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Centre for Fishery Research (CVO)

Kennisbasis WOT Fisheries 2011- What is in the Programme?

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Summary

The KBWOT Fisheries programme is core to the maintenance and development of the expertise that underpins the statutory obligations of fisheries monitoring and advice for the Netherlands. The structure of the KBWOT Fisheries programme for 2011 changed to reflect the recent discussions on the research direction between IMARES, CVO and EL&I. One of the strengths of the structure of the KBWOT Fisheries programme was the bottom up approach to calls for projects to fulfil the research priorities. This however was seen as giving the programme the potential to miss strategic needs of both the science development within IMARES and the research questions of EL&I, thus the programme now also contains a specific project request on an research subject relevant to IMARES and EL&I needs. The KBWOT Fisheries programme will fund 12 projects in 2011. The projects will investigate competition in exploited fish communities, long term changes in eel populations, the spawning habitat of mackerel, sub-stock structure in fish, trawling impact on benthic communities, quality assurance in fish aging, surveys of shellfish, maturity staging of fish and acoustic methods. Plus a targeted project specifically designed to research needs of IMARES and EL&I will be carried out into the trade-offs in FMSY targets for North Sea flatfish fisheries.

Samenvatting

Het KBWOT Visserij programma onderhoudt en ontwikkelt de expertise die nodig is om de WOT visserij uit te voeren. De structuur van het KBWOT Visserij-programma is in 2011 aangepast naar aanleiding van recente discussies tussen IMARES, CVO en EL&I over prioriteiten ten aanzien van kennisbehoefte. Een van de sterke punten van de structuur van het KBWOT visserij programma is de bottom-up benadering om aan onderzoekers te vragen om projecten voor te stellen om de onderzoeksprioriteiten in te vullen. Een nadeel van de huidige structuur is echter dat het mogelijk is dat een kennisbehoefte, die van strategisch belang is zowel voor de wetenschappelijk ontwikkeling binnen IMARES als voor EL&I buiten de boot valt. Daarom bevat het programma nu ook een verzoek om een specifiek project voor een onderzoek relevant voor IMARES en het ministerie van EL&I voor te stellen. Het KBWOT programma Visserij financiert 12 projecten in 2011. Deze projecten hebben betrekking op de volgende onderwerpen: voedselconcurrentie in geëxploiteerde visbestanden, lange termijn veranderingen in aalpopulaties, het voortplantingshabitat van makreel, sub-populatie structuur in visbestanden, impact van de trawlvisserij op de benthische gemeenschappen, kwaliteitsborging van de leeftijdsbepaling van vis, bestandopnamen van schelpdieren, bepalen van geslachtsrijpheid van vis, en akoestische methoden gebruikt bij bestandsopnamen. Bovendien is er op verzoek van IMARES en EL&I een gericht project ontwikkeld rond de nieuw MSY doelstellingen in het beheer van platvis in de Noordzee visserij.

1 Introduction

The KBWOT Fisheries programme is a core to the maintenance and development of expertise to underpin the statutory obligations of the Netherlands in fisheries monitoring and advice. It is an annually reviewed multiannual programme with clear objectives and deliverables. As the WOT obligations of the Netherlands change over time, the KBWOT fisheries programme remains flexible and responsive to developments and innovations in methods and policy needs. The core principles of the programme are maintaining expertise whilst being forward looking, ensuring value for money and strong collaboration with client ministries.

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

The structure of the KBWOT Fisheries programme for 2011 changed to reflect the recent discussions on the research direction between IMARES, CVO and EL&I (see Dickey-Collas 2010). One of the strengths of the previous structure of the KBWOT Fisheries programme was the bottom up approach to calls for projects to fulfil the research priorities. This however was seen as giving the programme the potential to miss strategic needs of both the science development within IMARES and the strategic questions of EL&I. Thus an extra component was brought into the programme (within existing budgets) to ask directly for not just projects to fill research priority areas, but for a targeted research project to directly address a strategic gaps in both IMARES and EL&I's research portfolio. For 2011 and 2012, this was viewed to be the science to underpin multispecies management plans for the southern North Sea within an MSY framework (see below).

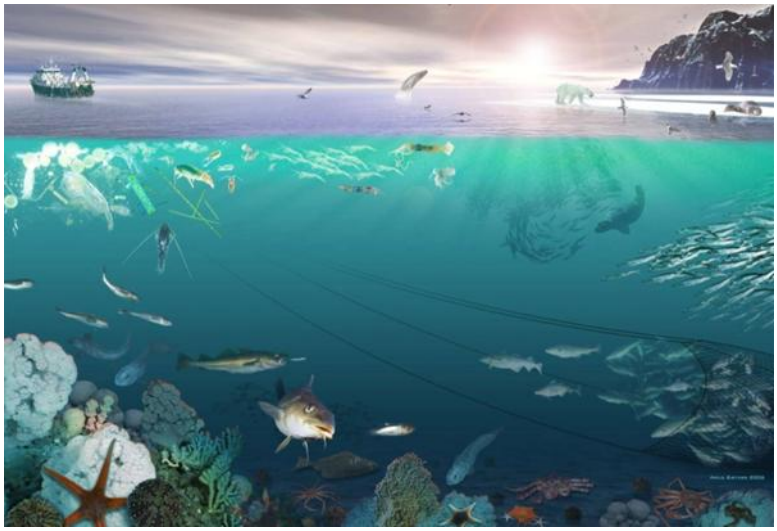
The programme operates through long term projects (multiannual) and annual projects in response to scientific and societal needs. Examples of KBWOT areas of research include integrated assessments of the ecosystem (particularly the demersal and benthic communities of the southern North Sea), multispecies and maximum sustainable yield (MSY) considerations in fisheries management, development of acoustic survey techniques and fish aging, ecosystem change, bycatch and discarding of marine organisms and the development of management plans for fisheries. The programme is administered by a panel of marine scientists, who review the programme each year, meet with civil servants from EL&I and circulate an annual report. This programme is part of the larger Kennisbasis programme carried out by Wageningen UR and has been developed in consultation with LNV. This document describes the strategic framework for the support of the knowledge base and the development of key expertise for the WOT programme.

2 The Broader Picture

Within DLO, kennisbasis is classified in seven themes. The kennisbasis for the WOT related to fisheries is positioned in theme 4: "groen-blauwe ruimte" which translates to use of the green and blue space. The core areas of this theme cover the sustainable use of the space in which we are living. Sustainable development covers both the maintenance of fisheries as well as the marine resources they exploit.

The fishery WOT tasks cover the advice and actions required to support the national and European fishery policy. They cover commitments to the CFP (Common Fisheries Policy), national freshwater policy, the Habitats Directive, the Water Quality Directive and the Marine Strategy Framework Directive where relevant to fisheries. The tasks include the collection of information and data, the development of understanding and the provision of evidence based advice. It is necessary to anticipate the future needs of EL&I and the EU when developing the structure of the kennisbasis WOT programme. Importantly for the kennisbasis programme in 2011, the EU is attempting to move towards a gradual implementation of the ecosystem considerations into fishery management and the next reform of the CFP. This is also true for the national policy. Thus KB WOT fisheries 2011 must respond to these needs.

When using science to advise policy, such as in fisheries management, it is necessary that the advice is based on credible and independent research of high scientific standards. This requires peer review of the science. Scientists must be aware of recent trends across the world in their research fields, any new developments in methodologies and must be internationally credible themselves. Thus Kennisbasis money could also be used to support technology exchange and scientific communication with scientists and institutes outside the Netherlands too. In addition, staff swaps with other institutes are encouraged.



3 International nature of KBWOT Fisheries – added value

The majority of projects within the programme are carried out in collaboration with European and North American partners. This provides a large amount of added value to the programme, as resources and expertise from other countries contribute to the IMARES research strategy. In some cases, added value is also increased by combining KB funds with those from EU FP7 projects. There is a component of the programme devoted specifically to international collaboration. This ensures that IMARES stays at the cutting edge of scientific developments and at the centre of fisheries research in Europe. The programme also encourages exchange through publications, presentations and developing new methods or tools for fisheries research.

4 Financing

Long term agreements between DLO and EL&I cover the WOT and with that the KBWOT.

The development of expertise programme for 2011 is financed by the research budget reserved for the kennisbasis programme. At the evaluation of the WOT programmes in 2004, it was agreed to allocate an annual budget to these programmes thus enabling key expertise to be maintained or developed to carry out the WOT. The available budget in 2011 for WOT programme 5 "Wettelijke Taken Visserijonderzoek" is € 621 000. This budget was expanded with additional funds from research programmes. However € 11 000 of this budget was reserved by WUR for general KB management.

The requests for kennisbasis WOT money in 2011 showed that the budget was already oversubscribed.

5 The programme for 2011

The programme for 2011 has the four following themes:

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

The programme is mostly populated with projects resulting from an annual call for proposals. Theme 2 though, is a direct targeted call for a specific research project. The programme prioritises projects that publish their results in the international peer reviewed literature and those that add value by offering co-financing opportunities with other projects. The four themes are described as follows:

5.1 Ecosystem Approach

The ecosystem approach is central to the development of fisheries management in the Netherlands and the EU. This approach requires novel and innovative methods to address the interaction of fisheries with the ecosystem. The specific knowledge and instruments (ideas) must be developed that can be applied to the management of human activities that impact the marine ecosystem The KBWOT definition of ecosystem approach is broad and is reflected by the breadth of proposals funded through this theme (from ecosystem functioning, to impact of fisheries on the ecosystem, to the interaction of fisheries, the ecosystem and society). Project proposals were invited that provide information or tools for the ecosystem approach to fisheries management and also research projects that make the ecosystem approach operational.

5.2 MSY targets for North Sea flatfish

There was an open call for proposals to carry out one specific project. This project call was developed in close liaison with EL&I to address the science needs and expertise development for fisheries management in the southern North Sea. In order to exhibit the trade-offs in fisheries management aiming for a maximum level fishing mortality that will produce maximum sustainable yield (MSY) that result from the ecosystem complexities, various factors need to be assessed: the spatial dimension of target species, incidental bycatch, the North Sea habitats, and the fishery. The aim of the project is to develop a way to examine the trade-offs in fisheries management by linking a full ecosystem model, including the dynamics of the largest source of mortality for most species: the fishery. This should be carried out with respect to the five main flatfish species caught in the southern North Sea (plaice, sole, dab, turbot and brill) and the ecosystem approach. The project should exhibit the trade-offs in fisheries management aiming for MSY in the light of integrated food web interactions and fisheries dynamics.

5.3 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 key competencies to deliver and internationally approved WOT programme. These competencies include age reading, stock assessments, acoustic techniques, shellfish surveying and data collection. Courses, workshops and exchanges are an important part of maintaining and developing key skills. The choice of areas to receive funding was made by the KBWOT fisheries programme leadership.

5.4 International Exchange

Under this theme funds are allocated to participate in international networks of active research (primarily ICES). Funds will be allocated by the KBWOT programme management (with the input of the review team) to participate in groups that are considered within the KBWOT fisheries remit. By devoting a theme to international collaboration, KBWOT fisheries ensures that not only does the Netherlands stay at the cutting edge of scientific developments but also remains efficient through added value of project financing and technology or expertise transfer from international partners.

5.5 Call for proposals

19 proposals were submitted to the KBWOT 2011 call (see annex 1). Of those the following were funded.

