel zijn zodat onder de reguliere WOT taken nieuwe soorten en gegevens toegevoegd kunnen worden.

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79	40	3160.00
CAT III	99	200	19800.00
CAT IV	122		0.00
CAT V	143		0.00
CAT VI	172		0.00
<b>Total Personnel</b>	22960.00		
<b>Material costs</b>			
Facilities			
Specific costs			
Travel costs			
Project equipment			
Other material costs			
<b>Total Material Costs</b>	0.00		
<b>Total project budget needed</b>	22960.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	22960.00		

<b>Project 11</b>		<b>INTRACAM (Improved monitoring through use of trawl cameras)</b>
Project leader		Sascha Fässler
Theme		1. Ecosystem approach
<b>Motivation and Project aims</b>		
Problem definition		WOT surveys are still largely focussed on "target species". In the move towards the ecosystem approach to fisheries management and measuring ecosystem health indicators, monitoring approaches need to change towards more integrated surveys that deliver observations on the wider ecosystem. This poses increased demands on sampling tools, as monitoring of eco-system components may be ineffective with sampling gear currently used. There is potential in using cheap trawl cameras, but these lack from data integration (no time-stamped data format & analysis software) to be useful.
Objective(s) of the project		To develop an innovative camera system that monitors organisms which encounter the trawl during surveys but are not effectively sampled (due to their size, behaviour, or quantities). The system will add metadata information (time, depth, trawl activity,...) to the video with a software to improve analyses and allow operational links to information like trawl data and acoustic recordings. This will widen the scope of current WOT surveys. Camera systems have been tested on several WOT surveys in 2014, but apart from recording many GB of video data, they are not operational yet.
Expertise needed		trawl surveys, acoustic surveys, underwater optics, engineering, IT
Expertise developed		integrated ecosystem monitoring
Why should this be funded by KB WOT?		The move towards integrated ecosystem surveys is a key strategic component of the WOT tasks. The project delivers data to support CFP and MSFD monitoring demands. It is INNOVATIVE by developing a new sampling technology, SUPPORTIVE by enhancing current survey technologies, and EXPLORATORY by trying new low-cost sensors (GoPro cams) to deliver data.
What other potential funding sources have been considered?		this project assists and improves current WOT funded surveys, however, there is no room in the WOT budget for such improvements of monitoring techniques as proposed here. WOT will cover the survey time for tests.
International objective of research		International partners face similar demands on monitoring approaches. IMARES could take a leading role towards integrated ecosystem surveys.
<b>Work plan</b>		
Broad description of the project including expected results		Pressure-resistant compact digital HD camera packages (incl. light) will be developed for deployment in survey trawls. The images will be visible live on-board via a cable. A software will be developed that links the camera images with important data (time, GPS, trawl depth, acoustic data) to improve analysis and to cut down data volume (exclude empty observations)
Approach and time schedule		January-March: develop camera and software system; April/May lab trials; June/July: field trials; August-October: data analysis; November-December: write paper/report
Output/deliverables		<ul style="list-style-type: none"> <li>- pressure-resistant trawl camera system for use on different WOT surveys</li> <li>- data-flow system (analysis software &amp; output data format)</li> <li>- publication/report</li> </ul>
Dissemination of findings being addressed		<ul style="list-style-type: none"> <li>- ICES WG (e.g. WGIPS, WGFASST, WGISUR..) presentations</li> <li>- survey blog</li> <li>- publication</li> </ul>
Utility of the developed products and expertise		Optimised usage of survey time by improving sampling efficiency and thereby advance towards WOT ecosystem surveys. Consequently this will trigger further developments (project acquisition, R&D)


What are the potential risks to the project's success?	- equipment damage/loss during testing
<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Sascha Fässler (acoustics); Bram Couperus (acoustics); Ingeborg de Boois (trawl surveys); Dirk Burggraaf (optics / electrical engineering); Kees Bakker (optics / electrical engineering); Daniel Benden (IT)
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	-
Involvement parties outside WUR (names and expertise)	members of ICES survey WG's
<b>Relevance</b>	
What is the market/ target audience	pelagic ecosystem monitoring
Economical relevance	Through improved survey data, the project reassures economic viability and sustainability of resource extraction and ecosystem usage.
Social relevance	Better description of MSFD indicators of GES and implementation of EAFM, thus benefitting wider society who profits from marine goods.
Scientific relevance	improved monitoring expertise and increasing the Imares role as leading in integrating ecosystem monitoring programmes
Relevance to ministry EZ	The result will be more accurate & integrated data for the same (survey) money! This is essential in the ecosystem approach, when having to sample many more ecosystem components with the same or decreasing resources.
<b>Summary (UK)</b>	<p>Monitoring surveys are still largely focussed on fish "target species". In the move towards an ecosystem approach to management, monitoring needs to change towards integrated surveys delivering observations on the wider ecosystem. This poses increased demands on existing sampling tools.</p> <p>The aim is to develop an innovative camera system that monitors organisms which encounter the trawl during surveys but are not effectively sampled. The system will incorporate metadata information in software to improve analyses of video images and allow operational links to information like trawl data and acoustic recordings. This will widen the scope of current surveys.</p>
<b>Samenvatting (NL)</b>	<p>Surveys zijn nog steeds sterk gericht op vis "doelsoorten". In het streven naar een ecosysteembenadering, moeten surveys veranderen naar geïntegreerde ecosysteem surveys. Dit vraagt hogere eisen aan bestaande hulpmiddelen voor bemonstering. Het doel is om een innovatief camerasysteem te ontwikkelen dat organismen waarneemt die het sleepnet tijdens surveys tegenkomen maar niet effectief bemonsterd kunnen worden. Het systeem zal met een software metadata informatie opnemen en deze aan de videobeelden koppelen om de operationele links naar informatie zoals trawl data en akoestische opnames te maken. Dit zal de omvang van de huidige surveys uitbreiden.</p>

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79	220	17380.00
CAT III	99	40	3960.00
CAT IV	122		0.00
CAT V	143		0.00
CAT VI	172		0.00
<b>Total Personnel</b>	21340.00		
<b>Material costs</b>			
Facilities			
Specific costs			
Travel costs			
Project equipment	2000.00		
Other material costs			
<b>Total Material Costs</b>	2000.00		
<b>Total project budget needed</b>	23340.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	23340.00		

<b>Project 12</b>		<b>Practical implementation of size selective exploitation</b>
Project leader	Gerjan Piet	
Theme	1. Ecosystem approach	
<b>Motivation and Project aims</b>		
Problem definition	<p>The MSFD Descriptor 3 states, inter alia, that fish populations should exhibit a "population age and size distribution that is indicative of a healthy stock." This introduces a requirement to manage the demographics of fish stocks which is not part of existing fisheries management concepts. Moreover, following discussions on what constitutes a healthy stock the Commission Decision states that "Healthy stocks are characterised by a high proportion of old, large individuals" which may be at odds with the recent CFP landing obligation which may result in a shift in selectivity towards larger fish.</p> <p>Whether these objectives can be met simultaneously and how management could achieve them remains as yet unknown.</p>	
Objective(s) of the project	<p>Identifying the optimal size selection pattern of the exploitation of the main North sea fish species to achieve the MSFD and CFP requirements. In addition, the project aims to evaluate example changes in fishing regime, i.e. protecting old fish, implementing a discard ban with its associated anticipated increase in selectivity and fishing according to balanced harvesting in terms of the performance to achieve the relevant policy objectives (MSFD, CFP).</p>	
Expertise needed	<p>Knowledge on the size structured model to be applied. Understanding of management objectives and indicators under the MSDF. Policy context.</p>	
Expertise developed	<p>Application of the multispecies size spectrum model</p>	
Why should this be funded by KB WOT?	<p>This is specifically relevant for KBWOT as it contributes to the practical implementation of fish community based exploitation and knowledge required to apply multispecies and maximum sustainable yield (MSY) considerations in fisheries management.</p>	
What other potential funding sources have been considered?	<p>None</p>	
International objective of research	<p>Show that IMARES has the modelling tools (i.e. multispecies size spectrum model) to evaluate ecosystem-based fisheries management beyond the regular single-species approaches.</p>	
<b>Work plan</b>		
Broad description of the project including expected results	<p>The project will design different size-selective exploitation scenarios and evaluate how the North Sea fish community changes under these scenarios. The results will be contrasted to policy objectives. Result will indicate what type of fisheries exploitation is most appropriate to achieve the policy objectives and what the consequences are for current fisheries size-selection.</p>	
Approach and time schedule	<p>Q1: Test runs with existing size-spectrum model (published in J App Ecology, co-authors Gerjan and Niels)  Q2: Definition of model scenarios, implementation and evaluation of these scenarios  Q3-4: Analyses of results and writing report</p>	
Output/deliverables	<p>Paper in ICES Journal of Marine Science</p>	
Dissemination of findings being addressed	<p>Input in the MSFD process developing D3 as well as the process lead by the European Environment Agency towards achieving the objective of securing the food provisioning ecosystem service.</p>	
Utility of the developed products and expertise	<p>This multispecies size spectrum model can be applied to assess various EBM issues in a multispecies context</p>	
What are the potential risks to the project's success?	<p>A publication by another group on the subject prior to ours.</p>	

<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Gerjan Piet and Niels Hintzen
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	
Involvement parties outside WUR (names and expertise)	Julia Blanchard and Ken Andersen
<b>Relevance</b>	
What is the market/ target audience	Policy (both MSFD and CFP) as well as science
Economical relevance	increase of fishing yield (and thus revenue) within environmental limitations
Social relevance	The sustainable provisioning of seafood to feed a growing population while aiming to achieve environmental status
Scientific relevance	Proof of expertise to consider fisheries issues in a multi-species context
Relevance to ministry EZ	Relevance to landings obligation, CFP and MSFD D3.
<b>Summary (UK)</b>	Part of the MSFD Descriptor 3 states that fish populations should exhibit a "population age and size distribution that is indicative of a healthy stock." A Commission Decision states that "Healthy stocks are characterised by a high proportion of old, large individuals" which may be at odds with the recent CFP landing obligation which may result in a shift in selectivity towards larger fish. Whether these objectives can be met simultaneously and what type of management should be implemented remains yet unknown. Within this project the optimal size selection patterns of exploitation of the main North sea fish species to achieve the MSFD and CFP requirements are identified.
<b>Samenvatting (NL)</b>	Binnen de KRM schrijft 'Descriptor' 3 voor dat visbestanden een gezonde leeftijd- en lengtestructuur moeten hebben. Tegelijkertijd stelt het gemeenschappelijk visserijbeleid dat voldoende oude vissen moeten zijn. Deze twee doelstellingen kunnen in het geding komen met de recent geïmplementeerde aanlandingsverplichting die mogelijk resulteert in een visserij die juist grotere vis selecteert. Of de KRM beheerdoelstellingen behaald kunnen worden en hoe beheer ingericht moet worden wordt binnen deze studie bestudeert.

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79		0.00
CAT III	99	100	9900.00
CAT IV	122		0.00
CAT V	143	100	14300.00
CAT VI	172		0.00
<b>Total Personnel</b>	24200.00		
<b>Material costs</b>			
Facilities			
Specific costs			
Travel costs			
Project equipment			
Other material costs			
<b>Total Material Costs</b>	0.00		
<b>Total project budget needed</b>	24200.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	24200.00		

<b>Project 13<sup>4</sup></b>		<b>CLUPID: Clupeoid larvae identification</b>
Project leader	Cindy van Damme	
Theme	2. Maintaining Quality	
<b>Motivation and Project aims</b>		
Problem definition	<p>The results of the international clupeoid larvae identification workshop (WKIDCLUP, ICES CM 2014/SSGESST:04) showed that international agreement of larvae identification was low, 56%. During the workshop validated larvae were used. In October an IMARES internal workshop was held, also using validated larvae. Although agreement at the IMARES workshop was higher, 77%, both results show there is much room for improvement. Currently individual myotome counting under a microscope is the means of identifying larvae. This doesn't allow for an easy quality control. Each year many thousands of larvae are identified and it is not possible to keep each individual larvae separate for quality control.</p> <p>From the international workshop we have validated larvae available of herring, sprat, sardine and anchovy. We want to investigate possibilities of using image and genetic analyses to improve larvae identification and establish an easy way of quality control of the identification.</p>	
Objective(s) of the project	Improve clupeoid larvae identification and establish a means of quality control of the identification.	
Expertise needed	1) Fish larvae identification, 2) Image analyses, 3) Genetic analyses	
Expertise developed	Image analyses macro in ImageJ-ObjectJ to help identification of clupeoid larvae and provide an easy way of quality control through the image and genetic analyses.	
Why should this be funded by KB WOT?	Every year IMARES carries out 4 WOT herring larvae surveys (IHLS & MIK). These surveys provide important information for the SCAI and MIK indices used in the assessment of the North Sea herring stock.	
What other potential funding sources have been considered?	None	
International objective of research	There are at least 12 institutes involved in herring larvae surveys in the North East Atlantic. An improved means of clupeoid larvae identification and an easy way of quality control would be beneficial for all institutes involved.	
<b>Work plan</b>		
Broad description of the project including expected results	<p>We will establish a protocol for picture taking of the larvae. From the pictures and available larvae identification literature we have to identify which parameters can be used to identify the larvae. We will not only focus on myotome counting, but also position of pylorus, anus, fins, head length etc. Once the parameters are established an ObjectJ macro will be programmed by Norbert Vischer (UVA).</p> <p>Once the macro is developed on the validated larvae we can test it with larvae from survey samples. Next to the image analyses, genetic analyses will be carried out to check the larvae identification from the samples. Single use of genetics gives the problem that larvae still need to be measured and staged. Image analyses allows for measuring and staging at the same time.</p> <p>Finally a protocol for quality control of the larvae identification will be developed.</p>	


<sup>4</sup> Project proposal has been granted but without the genetic part.

Approach and time schedule	Q1: Establish picture taking, decide an parameters and development of ObjectJ macro, all using validated larvae Q2: Testing macro with larvae from samples and genetic analyses Q3: Preparing protocols Q4: Using the image analyses on samples from the September herring larvae survey
Output/deliverables	1) Protocol on picture taking of clupeoid larvae; 2) ObjectJ macro with manual; 3) Protocol on quality control; 4) Report
Dissemination of findings being addressed	Once the ObjectJ macro is develop and the first results are available, these will be presented at ICES WG's involved in herring larvae surveys and assessment (WGIPS, IBTSWG, HAWG, and WGALES). Results will also be presented at the larval fish conference (LFC).
Utility of the developed products and expertise	Image analyses macro and protocol for quality control of larvae identification will be useful for all European institutes carrying out herring larvae surveys.
What are the potential risks to the project's success?	It could be that the image analyses larvae identification is as difficult and takes as much (or more) time as the microscope work. But it will in all cases provide a means of quality control, which can't be done at the moment.
<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Ineke Pennock, Ruben Hoek, Andre Dijkman, Betty van Os, Marco Lohman (larvae identification), Hilde van Pelt (genetics)
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	
Involvement parties outside WUR (names and expertise)	Norbert Vischer (UVA, ImageJ expert and ObjectJ programmer)
<b>Relevance</b>	
What is the market/target audience	ICES and institutes involved in clupeoid larvae surveys
Economical relevance	Herring is an important commercial stock
Social relevance	Herring fishery is important in Europe
Scientific relevance	Once the image analyses macro and protocols are established they might be extended for other fish larvae.
Relevance to ministry EZ	Improvement in herring larvae identification will provide improved indices and improve the assessment of the herring stocks
<b>Summary (UK)</b>	Results of the international clupeoid larvae workshop showed that the larvae identification can be considerably improved. In this project we aim to develop an image analyses macro to aid larvae identification. With the current microscope identification a good quality control is not possible. The use of image analyses and genetics will provide an easy way of checking larvae identification. Thus improving indices from the herring larvae surveys and ultimately improve the assessment of the herring stocks.
<b>Samenvatting (NL)</b>	De resultaten van de internationale clupeoid identificatie workshop laten zien dat er grote verbeteringen in de larven identificatie mogelijk zijn. In dit project wordt een macro ontwikkeld voor larven identificatie met beeldanalyse. Op dit moment is het zo goed als onmogelijk om de larven identificatie te controleren. Het gebruik van beeld- en genetische analyse zal een makkelijke manier voor controle geven. Hierdoor wordt de kwaliteit en betrouwbaarheid van indices van de haring larven surveys aanzienlijk verbeterd en zal uiteindelijk de bestandsschatting van haring verbeteren.

