Stichting DLO
Centre for Fisheries Research (CVO)

KB WOT Fisheries 2014 - Maintaining Excellence and Innovation in Fisheries Research

Cindy van Damme & Sieto Verver

Eileen Donovan, Australia

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Summary

The KB WOT Fisheries programme is fundamental to the maintenance and development of expertise needed to carry out the statutory obligations of the Dutch WOT Fisheries monitoring and advice. The structure of the KB WOT Fisheries programme 2014 is a result of discussions on the research direction and needs between IMARES, CVO and the ministry of EZ. Important in the structure of the KB WOT Fisheries programme is the bottom up approach, where a call for proposal submission is launched ensuring innovation in the programme. However the top-down decision on the research themes within the programmes ensures that needs of both the science development within IMARES and the research questions of EZ remain covered. The KB WOT Fisheries programme will fund 17 projects in 2014 which will focus on remote sensing of the pelagic and benthic systems (acoustics and video imaging) and the interaction of ecology and fisheries, as well as new techniques for surveys and monitoring.

Samenvatting

Het KB WOT programma voor Visserijonderzoek onderhoudt en ontwikkelt de expertise die nodig is voor het uitvoeren van de wettelijke WOT Visserijonderzoektaken. De inhoud van het KB WOT programma voor 2014 is een resultaat van discussies over de visserijonderzoeksrichting en kennisbenodigdheden tussen IMARES, CVO en het ministerie van EZ. De opzet van het KB WOT Visserijonderzoek programma is een bottom-up benadering, waarbij onderzoekers van IMARES uitgenodigd worden om projecten in te dienen en onderzoeksprioriteiten in te vullen. Deze benadering vergroot de innovatie van het KB WOT Visserijonderzoek. Om er voor te zorgen dat de kennisbehoefte voor de wetenschappelijke ontwikkeling binnen IMARES als voor EZ beantwoordt wordt is er een top-down benadering waarin de grote thema's van het onderzoek worden bepaald. Het KB WOT programma voor Visserijonderzoek financiert in 2014 17 projecten die zich richten op remote sensing van de pelagische en bentische systemen (akoestiek videobeeld analyse), de interactie tussen ecologie en visserij en nieuwe technieken voor surveys en monitoring.

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. The statutory obligations of the Netherlands and particularly fishery management has changed over time. Therefore the KB WOT Fisheries programme needs to be pro-active and respond to the changes in policy needs and method innovations. Hence the KB WOT Fisheries program is a flexible multiannual programme which is yearly reviewed. The KB WOT Fisheries programme has clear objectives and deliverables.

The KB WOT Fisheries programme main task is underpinning expertise for the statutory tasks. But at the same the development of and maintaining this expertise is part of the IMARES strategy. In this respect the KB WOT Fisheries programme is collaboration between CVO, IMARES and the ministry of EZ. The expertises 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 future policy needs come mainly from the existing and upcoming EU directives.

The current KB WOT Fisheries programme is developed with a top-down direction of research, but allowing bottom-up submission of projects. Examples of KB WOT Fisheries 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 standard surveys into a more ecosystem monitoring is also stimulated.

The programme is managed by a programme leader from IMARES and CVO, who review the programme each year, meet with civil servants from EZ and produce two annual reports, 1) with the results of the current year and 2) with the programme for the next year. This programme is part of the larger KB programme carried out by Wageningen UR and has been developed together with the ministry of EZ. This report describes the framework for the 2014 KB WOT Fisheries programme and the proposed research which will be carried out in 2014.

2 The embedding of KB WOT Fisheries

Within Wageningen UR, KB is divided in seven different themes. The KB WOT Fisheries operates within theme IV: "Sustainable development of the green-blue space". This theme covers the research on sustainable use of our environment, both the marine and freshwater (blue) and terrestrial (green) environment. Sustainable development of exploitation of marine resources, including fisheries, is part of theme IV.

The KB WOT Fisheries programme is developed to cover the tasks required for the national and European fisheries policy. 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). These tasks require both the collection of information and data, through long-term data collection programmes, as well as develop and maintain the understanding of the marine and freshwater environment and the development and delivery of science-based advice. It is necessary that for these tasks the KB WOT Fisheries programme reacts to present needs, but should also anticipate on the future needs of the national and European fisheries policies.

In order to develop reliable science-based advice for fisheries management and policy, it is necessary to collect high quality data according to international agreed and developed scientific protocols and keys. This can only be achieved through international collaboration and peer-reviewed science. Thus scientists working on projects within the KB WOT programme must present their results to the internationally science world but also keep up to date with developments going on elsewhere as well as be involved in the developments of standardized protocols and standards. Part of the KB WOT programme is used to for international travel to exchange scientific developments both within and outside the Netherlands.
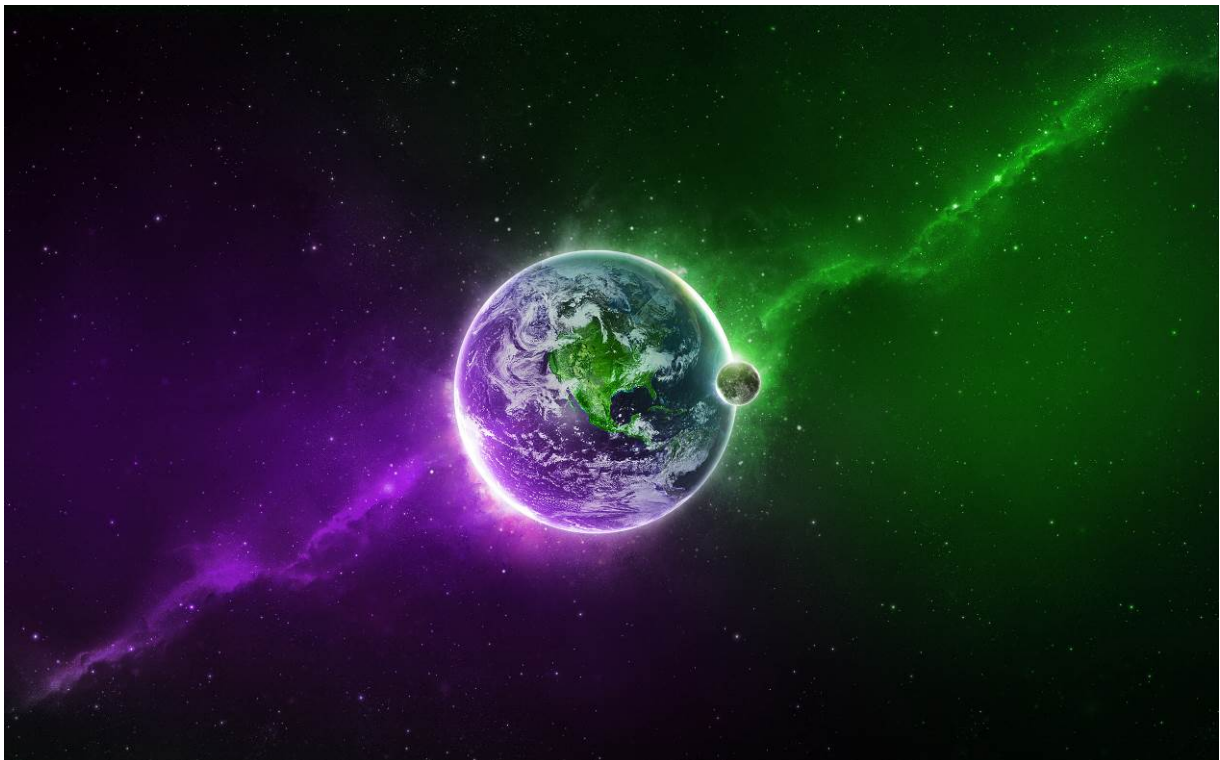
3 International nature of KB WOT Fisheries

The majority of projects within the KB WOT Fisheries programme are carried out in collaboration with national or European partners. These collaborations provide added value to the programme, as resources and expertise from other institutes and countries contribute to the KB WOT Fisheries research. In some cases, value is also increased by combining KB funds with those from EU or other funded projects.

Part of the KB WOT Fisheries programme is reserved specifically for international collaboration, participation in meetings and workshops. In this way IMARES ensures that scientists remain at the centre of fisheries research and developments in Europe. The KB WOT Fisheries programme also encourages exchange through publications, presentations and developing new methods or tools for fisheries research.
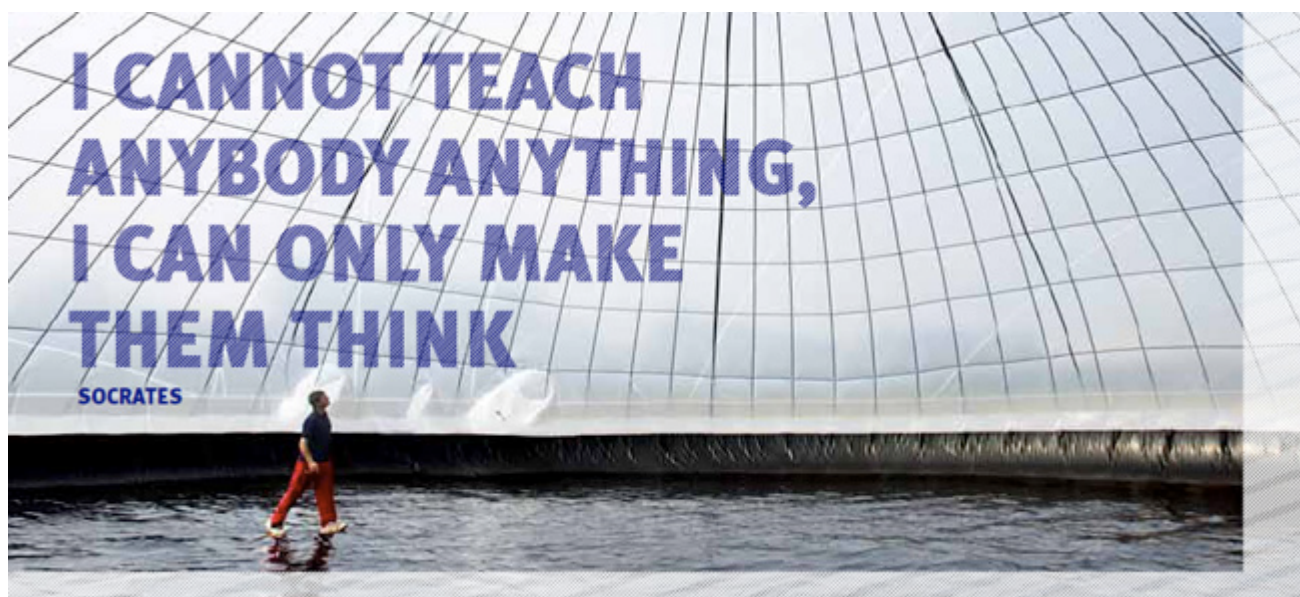
4 Structure of the KB WOT Fisheries programme

4.1 Management

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

4.2 Financing

The WOT and KB WOT Fisheries programmes are covered in long term agreements between DLO and the ministry of EZ. The development of the KB WOT Fisheries expertise programme for 2014 is financed from the research budget reserved for the KB programme. The WOT and KB WOT programmes were evaluated in 2010, and it was agreed to allocate an annual budget to these programmes in order to maintain and develop expertise needed to carry out the statutory WOT tasks. The available budget in 2014 for KB WOT Fisheries programme has been reduced by 2.2% due to cuts in the WOT and KB programmes. The available budget for KB WOT Fisheries in 2014 is € 588.000,-.

4.3 Reviewing of submitted proposals

The themes for the KB WOT Fisheries programme are decided by the management team. The proposals from IMARES scientists are submitted to the different themes. The management team is supported by a proposal review team to advise which proposals should be granted for next year's programme. The proposals are reviewed and judged for relevance for the WOT statutory tasks, relevance for the IMARES research strategy and scientific relevance. The proposals receive a mark for each of the three relevancies, WOT, IMARES and science from each reviewer. The means of these marks is then used to rank the submitted proposals, making sure that relevance for the WOT programme is ensured.

The review team for the KB WOT 2014 proposals consisted of:
- Frans van Beek, KB WOT Fisheries, CVO
- Cindy van Damme, KB WOT Fisheries, IMARES
- Pauline Kamermans, senior scientist department Delta, IMARES
- Han Lindeboom, senior adviser IMARES
- Adriaan Rijnsdorp, senior scientist department Fisheries, IMARES
- John Schobben, head department Fish, IMARES
- Natalie Steins, head department Fisheries, IMARES

5   The programme for 2014

The programme for 2014 will have the following themes:

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

The programme is a result of excellent projects which have been submitted to an annual call for proposals. International collaboration, exchange and teamwork are thought important within the KB WOT Fisheries programme. Also projects that propose to publish their results in international peer reviewed literature are highly regarded. Added value by offering co-financing opportunities with other projects is also seen as strength of the programme.

The three 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 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 in the wide variation of proposal subjects 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 were invited that provide information or tools for the ecosystem approach to fisheries management and also research projects that make the ecosystem approach operational. Proposals that explore the science and concepts behind the objectives relating to descriptors of Good Environmental Status (GES) as they apply to fish and shellfish were encouraged. 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 competencies to carry out the approved WOT programme tasks. These expertises include age reading, stock assessments, acoustic survey techniques, shellfish surveying, ichthyoplankton surveying and biological data collection. Courses, workshops and exchanges are an important part of maintaining and developing expertise. 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 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. Value of KB WOT Fisheries programme in increased by project financing and technology or expertise transfer from international partners.

5.4   Call for proposals

31 proposals were submitted to the KB WOT 2013 call (see annex 1). Of those the following 17 projects were granted.

Proposal no	Theme	Title	Project leader	Agreed finance *
17	3	International exchange	Van Damme	€ 120,000
5	2	Novel Stratification Approach in shell fish surveys	Troost	€ 46,600
27	2	Underpinning Acoustics	Fässler	€ 44,911
9	1	Has trawling turned the Dutch seafloor into a high-production fish farm?	Van Kooten	€ 29,800
24	1	CCTV segmentation	Benden	€ 26,940
10	1	Bycatch: bane or boon?	Van Kooten	€ 19,200
19	1	Discriminating between landings from the North Sea horse mackerel and Western horse mackerel stocks using the GCxGC-MS	Coers	€ 33,880
28	1	Long-term spatial distribution of pelagic fish from commercial vessel acoustic data (PELSPA)	Fässler	€ 24,960
12	1	Modelling the interdepence of perch and pikeperch in Lake IJssel and lake Marker	Tien	€ 24,000
7	1	Larval time series in stock assessment	Hintzen	€ 19,600
14	2	Fish ageing	Bolle	€ 50,000
29	1	Stationary acoustic monitoring of pelagic ecosystems in shallow Dutch inshore waters (STAMPOT)	Gastauer	€ 26,340
18	2	HERCATCH - Herring larvae catchability	Van Damme	€ 49,120
16		Program management	Van Damme	€ 25,200
3	1	Analysis tagging experiments: seasonal growth patterns	Rijnsdorp	€ 12,174
2	2	Making fish tagging data available to everyone	Boois	€ 15,275
30	1	BLUEFEED - Feeding Behaviour of Blue Whiting	Gastauer	€ 20,000
			Total	€ 588,000

*Amounts are excluding VAT

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

6 Conclusion

The KB WOT Fisheries programme will fund 17 projects in 2014. In 2014 the programme is balanced with projects in remote sensing of the pelagic and benthic systems (acoustics and video imaging) and the interaction of ecology and fisheries, as well as new techniques for surveys and monitoring, including a project which extends a regular survey towards a more ecosystem monitoring.
This research is performed within KennisBasis Onderzoek (KB), Beleidsondersteunend Onderzoek (BO) and Wettelijke OnderzoeksTaken (WOT) of EZ-programmes.

