Stichting DLO
Centre for Fishery Research (CVO)

KB – WOT Fisheries Research; programme for 2008

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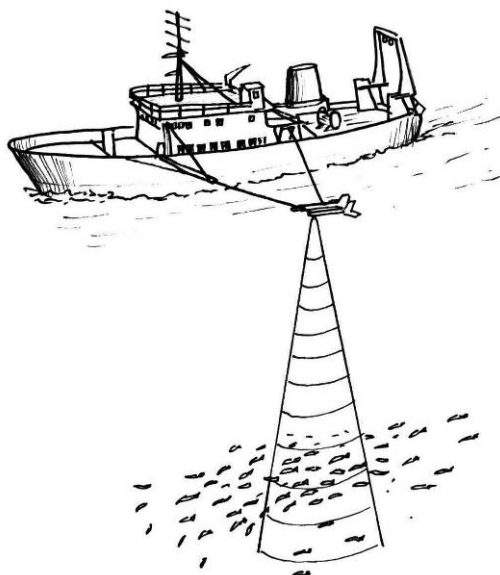
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Contents:

Summary

LNV programme 406 covers the execution of statutory tasks (WOT) in fisheries carried out by DLO. Part of the KB programme, presented in this report, contains resources earmarked to maintain and develop the expertise needed to carry out the WOT programme. As well as maintaining expertise, innovation is an important part of the programme. The programme is also part of the Wageningen UR Kennisbasis and comes under the theme KB01: "Groene en blauwe ruimte". This report describes the allocation and utilisation of the Kennisbasis budget in 2008. The available budget in 2008 is €621 000. The money is spent through projects, each of which is described here. The projects are split up into four research priority areas: A) Influence of changes in the environment on marine ecosystems, B) impact of fisheries on ecosystems, C) changing fishery management, D) maintenance and international exchange of key WOT expertise. All of these areas fall under the wider WUR kennisbasis themes.

Samenvatting

In LNV-programma 406 worden door DLO de Wettelijke Onderzoek Taken (WOT) uitgevoerd die betrekking hebben op de visserij. In het KB programma, beschreven in dit rapport, worden middelen bestemd om de deskundigheid te handhaven en kennis te ontwikkelen nodig voor de uitvoering van het WOT programma. Naast het handhaven van deskundigheid, is innovatie een belangrijk element in het programma. Het programma is een onderdeel van Wageningen UR Kennisbasis en valt onder het thema KB01: „Groene blauwe ruimte". Dit rapport beschrijft de toewijzing en het gebruik van de begroting Kennisbasis in 2008. Het beschikbare budget in 2008 is €621 000. Het geld wordt besteed aan projecten, die hier wordt beschreven. De projecten zijn verdeeld in vier onderzoek prioriteitsgebieden: A) De invloed van veranderingen in het milieu op mariene ecosystemen, B) het effect van de visserij op ecosystemen, C) veranderingen in het beheer van de visserij en D) onderhoud en internationale uitwisseling van sleutelexpertise. Elk van deze gebieden vallen onder de bredere WUR kennisbasisthema's.

1. Introduction

The LNV programme WOT 406 deals with the statutory tasks which The Netherlands is obliged to carry out in the area of fisheries (advice and science). Most of the obligations stem from international agreements to which The Netherlands is a signatory. The statutory tasks in fisheries are carried out by the Centre of Fisheries Research (CVO) which exploits the resources and expertise from the Institute of Marine Resources and Ecosystem Studies (IMARES)[1]. In order to maintain the infrastructure required to carry out these tasks, and to help anticipate future strategic needs through innovation, a separate programme within IMARES has been established (Kennisbasis WOT). The programme is part of the larger Kennisbasis programme carried out by Wageningen UR and has been developed in consultation with the Ministry of Agriculture, Nature and Food Quality (LNV). LNV provides the financial support for the programme and advises on the strategic vision.

The Kennisbasis WOT programme (supporting knowledge) 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.
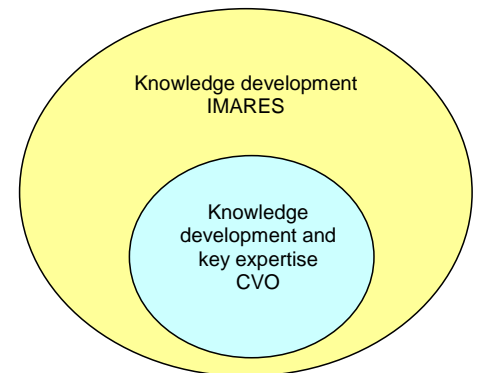
The investment in development and training is necessary to cope with the demands of both the research market in the future and the statutory obligations of The Netherlands.

The integration of and investment in the key expertise required by CVO into the knowledge base of a research organisation is important. In the past, knowledge gaps arose between what expertise was required by CVO and what was available. The requirements of LNV change regularly, thus development and innovation is crucial to the ability of CVO to provide the needed expertise and knowledge to address current and future strategic issues. In 2008 resources were prioritised towards number of specific themes and research areas that were felt to be lacking within IMARES but required by the WOT programme.

This document describes the strategic framework for the support of the knowledge base and the development of key expertise for the WOT programme.

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[1] IMARES was established in 2006 and consists of the former Nederlands Instituut voor Visserijonderzoek (RIVO) and parts of Alterra and TNO.

2. How KB WOT fits into the broader spectrum of research

Within DLO, kennisbasis is classified in nine themes. The kennisbasis for the WOT related to fisheries is in theme 1: "*Multifunctioneel gebruik van de groene en blauwe ruimte*" which translates to the multifunctional use of the green and blue space. The core areas of this theme are sustainable development, flexibility and regional decision making. Sustainable development covers both the maintenance of fisheries as well as the marine resources they exploit. The response of fisheries and managers to changes in fish populations and the dynamics of the environment which impact on those fish make flexibility a core area of the kennisbasis. With the development of fleet based data collection (under the EU data collection regulation) and the role of the regional advisory bodies the KB WOT programme must also consider the relevant scales of regionalisation.

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 and the Water Quality 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 LNV and the EU when developing the structure of the WOT kennisbasis programme. The current programme anticipates the following issues to be of importance to policy and statutory requirements: rebuilding of depleted resources, assessing resource exploitation (current and future), limiting and assessing the damage to habitat, protection of biodiversity, changes in trophodynamics of the marine ecosystem and environmental change.

Importantly for the kennisbasis programme in 2008, the EU is attempting to move towards a gradual implementation of the ecosystem considerations into fishery management. This is also true for the national policy with regard to the exploitation of bivalves in Dutch waters. In this area of advice, habitat and biodiversity are leading factors and the WOT KB programme has the ambition to develop expertise in these areas.

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 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.

3. The role of KB WOT

In a practical sense the KB WOT resources are used:

a.   to innovate, develop and expand the knowledge in the research areas covering the priority policy areas (mentioned above)

b.   to maintain and underpin key expertise to carry out the WOT programme and improve the efficiency of carrying out the tasks

c.   to maintain/enforce the scientific reputation of the research organisation carrying out the statutory tasks

These resources are spread between fishery dynamics, fish biology, sampling strategies, populations, ecology and management systems (simulations and advice).

To ensure that the statutory tasks (WOT) can be carried out, key expertise should be maintained. Within a research organisation, the key expertise must be supported by experience and ability. To ensure continuity and maintain quality, the key expertise should be spread across a number of personnel. Flexibility must be maintained by a research organisation to allow key expertise to adjust as required to improve quality, efficiency or renewal. The key expertise base is also important to ensure the maintenance of IMARES as successful contract research organisation.

Key expertise can be maintained by the internal or external training of personnel; active participation in projects in which expertise can be transferred or developed and participation in relevant working groups. Also in house expertise can be developed by attracting into new staff with specific abilities and experience that complements the existing knowledge base.

Within the WOT programme, key expertise is seen as: understanding and experience of population assessment techniques; advising and communication on the management of fisheries; advising on ecosystems; expertise in trawl, acoustic, bivalve and ichthyoplankton

surveys; research and advice on fishing gears; development and maintenance of data bases; experience in fish age determination; coordination of market sampling; collection of fishery statistics and discard (observer) data; surveying sea mammal abundance; expertise in fresh water fisheries and sampling of eels.

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

It is of course important to take available resources into account whilst trying to realise the ambitions of the WOT programme. This means that the key expertises must be prioritised and occasionally strategic decisions need to be made. If the need for a specific expertise is only temporary and that expertise is not available within IMARES, the relevant expertise could be hired in from outside.

4. Research priorities for 2008

The research priorities for 2008 are based on the perceived needs of the WOT programme (Table 1). Within these research priority areas, the maintenance of key expertise necessary to WOT takes priority, followed by the development and innovation required for future WOT work, then part of the available resources can be used for the co-financing of existing obligations to EU programmes (as long as the EU project objectives are considered within those of the WOT 406 programme).

Table 1. Overview of research priority areas and approximate budget allocations.

	priority research area	indicative budget in k€
A	influence of changes in the environment on marine ecosystems	240
B	impact of the fishery on ecosystems	115
C	changing fishery management	85
D	maintenance and international exchange of key WOT expertise	180
Total		620

Priority area A: "Influence of changes in the environment on marine ecosystems"

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

The role of ecosystem variability and change within the provision of fisheries advice is expected to increase. This has been specifically mentioned as a goal by ICES[1]. In 2006 new activities were started within the WOT 406 kennisbasis programme both in house and by joining initiatives by ICES or the EU 6th framework programme. There is a need to build up expertise in this field, hence the budget allocation for this priority research area is expected to remain similar into the near future. The research will also contribute to the scientific status of IMARES and to our quality control through peer reviewed publications.

Priority area B: "Impact of the fishery on the ecosystem"

Priority Area A dealt with the influence of natural factors on the marine ecosystems. Priority Area B deals with the human impact on the ecosystem, in particular what society now views as the undesirable side effects of fishing. IMARES, in recent years, has developed a significant amount of knowledge in this area. However there is still a need for further knowledge to assist managers. In 2008, EU legislation will oblige Member States to establish a programme to monitor a number of elements in the ecosystem which are sensitive to fishing. Resources from kennisbasis must be used to prepare for this international obligation. As this is a wide research area, projects will be carefully selected to address specific needs of the WOT programme. Some resources, if available, will be made available for contra financing to EU projects (matching funding). The research will also contribute to the scientific status of IMARES and to our quality control through peer reviewed publications.

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[1] International Council of the Exploration of the Sea

Priority area C: "Changing Fishery management"

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

Priority area D: " maintenance and international exchange of key WOT expertise "

Further, kennisbasis resources will be put aside for the maintenance and quality control of the present expertise base and routine techniques and skills. IMARES needs to maintain core competencies. This covers age reading, stock assessments, acoustic techniques and data collection. Courses, workshops and exchanges are an important part of maintaining and developing core skills. The sharing and gaining of experience is a core part of the development of fisheries science within the EU, through study and working groups usually coordinated by ICES. These study groups also produce new innovative products and methods, thus it is crucial that those working for WOT remain active in these fora. Within this priority area "clusters" of expertise will be maintained. To date two clusters have been identified: fish ageing and acoustic techniques for surveys. These clusters may expect regular funding from KB WOT but must still submit annual research proposals and report like all other KB WOT projects.