<b>Proposed budget<sup>5</sup></b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79	300	23700.00
CAT III	99	160	15840.00
CAT IV	122		0.00
CAT V	143		0.00
CAT VI	172		0.00
<b>Total Personnel</b>	39540.00		
<b>Material costs</b>			
Facilities			
Specific costs	1500.00		
Travel costs	500.00		
Project equipment			
Other material costs	3000.00		
<b>Total Material Costs</b>	5000.00		
<b>Total project budget needed</b>	44540.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	44540.00		


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<sup>5</sup> Project granted without genetic costs, granted budget is €34000.00

Project 14 	Data storage of Electronic Monitoring(EM)
Project leader	Edwin van Helmond
Theme	2. Maintaining Quality (project not invited)
<b>Motivation and Project aims</b>	
Problem definition	Currently there is no possibility to store EM data in the IMARES database, with the risk to loose data and incapability to protect data and/or deny for unauthorized access.
Objective(s) of the project	Develop facilities to store EM data in a secure environment.
Expertise needed	Database and software development EM expertise across different EM projects.
Expertise developed	Data storage of innovative monitoring methods.
Why should this be funded by KB WOT?	In the context of the landings obligations, EM is developing into the most promising tool to monitor commercial fishing activities in the future. Currently there is no EM data storage facility.
What other potential funding sources have been considered?	Overhead of different EM projects. However, this capacity is limited.
International objective of research	Keep up with current international developments in EM. Increase the possibility to join international consortia (EU funded).
<b>Work plan</b>	
Broad description of the project including expected results	<ol style="list-style-type: none"> <li>1. Inventory of all possible EM output formats.</li> <li>2. Investigate the security level to store EM data and select a database for future storage of EM data.</li> <li>3. Investigate and adjust the database to store all EM data formats.</li> <li>4. Develop a software to translate output from EM analysis software to a frisbe compatible format.</li> <li>5. Process monitoring and trials</li> <li>6. Present results.</li> </ol>
Approach and time schedule	<ol style="list-style-type: none"> <li>1 and 2. meeting/brainstorm session: 1day</li> <li>3. -Impact analysis: 5days -Adjust database: 20 days</li> <li>4. Develop software to -store sensor data: 5 days -translate XML output from EM analysis software: 20 days -translate and store (existing) excel logbooks: 10 days</li> <li>5. Trials with EM experts and feedback to developers: 4 days</li> <li>6. Prepare presentation and present results: 2 days</li> </ol>
Output/deliverables	database conversion software
Dissemination of findings being addressed	Present results to EM data users.
Utility of the developed products and expertise	Improved reporting and analysis of EM data.
What are the potential risks to the project's success?	<p>Technical failure of EM software</p> <p>Complexity of the EM data in relation the database set up is currently unclear. There is a minor risk that this will lead to increased use of resources.</p>


<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Edwin van Helmond (cross EM project expertise) Daniel Benden (software and database development) Bram Couperus (cross EM project expertise) Peter van der Kamp (database management)
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	Advice from legal department concerning privacy sensitive information.
Involvement parties outside WUR (names and expertise)	no
<b>Relevance</b>	
What is the market/ target audience	researchers -> ministry & compliance
Economical relevance	Advanced support of fishery management.
Social relevance	Advanced support of fishery management.
Scientific relevance	Advanced availability of data.
Relevance to ministry EZ	Advanced support of fishery management.
<b>Summary (UK)</b>	<p>This is a proposal to develop facilities to store Electronic Monitoring (EM) data. Currently there is no possibility to store EM data in an IMARES database, with the risk to loose data, incapability to protect data and/or manage access. EM is currently developing into the most promising tool to monitor fishing activity on national and international level. The proposal is divided in 6 stages, including (1)an inventory of EM output formats, (2)security/privacy issues, (3)possible adjustments of the database, (4) development of software to translate output from EM software tot frisbe compatible format, and (5&amp;6) process monitoring, trials and presentation of the results.</p> <p>The estimated workload is 408 hours in CAT II and 144 hours in CAT III, representing an amount of 45801 euro.</p>
<b>Samenvatting (NL)</b>	<p>This is a proposal to develop facilities to store Electronic Monitoring (EM) data. Currently there is no possibility to store EM data in an IMARES database, with the risk to loose data, incapability to protect data and/or manage access. EM is currently developing into the most promising tool to monitor fishing activity on national and international level. The proposal is divided in 6 stages, including (1)an inventory of EM output formats, (2)security/privacy issues, (3)possible adjustments of the database, (4) development of software to translate output from EM software tot frisbe compatible format, and (5&amp;6) process monitoring, trials and presentation of the results.</p> <p>The estimated workload is 408 hours in CAT II and 144 hours in CAT III, representing an amount of 45801 euro.</p>

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79		0.00
CAT III	99	408	32232.00
CAT IV	122	144	14256.00
CAT V	143		0.00
CAT VI	172		0.00
<b>Total Personnel</b>	46488.00		
<b>Material costs</b>			
Facilities			
Specific costs			
Travel costs			
Project equipment			
Other material costs			
<b>Total Material Costs</b>	0.00		
<b>Total project budget needed</b>	46488.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	46488.00		

<b>Project 15</b>		<b>Improved accuracy and error estimates in shellfish stock assessments</b>
Project leader	K. Troost	
Theme	2. Maintaining Quality	
<b>Motivation and Project aims</b>		
Problem definition	<p>WOT shellfish gives annual estimates of stock sizes of target species, and surface areas of mussel and oyster beds. We propose to increase the efficiency of sampling grid and gear, and to improve variance estimates. Improvements are urgently needed for 4 topics (A-D):</p> <p>A. To optimize efficiency, the sampling grid is stratified, which will only lead to a higher accuracy of the stock assessment if a reliable basis for stratification is used. (A) shift in target species (<i>Spisula</i> -&gt; <i>Ensis</i>) calls for an update of the stratification. (B) The towed bottom dredge was modified to improve bottom contact. To examine effects on catch efficiency with the aim of implementing the improved dredge in the WOT survey, a comparison between both dredges was made. First data (KB WOT 2013) showed unexpected results. More detailed observations are needed to explain these results. (C) We currently use a bootstrapping method to estimate the variance in stock estimates. Model-based approaches are, however, more suitable for spatially auto correlated populations. These will render more precise (and likely smaller) variance estimates. (D) Mussel bed area is estimated annually, but without an estimate of the variance. With an increase in mussel bed area in the Wadden Sea being an important political goal we urgently need to be able to give assessment of the accuracy of our annual estimates.</p>	
Objective(s) of the project	To increase accuracy of the stock assessments through improvement of efficiency of the sampling grid (A) and bottom dredge configuration (B), and improved variance estimates of stock sizes (C) and mussel bed area (D).	
Expertise needed	Statistics, GIS, expertise on behaviour of the bottom dredge	
Expertise developed	Improved skill in error estimates on different types of survey data	
Why should this be funded by KB WOT?	Because the results will increase accuracy, and variance estimation, of the annual WOT shellfish surveys.	
What other potential funding sources have been considered?	None. The proposed project is of specific interest for WOT Fisheries.	
International objective of research	Maintain a leading position in monitoring of shellfish (and benthos). This will attract interest for international cooperation e.g. in EU projects (EMODnet).	
<b>Work plan</b>		
Broad description of the project including expected results	<p>(A) Existing habitat maps need to be improved and used as a basis for resampling simulations with existing data since 1995. A method will be developed to (periodically) update stratification on a scientifically objective basis. (B) Comparison of both dredges will be repeated, in different areas and / or with scale models in the test facility of MARIN. The aim is to test effects of all three modifications to the 'improved' dredge separately and in interaction. (C) Heikkinen (2006) describes a model-based analysis (METLA) using Matérn's variance estimators. The R-script made available by the author has been adapted (by Johan Craeymeersch) to our situation, where not all strata are spatially connected. This test will be run for the different areas and for different species and is expected to lead to a smaller and more accurate sampling error. (D) A first assessment of the accuracy of mussel bed area estimation will be made to lead to a better evaluation of the statistical and biological significance of observed changes.</p>	


Approach and time schedule	(A) Habitat modelling (months 1-2), statistical analyses (m 3-4). Assess statistical consequences of eventual changes in stratification and update stratified grid according to results (m 5-7). Report: Description of methods to update periodically, maps with shellfish habitat (m 8-11). (B) Depends on funding for shipping time and possibilities at MARIN. (C) Preparation of data (m 1-3). Variance estimation by METLA and Monte Carlo permutation test (m 4-6). (D) Evaluation of possible errors in all steps involved (m 1-3), assessment of variance related to these errors (m 4-8). Reporting of C and D (m 7-11).
Output/deliverables	Reports: 1) improvement of stratified grid and habitat maps (A); 2) results and implications of dredge comparisons (B); 3) variance estimation (C-D).
Dissemination of findings being addressed	Reports and maps, throughout network
Utility of the developed products and expertise	Direct applicability in WOT survey, impact assessments, Natura 2000 / MSFD. Improved marketability of IMARES' towed bottom dredge.
What are the potential risks to the project's success?	No specific risks, except for point B (gear efficiency): we need ship time and/or simulation tests at MARIN. There is no project yet to finance ship time (10K) and costs of tests at MARIN (estimated 5K) are yet uncertain.
<b>Project organisation</b>	
Involvement IMARES (names and expertise)	K.Troost (monitoring), J.Craeymeersch (statistics), C.Chen (statistics), M. van Asch (database), C. van Zweeden (GIS)
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	None
Involvement parties outside WUR (names and expertise)	MARIN, Maritime Research Institute Netherlands (Wageningen)
<b>Relevance</b>	
What is the market/target audience	Ministries of EZ and I&M, companies obliged to perform North Sea impact assessments
Economical relevance	Indirect through impact assessments
Social relevance	None
Scientific relevance	Novel integrated approach to monitoring setup.
Relevance to ministry EZ	Increased accuracy and efficiency shellfish survey and mapping shellfish beds
<b>Summary (UK)</b>	Accuracy of sampling is expected to be improved through an update of the basis for stratification of the sampling grid and through improved insight in the behaviour and efficiency of the towed bottom dredge. Improved variance estimates of stock size and mussel bed area will lead to a better evaluation of the statistical and biological significance of observed changes.
<b>Samenvatting (NL)</b>	In dit project worden vier elementen voorgesteld om te komen tot een verbeterde precisie van het schelpdier bestandsschattingen. De zijn: een update van de basis voor stratificatie van het monstergrid, meer inzicht in effecten van verbeteringen aan de bodemschaaf om deze evt. toe te kunnen passen in de WOT surveys, en het verbeteren van methoden voor variantie schattingen om significantie van geobserveerde veranderingen beter in te kunnen schatten.

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79	250	19750.00
CAT III	99	200	19800.00
CAT IV	122	40	4880.00
CAT V	143		0.00
CAT VI	172		0.00
<b>Total Personnel</b>	44430.00		
<b>Material costs</b>			
Facilities			
Specific costs	5000.00		
Travel costs	300.00		
Project equipment			
Other material costs	10000.00		
<b>Total Material Costs</b>	15300.00		
<b>Total project budget needed</b>	59730.00		
Financing through other resources	10000.00		
<b>Finance needed from KBWOT</b>	49730.00		

<b>Project 16</b>		<b>Effect of fish ageing uncertainty on stock assessment results. A case study for dab (<i>Limanda limanda</i>)</b>
Project leader		Loes Bolle
Theme		1. Ecosystem approach
<b>Motivation and Project aims</b>		
Problem definition		<p>Age determination requires a subjective assessment of whether growth checks in calcified structures should be interpreted as annual rings. Consequently, age-reading errors (in accuracy and precision) are inevitable. Age-reading uncertainty is frequently determined during international exchanges and workshops. The main goal of these exchanges and workshops is to internationally calibrate age-reading (i.e. reduce uncertainty). Usually only variation between readers is examined (to determine precision). Validated material is required to enable comparison between age determinations and true ages (to determine accuracy), but such material is seldom available. Nevertheless, the variation between readers provides information on how difficult it is to age certain species or stocks and can be used to obtain quantitative estimates of uncertainty by age-group.</p> <p>Within the ICES community, deterministic, age-structured assessment models are used for almost all stocks. These models do not allow incorporation of variance in age determinations (or other biological parameters). World-wide, fisheries scientists have addressed this issue. Publications are available on how to quantify age-reading error for use in stock assessments, and the effect of age-reading error on the results of stock assessments. During WKNARC2 (2013) and WKSABCAL (2014), the means of dealing with age-reading uncertainty in assessments were reviewed, but not applied. We propose to carry out a case study for dab. A stochastic assessment model will be developed in which age-reading error can be incorporated. The effects of age-reading error on assessment results will be examined.</p> <p>Dab is chosen for this case study for 2 reasons. Firstly, dab is an important species in the benthic ecosystem. It is the most abundant flatfish species in the North Sea and constitutes an important part of the commercial catches. Despite this, dab is not included in ecosystem and mixed fisheries models, nor are single-species assessments carried out for this species. Lack of knowledge on the population dynamics of dab is a serious omission for an ecosystem approach in the North Sea. Secondly, age-reading uncertainty is high in dab. Within-reader consistency is often less than 50%. An international age-reading exchange and workshop are planned for dab in 2015. These results can be used to estimate age-reading error by age group.</p>
Objective(s) of the project		Develop a stochastic assessment model for dab and examine the effects of ageing uncertainty on assessment results.
Expertise needed		Stock assessment, statistics and fish ageing
Expertise developed		Statistical tools for stock assessment and fish ageing; assessment of NS dab
Why should this be funded by KB WOT?		Stock assessments and fish ageing are an important part of the WOT programme.
What other potential funding sources have been considered?		none
International objective of research		Improve stock assessment and fish ageing methods


<b>Work plan</b>	
Broad description of the project including expected results	Develop a stochastic assessment model, in which ageing uncertainty can be incorporated. The model will be used to examine effects of age-reading error on assessment results for dab. We aim for scientific publication of this work.
Approach and time schedule	Jan-Sep: Preparation data (market, discard & surveys); development model Oct-Nov: Test runs using actual catch data and simulated age-reading errors 23-27 Nov: Dab age-reading workshop Dec: Incorporate actual age-reading errors; prepare draft manuscript
Output/deliverables	Peer-reviewed publication
Dissemination of findings being addressed	ICES Journal of Marine Science
Utility of the developed products and expertise	Fish ageing exchanges and workshops, stock assessments
What are the potential risks to the project's success?	Although novel within ICES, including age-reading error in assessments is not novel world-wide, which may hamper publication. This is one of the reasons why we chose dab; a quantitative assessment for dab is novel.
<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Stock assessment models (Poos, Miller); Stock assessment data preparation (Miller, van der Reijden, Bolle); Statistics (Chen); Fish ageing (Bolle)
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	none
Involvement parties outside WUR (names and expertise)	none
<b>Relevance</b>	
What is the market/ target audience	ICES community
Economical relevance	Fisheries management advice
Social relevance	none
Scientific relevance	Statistical tools for stock assessment and fish ageing; assessment of NS dab
Relevance to ministry EZ	Fisheries management advice
<b>Summary (UK)</b>	We propose to develop a stochastic assessment model, in which ageing uncertainty can be incorporated. The model will be used to assess dab, an important species in the North Sea benthic ecosystem, and to examine effects of age-reading error on assessment results.
<b>Samenvatting (NL)</b>	We stellen voor om een stochastisch assessment model te ontwikkelen waarin onzekerheid over leeftijdsbepalingen kan worden opgenomen. Het model zal worden toegepast voor een toestandsbeoordeling van schaar, een belangrijke soort in het benthische ecosysteem van de Noordzee, en om de effecten van fouten in leeftijdsbepalingen op de uitkomsten van een toestandsbeoordeling te bekijken.