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: 13.009
Project number: KB WOT Fisheries 2014 Programme

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

Signature:

Date: November 2013

Annex 1. The Proposals submitted to the call KB WOT Fisheries 2014

Project 1 ☹	Quantifying fishing intensity of fixed gear (gill net) fisheries on the Dutch EEZ
Project leader	Niels Hintzen
Theme	1. Ecosystem approach
Motivation and Project aims	
Definition of the problem	When addressing fishing impacts on the ecosystem, from benthic communities to mammals, fixed gear efforts are often overlooked as quantifying their fishing intensity is difficult from readily available data sources. Their impact is significant and should be taken into account, especially in more coastal zone analyses.
Objective of the project	Quantify fishing intensity in space and time for gill net fisheries. Investigate the relationship between fishing intensity and catch (analyses of management efficacy)
Expertise needed	Modelling skills (VMS+logbook analyses), Collaboration with fishermen, Scientific writing
Expertise developed	Within the IMARES project 'NEA analyse staandwantvisserij - bruinvis', tools to analyse gill net fishing intensity, in collaboration with fishermen have been developed.
Why should this be funded by KB WOT?	This research aims directly at studying the impact and manageability of fixed gear fisheries, necessary to be included when one want to achieve an overall view of fishing (GES descript 3 or 6) impact on the ecosystem
What other potential funding sources have been considered?	None
International objective of research	Strengthening leading position in VMS and Logbook analyses
Work plan	
Broad description of the project including expected results	- Description of process how VMS + logbook results can be translated into fishing effort - Verification and validation by fishermen - Short term analyses of effort development versus landings and status of the stocks - writing of scientific publication
Approach and time schedule	Development of tools in Q1, verification depends on overlap with Kenniskring research. Aim for Q2 verification. Q3 + Q4 publication.
Output/deliverables	- R script that allows estimation of fishing effort for gill net fishery - manuscript for peer-reviewed journal
Dissemination of findings being addressed	manuscript to peer-reviewed journal

Utility of the developed products and expertise	Many studies at IMARES that deal with N2000 areas or benthic impact studies in the coastal zone of the Netherlands require estimates of fishing intensity by the gill net fishery
What are the potential risks to the project's success?	Low collaboration of fishermen to verify and validate our methods
Project organisation	
Involvement IMARES (names and expertise)	Niels Hintzen (R, VMS, Logbooks). Floor Quirijns (collaboration fishermen, VMS, expert knowledge on gill net fishery)
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	IMARES
Involvement parties outside WUR (names and expertise)	kenniskring staandwant tong, kenniskring kleinschalige visserij
Relevance	
What is the market	Fisheries managers: benefit from these analyses, for MPA's or coastal management. Industry / fishermen: benefit as they get tools at hand to independently show their fishing efforts and how management actions might affect their income. NGOs: benefit as interactions with e.g. marine mammals can be studied more reliably.
Economical relevance	Management actions that affect fishing opportunities in the coastal areas might have an effect on gill net fisheries. However, with lacking information on their intensity, an economic analyses cannot be made, which will become available through this study
Social relevance	Gill net fishers have problems convincingly others how they behave at sea: where and when they fish. Up to now, only qualitative information on this at-sea behaviour is available. Here, we will obtain quantitative information on spatial and temporal behaviour. Hence, project outcomes will support discussions about gill net fisheries between different stakeholders.
Scientific relevance	No study known to us has investigated gill net effort based on logbook analyses (thereby ensuring independent calculation of effort). We would be the first to publish on this matter, in relation to CPUE analyses, allowing to judge whether e.g. gear length restrictions or days at sea would be sensible measures.
Relevance to ministry EZ	Economic an ecological impact of coastal fisheries is of growing importance with respects to MPA and Natura 2000 regulations (NZKZ). Getting reliable and repeatable estimates on fixed gear fisheries is crucial in their assessment
Summary	We develop tools to quantify gill net fishery effort and relate these to potential management actions

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	77		0.00
CAT III	96	140	13440.00
CAT IV	120	60	7200.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			20640.00
Material costs			
Facilities			
Specific costs			
Travel costs			100.00
Project equipment			
Other material costs			
Total Material Costs			100.00
Total project budget needed			20740.00
Financing through other resources			
Finance needed from KBWOT			20740.00

Project 2	Making fish tagging data available to everyone
Project leader	Ingeborg de Boois
Theme	2. Maintaining quality
Motivation and Project aims	
Definition of the problem	Currently it is not possible to import tagging data in the IMARES database Frisbe.
Objective of the project	Data of tagging and transponder experiments can be imported in Frisbe and will be available to all IMARES scientists
Expertise needed	(1) Database development (2) Data transformation from various formats to Frisbe format (3) Data entry in Excel
Expertise developed	Understanding how capture-release-recapture-release data can be stored in te IMARES database Frisbe. Further expertise development is secondary as the data only can be used when they are available. Scientific expertise developed is described in the connected proposal (Rijnsdorp et al.)
Why should this be funded by KB WOT?	Tagging and transponder data form a cornerstone in gaining knowledge on the spatial behaviour of fish. The data are available, but not in a usable format for scientists. The current storage is not sustainable and does not support use of the data.
What other potential funding sources have been considered?	Project financing, but as many tagging experiments have been carried out in the past. For fresh water transponder experiments financial support from RWS Waterdienst might become available in 2014 (40 hours CATIII for data transmission, min. 15 hours CATIII for database development). It is however still unclear if and how this process develops.
International objective of research	The IMARES expertise might be used by other countries if they would like to develop a database for storage of tagging data
Work plan	
Broad description of the project including expected results	
Approach and time schedule	Database development and completing the historic data will be done in parallel during the January-April 2014. After testing the database tables and procedures the data will be added April-December 2014. First the historic tagging data will be imported (before October 2014) and later the transponder experiment data. NB: the order or scheduling of data import might change when financial support from RWS Waterdienst requests deadlines not matching this KBWOT proposal.
Output/deliverables	Database tables and import module for tagging data. Tagging data are imported in the IMARES database Frisbe, SAS code

	available for extraction of tagging data from Frisbe.
Dissemination of findings being addressed	No findings, product output
Utility of the developed products and expertise	Tagging data give insight in spatial behaviour of fish, see additional proposal for details (Rijnsdorp et al.)
What are the potential risks to the project's success?	Technical problems, overbooking of people involved. This can be prevented by prioritising this project in relation to other activities.
Project organisation	
Involvement IMARES (names and expertise)	Ingeborg de Boois (data management), Peter van der Kamp (database development), Daniël Benden (database development), Corrina Hinrichs (data update)
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	no
Involvement parties outside WUR (names and expertise)	no
Relevance	
What is the market	fish behaviour science
Economical relevance	no
Social relevance	no
Scientific relevance	yes
Relevance to ministry EZ	sustainable storage of relevant data
Summary	Making fish tagging data available to everyone will lead to the sustainable storage and availability of tagging and transponder experiment data to all IMARES scientists using Frisbe.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58	20	1160.00
CAT II	77	15	1155.00
CAT III	96	135	12960.00
CAT IV	120		0.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			15275.00
Material costs			
Facilities			
Specific costs			
Travel costs			
Project equipment			
Other material costs			
Total Material Costs			0.00
Total project budget needed			15275.00
Financing through other resources			
Finance needed from KBWOT			15275.00

Project 3 ☺	Analysis tagging experiments: seasonal growth patterns
Project leader	Adriaan Rijnsdorp
Theme	1. Ecosystem approach
Motivation and Project aims	
Definition of the problem	IMARES has a large data set of mark-recapture experiments of fish species which will be made available in FRISBE in 2014 (see application Ingeborg de Boois). The software to analyse the data, which is available as PASCAL programs, needs to be consolidated and updated in R to allow efficient processing of the data.
Objective of the project	(1) test the tagging data from FRISBE

(2) analyse tagging data and develop R-scripts for general use (recapture patterns, estimates of migration and dispersion parameters, growth, mortality) |
| Expertise needed | (1) Knowledge IMARES tagging experiments

(2) Expertise on animal movement

(3) Population biology |
| Expertise developed | (1) R-scripts will be developed to analyse recapture data replacing the PASCAL programs developed by Frans van Beek and Adriaan Rijnsdorp in the 1990s.

(2) Expertise will be consolidated by collaborating with younger colleagues (Jan Jaap Poos, Niels Hintzen, Loes Bolle, Erwin Winter) |
| Why should this be funded by KB WOT? | Tagging data provide important information on (i) movement and life history parameters of exploited fish species; (ii) spatial (stock) structure of exploited populations. Expertise in tagging experiments needs to be consolidated since Frans van Beek and Adriaan Rijnsdorp will retire in the near future. |
| What other potential funding sources have been considered? | No other funds have been considered |
| International objective of research | Database and analysis tools may be used in research collaboration:

(1) FISHCONNECT (KU-Leuven, ILVO): Analysis of the link between nursery grounds and spawning areas contribute to the collaboration with KU-Leuven on the Connectivity in flatfish populations (LB, ADR)

(2) Modelling spatial dynamics of flatfish: the seasonal movements estimated from the tagging experiments will be used to calibrate a spatially explicit model of the seasonal dynamics of plaice (JJP, NH, ADR)

(3) Transponder experiments are expected to be continued in future years around the effect studies of wind farms and infrastructural changes in river systems |

Work plan	
Broad description of the project including expected results	- Flatfish data extraction and quality control - Compilation of historic computer programmes used to analyse tagging data - Inventory of wish list of R-scripts to analyse tagging data - Development R-scripts to estimate the parameters for migration, growth and mortality from mark-recapture data, including graphical output in terms of maps. - workshop will be organised to discuss scripts and results - Output of migration experiments will be compared with previous analysis using the PASCAL programs (plaice) - Growth rates by year and by month will be analysed for various size classes of male and female plaice, sole and dab.
Approach and time schedule	Database completing the historic data will be done in parallel during the January-April 2014. Flatfish data sets will be extracted, analysed and reported between April and October.
Output/deliverables	- Rscript for analysis migration, growth, mortality parameters - Manuscript on seasonal growth patterns in flatfish
Dissemination of findings being addressed	Results of the growth analysis will be input in a paper to be presented on the 9th Flatfish Ecology Symposium (November 2014)
Utility of the developed products and expertise	- R-scripts will be made generally available - Expertise with tagging experiments will be consolidated with younger group of IMARES scientist
What are the potential risks to the project's success?	Technical problems, overbooking of people involved. This can be prevented by prioritising this project in relation to other activities.
Project organisation	
Involvement IMARES (names and expertise)	Loes Bolle, Jan Jaap Poos, Niels Hintzen, Erwin Winter, Ingeborg de Booijs
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	no
Involvement parties outside WUR (names and expertise)	KU Leuven & ILVO via BE-FISHCONNECT (Filip Volckaert, Genevieve Lacroix)
Relevance	
What is the market	fish behaviour science

Economical relevance	no
Social relevance	no
Scientific relevance	yes
Relevance to ministry EZ	contribution to sustainable fisheries management
Summary	Developing and consolidating scripts for analysis of tagging data. Analysing changes in annual and seasonal growth patterns in flatfish

Proposed budget*			
Personnel	tariff	hours	amount
CAT I	58	0	0.00
CAT II	77	0	0.00
CAT III	96	100	9600.00
CAT IV	120	80	9600.00
CAT V	140	40	5600.00
CAT VI	171		0.00
Total Personnel			24800.00
Material costs			
Facilities			
Specific costs			
Travel costs			0
Project equipment			0
Other material costs			
Total Material Costs			0.00
Total project budget needed			24800.00
Financing through other resources			
Finance needed from KBWOT			24800.00

* Project has been granted for the consolidation of expertise to young scientists, hence this project will receive € 12174,00.

Project 4 ☹	Size selective exploitation in a multi-species context
Project leader	Gerjan Piet
Theme	1. Ecosystem Approach
Motivation and Project aims	
Definition of the problem	The MSFD has stated objectives that will affect fisheries management but may not be achieved by single species management based on fishing mortality alone especially when dealing with mixed fisheries or when there are strong food web interactions between the exploited fish species.
Objective of the project	Investigate under what regime of size-selective fishing mortality the CFP and MSFD objectives can be achieved.
Expertise needed	Modelling skills in R, knowledge of Ecosystem-based fisheries management (EBFM)
Expertise developed	A recently developed size-structured simulation model of the North Sea fish community (consisting of the 12 main commercial species). Paper is submitted with GJ Piet and NH Hintzen as co-authors.
Why should this be funded by KB WOT?	This research aims directly at exploring how ecosystem-based fisheries management can achieve the objectives of the revised CFP and MSFD.
What other potential funding sources have been considered?	EU-funded projects but no suitable projects have been identified as yet
International objective of research	Expertise building of ecosystem models that can be applied for EBFM
Work plan	
Broad description of the project including expected results	Modification and application of the model to evaluate size selective fishing in a multi-species context.
Approach and time schedule	(1) Parameterisation of the model (1wk), (2) Design of scenarios to evaluate (1wk), (3) Link foodweb model to management strategy evaluation framework (1wk), (4) Running of the model and description of trade-offs in terms of yield versus the achievement of the different policy objectives depending on the size selectivity of fishing (1wk), (5) Preparation of paper and submission to peer-reviewed journal (2wks). As this needs to occur alongside other commitments the work will need to be spread over 5-6 months.
Output/deliverables	Publication in a peer-reviewed journal
Dissemination of findings being addressed	Possibly combined with presentation at appropriate fora (not identified)
Utility of the developed products and expertise	For IMARES it is important to show we have the expertise and these types of ecosystem models available as these are the tools

	required for any future EBFM.
What are the potential risks to the project's success?	None, as this is an exploratory academic exercise and expertise and capacity is available
Project organisation	
Involvement IMARES (names and expertise)	Gerjan Piet (EBM and Fish community), Niels Hintzen (Fish species and modelling)
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	None
Involvement parties outside WUR (names and expertise)	Julia Blanchard, University of Sheffield for the expertise on size-structured ecosystem models
Relevance	
What is the market	EU fisheries managers and ICES will be interested in these results as they can contribute to improved EBFM. For IMARES to be involved in any future project on EBM this type of expertise is needed.
Economical relevance	Size-selective exploitation can have larger consequences than the move from precautionary to MSY-based levels and can therefore have major economical relevance
Social relevance	The sustainability of our fisheries has great social relevance. Also, size selective fishing might select only adult fish rather than young, underdeveloped fish which is socially more accepted.
Scientific relevance	Size-selective exploitation was put forward in a recent Science publication as a means to achieve more sustainable fisheries. This, however, has never been explored with this type of model in a real setting.
Relevance to ministry EZ	This addresses several policy objectives that determine fisheries management
Summary	We intend to apply a size-structured model of the North sea fish community to evaluate size-selective EBFM scenarios. This will be disseminated in a peer-reviewed publication.

Proposed budget			
Personnel	**tariff**	**hours**	**amount**
CAT I	58		0.00
CAT II	77		0.00
CAT III	96	100	9600.00
CAT IV	120		0.00
CAT V	140	100	14000.00
CAT VI	171		0.00
Total Personnel			23600.00
Material costs			
Facilities			
Specific costs			
Travel costs			
Project equipment			
Other material costs			
Total Material Costs			0.00
Total project budget needed			23600.00
Financing through other resources			
Finance needed from KBWOT			23600.00

Project 5 ☺	Novel Stratification Approach
Project leader	Karin Troost
Theme	2. Maintaining Quality

Motivation and Project aims

Definition of the problem	Annually the stocks of fished bivalve species are estimated in Dutch coastal waters (WOT Schelpdieronderzoek). 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. With the near-disappearance of Spisula, other species showed strong increases (e.g. Ensis). This shift in target species requires an update of the stratification. The demand for spatial mapping of shellfish beds in the coastal zone is increasing due to nature legislation (Natura 2000, MSFD) and human impact studies (e.g. MER sand extraction). This calls for the same information as is needed to optimize stratification of the sampling grid.
Objective of the project	1. Update the basis for stratification in the North sea coastal zone WOT shellfish survey. 2. Optimize the stratified grid so that a trend-break is avoided, and the grid is suitable for stock assessments of multiple species. 3. Find the best way to map shellfish beds, or at least hotspots for development of shellfish beds.
Expertise needed	Analysis of remote sensing data, habitat suitability maps, benthos communities in the North Sea, statistics.
Expertise developed	Integrated use of remote sensing, habitat modelling and mathematical approaches, and a practical application in monitoring. More specific: -remote sensing techniques, -habitat modelling, -statistically sound survey designs, -mapping shellfish beds in subtidal areas.
Why should this be funded by KB WOT?	The WOT coastal shellfish survey will benefit through an updated sampling grid and therefore improved accuracy/efficiency for multiple species.
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 in particular and benthos in general. This will attract interest for cooperation across borders e.g. in EU projects (e.g. EMODnet).