5. Management of the KB WOT programme

The structure of the programme is similar to that of the other DLO research programmes. The Kennisbasis programme consists of a number of approved, sometimes multi-annual projects. The programme is managed by a kennisbasis programme leader. The programme leader provides direction of the programme, controls the budgets, provides internal quarterly progress reports and an annual progress report. The format of the quarterly progress reports is identical to the normal WOT projects. The programme leader is also responsible for reporting and resolving problems within the programme, and where necessary reporting issues

to senior management. The annual progress report covers the allocation and spend of resources and documents the projects funded and the deliverables produced.

The projects, in the Kennisbasis WOT programme, are coordinated by project leaders. They are responsible for the planning and execution of the project, similar to other projects managed through IMARES. Each quarter, the project leader supplies the programme leader with information on the progress of the project, both financial and in terms of promised deliverables. It is the responsibility of the project leader to report any problems (present or predicted) to the programme leader at the earliest opportunity.

In the situations where Kennisbasis WOT money has been made available for co-financing of EU projects, it is the responsibility of the project leader to use all of the Kennisbasis money during the appropriate year. Funds cannot be rolled over, and failure to spend the money in one year, does not automatically mean that the money can be spent in the following year. The programme leader will regularly review the expenditure throughout the financial year.

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6. Proposing and awarding projects

Applicants for Kennisbasis WOT resources must complete a project proposal form (Appendix 1). The form requests information on the motivation for the project, a project description, how the project fits into WOT Kennisbasis and IMARES Kennisbasis as a whole, the duration and cost of the project, added value and corporation with other projects, the risks associated with the project and the final products to be delivered.

The applications are evaluated by a Permission Team (PT) using a number of criteria (Table 2). The composition of the PT varies annually and consists of the Head CVO or their nominated alternate, and three scientists to be appointed by IMARES including the Kennisbasis programme manager. This procedure ensures synergy between the expertise requirements of CVO and IMARES. The head of CVO is responsible to LNV for the execution of the programme and expenditure of the budget. Thus the head of CVO has use of the available resources and has the final say on whether a project is supported or not.

Table 2. Prioritised list of criteria used to evaluate proposals for support from the kennisbasis WOT programme.

1	Does the proposal invest in essential missing expertise?
2	Does the proposal fit into at least one of the research priority areas (see section 4)?
3	Have other sources of funding been explored, and is KB WOT the most appropriate funding source?
4	Does the proposal add value by providing connectivity between existing projects?
5	What is the risk of success or failure of the proposal?
6	Does the proposal contribute to the prestige of the research organisation?
7	Does the proposal contain novel ideas or techniques?
8	Is the proposal seen as value for money?
9	Does the proposed project leader have a successful track record of delivering projects on time, with good products within budget?

As the budget must be spent during each financial year, and no money can be transferred to the following year, the utilisation of the annual budget must be monitored carefully. This one of the programme manager's roles. If an under spend occurrs, then projects which failed to be funded, as a result of their lower criteria rating may well be funded. Thus new projects can be initiated during the year. Due to this probable under spend each year, the initial programme is set at approximately 110% of the available budget.

The following projects and budgets for 2008 were approved (Table 3), and individual project applications are shown in Appendix 2.

The acoustic survey project (final project in Table 3) was funded, after 4 separate project submissions within the area of acoustics were rejected by the Permission Team. However the rejection was with the understanding that one coherent project that maintains and underpins acoustic expertise be developed. This would result in maintaining key expertise in the cluster of acoustics. The resulting funded project was thought by the Permission Team to fulfil this request.

Table 3. Projects funded by Kennisbasis WOT in 2008.

priority area	Project name	leader	cost (€k)
A	INEXFISH	Piet	69
A	RECLAIM	Deerenburg	94
A	Flatfish climate	Bolle	12.5
C	elasmobranchs	Heessen	13.6
D	Programme Leadership	Dickey-Collas	15
D	International exchange (ICES WG and SGs)	Beek	95.0
B	Development of analysis techniques for the use of aerial photography in	Dankers	30
B	Fisheries-induced adaptive change and Fisheries Management	Rijnsdorp	70
B	Fisheries related changes in the age composition of the spawning stock:	Brunel	14.6
C	Determination of origins of spawner by season in herring	Damme	28
A	Dynamics and impact of Anchovy in the North Sea	Dickey-Collas	30
C	Reproductive Biology and Management in Marine Fish (FRESH)	Dickey-Collas	18
A	Impact of climate change on predator-prey interactions and population dy	Hille Ris Lambe	35
D	Automation of determination, staging and measuring of fish eggs	Damme	20.5
C	Towards a full carrying capacity estimation for the Dutch Wadden Sea ar	Jansen	26.5
D	Quality and maintenance of expertise in fish aging	Bolle	40
D	Maintaining and improving quality in acoustic surveys	Ybema	20
		Total Budget	**631.74**

7. Financing

From 2004 onwards, a new framework was developed to carryout the research by DLO for the Ministry of Agriculture, Nature and Food Quality (LNV). There are three financial layers: kennisbasis (KB), statutory tasks (WOT) and policy supportive research (BO).

Long term agreements between DLO and LNV cover the WOT. Policy supportive research projects are directed to applied short term requests from managers and tend to last up to 2 years.

The development of expertise programme for 2008 was 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 2008 for WOT programme 406 "Wettelijke Taken Visserijonderzoek" is € 621000. This budget was expanded with additional funds from international research programmes.

The existing requests for kennisbasis WOT money in 2008 showed that the budget was already over subscribed.

8. Co-operation

Many of the WOT tasks must be carried out in collaboration with research organisations from abroad. In particular the research at sea, the sampling of the catches, the development of

methods and models and also the international advisory process itself. Thus it is evident that international cooperation is often required to develop the skills base to complete the WOT and maintain quality. All collaboration must conform to the aims and priorities of the WOT programme.

Examples of this cooperation include ICES working groups and a number of EU financed research programmes. The strength of these cooperation's are that knowledge and technology transfers are carried out in a more cost effective manner with efficiencies of scale. It also reduces the risk of IMARES "*reinventing the wheel*" when dealing with novel requests and new situations.

Appendix 1. Format application form for KB WOT projects

Research priority Area:	
Title of project	
Number of project	
Project leader	
Participating partners	
Duration	
Broad description of the project	
Why should this be funded by KB WOT?	
Products to be delivered?	
Budget	
Is the appropriate capacity available?	
Other potential funding sources have been considered?	
What are the potential risks to the project's success?	

Appendix 2. Description of Proposals submitted to Kennisbasis WOT 2008 for funding.

Research priority Area:	C
Title of project	Too little and too late, but in comparison to what?
Number of project	2008/01
Project leader	Joep de Leeuw
Participating partners	Joep de Leeuw, Willem Dekker, Wim van Densen, Martin Pastoors, extra inputs from people with case study experience.
Duration	12 months
Broad description of the project	Rational fisheries management relies on adequate knowledge of fish population dynamics. Most of our process knowledge is derived from field observations acquired in the past. The implicit assumption is, that processes do not change over time, that additional data years increases the statistical information. This is obviously not fully correct. The ecosystem approach starts off from the opposite view, that environmental factors can influence all processes almost every day. In practice, the more data years available, the better our process knowledge, but also the more likely environmental perturbations of the (static) process. As time passes by, external perturbations disrupt our accumulating information. Next to adequate scientific knowledge of the processes involved, effective management requires that stakeholders are informed, accept the view on the status of the stock, and support the implementation of management measures. This governance process in itself, requires time too. A collapse of a fish stock is followed by denial of facts, blaming others or other factors, finding excuses, before finally taking measures (or shuffling the blame around the table). Finally, political agreement often (if not always) dilutes tough management measures, watering down what is actually needed, or postponing to face the facts. Consequently, initial measures will be often too little to achieve the desired effect. Secondary adaptation will gradually bring the measures to the minimally required level. Post-hoc, one often blames managers for too little or too late. Success or failure of management thus depends amongst others on response times. Response times of the population dynamics, in contrast to characteristic frequencies of environmental perturbations. Response times of the governance processes, in relation to process dynamics. Analysing typical response times of population dynamics is rather straight forward, if not from historical data, then from process knowledge. For a single well-studied case, we could quantify response times for the management process based on verbal accounts (case IJsselmeer; de Leeuw, Dekker & Buijse, subm.), but to extend our approach to more general patterns, we will have to find new techniques to quantify the response time. We envisage: 1. conceptual analysis, 2. documenting case studies, 3. quantification of process response times, 4. quantification of governance response times, 5. effects of too little/too late in simple simulation studies, 6. effects of too little/too late on credibility crises, ….
Why should this be funded by KB WOT?	Novel idea, high abstraction level. That does not easily get support from practical managers.
Products to be delivered?	Publication(s), aiming high.
Budget	10 days per person * 4 persons = 40 man-days. ± 50 k€. This is an initial budget. Results will be used to apply for additional resources elsewhere.
Is the appropriate capacity available?	Yes
Other potential funding sources have been considered?	No, since attracting external support for a primordial novel idea is not realistic.
What are the potential risks to the project's success?	Novel idea, which might not work out well, but not trying is a certain failure. Analysis needs to start with a conceptual discussion, but will subsequently require splitting up tasks, and coming down to earth of actual data. Active project management must ensure that conceptual discussion is no excuse for never coming down. High ambition publication.