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79		0.00
CAT III	99	200	19800.00
CAT IV	122	120	14640.00
CAT V	143		0.00
CAT VI	172		0.00
<b>Total Personnel</b>	34440.00		
<b>Material costs</b>			
Facilities			
Specific costs			
Travel costs			
Project equipment			
Other material costs			
<b>Total Material Costs</b>	0.00		
<b>Total project budget needed</b>	34440.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	34440.00		

<b>Project 17</b>		<b>Development of catch efficiency for bycatch species in the evolution of fishing gears</b>
Project leader	Jan Jaap Poos	
Theme	1. Ecosystem approach	
<b>Motivation and Project aims</b>		
Problem definition	<p>The design and use of fishing gear is constantly evolving. Currently, the demersal beam trawl fleet in the Netherlands is seeing substantial changes with the adoption of pulse fishing and sumwings. Recently most TBB vessels have shifted to one of the new gears and it is expected that in the next few years all vessels have shifted to wing or pulse fishing. Recent trials have suggested that the catch efficiency for the main commercial species sole and plaice for these new gears is different from the traditional beam trawl. This is corroborated by population level analyses of efficiency for the main target species. In addition, fishing effort for vessels with the new gears has shifted to new fishing grounds. From an ecosystem perspective, knowledge on the efficiency of the new gears for non-commercial or bycatch species is relevant to understand if mortality for these species is changing.</p> <p>From a fleet dynamic perspective, knowledge on how the efficiency changes is relevant: do individuals adopting the new gear benefit from knowledge gained from earlier adopters? That would suggest information sharing within the fishing fleet. Do we see directional changes in catchability for bycatch species within individual vessels after adoption? That would suggest a learning period is required for fishers to adapt to the new gear. Answering these questions helps gain understanding in how catch efficiency changes for a wide range of species with the continuous evolution of fishing gears.</p>	
Objective(s) of the project	Evaluate how the catch efficiency for bycatch species has changed resulting from the evolution of innovative gears (puls, sumwing), and the mechanisms behind these changes.	
Expertise needed	Database extraction, knowledge on discards program, statistical expertise	
Expertise developed	ecosystem effects of fishing, fleet dynamics	
Why should this be funded by KB WOT?	Development of knowledge on the transition to new fishing gears	
What other potential funding sources have been considered?	none	
International objective of research	Evaluate how the catch efficiency for bycatch species has changed resulting from the evolution of innovative gears (puls, sumwing), and the mechanisms behind these changes.	
<b>Workplan</b>		
Broad description of the project including expected results	We will analyse the landings and discards data collected over the last 5 years. Combined with the list of vessels who adopted new gears, we can test for changes in catch efficiency, accounting for changes in the spatial distribution of vessels. The analyses will focus on the bycatch species and on the individual differences among vessels, and how these change over time.	
Approach and time schedule	Jan-Apr: Extract data Apr-Sept: Development of statistical analyses Sept-Dec: write manuscript	
Output/deliverables	Peer-reviewed publication	
Dissemination of findings being addressed	ICES Journal of Marine Science	


Utility of the developed products and expertise	management advice on Data Limited Stocks; Ecosystem effects of fishing
What are the potential risks to the project's success?	Insufficient resolution in discards observation program, Over commitment of participants
<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Niels Hintzen (Adoption of new gears; VMS), Tessa van der Hammen (VISSTAT database; statistical analyses), Jan Jaap Poos (statistical analyses)
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	none
Involvement parties outside WUR (names and expertise)	none
<b>Relevance</b>	
What is the market/ target audience	ICES
Economical relevance	Fisheries advice
Social relevance	none
Scientific relevance	Development of catch efficiency for bycatch species in the evolution of fishing gears
Relevance to ministry EZ	Fisheries advice
<b>Summary (UK)</b>	The goal of this project is to evaluate how the catch efficiency for bycatch species has changed resulting from the evolution of innovative gears (puls, sumwing), and the mechanisms behind these changes.
<b>Samenvatting (NL)</b>	Het doel van dit project is om te begrijpen hoe de vangstefficiëntie voor niet-doelsoorten is veranderd ten gevolge van de ontwikkelingen in vistuigen in de boomkorvloot. Daarnaast willen we begrijpen hoe de veranderingen in efficiëntie plaatsvinden op het niveau van het individuele schip: is hierbij bijvoorbeeld sprake van het delen van informatie?

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79		0.00
CAT III	99	300	29700.00
CAT IV	122	150	18300.00
CAT V	143		0.00
CAT VI	172		0.00
<b>Total Personnel</b>	48000.00		
<b>Material costs</b>			
Facilities			
Specific costs			
Travel costs			
Project equipment			
Other material costs			
<b>Total Material Costs</b>	0.00		
<b>Total project budget needed</b>	48000.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	48000.00		

<b>Project 18</b>		<b>Bottom trawl fishery and the functioning of marine reserves</b>
Project leader	Tobias van Kooten	
Theme	1. Ecosystem approach	
<b>Motivation and Project aims</b>		
Problem definition	Spatial management or zoning is an important part of the ecosystem approach to fishery management, which is being implemented. Marine reserves where fishing is prohibited are increasingly implemented in the North Sea, as part of the ecosystem approach to fishery management. Bottom trawl fisheries are often seen as damaging to the seafloor, and marine reserves are viewed as a way to reduce their impact. It has been shown however that the trawling impact on the bottom can have either a stimulating or negative effect on the food production for the fish targeted by the trawls. This has potential implications for the functioning of reserves closed to bottom trawling, both as fishery management measure and as a conservation measure.	
Objective(s) of the project	To study, using community modelling, the role of closed areas as a way to reduce fishing mortality and attain conservation goals, in fisheries that cause direct effects on the benthic macrofauna.	
Expertise needed	Population and community modelling	
Expertise developed	Understanding of the functioning of marine protected areas for bottom trawling.	
Why should this be funded by KB WOT?	Closed areas are increasingly being implemented in the North Sea. However, the theory on the basis of which their use is justified misses an important aspect of the fishing impact. This can conceivably change the efficacy of reserves as a management measure.	
What other potential funding sources have been considered?	VIBEG research and BENTHIS provide in kind contribution (supervision hours) to TvK and AR.	
International objective of research	see objective, above.	
<b>Workplan</b>		
Broad description of the project including expected results	We will extend the work in Van Denderen et al (proc. roy soc., 2014) to include an area closed to the fishery. We will study how this affects benthic fauna, stock, and yield. We will do so under a variety of assumptions regarding the effect of trawling on the benthos, and regarding how fish migrate across the boundary between open and closed areas. This will result in a peer reviewed publication.	
Approach and time schedule	This project will be executed in the first 4 months of 2015, as the PhD contract of Daniel van Denderen ends the 1st of May 2015.	
Output/deliverables	1 peer reviewed publication.	
Dissemination of findings being addressed	Apart from the publication being produced, the findings will be taken up in a variety of ongoing and future projects regarding the effects of fishing (BENTHIS) and closed areas (VIBEG, VISWAD, MSFD Frisian Front/ Oyster Grounds)	
Utility of the developed products and expertise	See dissemination. Developed expertise puts us in an excellent position to advice on fishery closures which are currently being proposed in a variety of Natura 2000 areas.	
What are the potential risks to the project's success?	4 months is a short time, but the person doing the bulk of the work (Daniel van Denderen) has shown that he can deliver under time pressure. Also, we have a very clear plan for what has to be done for this study.	
<b>Project organisation</b>		
Involvement IMARES (names and expertise)	Tobias van Kooten (modelling, writing, supervision) Adriaan Rijnsdorp (supervision, advice)	
Is the appropriate capacity available?	yes	


Involvement parties within WUR (names and expertise)	Daniel van Denderen (modelling, writing) inhuur als AIO via AFI, period Jan - April (€ 17000).
Involvement parties outside WUR (names and expertise)	none
<b>Relevance</b>	
What is the market/ target audience	Fishery managers and policy makers who decide on fishery and nature at sea. Hence: Ministry of Economic Affairs, Ministry of Infrastructure and the Environment.
Economical relevance	Fishermen claim financial compensation for lost fishing grounds, in relation to the size of the area. This research will give an indication for which type of fish and fishery this is appropriate, as for certain types the closed area may actually be a source of harvestable fish outside the reserve, whereas in other situations the area may come to attract fish from outside.
Social relevance	Several NGOs campaign for closed areas at sea, and the concept is intuitively appealing. This research will allow for a more fact-based consideration of the issue.
Scientific relevance	We extend existing theory to an important type of fishery for which the current theory is not appropriate.
Relevance to ministry EZ	See above: target audience, economical and social relevance.
<b>Summary (UK)</b>	Current theory on the functioning of marine reserves closed to fishing does not accurately represent the way bottom trawls fishery impacts the ecosystem. Despite this, arguments from this theory form the basis to close areas to bottom trawling. We extend the theory to include specific effects of bottom trawling on the bottom ecosystem, thereby enabling a more appropriate assessment of closed areas as tools to obtain fishery and conservation targets.
<b>Samenvatting (NL)</b>	De huidige theorie voor de werking van gesloten gebieden voor visserij is niet goed afgestemd op hoe demersale sleepnetvisserij ingrijpt op het ecosysteem. Desondanks wordt op basis van deze theorie beargumenteerd dat gebiedssluitingen wenselijk zijn. Wij breiden de bestaande theorie uit zodat de effecten van bodemvisserij op een meer correcte manier worden meegenomen. Daarmee zijn we beter in staat te beoordelen of en onder welke omstandigheden gesloten gebieden bijdragen aan het behalen van beheersdoelstellingen voor visserij en natuurbescherming.

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79		0.00
CAT III	99		0.00
CAT IV	122	32	3904.00
CAT V	143		0.00
CAT VI	172		0.00
<b>Total Personnel</b>	0.00		
<b>Material costs</b>			
Facilities			
Specific costs			
Travel costs			
Project equipment			
Other material costs	17000.00		
<b>Total Material Costs</b>	17000.00		
<b>Total project budget needed</b>	20904.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	20904.00		

<b>Project 19</b>		<b>Fishery management in the age of recovery</b>
Project leader	Tobias van Kooten	
Theme	1. Ecosystem approach	
<b>Motivation and Project aims</b>		
Problem definition	<p>More and more fished stocks in the North Sea reach management targets in terms of SSB and fishing mortality, often recovering from much lower abundances. As fishing intensity is reduced, these stocks will at some point reach a natural equilibrium, set by the balance of productivity and mortality in the ecosystem they are part of. It appears that this is starting to happen in North Sea plaice. While the stock of plaice is still growing in numbers and biomass, we see a marked decline in size at age coinciding with the population recovery. This so-called stunting is an important issue in relation to stock management, because an increasingly smaller fraction of the stock is above the minimum landing size. Currently, this is masked by the increasing numbers, but it can eventually lead to reduced catches and catch efficiency despite a large stock, as more and more individuals are below the minimum landing size.</p>	
Objective(s) of the project	Study the (potential) causes of the above observation and explore the degree to which it can hamper efficient stock management.	
Expertise needed	analysis of size- and age structured population data	
Expertise developed	Insight into how different potential regulatory mechanisms (in particular size-specific food availability) affect the size-at-age distribution of a fish population	
Why should this be funded by KB WOT?	This is an aspect of population recovery which has so far stayed under the radar, but which clearly has the potential to become a problem for fishery management in the future.	
What other potential funding sources have been considered?	none	
International objective of research	Study the (potential) causes of the above observation and explore the degree to which it can hamper efficient stock management.	
<b>Workplan</b>		
Broad description of the project including expected results	Collect the available survey and assessment time series of North Sea Plaice, develop hypotheses about what may cause the observed patterns in growth, collect appropriate data to test these hypotheses and do so. Report findings in peer-reviewed article.	
Approach and time schedule	Will start early in 2015 as collecting appropriate data will most likely involve some detective work and waiting time	
Output/deliverables	peer-reviewed article	
Dissemination of findings being addressed	-appropriate ICES working groups (WGECO/WGNSSK) -peer-reviewed article -presentation at appropriate symposium/conference/meeting	
Utility of the developed products and expertise	Insight into a potential problem for fishery management as we are approaching the target stock sizes in the North Sea, before the problem occurs.	
What are the potential risks to the project's success?	Main risk is that the data to test hypotheses do not exist. However, preliminary exploration indicates that most data we expect to require do exist.	
<b>Project organisation</b>		
Involvement IMARES (names and expertise)	Tobias van Kooten (PI), Karen van de Wolfshaar, Adriaan Rijnsdorp, Margriet van Asch	
Is the appropriate capacity available?	yes	


Involvement parties within WUR (names and expertise)	none
Involvement parties outside WUR (names and expertise)	none
<b>Relevance</b>	
What is the market/target audience	Fishery advisors/scientists/managers (ICES & Ministry of Economic Affairs)
Economical relevance	The stunting of populations is a potential economic risk for the fishing industry, which is not taken into account in current management practise.
Social relevance	For the public acceptance of fisheries as a sustainable activity it is important to detect potential backlashes of seemingly successful management before they become problematic.
Scientific relevance	The North Sea plaice population has entered new territory in terms of its record abundance, where we have a chance to learn something about what regulates fish populations in absence of fishing. This is a historically unique situation, because generally populations in a more or less natural state of regulation are not sampled as thoroughly as heavily exploited stocks.
Relevance to ministry EZ	The stunting of populations is a potential economic risk for the fishing industry and the perception of fishing as a successfully regulated activity.
Summary (UK)	Fish stock management in the North Sea is increasingly successful in rebuilding previously overexploited stocks. At some point, these stocks are likely to become limited by aspects of the ecosystem, such as food availability, which can potentially result in a 'stunted' population, where individuals do not reach their full growth potential. This can lead to that both the fraction of the population which is above the minimum landing size and the average size of those landable individuals decreases. This is obviously a potential problem for the fishery, because small individuals yield a lower price per weight. The plaice stock in the North Sea shows a marked decrease in size at age, which has coincided with the rebuilding of the stock, indicating possible stunting. Here we aim to elucidate the likely cause of this pattern and the potential consequences for fishery and management.
Samenvatting (NL)	Het beheer van de visserij in de Noordzee leidt in toenemende mate tot herstel van voorheen overbeviste bestanden. De groei van herstellende visbestanden zal op een gegeven moment afremmen, doordat de vispopulatie tegen de draagkracht van het ecosysteem aanloopt. Dit kan leiden tot zogenaamde 'stunting', het afremmen van de groei van individuen. Hierdoor neemt de vangbare fractie van het bestand af, en worden tegelijk de wel vangbare individuen gemiddeld kleiner. Dit is een potentieel probleem voor de visserij, omdat kleine vissen minder opbrengen dan grotere. In het scholbestand in de Noordzee zien we een duidelijke afname in de lengte per leeftijdsgroep die samenvalt met het bestandsherstel. Dit kan duiden op het ontstaan van 'stunting'. In deze studie gaan we op zoek naar de meest waarschijnlijke oorzaak van dit patroon, en de consequenties daarvan voor visserij en beheer.

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79	40	3160.00
CAT III	99	100	9900.00
CAT IV	122	80	9760.00
CAT V	143	16	2288.00
CAT VI	172		0.00
<b>Total Personnel</b>	25108.00		
<b>Material costs</b>			
Facilities			
Specific costs			
Travel costs	500.00		
Project equipment			
Other material costs			
<b>Total Material Costs</b>	500.00		
<b>Total project budget needed</b>	25608.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	25608.00		

Project 20 	Relationships between benthos and shrimp fisheries in Natura 2000 sites
Project leader	Ingrid Tulp
Theme	Ecosystem approach to management
<b>Motivation and Project aims</b>	
Problem definition	Nature legislation (Natura2000) for the Wadden Sea and the coastal zone has set an objective to improve the quality of H1110. Though, nearly all shrimp fisheries operate in Natura2000 areas and questions are raised on the effect of these fisheries on the benthic community. Understanding effects on benthic species is core to design management measures to improve the quality of H1110. Hitherto no spatial analyses of the fishing effort in relation to the distribution of benthos were done. The data quality of VMS and landing statistics of shrimp fisheries recently improved such that relating fishing effort to biotics has become available as a new analysis tool.
Objective(s) of the project	Investigate the spatial relationships between shrimp fisheries effort and fishing intensity and trends in benthic community development, hereby accounting for variation caused by abiotics.
Expertise needed	VMS data (N. Hintzen), WOT benthos (K. Troost, M. van Asch), WOT DFS (for epibenthos species, I. Tulp), general benthos ecology (J. Craeymeersch)
Expertise developed	more insight into possible effects of shrimp fisheries on benthos
Why should this be funded by KB WOT?	This proposal uses data collected in WOT surveys, that are currently largely unexplored for these questions. It contributes to the knowledge base on one of the largest fisheries in the Netherlands and its effect on the ecosystem.
What other potential funding sources have been considered?	none
International objective of research	The shrimp fisheries issue is very much a trilateral one (Germany, Denmark). Information from this study can directly be applied in WGCRAN
<b>Workplan</b>	
Broad description of the project including expected results	VMS data for the time period 2010-2013 will be coupled to benthos data on the appropriate time and spatial scale. WOT shellfish surveys, the mussel seed survey and the DFS survey will be used for macrobenthic benthic species. We will use these data to identify: 1. consistency in preferred fishing areas 2. links between the benthos community and fishing pressure
Approach and time schedule	This work will be carried out before mid-2015. After data preparation, spatially resolved analyses will be carried out. This study is descriptive in nature, but this step is necessary to identify potential mechanisms.
Output/deliverables	Manuscript to be submitted to a an international journal
Dissemination of findings being addressed	in manuscript and internal presentation at IMARES
Utility of the developed products and expertise	The products may be used directly by the Dutch policymakers to design fisheries management to improve habitat quality of N2000 areas
What are the potential risks to the project's success?	There is no practical work involved, which greatly reduces potential risks.
<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Niels Hintzen (VMS), Johan Craeymeersch (benthos), Karin Troost (WOT benthos), Margriet van Asch (benthos database)


Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	
Involvement parties outside WUR (names and expertise)	
<b>Relevance</b>	
What is the market/ target audience	policy makers, NGO's, scientific world
Economical relevance	A change in management of shrimp fisheries may affect the shrimp sector.
Social relevance	The Wadden Sea is a UNESCO world heritage site and understanding of impact of human activities here is of interest to the public.
Scientific relevance	Improvement of the knowledge base of the effect of a high intensity fishery
Relevance to ministry EZ	Understanding the impacts of shrimp fishing is crucial to design management of this hitherto unmanaged fisheries, a core task of EZ.
<b>Summary (UK)</b>	The shrimp fishery is economically one of the NL most important fisheries and carried out largely in Natura2000 sites. Yet, the effect of shrimp fisheries on the benthos community has received little research attention. In this project we aim to capitalize on the information still underused in our WOT surveys to investigate the relationship between shrimp fisheries and benthos.
<b>Samenvatting (NL)</b>	De garnalenvisserij is economisch gezien een van de belangrijkste visserijen voor Nederland en opereert vooral in Natura2000 gebieden. In dit project willen we onderzoeken hoe de verspreiding van deze visserij in ruimte en tijd samenhangt met de bodemfauna. Daarbij maken we gebruik van de informatie die (nu nog steeds) verscholen ligt in onze (WOT) surveys.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	79	60	4740.00
CAT III	99	150	14850.00
CAT IV	122	150	18300.00
CAT V	143		0.00
CAT VI	172		0.00
Total Personnel	37890.00		
Material costs			
Facilities			
Specific costs			
Travel costs	200.00		
Project equipment			
Other material costs			
Total Material Costs	200.00		
Total project budget needed	38090.00		
Financing through other resources			
Finance needed from KBWOT	38090.00		

<b>Project 21</b>		<b>Seeing the forest for the trees</b>
Project leader	Jan Jaap Poos	
Theme	1. Ecosystem approach	
<b>Motivation and Project aims</b>		
Problem definition	Currently, IMARES lacks a good overview of the data that we have that can be used for informing management advice for adopting the ecosystem approach to management. As a case in point, we do not have annual overviews of the development of fishing effort by the various fisheries, or what the size distribution is of the landings and discards.	
Objective(s) of the project	Develop computer code for a standardized report with basic information about the development of the Dutch fishing fleet in terms of fishing effort, landings and discards. Once a starting point is made, we can extend the output to generate an annual report that is of use to all IMARES researchers (outside this project).	
Expertise needed	Database extraction, Sweave	
Expertise developed	ecosystem effects of fishing	
Why should this be funded by KB WOT?	making the data on Dutch fisheries more easily available (1) improves the knowledge base required for our advice, and (2) acts as an aid in quality control of our data	
What other potential funding sources have been considered?	none	
International objective of research	Once we have good annual reports, we can publish parts of those on the IMARES or CVO website, so that international research can access the data. Also, there is an international trend to work towards 'automatic report generation'. This proposal fits into this trend.	
<b>Workplan</b>		
Broad description of the project including expected results	We will develop R code that generates a standardized report of several features of the effort and catches of the Dutch fleets. Once we have this, we can make an annual report for internal use, and extend the outputs as we see fit. In addition, we can publish excerpts of the report on our websites	
Approach and time schedule	Jan-June: Develop code and extract data, publish report internally Although the work can be done within a relatively short time frame, the availability of Peter van der Kamp in the first quarter of the year may be limited. Hence the longer time frame.	
Output/deliverables	R code and internal report of key fisheries data for the Dutch fishing fleets	
Dissemination of findings being addressed	intranet, possibly internet	
Utility of the developed products and expertise	management advice	
What are the potential risks to the project's success?	Expertise is with a limited set of people (Peter van der Kamp)	
<b>Project organisation</b>		
Involvement IMARES (names and expertise)	Peter van der Kamp (database, Sweave), Adriaan Rijnsdorp (development of key fisheries indicators), Niels Hintzen (R, development of key fisheries indicators), Jan Jaap Poos (development of key fisheries indicators)	
Is the appropriate capacity available?	yes	


Involvement parties within WUR (names and expertise)	none
Involvement parties outside WUR (names and expertise)	none
<b>Relevance</b>	
What is the market/ target audience	IMARES researchers/Ministry of EZ/ICES researchers
Economical relevance	Fisheries advice
Social relevance	none
Scientific relevance	Availability of key data and the quality control of these data
Relevance to ministry EZ	Fisheries advice
<b>Summary (UK)</b>	The goal of this project is to develop computer code for a standardized report with basic information about the development of the Dutch fishing fleet in terms of fishing effort, landings and discards.
<b>Samenvatting (NL)</b>	Het doel van dit project is om computer code te ontwikkelen die een standaard rapportage maakt met informatie over de ontwikkelingen van de Nederlandse visserij in termen van visserij inspanning, aanlandingen en discards.

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79		0.00
CAT III	99	60	5940.00
CAT IV	122	20	2440.00
CAT V	143	20	2860.00
CAT VI	172		0.00
<b>Total Personnel</b>	11240.00		
<b>Material costs</b>			
Facilities			
Specific costs			
Travel costs			
Project equipment			
Other material costs			
<b>Total Material Costs</b>	0.00		
<b>Total project budget needed</b>	11240.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	11240.00		

<b>Project 22</b> 	<b>What about shrimp?</b>
Project leader	Josien Steenbergen
Theme	2. Maintaining quality
<b>Motivation and Project aims</b>	
Problem definition	<p>In the European Union the collection of discard data is enforced through the Data Collection Regulation or Framework (DCF) of the EC. To comply with this ruling, Dutch shrimp vessels have been monitored since 2008 under the WOT shrimp discard sampling programme. The methods and results of the monitoring of the brown shrimp fishery in the Netherlands and Germany for the period 2009 – 2012 are described by Steenbergen et al. (2014). This report is a first joint initiative to come with a regional harmonization of sampling of discards in the Dutch and German shrimp fisheries. Based on the results the following recommendations were made for both monitoring programmes:</p> <ol style="list-style-type: none"> <li>1. Harmonization of Dutch and German sampling programmes.</li> <li>2. Protocol on board needs to be optimized. There is need for a better estimation of different catch fractions and improvements in measuring benthos weight.</li> <li>3. Profound methodologies to raise shrimp discard data to fleet level need to be found.</li> </ol>
Objective(s) of the project	The main objective of this project is to further improve the WOT shrimp discard sampling programme. We will tackle the recommendations that have been made by Steenbergen et al. (2014) (see problem definition).
Expertise needed	Field work, data analyses (collected data and VMS/logbook data)
Expertise developed	Raising procedure for shrimp fisheries.
Why should this be funded by KB WOT?	This project concerns optimization of the WOT shrimp discard sampling programme that is carried out under the DCF. Furthermore, raised shrimp discard data (fleet level) can be used by STECF.
What other potential funding sources have been considered?	WOT shrimp discard sampling programme. However, this project does not have enough budget to further optimize the sampling programme.
International objective of research	Regional harmonization of sampling programmes.
<b>Workplan</b>	
Broad description of the project including expected results	<p>Within this project a number of activities will be carried, namely:</p> <ol style="list-style-type: none"> <li>1. Comparison of the Dutch and German sampling methods. In order to do so, both methods could be implemented simultaneously on-board one vessel, after which (dis)advantages of both methods will be discussed.</li> <li>2. Improving our sampling protocol. We will need to find a method to estimate benthic organisms more precisely. Furthermore, we will analyse what the possibilities are in better estimating the different shrimp fractions after the first and second sieving process. In order to do so we need to sample trips in addition to the trips that are currently being conducted under the WOT shrimp discard sampling programme.</li> <li>3. We will use logbook/VMS data and the discard data of the last 2 years to find a sound method to raise the discard data to fleet level. In order to do so we first need to raise the data from sample to haul level. This will be done in close collaboration with our German colleagues.</li> </ol>


Approach and time schedule	<p>Q1: Bi-lateral meeting on approach with Ti in Germany to discuss plan of action, include weighting benthic species and measuring shrimp fractions in protocol, implement first trip(s).</p> <p>Q1,Q2: Compare German and Dutch raising method, make proposal to raise discard data to fleet level and discuss this in WGCRAN.</p> <p>Q2,Q3,Q4: Implement trips, analyse shrimp fractions, prepare report for years 2013 and 2014 (this is partly covered by WOT ship discard sampling programme).</p> <p>Q4: Reconsider sampling protocol in agreement with Germany.</p>
Output/deliverables	<p>Revised protocol, that is in agreement with Ti in Germany, for monitoring discarding on board shrimp vessels.</p> <p>Report of shrimp discards in 2013 and 2014 including data raised to fleet level.</p>
Dissemination of findings being addressed	<p>WOT team in IMARES</p> <p>WGCRAN in May 2014</p>
Utility of the developed products and expertise	A revised protocol that can be used in future monitoring. Raised data for STECF and maybe in (future) assessments.
What are the potential risks to the project's success?	<p>Incomplete logbook data.</p> <p>As this project will be carried out in close cooperation with our German counterpart, a risk may be that they lose interest in cooperation.</p>
<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Josien Steenbergen (project leader), Karin van der Reijden (data analyses and VMS), Michiel Dammers (data collection)
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	none
Involvement parties outside WUR (names and expertise)	Jens Ulleweit, Kay Panten (Ti)
<b>Relevance</b>	
What is the market/ target audience	Ministry EZ, ICES WGCRAN and shrimp industry
Economical relevance	Raised shrimp discard data that can be used by STECF and maybe in (future) assessments.
Social relevance	None
Scientific relevance	This project will provide raised shrimp discard data.
Relevance to ministry EZ	Improvement in shrimp discard sampling programme, raised shrimp discard data.
<b>Summary (UK)</b>	<p>Since 2008 brown shrimp discard data is collected on-board commercial shrimp vessels. Analysis of the Dutch and German data show that improvements are needed. Within this project a number of activities will be carried out to further improve data collection and data analysis.</p>
<b>Samenvatting (NL)</b>	<p>Nederland is in 2008 gestart met een monitoringsprogramma naar ongewenste bijvangsten aan boord van schepen die vissen op Noordzeegarnaal. Recente analyses van de Nederlandse en Duitse gegevens laten zien dat er ruimte is voor verbetering binnen dit monitoringsprogramma. In dit project zullen een aantal activiteiten uitgevoerd worden die bij zullen dragen aan een verbetering in data verzameling en data analyse van het monitoringsprogramma.</p>

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79	160	12640.00
CAT III	99	140	13860.00
CAT IV	122		0.00
CAT V	143		0.00
CAT VI	172		0.00
<b>Total Personnel</b>	26500.00		
<b>Material costs</b>			
Facilities			
Specific costs			
Travel costs	1000.00		
Project equipment			
Other material costs			
<b>Total Material Costs</b>	1000.00		
<b>Total project budget needed</b>	27500.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	27500.00		

<b>Project 23</b>		<b>RAP (Rays and Pulse)</b>
Project leader	Harriet van Overzee	
Theme	1. Ecosystem approach	
<b>Motivation and Project aims</b>		
Problem definition	<p>Fisheries on rays (and skates) in the North Sea have been managed under a common TAC since 1999. This TAC has been gradually reduced and has become more restrictive for the Dutch fisheries in recent years. It is, however, uncertain whether the restrictive TAC has actually resulted in a reduction in ray catches or whether the fishery has been discarding their over-quota catch.</p> <p>There are strong indications that the transition of the Dutch flatfish fishery from the tickler chain beam trawl to the pulse trawl has resulted in a shift in fishing effort towards the core distribution area of rays, namely the south-western North Sea. This transition in fishing area may potentially increase the (over-quota) catch of rays in the Dutch demersal fishery.</p>	
Objective(s) of the project	<p>The aim of this project is to investigate whether the recent shift by the Dutch beam trawl fishery, from tickler chains to pulse, has resulted in a change in level and distribution of fishing effort and estimate whether this, in turn, has resulted in a change in fishing pressure on rays. In addition, the weekly landings of rays by vessel will be studied in relation to management measures (e.g. landing quota by trip) and compared to possible encounter rate (estimated from survey information) in order to test whether vessels move on when their weekly quota has been reached. It should be noted that this study will most likely focus on a single ray species (e.g. thornback ray).</p>	
Expertise needed	<p>Knowledge on rays &amp; skates biology, distribution and fisheries.</p> <p>Knowledge on distribution of fisheries and fisheries behaviour.</p>	
Expertise developed	<p>Spatial analysis to combine fishing behaviour with landing and survey information on species that are difficult to track solely with landings data.</p>	
Why should this be funded by KB WOT?	<p>As rays are often considered indicators of a healthy ecosystem, being long-lived late maturing species that are vulnerable for fishing mortality, they play a key role in the ecosystem approach to fisheries management. The recent shift of the Dutch fishing fleet may however jeopardize their survival. The knowledge base on the effects of changing fishing behaviour on this part of the ecosystem is not well known, and IMARES therefore lacks the ability to appropriately advice the ministry on the potential ecosystem effects of the pulse fishery.</p>	
What other potential funding sources have been considered?	<p>Science hours (in case project is granted, both Harriet and Niels will contribute 40 hours each to the project from the science hours they receive because of publishing a first-author paper in 2014).</p>	
International objective of research	<p>Presenting potential ecosystem effects of changes in fishing gear / behaviour.</p>	
<b>Workplan</b>		
Broad description of the project including expected results	<p>Identifying the areas where rays are being caught, compared to the areas the beam trawl fishery operated before and after introduction pulse gear.</p> <p>Investigate whether a potential increase in spatial overlap between rays and the fishery has resulted in a change in fishing pressure on rays.</p> <p>Investigate whether it is possible to detect move on behaviour (by fisheries).</p> <p>Determine encounter rate of rays based on survey information.</p>	
Approach and time schedule	<p>Q1: Collection and preparation of relevant data. Q2: Combine landings, fisheries distribution and survey information. Q3: Calculate fishing intensity and overlap. Q4: Discussion of results.</p>	
Output/deliverables	<p>Draft manuscript</p>	


Dissemination of findings being addressed	Presentation of preliminary results at ICES WGEF. Presentation at international conference (Biology, Ecology and conservation of Elasmobranchs, not covered by budget KBWOT).
Utility of the developed products and expertise	The product may be used in discussions on spatial management of the Dutch fishing fleet, the implementation of the ecosystem approach and fisheries behaviour studies.
What are the potential risks to the project's success?	Due to the quota being restricted, signals in landings may not be significant, similarly to impacts of pulse on this long-living species given the relatively short period in which the pulse has been in operation.
<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Harriet van Overzee, Niels Hintzen, Adriaan Rijnsdorp
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	None
Involvement parties outside WUR (names and expertise)	None
<b>Relevance</b>	
What is the market/ target audience	Ministry of EZ, NGOs, society
Economical relevance	High: Depending on the results the spatial distribution of the pulse fishery may be limited/managed which may potentially have high economic impact. Furthermore, the interaction of pulse and rays can be of importance in discussions on whether the pulse will be permitted by the EU as fishing gear.
Social relevance	High: Discussions on the wellbeing of rays and skates and the pulse fishery are hot topics in societal debates. Results will provide scientific input.
Scientific relevance	High: Publications on effects of pulse fishery are limited, especially linking ecosystem functioning to fishing practices.
Relevance to ministry EZ	High: Knowledge on appropriate management of rays, the ecosystem approach
Summary (UK)	There are strong indications that the recent shift in the Dutch beam trawl fishery, from tickler chains to pulse, has resulted in a shift in fishing effort towards the core distribution area of rays, the south-western North Sea. This project aims to link knowledge on rays and skates to the impact of pulse fisheries. The results contribute to the discussion on appropriate management of rays and skates and to the implementation of the ecosystem approach.
Samenvatting (NL)	De recente verandering in de Nederlandse bodemvisserij van wekkerkettingen naar pulstuig heeft als gevolg dat de visserij verschoven is naar gebieden waar roggen vaker voorkomen, namelijk de zuidwestelijke Noordzee. In deze studie wordt de kennis van roggen gekoppeld aan de kennis van de pulsvisserij en de mogelijke effecten van deze visserij op de roggenpopulaties. Het project presenteert waardevolle kennis over het beheer van roggen en draagt bij aan de implementatie van de ecosysteem benadering.