Work plan

Broad description of the project including expected results	We integrate several disciplines to develop an updated stratified grid and a method to map shellfish beds. Remote sensing: single beam data is available at RWS. Correlate with shellfish data since 1995. Cooperate with sonar experts at Dutch Royal Navy. Habitat modelling: improve existing habitat suitability maps and extend this to other species and bivalves in general. Resampling simulations with the existing dataset since 1995. Integrate all these methods into an applicable approach to (periodically) update stratification on a scientifically objective basis and into

	the most efficient method based on presently available data for mapping of shellfish beds.
Approach and time schedule	1. Collate already available data and studies (months 1-3); 2. Analyses single beam data, statistical analyses on existing dataset (e.g. resampling sims), habitat modelling (months 3-6). Assess statistical consequences of eventual changes in stratification and update stratified grid according to results (months 6-9). Reporting: Describe method to update periodically. Describe best method to map shellfish areas / beds and create maps (months 9-12).
Output/deliverables	Reports: 1) improvement of stratified grid; 2) algorithm on efficient mapping of shellfish beds
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
What are the potential risks to the project's success?	Because of integration best methods presently available, no specific risks.
Project organisation	
Involvement IMARES (names and expertise)	K.Troost (monitoring), J.Craeymeersch (communities/models), N.Davaasuren (remote sensing), C.Chen (statistics).
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	None
Involvement parties outside WUR (names and expertise)	Leendert Dorst Dutch Royal Navy (remote sensing), Roger Mann VIMS USA (statistics)
Relevance	
What is the market	Ministries of EZ and I&M, companies obliged to perform North Sea impact assessments
Economical relevance	Indirect through impact assessments
Social relevance	No
Scientific relevance	Improvement knowledge functioning North Sea shellfish communities, novel integrated approach to monitoring setup.
Relevance to ministry EZ	Increased accuracy and efficiency shellfish survey and mapping shellfish beds
Summary	This project will update the basis for stratification in the North sea coastal zone WOT shellfish survey, by optimizing the stratified grid so that a trend-break is avoided, and find the best way to map shellfish beds or hotspots for development of shellfish beds.

Proposed budget			
Personnel	**tariff**	**hours**	**amount**
CAT I	58		0.00
CAT II	77	140	10780.00
CAT III	96	320	30720.00
CAT IV	120	40	4800.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			46300.00
Material costs			
Facilities			
Specific costs			
Travel costs			300.00
Project equipment			
Other material costs			
Total Material Costs			300.00
Total project budget needed			46600.00
Financing through other resources			
Finance needed from KBWOT			46600.00

Project 6 ☹	Innovative Mussel Mapping
Project leader	Karin Troost
Theme	2. Maintaining Quality

Motivation and Project aims

Definition of the problem	Mussel and oyster beds are mapped annually in spring throughout the entire Wadden Sea. Field work is time consuming and not all beds can be visited in the available time. We visit 40-95% of all beds every year. Innovative techniques are available to increase efficiency.
Objective of the project	Develop algorithm to use remote sensing (satellite data) to map presence of mussel and oyster beds, as a basis for field validation.
Expertise needed	remote sensing, mussel/oyster surveys
Expertise developed	algorithm to automatize mussel bed mapping from satellite images
Why should this be funded by KB WOT?	It increases efficiency and accuracy of WOT mapping of mussel and oyster beds.
What other potential funding sources have been considered?	None
International objective of research	Maintain leading position in survey techniques and optimise mussel bed mapping in international Wadden Sea to increase comparability between countries.

Work plan

Broad description of the project including expected results	It has proved possible to map mussel- and oyster beds using satellite images. Now we want to develop an algorithm to automatize creation of maps from these images to be able to apply it structurally in the surveys. This will also allow for measurements on (changes in) elevation of the beds, valuable for ecological studies.
Approach and time schedule	Development of algorithm (January - June); validate with survey data since 1994 (July - September); develop into user-friendly tool for annual use (October - December).
Output/deliverables	User-friendly tool to map beds from satellite data. Short report.
Dissemination of findings being addressed	Annual application in surveys, publication through WOT survey reports
Utility of the developed products and expertise	To improve efficiency and accuracy shellfish bed mapping Wadden Sea, a basis to attract cooperation with other institutes / countries
What are the potential risks to the project's success?	None. Development of algorithm should be feasible.

Project organisation

Involvement IMARES (names and expertise)	Karin Troost (shellfish monitoring), Nara Davaasuren (remote sensing), Carola van Zweeden / Douwe van den Ende (GIS)
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	None
Involvement parties outside WUR (names and expertise)	None
Relevance	
What is the market	Ministry EZ, potentially institutes mapping mussels in Germany (3 institutes) and other countries
Economical relevance	Not directly
Social relevance	None
Scientific relevance	High. Allows IMARES to stay on top of scientific developments in this field. In combination with sufficient field validations extra information will be generated that can be widely applied in research, such as elevation of the beds. The demand for mussel bed contours by third (research) parties is already high.
Relevance to ministry EZ	Increased efficiency and accuracy. In some years only 40% of the beds can be mapped, especially in years with a high cover of mussel/oyster beds. If remote sensing is applied 100% of the beds can be mapped efficiently each year. This can also be applied to oyster beds in Wadden Sea, Oosterschelde and Westerschelde.
Summary	This project will develop an algorithm to use remote sensing (satellite data) to map presence of mussel and oyster beds, as a basis for field validation.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	77	80	6160.00
CAT III	96	240	23040.00
CAT IV	120		0.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			29200.00
Material costs			
Facilities			
Specific costs			
Travel costs			300.00
Project equipment			
Other material costs			
Total Material Costs			300.00
Total project budget needed			29500.00
Financing through other resources			
Finance needed from KBWOT			29500.00

Project 7	☺	Larval time series in stock assessment
Project leader		Niels Hintzen
Theme		1. Ecosystem approach

Motivation and Project aims	
Definition of the problem	To accurately study the impact of fisheries on the 'pelagic ecosystem' means zooming in to species specific fish populations. Here we zoom in to the exploitation of the complex population structure of North Sea herring, which requires accurate estimation of spawning component densities to remain with a resilient population. Information on larval densities are key in this process but are currently not well embedded in the assessment process even though large amounts are yearly spend on the larval herring surveys. There is a need to improve the methods to address larval time series of the different components in stock assessment.
Objective of the project	Adjust the North Sea herring stock assessment model to accurately deal with larval time series of the different components and critically review the raw data of the larval time series.
Expertise needed	Knowledge on larval surveys and herring reproduction, knowledge on stock assessment and statistical estimation
Expertise developed	Linking survey observation appropriately to highly aggregated estimations of population abundance
Why should this be funded by KB WOT?	Large WOT budgets are spend yearly on herring larvae surveys, but the time series is partly neglected by the stock assessment. Through KBWOT we will aim to better utilise the available data.
What other potential funding sources have been considered?	-
International objective of research	Move to complex population structure assessment models is necessary improve fisheries (spatial) management

Work plan	
Broad description of the project including expected results	Through an analyses and valuation of the current larval abundance index (LAI) data, we will prepare an appropriate tuning index to be used in the assessment model. The assessment model will be adapted to take 4 larval index series, rather than an aggregated pre-processed survey index. This modification allows internal estimation of spawning component densities.
Approach and time schedule	LAI data analyses will be executed in the first quarter of 2014. In the second quarter, the assessment model modifications will be made, followed by scenario testing. In the third quarter, the results will be documented.
Output/deliverables	Adjusted stock assessment model. Communication at conference
Dissemination of findings being addressed	Communication at conference
Utility of the developed	Adjusted stock assessment model can be used worldwide to

products and expertise	appropriately deal with larval observations inside stock assessment models
What are the potential risks to the project's success?	Information in LAI might not contain enough signal to allow estimation of spawning component densities
Project organisation	
Involvement IMARES (names and expertise)	Niels Hintzen (stock assessment and modelling), Cindy van Damme (larval surveys and spawning)
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	-
Involvement parties outside WUR (names and expertise)	Mark Payne, DTU-Aqua, statistical and recruitment modelling
Relevance	
What is the market	Direct application to WOT larval survey and stock assessment tasks
Economical relevance	Good estimation of spawning component densities should ensure sustainable exploitation and prevent overexploitation of any component, as was seen before with Down's herring.
Social relevance	Better assessment model will lead to improved management of the resources.
Scientific relevance	Larval data is being collected worldwide but does not often find its way directly into stock assessments. This improvement is a step forward to match biological population structure to management objectives
Relevance to ministry EZ	Larval data collection is being paid for via WOT, but should be used more appropriately to improve herring assessment and (spatial) management decisions
Summary	We will analyse larval survey data and adjust an existing stock assessment model to estimate spawning component densities within the assessment model rather than outside the model which currently results in statistically ignoring the larval time series.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	77		0.00
CAT III	96	200	19200.00
CAT IV	120		0.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			19200.00
Material costs			
Facilities			
Specific costs			
Travel costs			400.00
Project equipment			
Other material costs			
Total Material Costs			400.00
Total project budget needed			19600.00
Financing through other resources			
Finance needed from KBWOT			19600.00

Project 8 ☹	Modelling nutrient dependence for growth of Perch and Pike perch in Lake IJssel and lake Marker using DEB
Project leader	Nicola Tien/Tessa van der Hammen
Theme	1 Ecosystem approach
Motivation and Project aims	
Definition of the problem	Perch and pikeperch in lake IJssel/Marker are suffering from depletion. It is unknown which part of the depletion is caused by the decreased nutrient inflow in the lakes and which part is caused by fishing mortality.
Objective of the project	(i) Develop a DEB model for perch and pike perch. (ii) Use the DEB model to model growth and reproduction and their dependencies on nutrient and consequently food availability. (iii) Compare results to available biological data in the two separate lakes. The lakes have distinctly different historical and contemporary nutrient conditions. They thus present two separate but comparable test cases for the DEB model. (iv) Publish in a peer reviewed journal
Expertise needed	DEB modelling knowledge. Knowledge of the lake IJssel/Marker ecosystem.
Expertise developed	DEB model on perch and pike perch. Knowledge on the effect of historical nutrient conditions on growth rate and maturation.
Why should this be funded by KB WOT?	The government is at present focussed on effective management of these stocks, and the lakes in general. Fundamental research on key ecological processes underlying the stock dynamics will aid our potential research and advice in this field.
What other potential funding sources have been considered?	Cooperation with KBWOT project OSMOSE for lake IJssel/Marker and probable BO/WOT projects in 2014 on stock assessment and management advice.
International objective of research	It would aid management and knowledge of other perch and pike perch stocks.
Work plan	
Broad description of the project including expected results	Healthy fish stocks are a requirement under GES (descriptors 1 diversity, 3 populations of commercial fish) and similar fresh water legislation. Understanding how to achieve a healthy stock is crucial. One aspect of this is understanding the impact of a changing environment on processes such as growth. In lake IJssel/Marker, fish stocks have decreased, which is in part expected to be the result of a decreased carrying capacity as a result of the depletion of nutrients.
Approach and time schedule	(1) Literature research (an expansion of previous literature re-search). (2) Estimation of DEB parameters using the DEB-routine written by prof. B. Kooijman (VU). (3) Estimation of dependence of growth, maturation and fecundity. (4) Comparison of results to present and historical growth and maturation rates in the two lakes, under the various abiotic conditions.

Output/deliverables	DEB model perch/pikeperch. The intention is to publish a paper in a peer reviewed journal
Dissemination of findings being addressed	See above
Utility of the developed products and expertise	Understanding the key ecological processes underlying these systems - such as the influence of changing nutrient conditions - will improve our use as research and advice partners for both government and other stakeholders.
What are the potential risks to the project's success?	The quality and quantity of the available input data for the DEB model.
Project organisation	
Involvement IMARES (names and expertise)	Nicola Tien (IJsselmeer ecology), Tessa van der Hammen (DEB model), Ben Griffioen (freshwater biology), Karen van de Wolfshaar (physiological modelling, perch knowledge).
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	-
Involvement parties outside WUR (names and expertise)	Bas Kooiman (VU), DEB expert. Eddy Lammens (RWS), IJsselmeer biology expert Dirkjan van der Stelt (min. EZ), IJsselmeer management expert
Relevance	
What is the market	Fishermen, ministries (EZ and I&M), NGO's
Economical relevance	Knowledge about important commercial species in the Dutch fresh water
Social relevance	There are strong discussions between stockholders about whether the depletions of the stocks in lake IJssel/Marker are caused by fisheries or nutrient depletion.
Scientific relevance	Knowledge about the lake IJssel/Marker ecosystem in combination with growth and fecundity of perch and pikeperch.
Relevance to ministry EZ	Better insight in the processes in lake IJssel/Marker
Summary	A DEB-model is developed for pikeperch and perch and tested with regard to their growth rate and maturation in lake IJssel/Marker, two lakes with distinctly different contemporary and historical nutrient inflow conditions.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	77		0.00
CAT III	96	350	33600.00
CAT IV	120		0.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			33600.00
Material costs			
Facilities			
Specific costs			
Travel costs			100.00
Project equipment			
Other material costs			
Total Material Costs			100.00
Total project budget needed			33700.00
Financing through other resources			
Finance needed from KBWOT			33700.00

Project 9	☺	Has trawling turned the Dutch seafloor into a high-production fish farm?
Project leader		Tobias van Kooten
Theme		1 Ecosystem approach
Motivation and Project aims		
Definition of the problem		Is the production of flatfish on the Dutch Continental Shelf stimulated by trawling-induced fish-food subsidies?
Objective of the project		Test recent model predictions which show that side effects of trawling on benthic macro-invertebrates can stimulate the production of fish.
Expertise needed		Data analysis, statistical modelling
Expertise developed		ecosystem feedback effects on fishery yield
Why should this be funded by KB WOT?		This study facilitates a fact-based evaluation of the relevance of food web interactions, a central concept in the ecosystem approach, in shaping fishery yield and macrobenthos biodiversity.
What other potential funding sources have been considered?		Both VIBEG research and BENTHIS will contribute this research in 2014.
International objective of research		see above (objective of the project)
Work plan		
Broad description of the project including expected results		Our recent study 'when does fishing lead to more fish?..." has been well-received. In this work, we analyse a simple food web model to study under which conditions a trawling-induced shift in the macrobenthic food web can boost the production of harvestable fish. Use a simple community model to study under which conditions the combination of direct mortality on benthic macroinvertebrates. However, the recurring response to model studies is 'but it's just a model'. In the research proposed here we will look for evidence of these processes in benthos data. We will carry out a Biological Trait Analysis (with CEFAS through the BENTHIS project) on benthos monitoring data (MWTL), to study patterns in benthos susceptibility to trawling and edibility to fish in relation to the trawling history of the sampled location, which we get from VMS data. The emerging relationships between fishery, various types of benthos (edible/inedible, susceptible/resistant) will be compared to output from the model under various scenarios of biological regulation (bottom-up and top-down). The majority of the money applied for will be used to finance the PhD position of DvD. through AFI. The rest will be used to cover TvK's involvement. AR's involvement in this study will be covered by BENTHIS and AR's appointment at AFI. Benthis will provide funding for meetings with CEFAS collaborators.
Approach and time		Analysis of available data and application of an existing biological

schedule	trait database for macrobenthos (collaboration with CEFAS/Stefan Bolam).
Output/deliverables	a peer-reviewed publication
Dissemination of findings being addressed	Dissemination through talks on conferences, WUR website, scientific publication, active communication of results in various stakeholder fora (ex.: VIBEG regiegroep, North Sea RAC), presentation at ICES ASC.
Utility of the developed products and expertise	Peer-reviewed publications increase our credibility, both nationally and internationally. Publications on this subject keep us on the forefront internationally in disentangling the interaction between trawlers, benthos and fish, in determining the yield from fishery.
What are the potential risks to the project's success?	As with any research, we do not know the results beforehand. Hence, there is always the risk that the results are unpublishable.
Project organisation	
Involvement IMARES (names and expertise)	Tobias van Kooten, Adriaan Rijnsdorp, Daniel van Denderen
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	Daniel van Denderen (WIAS PhD student through AFI)
Involvement parties outside WUR (names and expertise)	AFI (DvD), CEFAS (Stefan Bolam/ Andy Kenny)
Relevance	
What is the market	This work further strengthens our expertise in the community effects of trawling and makes us a more attractive partner in international collaborations such as EU consortia.
Economical relevance	Beam trawlers are an important commercial fleet in the Netherlands. This study directly relates to several measures which are used to restrict their operation (area closures and gear modification)
Social relevance	This work relates strongly to a claim from the fishermen, that untrawled areas (like the plaice box) become unproductive.
Scientific relevance	This work will test model predictions which we have produced. It is a logical follow-up on an earlier study.
Relevance to ministry EZ	This work is highly relevant in relation to management of the beam trawl fleet and in particular to the use of closed areas and gear modifications.
Summary	In this study, we test recent model predictions which show that side effects of trawling on benthic macro-invertebrates can stimulate the production of fish. We do this using a combination of existing data (VMS, MWTL benthos survey) and a biological trait database. The results have important ramifications for the

implementation

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	77		0.00
CAT III	96		0.00
CAT IV	120	40	4800.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			4800.00
Material costs			
Facilities			
Specific costs			
Travel costs			
Project equipment			
Other material costs			45000
Total Material Costs			45000.00
Total project budget needed			49800.00
Financing through other resources			20000.00
Finance needed from KBWOT			29800.00