Proposal No	BAS No	Title	Project leader	Agreed Finance
8	KB-14-012-001-IMARES	Forage Fish Interactions (FACTS)	Dickey-Collas	€0
11	KB-14-012-002-IMARES	Effects resource competition	Kooten, van	€41 200
2	KB-14-012-003-IMARES	Changes in eel populations	Dekker	€20 000
3	KB-14-012-004-IMARES	Modelling the spawning habitat	Brunel	€19 000
5	KB-14-012-005-IMARES	Structure in fish populations	Overzee, van	€36 880
13	KB-14-012-006-IMARES	Impact on benthic productivity	Rijnsdorp	€26 100
14	KB-14-012-007-IMARES	Fish Ageing	Bolle	€50 000
15	KB-14-012-008-IMARES	Quality Shellfish Surveys	Troost	€40 000
16	KB-14-012-009-IMARES	Underpinning acoustics	Fassler	€54 700
17	KB-14-012-010-IMARES	International Exchange	Dickey-Collas	€118 500
1	KB-14-012-011-IMARES	WKMSFLAT: staging of flatfish	Damme, van	€30 465
18	KB-14-012-012-IMARES	Programme Management	Dickey-Collas	€24 000
19	KB-14-012-013-IMARES	North Sea demersal fisheries	Poos	€150 000

The total budget thus being €610,845. Which when combined with the WUR charges fulfils the 2011 budget of €621,000. The project proposal 8 – Forage Fish Interactions (FACTS) will be part of KB WOT from 2010 to 2012 but does not require funding for 2011. This project brings FP7 co-financing to KBWOT, and was partly funded in 2010 through the KB WOT Fisheries programme.

6 Conclusion

The KBWOT Fisheries programme will fund 12 projects in 2011. The projects will investigate resource competition in exploited fish communities, long term changes in eel populations, the spawning habitat of mackerel, sub-stock structure in fish, trawling impact on benthic communities, quality assurance in fish aging, surveys of shellfish, maturity staging of fish and acoustic methods. Plus a targeted project specifically designed to research needs of IMARES and EL&I will be carried out into the trade-offs in FMSY targets for North Sea flatfish fisheries. This research is performed within Kennisbasis Onderzoek (KB) / Beleidsondersteunend onderzoek (BO) / Wettelijke onderzoekstaken (WOT) of EL&I-programs.

7 References

Dickey-Collas 2010. Report of Trip to LNV to discuss Kennisbasis WOT fisheries with Directie Kennis and Directie Agroketens en Visserij. 10.IMA0283.MDC. 5pp

Signature

Report CVO 11.004
Projectnumber: KBWOT Visserij

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

Signature:

Date: April 2011

8 Annex 1 – The Proposals submitted to the call

8.1 Proposals for Ecosystem Approach

Proposal 1.

Title of project	WKMSFLAT: Workshops on sexual maturity staging of flatfish; sole, plaice, dab, flounder, turbot and brill
Project leader	Cindy van Damme
Theme	Ecosystem Approach
Participating partners (IMARES)	Internal: Ingeborg de Boois
Participating partners (external)	In cooperation with laboratories involved in collection of maturity and reproductive biology data
Duration	1-1-2011 – 31-12-2011
Broad description of the project including Expected results	The maturity stage is an important biological parameter to be used in the calculation of maturity ogives (and therefore of Spawning Stock Biomass), for the definition of the spawning season of a species, for the monitoring of long-term changes in the spawning cycle, and for many other research needs regarding the biology of fish. In 2010 WKMSSPDF (Workshop on sexual maturity staging of sole, plaice, dab and flounder) was organised. This workshop resulted in a new common maturity scale for the above species. However, participants also felt the need to evaluate this new maturity scale after use for one year. The 2010 workshop used fresh fish and photographs of gonads for maturity stage identification. A major problem was that not all participants collecting samples were able to prepare histological examinations to check the macroscopic staging. A new workshop should include both macro- and microscopic examinations of the gonads. To address above issues a follow-up workshop will be organised in 2012. Term of References (TOR): a) Report on the use of the 2010 proposed common scale; b) Check the description of the characteristics of the stages of the 2010 scale; c) Calibrate staging of sole, plaice, dab and flounder using fresh fish, following the pattern of trial-discussion-retrial; d) Calibrate staging of sole, plaice, dab and flounder using photographs, following the pattern of trial-discussion-retrial; e) Validate macroscopic maturity determination with histological analysis. At the 2010 WKMSSPDF a need for a sexual maturity staging workshop on turbot and brill was put forward and it was agreed to organise WKMSTB in 2012. Term of References (TOR): a) agree on a common maturity scale for turbot (*Psetta maxima*) and brill (*Scophthalmus rhombus*) across laboratories comprising a comparison of ex-isting scales and standardization of maturity determination criteria; b) reduce sources of error on maturity determination validating macroscopic staging; c) establish correspondence between old and new scales to convert time se-ries; d) propose optimal sampling strategy to estimate accurate maturity ogives; e) address the generic ToRs adopted for maturity staging workshops

	Both workshops will be chaired by Ingeborg de Boois and Cindy van Damme. Before the workshop macroscopic and microscopic samples need to be collected by the institutes involved. The samples can be collected through the running survey and market sampling program. However taking good photographs for the workshops and preparing of the histological slides requires extra time and expenses. In 2011 samples will be collected and photographed and histological slides prepared.
Proposed budget	Research **hours by scale**: Preparation of samples: 72JOND + 72 OASS Preparation of histological slides: 154 OASS Material €6000 (material for histological slides) Total cost: €24465 (personnel) + €6000 = €30465
Is the appropriate capacity available?	Ingeborg de Boois, Cindy van Damme and technicians have the required knowledge and capacity available.
What other potential funding sources have been considered?	Technicians will be partly funded through other projects: 50 hours from WOT surveys and 50 hours from WOT market (this is not included in the above budget). It is not possible to fund this through other sources.
What are the potential risks to the project's success?	Knowledge and techniques are available at IMARES. If histological slides are not present at the workshop it will not be possible to validate the macroscopic staging.
Why should this be funded by KB WOT?	Correct maturity staging is important for the determination of maturity ogives and SSB and therefore a key expertise in the market sampling and WOT surveys. Building on new expertise: The workshop offers the opportunity to increase the knowledge on macro- and microscopic staging of gonads which will be useful in quality assurance of the maturity staging.
Utility of the developed products and expertise	Since correct maturity staging is important for the determination of maturity ogives and SSB, it fits into the development plan in 'sustainable marine production'
Products to be delivered	ICES reports with the results of the maturity staging workshop after the workshops in 2012.
Dissemination of findings being addressed	Through ICES workshops and reports.
Connection to knowledge development at the University	None
International Scientific network	ICES, institutes involved in WKMSSPDF and WKMSTB
International objective of research	Correct maturity staging is important for the determination of maturity ogives and SSB and therefore a key expertise in the market sampling and WOT surveys.
International Project results	WKMSSPDF and WKMSTB
International Finance	None

Proposal 2.

Title of project	Long term demographic, phenotypic and genetic changes in European eel populations: driven by or driving anthropogenic impacts?
Project leader	Willem Dekker
Theme	Ecosystem Approach
Participating partners (IMARES)	Adriaan Rijnsdorp
Participating partners (external)	KU Leuven Belgie, Fiskeriverket Stockholm Sweden
Duration	2010 & 2011
Broad description of the project including Expected results	This cooperation has been discussed for many years, started in 2010, and if budget allows, will be completed in 2011 Eel: the interaction between population dynamics, phenotypic and genetic changes under human pressure and a changing climate, using historical otoliths. All temperate eel stocks are in decline for more than half a century, probably due to anthropogenic and natural factors. To disentangle the likely causes of the decline (anthropogenic or natural), the analysis of our invaluable historical otolith collection (unique in the world!) allows the joint analysis of the genetic background/shifts (original structure is potentially completely destroyed by large scale transplantation of tons of glass eel in the past) at neutral and adaptive markers, and potential trends in growth (also under influence of eutrophication, temperature, etc) during the past decades. As such, demographic and evolutionary changes will be analysed in depth, enabling better management decisions in future. The ongoing cooperation involves: a PhD project in Leuven (population genetics and adaptation), Fiskeriverket Sweden (ageing). Imares will cover the local population dynamics of Lake IJsselmeer eel stock, and handles the otolith collection.. Leuven performs the main practical work for genetic analyses and otolith reading. Amongst others, this requires ageing of most material. The focus of the work will be on Lake IJsselmeer, the only water body with such a long time series of data and otoliths in the world. For Lake IJsselmeer, earlier research has delivered partial analyses of recruitment, abundance, fishing impact, but not growth and mortality. Growth (ageing) is now (fall 2010) being performed in Leuven/Stockholm. Assessment of mortality remains to be inferred, which can be determined from the observed abundance by 'subtraction' of the other processes. That will complete the one and only case study in the world, where the observed decline of the stock is completely documented during the period of decline (ca.1950-recent)! Since the decline of the continental stock (since 1960) preceded (and caused?) the recruitment decline (since 1980), this is likely to give new insights on the ultimate causes of the current stock collapse.
Proposed budget	Research hours by scale: 2*160 senior scientist 37,440 Additional Expenditure: some local travel. 2,560 Total cost over two years: € 40,000 Requested contribution in 2011: € 20,000
Is the appropriate	yes

capacity available?	
What other potential funding sources have been considered?	Since this is a continuation, none other than before.
What are the potential risks to the project's success?	A pilot study in historical otoliths has tested the DNA quality/quantity (successful) and age readability (ongoing) Risk of Leuven or PhD-student not delivering; small risk. Risk of chaotic results. That is part of our live. In 2010, collection has been disclosed and techniques have been tested. 2011 will primarily focus on analysis and publication.
Why should this be funded by KB WOT?	The questions addressed in this proposal relate to the Ecosystem Approach, MSY targets (not of flatfish), fish objectives and international exchange. As most of the work has been done in the past (collection), in international cooperation (Leuven and Stockholm), and in the ongoing WOT programme (monitoring & assessment), this proposal will constitute the much needed finishing piece to complete the story of the eel in Lake Ijsselmeer.
Utility of the developed products and expertise	The eel issue is above all a management issue, fitting into our core business on sustainable exploitation. However, the broader process analyses proposed here will explore potential climate effects, will consider broader anthropogenic pressure on the ecosystem, and address long-lasting, possibly highly detrimental effects of past anthropogenic impacts. The eel issue being of high political interest, and following a central role of Imares in the eel debate at the national and international level in the past, the interest in eel is now rapidly spreading in the academic world. Developing a strong partnership with such groups is of high importance for future research cooperation.
Products to be delivered	Trends in growth, analysis of population dynamics of IJsselmeer eel stock, articles. Co-supervision of PhD thesis in Leuven, several articles with co-authors. An introductory article describing the collection and techniques has been submitted.
Dissemination of findings being addressed	in scientific articles, contributions to national and international meetings, etc. No specific budget reservation.
Connection to knowledge development at the University	PhD at Leuven University
International Scientific network	The project is centered on international cooperation with Leuven and Stockholm.
International objective of research	Since the Imares otolith collection is absolutely unique in the world, results will play a key role in understanding the continent-wide decline of the stock. Environmental issues (eutrophication), climate change (warming), fisheries management and other anthropogenic impacts (large scale genetic pollution) will be touched upon.
International Project results	Results will be published, and made available to international assessments.
International Finance	This proposal covers only the national costs. Leuven and Stockholm cover their own expenses. The main costs are for the PhD in Leuven.