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79		0.00
CAT III	99	230	22770.00
CAT IV	122		0.00
CAT V	143	30	4290.00
CAT VI	172		0.00
<b>Total Personnel</b>	27060.00		
<b>Material costs</b>			
Facilities			
Specific costs			
Travel costs	50.00		
Project equipment			
Other material costs			
<b>Total Material Costs</b>	50.00		
<b>Total project budget needed</b>	27110.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	27110.00		

<b>Project 24</b> 	<b>Silver eel migration in Lake IJssel area: just go with the flow?</b>
Project leader	1. Ben Griffioen
Theme	1. Ecosystem approach
<b>Motivation and Project aims</b>	
Problem definition	In 2013 IMARES was asked to evaluate and to give a list of migratory barriers for silver eel escapement in the Netherlands. IMARES created a framework based on the 'yellow eel model' with additional information to give such a list, though there were many knowledge gaps. Many assumptions on fish behaviour and other factors were made. The framework was well built but further research is needed to fill in knowledge gaps and verify assumptions especially on eel behaviour.
Objective(s) of the project	To gain knowledge on silver eel escapement and behavioural patterns in the lake IJssel area in order to get a better evaluation of silver mortality rates.
Expertise needed	Fish behaviour, data analysis, telemetry technique
Expertise developed	a better understanding of silver eel behaviour
Why should this be funded by KB WOT?	Fish behaviour is generally misunderstood and a lot of knowledge is lacking. This study will contribute to a better understanding of silver eel escapement out of the two major lakes in the Netherlands.
What other potential funding sources have been considered?	RWS in combination with water boards
International objective of research	The decline of the eel stock is an international problem. A better understanding of silver eel escapement and behavioural patterns will contribute to a more knowledge based model than it is now.
<b>Workplan</b>	
Broad description of the project including expected results	A VEMCO telemetry network (V2RW) will be made in Lake Markermeer, IJsselmeer and the Noordzeekanaal at the different escapement routes and different kinds of bottlenecks. 50 silver eels will be surgically implanted with V7 VEMCO transmitters to follow their escapement out of the lake. The results of the project will give information of individual behavioural patterns of silver eels escaping from the Markermeer. It will give information on the usage of ship locks, discharge sluices and fish ways.
Approach and time schedule	JUL - AUG: buy material (transmitter), ask for permission to install VEMCO network (waterwet / RWS), arrange permission to use silver eels for experiments, and arrange permits for fishermen to catch eels in restricted period. SEP - OKT: install network of VEMCO receivers, catch eels and implant them with transmitters. NOV - DEC: retrieve receivers, data analysis and writing report (paper)
Output/deliverables	peer reviewed paper
Dissemination of findings being addressed	peer reviewed paper, conference presentations
Utility of the developed products and expertise	Knowledge based usage of the yellow eel model. Results would raise and conform the status of IMARES in fish behaviour research. A lot of studies in the Netherlands are lacking behavioural information on silver eel escapement.
What are the potential risks to the project's success?	permission of installing the VEMCO network, permission to use eels for this study, technical problems


<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Olvin van Keeken (VEMCO, fish behaviour, data analysis) Erwin Winter (VEMCO, fish behaviour, data analysis) Ben Griffioen (VEMCO, fish behaviour, data analysis) Martin de Graaf (fish behaviour, yellow eel model knowledge)
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	
Involvement parties outside WUR (names and expertise)	Henk Timmer (Fisherman)
<b>Relevance</b>	
What is the market/ target audience	Water boards, RWS, EZ
Economical relevance	To emphasize the usage of the yellow eel model
Social relevance	
Scientific relevance	To increase knowledge on fish behaviour during migration
Relevance to ministry EZ	To evaluate and potentially adjust ranking of silver eel escapement bottlenecks
<b>Summary (UK)</b>	The yellow eel model which is created by IMARES is a good tool for evaluation of silver eel mortality estimations. However knowledge on behavioural patterns is generally lacking. In 2013 IMARES was asked to evaluate and to give a list of migratory barriers for silver eel escapement in the Netherlands. A framework based on the yellow eel model was created to give a ranking in migratory bottlenecks (pumping stations etc.) The framework is well built but further research is needed to fill knowledge gaps and verify assumptions especially on fish behaviour. A telemetry study will help to fill in parts of the knowledge gaps on behavioural patterns during the migration period of silver eel.
<b>Samenvatting (NL)</b>	Het rode aal model dat is ontwikkeld door IMARES is een goede tool voor de evaluatie van schieraal sterfte schattingen. Echter specifieke kennis gedrag ontbreekt veelal. In 2013 werd IMARES gevraagd om een lijst op te stellen van knelpunten voor uittrekkende schieraal. Er werd een raamwerk ontwikkeld op basis van de rode aal model om een rangorde te maken in knelpunten voor schieraal in Nederland. Het raamwerk is goed gebouwd, alleen is er verder onderzoek nodig om de kennis hiaten op te vullen en te controleren of de aannames correct zijn gemaakt. Een telemetrie studie zal helpen bij het ophelderen van kennis lacunes over gedragspatronen tijdens de migratieperiode van schieraal.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	79		0.00
CAT III	99	168	16632.00
CAT IV	122		0.00
CAT V	143		0.00
CAT VI	172		0.00
Total Personnel	16632.00		
Material costs			
Facilities			
Specific costs	6000		
Travel costs	400		
Project equipment	15000		
Other material costs	200		
Total Material Costs	21600.00		
Total project budget needed	38232.00		
Financing through other resources			
Finance needed from KBWOT	38232.00		

<b>Project 25</b>		<b>Glass eel management measures: the end of the glass eel index?</b>
Project leader	1. Ben Griffioen	
Theme	1. Ecosystem approach	
<b>Motivation and Project aims</b>		
Problem definition	In the near future several migration facilities will be build or implemented at the discharge sluices and the ship locks at the Afsluitdijk (fish passage and fish friendly discharge sluice management). Glass eel has been monitored at the discharge sluices at Den Oever each year since 1938. This is one of the longest data series of monitoring in the Netherlands, but what does it really tell us if management measures are implemented? The realization of migration facilities will possibly negatively affect the index since migratory delay and residence time in front of the ship locks will be less due to the management measures.	
Objective(s) of the project	To get insight in spatial dynamics and behavioural patterns of glass eels related to tidal differences in front of the ship locks and discharge sluices	
Expertise needed	Fish behaviour, data analysis	
Expertise developed	Knowledge on glass eel behaviour in front of ship locks and discharge sluices and the relation to the glass eel index.	
Why should this be funded by KB WOT?	The glass eel index (WOT) is important to evaluate the glass eel abundance along the Dutch coast and is used for many other purposes including the eel management plan evaluation from the government.	
What other potential funding sources have been considered?	DUPAN, RWS	
International objective of research	-	
<b>Workplan</b>		
Broad description of the project including expected results	It is proposed to use group dyeing to evaluate glass eels spatial dynamics and to evaluate if the newly installed fish passage will potentially give an underestimation of the glass eel index. Secondly additional sampling within the WOT monitoring glass eel program will give insight if the implementation of the management measures (fish friendly sluice management) will negatively affect the glass eel index.	
Approach and time schedule	FEB- MAY: catch and release glass eels after group dyeing. Recapture will be done using a fixed grid using liftnets and a small boat. MARCH-APR: extend the current monitoring program to evaluate the use of selective tidal transport and relate data to fish friendly sluice management. JUN-JULY: data analysis and writing	
Output/deliverables	peer reviewed paper or report	
Dissemination of findings being addressed	paper, presentations	
Utility of the developed products and expertise	To evaluate the effect of the management measures on the glass eel index and to explore a correction factor for the index.	
What are the potential risks to the project's success?	Technical problems, bad weather conditions (risks when recapture glass eels), abundance of glass eel may be too few.	


<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Olvin van Keeken (monitoring, field work, fish biology) Erwin Winter (Fish biology) Betty van Os (monitoring) Anneke Rippen (index monitoring coordinator) Martin de Graaf (Fish biology) Ben Griffioen (Fish biology)
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	
Involvement parties outside WUR (names and expertise)	Bauke de Witte (RWS)
<b>Relevance</b>	
What is the market/ target audience	EZ, RWS, fisheries, WGEEL
Economical relevance	Maintaining use of the monitoring programme
Social relevance	
Scientific relevance	Behavioural patterns of glass eel in front of tidal barriers.
Relevance to ministry EZ	the effect of management measures on a WOT monitoring program
<b>Summary (UK)</b>	In the near future several migration facilities will be build or implemented at the discharge sluices at the Afsluitdijk. Glass eel has been monitored at the discharge sluices at Den Oever each year since 1938. And the management measures will potentially negatively affect the glass eel index. A study on spatial dynamics and behavioural patterns is needed in order to evaluate how these measures will affect the index.
<b>Samenvatting (NL)</b>	In de nabije toekomst zullen meerdere migratie faciliteiten in werking worden gesteld. Glasaal wordt sinds 1938 gemonitord bij de spuisluisen van Den Oever. De maatregelen zullen mogelijk negatieve effecten hebben op de glasaal index. Een studie naar de ruimtelijke verspreidings dynamiek en gedragspatronen is nodig om na te gaan hoe deze maatregelen de index zullen beïnvloeden.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	79	120	9480.00
CAT III	99	200	19800.00
CAT IV	122		0.00
CAT V	143		0.00
CAT VI	172		0.00
Total Personnel	29280.00		
Material costs			
Facilities			
Specific costs			
Travel costs	1000.00		
Project equipment	200.00		
Other material costs	7000.00		
Total Material Costs	8200.00		
Total project budget needed	37480.00		
Financing through other resources			
Finance needed from KBWOT	37480.00		

<b>Project 26</b>		<b>Validation of discard data from the Dutch selfsampling program</b>
Project leader	Verkempynck R.	
Theme	1. Ecosystem approach	
<b>Motivation and Project aims</b>		
Problem definition	<p>Within the new CFP discards and the practice of discarding at sea will become legally forbidden under a landings obligation (LO). This LO will have serious implications for the collection of discards data. At the moment discards data in the Dutch demersal fishery is mainly collected through a self sampling programme. Discard sampling programmes entail a number of difficulties that jeopardize the quality and validation of the data produced and the uses they are intended for. Additionally, it will be increasingly important to standardise the methods and data collection of discards with other member states (MS) around the North Sea (NS) under the new CFP. It is therefore important to develop thorough quality check and validation procedures for the Dutch demersal discard data programme. The sampling protocol needs to be as simple as possible and the collection of the information should not be too time consuming. While the Dutch self-sampling programmes reaches a much higher coverage when it comes to getting data from a large number of vessels, there is needs to be control over the vessel selection, which may otherwise be highly biased, and may not correspond with a sampling stratum. Additionally, potential bias can arise from the motivation of demonstrating "good" or hiding "bad" discard practices. And finally, data quality may be limited by insufficient fishers' training. Moreover discard data collected by fishers should be validated by cross-check against discard data from a dedicated observer programme and unmatched samples. However, under the LO it will be increasingly difficult to safeguard the scientific role of the sea-going observers.</p>	
Objective(s) of the project	Develop solid data quality and validation guidelines for the Dutch demersal discard collection for implementation under the CFP landings obligation.	
Expertise needed	Practical implementation of (catch and) discards sampling plans, Statistics	
Expertise developed	Guidelines and methods for quality checks and validation of discard data	
Why should this be funded by KB WOT?	Under the LO many uncertainties are expected. The need for developing solid data collection programs is therefore of great importance. Additionally, providing good guidelines for developing high quality and validated data programmes as a tool for standardising data collection with MS around the NS will lead to an increasingly efficient deployment of resources.	
What other potential funding sources have been considered?	None	
International objective of research	Design and development of sound catch monitoring programs. Standardisation of these programmes specifically within the MS around the NS and further abroad.	
<b>Workplan</b>		
Broad description of the project including expected results	<p>From analysis of past discard data (2011-2014), both from self-sampling as from observer-programme, quality check and validation methods will be developed. In light of the possible recommendations formulated based on the analysis, adjustments will be proposed for the Dutch demersal discard programme. Based on the findings and reporting on a national level, other MS around the NS with (quasi) similar fisheries will be approached (e.g. Belgium) for the development of a standardised discard data collection framework.</p>	


Approach and time schedule	Jan-Feb: Analysis of past discard data (2011-2014), both from self-sampling as from observer-programme. Feb-Mar: Develop statistical analysis (quality check and validation) of past data and identify possible adjustments and hiatuses in programme. Apr-May-June: Review sampling protocol together with sea-going observer and fishermen. Review Dutch discard reference fleet based on sampling stratum. May-June: Develop and incorporate bias indicators into sampling protocol. Train fishermen the sampling protocol. June/July: Reconsider observer programme possibilities. July/August: Write report with guidelines. Contact other fisheries institutions and discuss results. August/September: Write paper on newly developed methods for validation of Dutch self-sampling programme.
Output/deliverables	- Validation and quality check guidelines for discards data collection - Paper on newly developed validation methods within Dutch selfsampling programme
Dissemination of findings being addressed	ICES Journal of Marine Science, Fisheries Research Journal, (Inter)national report
Utility of the developed products and expertise	Discard data collection is a compulsory task under the CFP, guidelines will streamline the data collection under the MS around the NS. Additionally, validated data provide a solid basis for stock assessments, etc.
What are the potential risks to the project's success?	NA
<b>Project organisation</b>	
Involvement IMARES (names and expertise)	van der Reijden Karen (data-analysis), Verkempynck Ruben (data-analysis), van Helmond Edwin (data-analysis), Chen Chun (statistics)
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	NA
Involvement parties outside WUR (names and expertise)	Uhlmann Sebastian, ILVO, ICES, WGCatch, SGPIDS
<b>Relevance</b>	
What is the market/ target audience	WOT discard programme
Economical relevance	Sound numbers dealing with discards, efficient use and deployment of sea-going observers
Social relevance	Sound numbers detailing the complexity of discarding practices
Scientific relevance	Validation of discards data for stock assessments
Relevance to ministry EZ	More comprehensible and efficient use of WOT-funding.
<b>Summary (UK)</b>	This project aims to develop standardised methods for quality check and validation of discard data collection.
<b>Samenvatting (NL)</b>	Dit project beoogt gestandaardiseerde methodes te ontwikkelen voor data kwaliteit en validatie van bijvangst data collectie.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	79		0.00
CAT III	99	288	28512.00
CAT IV	122	24	2928.00
CAT V	143		0.00
CAT VI	172		0.00
Total Personnel	31440.00		
Material costs			
Facilities			
Specific costs			
Travel costs	2000.00		
Project equipment			
Other material costs			
Total Material Costs	2000.00		
Total project budget needed	33440.00		
Financing through other resources			
Finance needed from KBWOT	33440.00		

<b>Project 27</b>		<b>MSMAC: Maturity staging of mackerel and horse mackerel</b>
Project leader	Cindy van Damme	
Theme	2. Maintaining Quality	
<b>Motivation and Project aims</b>		
Problem definition	<p>The maturity stage is an important biological parameter to be used in the calculation of maturity ogives (and therefore of Spawning Stock Biomass), for the definition of the spawning season of a species, for the monitoring of long-term changes in the spawning cycle, and for many other research needs regarding the biology of fish. IMARES is obliged to participate in multiple ICES coordinated international WOT surveys, commercial and discard sampling. For these different samplings we are required to deliver data on sexual maturity stage, including mackerel and horse mackerel.</p> <p>In 2015 the ICES workshop on sexual maturity staging of mackerel and horse mackerel (WKMSMAC2) will be organised. Cindy van Damme (IMARES) is one of the co-chairs of the workshop. At the maturity workshop the macroscopic staging is validated with microscopic identification, so participants know immediately if their macroscopic staging is correct. During the mackerel egg survey in 2015 we will take pictures and collect histological samples from fresh mackerel gonads. This sampling can go along with the standard sampling needed for the survey.</p> <p>However, most of the mackerel and horse mackerel maturity staging is done from frozen gonads. Picture taking of the gonads is not part of the standard protocol during the commercial sampling. (It is not possible to prepare histological sections from frozen gonads.)</p> <p>Netherlands, Germany, Scotland, Norway, Spain, Portugal, Italy and Greece will be collecting fresh and frozen samples for the workshop ensuring a good coverage of the North East Atlantic in time and space.</p>	
Objective(s) of the project	To collect pictures of gonads and macroscopic maturity stages from frozen mackerel and horse mackerel from the commercial sampling. In order to ensure quality control and maintenance of the standard of maturity staging of mackerel and horse mackerel.	
Expertise needed	Maturity staging and picture taking	
Expertise developed	Quality control of maturity staging of mackerel and horse mackerel	
Why should this be funded by KB WOT?	Maturity staging is core to the data collected in the WOT routine samplings.	
What other potential funding sources have been considered?	None	
International objective of research	The surveys and samplings during which IMARES is obliged to carry out the maturity staging are ICES coordinated international samplings.	
<b>Workplan</b>		
Broad description of the project including expected results	During the IMARES commercial sampling macroscopic maturity stage is determined and pictures of the gonads inside and outside the fish will be taken. Pictures will be uploaded to WebGr and used during the workshop.	
Approach and time schedule	During the commercial sampling from January - beginning September gonad pictures will be taken. The workshop will take place end of September.	
Output/deliverables	Pictures and macroscopic maturity stage of mackerel and horse mackerel taken during the commercial sampling. Pictures will be uploaded to WebGr.	
Dissemination of findings being addressed	The workshop on sexual maturity staging of mackerel and horse mackerel is an ICES coordinated international workshop. Results of the workshop will be published in an ICES report.	