Project 10	:)	Bycatch: bane or boon?
Project leader		Tobias van Kooten
Theme		1 Ecosystem approach

Motivation and Project aims

Definition of the problem	It is theoretically possible that killing small fish can lead to more large fish, because it speeds up the growth rate and growth efficiency of the survivors (van Kooten et al 2007). Bycatch of undersized fish is an important source of mortality for small individuals of some commercially exploited species. This leads to the question if discarding could be an important mechanism speeding up the growth of larger, harvestable fish.
Objective of the project	Show how discarding of undersized fish (as coupled to harvesting of marketable sizes) changes growth patterns, and under which conditions it can increase the production of harvestable biomass in a fish stock.
Expertise needed	size-structured population modelling
Expertise developed	The role of discarding as an important process determining the growth and dynamics of harvested populations.
Why should this be funded by KB WOT?	Minimizing discarding has been and will continue to be an important consideration in fisheries management.
What other potential funding sources have been considered?	none
International objective of research	see above (objective)

Work plan

Broad description of the project including expected results	Individuals of a substantial number of commercially harvested fish species show density-dependent growth (Lorenzen & Enberg 2002). This means that growth slows down at high abundance. It has also been shown that mortality of juvenile individuals in such systems can increase the size and abundance of adult individuals (van Kooten et al '07). Potentially, this means that killing juveniles through bycatch could actually promote the growth of the remaining juveniles and the production of marketable adult. Bycatch could hence be not just the wasteful removal of unusable biomass, but also stimulate the production of large fish. Here we aim to study how gear selectivity and minimum landing size affect the role of discarding in the production of harvestable fish.
Approach and time schedule	An existing model and parameterization for sole will be extended to include fishing and discard mortality. Sole is one of the species in which density-dependent growth is most strongly present (Lorenzen & Enberg). Simulations will be carried out under different types of harvesting selectivity and at different intensities. The results will be written up in a scientific publication.
Output/deliverables	1 peer-reviewed publication

Dissemination of findings being addressed	Scientific publication, presentations for stakeholders (North Sea RAC?), WUR website, presentation at conferences (ICES ASC?)
Utility of the developed products and expertise	Insight into a potential controversial effects of bycatch will facilitate a facts-based discussion on the implementation of management measures to minimize it.
What are the potential risks to the project's success?	none foreseen
Project organisation	
Involvement IMARES (names and expertise)	Tobias van Kooten (modelling, writing, coordination) Karen van de Wolfshaar (modelling, writing)
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	IMARES
Involvement parties outside WUR (names and expertise)	-
Relevance	
What is the market	This work strengthens our expertise in the nonlinear and sometimes unexpected response of ecological communities to harvesting. This makes us a more attractive partner in international collaborations such as EU consortia.
Economical relevance	The results will show under which condition the potential to harvest a fish population could be boosted by undersized bycatch, or reduced by minimizing it.
Social relevance	Undersized bycatch and discarding has a strongly negative connotation in the eyes of the public. this work provides the knowledge for a discussion based on facts, rather than feelings
Scientific relevance	Despite ample evidence, there is not much published work in the fisheries literature which studies the consequences of density-dependent growth. This work aims to make a start to fill that gap.
Relevance to ministry EZ	Relevant in relation to the expected effects of gear modifications (pulse, wing) to minimize undersized bycatch.
Summary	This project will show how discarding of undersized fish changes growth patterns, and under which conditions it can increase the production of harvestable biomass in a fish stock.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	77		0.00
CAT III	96	100	9600.00
CAT IV	120	80	9600.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			19200.00
Material costs			
Facilities			
Specific costs			
Travel costs			
Project equipment			
Other material costs			
Total Material Costs			0.00
Total project budget needed			19200.00
Financing through other resources			
Finance needed from KBWOT			19200.00

Project 11 🙁	Population dynamical consequences of habitat shifts in juvenile flatfish
Project leader	Karen van de Wolfshaar
Theme	1. Ecosystem approach
Motivation and Project aims	
Definition of the problem	Large juvenile flatfish have left their known nursery areas since the 1990s moved to deeper areas. Studies on the phenomenon deal with observations in numbers (Tulp et al. 2008), in bycatch (van Keeken et al. 2007) and possible causes (e.g. Teal et al. 2012). Population consequences of this habitat shift have not been addressed yet.
Objective of the project	Study population consequences of juvenile flatfish age 1+ movement towards the deep
Expertise needed	modelling, flatfish biology
Expertise developed	expertise on the population consequences of habitat shift and including effects on (by)catch
Why should this be funded by KB WOT?	This research provides a first step in understanding the population dynamical consequences of the habitat shift observed for flatfish. It takes the observations a step further into understanding and managing stocks in a changing environment
What other potential funding sources have been considered?	none
International objective of research	provides input for the multi-annual goals of ICES wg VHES, on the value of coastal habitat to exploited species.
Work plan	
Broad description of the project including expected results	North Sea plaice age 1 no longer occurs in the coastal areas and has moved to deeper waters (Beare et al. 2013, Teal et al. 2012). This movement implies that this life stage shifts from one feeding area to the next, which will influence resource competition in both areas (Van Keeken et al. '07). Shifts in competition may influence population structure with respect to high or low biomass of the largest, marketable, size classes and affects bycatch rates. Here we will study the population dynamical consequences and effects of fisheries of this habitat shift, which has not been performed yet.
Approach and time schedule	An existing stage-structured model for plaice (Van de Wolfshaar et al. 2012) will be adopted. Results will deal with population dynamics of a plaice population as a function of the time large juveniles spent in deep and shallow habitat, thereby varying the completion between stages. Fishing mortality will be included for adults and the fraction of large juveniles in the deeper habitat, allowing a change in bycatch with changing habitat use.
Output/deliverables	a peer reviewed paper
Dissemination of findings	scientific publication; presentation at ICES wg VHES and possibly

being addressed	at an scientific conference
Utility of the developed products and expertise	This proposal shows the population dynamical and catch/bycatch consequences of a species life stage shifting habitat. It will provide knowledge needed for an ecosystem approach to marine management.
What are the potential risks to the project's success?	none

Project organisation

Involvement IMARES (names and expertise)	Karen van de Wolfshaar (ecological and population modelling), Ingrid Tulp (flatfish ecology, coastal ecology)
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	Imares
Involvement parties outside WUR (names and expertise)	collaboration with ICES working group VHES, on the value of coastal habitat to exploited species; Hakan Wennhage (Univ of Gotenburg; flatfish, coastal ecosystems) and Josianne Stottrup (Danish inst. Fisheries Res.; coastal fish ecology)

Relevance

What is the market	fisheries science ,ICES, and perhaps (government) marine spatial planning
Economical relevance	small
Social relevance	minor
Scientific relevance	high
Relevance to ministry EZ	minor
Summary	This project will study population consequences of juvenile flatfish age 1+ movement towards the deep.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	77		0.00
CAT III	96	150	14400.00
CAT IV	120	30	3600.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			18000.00
Material costs			
Facilities			
Specific costs			
Travel costs			
Project equipment			
Other material costs			
Total Material Costs			0.00
Total project budget needed			18000.00
Financing through other resources			
Finance needed from KBWOT			18000.00

Project 12 ☺	Modelling the interdependence of perch and pikeperch in Lake IJssel and lake Marker
Project leader	Nicola Tien
Theme	1 Ecosystem approach
Motivation and Project aims	
Definition of the problem	Many fish stocks in lake IJssel/Marker are suffering from depletion, including perch and pikeperch. Stock management is single stock oriented, but there is strong interdepence between key commercial stocks. Is the recovery of the separate stocks influenced by the dynamics of the other stocks? Should management first focus on the recovery of a sub selection of the stocks?
Objective of the project	(i) Develop a theoretical model for pikeperch and perch that takes their intraguild predation (IGP), cannibalism and their shared food source smelt into account. (ii) Investigate how the population dynamics are interdependent. (iii) Investigate how visibility conditions (via the attack rates) influence the IGP interactions. (iv) Compare results to biological data for the two lakes (which have different histories in visibility development). (v) Publish in a peer reviewed journal
Expertise needed	Theoretical modelling knowledge. Knowledge of the lake IJssel/Marker ecosystem.
Expertise developed	Theoretical model on perch and pike perch. Knowledge on the influence of IGP, competition and cannibalism on the population dynamics. Knowledge on the influence of visibility on the stocks.
Why should this be funded by KB WOT?	The government is at present focussed on effective management of pikeperch and perch, and the lake IJssel/Marker in general. Fundamental research on the ecological processes underlying stock dynamics will aid our potential research and advice.
What other potential funding sources have been considered?	BO/WOT projects in 2014 on stock assessment and management advice for pikeperch, perch and smelt in lake IJssel/Marker.
International objective of research	It would aid management and knowledge of other perch and pike perch stocks.
Work plan	
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 a healthy stock levels is crucial. One aspect of this is understanding the interactions between the stocks of interest. If two important stocks will negatively influence each other's recovery, management needs to be adapted accordingly.
Approach and time schedule	(1) literature research (an expansion of previous literature research). (2) development of IGP model (3) analysis and interpretation of the processes
Output/deliverables	Information on whether the recovery of a stock might be hindered/improved by the dynamics in another stock. Insight

	into the influence of visibility on the population dynamics. 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 quality of the available input data for the IGP model.
Project organisation	
Involvement IMARES (names and expertise)	Nicola Tien (pikeperch, perch, IJsselmeer ecosystem), Karen van de Wolfshaar (theoretical model, perch), Charlotte Deerenberg (smelt and IJsselmeer ecosystem), Ben Griffioen (fresh water).
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	-
Involvement parties outside WUR (names and expertise)	Eddy Lammens (RWS), IJsselmeer biology expert. Dirkjan van der Stelt (min. EZ), IJsselmeer management expert
Relevance	
What is the market	Fishermen, ministries (EZ and I&M), NGO's
Economical relevance	Knowledge about the lake IJssel/Marker system and a step ahead in reaching healthy fish stocks in combination with commercial fishery activities.
Social relevance	Knowledge on how management can most efficiently aid the economical and ecological recovery of lakes
Scientific relevance	Knowledge about the lake IJssel/Marker ecosystem, and especially the interaction between perch, pikeperch, changing environmental conditions and smelt.
Relevance to ministry EZ	Better insight in the processes in lake IJssel/Marker
Summary	A theoretical model is developed for pikeperch and perch, which takes their depence on a shared food source (smelt), their mutual predation, their cannibalism and the dependence on visibility into account.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	77		0.00
CAT III	96	250	24000.00
CAT IV	120		0.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			24000.00
Material costs			
Facilities			
Specific costs			
Travel costs			0.00
Project equipment			
Other material costs			
Total Material Costs			0.00
Total project budget needed			24000.00
Financing through other resources			
Finance needed from KBWOT			24000.00

Project 13 ☹	Improving the mackerel egg survey by better dealing with the spatio-temporal variability in spawning distribution.
Project leader	Thomas Brunel
Theme	1. Ecosystem approach

Motivation and Project aims	
Definition of the problem	The triennial mackerel egg survey is the only fisheries independent data source for NEA mackerel. The accuracy of the survey index relies on a good spatio-temporal coverage of spawning. Recently, mackerel spawning distribution has expanded and peak spawning occurs earlier in the year. This may have increased the uncertainty in the index because: 1) spawning timing is less predictable and the risk of missing part of the egg production due to inadequate coverage will increase, and 2) to completely cover the larger spawning area, part of the interlacing survey transects could not be sampled, increasing the number of interpolations. Hence, there is a need to develop new methods to minimise the consequences of these sources of uncertainty, both in terms of index calculation for the time series and optimisation of survey coverage in the future.
Objective of the project	Develop a method to more accurately derive the survey index and assess the risk of having inadequate survey coverage in the past and reduce this risk in future surveys.
Expertise needed	Knowledge about the current design and statistical methods implemented in the egg survey, geostatistics and species distribution modelling
Expertise developed	Model to assess uncertainty and model that can be used to predict spawning
Why should this be funded by KB WOT?	This will increase the accuracy of the egg surveys index and give a tool to decide where and when sampling should take place
What other potential funding sources have been considered?	None
International objective of research	Improve an international survey, provide better data for the assessment of mackerel

Work plan	
Broad description of the project including expected results	Geostatistics and species distribution modelling will be used to describe the spatial distribution of the egg density. Maps of egg production (and associated uncertainty estimates) will be produced and compared to the current method. The species distribution model will be used to predict past distributions based on environmental conditions to assess adequacy of the spatial coverage in the past surveys. The possibility of using the model to predict current egg production from current environmental information to adjust the design of an on-going survey will be investigated.
Approach and time schedule	Nov-Dec 2013: model development

Jan-Feb 2014: re-calculation of past egg survey indices and CVs |

	(as input to the benchmark) Mar-Aug 2013: hind cast and forecast possibilities
Output/deliverables	Robust statistical method for SSB index calculation, Estimate of uncertainty/bias in the past surveys, Tool to improve survey design
Dissemination of findings being addressed	ICES groups: WGMEGS, WGWIDE and benchmark in WKPELA 2014; and peer-reviewed paper
Utility of the developed products and expertise	This project should reduce the uncertainty on the abundance estimates for mackerel. This is especially relevant in the context of the upcoming mackerel benchmark assessment.
What are the potential risks to the project's success?	related to the potential lack of model fitting
Project organisation	
Involvement IMARES (names and expertise)	Cindy van Damme / mackerel egg survey Sven Gastauer / geostatistics Thomas Brunel/ species distribution modelling
Is the appropriate capacity available?	yes
Involvement parties within WUR	none
Involvement parties outside WUR	M. Payne (DTU Aqua / Denmark) statistical models
Relevance	
What is the market	the scientific community involved in mackerel monitoring, assessment and management, stakeholders and industry
Economical relevance	This is one of the largest stocks in the NE Atlantic, yet good reliable data for management is scarce.
Social relevance	improving the accuracy of the egg survey index has direct implication for the catch of mackerel and the sustainability of its fisheries
Scientific relevance	mackerel egg survey is unique with regards to the amount of survey time and lab work. to make the most of this considerable investment, improved statistical treatment of the data is needed.
Relevance to ministry EZ	Mackerel is a key species for the Dutch pelagic fleet, and a politically sensitive one. Improving the quality of the scientific advice given for this stock is very relevant for the Netherlands.
Summary	this project will reduce the uncertainty in the mackerel egg survey index by applying new statistical methods, better suited to deal with the type of the spatial distribution of the species and its variability. This will improve the accuracy of the mackerel assessment and management advice

Proposed budget			
Personnel	**tariff**	**hours**	**amount**
CAT I	58		0.00
CAT II	77		0.00
CAT III	96	220	21120.00
CAT IV	120		0.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			21120.00
Material costs			
Facilities			
Specific costs			
Travel costs			1000.00
Project equipment			
Other material costs			
Total Material Costs			1000.00
Total project budget needed			22120.00
Financing through other resources			
Finance needed from KBWOT			22120.00

Project 14	Fish ageing
Project leader	Loes Bolle
Theme	2. Maintaining Quality
Motivation and Project aims	
Definition of the problem	Age reading is a key expertise in fisheries research, but it is not a simple task. It 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 of the project	Maintaining quality of age determinations
Expertise needed	(1) Coordinators with international contacts in the field of fish aging (2) Experienced age readers
Expertise developed	Fish ageing
Why should this be funded by KB WOT?	IMARES needs to maintain its expertise in fish ageing to deliver an internationally approved WOT programme. 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.
What other potential funding sources have been considered?	WOT programme
International objective of research	Improve quality of age data used in international stock assessment working groups
Work plan	
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.
	(3) Specific goal for 2014: an elaboration of the existing IMARES fish ageing manual (revised in 2013), to document the quality control and training 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
Project organisation	
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 - 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
Relevance	
What is the market	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	Most stock assessment models are age structured

Summary	Age reading is a key expertise in fisheries research, but it is not a simple task. It requires training, exercise, (international) calibration, quality assurance and quality control. This project will maintain the quality of age reading.