Not funded

Research priority Area:	D
Title of project	Development of analysis techniques for the use of aerial photography in the monitoring of intertidal mussel- and oyster beds
Number of project	2008/ 02
Project leader	Norbert Dankers
Participating partners	Frouke Fey, Jeroen Jansen, Elze Dijkman, Anne Schmidt (Alterra)
Duration	4 months
Broad description of the project	Within the framework of the WOT-tasks, IMARES monitors the area of intertidal mussel beds and the total biomass of mussels in the Dutch Wadden Sea twice a year. These measurements are carried out to facilitate policy making concerning mussel seed fishery. Next to this monitoring program IMARES carries out a detailed study on 7 individual mussel beds, concerning the parameters involved in the survival and development of mussel beds, within the framework of TMAP. These individual mussel beds are mapped every year to determine their exact location and size. In addition to these basic parameters, data is also collected on percentage cover, patch size, size-distribution and biomass within each individual bed. The current methods are extremely labour-intensive. The combination of working on a tight schedule in a dynamic area as the Wadden Sea results in a high work load resulting in little time for measuring and describing features which may be useful for decision makers.. Because of differences in methodology, level of detail and the short time span available for field work it is hardly possible to combine efforts. From 2007 onwards aerial photographs are taken by NAM at low tide in spring and autumn. On these photographs mussel beds and oyster reefs are visible. Detailed measurements of the contours of the beds and reefs on these photographs will contribute to the analysis of the dynamics, as all beds can be monitored in greater detail. The development of individual patches in beds can be monitored and related to location within the bed, exposure to wind and waves, etc. This would contribute enormously to studies on stability of individual mussel beds and the parameters which are of importance for the survival of these structures. These are important variables for contributions to development of management plans for the ministries of LNV en V&W (RWS) Furthermore, the estimation of the total mussel bed area and total biomass of mussels in the WOT field inventory can be improved by analyzing the photographs before the start of the survey. The photographs, in combination with maps of the previous year can be used to detect changes and thus improve efficiency of the survey. With this information not all beds have to be visited and recorded by foot, but inspection of uncertainties may be sufficient. In combination with the ground truth data of the vessel survey on biomass this will result in a less labour intensive, and in specific areas, a more detailed monitoring program. More detail is required on mussel beds which are (partly) taken over by oysters and on oyster reefs in general, which are not in the monitoring program at present To realize this improvement, the analysis techniques of aerial photography have to be further developed and tested. In first instance, aerial photographs will be compared with the data of the WOT- and TMAP-projects. Among others this will be done with the tool E-cognition and with the help of remote sensing experts from Alterra.
Why should this be funded by KB WOT?	This proposal describes a small research project which aims to maintain and develop key expertise on the monitoring of intertidal mussel beds and oyster reefs, The methodology will result in more detailed information on the development of mussel beds and oyster reefs which will facilitate the development of hypothesis on the influence of changes in the environment and impact of fisheries on the ecosystem. Further more, the improvement of measurements on total area and biomass of mussel beds will improve information supply for fishery management. This fits in the priority aims of WOT kennisbasis
Products to be delivered?	- Report on methodology and comparison with ground truth - Advice and proposal for more detailed and efficient methodology for monitoring of mussel beds and oyster reefs
Budget	30 k€
Is the appropriate capacity available?	yes
Other potential funding sources have been considered?	yes
What are the potential risks to the project's success?	Preliminary tests have been done some years ago and looked promising. It is certain that improving the present technique is possible, but before it is offered to the ministry we have to show that we are able to get reliable results

Funded

Research priority Area:	D
Title of project	Incorporating IBTS benthos data in FRISBE
Number of project	2008/ 03
Project leader	Remment ter Hofstede
Participating partners	IFREMER (S. Vaz et al.)
Duration	1 month
Broad description of the project	Benthic data has been thoroughly collected by IMARES during the IBTS (International Bottom Trawl Survey) since 1992. However, it is only available through FRISBE from 2002-present. During the period 1992-2001, benthic data has been stored in Bessie, but only in the 'comment'-field, so transforming the data from Bessie to Billie is not straightforward. The data from the comment-fields have to be imported manually in Billie, in order to make them available through FRISBE.
Why should this be funded by KB WOT?	The data will be used in a joint paper between IFREMER and IMARES on the benthic invertebrate community structure in the North Sea: S. Vaz, R. ter Hofstede, J. Martin, J-M Dewarumez, Y. Verin, D. Le Roy, H. Heessen, N. Daan. Benthic invertebrates community structure inferred from bottom trawl hauls observations and its relationships to abiotic conditions in the southern North Sea. A draft of the paper has been presented at the ICES ASC 2007, but the analysis needs to be refined. In the future, this paper will be followed by a second paper in which fish communities will be related to the spatial and temporal distribution of benthic communities in the North Sea.
Products to be delivered?	Availability of long-term benthic data in FRISBE.
Budget	7,500
Is the appropriate capacity available?	Yes
Other potential funding sources have been considered?	Yes
What are the potential risks to the project's success?	None

Not funded although advice given for other sources of funding

Research priority Area:	B,C
Title of project	Fisheries-induced adaptive change and Fisheries Management
Number of project	2008/ 04
Project leader	Adriaan Rijnsdorp
Participating partners	IIASA, IFREMER, IMR, University Leuven
Duration	2008-2010
Broad description of the project	Fisheries management generally ignores both the possible impact of fishing on the evolution of life history characteristics (growth, maturation, reproduction) and on the population genetics (genetic diversity, inbreeding). There is growing evidence that the genetic basis of natural populations is indeed affected by fisheries. The research into the genetic consequences has mainly been carried out through collaborative projects with academic groups supported by strategic investments from RIVO (R&D), NWO projects and EU-funding. For 2005-2009, a Marie-Curie fellowship is available to employ a PhD-student (Fabian Mollet) to study fisheries-induced changes in North Sea flatfish. For 2007-2010 a FP6-STREP funded project was granted linking the ongoing flatfish studies with studies of changes in genetic markers (micro-satellites and non-neutral markers) focussing on sole. The project studies (i) the observed changes in growth, maturation and reproductive investment from market sampling data and from otolith back-calculated Individual growth trajectories; (ii) develop an eco-genetic model for a sexual dimorphic flatfish; (iii) apply the model to analyse the expected evolutionary change and the observed changes; (iv) apply the model to explore the implication of various management scenario's to reduce the evolutionary effects of fishing; (v) compare the observed changes In life history parameters with changes in genetic markers. The results of the project will be input in the ICES SG on Fisheries-Induced Change to explore the implications for fisheries management.
Why should this be funded by KB WOT?	The project is innovative, scientifically very well received (high impact) and has potentially far reaching effects for fisheries management. KB-WOT funding is needed for (i) support of FishACE; (ii) matching funds for FP6-STREP FinE); (iii) the science necessary to translate the science into management advice; (iv) support for participation in ICES SGFIAC (2 persons, one is co-chairman). IMARES has played a prominent role in this research area (see list of publications funded by KB-WOT in previous years) and is co-chairing the ICES SG. Financial support is needed to consolidate the knowledge generated in the PhD-project of Mollet (in particular with regard to the eco-genetic modelling) and to support the collaboration in the IIASA network which plays a dominant role. The IIASA network offers a valuable training environment for our permanent staff (exchange visits of Grift and Poos in previous years) Publications (partialy) funded by KB-WOT and RIVO R&D: Grift, R.E., Rijnsdorp, A.D., Barot, S., Heino, M., Dieckmann, U. 2003. Fisheries-induced trends in reaction norms for maturation in North Sea plaice. Marine Ecology Progress Series 257:247-257 Rijnsdorp, A.D., Grift, R.E., Kraak, S.B.M. Kraak. 2005. Fisheries-induced adaptive change in reproductive investment in North Sea plaice, Pleuronectes platessa L.? Canadian Journal Fish. Aquat. Sci. 62: 833-843. Grift, R.E., Heino, M., Rijnsdorp, A.D., Kraak, S.B.M., Dieckmann, U. 2007. Three-dimensional maturation reaction norms for North Sea plaice. Marine Ecology Progress Series: 334: 213-224. Kraak, SBM 2007. Does the probabilistic maturation reaction norm approach disentangle phenotypic plasticity from genetic change? Marine Ecology Progress Series: 335: 295–300. Mollet, FM, Kraak SBM, Rijnsdorp AD, 2007. Fisheries-induced evolutionary changes in maturation reaction norms in North Sea sole (Solea solea). Marine Ecology Progress Series in press Jørgensen C, Enberg K, Dunlop ES, Arlinghaus R, Boukal DS, Brander K, Ernande B, Gårdmark A, Johnston F, Matsumura S, Pardoe H, Raab K, Silva A, Vainikka A, Dieckmann U, Mikko Heino M, Rijnsdorp AD, 2007. Management of the world's evolving fish stocks. Science, in press
Products to be delivered?	PhD thesis and several publications Input for ICES SG and dissemination of results to society
Budget	2008 60kEuro + 10kEuro (ICES SG) 2009 60kEuro + 10kEuro (ICES SG) 2010 30kEuro
Is the appropriate capacity available?	Yes
Other potential funding sources have been considered?	Results of ongoing work has been presented to fisheries managers but research projects have not (yet) been issued by LNV. Additional research funding in the future is not unlikely as the problem of management of evolving resources has been recognised by the EU, and because there is a growing awareness within the scientific community as reflected in the growth of publications. The forthcoming

	Science Policy Forum publication (Management of the world's evolving fish stocks) co-authored by IMARES will offer another opportunity to address this issue with LNV.
What are the potential risks to the project's success?	The only risk is that IMARES will lose out in this high-impact research area if we are unable to consolidate the results of the PhD-study of Fabian Mollet by involvement of our own permanent research staff.

Funded

Research priority Area:	B Impact of the fishery on ecosystems
Title of project	**Fisheries related changes in the age composition of the spawning stock: consequences for recruitment**
Number of project	2008/ 05
Project leader	Thomas Brunel
Participating partners	-
Duration	4 weeks
Broad description of the project	**Background :** Fishing removes preferentially the oldest fishes from the stocks and is therefore responsible for substantial changes in the demographic structure of the SSB. At a virgin state or under a low fishing pressure, the spawning stock is composed of various age classes contributing to reproduction and the major part of the reproductive effort relies on the oldest age classes. For heavily exploited stocks, the diversity of age classes is reduced and the reproductive effort relies only on young fishes. It has been shown for several species that old and young female contribute unequally to reproduction. Old females are generally more fecund per unit of weight than young ones, and young ones are more likely to skip reproduction when bad conditions occur. Furthermore, eggs spawned by old females (and the subsequent larvae) have often higher survival rate than those produced by young females. The changes in spawning stock structure caused by fishing can hence have consequences on recruitment : for a given level of SSB, a stock submitted to a high fishing pressure will have a lower reproductive potential (produces less eggs, which are subject to higher mortality rate). A stock with a demographic structure modified by fishing should hence have a lower recruitment (for the same level of SSB) than before its demographic structure was changed (hypothesis 1). Furthermore, the timing and the length of the spawning season and the location of spawning may be different for the old and young individuals of a same population. Heavily exploited stocks, with a lower mean age of spawners and fewer age classes, should hence have a shorter spawning season and a smaller spawning area, and then a increasing risk of temporal and/or spatial mismatch between larvae and their preys. This, in addition to the higher mortality rates related to lower egg quality, may increase the dependency of reproduction success on the occurrence of favourable environmental conditions during the early life. For a stock under high fishing pressure, with a poor SSB age structure, the sensitivity of recruitment to environmental conditions may then be higher than under lower fishing pressure (hypothesis 2). As a corollary, and also due to the possible relaxation of density dependent processes caused by the decrease in SSB, recruitment variability should increase as the age structure of the SSB is modified by fishing (hypothesis 3). **Approach :** The effects of the changes in age structure of the spawning stock will be investigated through a meta-analysis performed at the scale of all North East Atlantic populations. Adopting such a macroecological point of view allows to test the three hypothesis on a wider range of ecological situations (species, environments, exploitation histories) which increases the possibility of finding relationships and the significancy of these relationships. This large-scale framework will then be used to focus on the particular case of North Sea stocks. **Data :** Two types of data will be used for this project : - time series of recruitment and spawning stock abundance at age from ICES/ACFM reports. - time series of SST for the main fishing areas of the North East Atlantic and large scale climate indices **Method :** A set of indices of spawning stock age structure (e.g.: mean spawners age, age class diversity, old/young ratio) will be calculated. An analysis of the variations in these indices will be done to see if significant changes in the age structure of the SSB are observed for the stocks studied in this project. 　• *Test hypothesis 1:* Stock-recruitment models with indices of spawning stock age structure as additional explanatory variables will be developed. These models will be used to test whether variations in SSB age composition can explain a part of the variance of recruitment which is not explained by stock biomass. 　• *Test hypothesis 2:* Correlations between recruitment and *i)* SST and *ii)* climate indices will be calculated on a moving time window to investigate the changes in the link between recruitment and environment in time. The relationship between the changes in correlation value and the changes in SSB structure indices will be analyzed. 　• *Test hypothesis 3 :* For each stock the difference in recruitment variability between the period poor an