Utility of the developed products and expertise	Maturity staging is core to the data collected in the various WOT data collections.
What are the potential risks to the project's success?	None, commercial sampling of mackerel and horse mackerel is planned in 2015.
<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Ineke Pennock, Ruben Hoek (picture taking), Sieto Verver (project leader commercial sampling and photographing expertise)
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	None
Involvement parties outside WUR (names and expertise)	The workshop on sexual maturity staging of mackerel and horse mackerel is an international ICES coordinated workshop. At least 13 European institutes are involved in the collection of samples and will participate in the workshop.
<b>Relevance</b>	
What is the market/target audience	ICES and institutes involved in routine taking of maturity staging of mackerel and horse mackerel. Those involved in the assessment of mackerel and horse mackerel.
Economical relevance	Mackerel and horse mackerel are important commercial stocks.
Social relevance	Mackerel and horse mackerel are important commercial stocks.
Scientific relevance	Maturity staging is core to the various WOT samplings.
Relevance to ministry EZ	Maturity stage is an important parameter for the calculation of maturity ogives and determination of spawning season. This information is vital for good assessments of stocks.
<b>Summary (UK)</b>	<p>The maturity stage is an important biological parameter to be used in the assessment of SSB of fish stocks. IMARES is obliged to participate in multiple ICES coordinated international WOT surveys as well as commercial and discard sampling of the catches. For these different sampling projects we are required to deliver data on sexual maturity stage, including mackerel and horse mackerel.</p> <p>In 2015 an ICES coordinated sexual maturity staging workshop for mackerel and horse mackerel will be organised to standardize and calibrate maturity staging. For the workshop it is necessary to collect pictures and maturity staging of mackerel and horse mackerel over the entire range of the species. IMARES will collect pictures and samples during the WOT surveys and commercial sampling.</p>
<b>Samenvatting (NL)</b>	<p>Maturity (geslachtsrijpheid) bepaling is een belangrijke parameter voor het schatten van de omvang van volwassen visbestanden. IMARES moet voor de WOT taken deelnemen aan ICES gecoördineerde surveys, markt en bijvangst monitoringen. Voor deze bemonsteringen moet de maturity van makreel en horsmakreel bepaald worden.</p> <p>In 2015 wordt er een ICES gecoördineerde workshop over maturity bepaling van makreel en horsmakreel georganiseerd voor de standaardisatie en kalibratie van maturity bepalingen. Het is belangrijk dat voor de workshop foto's en maturity bepaling van het gehele verspreidingsgebied van makreel en horsmakreel beschikbaar zijn. IMARES verzamelt foto's en data tijdens de WOT surveys en markt monitoring.</p>

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79	80	6320.00
CAT III	99	30	2970.00
CAT IV	122		0.00
CAT V	143		0.00
CAT VI	172		0.00
<b>Total Personnel</b>	€9,290.00		
<b>Material costs</b>			
Facilities			
Specific costs			
Travel costs			
Project equipment			
Other material costs	300.00		
<b>Total Material Costs</b>	300.00		
<b>Total project budget needed</b>	9590.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	9590.00		

<b>Project 28</b>		<b>SPI-FISH: Benthic impacts of fishing trawls</b>
Project leader	Lorna Teal	
Theme	1. Ecosystem Approach	
<b>Motivation and Project aims</b>		
Problem definition	<p>The debate on effects of trawling gear on benthic ecosystems remains a hotly debated topic. Impacts are context-dependant and not simply described. BACI field studies assessing direct mortality of gears on benthic organisms are unlikely to give the full picture. A holistic approach is needed to assess system-level effects. Bioturbation plays an important role for the marine ecosystem as it contributes significantly to sediment biogeochemical cycling and influences the magnitude of benthic nutrient fluxes, carbon and nutrient regeneration to the water column. The relationship between bioturbation and biogeochemical cycling is strongly affected by physical disturbance such as trawling. Understanding the mechanisms by which trawling impacts on sediment function is vital to maintaining seafloor integrity and underpinning an ecosystem approach to fisheries management.</p>	
Objective(s) of the project	<p>The objective is to develop and assess the use of sediment profile imaging (SPI) as a tool for studying trawl impacts and establish the effects of trawling on the sediment mixing depth (MDI; Teal et al. 2010). MDI serves as a proxy for sediment function (carbon and nutrient cycles). An increase/decrease in sediment mixing depth can be associated with an increase/decrease in the magnitude of benthic nutrient fluxes/carbon cycling. Specifically the project aims to:</p> <ol style="list-style-type: none"> <li>1) develop image analysis software for objective and quantitative assessment of sediment profile images</li> <li>2) describe and compare acute effects of three gears (beam, pulse, shrimp) on the MDI at two contrasting sites</li> <li>3) combine SPI results with benthic sampling and multi beam data for a more complete picture of the impacts and to assess the use of SPI as a rapid assessment tool of seabed function (useful for MSFD).</li> </ol>	
Expertise needed	Sediment Profile Imaging, Image analysis, benthic ecology	
Expertise developed	New software tools, holistic understanding of trawl impacts	
Why should this be funded by KB WOT?	<p>SPI is a rapid and effective seafloor assessment tool which can aid measurements of seafloor function (useful for seafloor integrity assessment under MSFD). It is a novel innovative tool which has gained much interest across sectors in recent years. The expertise developed can further underpin an ecosystem approach to fisheries management through better understanding of context-dependant trawl effects. The project also provides a series of valuable links between on-going international work such as e.g. the BENTHIS or Effects of shrimp fisheries in Natura2000 areas projects.</p>	
What other potential funding sources have been considered?	BENTHIS	
International objective of research	<p>Impacts of fishing gear on benthic communities are a hot topic which concerns trawling activities across the globe. The use of SPI in combination with more traditional sampling techniques is a novel approach to gain a better understanding of such impacts on the seabed and makes this project interesting for an international audience.</p>	


<b>Workplan</b>	
Broad description of the project including expected results	The first step is to develop image analysis software for objective and numerical assessment of SPI images. Using this software available images from two BENTHIS field campaigns will be analysed. New images will be collected on an ILVO campaign in June 2015. Combining all SPI data together with all other data collated on-board the field campaigns will allow a holistic analysis of the effects on the benthic system to be undertaken which will provide novel insights into trawl impacts.
Approach and time schedule	Step 1) Develop image analysis software in ImageJ - quarter 1 Step 2) Analyse images from BENTHIS field campaign 2013/2014, ILVO field campaign 2015 - quarter 2 Step 3) Combine results of SPI with other data collected (benthic sledge data, boxcore, sediment data, multibeam) for comparison of effects across contrasting sites and different gears - quarter 3 4) manuscript for peer-reviewed journal, article Visserijnieuws - quarter 4
Output/deliverables	SPI analysis software
Dissemination of findings being addressed	Peer-reviewed publication Article in Visserijnieuws Contribution to BENTHIS report
Utility of the developed products and expertise	The image analysis software will give IMARES unique expertise for analysing SPI images. The insights gained will strengthen IMARES expertise in the debate on trawl impacts.
What are the potential risks to the project's success?	With software development, especially in a complicated field as image analysis, there is always a risk unforeseen problems and delays. The image analysis expertise is with a limited set of people (Daniel Benden).
<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Daniel Benden (software development ImageJ) , Adriaan Rijnsdorp (ecology)
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	NA
Involvement parties outside WUR (names and expertise)	Bart Vanelslander (ILVO, ecologist), Jochen Depestele (ILVO, ecology, multibeam), Silvana Birchenough (Cefas, SPI and MSFD)
<b>Relevance</b>	
What is the market/ target audience	Science and Policymakers, fishing gear technologists, fishing sector
Economical relevance	NA
Social relevance	New insights to feed debate on trawl impacts on the ecosystem
Scientific relevance	New, more holistic, knowledge on context-dependant trawl impacts
Relevance to ministry EZ	New insights for debate on trawl impacts and relevance of new gears (pulse)
<b>Summary (UK)</b>	Effects of trawling on the benthic ecosystem are complex and a multi-disciplinary approach is required for field studies. SPI is an innovative way to measure impacts and can add new insights into the debate on trawl impacts.
<b>Samenvatting (NL)</b>	De effecten van bodemvisserij op de benthische ecosystemen zijn complex en de studie hiervan vergt een multidisciplinaire aanpak. SPI is een nieuwe innovatieve methode om effecten van bodemvisserij te meten. Deze methode kan nieuwe inzichten opleveren die een waardevolle bijdrage kunnen zijn aan het debat over de gevolgen van bodemvisserij.

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79		0.00
CAT III	99	300	29700.00
CAT IV	122		0.00
CAT V	143		0.00
CAT VI	172		0.00
<b>Total Personnel</b>	29700.00		
<b>Material costs</b>			
Facilities			
Specific costs			
Travel costs	1000.00		
Project equipment	500.00		
Other material costs			
<b>Total Material Costs</b>	1500.00		
<b>Total project budget needed</b>	31200.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	31200.00		

<b>Project 29</b>		<b>The influence of invasive goby species on the decline of commercial fish species in Lake IJssel</b>
Project leader		Nicola Tien
Theme		1. Ecosystem Approach
<b>Motivation and Project aims</b>		
Problem definition		The rapid and steep invasion of goby species in the Dutch fresh water systems since 2003 might cause significant competition with and predation on the local commercially exploited fish species, as also voiced by a diversity of stakeholders. The management of the commercial species in the lake IJssel is currently based on a data-limited fisheries approach only. However, if the decline of commercial species is significantly exasperated by the interaction with these exotics, this should be taken into account in the management of these stocks. So far, almost no research has been done on the subject.
Objective(s) of the project		The spatial and temporal invasion of several goby species in the lake IJssel can be tracked in detail in the survey data, from the beginning of the invasion onwards. The objective of this study will be to investigate whether local increases in goby presence influences the fish composition through time and space. Are commercial species affected by the settlement of goby species, and to which degree?
Expertise needed		Knowledge of the lake IJssel ecosystem, the ecology of the goby species and the commercial species, fresh water surveys, quantitative analysis and statistics.
Expertise developed		Knowledge on the causes of the decline in commercial fish species. Knowledge on the lake IJssel ecosystem in general.
Why should this be funded by KB WOT?		Since a few years, the government is focussed on effective management of pikeperch, perch, bream and roach and the lake IJssel/Marker in general. The main criticism of stakeholders on the fisheries management focusses on the lack of knowledge on the underlying causes of the decline in the stocks. Fundamental research on the ecological processes underlying stock dynamics will aid our future research and advice regarding lake IJssel fisheries and strengthen our role as expertise centre for all stakeholder parties.
What other potential funding sources have been considered?		BO/WOT projects concerning the fresh water survey data and stock assessment.
International objective of research		It would aid knowledge on the effect of invasive species on commercial fish stocks in fresh water systems.
<b>Workplan</b>		
Broad description of the project including expected results		Healthy fish stocks are a requirement under GES and similar fresh water legislation. Understanding how to achieve healthy stock levels is crucial. One aspect of this is understanding the causes behind stock dynamics. Do upcoming invasive species have an influence on a stock, also in relation to the influence of the fisheries. Two main questions will be addressed: (i) is the presence of goby species in a haul correlated with changes in the presence of other species? (ii) is the presence of goby species correlated with lower fitness (i.e., weight at length) of other species in a haul? The second question could give insight into the role of competition specifically (more competition->lower weight at length). Results: Information on which commercial stocks are hindered by the invasion of exotic goby species.


Approach and time schedule	(i) Analysis of data series of the surveys on the lake IJssel (open water and embankment); (ii) Analysis of data collected in the open water survey. Data exploration to determine the strength of the correlation between all goby and commercial species, and for the strongest relations a statistical analysis (mixed effect models), investigating the effect of goby presence, time and space on the local presence (i) and fitness (ii) of commercial fish. Additional: literature search on goby biology (especially diet). Time schedule: data exploration in May-July, statistical analysis August-October.
Output/deliverables	A report/a paper in a peer reviewed journal
Dissemination of findings being addressed	See above
Utility of the developed products and expertise	Understanding key ecological processes underlying economically and politically important systems will improve our use as research and advice partners for lake IJssel stakeholders.
What are the potential risks to the project's success?	The main risk is vague results. But whether evidence is found that goby does / does not replace other fish species at locations, this will both be interesting for stakeholders.
<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Nicola Tien (fisheries management and ecosystem lake IJssel, quantitative analysis and statistics) and Pieke Molenaar (goby biology and lake IJssel ecosystem, quantitative analysis)
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	Leo Nagelkerke, AFI (work on goby diet)
Involvement parties outside WUR (names and expertise)	Eddy Lammens (RWS), IJsselmeer biology expert. Dirkjan van der Stelt (min. EZ), IJsselmeer fisheries management expert
<b>Relevance</b>	
What is the market/target audience	EZ, RWS, PO IJsselmeer, fishermen, recreational fisheries
Economical relevance	Knowledge on the causes of commercial stock dynamics in the lake and a step ahead in reaching healthy fish stocks in combination with sustainable commercial fishery activities.
Social relevance	Knowledge on the relative influence of fisheries and other factors on the decline in stocks will aid a fact-driven debate regarding the management of the lake.
Scientific relevance	Knowledge on invasive biology and ecosystem dynamics. The surveys of the lake IJssel hand us a unique and powerful dataset with which to follow the invasion and ecological effect of a fish species, from the onset onwards.
Relevance to ministry EZ	Better insight in the processes in lake IJssel/Marker and a better foundation for fisheries management
<b>Summary (UK)</b>	Since 2003 a strong invasion of goby species is taking place. This project will investigate whether these gobies have played a part in the decline of commercial stocks in the lake IJssel.
<b>Samenvatting (NL)</b>	Sinds 2003 vindt een sterke invasie plaats van verschillende grondelsoorten. Dit project zal onderzoeken of deze grondels een rol hebben gespeeld in de achteruitgang van de commerciële visbestanden in het IJsselmeer.

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79		0.00
CAT III	99	200	19800.00
CAT IV	122		0.00
CAT V	143		0.00
CAT VI	172		0.00
<b>Total Personnel</b>	19800.00		
<b>Material costs</b>			
Facilities			
Specific costs			
Travel costs			
Project equipment			
Other material costs			
<b>Total Material Costs</b>	0.00		
<b>Total project budget needed</b>	19800.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	19800.00		

Project 30 	Improving age-calculations in the demersal discard monitoring programme
Project leader	Karin van der Reijden
Theme	1. Ecosystem approach
<b>Motivation and Project aims</b>	
Problem definition	Most of the major fish stocks fished by the Dutch demersal fleet require age-structured estimates of discards for their assessment. With the impending landings obligation and movement towards mixed-fisheries management plans this has become important for the less economically important species as well. The demersal discards monitoring programme is collecting data on discarded species in demersal fisheries. Samples are taken year-round, covering the whole North Sea. All fishes in the discard samples are length-measured in centimetres, but not aged. Instead, ages are estimated based on the length distribution and a so-called age-at-length key (ALK). This ALK is calculated based on otolith-sampled discards samples, and are in various ways stratified. Age-at-length is affected by species, time (season and year), location and even fishing gear. Currently, IMARES uses different stratified ALKs to calculate age-at-length for the discards. This method is increasing the uncertainty of the age distribution of the discards. A GLM or GAM approach can be used to model the probability of age given length and other factors listed above. Additionally, a GLM or GAM model could decrease the minimum sample size, which allows for a statistical based reorganisation of the otolith-sampling protocol.
Objective(s) of the project	Develop models to improve age-length keys for discard (and landings) data. Optimize otolith sampling and create guidelines for this sampling.
Expertise needed	Statistical modelling (GLM, GAM etc.)
Expertise developed	Statistical models for age-distribution calculations
Why should this be funded by KB WOT?	With the impending landings obligation and the movement towards ecosystem approaches and mixed-fisheries management plans, accurate age-structured discard data of as many species as possible has never been more important for fisheries management in Europe. With the proposed models, we make more efficient use of the resources available at IMARES.
What other potential funding sources have been considered?	None.
International objective of research	Improve data used in the management of fisheries resources in the north Atlantic.
<b>Workplan</b>	
Broad description of the project including expected results	From existing age-readings, a GLM or GAM model will be written and applied on the discard data from 2011-2014. Differences with the current ALK will be investigated. We aim for a scientific publication on this work.
Approach and time schedule	Jan/Feb: prepare dataset (Karin); develop GAM/GLM (David & Ruben) Feb/March: develop GAM/GLM (David & Ruben) use GAM in raising. Check with "normal" procedure (Karin & Ruben) April: write publication.
Output/deliverables	Peer-reviewed publication. Revised otolith-sampling protocol.
Dissemination of findings being addressed	ICES Journal of Marine Science
Utility of the developed products and expertise	Streamline annual process of raising catch data. Provide a more accurate age distribution for more species.