Proposal 3.

Title of project	**Modelling the spawning habitat of the Northeast Atlantic mackerel to understand the recent changes in distribution.**
Project leader	Thomas Brunel
Theme	Ecosystem approach
Participating partners (IMARES)	Geert Arts and Cindy van Damme
Participating partners (external)	
Duration	One year
Broad description of the project including Expected results	**Topic** During the recent years, unusual distribution of the Northeast Atlantic mackerel have been observed both during the spawning and the feeding seasons. This gave rise the development of a targeted fishery in Icelandic waters during summer, and generated a lot of debate, both in the political and scientific spheres, about whether this represents a shift or an expansion of mackerel distribution, and whether this would be a permanent or reversible situation. The changes in distribution are suspected to be caused by environmental changes, which would modify the phenology of the species (i.e. migration dates) and make new areas suitable for the mackerel feeding and spawning. This question has become very sensitive, and has indirectly resulted in an ineffective management of the stock, which puts it under threat. **Aim** The distribution of the spawning mackerel and its temporal variation are well documented. The aim of this project would be to define the environmental characteristics of the spawning habitat of mackerel, to investigate the relationship between the recent changes in spawning distribution and timing, and the changes in environmental conditions. **Data** Monthly maps of the mackerel egg production from the triennial International mackerel egg surveys. **Method** The egg production per month and per geographical rectangle will be modelled (GAM or GAMM) as a function of the month, the latitude, and environmental variables such as temperature, salinity, and if possible zooplankton abundance. The model would allow to show if there are some preferred conditions for spawning, and if they are stable or have evolved in time. Additionally the model could be fit only for the years prior to the distribution change (until the 2004 survey) and be used to predict the distribution in the most recent years (2007 and 2010) on the basis of the observed environmental conditions, to see if the recent changes in distribution can be reproduced based on environmental information only.
Proposed budget	200h (19 000€) : T Brunel. running the project = 180h - G Aarts. providing advice on modelling and discussion on results = 10h - C v Damme. Providing input on egg survey (access to the data, data quality…) and discussion on results = 10h
Is the appropriate capacity available?	Yes
What other potential funding sources have been considered?	None, except that part of my hours for preparation of WGWIDE (about 40h) may be dedicated to this study (and its presentation to the group)
What are the potential risks to the project's success?	There is no available database containing the egg survey data (it is under construction). The data will have to be collected from the members of WGMEGS.
Why should this be funded by KB WOT?	This study deals with the impact of ecosystems changes on the mackerel distribution, which directly affects its fishery and its management. It therefore

	falls under the theme ecosystem approach
Utility of the developed products and expertise	This study could contribute to answer the question of the link between mackerel distribution changes and the environment. This would be very useful to estimate the likelihood (provided some forecast of the environmental variations in the coming years would be available) of a continuation of the currently observed changes, or on the contrary, a return to a previous situation. That type of information would probably be interesting for WGMEGS for the planning of the next (2013) survey. Stakeholders are also very eager to have some scientific explanation about the distribution changes in mackerel. If the proposed model fits well to the data, it can be used to predict the egg production in 2007. Comparison with the egg survey, which didn't reach the Northern limit of mackerel spawning this year, would give an estimate of the proportion of the spawning that has not been covered by the survey, i.e of the validity of the index used for stock assessment for 2007
Products to be delivered	Report + material for a publication in a peer reviewed journal
Dissemination of findings being addressed	See above
Connection to knowledge development at the University	none
International Scientific network	This work would be presented to WGMEGS and WGWIDE
International objective of research	Yes, given the international nature of the mackerel fishery, and through the collaboration with an international group of expert (WGMEGS)
International Project results	See "utility of the developed products and expertise"
International Finance	none

Proposal 4.

Title of project	**Spatio-temporal variations in North Sea herring body condition, and its link with the environment**
Project leader	**Thomas Brunel**
Theme	Ecosystem approach
Participating partners (IMARES)	None
Participating partners (external)	None
Duration	1 year
Broad description of the project including Expected results	**Topic** During the summer feeding season, North Sea herring store lipids in their muscles and guts. The amount of the energy which is stored in this way could be thought of as an indication of the individual's well being - or condition. More commonly, condition is viewed as a morphometric index, indicating whether a fish of a given length is heavier or lighter than the norm. While both biologically meaningful (it influences growth and fecundity) and economically relevant (fat content makes the value of the fish on some markets), little is known about condition variability, and the factors responsible for it. **Aim** In this study, I propose to look at condition variability in North Sea herring at different levels – among individuals, over space, and in time – and investigate the potential effects of environmental factors as well as density dependence. **Data** Condition will be calculated on an individual basis, based on length and weight measurements taken during the North Sea herring acoustic survey, for the period 1998-2009. **Method** The first aim will be to quantify and describe the variability in fish condition. More specifically, semi-variograms will be used to investigate if there are spatial patterns in the variation of condition. Variance decomposition techniques will be applied to test for significant differences in condition among classes (being defined as geographical units and age class) or if most of the variability occurs at an intra-class / inter-individual level. Then, condition will be modeled (using GLM or GAM) as a function of temperature, zooplankton abundance (as environmental drivers), and herring abundance (for density dependent effects).
Proposed budget	160 h for T Brunel (15 200 €)
Is the appropriate capacity available?	Yes
What other potential funding sources have been considered?	No other direct financing of this project. However, the dataset necessary for this study is currently being / has been assembled for the project DEFINEIT, which could be considered as some co-funding. In DEFINEIT, the individual condition was calculated. But since it was not the focus of the project, this data has not been analysed. This study would bring some added value to DEFINEIT.

What are the potential risks to the project's success?	None or very little, since the data is already collected and ready to be analysed
Why should this be funded by KB WOT?	Condition is a key parameter in fish populations, since it has direct implications for the reproductive potential (via fecundity determination), and for the stock's productivity (in term of harvestable biomass produced by each individual at a given time). This study should improve our knowledge on the variability of condition, and its link with some ecosystem factors, being the abiotic environment and the lower trophic levels. This study is part of the more general question of how the dynamic of herring is affected by the ecosystem and therefore it fits very well in the Ecosystem approach theme.
Utility of the developed products and expertise	This study should give indication about whether there is some determinism in the fish condition (whether it is linked to environment or population dynamics). This should indicate if it is worth putting more effort in understanding condition and its implication for stock management (for reasons mentioned above), or if it should be taken as a randomly varying parameter.
Products to be delivered	A short report of the work, material for writing a manuscript to be submitter to a peer reviewed journal.
Dissemination of findings being addressed	
Connection to knowledge development at the University	none
International Scientific network	The data is provided by 5 research institutes (IMR, Norway ; Marine Scotland, DTU-Aqua, Denmark, vTI, Germany and IMARES). One person from each institute will be associated to this study.
International objective of research	Yes, 1) because the data is from 5 different nations, and that each one wants to be associated to this work, and 2) because potential findings are relevant to the international scientific community.
International Project results	No direct application of the results, except a better understanding of North Sea herring biology.
International Finance	none

Proposal 5.

Title of project	Refining a tool for investigating spatial and substock structure in marine fish populations
Project leader	Harriët van Overzee
Theme	Ecosystem Approach
Participating partners (IMARES)	Stijn Bierman, Mark Dickey-Collas, Ineke Pennock, Silja Tribuhl, Cindy van Damme, Harriët van Overzee
Participating partners (external)	Audrey Geffen (University of Bergen) Lotte Clausen (DTU-Aqua, Denmark) Henrik Mosegaard (DTU-Aqua, Denmark) Norbert Dankers (Universiteit van Amsterdam)
Duration	One year
Broad description of the project including Expected results	The ecosystem approach requires an understanding of population dynamics at a different resolution than currently supplied by conventional stock assessments. IMARES is at the forefront of developing methods to investigate spatial and substock dynamics in commercially exploited fish. This project will synthesise previous and ongoing development on substock structure using herring as a case study. North-East Atlantic herring (*Clupea harengus*) consists of a complex mixture of spawning components, and in the North Sea at least three stocks mix. In addition, the North Sea stock is made up of at least 4 spawning components. Each spawning component has its own spawning ground to which it returns to during its own specific spawning period. An important management objective is to preserve the diversity of spawning components, but it is currently not possible to monitor the trajectories of the subcomponents independently. IMARES is part of a European wide team that is developing methods to quickly and cost effectively distinguish between these herring populations. The method can be used for catch and survey data. IMARES has further developed methods originally instigated by DTU-Aqua on the use of morphometric shape discrimination of otoliths and now needs to bring this development into the wider community, and ensure the transfer of the technology into the advisory and scientific arena. Although, the technique has been successfully used for the NORDIS project (Van Overzee *et al*., 2009) to distinguish between Norwegian spring spawning herring and North Sea herring, the method was complex and lacked a strong baseline to ensure robust transferring of results. The statistical approach also required further development. In 2010, further work was carried out at IMARES and University of Amsterdam to make the process more routine, more efficient and cost effective. Also a strong baseline study was carried out to strengthen the validation and thus scientific basis for the work. For 2011, we propose to synthesise our method development and investigation of the variability in the baseline analysis, leading to a manuscript for submission to a peer reviewed journal. We also propose to fund an international workshop at IMARES to further ensure the quality of our methods and their applicability. The main aim of the workshop will be

	to scrutinise current methods and agree methods for the discriminating statistics. This workshop will also encourage further cooperation and communication of results into the advisory system. We also seek funding to send one scientist to the ICES ASC to take part in the theme session "Applications of optical and image based technologies in the ecosystem approach to fisheries management". Participating in this theme session will further embed these techniques in the development of the ecosystem approach. **References** Van Overzee, H.M.J., M. Dickey-Collas, M.G. Pennock-Vos, S.V. Tribuhl, S.M. Bierman, C.J.G. van Damme & M. Warmerdam, 2009. Norwegian Sea Herring Stock Discrimination phase 1 [NORDIS 1]. IMARES Report C142/09.
Proposed budget	**Research hours by scale:** 7-9: 80 hours (€ 74 per hour) 10-11: 200 hours (€ 93 per hour) 13-14: 40 hours (€ 134 per hour) **Additional Expenditure:** Workshop € 5000 Travel expenses participating external partners Software development € 1000 Expenses Norbert Dankers (UvA) Travelling € 1000 ICES ASC 2011 **Total cost:** € 36880
Is the appropriate capacity available?	Yes
What other potential funding sources have been considered?	No other funding available. The Pelagic fishing industry funded NORDIS phase I, but withdrew their funding for the second phase due to other commitments (worries about horse mackerel)
What are the potential risks to the project's success?	No potential risks. Data is available and methods have already been developed.
Why should this be funded by KB WOT?	The dichotomy of having good single species stock assessments and yet, not being able to understand the spatial dynamics of populations in the ecosystem is a key stumbling block to both an ecosystem approach to fisheries management and carrying out integrated assessments of the North Sea. ICES acknowledges this problem and has thus initiated the Workshop on Integrating Stock Structure (WKISS), to be chaired by Hintzen from IMARES. These initiatives however, need data on sub-stock structure and mixing between stocks in the surveys and catches. Thus cost effective methods are being developed to address this lack of data and understanding. The use of otolith morphology to distinguish between fish is being increasingly cited as an appropriate technique (possibly also applicable to species such as cod, whiting and plaice too). The techniques being developed by IMARES and partners, are at the forefront of the field. It keeps in-house expertise in the development of optical techniques for the recognition of fish. The method, which is close to final development, can be used on embedded and lose otoliths, so easily transferred into the standard otolith processing line.