	rich age structure will be tested.
Why should this be funded by KB WOT?	Due to the increasing evidence for the importance of the age of spawners for the success of reproduction, the question of the consequences of the modification of the spawning stock age structure has becoming increasingly studied during the recent years. This project hence deals with a question which is currently in debate in the scientific community.
	The project asks the question of the importance of the demographic structure on the dynamics of exploited fish stocks and on their sensitivity to their environment. It will help improve our understanding of the effects of fishing on fish stock. Such a knowledge can provide guidelines for an improvement of the management of fisheries. For instance, it can help quantifying the effects of alternative management strategies, such as protecting the old females instead of protecting the level of SSB regardless to the age structure.
	Besides, this project will provided added value to other projects ongoing at IMARES. For instance, it will help find out if fishing can modify the natural response of populations to climate change. One expected conclusion is that heavily exploited stocks may react faster, or more significantly to climate change, which is a relevant result for the RECLAIM project.
	Likewise, if a depleted age structure limits the level of recruitment, high recruitment may occur in a recovering stock only when the SSB will have increased and when the old individuals will represent a significant proportion of the SSB. This may delay the recovery of the stock when a management plan is implemented. This may be of interest for the UNCOVER project.
	Finally this project will identify suitable descriptors of the demographic structure of the SSB and try to measure their influence on recruitment by a modeling approach. These results could be used to incorporate the effect of stock structure on recruitment in population dynamics models. This would be relevant in the framework of the INEXFISH project.
Products to be delivered?	Material to write a manuscript to be submitted in a scientific journal Internal report Working documents to ICES working groups
Budget	160 hours for T. Brunel : 14 560 €
Is the appropriate capacity available?	Yes
Other funding sources have been considered?	No, no other funding source have been considered. The project will however provide added value to several research projects ongoing at IMARES.
What are the potential risks to the project's success?	The datasets are already available, and some part of the work, such as calculation of indices of SSB age structure, has already been done by T. Brunel during his PhD. There is low risk to the project's success.

Funded

Research priority Area:	A Influence of changes in the environment on marine ecosystems Fishery management
Title of project	**North Sea regime shifts : implication for the fisheries?**
Number of project	2008/ 06
Project leader	Thomas Brunel
Participating partners	-
Duration	2 weeks
Broad description of the project	**Background :** Ecosystems change under the influence of natural and anthropogenic forcing. Numerous studies published in the recent years focusing on the North Sea ecosystem have shown that drastic and sudden changes have taken place in 1979, 1988 and perhaps 1998. These changes have been documented for all trophic levels, in the pelagic, benthic and coastal habitats, and are referred to as regime shifts. The consequences of regime shifts on fish stocks have been studied mainly through the analysis of catch data and, to a lesser extend, on recruitment data. However many aspects of the biology of a fish stock, such as growth, natural mortality and reproduction, can be affected by abrupt changes in the ecosystem. Regime shifts are hence susceptible to modify substantially the dynamic of a stock, and therefore its capacity to support fishing pressure. **Questions :** Is there evidence that North Sea fish stocks dynamics and biology have been affected by regime shifts? If yes, what are the possible implications for the assessment and management of the stocks affected? **Data :** The project will analyze time series of biological characteristics (weight, maturity, fecundity) and abundances of commercial stocks of the North Sea. The data collected by IMARES (sampling of commercial catches, surveys) and the data from ICES reports on the assessment of North Sea stocks will be used. **Method :** 1- The standard methods design to test for the existence of discontinuities in time series will be used to see if there are changes in fish stocks which are coherent with regime shifts. 2- For a selection of stocks, the reference points used to manage the stock will be calculated taking into account the difference in stock biology for the different regimes (in particular different stock-recruitment relationships for each regime). These reference points will be compared with the ones given in ICES reports.
Why should this be funded by KB WOT?	Due the complexity and the variety of the environmental effects on fish stocks, and to the limited knowledge we still have on them, the methods currently used for the assessment and management of stocks are based on the assumption that fishes live in an unchanging environment. This project aims at analyzing the consequences of this assumption on the accuracy of the assessments, in a very particular context where changes in the environment and their effects have been clearly identified.
Products to be delivered?	Material to write a manuscript to be submitted in a scientific journal Internal report Working documents to ICES working groups
Budget	7 280 € (two weeks)
Is the appropriate capacity available?	Yes
Other potential funding sources have been considered?	No, but the project will provide added value to other projects studying the relationships between fisheries resources, their environment and the fishery, such as RECLAIM or INEXFISH.
What are the potential risks to the project's success?	Analysis of discontinuities in recruitment time series of North Sea stocks has already been done by T. Brunel during his PhD. There is low risk to the project's success.

Not funded but alternative funding mechanisms suggested

Research priority Area:	D
Title of project	Paper on Taxonomic Quality Issues in the DATRAS
Number of project	2008/ 07
Project leader	Remment ter Hofstede
Participating partners	Niels Daan B.V.
Duration	In the course of 2008
Broad description of the project	Following the ICES Workshop on Taxonomic Quality Issues in the DATRAS Database (WKTQD) in 2007, a paper will be written in order to convince the international scientific community of a better and uniform use of the North Sea IBTS database, and to provide a clear example on how to perform this. A draft version is already available, but the manuscript needs serious revisions in order to meet the scope of the ICES Journal of Marine Science, which is the most suitable journal for such a paper.
Why should this be funded by KB WOT?	Fishery independent survey-data are an important source of information to provide fisheries and ecosystem advice. The paper will highly enhance the quality of the data used in marine science.
Products to be delivered?	Peer-reviewed IMARES paper by R. ter Hofstede and N. Daan, probably in the ICES Journal of Marine Science
Budget	100 hours for R. ter Hofstede = 9,400 euros
Is the appropriate capacity available?	Yes
Other potential funding sources have been considered?	Yes
What are the potential risks to the project's success?	low

Not funded although advice given for other sources of funding

Research priority Area:	C Changing Fishery management B Impact of the fishery on ecosystems
Title of project	Is the North Sea flatfish management plan robust to uncertainty and evolutionary shifts in age and size at maturation?
Number of project	2008/ 08
Project leader	Sarah Kraak
Participating partners	-
Duration	6 months
Broad description of the project	In the past couple of years it has become increasingly clear that fishing exerts an evolutionary force that selects for maturation at earlier sizes and ages. In the international scientific community it is becoming clear that the next step should be to address the question how such evolutionary shifts affect or should affect fisheries management. Through the work of Rijnsdorp, Grift, Mollet, myself and the FishAce network we have now quite detailed knowledge of the shift in age and size at maturation for the two North Sea flatfish stocks plaice and sole. However, this phenomenon is still ignored in the stock assessment methods that are at the basis of the management of these stocks. Also the management plan for the North Sea flatfish that was recently adopted (12 June 2007) does not take account of the possibility of these shifts. The proposed study explores whether and how robust the management plan is, given that this phenomenon is ignored. In other words, is the desired effect of the management plan jeopardized because the phenomenon exists but is ignored? In order to answer this question a simulation model will be set up in which the North Sea plaice and sole stocks are simulated. In the simulation model the current stock assessment methods and the adopted management plan will be applied to the stocks. Two contrasting versions of the 'true' population will be run: one in which our current knowledge on shifting maturation is incorporated, and one that assumes constant maturation. The development of the stocks into the future under the management plan will be compared between the two versions. The differences will be evaluated and it will be discussed whether it matters that management ignores this aspect of biological realism.
Why should this be funded by KB WOT?	Originally I had planned this work to be done within EFIMAS. Because of my illness and shifting priorities within EFIMAS it did not happen. The proposed project is a small well-defined study that can be handled with the existing tools and give results within the next year and inform the managers of the importance of this subject (fisheries-induced change). However, the subject is not yet enough on the minds of the managers to expect funding from their side as yet.
Products to be delivered?	• A scientific paper to be published in a peer reviewed journal. • A presentation to be used to inform the managers, the STECF, and the ICES WGNSSK.
Budget	400 hours senior scientist 47 k
Is the appropriate capacity available?	Yes (myself)
Other potential funding sources have been considered?	After EFIMAS: no.
What are the potential risks to the project's success?	Fundamental science always yields interesting results. Yet, whether these results are interesting enough to be published by a peer-reviewed scientific journal remains to be seen. In the worst case the study can only be published informally within our international network and in the grey literature. In any case, it will find its way to the managers.

Not Funded

Research priority Area:	C
Title of project	Ecosystem effects of MPA's/ Extending MPA theory to Windfarms
Number of project	2008/ 09
Project leader	Reinier Hille Ris Lambers
Participating partners	Reinier Hille Ris Lambers, Gerjan Piet, Ingrid Tulp
Duration	All 2008
Broad description of the project	Marine Protected Areas (MPA's) are topical, both as a means of conserving biodiversity and as an alternative to current means for managing fish stocks. Windfarms are also topical, as a relatively carbon neutral way of producing energy. In the Dutch north sea, the first windfarm,the Off Shore Windfarm Egmond aan Zee (OWEZ) has recently been completed by Noord Zee Wind, and is in the production phase. OWEZ has quickly been followed by Q7, which is currently in the production phase. Many other offshore windfarms are also planned in the north sea. Windfarms are designated as fishery free areas and as such may (partly) function as MPAs. In addition to the purely protective effect of a marine windfarm, it is also hypothesised that windfarms, and particularly the structures created by windfarms in sea are attractive to fish. This so called "reef-effect", as well as other aspects of windfarms as MPA's are under investigation as part of both a NoordZee Wind funded investigation as to the effects of the windfarm, as to the NoordZee Wind and WE@SEA co-financed studies. Windfarms are not pure MPA's. In particular the imposition of structure in sea may not be entirely positive for all organisms in the area, For instance: the effect of windfarms on migratory or local birds may not be entirely as positive as for fish. Also, the effects of windfarm operation (noise) may be detrimental to sea mammals and/or fish. In addition, while the fishery free zones may protect fish species from fisheries-induced mortality, the interactions between these fish species may also change with the introduction these type of MPAs. For instance the hypothesised attractive effect of the pillars on cod and seabass, may negatively affect marine benthos and smaller fish on which these species feed. There are also indications that windfarms may facilitate the roosting of cormorants, thus locally -increasing- predation mortality. These examples suggest that the effects of windfarms on the fish community or fish population covering issues like biodiversity or stock status may differ from that of "normal" MPAs and may not be linear or, indeed even monotonic. Current theory for MPAs is not suitable to assess the impact of windfarms, as it is still largely based on single species dynamics. . There is, as such a real need for the extension of this theory towards multiple species, and more complex interactions. This aim however is too ambitious to tackle in one step, therefore we propose to start small. Simple models of the effects of protected areas exist as do more complicated models of the behaviour of the fish community that are not spatially explicit, we will modify these to take the spatial component into account and incorporate three different interactions Within a MPA: 1) the local effect is positive for one species, and negative for the other: there is no interaction between the species (as may possibly be the case for migratory birds and fish), 2) the local effect of the windfarm is positive for both species in terms of reduction in fishing mortality, but predator prey relationships involve an increase in mortality for one and an increase in growth for the other. (e.g. cod and sea bass eat other fish/benthos) 3) the local effect of a windfarm is positive for both species in terms of mortality but local competitive interactions may be negative for both. 4) If possible, and time allows, we will explore the consequences of mixed effects on species for multiple species communities. These models will be an extension of existing modelling currently underway as a part of the WE@SEA funded program on windfarms and benthos demersal interactions, but will modify and extend these to suit the focus of this project. We wish to realise simple tools for predicting the effect of MPA's on ecosystem dynamics and thus the potential for biodiversity and stock preservation on a larger scale. These tools can be used to predict the large scale effects of MPA's for multiple species, and will provide policy relevant information in the face of an increasing number of protected areas in the north sea (windfarms or not) This work will partly be performed in conjunction with Hugh Possingham and his lab at the University of Queensland: experts on the theory of MPAs, conservation ecology and prioritising conservation areas. At IMARES, collaboration will focus on the practical implications of theory developed, links with MEP-NSW and WE@SEA projects on benthos-demersal interactions, as well as as well as baseline and effect studies on the land reclamation for Maasvlakte II