Proposed budget			
Personnel	**tariff**	**hours**	**amount**
CAT I	58	84	4872.00
CAT II	77	344	26488.00
CAT III	96	168	16128.00
CAT IV	120		0.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			47488.00
Material costs			
Facilities			0.00
Specific costs			0.00
Travel costs			1500.00
Project equipment			0.00
Other material costs			233.00
Total Material Costs			1733.00
Total project budget needed			49221.00
Financing through other resources			0.00
Finance needed from KBWOT			49221.00

Project 15 ☹	CLUPGEN - Genetics of clupeoids
Project leader	Cindy van Damme
Theme	2. Maintaining quality

Motivation and Project aims

Definition of the problem	Every year high budget is spent on herring larvae surveys. The identification of the fish larvae in the samples is still done by visual identification. Results of the international workshop WKIDFL showed agreement in larvae identification was only 62% (ICES 2011). There is a lot of confusion in identification between the clupeoid larvae, herring, pilchard and sprat. Genetic analysis of the larvae will show if the visual identification is correct. Furthermore in 2013 we showed it is possible to identity fish eggs in mixed samples. This project will aim to carry out genetic analysis on mixed larvae samples.
Objective of the project	To confirm larvae identification in samples from the different herring larvae surveys and investigate the use of genetics in workup of samples from larvae surveys instead of visual identification. In the short term this will improve the indices from the herring larvae surveys and the herring assessment.
Expertise needed	Genetic analysis, herring larvae surveys
Expertise developed	Confirmation of visual identification and possibly another method to workup samples which might reduce costs when genetic analyses is carried out on a routinely basis.
Why should this be funded by KB WOT?	Larvae identification is core to the data collection in the various WOT surveys.
What other potential funding sources have been considered?	None
International objective of research	Herring is an internationally important commercial species. The herring larvae surveys are ICES coordinated surveys and results are used in the assessment of herring. The use of genetic analysis to identify fish larvae in mixed samples can be used in worldwide surveys.

Work plan

Broad description of the project including expected results	Samples are collected during the various herring larvae surveys in December - February and September. Analysis will be carried out visually and afterwards the samples will be analysis with genetics.
Approach and time schedule	First quarter and third quarter sample collection Second and third quarter genetic analysis Third and fourth quarter data analysis
Output/deliverables	Confirmation of larvae identification of survey samples

Dissemination of findings being addressed	Presentations at ICES WG's and reports and larval fish symposium
Utility of the developed products and expertise	This will confirm the visual identification of the clupeoid larvae and might on the long term be used instead of visual identification.
What are the potential risks to the project's success?	Risks are minimal, samples will be collected during regular surveys and the genetics analyses on mixed samples of fish eggs were successful.
Project organisation	
Involvement IMARES (names and expertise)	Hilde van Pelt (Genetics) Cindy van Damme (Larvae surveys and sampling)
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	WUR Animal Breeding and Genomics Center
Involvement parties outside WUR (names and expertise)	Senkenberg Instituut, Duitsland
Relevance	
What is the market	Direct use in larval fish surveys and improvement of the herring assessment.
Economical relevance	Herring is one of the economically important fish species for the Dutch fisheries.
Social relevance	Improved assessment will lead to better management of the herring stocks.
Scientific relevance	Confirmation of the visual identification of fish larvae is currently lacking, workshops do not have the availability of larvae of known species. An independent method for identification from mixed samples will be helpful for all larval surveys.
Relevance to ministry EZ	Confirmation of the visual identification will increase the accuracy of the results from the regular WOT surveys. On the long term the genetic analysis may prove to be cheaper compared to the visual identification.
Summary	Visual identification of clupeoid larvae from mixed surveys samples will be confirmed by genetic analysis of the mixed larvae samples.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	77	120	9240.00
CAT III	96	100	9600.00
CAT IV	120		0.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			18840.00
Material costs			
Facilities			
Specific costs			
Travel costs			
Project equipment			
Other material costs			5000
Total Material Costs			5000.00
Total project budget needed			23840.00
Financing through other resources			
Finance needed from KBWOT			23840.00

Project 16	Program management
Project leader	Cindy van Damme
Theme	Management
Motivation and Project aims	
Definition of the problem	To manage and develop the KBWOT Fisheries theme within WUR KB theme 4.
Objective of the project	To manage and develop the KBWOT Fisheries theme within WUR KB theme 4.
Expertise needed	
Expertise developed	
Why should this be funded by KB WOT?	As this 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.
Work plan	
Broad description of the project including expected results	To manage and develop the KBWOT Fisheries theme within WUR KB theme 4. Reporting on the 2013 programme and a description and rationale for the 2014 programme.
Approach and time schedule	
Output/deliverables	2 reports – reporting on the 2013 programme and a description and rationale for the 2014 programme.
Dissemination of findings being addressed	Through a range of media and 2 reports – reporting on the 2012 programme and a description and rationale for the 2013 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.
What are the potential risks to the project's success?	Minimal.
Project organisation	
Involvement IMARES (names and expertise)	Cindy van Damme, Frans van Beek, Rian Schelvis

Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	Close links through KB 4.
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
Relevance	
What is the market	Ministry of EZ
Economical relevance	
Social relevance	
Scientific relevance	To manage and develop the KBWOT Fisheries theme within WUR KB theme 4.
Relevance to ministry EZ	See utility of the developed products and expertise.
Summary	To manage and develop the KBWOT Fisheries theme within WUR KB theme 4.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	77		0.00
CAT III	96	200	19200.00
CAT IV	120	50	6000.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			25200.00
Material costs			
Facilities			
Specific costs			
Travel costs			
Project equipment			
Other material costs			
Total Material Costs			0.00
Total project budget needed			25200.00
Financing through other resources			
Finance needed from KBWOT			25200.00

Project 17 ☺	International exchange
Project leader	Cindy van Damme
Theme	3 International exchange
Motivation and Project aims	
Definition of the problem	To fund participation in international science networks and ICES meetings.
Objective 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 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. and 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.
Work plan	
Broad description of the project including expected results	To fund participation 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 Group on Integrated Assessments of the North Sea, Workshop on the identification of clupeoid larvae, Workshop on Statistical Analyses of Biological Calibration Studies, Working Group on Integrative Physical-biological and Ecosystem Modelling, Working Group on Methods of Fish Stock Assessments, Working Group on Atlantic Fish Larvae and Eggs Surveys.
Approach and time schedule	
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
Project organisation	
Involvement IMARES (names and expertise)	de Boois, Bolle, Teal, Miller, Hintzen, Röckmann, Rijnsdorp, van Marlen, Fässler, van Damme, IMARES MT
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).
Relevance	
What is the market	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 KBWOT and the network provided by these groups provides great added value to the KBWOT resources.
Summary	To fund participation in international science networks and ICES meetings.

Proposed budget			
Personnel	**tariff**	**hours**	**amount**
CAT I	58		0.00
CAT II	77	140	10780.00
CAT III	96	600	57600.00
CAT IV	120	140	16800.00
CAT V	140	100	14000.00
CAT VI	171		0.00
Total Personnel			99180.00
Material costs			
Facilities			
Specific costs			
Travel costs			20673.00
Project equipment			
Other material costs			
Total Material Costs			20673.00
Total project budget needed			119853.00
Financing through other resources			
Finance needed from KBWOT			119853.00

Project 18 ☺	HERCATCH - Herring larvae catchability
Project leader	Cindy van Damme
Theme	2. Maintaining quality
Motivation and Project aims	
Definition of the problem	The 2013 KB WOT project gear efficiency showed that catchability of the different gears used for the various WOT herring larvae surveys are highly different. In fact the catchability of the MIK-net was lower than expected. This has raised questions on the MIK herring larvae time series. The ICES Herring assessment group (HAWG) has requested IMARES to continue the comparison sampling between the MIK, MIKey M and Gulf VII during the IBTS-MIK survey in 2014. But these data do not give information on the behaviour of the gear in the water column during the sampling. Therefore experiments in a flume tank are necessary to compare behaviour of the different gears. These experiments have not been done before. Added value is: In recent plankton surveys we have experienced bad weather circumstances when we decide that sampling was not reliable anymore but we have no idea when the efficiency of the gear goes down. Flume tank experiments would answer the question at which weather circumstances sampling should be stopped.
Objective of the project	Comparison of catchability and efficiency of different ichthyoplankton gears used for clupeoid larvae surveys.
Expertise needed	Ichthyoplankton surveys and gear technology
Expertise developed	Comparison of catchability and efficiency at different weather circumstances of ichthyoplankton samplers.
Why should this be funded by KB WOT?	The herring larvae surveys are long running ICES coordinated WOT surveys. This project will increase accuracy of the data and will improve the herring assessment.
What other potential funding sources have been considered?	JPI Oceans project.
International objective of research	The ICES HAWG has requested to continue investigations in the comparison of the catchability and efficiency of the plankton samplers in order to improve the herring larvae indices and herring assessment. Comparisons between the plankton gears and knowing under which circumstances efficiency will go down are of vital importance to any international ichthyoplankton survey.

Work plan	
Broad description of the project including expected results	During the IBTS-MIK survey MIK and MIKey M samples will be collected at all stations. During the sampling in the southern North Sea and English Channel comparison hauls will be carried out with the Gulf VII plankton sampler. Experiments will be carried out with all gears in the SINTEF flume tank in Hirtshals.
Approach and time schedule	1st quarter collect samples and carry out comparative hauls, 2nd quarter flume tank experiments and analyse samples, 3rd quarter data analysis and present results at international larval symposium.
Output/deliverables	Efficiency and catchability of different gears.
Dissemination of findings being addressed	Presentations at ICES expert groups and international symposium and peer-reviewed manuscript.
Utility of the developed products and expertise	Results will improve ICES herring larvae indices and other WOT ichthyoplankton survey data.
What are the potential risks to the project's success?	Risks are minimal, bad weather during the IBTS-MIK survey might reduce the number of samples.
Project organisation	
Involvement IMARES (names and expertise)	Kees Bakker (gear technology), Cindy van Damme (plankton surveys) Ineke Pennock, Ruben Hoek, Andre Dijkman-Dulkes, Betty van Os-Koomen (larval identification)
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	None
Involvement parties outside WUR (names and expertise)	Richard Nash, IMR, Norway, Steve Coombs, Spartel, UK, Matthias Klopmann, TI, Germany, Christophe Loots, IFREMER, France
Relevance	
What is the market	ICES HAWG for the herring assessment and other ichthyoplankton surveys.
Economical relevance	Herring is an economically important species.
Social relevance	Better indices will lead to better assessment and improve management of herring stocks.
Scientific relevance	Results will improve data collection in ichthyoplankton surveys.
Relevance to ministry EZ	Results will improve quality of WOT ichthyoplankton survey data collection and improve herring larvae indices for the ICES herring assessment.
Summary	Comparison of catchability and efficiency of different ichthyoplankton gears used for clupeoid larvae surveys.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	77	300	23100.00
CAT III	96	120	11520.00
CAT IV	120		0.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			34620.00
Material costs			
Facilities			12000.00
Specific costs			
Travel costs			1500.00
Project equipment			
Other material costs			1000.00
Total Material Costs			14500.00
Total project budget needed			49120.00
Financing through other resources			
Finance needed from KBWOT			49120.00

Project 19 ☺	Discriminating between landings from the North Sea horse mackerel and Western horse mackerel stocks using the GCxGC-MS
Project leader	Aukje Coers/Tessa van der Hammen
Theme	1 Ecosystem approach

Motivation and Project aims

Definition of the problem	The Dutch pelagic industry and IMARES have recently developed a North Sea horse mackerel management plan. However, a long-term management plan would greatly benefit from insight in the origin of the landings from ICES area VIId, which are allotted to the North Sea stock. However, Western horse mackerel are also present in this area during the time of the year when also most of the fishery takes place. This results in catches being a mix 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 of the project	The project will gain better knowledge of the North Sea stock, which will be used in the management of the North Sea Horse mackerel stock. In addition, the method of using the GCxGC-MS to distinguish fish stocks has not been done before and may with this project be developed and used in the future.
Expertise needed	GCxGC-MS use and interpretation
Expertise developed	use of GCxGC-MS for distinction between stocks/feeding areas
Why should this be funded by KB WOT?	The method of using the GCxGC-MS to distinguish fish stocks/feeding areas of fish may be developed and used in the future.
What other potential funding sources have been considered?	A short pilot is running already (BO horse mackerel management plan). The industry was also asked to contribute (without success).
International objective of research	Better management of the North Sea horse mackerel stock.