	Not only is this proposed work useful to the development of the ecosystems approach, it also maintains and develops expertise in an important field for WOT and the provision of fisheries advice. IMARES has a track record in this area which it must maintain with published studies on sub-stock structure (Bierman et al 2010) and the applicability of information of structure to the advisory process (Kell et al., 2009). So this project fulfils many of the KBWOT criteria and we hope that it will be funded in 2011, to make use of the opportunity provided by the ICES theme session. **References** Bierman, S.M., M. Dickey-Collas, C.J.G. van Damme, H.M.J. van Overzee, M.G. Pennock-Vos, S.V. Tribuhl & L.A.W. Clausen, 2010. Between-year variability in the mixing of North Sea herring spawning components leads to pronounced variation in the composition of the catch. ICES Journal of Marine Science, 67: 885-896. Kell, L. T., M. Dickey-Collas, N.H. Hintzen, R.D.M. Nash, G.M. Pilling, B.A. Roel, 2009. Lumpers or splitters? Evaluating recovery and management plans for metapopulations of herring. ICES Journal of Marine Science, 66: 1776-1783.
Utility of the developed products and expertise	This project will provide a better understanding of the spawning origin of herring in samples from catches. Such knowledge will be of value to WOT and the IMARES research themes pressure on the ecosystem and sustainable marine production.
Products to be delivered	A scientific paper to be published in a peer reviewed journal, an international workshop, a scientific presentation to be given at ICES ASC 2011
Dissemination of findings being addressed	Scientific publication, workshop and presentation. Also liaison with ICES WKISS.
Connection to knowledge development at the University	Not Wageningen, but Universities of Amsterdam, Bergen and the Danish Technical University.
International Scientific network	Yes. ICES – through WKISS, **DTU-Aqua** (Denmark) and **University Bergen** (Norway).
International objective of research	This work contributes to the developing Common Fisheries Policy (CFP), and to the biodiversity descriptors of the Marine strategy framework directive (MSFD). It also has the potential to inform scientist in North America via ICES.
International Project results	Scientific paper and scientific presentation. The method will be spread across the ICES community.
International Finance	None but added value through partnership.

Proposal 6.

Title of project	Trends in abundance of freshwater and diadromous fish species
Project leader	Martin de Graaf
Theme	Ecosystem Approach
Participating partners (IMARES)	Martin de Graaf Stijn Bierman Pepijn de Vries Ingeborg de Booijs
Participating partners (external)	None
Duration	2011
Broad description of the project including Expected results	*Planned activities, deliverables and milestones* Time series analysis fresh water and diadromous fish IMARES routinely conducts several freshwater and diadromous fish monitoring programmes; Fyke registration in Rivers and Lake IJsselmeer/Markermeer, Trawl survey Lake IJsselmeer/Markermeer, Registration diadromous fish at Kornwerderzand (Waddenzee), Rare fish collection in Lake IJsselmeer/Markermeer. Until a few years ago IMARES also conducted the monitoring program of fish with the major rivers (Rijkswateren). Each monitoring program is at present reported on separately. Our proposal is to develop an integrated trend analysis which uses data from all monitoring programs and which can be updated and reported annually. For example SOVON produces annual reports on trend of for example water birds. Our vision is to provide an annual report on the "Status of freshwater and diadromous fish in the Netherlands Rijkswateren". Providing one report, a complete overview of all the monitoring programs, should be an improvement for our customers and other stakeholders. Furthermore one integrated report enhances our claim as custodians of freshwater and diadromous fish distribution, abundance and biological data. Being able to deliver this service might also play a positive role in our attempt to regain the contract for monitoring fish of the main rivers. Collating distribution, abundance and other related data (length frequency) of eel will receive specific attention within the proposed project with regards to undergoing eel research within WOT and BO. For eel we will not only attempt to collate and update the information available with our own data base and monitoring programs but we will also explore to possibilities of integrating eel data collected throughout the Netherlands as part of the Water Framework Directive. Furthermore, we will revisit the current data collection protocols for the different monitoring programs and investigate whether minor adjustments are required to improve the quality of eel data. Planned activities: Data preparation (Jan-Apr) Trend analysis (Apr-Jun) Reporting, scientific paper (Jun-Dec)

Proposed budget	*Martin de Graaf* - project management 40 hours x € 95 = 3800 - writing 40 hours x € 95 = 3800 - data preparation 40 hours x € 95 = 3800 - writing 40 hours x € 95 = 3800 *Pepijn de Vries* - analysis 40 hours x € 95 = 3800 - writing 40 hours x € 95 = 3800 *Stijn Bierman* - data preparation 40 hours x € 95 = 3800 - analysis 40 hours x € 95 = 3800 - writing 40 hours x € 95 = 3800 *Ingeborg de Booijs* - data base management 40 hours x € 95 = 3800 Travel: € 1000 **Total: € 39.000**
Is the appropriate capacity available?	Yes
What other potential funding sources have been considered?	Unlocking eel data (e.g. water framework directive) and eel trend analysis is connected with the WOT Eel Programme and the BO Yellow Eel Model.
What are the potential risks to the project's success?	In 2010 a start was already made with the trend analysis by Pepijn de Vries, the rough structure for the analysis is already present.
Why should this be funded by KB WOT?	*Name (1) Knowledge question from the KB programme that will be addressed (zie het bijgaande visiedocument)* Ecosystem Approach (and Maintaining Quality) *and (2) – after the project will be finished – what contribution will be delivered to answer this question.* While IMARES conducts several monitoring programs, the results are interpreted and reported separately. Integrating the results of the different monitoring programs and reporting the results annually in one report e.g. "Status of freshwater and diadromous fish in "Nederlandse Rijkswateren" will: a) strengthen IMARES's claim as custodians of freshwater and diadromous fish data, and b) provide a better and structured overview of the changes in fish populations within the different freshwater ecosystems
Utility of the developed products and expertise	*Which strategic goals from IMARES and WUR will be contributed by your results?* Maintain the leading institute in the Netherlands with respect to the ecology of freshwater and diadromous fish species in 'Rijkswateren'. Strengthen the role of IMARES as custodian of freshwater and diadromous fish distribution

	and abundance data. Being able to provide an integrated time series analysis may enlarge our changes as an institute to compete for the upcoming contract for monitoring fish on the large rivers (ACTMON).
Products to be delivered	A statistical methodology for integrated (PASMON, ACTMON, Zeldzame Vis, Diadrome Vis) trend analysis of freshwater and diadromous fish species. An up to date analysis of available eel data with our current database. A protocol for annual uodate of the IMARES database with Water Framework Directive eel data.
Dissemination of findings being addressed	- Scientific paper on trends in the abundance of freshwater and diadromous fish (with special emphasis on eel. - Presentation of the result at a meeting of Vissennetwerk - Popular scientific paper in Visionair - Eel trend analysis will also be published in the 2011 Country Report for ICES WGEEL.
Connection to knowledge development at the University	None
International Scientific network	Results of the project will be reported to WGEEL (Martin) and international networks working on diadromous species (Erwin Winter)
International objective of research	Provide more insight in trends of especially internationally managed (eel, salmon etc) diadromous fish species within Dutch freshwater ecosystems
International Project results	Result of the trend analysis may be used by groups working on internationally managed species.
International Finance	None

Proposal 7.

Title of project	Experimental design and Analysis Recreational Fisheries Surveys
Project leader	Dr Martin de Graaf
Theme	Ecosystem Approach
Participating partners (IMARES)	Dr Martin de Graaf Dr Stijn Bierman
Participating partners (external)	Dr Jeremy Lyle Research Group Leader Scale Fish and Recreational Fisheries Tasmanian Aquaculture & Fisheries Institute University of Tasmania
Duration	2011
Broad description of the project including Expected results	Recently the EU installed additional regulations, which obliges Member States to estimate and report recreational catches of cod, eel, salmon, seabass, bluefin tuna, sharks and rays in European waters. To fulfil the requirements of the EU regulations, the Netherlands has implemented a Recreational Fisheries Programme in 2009 to estimate the recreational catches of cod, eel, sharks and rays. To collect data on fishing participation (e.g. "Have you fished in the past 12 months?"), assessing attitudes or awareness and/or socioeconomic and demographic profiling of recreational fishers, phone or mail recall surveys are straightforward, easy to administer and relatively cost-effective. However, if detailed information on effort (e.g. "How many days have you fished in the past 12 months?"), catch (e.g. number or size) and/or economic activity is required, recall surveys are of limited applicability due to the impacts of recall bias, non-response bias, digit preference and/or prestige bias (Pollock et al 1994; Lyle et al 2002; Henry and Lyle 2003; Baharthah 2006). In recent years several estimates of the total catch of cod (*Gadus morhua*) by angling recreational fishers have been reported: 264-1037 tonnes (Van Keeken et al. 2007) based on phone and mail recall survey, ~1650 tonnes in 2006 (Wijnstroom, 2006) based on a phone recall survey. Due to the methods (recall surveys) the accuracy of these catch estimates are doubtful as recall surveys have been demonstrated to overestimate recreational catches by as much as a factor two (Baharthah, 2006). In the Netherlands, marine recreational fishers are not registered and are not required to obtain a recreational fishing permit. Therefore the most reliable survey should comprise of two components following Lyle et al. (2002) and Henry and Lyle (2003): (1) **Screening Survey**: identify fishing households, profile fishing households, select participants for a follow-up, and (2) **Diary Survey**: monitoring fishing (and economic) activity through regular contact (monthly) by survey interviewers. The Screening Survey was conducted in December 2009 and the 12 month Diary Survey (2000 logbooks) started in March 2010. Dr Jeremy Lyle is one of the leading scientists in design and analysis of recreational surveys (See Appendix I). Jeremy is the co-chair if the ICES

	Planning Group of Recreational Fisheries Surveys and his/Australian methods of a combination of Screening Surveys and Diary Surveys was adopted as the standard methodology for current and future European designs at the 2010 PGRFS meeting. *Expected Results:* 1) Analysis current RECFISH surveys Jeremy has offered to assist with the analysis of the current survey. He has developed a package of tools (code) in R to analyse the data of the current (and future) Diary Survey of the Recreational Fisheries Program to estimate the recreational catches of cod, eel, sea bass, sharks and rays as required by the EU. 2) Design future RECFISH surveys To improve and strengthen the experimental design of the Recreational Fisheries Survey in the Netherlands based on the results of the current survey and using Jeremy's international expertise. *Planned activities:* April 2010 end Logbook Survey May/June 2010 Preparing data for analysis July (3 weeks) Analysis of 2010-11 Logbook Survey and Design 2012 Logbook Survey
Proposed budget	Dr Jeremy Lyle: Ticket Australia-Netherlands 1000 Hotel (20 nights x €150) 3000 Food (20 days x €100) 2000 Local travel 200 Dr Martin de Graaf 40 uur (WOT) 80 uur x €95 7600 Dr Stijn Bierman 40 uur (WOT) 80 uur * € 95 7600 Total €21.400 **Note that Dr Lyle's salary will be covered by his institute during his stay at IMARES.**
Is the appropriate capacity available?	Yes
What other potential funding sources have been considered?	The proposed KBWOT project is an addition to the Recreational Fisheries Programme (WOT).
What are the potential risks to the project's success?	Due to unforeseen circumstances Dr Jeremy Lyle may not able to travel to Europe at the agreed dates.
Why should this be	(1) Ecosystem Approach and International Exchange.