	The utility of this project will be reflected in the development of multi-species MPA theory, and will boost IMARES' track record in this area.
Why should this be funded by KB WOT?	This project fills in expertise on ecosystem effects of marine protected areas. Modelling expertise on MPA's is not well developed within IMARES. This project will link in to other projects (MEP-NSW, WE@SEA, Maasvlakte II),
Products to be delivered?	Paper/Poster presented at appropriate international congress. Multispecies models of MPA's
Budget	30,000
Is the appropriate capacity available?	Yes: Reinier Hille Ris Lambers is currently exploring windparks as MPA's for benthic-demersal interactions and has extensive contacts with the lab of Hugh Possingham. Gerjan Piet has extensive expertise in the development of an ecosystem approach in fisheries management including experience with size-structured and species-specific models of the fish and benthic communities. Ingrid Tulp expertise covers general ecology, including bird and fish ecology.
Other potential funding sources have been considered?	WE@SEA is also appropriate but budget is depleted. KB WOT is equally appropriate for funding. This fills in important gaps on the modelling of MPA's currently –not- at IMARES.
What are the potential risks to the project's success?	Little Risk. We have the time and the skills. We aim to start early 2008 to minimize time constraints

Not funded

2008/ 10 spawning herring -damme

Research priority Area:	D
Title of project	Spawning origin of North Sea herring
Number of project	2007/ 4391900301 2008/ 10
Project leader	Cindy van Damme
Participating partners	DIFRES, Denmark
Duration	1 year
Broad description of the project	Over the last 4 years KBWOT has funded the collection and laboratory analysis of herring otoliths to determine the spawner type of each herring (autumn, winter or spring). These data are now stored and ready to be analysed and the results delivered to the herring assessment working group. The study is important because of the relative recovery of downs herring compared to the more northern spawning components. These data have been requested by the ICES herring working group (HAWG) and the pelagic RAC. Preliminary results were presented at the ICES ASC in 2005. However a robust analysis has yet to take place. To close the KB WOT project, this year's funding is requested to work up the full time series and deliver the results to HAWG. For 2008 we propose to work up the data collected in the last years and publish the results in a peer reviewed paper.
Why should this be funded by KB WOT?	Maintenance and improvement of key expertise. Provision of information to the relevant ICES assessment working group.
Products to be delivered?	Working document to HAWG and a peer reviewed paper
Budget	Personnel €28 k
Is the appropriate capacity available?	Yes, Christine Röckmann will work up the data and Cindy van Damme and Mark Dickey-Collas will help produce the manuscripts
Other potential funding sources have been considered?	No, as this project has been funded throughout by KBWOT
What are the potential risks to the project's success?	Data have already been collected and need to be worked up. The risk is low.

Funded

Research priority Area:	A and B
Title of project	Changes in the North Sea pelagic fish community – the dynamics and impact of anchovy in the North Sea?
Number of project	2008/ 11
Project leader	Mark Dickey-Collas
Participating partners	University of Hamburg (Prof Axel Temming) University of Bergen
Duration	3 years
Broad description of the project	The recent explosion of anchovy in the North Sea will have a large effect on the ecosystem. This project will investigate the trophic and ecological impact of the decline in herring and the increase in anchovy. The project will partly fund the PhD of Kristina Raab. The project will bring expertise in trophic interactions, currently held at the University of Hamburg, to IMARES. It will also provide valuable information on the processes of regime shift in the North Sea and how they impact on the higher trophic levels. It will also consider the appropriate indicators for regime change in the North Sea. The project will: • Construct a conceptual model of the trophic interactions in the pelagic fish community. • Relate the spatial variation in anchovy and sardine abundance changes to local zooplankton and pelagic fish abundances. • Relate the spatial variation in anchovy abundance changes to local fishing mortality on various (potentially competing) pelagic fish species.
Why should this be funded by KB WOT?	This work addresses important issues for the WOT programme, as it concentrates on the need for robust advice on the North Sea, the effects of fishing and the environment on the fish community and climate change.
Products to be delivered?	A PhD thesis, at least 4 peer reviewed scientific papers, further project development and technology transfer to IMARES
Budget	Personnel and travel €35 k per year for three years.
Is the appropriate capacity available?	Yes, Kristina Raab will be 100% on this project and will join IMARES on 1 January 2008.
Other potential funding sources have been considered?	Yes, the EU project UNCOVER will provide €10 k of funding in the first year. IMARES R&D money may also be available to cover other costs.
What are the potential risks to the project's success?	The project has medium risk, at this is a new project with a new member of staff.

Funded

Research priority Area:	C and D
Title of project	Reproductive Biology and Management in Marine Fish (FRESH)
Number of project	2008/ 12
Project leader	Mark Dickey-Collas
Participating partners	The EU Cost action FRESH – institutes from 12 different EU member states and Canada. The NAFO working group on fish reproduction.
Duration	3 years
Broad description of the project	IMARES is a member of the EU cost action FRESH (fa 0601)- the intergovernmental framework for European Cooperation in scientific and technical research. FRESH provides funding for travel and subsistence to attend scientific meetings and workshops on fish reproduction, management and the provision of advice. The novel idea behind the action is to bring biology together with management in usable products.

The main objective of FRESH is to establish a network of researchers to co-operate on the improvement of knowledge on fish reproduction in relation to fisheries and the enhancement of the current assessment methodology in order to promote sustainable exploitation of marine fish resources.

This KB WOT project would provide the hours for IMARES staff to attend the workshops and meetings to improve our expertise in fish reproduction and fisheries management. |
Why should this be funded by KB WOT?	This is a core part of WOT, as it is specifically focused towards improving management advice. KB WOT can also gain added value by utilising the FRESH funds for travel and subsistence.
Products to be delivered?	A series of scientific papers, a book and a synthesis document. Technology transfer from across Europe and North America to IMARES.
Budget	Personnel €18 k per year for three years.
Is the appropriate capacity available?	Yes. Cindy van Damme, Sarah Kraak, Thomas Brunel and Mark Dickey-Collas are involved.
Other potential funding sources have been considered?	FRESH will provide up to €30 k a year to fund travel to workshops and short scientific trips.
What are the potential risks to the project's success?	The project is low risk

Funded

Research priority Area:	A
Title of project	**Impact of climate change on predator-prey interactions and population dynamics**
Number of project	2008/ 13
Project leader	Reinier Hille Ris Lambers
Participating partners	Joep J. de Leeuw, Willem Dekker
Duration	2008-2011
Broad description of the project	Main goal of the project is to develop models addressing transitions in population dynamic regimes as a result of climate change induced shifts in growth rates and timing of spawning. The fish community of lake Ijsselmeer (2000 km2) is characterized by a dominance of smelt (*Osmerus eperlanus*) as prey fish species and the percids pikeperch (*Stizostedion lucioperca*) and perch (*Perca fluviatilis*) as the dominant piscivores. The smelt population is highly variable because of life history characteristics (>95% of the smelt population reproduces at an age of 1 year) with highly variable recruitment and survival rates due to annual variation in temperatures[1]. Pikeperch on the other hand is a warm-water species on its northern boundary in IJsselmeer. Pikeperch respond to higher temperatures through strong increases in growth rates and early maturation. Pikeperch suffer strong mortality in size classes above 25 cm due to fishing (bycatch fykenet fishery, gillnet fishery on fish>42 cm) and due to predation by cormorants (*Phalacrocorax carbo*). Growth of pikeperch below 25 cm is strongly affected by the availability of smelt as a food source. Thus depending on the availability of smelt and the temperature regimes pikeperch grow both faster into, and possibly out of the predation window for the cormorant. This in turn feeds back on smelt recruitment and survival rates. Lines of research: - Analyse temperature-dependent spawning, growth and (percids-smelt) predator-prey relationships to identify match-mismatch phenomena - develop models for simple foodweb predator-prey dynamics with temperature driven transitions - extend simple models to multiple-prey species (N.B. young fish of other species may act as alternative prey when smelt stocks are low,) including density-dependent feedback mechanisms. Model developments should be part of a PhD research program for which additionally funding will be searched for. The project will start in 2008 with a scoping exercise on proposed methods and techniques and statistical analysis of data already available
Why should this be funded by KB WOT?	With this project we develop new models addressing climate change and population dynamics. We expect that increasing awareness of the influence of climate change on the dynamics of exploited stocks will lead to a corresponding increase in calls for predictive research on climate change and its role in driving both commercial fish abundance and ecosystem functioning. Our expertise on the lake Ijsselmeer ecosystem will help us to build rigorous food web models addressing climate change and population dynamics of crucial fish species. These models and results from these models will function as a springboard to models of other ecosystems. Expertise on and expertise with temperature driven population models is currently low within IMARES, yet the development of these models is crucial to our ability to respond adequately to expected calls on the implications of climate change from both governmental and non-governmental organizations, both national and international. Developing these models and publishing these results in peer-reviewed journals ahead of these expected calls will establish IMARES' reputation in the field and lead to a better success rate in project proposals addressing all aspects of climate change. Understanding the dynamics of smelt and pikeperch is of utmost importance because the implementation of European Directives (Water Framework Dir. and Bird-Habitat Dir.) requires the estimation of preset threshold levels for assessment of ecological quality and sustainability of sensitive species. Especially smelt is the key species of this system as the main food resource for large numbers of bird species (e.g. goosander, smew, black tern, little gull) for which special conservation