Work plan

Broad description of the project including expected results	A way to distinguish between individuals of the two stocks may be with the GCxGC-MS (Gas chromatography–mass spectrometry). This technique uses a 'fingerprint', showing the chemicals in the fish meat, which have been taken up by feeding. Because individuals of the two stocks reside at different feeding areas, they have absorbed different chemicals, resulting in distinguishable fingerprints. The project will consist of taking samples that belong to one of the two populations (e.g. west of Ireland and in the North Sea). We will use the GCxGC-MS to detect differences between the two stocks. We will then take samples from the area in which the stocks overlap and use the fingerprint to determine to what stock these individuals belong, resulting in that we know which fraction of the landings from area VIId belong to what stock. Within a BO project on the horse mackerel management plan, a short pilot has already been

	started, doing this with few samples. The results are expected at the end of 2013 and will be used as pilot for this project.
Approach and time schedule	1) Take samples in different areas 2) analyse using GCxGC-MS, 3) write paper.
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 a peer reviewed paper).
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.
Project organisation	
Involvement IMARES (names and expertise)	T. v.d. Hammen/A.Coers (horsemackerel stock), M.Kotterman (GCxGC-MS), D.Miller (chair 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)	Beatrice Roel (CEFAS), pelagic RAC Denmark
Relevance	
What is the market	WGWIDE, ICES, ministry
Economical relevance	better NS horse mackerel management
Social relevance	better NS horse mackerel management
Scientific relevance	Use of the GC-GC-MS to distinguish between two feeding areas.
Relevance to ministry EZ	better NS horse mackerel management
Summary	Discriminating between landings from the North Sea Horse Mackerel and Western Horse-mackerel stocks using the GCxGC-MS.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	77	40	3080.00
CAT III	96	250	24000.00
CAT IV	120	40	4800.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			31880.00
Material costs			
Facilities			
Specific costs			
Travel costs			
Project equipment			
Other material costs			2000.00
Total Material Costs			2000.00
Total project budget needed			33880.00
Financing through other resources			
Finance needed from KBWOT			33880.00

Project 20 🙁	Compliance of observer and self-sampled bycatch data with Benford's Law: an indication of reliability?
Project leader	Pepijn de Vries
Theme	1 Ecosystem approach

Motivation and Project aims

Definition of the problem	At-sea sampling of commercial fishery catches by observers is a relatively expensive exercise. Sampling by fishermen themselves (self-sampling) is an attractive alternative, because a larger number of trips can be sampled at lower cost. Self-sampling should not be used too casually, however, as there are often issues of data-acceptance related to it.
Objective of the project	Test the utility of Benford's Law as an indicator for the reliability of self-sampled versus observer data.
Expertise needed	Expertise with respect to bycatch data and the database in which it is stored. Also basic knowledge on Benford's Law is required.
Expertise developed	Statistics required to test for compliance to Benford's Law and its application to bycatch data.
Why should this be funded by KB WOT?	KKB WOT has the aim to develop knowledge that is needed to underpin and complete statutory tasks. Accuracy and reliability of self-sampled discard data will be of utmost importance, because these data will be used to allocate catch quotas under the upcoming landing obligation of the Common Fisheries Policy.
What other potential funding sources have been considered?	Until now there are no other funds considered.
International objective of research	

Work plan

Broad description of the project including expected results	Benford's Law revolves around the first significant digits in a data set and the frequency with which they occur. According to the Law, these frequencies follow a specific distribution in natural data sets. Deviations from this distribution can be an indication of irregularities in the data (possibly caused by manipulation or rounding errors). The Law has successfully been applied in the field of accounting where it has been used to identify suspicious bookkeeping and even fraud. The Law is increasingly used in other fields for similar applications, such as in ecotoxicology (see De Vries & Murk, 2013). Not all data follows Benford's Law; there are several criteria that would indicate if Benford's Law applies to a data set. First stage of the project would therefore be to analyse the data against these criteria. Also, Benford's Law only applies to large data set or subset thereof. In the initial stage of the project it will also be decided which data is clustered (if necessary) and which

	observer data is compared to which self-sampled data. A second stage is only executed when outcomes of the first stage indicates that Benford's Law is applicable. In this second stage statistical goodness-of-fit-tests are applied to test how well each (clustered) data set follows Benford's Law.
Approach and time schedule	Q1 -Stage 1 -Pre-screening of the data (40h) Q2 -Stage 2 -Analysis of the data (80h) Q3 -Stage 2 -writing + submitting paper (84h)
Output/deliverables	Peer reviewed paper
Dissemination of findings being addressed	If the data appears suitable for analysis with Benford's Law findings will be published in a peer reviewed journal.
Utility of the developed products and expertise	The proposed project will provide insight as to whether the data in question complies with Benford's Law and whether this gives an indication of data reliability.
What are the potential risks to the project's success?	Stage 1 of the project could indicate that Benford's Law is not applicable, making stage 2 superfluous.
Project organisation	
Involvement IMARES (names and expertise)	Pepijn de Vries is an expert in ecological risk and impact assessment and has experience with application of Benford's Law to ecotoxicological data. Sebastian Uhlmann studies commercial fisheries interactions with the environment. He characterises unaccounted fishing mortalities such as those of incidental bycatches and discards. Marloes Kraan is case study leader of the gap2 case in which self-sampling is studied and project leader of one of IMARES' self-sampling projects.
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	Prof dr. Tinka Murk
Involvement parties outside WUR (names and expertise)	-
Relevance	
What is the market	Decision/policy makers
Economical relevance	Costs of observer data are relatively high. Depending on the outcome of the proposed study, it may lead to better acceptance of less costly self-sampled data.
Social relevance	Also here, it may lead to better acceptance of self-sampled data, depending on the outcome of the study of course.
Scientific relevance	Benford's Law has to our knowledge not yet been applied to fisheries data and is therefore a novel and publishable idea.
Relevance to ministry EZ	Benford's Law may give EZ an instrument to get an indication of

	trustworthiness of the data on which decisions are based (e.g. quotas).
Summary	This research focusses on the applicability of Benfords Law for fishery data derived from two sampling techniques. The first question is whether Benfords law is applicable. If so; the second question is what it tells us about the reliability of the two sampling techniques.

Proposed budget			
Personnel	**tariff**	**hours**	**amount**
CAT I	58	0	0.00
CAT II	77	0	0.00
CAT III	96	200	19200.00
CAT IV	120	0	0.00
CAT V	140	4	560.00
CAT VI	171	0	0.00
Total Personnel			19760.00
Material costs			
Facilities			0.00
Specific costs			0.00
Travel costs			100.00
Project equipment			0.00
Other material costs			0.00
Total Material Costs			100.00
Total project budget needed			19860.00
Financing through other resources			
Finance needed from KBWOT			19860.00

Project 21 ☹	Effects of diets on gut microbial development and health in early life stages (ELS) of dover sole (*Solea solea*)
Project leader	Eugene Rurangwa
Theme	1 Ecosystem approach

Motivation and Project aims

Definition of the problem	Common Sole is an economically important fish species in the North Sea fisheries with a potential for intensive aquaculture in the Netherlands. Like other fish species, gut microbial colonisation is determined after first feeding by their aquatic environments and the preys ingested. The micro biota that further establishes in the gut control several health related aspects of nutrition, disease resistance and immune system development. Because of the absence of an adaptive immune response during the very early life stages in fish, gut colonising bacteria are important in maintaining health during this critical period. The present study aims at establishing a link between diet, gut micro biota and health of sole larvae and juveniles.
Objective of the project	Study of the impact of diets on the establishment of the gut microbial community and related health effects in larvae and juvenile soles using a combination of morphological, somatic, physiological, haematological, microbiological and immunological indices.
Expertise needed	Molecular taxonomy (Metabarcoding), Microbiology, Immunology, Fish ecology, Fish nutrition.
Expertise developed	Relation between habitat-linked diets and fish health and overall survival prediction.
Why should this be funded by KB WOT?	Knowledge important for fisheries, ecologists as well as aquaculturists during the critical life stages of fish development.
What other potential funding sources have been considered?	KB, NWO proposal for in-depth investigations.
International objective of research	Contribution to the development of a gnotobiotic sole model by generation of microbial data during ELS (on-going research by a collaborating Belgian team).

Work plan

Broad description of the project including expected results	Sole larvae (>10 dpf) and juveniles (~40dpf) will be caught by beam trawling during 2 seasons in spawning and nursery areas, in the Wadden Sea and the Western Scheldt, respectively. Water quality is measured and blood/tissue samples collected for haematocrit, haemoglobin, cortisol, innate and immune responses measurements. Fish are then snap frozen for handling in the laboratory. In the lab, gut contents (diet) and gut (after removal of contents) will be sampled for prey composition analysis and gut adhering-microbiota analysis, respectively. Dietary and microbial DNA will be extracted from different samples using commercial DNA extraction kits. Two genes (COI, 18S rRNA) will be amplified following PCR protocols to identify the preys in natural diets by metabarcoding. Barcoded amplicons

	from the V1-V2 region of 16S rRNA genes will be generated by PCR and used to characterise the microbial composition in diets and fish guts. Purified amplicon pools will be sequenced and sequencing data analysed using the QIIME 1.7.0 pipeline. Hatchery-born sole of the same life stages as those from the wild, and the gnotobiotic model if available, will be fed in the laboratory different diet and prey combinations and compared to their wild conspecifics. Additional measurements for this group include fish behaviour towards feed, growth, survival, feed conversion. Results are scientific publications and microbial collection.
Approach and time schedule	2014-2015: Wild studies after spawning season and lab studies out-of spawning seasons
Output/deliverables	peer-reviewed publications, popular articles
Dissemination of findings being addressed	Publication of results (scientific and public articles
Utility of the developed products and expertise	Prediction of survival in natural populations. Baseline to develop species specific sole probiotics for use in intensive aquaculture.
What are the potential risks to the project's success?	PCR inhibitions and chimera formation during PCR amplification. No sole larvae or juveniles in sampled areas.
Project organisation	
Involvement IMARES (names and expertise)	Hilde van Pelt (Molecular biology), Jan Jaap Poos and Adriaan Rijnsdorp (Fisheries specialists)
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	Hauke Smidt and Detmer Sipkema (Microbiology), Geert Wiegertjes and Maria Forlenza (Immunology)
Involvement parties outside WUR (names and expertise)	Annemie Decostere (Gnotobiotic sole, University Ghent, Belgium)
Relevance	
What is the market	Industry (Fisheries, Fish Feed, Fish Health), EZ (marine surveys
Economical relevance	-Impact of habitat-linked diets to fish gut microbiota and health. -Probiotic indications to improve health and performances in farmed fish.
Social relevance	No need of use of antibiotics in disease treatment
Scientific relevance	Combined expertises resulting into strong outputs.
Relevance to ministry EZ	Knowledge transferred to support sole aquaculture development.

Summary	The gut microbial development will be screened and related to health indices during early life stage development of wild and captive sole larvae and fingerlings in relation to diets. The findings will be used to predict survivals based on diets and as first indication of gut bacteria with probiotic potential.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	77	100	7700.00
CAT III	96	100	9600.00
CAT IV	120	100	12000.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			29300.00
Material costs			
Facilities			2000.00
Specific costs			1500.00
Travel costs			1000.00
Project equipment			1500.00
Other material costs			15000.00
Total Material Costs			21000.00
Total project budget needed			50300.00
Financing through other resources			0.00
Finance needed from KBWOT			50300.00

Project 22 🙁	The role of salt marshes as nurseries for fish
Project leader	Ingrid Tulp, Willem van Duin, Alma de Groot
Theme	Ecosystem approach
Motivation and Project aims	
Definition of the problem	The role salt marshes may have for fish as nurseries in The Netherlands is still largely unknown. Studies in the US and elsewhere in Europe (UK and Germany) have shown that saltmarshes provide a nursery, sheltering, and feeding area for economically important species and that fish actually feed in salt marshes. Studies in the southern delta of the NL have shown that several fish species occur inside salt marshes. The importance of this habitat relative to other nursery habitats is however never quantified.
Objective of the project	Investigate and quantify the importance of saltmarshes as nurseries for fish
Expertise needed	the importance of saltmarshes in the life cycle of (commercially exploited) fish species
Expertise developed	quantitative information on the potential function of salt marshes as nurseries
Why should this be funded by KB WOT?	- lack of knowledge about the subject - delivers useful information for policy makers and salt marsh managers
What other potential funding sources have been considered?	
International objective of research	A similar project started recently in Germany by Andreas Danhardt from University of Hamburg and a comparison can be made with available information from other European countries.
Work plan	
Broad description of the project including expected results	We propose a pilot study investigating the fish fauna in tidal creeks in salt marsh areas using fyke nets. Studies in UK, USA, Germany and France have shown that salt marshes harbour juveniles of several fish species and that fish feed in the inundated salt marshes (Gardner 1996, Lafaille 2000, 2001, Mathiesson et al 2000, Stevenson 2002). Saltmarshes are characterised by a high productivity, relatively high abundances of detrivores and infauna (Hampel 2003, Hampel et al 2005). In addition to abundances, we will measure growth of fish as a proxy of habitat quality. Recently Vasconcelos et al (2013) emphasized that to be able to quantify the value of nursery habitats to adult populations of commercial species, there is great a need for studies that compare vital rates, such as growth, immigration and mortality among habitats. Within the same project we aim to quantify the amount of salt marsh available as nursery areas using satellite photographs. In combination with the proposed fieldwork and in comparison with

	other nursery habitats, this will enable to quantify the relative importance of salt marshes as nurseries in The Netherlands.
Approach and time schedule	Sampling will take place at monthly intervals during the growing season (April-Sept) in tidal creeks in a salt marsh area. We plan to sample at a site in The Netherlands with considerable salt marsh areas: the Dollard or Saeftinge and characterised by a relatively large tidal range. Fyke nets will be set at low tide and emptied and taken down the next low tide. The field team will consist of one assistant and one student (which still has to be recruited)
Output/deliverables	manuscript
Dissemination of findings being addressed	If possible through a manuscript suitable for publication and through the Imares website
Utility of the developed products and expertise	Quantification of the importance of saltmarshes as nurseries for fish. Insight into the contribution of such as widespread habitat to populations of commercially exploited species can contribute greatly to the ecosystem approach to marine management.
What are the potential risks to the project's success?	Getting permission to work in the area from the local managing agency
Project organisation	
Involvement IMARES (names and expertise)	Ingrid Tulp: fish ecology, nursery function, monitoring Alma de Groot: geomorphology, salt marshes Willem van Duin: salt marshes
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	
Involvement parties outside WUR (names and expertise)	Wintermans Ecologenbureau, University of Hamburg (Andreas Danhardt)
Relevance	
What is the market	fisheries science, ICES, EZ
Economical relevance	not direct
Social relevance	minor
Scientific relevance	potentially high
Relevance to ministry EZ	evaluating the importance of a habitat as potential fish nursery area, a role which was hitherto not acknowledged in management
Summary	This project will investigate and quantify the importance of saltmarshes as nurseries for fish.

Proposed budget			
Personnel	tariff	hours	Amount
CAT I	58	190	11020.00
CAT II	77		0.00
CAT III	96	60	5760.00
CAT IV	120	50	6000.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			22780.00
Material costs			
Facilities			
Specific costs			
Travel costs			2500.00
Project equipment			3500.00
Other material costs			
Total Material Costs			6000.00
Total project budget needed			28780.00
Financing through other resources			
Finance needed from KBWOT			28780.00

Project 23	Metabolic scope flatfish
Project leader	Adriaan Rijnsdorp
Theme	1 Ecosystem approach

Motivation and Project aims

Definition of the problem	Physiology-based understanding of the interactions between marine organisms and environmental influences is required for better projections of how climate change may impact marine ecosystems and fisheries. Near future ecophysiological research will focus on revealing how key abiotic factors affect ecosystems through effects on physiology. Metabolic scope measures the physiological performance (e.g. growth) capacity of organisms. Measurement of metabolic scope is a powerful tool to study environmental influences on performance capacity. Results will be used to increase the predictive capacity of current models simulating the biological as well as socio-economic impacts of climate change. To ensure a prominent role in near future marine ecosystem research programs, IMARES needs to develop its expertise, toolbox and track record in eco-physiological research
Objective of the project	Implement new tools to measure metabolic scope in fish. Extend our track-record in eco-physiological research. Eliminate technical risks of new tools.
Expertise needed	Expertise on direct and indirect measurement of metabolic scope in fish
Expertise developed	Tools to measure metabolic scope in flatfish.
Why should this be funded by KB WOT?	To secure our role in future climate change research, which is of key relevance for an EAFM, IMARES should strengthen its international position by expanding the use of its physiological expertise and tools for ecological research. Developing new eco-physiological tools and extending our scientific track-record in eco-physiological research is therefore of strategic interest.
What other potential funding sources have been considered?	CRISEAS. Travel and subsistence costs will be covered by FA COST Action 1004 "Conservation Physiology of Marine Fishes".
International objective of research	Participation in international consortia for eco-physiological research projects

Work plan

Broad description of the project including expected results	Methods to measure metabolic scope of fish will be reviewed, selected, implemented and tested. These methods include: heart beat rate measurements, oxygen consumption measurement (respiration chamber), ventilation rate (high speed camera) and blood flow rate (echoscope). Researchers will be trained to use these tools. Training abroad at a CRISEAS partner is foreseen. The new tools will be applied in the experimental assessment of the effect of starvation on metabolic scope of Dover sole.
Approach and time	Jan-Feb Review and selection of methods.