What are the potential risks to the project's success?	There are few risks associated with this work. Where expertise may be lacking internally, there are sufficient international colleagues with appropriate expertise to assist.
<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Karin van der Reijden (data analysis), Ruben Verkempynck (model) and David Miller (model).
Is the appropriate capacity available?	Yes.
Involvement parties within WUR (names and expertise)	None.
Involvement parties outside WUR (names and expertise)	None.
<b>Relevance</b>	
What is the market/ target audience	ICES community
Economical relevance	Fisheries management advice
Social relevance	None
Scientific relevance	Statistical methods for age distribution-calculations
Relevance to ministry EZ	More efficient use of WOT-funding.
<b>Summary (UK)</b>	This projects aims to develop a GLM or GAM model to accurately calculate age-distributions for the Dutch demersal discards.
<b>Samenvatting (NL)</b>	Dit project richt zich op het ontwikkelen van een GLM of GAM-model voor nauwkeurige leeftijds-berekening voor de Nederlandse benthische bijvangst.

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79		0.00
CAT III	99	280	27720.00
CAT IV	122	20	2440.00
CAT V	143		0.00
CAT VI	172		0.00
<b>Total Personnel</b>	30160.00		
<b>Material costs</b>			
Facilities			
Specific costs			
Travel costs			
Project equipment			
Other material costs			
<b>Total Material Costs</b>	0.00		
<b>Total project budget needed</b>	30160.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	30160.00		

<b>Project 31</b>		<b>Ecosystem model OSMOSE-IJsselmeer</b>
Project leader	Charlotte Deerenberg	
Theme	1. Ecosystem Approach	
<b>Motivation and Project aims</b>		
Problem definition	<p>NOTE: This proposal is closely linked to the Ecosystem model EcoWasp-IJsselmeer proposal.</p> <p>With the designation in 2009 of IJsselmeer and Markermeer as Natura 2000-areas, the interaction between, prey fish, piscivorous fish, fisheries and birds as well as the carrying capacity have become subject of discussion, which is mainly driven by hypotheses and lacks integration of knowledge. The ecosystems of the lakes are characterized by a plethora of complex relations that are far from understood. There is an increasing urge among the managers to understand the impact of the fishery on the lake ecosystems and at the same time to get a basic notion of the carrying capacity (in a broad sense) of the lakes for fish (species and size composition) and fishery. In 2014 (autumn) RWS has shown a keen interest in the ecosystem (and other) models developed by IMARES; they consider incorporating those models in their 'Beheer &amp; Onderhoud'-system. In its current state, OSMOSE (as well as EcoWasp) is incomplete and needs finalizing, calibration and description to allow its use.</p> <p>Additionally, Karin van de Wolfhaar, developer of the model, may leave IMARES in June 2015; we need to have other people with the expertise and knowledge to further develop and run this model.</p>	
Objective(s) of the project	<p>Taking the construction of OSMOSE-IJM (KBWOT 2013) to a next level.</p> <p>Underlying objectives: To identify the main influences that determine the abundance and dynamics of the commercially relevant fish species; To have our own IMARES-model of the lake ecosystems, that appreciates the main determinants of the fish biomass and their interrelationships; To suggest and develop up-to-date management strategies for the percids (and smelt) fishery, based on the model results.</p>	
Expertise needed	Knowledge of the lake's (fish) ecosystem; data handling (using R); modelling; translating management questions into scientific/modelling q's.	
Expertise developed	Extension of expertise mentioned under "needed"; setting standards for underpinning management decisions based on ecosystem models.	
Why should this be funded by KB WOT?	Within the framework of long-term survey data of the fish and fisheries of IJsselmeer and Markermeer, models to integrate the available knowledge to provide a science-based (rather than rule-of-thumb based) management rule is long overdue. If we don't develop and finalize this model ourselves, we will continue to be overruled by others without the opportunity to support points of view with our own (better) approaches or work.	
What other potential funding sources have been considered?	Rijkswaterstaat (Beheer & Onderhoud models); EZ N2000 (revision of aims for the lakes due in 2015); previously: EZ financed the "Herziening spieringprotocol"-project, Rijkswaterstaat financed the ANT-project.	
International objective of research	The proposed research will become a key example of how to set conservation aims and judge effects of activities in Natura 2000-areas in a changed/changing environment.	


<b>Workplan</b>	
Broad description of the project including expected results	In 2013, OSMOSE-IJsselmeer was set-up by modelling six fish species, their predator-prey relations, food-dependent growth, reproduction and mortalities. External food (re)sources were planned to be incorporated by using output-data from EcoWasp-IJsselmeer. Several obstacles remained: a) data-driven estimates or -if not available- 'guesstimates' of the various fishing mortalities, b) development of algorithm to incorporate the output of EcoWasp-IJsselmeer into OSMOSE, c) exploration of the usefulness of available fish survey data to use a starting point for the stocks. These three elements are key to arrive at a model that is sufficiently complete to run.
Approach and time schedule	Planning (we will identify & assign exact tasks at start-up meetings): Feb-Apr 2013: Development of a feasible approach for element a) (see above) given the limited data (NT, MdG, KvdW, CD) Apr-July 2015: Development of algorithm to use output of EcoWasp as input for OSMOSE (BB, KvdW, DB, CD) Jan-Mar 2015: Analysing and raising survey data (BG, MdG, CD) Aug-Oct 2015: Calibration runs (DB, KvdW, CD) Aug-Dec 2015: Technical model description (KvdW, BB, BG, CDa)
Output/deliverables	A parameterized and -if possible- calibrated ecosystem model of a freshwater lake centred around the main fish populations.
Dissemination of findings being addressed	Scientific publication (IF the model gets sufficiently developed); fishery and nature management advice – both not included in current estimate of costs.
Utility of the developed products and expertise	When sufficiently completed, the model allows scenario studies and forecasting and thereby assists in guiding ideas to develop management rules for fisheries and conservation to achieve GES.
What are the potential risks to the project's success?	Too complicated to arrive at a sufficiently developed model; insufficient data about or knowledge on essential relationships (but their effects on the population dynamics may be explored using scenarios).
<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Karen van de Wolfshaar, Bert Brinkman (models), Nicola Tien (data poor fisheries assessment), Ben Griffioen, Martin de Graaf (data), Daniel Benden (Java programming)
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	None (but cooperation with the group of Marten Scheffer (Aquatic Ecology and Water Quality Management) should be considered and/or sought.
Involvement parties outside WUR (names and expertise)	Arno Nolte, Deltares (models), Frans Buschman & Wouter Iedema, RWS (lake management), Dirkjan van der Stelt, EZ (fisheries management)
<b>Relevance</b>	
What is the market/ target audience	Fisheries, Government (fisheries & nature managers), NGO's
Economical relevance	Medium: knowledge about sustainable fisheries and impact assessment tools
Social relevance	Medium: economic and ecological sustainable recovery and management of the lakes
Scientific relevance	High: knowledge about complex ecosystem functioning of freshwater lakes
Relevance to ministry EZ	High (both fisheries and Natura 2000/WFD)
<b>Summary (UK)</b>	Further developing a working version of a (fish-centred) model OSMOSE of the IJsselmeer ecosystem
<b>Samenvatting (NL)</b>	Verdere ontwikkeling van een werkbaar versie van OSMOSE-IJsselmeer ecosysteemmodel

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	79		0.00
CAT III	99	200	19800.00
CAT IV	122	250	30500.00
CAT V	143		0.00
CAT VI	172		0.00
Total Personnel	50300.00		
Material costs			
Facilities			
Specific costs			
Travel costs	150.00		
Project equipment			
Other material costs			
Total Material Costs	150.00		
Total project budget needed	50450.00		
Financing through other resources			
Finance needed from KBWOT	50450.00		

Project 32 	Ecosystem model EcoWasp-IJsselmeer
Project leader	Charlotte Deerenberg
Theme	1. Ecosystem approach
<b>Motivation and Project aims</b>	
Problem definition	<p>NOTE: This proposal is closely linked to the Ecosystem model OSMOSE-IJsselmeer proposal.</p> <p>With the designation in 2009 of IJsselmeer and Markermeer as Natura 2000-areas subject to the strict regulation of Nature Conservation Act ("Natuurbeschermingswet"), the interaction between fisheries, prey fish, piscivorous fish and birds as well as the potential carrying capacity of the lakes have become subject of discussion, which is mainly driven by hypotheses and lacks integration of knowledge. The ecosystems of the lakes are characterized by a plethora of complex relations that are far from understood. The fishery on the lakes has been faced with ever diminishing returns and fisheries data have been sparse. There is an increasing urge among the managers to understand the impact of various environmental factors (nutrients, T, etc.) on the lake ecosystems and to get a basic notion of the carrying capacity (in a broad sense) of the lakes for fish (species and size composition). Also, EcoWasp will provide dynamic input data for OSMOSE, i.e. data that are geographically diverse and change over time. In 2014 (autumn) RWS has shown a keen interest in the ecosystem (and other) models developed by IMARES; they consider incorporating those models in their 'Beheer &amp; Onderhoud'-system. In its current state, EcoWasp (as well as OSMOSE) needs finalizing, further calibration and above all description/publication to allow its use.</p> <p>Additionally, Bert Brinkman, developer of the model, will stop working in a few years and IMARES needs to have other people with the expertise and knowledge to run and further develop this model.</p>
Objective(s) of the project	<p>The current proposal focusses on finalizing and publishing EcoWasp-IJM.</p> <p>Underlying objectives: To identify the main influences that determine the abundance and dynamics of the commercially relevant fish species; To have our own IMARES-lower trophic-model of the lake ecosystems, that appreciates the main determinants of the fish biomass and their interrelationships.</p>
Expertise needed	Knowledge of the lake's lower trophic ecosystem (water flows, nutrients, fyto- and zooplankton interactions); data handling (using R); modelling; translating management questions into scientific/modelling questions.
Expertise developed	Extension of expertise mentioned under "needed"; setting standards for underpinning management decisions based on ecosystem models
Why should this be funded by KB WOT?	Within the framework of long-term survey data of the fish and fisheries of IJsselmeer and Markermeer, models to integrate the available knowledge to provide a science-based (rather than rule-of-thumb based) management rule is long overdue. If we don't develop and finalize this model ourselves, we will continue to be overruled by others without the opportunity to support points of view with our own (better) approaches or work.
What other potential funding sources have been considered?	Rijkswaterstaat (Beheer & Onderhoud models); EZ N2000 (revision of aims for the lakes due in 2015); previously: EZ financed the "Herziening spieringprotocol"-project, Rijkswaterstaat financed the ANT-project
International objective of research	The proposed research will become a key example of how to set conservation aims and judge effects of activities in Natura 2000-areas in a changed/changing environment.


<b>Workplan</b>	
Broad description of the project including expected results	EcoWasp has been developed in the early 1990's for the Wadden Sea ecosystem; in the mid 2000s and in 2013 major steps have been taken to make a separate version of the model for IJsselmeer. The model is sufficiently finalized to run, but is in urgent need of both calibration and description/publication.
Approach and time schedule	Planning (we will identify & assign exact tasks at start-up meetings): Jan-Mar 2013: Adaptation and calibration of the model using available external data sources (BB, CD) Feb-Apr 2015: Technical model description (BB, CD) Apr-Jun 2015: Analysing results and set-up of paper (CD, BB) Jul-Dec 2015: Writing paper(s) (CD, BB)
Output/deliverables	A calibrated, well-described and -if possible- ready-to-use ecosystem model of a freshwater lake centred around the main fish populations.
Dissemination of findings being addressed	Scientific publication; fishery and nature management advice – not included in current estimate of costs.
Utility of the developed products and expertise	The model will allow scenario studies and forecasting and thereby assists in guiding ideas to develop management rules for fisheries and conservation to achieve GES.
What are the potential risks to the project's success?	Calibration problem due to insufficient data (low, will probably not hinder publication, but may limit applicability).
<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Bert Brinkman (model); we may consider calling in another colleague (apart from CD) to become knowledgeable about this model
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	None (but cooperation with the group of Marten Scheffer (Aquatic Ecology and Water Quality Management) should be considered and/or sought.
Involvement parties outside WUR (names and expertise)	Arno Nolte, Deltares (models), Frans Buschman & Wouter Iedema, RWS (lake management), Dirkjan van der Stelt, EZ (fisheries management)
<b>Relevance</b>	
What is the market/ target audience	Government (fisheries & nature managers), NGO's, businesses in energy (wind parks) or sand extraction sector (for impact studies)
Economical relevance	Medium: knowledge about effective nature management and impact assessment tools
Social relevance	Medium: economic and ecological sustainable recovery and management of the lakes
Scientific relevance	High: knowledge about complex ecosystem functioning of freshwater lakes
Relevance to ministry EZ	High (both Natura 2000/WFD and fisheries)
<b>Summary (UK)</b>	Calibration, finalization and publication of the lower trophic ecosystem model EcoWasp IJsselmeer.
<b>Samenvatting (NL)</b>	Kalibratie, afronding en publicatie van het lagere trofische ecosysteemmodel EcoWasp-IJsselmeer

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	79		0.00
CAT III	99	200	19800.00
CAT IV	122	250	30500.00
CAT V	143		0.00
CAT VI	172		0.00
Total Personnel	50300.00		
Material costs			
Facilities			
Specific costs			
Travel costs	150.00		
Project equipment			
Other material costs			
Total Material Costs	150.00		
Total project budget needed	50450.00		
Financing through other resources			
Finance needed from KBWOT	50450.00		

<b>Project 33</b>		<b>PHYSECO - PHYSiological insights for the ECOsystem approach</b>
Project leader	Lorna Teal	
Theme	1. Ecosystem Approach	
<b>Motivation and Project aims</b>		
Problem definition	In order to improve the predictive capacity of habitat quality modelling and spatial distributions, it is necessary to understand how fish select habitat in relation to food and temperature, and how metabolic changes that may occur as a result affect the population output and ultimately impact fisheries.	
Objective(s) of the project	The hypothesis (and model assumption) that starved fish lower their temperature preference in order to lower their metabolism will be tested. Metabolic changes will be assessed alongside the behavioural response.	
Expertise needed	Preference chamber experimental procedure, DEB modelling, RNAseq	
Expertise developed	Combining experimental data into modelling tools, application of molecular techniques for ecological questions, validation of model assumptions.	
Why should this be funded by KB WOT?	This innovative approach will help underpin current modelling studies with experimental data and provide a better mechanistic understanding of how fish populations interact with their environment. The ability to model distributional ranges and habitat areas is key for MSFD (descriptor 1) to maintain biological diversity.	
What other potential funding sources have been considered?	Horizon 2020, FACOST Action 1004 Short Term Scientific Mission (potential to provide a post-doc to assist with experiment).	
International objective of research	Relates to membership of IMARES in FACOST Action 1004 "CONPHYS", precedes calls within Horizon2020 (proposal: CERES).	
<b>Workplan</b>		
Broad description of the project including expected results	Fish (sole) will be fed unlimited or starved. Temperature preference of both groups will be determined using a preference chamber and compared to modelled optima. Metabolic differences between the two treatments will also be assessed by deep RNA sequencing (RNAseq) of the liver transcriptomes and analyses of differentially expressed genes, which will allow us to dissect the complex physiological process of starvation and provide a physiological background against the observed behaviours. Raised mechanistic insights can be incorporated in a generic model to be applied to all species.	
Approach and time schedule	Step 1) Preference chamber experiment (Apr) and statistical analysis (Aug)	
Output/deliverables	Step 2) Molecular analysis (May-Aug)	
Dissemination of findings being addressed	Step 3) results and manuscript writing (Sep-Dec)	
Utility of the developed products and expertise	Improved DEB model as a proof of concept for strengthening ecosystem modelling by raising physiological data through experimentation.	
What are the potential risks to the project's success?	Peer-reviewed publication (Aim: Molecular Ecology - IF = 5.84), oral presentation at final CONPHYS COST meetings (stakeholders present)	
<b>Project organisation</b>		
Involvement IMARES (names and expertise)	Lorna Teal (ecology, DEB), Edward Schram (physiology), Arjan Palstra (physiology, RNAseq), Ewout Blom (experimental setup), Adriaan Rijnsdorp (ecological input)	
Is the appropriate capacity available?	yes	


Involvement parties within WUR (names and expertise)	N.A.
Involvement parties outside WUR (names and expertise)	Potential for a 'Short Term Scientific Mission' of a post-doc via CONPHYS COST action
<b>Relevance</b>	
What is the market/ target audience	Multidisciplinary scientific audience
Economical relevance	Insights valuable for fisheries yields and spatial planning
Social relevance	Sustainable fisheries yields and environmental protection
Scientific relevance	Mechanistic understanding of temperature effect on metabolism for implementation in generic modelling framework
Relevance to ministry EZ	Improved modelling frameworks for better spatial insights into fish habitat
<b>Summary (UK)</b>	PHYSECO aims to gain a better understanding of habitat selection and temperature effects at the individual level to improve spatial modelling studies as well as predictive capacity on population output.
<b>Samenvatting (NL)</b>	PHYSECO tracht beter inzicht te geven in habitat selectie en temperatuur effecten op individueel niveau om zo het spatiaal modelleren en de voorspellende waarde daarvan op de populatie te verbeteren.