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[1] Smelt is a cold water species with IJsselmeer at the southern boundary of its distribution; warm summers can cause exceptionally high mortality

	criteria have to be met through these European Directives.
Products to be delivered?	1. Predator-prey models with temperature components 2. Scientific paper(s) on temperature-induced predator-prey models and implications of climate change on foodwebs and fish communities. 3. Short summary report (Dutch) with main conclusions and implications for management within European Directives Deliverables for 2008: 1. Report with results of the scoping exercise 2. PhD project proposal and PhD candidate 3. Scientific paper on statistical analyses of data on possible match-mismatch phenomena (setting the goals for further model development).
Budget	K€ 35
Is the appropriate capacity available?	Yes, but we are considering adding a PhD to the research team
Other potential funding sources have been considered?	No, but possibilities for funding a PhD will be part of the scoping exercise envisaged for 2008
What are the potential risks to the project's success?	Data series are available and operational, but complications in model development might arise. In 2008 we will start with statistical analyses of available data (low risk) and investigate options for PhD work and potentials for model developments for continuation of the work after 2008

Funded

Research priority Area:	C Changing fishery management
Title of project	Exploring the usefulness of Bayesian models for stock assessment: the quantification and presentation of uncertainty
Number of project	2008/ 14
Project leader	Sarah Kraak
Participating partners	-
Duration	6 months
Broad description of the project	By the end of the F-project (March 2007) four reports on the exploration of three Bayesian models for North Sea plaice stock assessment had been delivered. Presentation of these reports to the F-steering group had raised interest, especially with Productschap Vis, for further development of Bayesian stock assessment methods. Also ACFM chair Martin Pastoors expressed interest in further investigation. The proposed project is meant to accommodate these interests. Two challenges will be tackled with this project. 1. How do Bayesian methods help us understand uncertainty in stock assessment and differentiate between sources of uncertainty, such as model structure or data? 2. Can Bayesian methods contribute to the paradigm shift towards the (visual) presentation of estimated stock parameters as fundamentally uncertain instead of point estimates which always turn out to be "wrong". The study will use a simulated population with "plaice-like" characteristics. While the true state of the simulated population is known, uncertainties about the data will be introduced and the population will be assessed with various structurally different models by Bayesian methods. The differences between the true population and the estimated population will be analysed and it will be clarified what the sources of these differences are. This will give insight in the probable true uncertainties existing for the North Sea plaice stock. Different ways of visually presenting estimated stock parameters will be explored. Feedback on "what the graphs tell" will be asked from representatives of e.g. Productschap Vis, in order to decide how the message of uncertainty can best be communicated.
Why should this be funded by KB WOT?	In the discussions with the F-project partners held near the end of the F-project about future work, the importance of this research was several times stressed. Yet, it was decided not to structurally allocate money to fundamental research on stock assessment methods (as in F-1 of the F-project).
Products to be delivered?	• A scientific paper to be published in a peer reviewed journal. • A presentation to be used to inform the managers, the industry, and the ICES WGNSSK.
Budget	400 hours senior scientist 47K
Is the appropriate capacity available?	Yes (myself)
Other potential funding sources have been considered?	As mentioned above, in the discussions held near the end of the F-project about future work, the importance of this research was several times stressed. Yet, it was decided not to structurally allocate money to fundamental research on stock assessment methods (as in F-1 of the F-project).
What are the potential risks to the project's success?	Fundamental science always yields interesting results. Yet, whether these results are interesting enough to be published by a peer-reviewed scientific journal remains to be seen. In the worst case the results can only be published informally within our international network and in the grey literature.

Not funded

Research priority Area:	D
Title of project	Cross check existing ad hoc photo guides of deep sea – and meso pelagic fauna used in ICES suveys in the NEA.
Number of project	2008/ 15
Project leader	Bram Couperus
Participating partners	
Duration	6 months
Broad description of the project	With the introduction of the ecosystem approach, more information on non-target species is and will be stored during high seas surveys. Combining existing photo guides from survey member states will push the ecosystem approach forward.
Why should this be funded by KB WOT?	Deep sea species are being sampled only during WOT surveys at the moment and a request for storing this information comes from the ICES planning groups coordinating these surveys.
Products to be delivered?	A field guide of deep sea – and meso pelagic fauna to be used during NEA high sea surveys. Implementation of pictures and taxonomic information in existing international databases will be assessed.
Budget	WO: 9k€
Is the appropriate capacity available?	Yes, supervision from Bram Couperus.
Other potential funding sources have been considered?	Yes, no funding is available within PT surveys. The need has been discussed and agreed within PGNAPES.
What are the potential risks to the project's success?	Cooperation by international partners

Not funded although advice given for other sources of funding

Research priority Area:	D
Title of project	Proposal on acoustic system deployment
Number of project	2008/ 16
Project leader	Kees Bakker
Participating partners	Dick de Haan, Sytse Ybema / Bram Couperus
Duration	6 months
Broad description of the project	Inventory of available designs and international development on towed bodies and dropped keels must lead to the most suitable design needed for our high seas acoustic surveys.
Why should this be funded by KB WOT?	The towed body which is now being used for WOT surveys is not suitable for blue whiting surveys at high seas. Implementation of a new approach will improve data quality used for assessments.
Products to be delivered?	Report on available acoustic sampling techniques and most suitable technique for IMARES.
Budget	2 international trips: 0.8€ 6 travelling days: 3.6k€ 5 office days: 3k€ Total: 7.4k€
Is the appropriate capacity available?	yes
Other potential funding sources have been considered?	Yes, no funding is available within PT surveys. The need has been discussed and approved by PT surveys.
What are the potential risks to the project's success?	Teamwork might fail ☺

Not funded although advice given for other sources of funding

Research priority Area:	D
Title of project	Quality assurance acoustics - protocols
Number of project	2008/ 17
Project leader	Sytse Ybema
Participating partners	
Duration	2 months
Broad description of the project	To insure a standard in acoustic data use, a protocol will be written covering sampling, analysis methods and data storage.
Why should this be funded by KB WOT?	Acoustic data collection is part of the WOT surveys for herring and blue whiting.
Products to be delivered?	Sampling and analysis protocols
Budget	WO: 2 weeks 7.5k
Is the appropriate capacity available?	yes
Other potential funding sources have been considered?	Yes, no funding is available within PT surveys. The need has been discussed and agreed on within the acoustic team.
What are the potential risks to the project's success?	

Not funded although advice given for other sources of funding

Research priority Area:	D
Title of project	Quality assurance acoustics - Watchdog
Number of project	2008/ 18
Project leader	Dick de Haan
Participating partners	Simrad might be participating by advising IMARES
Duration	Deadline: 15 March
Broad description of the project	A watchdog system installed in the transducer circuitry will produce trends of the applied energy and alerts the operator on sudden fall-outs or slower ramping drifts. The sensor will be developed outside the SIMRAD environment to derive a fully independent watchdog, which has not a single electrical or software link to the SIMRAD equipment.
Why should this be funded by KB WOT?	Acoustic data collection is part of the WOT surveys for herring and blue whiting. The system could be introduced within ICES acoustic surveys.
Products to be delivered?	Acoustic signal monitoring hardware device with visual display.
Budget	Hardware: 5k€ Programming, assemblage: 9.5k€ Total: 14.5k€
Is the appropriate capacity available?	yes
Other potential funding sources have been considered?	Yes, no funding is available within PT surveys although it has been discussed and approved by PT surveys.
What are the potential risks to the project's success?	Growing expertise could lead to broader development of the watchdog as planned.

Not funded although advice given for other sources of funding

Research priority Area:	D
Title of project	Automation of determination, staging and measuring of fish eggs
Number of project	2008 / 19
Project leader	Cindy van Damme
Participating partners	In cooperation with IMR, Norway and BFA fisheries, Germany
Duration	1-1-2008 – 31-12-2008
Broad description of the project	Automation of the working up of the plankton samples on board research vessels during egg surveys. Norwegian and German colleagues have developed a tool to be able to work up egg samples during the survey while on board the vessel. It has been used successfully during cod egg surveys in the Norwegian sea. Eggs are sorted from the other plankton (using the spaying method). All the eggs of one sample are put into a sorting tray. A photograph is taken of all the eggs together. The eggs can be identified to species and staged from the computer screen. Identification will be much easier since the eggs in the picture are not moving about as they do under the dissecting microscope. With the use of the image analysis program ImageJ we can automatically measure the diameters of the eggs. The macro for ImageJ is written by our Norwegian and German colleagues. This procedure will save time in working up the plankton samples. During the 2007 survey we successfully took photographs of mackerel and horse mackerel eggs on board the Tridens. During the 2008 egg survey we want to use this method to speed up the sample work up. The identification and staging of the eggs requires a good photograph reference collection. The current reference collection only contains old and not very clear pictures. Therefore the reference collection needs an update with state-of-the-art digital images. The new reference collection would also be used for the next WKMHMES.
Why should this be funded by KB WOT?	Maintenance and improvement of key expertise. Development of time-saving techniques.
Products to be delivered?	Reference collection of eggs of different species and stages. Working document for WGMEGS and scientific article
Budget	Material 500 euro Personnel 20000 euro (This includes having an extra person on board the Tridens during the egg survey to help with working up the samples and take the photographs of the samples. But time for working up the samples will be reduced.)
Is the appropriate capacity available?	Sieto Verver and Marcel de Vries have great experience in photography and are able to go on the survey. The macro for ImageJ is already written and we are able to use the latest version of this.
Other potential funding sources have been considered?	Survey budget
What are the potential risks to the project's success?	The macro for ImageJ is already written and used by our colleagues. We also cooperate with them for the image analysis of fecundity samples. During the 2007 egg survey we successfully managed to take clear pictures on board the Tridens while the ship was moving about.

Funded

Research priority Area:	D
Title of project	Glass eel
Number of project	2008/ 20
Project leader	Erwin Winter (with Tammo Bult as back-up)
Participating partners	none
Duration	2008
Broad description of the project	Testing a siphon-system to enhance glass eel immigration along barriers, mainly at Den Oever.
Why should this be funded by KB WOT?	This siphon-system can replace the current increasing more expensive labour intensive monitoring with small lift nets
Products to be delivered?	A functioning design of the siphon which is widely applicable and a report on the test-outcomes
Budget	29 kEuro
Is the appropriate capacity available?	yes
Other potential funding sources have been considered?	yes
What are the potential risks to the project's success?	If the design of the vacuum-pump in the siphon is not working in the first tests, than a 'no-go' decision will be made for the Den Oever glass eel test and thus only a small proportion of the budget will be used.