schedule	March - April training en testing methods.
	May- June application of methods in experimental settings.
	Sep - Dec. Data analysis and preparation of manuscript.
Output/deliverables	1. Manual that documents the practical aspects of the use of the new methodologies to measure metabolic scope;
	2. Trained researchers and research assistants
	3. Manuscript for a scientific paper on the effect of starvation metabolic scope in Dover sole
Dissemination of findings being addressed	Scientific paper, Conference presentation
Utility of the developed products and expertise	Research projects
What are the potential risks to the project's success?	Delay due to technical bottlenecks.
Project organisation	
Involvement IMARES (names and expertise)	Adriaan Rijnsdorp - ecology, fisheries research
	Arjan Palstra - physiology, eco-physiology
	Lorna Teal - ecology, DEB, statistics.
	Edward Schram, Wout Abbink - physiology, experimental research.
	Ewout Blom - experimental research
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	-
Involvement parties outside WUR (names and expertise)	-
Relevance	
What is the market	Horizon2020
Economical relevance	yes, through fisheries
Social relevance	yes, through fisheries
Scientific relevance	yes, new eco-physiological data
Relevance to ministry EZ	yes, through its economic and social relevance
Summary	This project will implement new tools to measure metabolic scope in fish and extend our track-record in eco-physiological research.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	77	180	13860.00
CAT III	96	200	19200.00
CAT IV	120		0.00
CAT V	140	8	1120.00
CAT VI	171		0.00
Total Personnel			34180.00
Material costs			
Facilities			
Specific costs			1500.00
Travel costs			
Project equipment			1000.00
Other material costs			
Total Material Costs			2500.00
Total project budget needed			36680.00
Financing through other resources			
Finance needed from KBWOT			36680.00

Project 24 🙂	CCTV segmentation
Project leader	Daniel Benden
Theme	1 Ecosystem approach

Motivation and Project aims

Definition of the problem	The utility of Electronic Monitoring (EM) in data collection programmes is expanding rapidly in recent years. EM is using closed circuit television (CCTV) to remotely monitor catches and discards on commercial fishing vessels. Large amounts of video footage is collected and analysed to identify and count fish, sea mammals and birds in discards, in currently relevant projects within the context of the Common Fisheries Policy (CFP) and DCMAP reformation, like Fully Documented Fisheries, pilot studies on Catch Quota Regimes, and monitoring Protective Endangered and Threatened Species (PETS). Typically for EM monitoring, the collected footage contains long intervals without any interesting information, this is the case in situations when the EM system is recording periods between hauls and the crew handling the catch on board . Currently this filtering process is done either by hand or semi-automatic with the help of additional collected sensor data. In both cases, the EM Interpret, software made by Archipelago is used to separate the video footage. These approaches are labour intensive and depend on the availability of sensor data.
Objective of the project	Develop a more direct approach using smart image analysis software to completely automate the identification and selection of the interesting parts in the footage and incorporated this filtering process in the existing workflow using EM interpreter. This approach decreases the input of human resources, resulting in a faster and cheaper process of filtering footage. Also, using video data directly and not being depend on extra sensor data, is making the filtering process more robust and , in addition, reduces installation cost on vessels, since expensive sensors are not needed.
Expertise needed	Software development, experience with EM analysing software, observer experience on commercial vessels is beneficial.
Expertise developed	Image Analysis techniques, Improved EM analysing software
Why should this be funded by KB WOT?	The use of Electronic Monitoring (EM) and video and imaging techniques in biological research is expanding rapidly. Within the context of the CFP reform and regionalisation of the DCMAP it is of great importance for IMARES to be involved in recent developments in monitoring techniques and methods. Developing expertise in this field creates a leading role for IMARES in international research consortia in the near future.
What other potential funding sources have been considered?	-
International objective of research	-

Work plan	
Broad description of the project including expected results	Improve the existing video segmentation algorithm by making the algorithm less sensitive to changes in light conditions. Step will be the incorporate of the output of the algorithm into EM Interpreter.

The expected results will be a working segmentation algorithm usable in the existing workflow. |
| Approach and time schedule | improving existing software 100 hours

incorporation in EM Interpreter 160 hours

reporting 40 hours |
Output/deliverables	segmentation algorithm with connectivity to EM software
Dissemination of findings being addressed	ICES network, working document.
Utility of the developed products and expertise	Fully Documented Fisheries, WOT monitoring.
What are the potential risks to the project's success?	Although we do not expect this there is a risk that software will not be fully ready to use at the end of the project due to unforeseen difficulties with such complex algorithms needed to process video.
Project organisation	
Involvement IMARES (names and expertise)	Daniel Benden - Software development/Image analysis.

Bram Couperus - CCTV data collection

Edwin van Helmond - CCTV data collection |
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	IMARES
Involvement parties outside WUR (names and expertise)	-
Relevance	
What is the market	This work will strengthen and broaden our experience with image analysis. And thus making Imares more attractive for partners/projects with the same needs.
Economical relevance	Private parties might be interested in developing these kinds techniques in cooperation with IMARES
Social relevance	By catches have a strong negative image with the public. This work will help get better data and fact to support a discussion less based on feelings
Scientific relevance	Could pave the way for scientific cooperation with computer science departments of universities and international research

	consortia.
Relevance to ministry EZ	Improvement of WOT monitoring. Implementation of innovative monitoring techniques and methods in WOT projects.
Summary	This project will develop a more direct approach using smart image analysis software to completely automate the identification and selection of the interesting parts in the footage and incorporated this filtering process in the existing workflow using EM interpreter.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	77	300	23100.00
CAT III	96	40	3840.00
CAT IV	120		0.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			26940.00
Material costs			
Facilities			
Specific costs			
Travel costs			
Project equipment			
Other material costs			
Total Material Costs			0.00
Total project budget needed			26940.00
Financing through other resources			
Finance needed from KBWOT			26940.00

Project 25 ☹	PHYSECO - PHYSiological insights for the ECOsystem approach: Temperature preference of sole in relation to feeding status
Project leader	Lorna Teal
Theme	1 - Ecosystem approach

Motivation and Project aims

Definition of the problem	Climate change is a main driving force behind changes in species distribution. Recent physiological modelling studies have shown changes in habitat quality of fish in relation to changes in temperature and food (Teal et al. 2012, Raab et al. 2013). However, the underlying assumption for interpretation of such models is that fish move in order to maximise their physiological performance, i.e. preferred habitat = optimum habitat, which is not always the case (e.g. Schram et al. 2013). In order to further our mechanistic understanding of how fish utilise their habitat and improve predictive capacity of models it is necessary to understand how fish behave (move) in relation to changes in food and temperature, and how the metabolic changes that may occur as a result affect the population output (growth, reproduction, survival) and therewith impact on fisheries.
Objective of the project	To test the hypothesis (and model assumption) that starved fish lower their temperature preference in order to lower their metabolism (energy saving mode). Metabolic changes will be assessed alongside the behavioural response.
Expertise needed	Preference chamber experimental procedure, statistical analysis, DEB modelling, molecular tools
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?	The results will help validate current modelling studies by underpinning assumptions with experimental data. These modelling studies contribute to a better understanding of how the ecosystem affects fish physiology (and thus growth, reproduction, survival, migration routes) and habitat preference, addressing key mechanisms required in an EAFM.
What other potential funding sources have been considered?	None.
International objective of research	Relates to membership of IMARES in FACOST Action 1004 "CONPHYS", preceeds calls within Horizon2020.

Work plan

Broad description of the project including expected results	Experiments will be performed where fish (sole) are subjected to one of two treatments: fed unlimited versus starved. The temperature preference of the two treatments will be compared using the preference chamber. Preferred temperatures will be compared to modelled optima. Metabolic differences between the two treatments will also be assessed by deep RNA sequencing (RNAseq) of the liver transcriptomes of individual fish and gene

	ontology 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.
Approach and time schedule	Step 1) Preference chamber experiment (by Apr) and statistical analysis (by Aug) Step 2) Molecular analysis (May-Aug) Step 3) results and writing (Sep - Dec)
Output/deliverables	Publication
Dissemination of findings being addressed	Peer-reviewed publication, conference talk, dissemination in popular scientific magazine
Utility of the developed products and expertise	Results will feed into modelling studies conducted under VECTORS, EU COST Action CONPHYS and used for future proposal writing.
What are the potential risks to the project's success?	Mortality of experimental animals, technical failures - estimated risk is low as a pilot has already been completed (Hewitt MSc).
Project organisation	
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)	NA
Involvement parties outside WUR (names and expertise)	NA
Relevance	
What is the market	Multidisciplinary scientific audience
Economical relevance	Socio-economic impacts through fisheries
Social relevance	Socio-economic impacts through fisheries
Scientific relevance	Required science for ecosystem models
Relevance to ministry EZ	Working towards models for EAFM
Summary	Physiological insights for ecosystem approach.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	77	194	14938.00
CAT III	96	200	19200.00
CAT IV	120		0.00
CAT V	140	8	1120.00
CAT VI	171		0.00
Total Personnel			35258.00
Material costs			
Facilities			
Specific costs			4140.00
Travel costs			
Project equipment			500.00
Other material costs			500.00
Total Material Costs			5140.00
Total project budget needed			40398.00
Financing through other resources			
Finance needed from KBWOT			40398.00

Project 26 🙁	Advanced Pelagic Ecosystem Monitoring (APEM) Module I: Combining Acoustic and Optical Methods
Project leader	Dirk Burggraaf
Theme	1. Ecosystem Approach

Motivation and Project aims	
Definition of the problem	During current pelagic WOT surveys we apply methods that address primarily the monitoring requirements for the traditional "target species". Moving towards an ecosystem approach to fisheries management (EAFM) and initiatives such as MSFD, monitoring approaches need to change, asking for integrated surveys that deliver observations on the wider ecosystem. For pelagic ecosystem surveys, this poses increased demands on remote identification of species and observing objects other than the "target species" encountered in the water column.
Objective of the project	Develop an innovative system to combine acoustic and optical methods in a first attempt to increase accuracy and widen the scope of current pelagic WOT surveys.
Expertise needed	fisheries acoustics, underwater optical system, engineering, marine biology, IT
Expertise developed	integrated pelagic ecosystem monitoring
Why should this be funded by KB WOT?	There is a need to move towards integrated ecosystem surveys to satisfy the additional data and monitoring needs for the EAFM and GES descriptors of the MSFD. Therefore an adaptation or adjustment of the sampling strategies used during WOT surveys is critical.
What other potential funding sources have been considered?	WOT will cover survey time
International objective of research	IMARES could take a major step towards integrated pelagic ecosystem surveys and play an important leading role internationally.

Work plan	
Broad description of the project including expected results	Within the project, pressure-resistant compact digital camera packages will be developed, which will be deployed in the pelagic survey trawl and on the CTD during normal pelagic WOT surveys. Trawl cameras will provide new insights into the species composition and behaviour of the resources. This will greatly improve the accuracy of species identification and allow improved targeting of trawls. CTD cameras will provide insights into the vertical distribution of fish resources and plankton.
Approach and time schedule	January-March: develop camera systems; April/May lab trials; June/July: field trials; August-October: data analysis; November-December: write journal paper
Output/deliverables	- 2 pressure-resistant camera systems targeting specific organism dimensions: 1) "fish viewer" in the trawl 2) "plankton

	viewer" on the CTD
	- data-flow system (file format, data base, analysis software using pre-existing developments, e.g.: sciviews.org/zooimage/)
	- peer reviewed publication
Dissemination of findings being addressed	- ICES WG (e.g. WGIPS, WGFAST, WGISUR) presentations
	- peer-reviewed publication
Utility of the developed products and expertise	Improved and optimised usage of survey time by making the developed products 'standard tools' during WOT ecosystem surveys. Consequently this will trigger further developments (project acquisition, R&D)
What are the potential risks to the project's success?	- insufficient and unusable test data collection (further tests on other surveys may be necessary)
	- the novice project manager may be overwhelmed (others in the project group can easily assist with management)
Project organisation	
Involvement IMARES (names and expertise)	Dirk Burggraaf (optics / electrical engineering); Sascha Fässler (marine biology, acoustics); Sven Gastauer (marine biology, acoustics); Bram Couperus (marine biology, acoustics); Kees Bakker (optics / electrical engineering); Daniel Benden (IT)
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	IMARES only
Involvement parties outside WUR (names and expertise)	Eric Armstrong (acoustics); Stephan Gauthier (acoustic/optical fish monitoring); Tim Ryan (acoustic/optical fish monitoring); Peter Wiebe (acoustic/optical zooplankton monitoring)
Relevance	
What is the market	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
Relevance to ministry EZ	More accurate & integrated data for the same (survey) money!
Summary	This project will develop an innovative system to combine acoustic and optical methods to increase accuracy and widen the scope of current pelagic WOT-surveys.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	77	200	15400.00
CAT III	96	160	15360.00
CAT IV	120		0.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			30760.00
Material costs			
Facilities			
Specific costs			
Travel costs			
Project equipment			7500.00
Other material costs			
Total Material Costs			7500.00
Total project budget needed			38260.00
Financing through other resources			
Finance needed from KBWOT			38260.00

Project 27	Underpinning Acoustics
Project leader	Sascha Fässler
Theme	2. Maintaining quality

Motivation and Project aims

Definition of the problem	Acoustic methods are an important tool to deliver data for stock assessment, habitat mapping, marine mammal monitoring and ecosystem modelling purposes. In order to maintain the quality of the information provided, it is important to invest into the development of the methods.
Objective of the project	Maintenance and expansion of hydro acoustic work within IMARES
Expertise needed	active & passive hydro acoustics
Expertise developed	active & passive hydro acoustics
Why should this be funded by KB WOT?	The project aims to maintain and develop acoustic ecosystem monitoring techniques. Apart from improving data flow, the project will also serve to answer ad hoc research questions where contributions are needed at short notice (e.g. new monitoring needs for mackerel, properties of boarfish, or multidisciplinary surveys in the Marsdiep). It will keep the methods at the most current state and explore alternative ways to assist in-house research
What other potential funding sources have been considered?	-
International objective of research	To maintain and raise the IMARES active and passive acoustics profile

Work plan

Broad description of the project including expected results	Support on-going maintenance and development of acoustic expertise at IMARES. Building and maintaining links within IMARES and other national and international institutes. 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.
Approach and time schedule	
Output/deliverables	- Continuation of the "Bioacoustics Day" workshop to develop collaborations within the hydro acoustic work covered at IMARES and other institutes within the Netherlands. - Setting up and maintaining a database at IMARES to house the raw acoustic data collected by various countries during ICES herring surveys. - Expansion of the R library "acousaR" (http://code.google.com/p/acousa/) to make it the standard routine for analysis of surveys coordinated in ICES WGIPS.