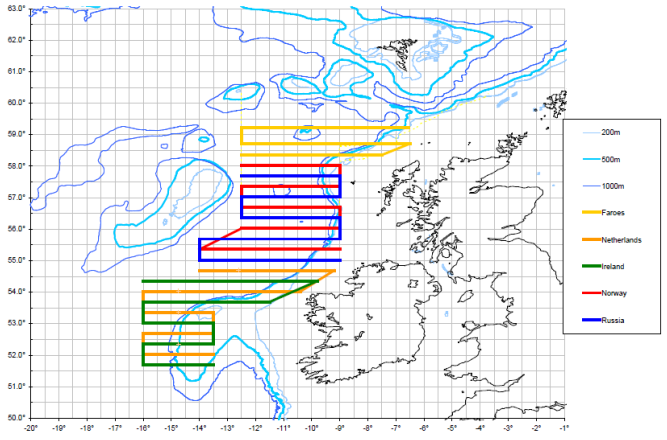
funded by KB WOT?	Until recently the impact of recreational fisheries has been ignored in the development of fisheries management and stock assessment. However, the impact of coastal recreational fisheries can be as severe as commercial fisheries. The aim of the KBWOT proposal is to improve and strengthen the analysis and design of recreational fisheries surveys by using the expertise of one of the leading scientist (Dr Jeremy Lyle) in this field. (2) This KBWOT project will strongly assist in improving the accuracy when estimating the impact of recreational fisheries on coastal fish stocks and ecosystem.
Utility of the developed products and expertise	The current Recreational Fisheries Program was well received at the 2010 ICES PGRFS meeting. The Netherlands has at the moment one of the more comprehensive programmes and the use of (cheap) online methodology is also innovative. However, now it needs to be proven that the online methods are as robust as the more traditional methods of mailing and (random) phone calls etc.
Products to be delivered	1) To develop a set of tools (code) in R to analyse the data of the current (and future) Diary Survey of the Recreational Fisheries Program to estimate the recreational catches of cod, eel, sea bass, sharks and rays as required by the EU. 2) To improve and strengthen the experimental design of the Recreational Fisheries Survey using international expertise.
Dissemination of findings being addressed	The results of the Recreational Fisheries Programme will be presented at: - ICES PGRFS 2011 (Annual Country Report) - IMARES Report (Annual Country Report) - 6th World Recreational Fishing Conference (August 1-4, 2011, Berlin) - Popular Scientific publications in Visionair and Beet - Scientific publication (ICES Journal or Fisheries Research)
Connection to knowledge development at the University	Not at present.
International Scientific network	1) ICES Planning Group for Recreational Fisheries Surveys 2) IMARES is part of a European COST proposal "Understanding Recreational Fisheries: A Missing piece for Sustainable European Coastal Fisheries" that was recently submitted.
International objective of research	The methodologies and results of the Dutch Recreational Fisheries Program are closely followed by scientist in other countries.
International Project results	If robust and unbiased the online survey method may be used in other countries.
International Finance	The COST proposal is granted will provide funding for international travel/meetings of scientists working on RECFISH surveys.

Proposal 8.

Title of project	Forage Fish Interactions (FACTS) – Cofinancing EU FP7 project
Project leader	Mark Dickey-Collas
Theme	Ecosystem Approach
Participating partners (IMARES)	Geert Aarts, Tobias van Kooten, Tim Schellekens, Thomas Brunel, Meike Scheidat,; Sophie Brasseur, Kristina Raab
Participating partners (external)	The EU 7th framework project FACTS.– 15 institutes from 8 different European states; Denmark, Germany, Norway, UK, France, Spain, Norway, Finland.
Duration	Second of three years
Broad description of the project including Expected results	FACTS will develop and disseminate advice on the consequences of various forage fish harvest strategies to the ecosystem including their economic implications. FACTS research focuses on seven forage fish species (anchovy, herring, capelin, Norway pout, sardine, sandeel and sprat) that are a major natural resource to the European community and represent key elements in the functioning of marine ecosystems. FACTS will eliminate critical gaps in knowledge that currently exist concerning the impact of variations in forage fish populations (due to various drivers such as climate and fishing) on the trophodynamic structure and function of different European marine ecosystems. The North Sea is a case study, being lead by IMARES. FACTS will answer the following questions: 1. What are the major short- and long-term drivers of changes in commercially and ecologically important forage fish populations within European waters? 2. What are the biological and economic consequences of changes in forage fish populations in terms of their prey, their competitors and their predators? 3. What are the biological and economic consequences of changes in predator populations on forage fish populations and their fisheries? 4. What is the role of forage fish species in maintaining biodiversity and ecosystem stability? FACTS will develop new operational models that estimate the biological and economic tradeoffs associated with various exploitation strategies of forage fish stocks in major European fisheries. Moreover, as the main providers of advice on forage fish in the North Atlantic, FACTS partners are also able to translate these model outputs into urgently needed advice on how best to move beyond the single-species approach of current fishery assessments and adopt ecosystem-oriented management.
Proposed budget	Cofinancing : €70,000 over three years. **Total cost for 2011: € 23,500**
Appropriate capacity available?	Yes
What other potential funding sources have been considered?	The majority of costs come from other sources with large added value from other institutes: This is an EU funding project which requires 3 years of cofinancing. The EU provide €300,000 and IMARES directorate €30,000. The total international budget is €4 million. FACTS also has ICES and PICES backing with planned joint symposia for 2011 and 2012. (PICES is Pacific ICES).
What are the potential risks to the project's	The project is medium risk and most deliverables are shared between various staff.

success?	
Why should this be funded by KB WOT?	This is a core part of WOT, as FACTS is specifically focused towards improving management advice for forage fish. KB WOT will gain added value by the €300,000 funding from the EU and €30,000 from the IMARES directorate for two remaining years of a PhD. It addresses interesting science questions and involves major method and approach development.
Utility of the developed products and expertise	Applicable to considerations of Good Environmental Status and direct links into the advisory system via CFP and MSFD.
Products to be delivered	A series of scientific papers, symposia, technology transfer from across Europe to IMARES.
Dissemination of findings being addressed	The findings will be published, and a major international symposium is planned for 2012.
Connection to knowledge development at the University	This project is directly linked to a WIAS PhD student.
International Scientific network	Yes, through ICES, STECF, and the project consortium.
International objective of research	Addresses major research objectives set forth by the revised Common Fisheries Policy, the Marine Strategy Directive (2008/56/EC) and EU Marine and Maritime Research Strategy. It also has the potential to inform scientist in North America & East Asia via ICES and PICES
International Project results	The results of the project will be disseminated through an ICES theme session at the 2011 ASC and through an ICES/PICES symposium in 2012.
International Finance	Yes through FP7 and links to ICES

Proposal 9.

Title of project	*Blue whiting migration*
Project leader	*Sascha Fässler*
Theme	*Ecosystem Approach*
Participating partners (IMARES)	*Bram Couperus*
Participating partners (external)	*ICES WGNAPES participants coming from: IMR (Norway), Marine Institute (Ireland), PINRO (Russia), FAMRI (Faroes).* *Marine Laboratory (UK)*
Duration	*1 year*
Broad description of the project including Expected results	*The internationally coordinated acoustic Blue Whiting spawning stock survey has only been running for the past 7 successive years. Its survey design therefore faces some teething problems mainly concerned with survey timing and the onset of spawning migration in a northern direction. There is evidence that the survey direction of some participating vessels (soutl ng" in some At the electe Whitir new surve in two c with the di logy will se oppos poten ally this w while maint*  Figure 5.1.1. Preliminary survey tracks for the 2011 International blue whiting spawning stock. *The project will primarily make use of this change in survey design to analyse the effect of spawning migration on acoustic abundance estimates. Environmental variables collected during the survey by participating nations will be used to explain migration speed/direction/timing.* *Expected results include a better understanding of the spawning migration of the Blue Whiting stock and associated improvement of survey design.*
Proposed budget	*Total costs: € 22'800.00* *Hours: 240 x JONDZ = € 22'800.00*
Is the appropriate capacity available?	-
What other potential funding sources have been considered?	-
What are the potential risks to the project's success?	*No specific risks other than unexpected unavailability of staff and international colleagues*
Why should this be funded by KB WOT?	*In order to answer the knowledge question: what is the best way to survey the Blue Whiting spawning stock to provide accurate biomass estimates? The project would allow IMARES as the elected coordinator of the survey to take the lead in designing a robust survey for the coming years, in terms of*

	coverage, timing and effort, in order to properly fulfil DCF needs.
Utility of the developed products and expertise	*Species migration can contribute up to 30% of the total systematic error in an acoustic survey. The ecosystem approach will rely on accurate biomass estimates of species to feed into ecosystem models. Improving the accuracy of surveys for Blue Whiting will provide a sound basis for future acoustic SSB estimates of this important forage species in the northeast Atlantic and Norwegian Sea.*
Products to be delivered	*Robust design for the acoustic Blue Whiting SSB survey*
Dissemination of findings being addressed	*Working document at WG meeting* *Publication in peer reviewed literature*
Connection to knowledge development at the University	-
International Scientific network	*ICES WGNAPES*
International objective of research	*Improved design of internationally coordinated acoustic survey for Blue Whiting*
International Project results	*Facilitation of international survey coordination in the future*
International Finance	*Assimilation of results during WGNAPES meeting*

Proposal 10.