Not funded

Research priority Area:	A
Title of project	Towards a full carrying capacity estimation for the Dutch Wadden Sea and other marine areas
Number of project	2008/ 21
Project leader	Jeroen M. Jansen
Participating partners	Jack Perdon
Duration	3 weeks
Broad description of the project	The effect of fisheries, invasive species and other activities in Dutch marine waters are being investigated with carrying capacity models. These models are based on the biomass of one trophic level that is consumed by a subsequent trophic level, etc. For example: algae are consumed by filter-feeding invertebrates, that, in turn, are eaten by crayfish, fish and birds. These filter-feeding invertebrates are largely represented by bivalve species (incl. cockles, mussels and oysters) that dominate the marine waters in terms of biomass. In the Wadden Sea, IMARES Yerseke has taken care of the monitoring of mussels and cockles for years. This data, collected at an annual basis, forms the main input in carrying capacity estimations for the Wadden Sea. However, mussels and cockles may not be the single most important group of species in the Wadden Sea. Researchers speculate that the Soft shelled-clam (*Mya arenaria*) is probably the most abundant species. Dwelling down to 30 cm in the sediment, this species does not appear in current surveys designed for mussels and cockles. Similarly, the invasive razorshell clam (*Ensis directus*) appears in large densities in the western part of the Wadden Sea, mostly escaping conventional sampling tools by burying deep in sediment. Knowledge of the biomass and distribution of these two species may completely change our view on the functioning, resilience and carrying capacity of the Wadden Sea. The same phenomena apply to the other coastal areas ,e.g. Oosterschelde, Westerschelde, German and Danish Wadden Sea, Voordelta, etc.. With in increasing need for carrying capacity-related research in the Wadden Sea, by LNV, an area-broad survey of these important species is expected in the near future. For the monitoring of razorshell clam fisheries in the Dutch Delta, IMARES developed a specific sampling device that has been used successfully in a test-survey for the first time this year. We believe that this device would also be useful to examine the distribution and biomass of both Soft-shelled clams and Razoshell clams in the Wadden Sea. Whether this sampler works under shallow, dynamic Wadden Sea conditions, and whether it catches the Soft-shelled clam satisfactory, needs to be tested. To test this usefulness of this sampling device, we propose a test survey in the Wadden Sea, in the summer of 2008.
Why should this be funded by KB WOT?	Bivalve monitoring is important to value the natural quality of the Wadden Sea for birds. Some ornithologists believe that the Razorshell clam becomes an alternative food source for birds that are under the protection of the Bird Directive. Basic information space for other activities such as fisheries. Defining closed area for the protection of natural values.
Products to be delivered?	Comparison of sampling results of several sampling points that are usually sampled during the cockle survey. Tests of sampling efficiency in full current. Tests of sampling efficiency over steep depth gradients. Tests of sampling efficiency in shallow water.
Budget	Shipping costs (inc. logistics) 25000 euro Researcher (3 weeks) 15000 euro. Assistant (3 weeks) 11500 euro. Total: 51500 euro.
Is the appropriate capacity available?	Yes
Other potential funding sources have been considered?	Partly funded by WOT ensis. WOT kokkel survey program is too time-limited to be combined. NOW ZKO research has been considered,
What are the potential risks to the project's success?	The project may be delayed by the weather. The sampler may get damaged when obstructed under water. (Both are the usual risks in any survey).

Partially funded as KB WOT doesn't pay for ship time

Research priority Area: B	B
Title of project	Cooperative Research Programme on Fishing Techniques for Ecosystem Based Management (CRP-FTEBM)
Number of project	2008/ 22
Project leader	Bob van Marlen
Participating partners	ILVO Vlaanderen PVis, Others (EU)
Duration	5 years
Broad description of the project	Energy saving techniques and discard reducing techniques are being developed by many individual fishing companies, through the VIP. This works lacks coordination and scientific input, but ensures a strong incentive and commitment by the industry. It is also weak in terms of data collection and appraisal of ecosystem effects through modelling. Many so-called 'pilot projects' were initiated and it is too early to tell whether this approach works better than the classical 'marketing push approach' of the scientific community in which solutions were developed and presented to the industry for taking up, which mostly failed, because of associated initial losses in earnings. Nevertheless, it should be acknowledged, that the scientific approach had the advantages of lack of pressure to maintain earnings during fishing trials, more sophisticated data collection and observation techniques, and the link to an international scientific community with a huge knowledge base over a wide range of applications. This project aims at bringing together the weaknesses of research and development purely driven by the scientific community on one hand, and those by the 'ad hoc' and short term approach by the fishing industry on the other by strengthening cooperative research (CR). We take onboard the lessons learned from CR in the USA as expressed during the ICES-Symposium 'Fishing Technology in the 21st Century – Integrating Fishing and Ecosystem Conservation' in Oct-Nov 2006 in Boston, USA. The project addresses both fishing sectors relevant for the Dutch industry, the beam trawling sector and the pelagic fleet. Key activities outside this project are design and testing of alternative techniques with the fishing industry as driving actor, scientific data collection onboard research and commercial fishing vessels, modelling of ecosystems under various scenarios of gear use, including economic consequences. The project budget will be used to organise and run the Cooperative Research Programme (CRP) suggested, to facilitate collaboration and dissemination throughout its whole duration including goal setting and developing a commonly supported data collection programme. Conclusions of the work are to be drawn by both scientific and industrial partners in a coherent and mutually agreed manner.
Why should this be funded by KB WOT?	Because it is an essential component of ecosystem based fisheries management
Products to be delivered?	Novel fishing techniques and methods that can be implemented and of which the ecosystem effects can be forecasted.
Budget	? to be negotiated, eg € 50000
Is the appropriate capacity available?	Yes and we will seek external combinations and industrial input (eg ILVO, others)
Other potential funding sources have been considered?	Yes for the actual research and development work there are some existing funds and mechanisms, developments in the industry run through VIP, and current EU-projects (eg DEGREE and the new ESIF), and we link into these. The modelling work has been suggested in EU-proposal ICEF, but this was unfortunately not granted, possibly other sources still exist. The ideas generated here are still valid and outstanding in terms of research strategy (to my view).
What are the potential risks to the project's success?	Practical gear solutions that are not implemented, as has been the case in the past!!! Different agendas by the industry and the scientific community. Lack of support by an industry who wants everything for the least sum of money!!! EU projects RECOVERY, NECESSITY and DEGREE are/were multi-disciplinary projects resulting in a number of promising techniques that can be used to reduce the by-catch of unwanted species, discarding and sea bed impact, and were developed in close cooperation with the fishing industry. The current regulation (eg EC 850/98 on Technical Conservation Measures) is currently debated within the EU, and ways are sought to improve the effectiveness, and provide stronger incentives concerning the application of ecosystem friendly techniques.

Not funded

Research priority Area:	AB
Title of project	Bayesian Smelt
Number of project	2008/ 23
Project leader	Reinier Hille Ris Lambers
Participating partners	Joep de Leeuw, Reinier Hille Ris Lambers, Hans Bogaards
Duration	2008
Broad description of the project	IMARES possesses a good deal of expertise regarding simulation modelling, but the knowledge base in fitting intricate mathematical models (including stock assessment models) to data is slight. The F-project provided a starting point for exploring the advantages of Bayesian analysis, as related to stock assessment-type models. While people involved were mostly positive about "the Bayesian experience", until now there has been no opportunity to further explore its advantages (or, for that matter, its shortcomings). We aim to provide this opportunity within this proposed project, and to combine it with other key research areas of the WOT-KB programme, namely the influence of environmental changes on population dynamics from an ecosystem perspective.

Bayesian data analysis offers a powerful and flexible methodology for general parameter estimation. The mathematics involved in Bayesian estimation is quite complicated, but the advance of high-speed computation has made it relatively easy to obtain approximate solutions based on MCMC algorithms. While the Bayesian approach can be applied to any statistical problem, its application to model-based parameter estimation is especially advantageous; its framework naturally allows for incorporation of hierarchically interdependent parameters and iterative estimation procedures.

We have identified a specifically promising topic for investigation; the population dynamics of smelt in Lake IJssel (IJsselmeer) are ideal for combining the above-mentioned objectives. First, because we have data available; routine surveys on smelt abundance have been carried out for almost 20 years now. Second, food web interactions within Lake IJssel are well understood and indices on relevant species linked to smelt (eg perch, pikeperch) are available. Third, the population dynamics of smelt are not much affected by fisheries; the species is short-lived and spawns before massive fishing mortality takes place. Fourth, a population-dynamic model of smelt in Lake IJssel has already been developed as part of an MSc research project (Jim de Fouw, to be finished by the end of the year). And last but not least, quantification of distinct population dynamic processes (eg growth, resource competition, natural mortality) in relation to abiotic factors is challenging from a scientific point of view. Naturally, Bayesian analysis is the preferred method of choice for quantification of such relations in the context of a population dynamic model.

The questions we address in this proposal are readily applicable to other topics. The primary goal of the research project would therefore be to develop a conceptual and model-based framework for the analysis of a single species' population dynamics, incorporating knowledge of ecosystem interactions and processes conditional on abiotic factors. Key techniques involved in the development of such a framework are data-based modelling and (Bayesian) parameter estimation, and this project can be used to solidify IMARES' expertise in biostatistics.

This project will analyse the population dynamics of smelt in relation to abiotic and biotic factors using existing data series, and deliver both knowledge on key processes determining its dynamics, as well as help develop expertise on Bayesian techniques. |
Why should this be funded by KB WOT?	• Bayesian methods are a natural choice for combining simulation models with data and important in the applications in climate change questions or ecosystem approaches to fisheries management. Smelt in the Ijsselmeer are a relatively easy step up to develop Bayesian methodologies for species with more complex life cycles and multiple species models. • Smelt Stock in the IJsselmeer are at an all time low. We foresee questions on smelt stock management to come our way from LNV and RWS, in the course of this year. This project will ensure that the right scientific infrastructure will be in place for this
Products to be delivered?	We will consolidate our knowledge in 1) a paper on the dynamics and state of smelt in the Ijsselmeer 2) presentation of paper/poster at appropriate international conference. 3) development of statistical tools for smelt assessment
Budget	30,000
Is the appropriate capacity available?	Yes, models for smelt have already been developed, next stage is purely centered on bringing this to a higher level. Team capacity is also appropriate and available
Other potential funding sources have been considered?	KB wot is the most appropriate source. No other sources could be identified
What are the potential risks to the project's success?	Low risk, relies primarily on manpower. The appropriate capacity is available. Team members are complementary in expertise, but overlap is such that filling in the gaps, should one team member be (temporarily) incapacitated, is possible.