	- WUR web presence.
	- Participation in ad hoc research relevant to on-going WOT survey tasks together with international partners. It also includes work on on-going papers to lift scientific output of the fisheries acoustics section. This is vital to remain an attractive potential consortium partner in international projects.
	- Follow up an offer for exchange (study trip) with partners in the US (Dr John Horne at Washington University).
Dissemination of findings being addressed	- Scientific publications
	- ICES WG presentations (e.g. WGFAST)
	- WGIPS herring survey database
	- Publicly available R analysis code library (http://code.google.com/p/acousa/)
Utility of the developed products and expertise	The project contributes to the strategic areas highlighted by the KBWOT team
What are the potential risks to the project's success?	no specific risks
Project organisation	
Involvement IMARES (names and expertise)	Sascha Fässler (fisheries acoustics), Sven Gastauer (fisheries acoustics), Bram Couperus (fisheries acoustics), Dirk Burggraaf (electrical engineering), Kees Bakker (electrical engineering), Daniel Benden (ICT), Ben Griffioen (fisheries acoustics), Dick de Haan (passive acoustics), Meike Scheidat (passive acoustics)
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	-
Involvement parties outside WUR (names and expertise)	collaborators working in the same field at IMR, IFREMER, MSS, CEFAS, MI and NOAA
Relevance	
What is the market	environmental monitoring (pelagic ecosystem), offshore engineering
Economical relevance	Hydro acoustics is becoming increasingly relevant as primary tool for integrated ecosystem monitoring to aid management.
Social relevance	monitoring to guarantee GES
Scientific relevance	acoustic methods are vital
Relevance to ministry EZ	guarantee quality of pelagic monitoring work
Summary	Maintenance and expansion of hydro acoustic work within IMARES.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	77	85	6545.00
CAT III	96	350	33600.00
CAT IV	120		0.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			40145.00
Material costs			
Facilities			
Specific costs			
Travel costs			2259.00
Project equipment			2507.00
Other material costs			
Total Material Costs			4766.00
Total project budget needed			44911.00
Financing through other resources			
Finance needed from KBWOT			44911.00

Project 28 🙂	Long-term spatial distribution of pelagic fish from commercial vessel acoustic data (PELSPA)
Project leader	Sascha Fässler
Theme	1. Ecosystem approach
Motivation and Project aims	
Definition of the problem	Over the past few years, IMARES has been involved in several projects with the pelagic industry to collect acoustic echosounder data from vessels during fishing operations. These projects were/are primarily of an exploratory nature with the majority of the resources going towards focussing on methodology development. At the same time, the projects have increasingly received attention from Dutch Ministries and scientists abroad due to their novelty, science-industry partnership and innovative character. However, although the developed methods now allow collection of vast amounts of unprecedented data, the resources available to investigate their scientific and management use are sparse.
Objective of the project	This project will make use of acoustic data collected in previous & on-going IMARES science-industry projects to get quantitative information out of them. These data will provide information on migration/distribution of important pelagic fish stocks (herring, horse mackerel, blue whiting) over a wider time period.
Expertise needed	spatial modelling; fisheries acoustics
Expertise developed	spatial distribution of pelagic fish resources; commercial vessel acoustic data analysis
Why should this be funded by KB WOT?	Having an understanding of the distribution of major pelagic fish stocks over wider temporal scales is essential to implement an integrated EAFM. This also applies to several descriptors of GES (1,3,4,and 11) within the MSFD. The project makes use of innovative approaches towards answering such questions.
What other potential funding sources have been considered?	science-industry projects provide the quantities of input data; WOT survey data will be used for method validation
International objective of research	IMARES is already moving at the forefront of collection of commercial vessel acoustic data. Putting resources into data exploration and developing analysis methods will make the next (more difficult but attractive!) step by providing answers to support resource management decisions and international policy requirements (MSFD, CFP) from these data. This will hugely enhance opportunities to lead international consortia and acquire projects in that area und underpin the science/ind relations
Work plan	
Broad description of the project including expected results	Statistical analysis methods for these data will be developed & tested and results put into appropriate formats for use by stakeholders, scientists and managers (e.g. maps showing distributional changes of fish stocks over longer time (2-3 months) periods). This will be vital for demonstrating our expertise and advertising science-industry based collaborative

	projects in the market.
Approach and time schedule	Jan-June: data analysis & model development; Jul-Oct: result dissemination & paper writing
Output/deliverables	analysis methods for spatially biased resource data; peer reviewed paper & presentations
Dissemination of findings being addressed	peer reviewed paper & WG / conference presentations
Utility of the developed products and expertise	The methods will also be relevant for many marine data with similar sampling patterns; the expertise will allow IMARES to take similar science-industry partnerships to a next level and work towards standardisation of the whole methodology as data source for resource management/assessment. Further steps such as improved species recognition & habitat / bottom mapping from the data will follow.
What are the potential risks to the project's success?	That more resources than specified may be required in case the model/analysis method development turns out to be too difficult.
Project organisation	
Involvement IMARES (names and expertise)	Sascha Fässler (fisheries acoustics, spatial modelling); Thomas Brunel (spatial modelling); Sven Gastauer (fisheries acoustics)
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	-
Involvement parties outside WUR (names and expertise)	Pierre Petitgas (geostatistics); Matthieu Woillez (geostatistics); Paul Fernandes (geostatistics); Ben Scoulding (acoustics)
Relevance	
What is the market	science-industry partnerships
Economical relevance	sustainable resource exploitation
Social relevance	stakeholder representation
Scientific relevance	spatial monitoring data analysis from biased sampling
Relevance to ministry EZ	stakeholder involvement in management
Summary	This project will make use of acoustic data collected in previous & on-going IMARES science-industry projects to get quantitative information out of them. These data will provide information on migration/distribution of important pelagic fish stocks (herring, horse mackerel, blue whiting) over a wider time period.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	77		0.00
CAT III	96	260	24960.00
CAT IV	120		0.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			24960.00
Material costs			
Facilities			
Specific costs			
Travel costs			
Project equipment			
Other material costs			
Total Material Costs			0.00
Total project budget needed			24960.00
Financing through other resources			
Finance needed from KBWOT			24960.00

Project 29	🙂	Stationary acoustic monitoring of pelagic ecosystems in shallow Dutch inshore waters (STAMPOT)
Project leader		Sven Gastauer
Theme		1. Ecosystem approach
Motivation and Project aims		
Definition of the problem		The role of pelagic fish in shallow ecosystems is badly understood. Previous studies have shown that pelagic fish are extremely abundant in the Marsdiep area (100 x demersal biomass) or that smelt plays an important role in the Natura 2000 habitat Ijsselmeer (prey for waterfowls). There is a need for long-term monitoring techniques to better understand and quantify the role of the resources in these systems. Traditional monitoring techniques will only provide a snapshot (temporal and spatial) for a limited number of species in the ecosystem & miss out on a large proportion of the resource due to its vertical distribution.
Objective of the project		Develop a stationary bottom-mounted acoustic observation system to deliver long-term data (over several weeks) on forage fish abundance from stations in the Marsdiep and IJsselmeer. This will deliver high-resolution insight into forage fish prey availability to predators.
Expertise needed		fisheries acoustics, electrical/mechanical engineering, hydrology, bird ecology
Expertise developed		shallow water acoustic monitoring techniques; understanding about pelagic fish resources in shallow Dutch coastal waters
Why should this be funded by KB WOT?		Shallow water monitoring techniques are very important due to policy developments (e.g. Natura-2000 & MSFD). All Dutch coastal and inland water regions are classified as "shallow". We therefore need to develop expertise with such techniques to become attractive for customers
What other potential funding sources have been considered?		ZKO
International objective of research		Shallow water resource monitoring is an international challenge, development of innovative techniques will provide IMARES with a leading role. The development of a long-term index on pelagic fish in coastal areas is new and therefore appealing .
Work plan		
Broad description of the project including expected results		A stationary "upward looking" bottom-mounted monitoring platform housing containing an echosounder (200/333 kHz) and a DIDSON sonar camera will be developed. Data collection: Tank trials and field recordings (several weeks, different seasons in the Marsdiep & IJsselmeer). Results will provide qualitative & quantitative long-term information of forage fish. An improved insight into species composition, behaviour & size spectra of the resources, feeding directly into ecosystem models to underpin the need for future integrated monitoring projects will be

	delivered.
Approach and time schedule	Jan-Mar: platform development & tank tests; April-Oct: filed data collection; Oct-Dec: data analysis.
Output/deliverables	bottom-mounted monitoring platform; peer reviewed paper
Dissemination of findings being addressed	peer reviewed paper; WG and conference presentations
Utility of the developed products and expertise	Extending the traditional use of acoustics towards a tool for behavioural studies is a rapidly growing field of research. Results would raise the status of IMARES in the field of shallow water observation technologies (monitor GES) & behavioural studies. Hence greatly help in acquiring future projects in these fields.
What are the potential risks to the project's success?	technical problems and/or material loss during data acquisition
Project organisation	
Involvement IMARES (names and expertise)	Dirk Burggraaf (technical, acoustics); Erwin Winter (Didson); Ben Griffioen (DIDSON); Sascha Fässler (acoustics); Kees Bakker (technical, acoustics); Bram Couperus (acoustics); Martin Baptist (Bird ecology)
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	-
Involvement parties outside WUR (names and expertise)	Henk de Haas (NIOZ; Marsdiep bathymetrics and hydrology)
Relevance	
What is the market	shallow water ecological monitoring
Economical relevance	maintaining sustainable use of resources and services
Social relevance	maintaining GES of such areas
Scientific relevance	development of monitoring expertise and providing in situ data for ecosystem understanding
Relevance to ministry EZ	GES monitoring for MSFD, EAFM in shallow Dutch waters
Summary	This project will develop a stationary bottom-mounted acoustic observation system to deliver long-term data on forage fish abundance from stations in the Marsdiep and IJsselmeer. This will deliver high-resolution insight into forage fish prey availability to predators.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	77	160	12320.00
CAT III	96	120	11520.00
CAT IV	120		0.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			23840.00
Material costs			
Facilities			
Specific costs			
Travel costs			500
Project equipment			2000
Other material costs			
Total Material Costs			2500.00
Total project budget needed			26340.00
Financing through other resources			
Finance needed from KBWOT			26340.00

Project 30	☺	BLUEFEED - Feeding Behaviour of Blue Whiting
Project leader		Sven Gastauer
Theme		1. Ecosystem Approach

Motivation and Project aims

Definition of the problem	Blue whiting is generally assumed not to be feeding during their spawning season. This is a strong assumption. However, recent preliminary Russian stomach analysis results suggest that at least a part of the stock is feeding during their spawning migration West of the British Isles. There is an urgent need to gain insights into these new findings as this would have direct effects on our general understanding of the key drivers behind the migration of blue whiting and hence on the planning and interpretation of surveys.
Objective of the project	The main objective is to gain new insights into the feeding behaviour of blue whiting: in relation to spawning behaviour; what are the main prey species? What is the proportion/age of the stock feeding?
Expertise needed	Stomach and gonad analysis, fish sampling
Expertise developed	feeding behaviour of blue whiting, ecosystem understanding for modelling studies
Why should this be funded by KB WOT?	With regards to EAFM it is important to understand the basic biology and behavioural patterns of blue whiting in order to improve sampling strategies, to identify monitoring needs and to develop GES descriptors of the MSFD. In order to improve our understanding of the resource and its role in the ecosystem, the collection of stomach and gonad samples during standard WOT surveys is critical.
What other potential funding sources have been considered?	WOT will cover survey time
International objective of research	IMARES could take a leading role in integrated ecosystem monitoring, understanding and implementation towards EAFM. For the international blue whiting survey this would have implications for all participating nations.

Work plan

Broad description of the project including expected results	The Irish started sampling stomachs of blue whiting in 2006, this data has not been included in any study as yet. We will collect additional stomachs and gonad samples during the Dutch part of the BWHTS and therefore request other participating nations to do so as well. Gonad development will be assessed through histology. Stomach fullness and contents will be linked with age, maturity, length and weight. Combined information of stomach and gonad analysis paired with acoustic recordings, will provide insights into the feeding behaviour patterns of blue whiting.
Approach and time schedule	January-March: Get Irish stomach data collected during the blue whiting survey for past years; March/April Collect stomach samples during the 2014 survey; June/September: data

	analysis; August-December: write journal paper
Output/deliverables	- Working groups/conference presentations - peer reviewed publication
Dissemination of findings being addressed	- ICES WG (e.g. WGIPS) presentations - peer-reviewed publication
Utility of the developed products and expertise	Improved and optimised usage of survey time by making the developed products 'standard tools' during WOT ecosystem surveys. Consequently this will trigger further developments (project acquisition, R&D)
What are the potential risks to the project's success?	- insufficient availability of samples - technical problems during the survey
Project organisation	
Involvement IMARES (names and expertise)	Sven Gastauer (marine biology); Sascha Fässler (marine biology); Bram Couperus (marine biology); Cindy van Damme(marine biology)
Is the appropriate capacity available?	yes
Involvement parties within WUR (names and expertise)	IMARES only
Involvement parties outside WUR (names and expertise)	Andrey Dolgov (marine biology); Ciaran O'Donnell (marine biology); James Keating (marine biology); Ben Scoulding (marine biology); Matthias Schaber (marine biology)
Relevance	
What is the market	pelagic ecosystem monitoring
Economical relevance	Through a better understanding of the basic biology and behaviour of the species with highest TAC in the Northeast Atlantic, we will work towards improved monitoring and EAFM
Social relevance	Better description of MSFD indicators of GES and implementation of EAFM, thus benefitting wider society who profits from marine goods.
Scientific relevance	better understanding of the biology and behaviour of the widely distributed and commercially extremely important blue whiting
Relevance to ministry EZ	improved insights into the biology and behaviour of the species with the highest available quota in the NE Atlantic and improved monitoring without extra costs
Summary	This project will gain new insights into the feeding behaviour of blue whiting in relation to spawning behaviour.

Proposed budget*			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	77	200	15400.00
CAT III	96	300	28800.00
CAT IV	120		0.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			44200.00
Material costs			
Facilities			
Specific costs			
Travel costs			500.00
Project equipment			
Other material costs			500.00
Total Material Costs			1000.00
Total project budget needed			45200.00
Financing through other resources			
Finance needed from KBWOT			45200.00

* Project has been granted for € 20000,-, in agreement with the project leader that part of the work can and will be carried out by students.

Project 31 ☹	Calculating abundance indices for a semi-pelagic species from a demersal survey
Project leader	David Miller
Theme	1. Ecosystem approach
Motivation and Project aims	
Definition of the problem	The North Sea horse mackerel stock currently has no accepted quantitative basis for advice. This is largely due to a shortage of fishery independent data about the abundance of this stock. This is also a barrier to developing a robust management plan for the stock.

Work started in 2013 under a VIP project has gone a long way towards developing a new index for NS horse mackerel from IBTS data. However, there is potential to improve the accuracy of the index by applying statistical methods more suitable for the characteristics of the data. |
Objective of the project	Develop a method to produce a meaningful abundance index for North Sea horse mackerel using IBTS data.
Expertise needed	Survey expertise and GLM modelling skills.
Expertise developed	Alternative methods for developing abundance indices from standard survey CPUE data.
Why should this be funded by KB WOT?	North Sea horse mackerel is one of many data-limited stocks that are of importance to the Dutch fisheries. In most of these cases data do exist, even though this may be sub-optimal. This work hopes to develop techniques that can be applied to other stocks to produce robust indices of abundance. This will be very beneficial in the move towards a more integrated ecosystem approach to fisheries management.
What other potential funding sources have been considered?	None
International objective of research	Support the development of a management plan from North Sea horse mackerel. Provide robust methods to calculate survey abundance indices for non-target, data-limited species.
Work plan	
Broad description of the project including expected results	Using raw IBTS survey data, conduct GLM analyses including numerous factors of interest (e.g. location, vessel, abundance of other fish etc.). Explore zero-inflated data methods (e.g. delta-lognormal approach utilising the proportion of zero hauls).

Test the hypothesis that horse mackerel catchability is influenced by the abundance of demersal fish (the 'pelagic fear of demersals'). |
| Approach and time schedule | Analyses and index construction: Q1 2014

Peer-reviewed paper: Q1 2014 |

Output/deliverables	A quantitative index of abundance for NS horse mackerel to be used in a management plan for the stock. A peer-reviewed paper.
Dissemination of findings being addressed	The derived index will feed directly into other on-going work on developing a management plan for NS horse mackerel. Results and analyses will be presented at ICES working groups, as well as at the PRAC. A paper on this topic has been proposed for inclusion in a special issue of Fisheries Research on data-limited methods for fisheries management (28 February deadline).
Utility of the developed products and expertise	The ICES data-limited approach has led to the advice for numerous stocks being based on single indices of biomass/abundance. Constructing indices for direct use in management may require alternative methods to those used to construct indices for use in assessment models. The approaches we plan to test should assist in developing meaningful indices for many other data-limited stocks.
What are the potential risks to the project's success?	Risks are low. Much groundwork has already been done. D. Miller will also be doing a course on GLMs in Q1 next year and will use this opportunity to work further on the data.
Project organisation	
Involvement IMARES (names and expertise)	David Miller, Aukje Coers, Thomas Brunel
Is the appropriate capacity available?	Yes
Involvement parties within WUR (names and expertise)	-
Involvement parties outside WUR (names and expertise)	-
Relevance	
What is the market	Netherlands (EZ), EU, ICES
Economical relevance	Using currently available data is a cost effective way to manage data-limited stocks
Social relevance	-
Scientific relevance	Data-limited approaches to advice are a hot topic currently.
Relevance to ministry EZ	Support development of NS horse mackerel management plan and potentially management of other data-limited stocks.
Summary	This proposal is to allow the continuation of on-going work that is relevant to fisheries management in the Netherlands and the EU. The aims are achievable in the short term.

Proposed budget			
Personnel	tariff	hours	amount
CAT I	58		0.00
CAT II	77		0.00
CAT III	96	120	11520.00
CAT IV	120		0.00
CAT V	140		0.00
CAT VI	171		0.00
Total Personnel			11520.00
Material costs			
Facilities			
Specific costs			
Travel costs			
Project equipment			
Other material costs			
Total Material Costs			0.00
Total project budget needed			11520.00
Financing through other resources			0.00
Finance needed from KBWOT			11520.00