Title of project	North Sea herring summer habitat quality
Project leader	Sascha Fässler
Theme	Ecosystem Approach
Participating partners IMARES	Lorna Teal
Participating partners (external)	Mark Bulling (University of Derby, UK) Pierre Petitgas (Ifremer, France) Piet Ruardij (NIOZ) Paul Fernandes (Marine Scotland, UK)
Duration	1 year
Broad description of the project including Expected results	Acoustic herring survey data from the central and northern North Sea for the past 10 years will be used to explore the relationship with measured environmental data (by e.g. use of GAMs). Using a Dynamic Energy Budget Model (DEB), the survey area will be investigated for its potential to be suitable for herring growth and reproduction for different length classes. To achieve the required spatial and temporal resolution of environmental data for the DEB model, predictions from the hydrodynamic ERSEM will be used. By looking at the time series data, realized habitat, which is part of the essential habitat occupied each year, can be identified based on different model parameters.
Proposed budget	Total costs: € 34'200.00 Hours: 180 x JONDZ = € 17'100.00 180 x JONDZ = € 17'100.00
Is the appropriate capacity available?	-
What other potential funding sources have been considered?	-
What are the potential risks to the project's success?	No specific risks other than unexpected unavailability of staff and international colleagues
Why should this be funded by KB WOT?	An important component of the ecosystem approach to fisheries management is the prediction of the response of populations to climate variability and change (recruitment, suitability, spatial occupation). Consequently appropriate spatial management scenarios can be defined based on essential habitats. To tackle these challenges, it is essential to be able to: (i) construct long-term series of maps of environmental indicators as well as suitability indicators for growth and reproduction; (ii) monitor spatial patterns and their changes; (iii) develop simulations to couple environmental scenarios, fishing activity and response of populations (predict future). (iv) plan additional observations at sea to gain knowledge on individual behaviour, physiology and connectivity (i.e. optimise surveys). Our project would deal with these points in a scenario for North Sea herring. We describe changes in environmental variables and species distributions, and try to explain the links by use of DEB models to

	characterise the essential/realized habitat under different (environmental/management) scenarios. Such methods will be vital tools in an EAFM.
Utility of the developed products and expertise	The products/expertise will be vital contributors to the move towards an ecosystem approach to fisheries management. To be able to implement EAFM it is important to correctly understand the effects of the physical and biological environment variability on fish populations. The project would deliver knowledge base in that respect for an important forage species dominant in many marine ecosystems around the world.
Products to be delivered	Maps of suitable/potential habitat for North Sea herring based on growth and reproduction potential from DEB models. Description of mulit-annual relationships between herring distributions and environmental variables based on GAMs.
Dissemination of findings being addressed	Publication in peer reviewed literature
Connection to knowledge development at the University	-
International Scientific network	International partners as listed above. They will mostly be consulted from time to time in connection with various parts of the project (acoustic survey data, DEB, ERSEM).
International objective of research	Links with international partners involved in ecosystem modelling will be strengthened.
International Project results	The results will potentially be important for other ICES partners involved in herring stock assessment.

Proposal 11.

Title of project	Effects of resource competition on the dynamics of simple flatfish assemblages under harvesting
Project leader	Tobias van Kooten
Theme	Ecosystem approach
Participating partners (IMARES)	Jan-Jaap Poos Tim Schellekens
Participating partners (external)	Perhaps a WUR-student
Duration	1 year
Broad description of the project including Expected results	The management of marine resources is increasingly shifting from a system where exploitation boundaries are calculated on species in isolation, to a system where the ecological interactions of the marine environment are being taken into account (ecosystem approach). The science behind this advice has to catch up with this paradigm shift (see eg. Mackinson et al. 2009). One sign of this shift is the European Commissions wish to obtain more information about the population dynamics of a wide range of flatfish species, which has resulted in the NESPMAN project. One area where an ecosystem approach is most urgently needed is in the North Sea, where the beam trawl fleet targets a number of flatfish species simultaneously. Many of these species potentially compete with each other for food. Some of these species also show strong density dependence in growth, while others do not (Lorenzen & Enberg, 2002). The combination of density-dependent growth and resource competition can in theory give rise to unexpected effects of harvesting mortality such as catastrophic collapses of species and emergent facilitation (Van Kooten et al 2005, De Roos et al 08). Here we intend to study the dynamics of a small food web, representing a number of flatfish species that are harvested (or at least suffer additional mortality from fishing) by the Dutch beam trawl fleet. Using a model that is a combination of simultaneous stage structured population dynamics of 5 species, feeding on a limited number of resources, and a fleet dynamic model, we aim to show how the dynamics of the system are fundamentally altered when ecological interactions –in this case competition for food- are taken into account. Starting from a system where each fish species has an exclusive resource, which represents the 'single species in isolation' paradigm, we study the consequences of introducing diet overlap among species, and thereby competition. For modeling competitive relations between species, we can use data from two recent IMARES student reports (Labberton, 2009 and Stuke 2009). The effects of density dependence on growth and development of flatfish are available for certain species (Lorenzen & Enberg 2002), and we will try to estimate them from data and/or literature for other species. We will study a range of different food web configurations, with different degrees of diet overlap. When diet overlap is high, strong resource competition occurs, and competitive exclusion is expected to lead to the extinction of fish species. Fisheries mortality can ameliorate competition, thereby promoting the persistence of competitively inferior species. A

	fundamental understanding of how the effect of fishing changes when we consider the target species as part of a single ecosystem, rather than as single stocks in isolation, is crucial if we are to develop an integrated management approach to flatfish exploitation in the North Sea. This work will result in a publishable manuscript about the effects of diet overlap on multi-species fisheries, including considerations for management.
Proposed budget	Research **hours by scale**: Jan Jaap Poos 100 hrs * 117 €/hr = € 11.700 Tobias van Kooten 150 hrs * 95 €/hr = € 14.250 Tim Schellekens 150 hrs * 95 €/hr = € 14.250 Additional Expenditure: Travel costs (required to visit NSRAC) € 1.000 Total cost: €___41.200__
Is the appropriate capacity available?	Yes.
What other potential funding sources have been considered?	None.
What are the potential risks to the project's success?	The immediate link to advisory work is not strong. Given how the NSRAC appreciated the use of ECOSIM/ECOPATH, we anticipate their interest in our findings. However, this is not guaranteed. In the case the NSRAC does not show interest, the communication to stakeholders will have a smaller role in the project.
Why should this be funded by KB WOT?	The paradigm shift of moving from single species advice focusing on individual fish stocks to advice on fisheries and their effects on the ecosystem is ongoing. This research combines our knowledge of ecological interactions in food webs and fleet dynamics, two areas at which Wageningen IMARES is at the forefront. Although the results will not be immediately applicable in day-to-day advice, the long term consequences of fishing on food webs has proven to be a powerful tool in the communication with the fishing industry. An example of this is the great enthusiasm with which ECOPATH/ECOSIM models have been received in the North Sea RAC. By investing in this type of modeling tool, we strengthen our position as advisors for marine resources.
Utility of the developed products and expertise	This proposal shows how fishing pressure on a multi-species system works out if those species have a certain degree of diet ovelap. It will provide knowledge needed for an ecosystem approach to marine management and provides fundamental new insights which are needed for an integrated multi-species management plan for North Sea flatfish.
Products to be delivered	A scientific paper and a presentation for the NSRAC.
Dissemination of findings being addressed	The dissemination of findings is guaranteed by the product: a scientific paper to present the findings to the scientific peers, and communication

	with the NSRAC to present the findings to stakeholders
Connection to knowledge development at the University	TvK is currently discussing with a student from the university to participate in this project. If the student would do a substantial part of the work, the project can be carried out for a lower than estimated budget.
International Scientific network	No explicit international collaboration in this project. It does however connect well with several ongoing EU projects in which TvK is involved (particularly MEECE).
International objective of research	The new insights from this project will, in all likelyhood, be applicable to other mixed fishery systems. The envisioned scientific paper will reflect this.
International Project results	Mixed flatfish fisheries in the North sea is not an exclusively Dutch operation. Hence, the knowledge developed in this project will be valuable in an international context.
International Finance	None.

Proposal 12.

Title of project	SORTED (Sustainable OpeRations To Reduce and Eliminate discard Deaths)
Project leader	Sebastian Uhlmann
Theme	Ecosystem approach
Participating partners (IMARES)	Edwin van Helmond (Department of Fisheries) Kristina Raab (Department of Fisheries)
Participating partners (external)	Lodewijk van Walraven (Royal Netherlands Institute for Sea Research, NIOZ), Victor Langenberg (DELTARES)
Duration	One year
Broad description of the project including Expected results	(i) To identify (coastal) commercial fisheries where catches (especially discards) may be negatively affected by jellyfish (due to increased discarding and/or unaccounted mortalities of discards). (ii) To quantify the order of magnitude of the effects of abundant jellyfish species on the rate of discard mortality of key discard species in manipulative experiments under controlled laboratory conditions; (iii) To identify the underlying physiological mechanisms, if any, which may be associated with increased discard mortality in the presence of jellyfish. The project will involve two different groups of expertise: commercial fishers and ecologists / fisheries scientists. The applied context of this strategic, experimental research approach will provide important baseline data required for sound environmental management of fisheries resources. Throughout the process of this study any relevant information will be communicated back to the collaborating industry partners and also as peer-reviewed scientific publications highlighting the novel aspects of this research.
Proposed budget	Total cost: € 15 000 Costs in addressing objective (i): € 2 000 Organising questionnaires and conducting interviews of commercial fisheries. Costs in addressing objective (ii): € 11 000 Conducting manipulative experiments at the tank farm facilities in Yerseke. Costs in addressing objective (iii): € 2 000 Analytical, physiological work.
Is the appropriate capacity available?	'Kennisring' meetings with commercial fishers are organised by IMARES staff. Regular survey sampling of jellyfish are undertaken by NIOZ. Collected live specimens may be utilized for manipulative experiments at the tank farm in Yerseke.
Other potential funding sources	OECD
What are the potential risks to the project's success?	Poor performance of jellyfish under husbandry conditions. Irregular, unpredictable abundance of certain jellyfish species required for the discard survival experiments.
Why should this be funded by KB WOT?	The mechanism of jellyfish impacts on fisheries catches are poorly understood, despite predictions of a more gelatinous future in coastal (and pelagic) zones. The ultimate outcome of this project will be a reduction of the negative impacts of commercial (coastal) fisheries; measured by the enhanced

	survival of large numbers of juveniles of commercially- and recreationally-important species.
Utility of the developed products and expertise	This project will contribute to the sustainable use of fisheries resources ("Marine Living Resource Management"). This project will prioritize management interventions to avoid unsustainable fishing practices (e.g. large-scale discarding due to jellyfish blooms).
Dissemination of findings	2 peer-reviewed publications. One poster or DVD for industry.
Connection to knowledge development at the University	Natural and anthropogenic impact on North Sea gelatinous zooplankton population dynamics: implications for ecosystem structure and functioning. Lodewijk van Walraven, PhD candidate, NIOZ Do anchovy increases reflect a regime shift in the North Sea. Kristina Raab, PhD candidate, Wageningen UR, IMARES, Department of Fisheries
International Scientific network	Niels Madsen, Senior Scientist, Project SURVIVAL, DTU Aqua, Denmark Matt Broadhurst, Senior Scientist, NSW Industry & Investment, Australia
International objective of research	The abundance and spread of jellyfish can be tightly linked to hydro-climatic (temperature) changes. Current climate change predictions suggest a warming of the waters in the Northeast Atlantic and North Sea. The mixing of warmer waters in nutrient and food-rich coastal waters may promote jellyfish blooms that can have costly socio-economic effects. Thus, understanding the nature of the interaction with fisheries is of international importance.
International Project results	Isolating mechanisms and threshold levels on the effects of jellyfish on fisheries catches will provide a case study that may act as an incentive to intensify international research into the largely understudied genera of jellyfish and their interactions with fisheries.
International Finance	None

Proposal 13.