Not funded

Research priority Area:	A
Title of project	Trends, causes,and consequences of Invasive aquatic species in the Netherlands
Number of project	2008/ 24
Project leader	Reinier Hille Ris Lambers
Participating partners	Ingeborg de Boois Joep de Leeuw Jeroen Wijsman Henk Heessen Reinier Hille Ris Lambers , Diana Slijkerman
Duration	01/01-31/12/2008
Broad description of the project	The recent creation of the "Coordinerend orgaan invasieve exoten" by LNV has underlined the importance of identifying and assessing the impacts of invasive species in the Netherlands. IMARES has the potential to be a key player in many aspects of invasive species research in the future, as we have 1) an intimate knowledge of species trends in freshwater and marine environments, across many species and species types. In addition we 2) have broad qualitative and quantitative biological expertise and 3) a network of observers in the field allowing us to go beyond a reporting of trends towards research on mechanisms and implications of invasive species. In this project we aim to synthesise data on invasive species trends, link these with both biotic and a-biotic data and address hypotheses on invasion and invasibility of ecosystems. Mostly through WOT monitoring projects IMARES has a broad knowledge of species trends. Recent analyses show considerable biotic and a-biotic changes some of which have broad implications. For instance, the invasion of the Pacific oyster in the Oosterschelde and the local extinction of the native oyster are probably linked through the invasion of the exotic oysterparasite *Bonamia ostreae*. For other species like the American razorshell *Ensis directus*, and the Chinese crab *Eriocheis sinensis* which have become highly abundant it is unclear how their invasion is related to the small populations of native species. Fundamental questions to be answered are: Is this a cause or a consequence? Are other factors such as temperature or eutrophication key factors in predicting these invasions? Is invasion correlated with the rise or decline of other species, both native and exotic? Are invasions of benthos species more dramatic than those in fish or is this just a statistical coincidence (large number of benthos species, some of them show dramatic invasions) or a consequence of different life history characteristics between benthos and fish? The pooling of (WOT) monitoring data over different habitats gives a broad overview of possible causes of invasion and will allow us to compare and contrast different causes and effects of invasion. we will especially, focus on possible niche shifts or possible empty niches as a consequence of climate change, eutrophication, trophic cascades, or dispersal opportunities. Besides identification of driving (risk) factors and impacts on species and habitats (ecology), economical risks will be identified and discussed, together with risk reducing measures on national and international scale. Dutch and international policy on invasive species will be discussed in relation to the identified risks from species and habitats data analysis. By doing so, knowledge gaps are made clear, which will benefit communication with policy makers (and future research leads). In the course of next year we propose to bring together expertise and data from a broad range of WOT surveys and IMARES sub-divisions. We will • Identify key hypotheses for invasion and invasibility applicable to aquatic habitats. (this will largely be a literature review) • Identify invasive species, or invasive species syndromes of particular importance, be it ecological or economic, throughout the scope of IMARES' trends surveys. • For each representative species/syndrome identify important biotic and abiotic correlates (such as temperature, eutrophication, disturbance, increase/decrease in other species) • As much as possible attempt to elucidate the mechanism for invasion of the representative species/syndromes. Where this is not possible, identify the actions to be taken to move from correlation to causality. • Identify risk factors and current measures to reduce risks of invasive species • Short discussion on policy on invasive species and status of Dutch measures • Identify key sources of funding for continuation of research in areas identified within this project
Why should this be funded by KB WOT?	Key knowledge on invasive species exists within IMARES, but is fragmented across different locations and groups. IMARES has the potential to be a key player in invasive aquatics, but must first consolidate knowledge and expertise. KB WOT funding will provide the first step towards establishment of IMARES's track record in the field.
Products to be delivered?	communication on trends causes and conseqeuences as well as current and future risks on invasive species in the Netherlands. To be communicated via: • Poster presented at an (inter)national conference and brought to attention of both LNV and the COIE. (coordinerend orgaan invasieve exoten) • If possible paper published in peer reviewed journal. • LNV/COIE will be contacted at the start for an open discussion of goals and needs. Preferably via a workshop or lunch meeting(s)

Budget	Euro 60,000
Is the appropriate capacity available?	Yes.
Other potential funding sources have been considered?	None as yet. Project will consolidate knowledge and expertise on invasive species within IMARES and will position IMARES as source of expertise for future projects, funded by LNV and/or others, and is at a too early stage for this: KB WOT is thus the best source of funding at this stage.
What are the potential risks to the project's success?	Logistic: unplanned incapacitation of a majority of the team players might be detrimental to the success of this project. These risks are minimal. We propose to perform the majority of the work in the beginning of 2008 when time schedules of people are less tight than later in the year.

Not funded although advice given for other sources of funding

Research priority Area:	D
Title of project	improvement benthic dredge
Number of project	2008/ 25
Project leader	J. Craeymeersch
Participating partners	J. Perdon, D. de Haan
Duration	2 months
Broad description of the project	From 1995 onward annual surveys have been carried out in the coastal zone to estimate the standing stocks of commercially exploited shellfish (*Spisula subtruncata, Ensis directus, Cerastoderma edule*). Most of the stations are sampled with a trawled dredge. The length of the haul is measured by a measuring wheel: a magnetic reed-contact counts the revolutions of the wheel. Comparisons of the measured haul length with the distance between the start-point (end of setting) and the end-point of the haul (start of hauling) reveals large differences between both measurements. This is partly due to the fact that the dredge is already in the sediment before the end of setting, and remains in the sediment for some time after the start of the hauling. We estimated (based on recordings in the Wadden Sea) that about a quarter of the distance between the start of setting and the end of setting as well as a quarter of the distance between the start and the end of hauling should be added to the haul length. But this distances might be different depending on e.g. the water system and the setting and hauling speed. Many of the corrected haul length measurements based on the measuring wheel are shorter than the ones based on geographical position. Thus, the actual sampling distance seems to be shorter than expected unless the wheel is not working properly. The latter is probably the case in very silty sediments (as in some areas in the Voordelta) where haul lengths of less then 50m are recorded. In most cases, however, the dredge might loose contact with the bottom due the to the geomorphology of the seabed bottom. There are also indications that the dredged is lift up at higher wave heights. In the past we have tried to measure the moment of bottom contact using measurements of the pulling power, unfortunately without success (de Haan, 2005). In conclusion, we urgently have to check the behaviour of the benthic dredge and, if necessary, improve its performance. At least we have to improve the measurement of actual bottom contact.
Why should this be funded by KB WOT?	A better measurement of the haul length, will allow more precise estimates of the densities and biomass of species, and thus improve the stock assessment of shellfish species.
Products to be delivered?	An improved benthic dredge.
Budget	Shipping costs: pm (1-2 weeks) Material : pm (10000-20000 euro) Personnel : 20000
Is the appropriate capacity available?	Yes
Other potential funding sources have been considered?	Yes
What are the potential risks to the project's success?	No final result. This would also lead to problems getting other projects or even to the stop of (almost) granted projects (e.g. Nulmeting Benthos 2008 Maasvlakte 2)

Not funded

Research priority Area:	C
Title of project	Population dynamics of cockles in the Westerschelde and Oosterschelde
Number of project	2008/ 26
Project leader	J. Wijsman
Participating partners	A. Smaal, J. Kesteloo, C. van Zweeden, E. Brummelhuis
Duration	1 year
Broad description of the project	One of the main scientific objectives of the European project AquaDEB is to study and compare the sensitivity of aquatic species (molluscs and fish) to environmental variability of natural or human origin. The cockle *Cerastoderma edule* is one of the principal marine species to be studied. The various strategies of energy allocation will be described and quantified in these two groups of aquatic animals by means of a single mechanistic model, the DEB model. A DEB model describes the rates at which the organism assimilates and utilises energy for maintenance, growth and reproduction, as a function of the state of the organism (e.g. age, size, sex, nutritional status) and its environment (temperature & food density). The model assumes that the assimilated products enter a reserve pool, from which a fixed proportion κ of the available energy is allocated to somatic maintenance and growth combined, and the remaining *1-kappa* to either maturation (for embryos and juveniles) or to reproduction and maturity maintenance (for adults). Wageningen IMARES will contribute to the cockle model. The model will be calibrated by using data that is already published (Kamermans et al, 2003; Kesteloo, 2006). It was anticipated that new data could be used to validate the model. Unfortunately, the project is no longer part of the WOT program, and there is at present no project that allows further measurements of the cockle growth and mortality in the Westerschelde and Oosterschelde. Our proposal aims at continuing the fieldwork. Secondly the proposal is directly linked to policy making of the Westerschelde estuary. There is concern about the impact of further deepening on the cockle stocks (and the cockle fishery). A recent report concluded that hardly any effects are expected on the cockle habitat. However, effects on the food quality were not considered. Such effects might be reflected in changes in growth and mortality. Therefore, the research started in 1991 should be continued. The proposal want to ascertain that the field program will continue in 2008. Short description of field work: at 16 intertidal locations (40*40m), samples are taken three times a year with a small core (total sampling area ± 0.43 m2), and the total number, weight and shell length are measured for the different age-classes of cockles.
Why should this be funded by KB WOT?	The results could be used to evaluate changes in the standing stock of cockles (results of the yearly stock assessments – WOT program). Results are relevant for the fishery plans.
Products to be delivered?	The direct output is a better growth model (update of existing models COCO and EMMY). As a follow-up improvement of the models (STW proposal) will be combined by further application of the models and by coupling of these models with the ecosystem models Ecowasp (Brinkman) and the Mabene (Herman) models
Budget	Shipping costs : pm (Schollevaar, LNV) Researcher: 2020 Assistant: 17040 Travel: 200 Total: 19560
Is the appropriate capacity available?	YES
Other potential funding sources have been considered?	Because LNV is concerned about the effects of further deepening the Westerschelde estuary on the cockle stocks, we will ask funding within the framework of EHS-BO-Westerschelde.
What are the potential risks to the project's success?	No ship time made available by LNV

Not funded

Research priority Area:	D Maintenance of key expertises
Title of project	Age reading
Number of project	2008/ 27
Project leader	Bolle
Participating partners	ICES through PGCCDBS
Duration	Jan – Dec 2007
Broad description of the project	The following three aspects of age reading are essential for the maintenance of a key expertise within IMARES • Training of new age readers • International calibration: participation in international (mainly PGCCDBS coordinated) exchanges and workshops • Development of QA procedures within IMARES ("taakgroep")
Why should this be funded by KB WOT?	The above described aspects of age reading are not covered by the routine WOT tasks and funding and have therefore been covered by KB-WOT funding since 2004
Products to be delivered?	• Extended report of the horse mackerel exchange and workshop (NL coordinator, short report submitted in 2007) • Extended report of the turbot and brill exchange (NL coordinator, short report submitted in 2007) • Report of the 2008 cod workshop (by DK & NO coordinators) • Report of the 2008 turbot workshop (by BE coordinator) • Short note on limited sole exchange in 2008 (by UK coordinator) 1.
Budget	€ 40000
Is the appropriate capacity available?	Yes
Other potential funding sources have been considered?	Yes (WOT Surveys & WOT Market sampling).
What are the potential risks to the project's success?	Insufficient prioritisation within institute. Note: requested budget is driven by pragmatic experience on how much time can be made available for age reading QA and training. Ideally more time should be invested in QA and particularly in training.

Funded

Research priority Area:	D Maintenance of key expertises
Title of project	Quality assurance acoustic projects
Number of project	2007/ 28
Project leader	Sytse Ybema
Participating partners	Simrad might be participating by advising IMARES
Duration	Deadline for hardware side: 15 March Deadline for protocols and manuals: end of 2008
Broad description of the project	To insure a standard in acoustic data use, a protocol will be written covering sampling, analysis methods and data storage. On the data collection side a watchdog system installed in the transducer circuitry will produce trends of the applied energy and alerts the operator on sudden fall-outs or slower ramping drifts. The sensor will be developed outside the SIMRAD environment to derive a fully independent watchdog, which has not a single electrical or software link to the SIMRAD equipment.
Why should this be funded by KB WOT?	Acoustic data collection is part of the WOT surveys for herring and blue whiting. The watchdog system could be introduced within ICES acoustic surveys.
Products to be delivered?	Acoustic signal monitoring hardware device with visual display and sampling and analysis protocols.

Budget	Software side: WO: 2 weeks
	Hardware side:
	    Hardware: 5k€
	    Programming, assemblage: 9.5k€
	Total: 20k€

Is the appropriate capacity available?	yes
Other potential funding sources have been considered?	Yes, no funding is available within PT surveys although it has been discussed and approved by PT surveys.
What are the potential risks to the project's success?	Growing expertise could lead to broader development of the watchdog as planned.

Funded as resubmitted for all of the acoustic projects