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79	194	15326.00
CAT III	99	100	9900.00
CAT IV	122	80	9760.00
CAT V	143	8	1144.00
CAT VI	172		0.00
<b>Total Personnel</b>	36130.00		
<b>Material costs</b>			
Facilities			
Specific costs	4140.00		
Travel costs			
Project equipment	500.00		
Other material costs	500.00		
<b>Total Material Costs</b>	5140.00		
<b>Total project budget needed</b>	41270.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	41270.00		

<b>Project 34</b>		<b>Unravelling the hidden in SAM (how to better understand the importance of the process error in a state space assessment model)</b>
Project leader	Thomas Brunel	
Theme	1. Ecosystem Approach	
<b>Motivation and Project aims</b>		
Problem definition	The state space assessment model (SAM) is increasingly used, but yet the tools evaluate model quality are incomplete. One of the features of SAM, the process error (PE) is currently not looked at when validating the model. A good fit of the model to the data (catches and survey) can be achieved at the cost of a large PE (i.e. deviation of estimated abundances at age from the underlying theoretical population dynamics equation), which is an indication of poor model fit. There is a need to understand better how the PE works in SAM and for tools for a proper inspection of its realisation.	
Objective(s) of the project	To improve our understanding of the trade-off in SAM related to the PE and develop a series of tools to diagnose the quality of a model fit.	
Expertise needed	Practical and theoretical knowledge of SAM	
Expertise developed	Better understanding and criticism on SAM	
Why should this be funded by KB WOT?	IMARES is already a key institute for the development of SAM (notably the FLR implementation, within the library FLSAM). This project will improve the expertise on SAM within the institute, and create new tools (accessible to all FLSAM users) to improve the use of SAM. Additionally, those tools can contribute to an increased accuracy of stock assessment, with direct consequences for fisheries management but also for all ecosystem approach research based on the output of stock assessment models.	
What other potential funding sources have been considered?	none	
International objective of research	SAM is widely used in ICES, and not always completely understood, and there is a demand for improvement of the tools for model validation.	
<b>Workplan</b>		
Broad description of the project including expected results	Creating tools (implemented in FLR and incorporated in the FLSAM package, hence available freely to all SAM users) to visualise and analyse the realisation of the PE. Apply those tools to a selection of ICES stock assessments with SAM and check for problems linked to the PE. Modify the SAM model so that the magnitude of the PE can be controlled to better understand the trade-off within SAM between the quality of the model fit to the observations and the magnitude of the PE.	
Approach and time schedule	In the course of 2015: data collection (stock assessment output), writing R script, analysis of the PE in a selection of stock assessments, sensitivity analysis of the trade-off between PE and observation errors, reporting.	
Output/deliverables	A set of R functions in the library FLSAM, freely available, a draft manuscript, recommendations for a better use of SAM	
Dissemination of findings being addressed	The findings of this project will be published as a scientific paper. Communication will also be made to the relevant ICES expert groups (stock assessment or methods WG).	
Utility of the developed products and expertise	improve stock assessment	
What are the potential risks to the project's success?	None	


<b>Project organisation</b>	
Involvement IMARES (names and expertise)	Niels Hintzen, David Miller and Thomas Brunel (stock assessment experts and SAM experts/users)
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	None
Involvement parties outside WUR (names and expertise)	Höskuldur Björnsson and Einar Hjörleifsson, MRI, Reykjavík. Iceland
<b>Relevance</b>	
What is the market/ target audience	The fish stock assessment community, with direct implication for fisheries management stakeholders
Economical relevance	Related to optimizing fisheries profitability while ensuring sustainability
Social relevance	Optimal and sustainable resource exploitation is profitable to the society
Scientific relevance	Contribute to improve the basis on which scientific advice is given
Relevance to ministry EZ	Many fish stocks of importance to the Netherlands are currently assessed with SAM, and more may follow in future.
<b>Summary (UK)</b>	This project will develop the understanding and the tools necessary for a critical inspection of the process error in SAM models to improve the use (and avoid misuse) of SAM by the stock assessment community.
<b>Samenvatting (NL)</b>	Dit project levert de indicatoren en kennis die nodig zijn om de SAM modellen te controleren op een correct gebruik van proces error. Tevens draagt het bij aan de het correct gebruik van SAM door wetenschappers die bestandschattingen uitvoeren

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79		0.00
CAT III	99	160	15840.00
CAT IV	122		0.00
CAT V	143		0.00
CAT VI	172		0.00
<b>Total Personnel</b>	15840.00		
<b>Material costs</b>			
Facilities			
Specific costs			
Travel costs			
Project equipment			
Other material costs			
<b>Total Material Costs</b>	0.00		
<b>Total project budget needed</b>	15840.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	15840.00		

Project 35 	An assessment of a currently used method to stun and kill fish during surveys
Project leader	Olvin van Keeken & Hans van de Vis
Theme	2. Maintaining Quality (not invited)
<b>Motivation and Project aims</b>	
Problem definition	The Dutch law on protection of experimental animals requires that fish are stunned and killed without avoidable stress to collect tissues for analysis. For statutory tasks (WOT), fish are collected during surveys. In the field otoliths are extracted from heads of fish to determine their age. Prior to extraction of otoliths, the fish brains are cut with a knife for stunning and killing. However, it is not known whether the application of a cut through the brains results in an immediate and irrecoverable loss of consciousness to avoid stress. It is known that other mechanical methods that result in brain damage of fish can induce an immediate and irrecoverable loss of consciousness. Behavioural responses cannot be used as robust indicator for loss of consciousness, as these data need to be interpreted with caution.
Objective(s) of the project	We will assess whether a cut through the brains of fish results in an immediate and irrecoverable loss of consciousness in three species: plaice ( <i>Pleuronectes platessa</i> ), sole ( <i>Solea solea</i> ) and dab ( <i>Limanda limanda</i> ).
Expertise needed	Immediate and irrecoverable loss of consciousness will be assessed by registration of EEGs and ECGs by Wageningen Livestock Research (see other material costs), combined with behavioural observations by IMARES. For the behavioural observations an adjusted protocol of Morzel et al. (2003) will be used. A cut through the fish brains will be done by a technician of IMARES.
Expertise developed	In the inventory study we will establish whether a cut through the brains of fish results in an immediate and irrecoverable loss of consciousness in the selected fish species. The data obtained in the behavioural observations can be used by technicians of IMARES as tool box to assess whether or not the application of stunning and killing methods in the field may be effective.
Why should this be funded by KB WOT?	Our proposes study addresses the issue whether or not a cut through the brains results in an immediate and irrecoverable loss of consciousness. This issue falls under the category refinement (i.e. a reduction of discomfort in a live experimental animal). Refinement is part of the three Rs approach, which is an approach, required by law, in experiments with live animals. The outcome of our study is clearly relevant for the statutory task performed by IMARES. Therefore, we propose that the study is funded by KBWOT.
What other potential funding sources have been considered?	None
International objective of research	We facilitate research for WOT surveys and other studies. Our results are relevant for Dutch and Swedish institutes, as their national laws on experimental animals also apply to fish that are killed to extract tissues. In other European these laws do not apply to fish killed to extract tissues.
<b>Workplan</b>	
Broad description of the project including expected results	Plaice, sole, dab will be caught, using light gears and short trawls. The fish will be allowed to recover at IMARES Yerseke. The fish will be equipped with EEG and ECG electrodes (n=10 for each species) and then the brains are cut. The EEG and ECG data are used to assess whether fish are stunned immediately without recovery. Behavioural observations will be performed with 40 fish for each of the selected species, using the adjusted protocol.

Approach and time schedule	The first half year of the project will be used to obtain approval from the ethical committee prior to the start of the project and to carry out the proposed experiments. In the second half year the obtained data will be interpreted and an internal confidential report will be written.
Output/deliverables	The deliverable of the proposed study is an internal confidential report.
Dissemination of findings being addressed	The nature of this study requires that the results obtained and the report is not disseminated without the prior consent of the director of IMARES.
Utility of the developed products and expertise	Our study is aimed at refinement of experiments performed with live fish within the framework of WOT. In addition, our study will provide technicians who stun and kill fish in the field with a tool box to assess whether this task may be performed without induction of avoidable stress in fish.
What are the potential risks to the project's success?	Our study may show that cutting the fish brains with a knife does not induce an immediate and irrecoverable loss of consciousness. We may have to provide recommendations for further studies to develop a user-friendly, cheap and effective stunning and killing methods for fish in field studies.
Project organisation	
Involvement IMARES (names and expertise)	Hans van de Vis (fish welfare), Olvin van Keeken (surveys) and a technician (to be selected).
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	Wageningen Livestock Research, Wageningen UR (Marien Gerritzen, interpretation of EEG and ECG data)
Involvement parties outside WUR (names and expertise)	none
<b>Relevance</b>	
What is the market/target audience	The audience comprise institutes in the Netherlands and Sweden that study live fish in the field, and ethical committees in these countries.
Economical relevance	It is relevant to assess whether the current method for stunning and killing of fish is in agreement with the Dutch law on experimental animals. Recommendations to develop user-friendly, cheap and effective stunning and killing methods for fish in field studies for research may be needed.
Social relevance	Due to societal awareness there is a need to: reduce the number fish in experiments; replace them or refine methods. Our study aims at refinement.
Scientific relevance	Our study will show whether cutting the brains results in an immediate loss of consciousness in fish, without recovery until death.
Relevance to ministry EZ	There is political pressure to refine the methods used in experiments with live animals and to provide sound evidence that refinement is achieved.
Summary (UK)	This study investigates whether the current method used in the field, i.e. a cut through the brains, prior to extraction of otoliths from fish results in an immediate and irrecoverable loss of consciousness in plaice, sole and dab. This immediate and irrecoverable loss of consciousness is in accordance with the requirements in the Dutch law on experimental animals.
Samenvatting (NL)	We willen nagaan of de huidige methode, het doorsnijden van de hersenen van vissen voorafgaand aan het verzamelen van otolieten in veldstudies, leidt tot een onmiddellijk en onomkeerbaar intreden van de bewusteloosheid in schol, tong en schaar. Wanneer de hersenen met een mes worden doorgesneden is een onmiddellijk en onomkeerbaar intreden van de bewusteloosheid met het oog op de wet op dierproeven een vereiste.

<b>Proposed budget</b>			
<b>Personnel</b>	<b>tariff</b>	<b>hours</b>	<b>amount</b>
CAT I	58		0.00
CAT II	79	41	3239.00
CAT III	99	40	3960.00
CAT IV	122	36	4392.00
CAT V	143		0.00
CAT VI	172		0.00
<b>Total Personnel</b>	0.00		
<b>Material costs</b>			
Facilities	1500.00		
Specific costs	500.00		
Travel costs	1000.00		
Project equipment	500.00		
Other material costs	20000.00		
<b>Total Material Costs</b>	23500.00		
<b>Total project budget needed</b>	35091.00		
Financing through other resources			
<b>Finance needed from KBWOT</b>	35091.00		

<b>Project 36</b>		<b>Discriminating between landings from North Sea Horse Mackerel and Western Horse-mackerel stocks using the GCxGC-MS</b>
Project leader		Ruben Verkempynck/Tessa van der Hammen
Theme		1. Ecosystem approach
<b>Motivation and Project aims</b>		
Problem definition		The Dutch pelagic industry and IMARES have recently developed a North Sea horse mackerel management plan. This long-term management plan would greatly benefit from insight in the origin of the landings from ICES area VIIId, which are allotted to the North Sea stock. However, Western horse mackerel is also in this area during the time of the year when most of the fishery takes place. This results in a mixed catch of the two fish stocks. Visually, individuals from the two stocks cannot be distinguished, which makes it difficult to discriminate between the two stocks and consequently allot landings proportionally to the two separate stocks.
Objective(s) of the project		To gain better knowledge of the North Sea stock landings for use in the management of the North Sea horse mackerel stock. Method to distinguish fish stocks chemically will be optimised, also for use with other fish stocks.
Expertise needed		GCxGC-MS use and interpretation data Knowledge of when what stock of HM is where
Expertise developed		Use of GCxGC-MS for distinction between different stocks/feeding areas
Why should this be funded by KB WOT?		This method to distinguish fish stocks / feeding areas of fish will be optimised, so it can be used as tool, also for other stocks.
What other potential funding sources have been considered?		A short pilot has run (BO horse mackerel management plan). The industry contributes with delivering proper fish samples.
International objective of research		Better management tool for the North Sea horse mackerel stock. Evidence that stocks are true separate stocks (so no yearly cross-overs)
<b>Workplan</b>		
Broad description of the project including expected results		With GCxGC-MS (Gas chromatography–mass spectrometry) individuals of the two stocks may be discriminated. This technique delivers a 'fingerprint', showing the chemicals in the fish meat, which have been taken up by feeding and by respiration. As individuals of the two stocks reside at different feeding areas, they have absorbed different chemicals, resulting in distinguishable fingerprints. The project will analyse samples that belong to both populations; west of Ireland and in the North Sea. The GCxGC-MS will detect chemical differences between the two stocks. Then samples from the area in which the stocks overlap will also be analysed; the chemical fingerprint will determine to what stock these individuals, all caught in area VIIId, belong. The first try with sub-optimal samples showed that differences may not be so large between the stocks that effects of size and sexe can be neglected. Therefor, males of a common length (age) class in the catch will be used first from both feeding grounds.
Approach and time schedule		1) samples from different areas, feeding grounds AND mixed-grounds --> is organized 2) analyse using GCxGC-MS and report
Output/deliverables		- A description of methods on how to use the GCxGC-MS to discriminate between fish stocks. - Describe the overlap between the horse mackerel stocks in area VIIId in report.
Dissemination of findings being addressed		

Utility of the developed products and expertise	They can be used in the North Sea horse mackerel management plan
What are the potential risks to the project's success?	Failure to distinguish the stocks with the GCxGC-MS.
<b>Project organisation</b>	
Involvement IMARES (names and expertise)	R Verkempynck, T vd Hammen (horse mackerel stock), M Kotterman (GCxGC-MS), D Miller (member WGWIDE), S Verver (market sampling)
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	
Involvement parties outside WUR (names and expertise)	Beatriz Roel (CEFAS), pelagic RAC Denmark
<b>Relevance</b>	
What is the market/ target audience	WGWIDE, ICES, ministry
Economical relevance	better North Sea horse mackerel management
Social relevance	better North Sea horse mackerel management
Scientific relevance	Use of the GC-GC-MS to distinguish between two feeding areas.
Relevance to ministry EZ	better North Sea horse mackerel management
<b>Summary (UK)</b>	This project will help to discriminate between landings from the North Sea horse mackerel and Western Horse-mackerel stocks using the GCxGC-MS. The HHM management plan will greatly benefit from this knowledge. This method can be used for a wide variety of similar "overlapping" fish stocks
<b>Samenvatting (NL)</b>	Het project beoogt een methode te testen om horsmakreel afkomstig van de Noordzee te onderscheiden van westelijke horsmakreel. Het beheer van de horsmakreelbestanden is hierbij gediend. De te testen methoden zouden wellicht ook voor andere visbestanden kunnen worden gebruikt

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	79	190	15010.00
CAT III	99	130	12870.00
CAT IV	122	40	4880.00
CAT V	143		0.00
CAT VI	172		0.00
Total Personnel	32760.00		
Material costs			
Facilities			
Specific costs			
Travel costs			
Project equipment			
Other material costs	2500.00		
Total Material Costs	2500.00		
Total project budget needed	35260.00		
Financing through other resources			
Finance needed from KBWOT	35260.00		