Title of project	Trawling impact on benthic productivity and biodiversity
Project leader	Rijnsdorp
Theme	Ecosystem Approach
Participating partners (IMARES)	Van Kooten, Craeymeersch, Witbaard, van Marlen, Piet, Bierman
Participating partners (external)	Duineveld (NIOZ), Herman (NIOO-CEME), Floor Heinis
Duration	1 year
Broad description of the project including Expected results	This research proposal deals with the structure and the functioning of the benthic ecosystem in relation to the question how fishing affects the productivity and biodiversity. The results will be instrumental to understand how areas closed to fishing will affect productivity and biodiversity. The project will develop a model on the functioning of the benthic ecosystem distinguishing between different size classes, feeding guilds (filter feeders, deposit feeders, predators) and different vertical positions (epifauna on the surface,shallow buried infauna and deep buried infauna). The model will include both predation and food competition among benthic groups. The model will be parameterised on the available data from recent benthos studies in the Dutch coastal zone (Voordelta and Windfarms). Trawling impact will be modelled using the literature data on direct mortality estimates, in combination with a decomposition approach of the fishing gear in which the mortality generated by specific gear components is specified based on the mechanical specification of the gear. This approach will allow to use the model for other gear types which have not been studied in the field. Deliverables Decomposition model of bottom trawl gear to estimate the direct mortality imposed on benthic organisms Benthic model describing the trophic interactions (predation and food competition) among different feeding guilds, taking account of the vertical position of the benthos in the sea bed and the feeding guild. Application of the model to explore the implications of a closed area in the Voordelta on the structure of the benthic community
Proposed budget	75.000 Euro
Is the appropriate capacity available?	yes
What other potential funding sources have been considered?	Start of project made in Passende Beoordeling Boomkorvisserij Natura 2000. A much more elaborate project was submitted to ZKO Noordzee in 2009.
What are the potential risks to the project's success?	None
Why should this be funded by KB WOT?	Bottom trawling impact on the structure and functioning of the benthic ecosystem is a major issue. The problem played a central role in various management problems (e.g. Ethe evaluation of the Plaice Box, Natura 2000 sites).
Utility of the developed	The project will strengthen the position of IMARES in marine ecology and

products and expertise	bring together different ongoing research in the institute such as benthic monitoring, feeding studies, population dyunamics gear technology, ecosystem modelling.
Products to be delivered	Trawling impact model of the functioning of the benthic ecosystem, taking account of the siz, feeding guild and position of the benthos in the bottom (epi-benthos, superficial infauna, deep infauna).
Dissemination of findings being addressed	We expect that the project will result in at least one scientific publication. The model will also be available to be used in other projects such as Passende Beoordeling fishineries activities in Natura 2000 sites, FINPASS
Connection to knowledge development at the University	no
International Scientific network	Collaboration with Jan Geert Hiddink, who works in the group of Mike Kaiser (Bangor)
International objective of research	Although the model will be developed primarily for application in national questions, the approach taken is generic. The model therefore will be equally relevant for input in international projects.
International Project results	Not applicable
International Finance	Not applicable

8.2 Proposal for a specific call on MSY flatfish

Title of project	Understanding the trade-offs in FMSY targets for North Sea demersal fisheries with particular reference to flatfish
Project leader	Jan Jaap Poos
Theme	2
Participating partners (IMARES)	David Miller, Niels Hintzen, Lorna Teal, Adriaan Rijnsdorp
Participating partners (external)	Alexander Kempf
Duration	2 years
Broad description of the project including Expected results	In order to exhibit the trade-offs in fisheries management aiming for F_{MSY} that result from the ecosystem complexities, we need to account for the spatial dimension of both the target species, the North Sea habitats, and the fishery. Each of the individual components of this puzzle has been progressively been studies over the last few years. The movements of flatfish species during its entire life has been described in a number of publications (Hunter et al. 2003, Poos & Rijnsdorp 2007, Bolle et al. 2009), and currently much progress is being made on linking the movements to the environment (Teal et al. in prep.) and the energy requisites of the species. With respect to the spatial scale of exploitation, much progress has been made on understanding the location choice of fishers (Poos et al. 2010). Our aim is to synthesize the progress in these different fields by linking the different models and derive a full ecosystem model, including the dynamics of the largest source of mortality for most species: the fishery. By doing so, we can exhibit the trade-offs in fisheries management aiming for F_{MSY} in the light of integrated food web interactions and fisheries dynamics. Finally, the spatial dynamics of the fish and the fishery under fisheries management constraints will result in emergent exploitation patterns. These exploitation patterns not only shape the ecological effects of fishing, but also the evolutionary effects of fishing. The results of different management measures in relation to MSY management will be discussed in deliverables of the project. **Deliverables** • Manuscript on the optimal spatial strategy for North Sea plaice, extending the work of Teal et al. (in prep.), using an optimality model for growth and reproduction (at month 12). To be sent to marine ecological journal • Manuscript on the effort allocation of the beam trawl fleet, showing the changes in multispecies yield estimates under different F regimes, extending work of Poos et al. (2010), adding realism in the transfer of quota (at month (24), to be sent to fisheries journal. • A brief mid-term progress report (at 12 months). • A report summarizing the results of the project in terms of the trade-offs in FMSY targets for North Sea demersal flatfish fisheries. • Workshop with the Ministry of EL&I, discussing results of deliverables 1,2 and 4 in relation to policy decisions (in month 24).
Proposed budget	Research hours by scale:

	2011 Senior Researcher 185 hrs * 133 €/hr = € 24 605 Researcher 400 hrs * 117 €/hr = € 46 800 Junior Researcher 600 hrs * 95 €/hr = € 76 000 Additional Expenditure: Travel costs Total cost: €___149 905_____ **2012** Senior Researcher 185 hrs * 133 €/hr = € 24 605 Researcher 400 hrs * 117 €/hr = € 46 800 Junior Researcher 600 hrs * 95 €/hr= € 76 000 Additional Expenditure: Travel costs € 2 500 Total cost: €___149 905_____
Is the appropriate capacity available?	Yes
What other potential funding sources have been considered?	IMARES is currently involved in the formation of a consortium bidding on an EU project that also deals with the trade-offs involved in MSY management. In that project proposal, the spatial aspects of the mixed fisheries in the North Sea is specifically addressed.
What are the potential risks to the project's success?	One of the potential risks is that involvement in WOT tasks of the project team prevents time allocation of the project members to the project.
Why should this be funded by KB WOT?	There is a science need within the Ministry of ELI for fisheries management in the southern North Sea. The call for MSY management by 2015 made clear that the trade-offs in fisheries management aiming for FMSY that result from the ecosystem complexities needs to be assessed. These trade-offs come from the spatial distributions of target species, incidental bycatch, the North Sea habitats, and the fishery. The reports delivered by the project can be used in the discussion about appropriate MSY targets.
Utility of the developed products and expertise	The results of the project will contribute our knowledge of sustainable use of the ecosystems
Products to be delivered	The project delivers the three deliverables, being one interim report, and a final report consisting of two manuscripts on the trade-offs in MSY targets in the mixed demersal fishery in the North Sea
Dissemination of findings being addressed	The deliverables will be submitted to peer-reviewed scientific journals. Importantly, the results of the project will be discussed with the Ministry of ELI.
Connection to knowledge development at the University	There is no link to knowledge development at the university.
International Scientific	Currently, IMARES is involved in the formation of a consortium bidding for

network	an EU call on the MSY approach to fisheries management. Here we are in contact with several key fisheries institutes in Europe, keen to collaborate on extending the knowledge of MSY targets in mixed fisheries.
International objective of research	The knowledge built up in the project can ultimately be used by the EU, improving the fisheries management of mixed fisheries systems.
International Project results	If the EU funded project is won, we will be able to extend the work done here, and publish this work with our international collaborators.
International Finance	Since we are currently only bidding for the EU project, and have not won it yet, the amount of international funds is unknown.

8.3 Proposals for Maintaining Quality

Proposal 14.

Title of project	Fish Ageing
Project leader	Loes Bolle
Theme	Maintaining Quality
Participating partners (IMARES)	Ineke Pennock, Silja Tribuhl, Hanz Wiegerinck, Norie van Meeren, André Dijkman-Dulkes, Jan Beintema, Marcel de Vries, Peter Groot, Kees Groeneveld, Betty van Os-Koomen, Gerrit Rink, Thomas Pasterkamp, Simon Rijs, Martin de Graaf, Emil Kuijs, Rosemarie Nijman
Participating partners (external)	Age readers and age reading coordinators from laboratories in Europe
Duration	1 January – 31 December 2011
Broad description of the project including Expected results	The following three activities are essential for maintenance of IMARES' expertise in fish ageing: • International calibration by participation in international exchanges and workshops • Training of new age readers • Development and implementation of (inter)national QA procedures
Proposed budget	Staff €45.760 Other costs €4.240 **Total €50.000**
Is the appropriate capacity available?	Yes
What other potential funding sources have been considered?	WOT Surveys & WOT Market sampling
What are the potential risks to the project's success?	Insufficient prioritisation within institute
Why should this be funded by KB WOT?	IMARES needs to maintain it's expertise in fish ageing to deliver an internationally approved WOT programme. However, activities crucial for the maintenance of this expertise, such as international calibration, training and QA procedures, are not covered by WOT funding and have therefore been funded by KB-WOT since 2004.

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.
Products to be delivered	1) ICES reports of exchanges and workshops to be held in 2011 (sole exchange, brill exchange, turbot exchange, sprat exchange, eel workshop, age coordinators workshop) 2) Update and elaboration of IMARES manuals
Dissemination of findings being addressed	ICES reports of international exchanges and workshops are disseminated through the ICES Planning Group on Commercial Catches, Discards and Biological Sampling (PGCCDBS)
Connection to knowledge development at the University	No
International Scientific network	PGCCDBS calls for international workshops and exchanges when considered necessary. Further PGCCDBS facilitates international collaboration and tuning of protocols for training and quality control
International objective of research	Improve quality of age data used in international stock assessment working groups
International Project results	Besides improvement of the quality of age data used for international advice on fisheries management, this project contributes to the establishment of internationally agreed ageing manuals and reference collections.
International Finance	None

Proposal 15.

Title of project	**Quality Shellfish Surveys**
Project leader	Karin Troost
Theme	Maintaining Quality
Participating partners (IMARES)	Marnix Poelman, Jeroen Jansen, Johan Craeymeersch
Participating partners (external)	Invited will be: international leading experts on shellfish stock assessments (mainly oysters, mussels, cockles and (razor) clams. These will include Philippe Goulletquer (F), Bruno Cognie (F), Roger Mann (USA), Marc Herlyn (D), and Per Dolmer (DK).
Duration	2011 (with outlook to 2012)
Broad description of the project including Expected results	**Planned activities** The IMARES shellfish surveys have been conducted since the early 1990s. To guarantee the reliability of collected data, **1**) a structure, according to which the quality of the data can be guaranteed, needs to be set-up, **2**) methods used need to be compared to methods used abroad, and **3**) the availability and applicability of new methods that may enhance efficiency need to be explored. The following activities are proposed to find a solution for above-mentioned subjects: **1-Quality Guarantee** • **Workshop ageing and species determination**: Presently, skills in ageing shellfish and determination of species are transferred from employee to employee during fieldwork. A more structural approach through annual meetings, where knowledge will be refreshed and mutually checked, should improve methods and quality of the data. An initial team meeting will be held in November 2010, with the use of practice material and reference books. With this KB WOT application, funding is requested for a more extensive construction, with participation from experts in the fields of taxonomy and ageing of (primarily) shellfish. Employees of the Ministry of Economic Affairs, Agriculture and Innovation (former LNV) who frequently assist in the field, will also be invited. The workshop will be organised in the autumn of 2011. Results will consist of an enhanced expertise in ageing and determination of shellfish species (and other common benthic species) at IMARES. This workshop will also mark the beginning of an active maintenance of existing expertise at IMARES. • **Handbooks**: At IMARES, the quality of experimentally collected data is guaranteed through the use of handbooks. At the moment, the handbook of shellfish surveys is being updated. Within the annual budget for shellfish surveys, the team is working on separate handbooks for the different parts of the surveys. This way these separate activities can also be carried out in a standardised and approved manner in other projects. • **Evaluation**: As of 2010, an annual evaluation meeting is an integral part of the surveys. This is not included in the KB WOT application. **2&3-Methods** • **International workshop on stock assessment methods**: A workshop will bring together international experts in the field of shellfish stock assessment. The aim is to investigate whether improvements in our techniques are necessary and feasible, and

	how comparable our methods are to those used abroad. Results aimed for are: a higher degree of efficiency of our surveys, a better quality and therefore enhanced reliability of our data, and a better connection to international developments in this area of expertise. An enhanced quality of data allows for earlier detection of changes in stock sizes and a more reliable link to possible causes of the observed changes. In the light of an increased efficiency, the benefits and necessities of new methods such as sonar and remote sensing will also be discussed in the workshop. Together with the experts we will discuss whether and how these techniques can be implemented in the annual surveys, and what the costs and benefits are. Finally, techniques are discussed to estimate stocks of Pacific oysters as efficiently as possible. The workshop is planned for the autumn of 2011, when the results of the first year of monitoring the Pacific oyster stock have been collected and analysed. Techniques will be discussed with French and American colleagues who already have years of experience with the Pacific (Crassostrea gigas) and American oyster (C. virginica). Results from the workshop will be reported at the end of 2011. This report will highlight the relevance of the workshop results specifically for the IMARES shellfish surveys. The results aimed for will not all be immediately accomplished after the workshop. Some necessary adaptations may be applied directly, but others may take more time. Dependent on the results of the workshop, additional funding may be necessary in 2012. Therefore, a plan will be written on how to improve the surveys with the new information, and plans may be made for further collaboration and exchange with international partners. With the workshop, a network will be set up that may result in future collaborations and publications, and within which IMARES may be consulted as an international expert and involved in new developments. **Another important point of attention** within the route to an improved quality of the shellfish surveys is: the stratified sampling grid. At the moment, we are using a stratified sampling grid based on the expected occurrence of target species. The weakness of this method lies in the expected occurrence being based on previously collected data and information from fishermen. The quality of the data would be improved with an entirely independent basis for the stratification. Habitat modelling seems highly appropriate and very useful. Through discussions with colleagues currently involved in habitat modelling we will investigate the possibilities for application in the shellfish surveys, and possibilities to connect to existing projects at IMARES. Extra funds may be needed in 2012 to implement habitat models in the sampling grid. **Deliverables and Milestones** ☐☐Workshop ageing and species determination – Oct-Nov 2011 ☐☐International workshop on Stock Assessment – Sep-Oct 2011 ▪ Report on workshop results and relevance for IMARES surveys ▪ Plan for improvement of shellfish surveys
Proposed budget	€40 000
Is the appropriate capacity available?	YES
What other potential funding sources have	NONE

been considered?	
What are the potential risks to the project's success?	International guests not willing to visit for the international workshop. Therefore they need to be compensated for travel and stay.
Why should this be funded by KB WOT?	This proposal addresses Theme 3. The goal is to maintain the present expertise base and quality control routine techniques and skills. IMARES needs to maintain core competencies to deliver an internationally approved WOT programme. The proposed project will set up a structure to control the quality of delivered work and to maintain the skills of team members. Efficiency of the surveys will be optimised, and the project will contribute to keeping IMARES in a leading position in stock assessments worldwide.
Utility of the developed products and expertise	The results of this project will contribute to theme 4 of the IMARES research programme ("Sturing en beheer van living marine resources") and theme "Maintaining Quality" of the IMARES development plan.
Products to be delivered	Products to be delivered are: 2 workshops, 1 report on results of the international workshop, and a plan for improvement of the shellfish surveys.
Dissemination of findings being addressed	Findings from the workshops, especially the international workshop, and also an evaluation of eventual implemented changes, will be shared and discussed within the international network that was set-up, and with other international experts, through personal contacts.
Connection to knowledge development at the University	If remote sensing is promising, with: Laboratory of Geo-Information and Remote Sensing, of WUR.
International Scientific network	The aim is to set up, or get involved with international research groups on shellfish stock assessments and on taxonomy and ageing of shellfish.
International objective of research	The international aspect of the objective is 1) to improve stock assessments in the trilateral Wadden Sea to be better able to detect changes in stocks due to national or European legislation, and 2) to bring stock assessments internationally to a higher level through cooperation, with IMARES in a leading position.
International Project results	Improvement of stock assessments in the trilateral Wadden Sea to be better able to detect changes in stocks due to national or European legislation. The set-up of an international network of shellfish stock assessment experts, which holds a promise for future cooperation.
International Finance	Some invited guests may use own funding for travelling

8.4

Proposal 16.

Title of project	Underpinning acoustics
Project leader	Sascha Fässler
Theme	Maintaining quality
Participating partners (IMARES)	Bram Couperus Peter van der Kamp
Participating partners (external)	-
Duration	1 year
Broad description of the project including Expected results	The project will support ongoing maintenance and development of the acoustic expertise at IMARES. Methods to extract, analyse, store and maintain data from statutory survey tasks will be improved. New acoustic backscatter models and species identification algorithms (e.g. for mackerel) will be applied to reanalyse survey time series. Effort will be put into building and maintaining links with other institutes in order to enhance acoustics research output and develop current methodologies. Additionally, alternative ways of enhancing and applying the current inventory (hardware, e.g. upside-down towed body, DIDSON; and software, e.g. EchoView) will be explored. In line with the ongoing shift in survey focus towards a more holistic 'ecosystem survey', attempts will be made to collect acoustic data on alternative surveys and to use the acoustic survey time series to provide answers to research questions that are not related to stock assessment. The project will fund a research exchange with the french survey group on Thalassia.
Proposed budget	Total costs: € 54'725.00 Hours: 355 x JONDZ = € 33'725.00 Travel: € 1000.00 Plus 1 research exchange on Thalassia = € 20,000.00
Is the appropriate capacity available?	Yes
What other potential funding sources have been considered?	-
What are the potential risks to the project's success?	No specific risks other than unexpected unavailability of staff
Why should this be funded by KB WOT?	'Underpinning acoustics' is part of a multiannual project that fundamentally aims to maintain and develop acoustic survey techniques. Apart from improving data collection, analysis and storage, the project will also serve to answer ad hoc research questions. It will keep the methods at the most current state and explore alternative ways to assist in-house research
Utility of the developed products and expertise	Acoustic techniques were identified among the most promising to meet the scientific challenges faced by the implementation of ecosystem based fisheries management. Combined with other oceanographic tools and appropriate models, acoustics can provide information about changes in spatial and temporal species distribution, abundance and biomass – the prime input parameters of ecosystem models. The data are a vital contribution to research covering the topics of the IMARES development plan (e.g. how does climate affect the observed species distributions? What are the drivers of the observed changes in species biomass? How can the

	stocks be exploited sustainably given the observed species numbers/biomass?). In order to maintain the quality of the information provided by acoustics, it is important to invest into the development of the methods and explore alternative ways of usage.
Products to be delivered	Methods to objectively extract, store, and make available acoustic survey data and develop ways to make use of existing time series.
Dissemination of findings being addressed	-
Connection to knowledge development at the University	-
International Scientific network	Contact will be maintained with relevant researchers at e.g. CEFAS, Marine Lab, IMR, IFREMER to exchange ideas and develop ideas for future research projects
International objective of research	Maintain quality of acoustic surveys at and beyond the international standard
International Project results	-
International Finance	-

8.5 Proposal for International Exchange

Proposal 17.

Title of project	International Exchange
Project leader	Mark Dickey-Collas
Theme	International Exchange
Participating partners (IMARES)	de Boois, ter Hofstede, Miller, Hintzen, Pastoors, Röckmann, Rijnsdorp, van Marlen, Fässler, van Damme, Beare, Slijkerman, IMARES MT
Participating partners (external)	The ICES, PICES and FAO-fisheries community
Duration	1 year
Broad description of the project including Expected results	To fund participation in international science networks and ICES meetings. Workshop on Sexual Maturity Staging of Herring and Sprat, Working Group on Data and Information Management, Study Group on Biodiversity, Working Group on Fish Ecology, Working Group on Methods of Fish Stock Assessment, Working Group on Multispecies Assessment Methods, Working Group on operational oceanographic products for fisheries and environment, Study Group on the History of Fish and Fisheries, Working Group on Fishery Systems, Strategic initiative on Stock assessment methods, Working Group on Fisheries-Induced Evolution, Working Group on the Implications of Stock Structure, ICES-FAO Working Group on Fishing Technology and Fish Behaviour, Working Group on Fisheries Acoustic Science and Technology, Study Group on Electrical Trawling, Working Group on Integrating Surveys for the Ecosystem Approach, Workshop on the Identification of clupeoid, flatfish, gadoids and other fish larvae, Working Group on Integrated Assessments of the North Sea.
Proposed budget	€118 500
Is the appropriate capacity available?	Yes
What other potential funding sources have been considered?	Yes (WOT, IMARES R&D funds etc) and these are the groups that most require KBWOT funding.
What are the potential risks to the project's success?	Over commitment of staff
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.
Utility of the developed products and expertise	Products and expertise central to the development and research of fisheries in the Netherlands.
Products to be delivered	Formal working groups reports, internal IMARES reports of groups and collaborative manuscripts for peer reviewed journals.
Dissemination of findings being addressed	Yes through the ICES website, ICES theme sessions, symposia and through the ICES advisory system.
Connection to knowledge development at the University	Little
International Scientific	Mostly across the North Atlantic marine science community but now also

network	with FAO and with scientists from countries involved in PICES (Japan, Korea, China)
International objective of research	Maintain IMARES at the centre of fisheries research in Europe and project our skills to arenas beyond the EU.
International Project results	
International Finance	Added value by participating in collaborative international projects and groups.

Proposal 18.

Title of project	Programme Management
Project leader	Mark Dickey-Collas
Theme	Management
Participating partners (IMARES)	Rian Schelvis, Frans van Beek
Participating partners (external)	
Duration	1 year
Broad description of the project including Expected results	To manage and develop the KBWOT Fisheries theme within WUR KB theme 4.
Proposed budget	€24 000
Is the appropriate capacity available?	Yes
What other potential funding sources have been considered?	No
What are the potential risks to the project's success?	Few
Why should this be funded by KB WOT?	As this is core to an effective and innovative 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 EL&I (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 EL&I. Thus the KBWOT programme appears to utilise the expertise available to dlo on fisheries and look to the future research needs of society.
Products to be delivered	A programme of research in 2011, and preparations for 2012.
Dissemination of findings being addressed	Through a range of media and 2 reports – reporting on the 2009 programme and a description and rationale for the 2011 programme
Connection to knowledge development at the University	Close links through KB 4.
International Scientific network	Close links through ICES, the EU STECF, PICES and FAO. Plus a network of marine researchers in Universities across Europe and North America
International objective of research	Maintain IMARES at the centre of fisheries research in Europe and project our skills to arenas beyond the EU.
International Project results	Almost all projects within the programme are international.
International Finance	A mixture of funding mechanisms and poartnerships.