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Report

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Report of the KB-WOT fisheries programme carried out in 2006

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Summary

This report documents the activities of the KB WOT programme in 2006. It gives the results, products and documents the experience gained by staff through the KB WOT programme. It also shows how the individual projects fit into the research priority areas of WOT 2006. The financial spend is also documented in light of the experience and knowledge gained. The report also describes how KB WOT funding was used to maintain quality assurance for methods crucial for the WOT programme as a whole. Some of the programme was used to fund small projects and some for attending work shops and workgroups on issues relevant to the WOT programme. Added value was achieved by using KB WOT funds within EU projects on climate variability, stock assessment methods, bycatch issues, management simulations and environmental impacts on fish populations and fisheries advice.



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). In order to maintain the infrastructure required to carry out these tasks, and to help anticipate future strategic needs, 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.

This report describes the allocation and utilisation of the Kennisbasis budget in 2006. The available budget in 2006 was €621 000. The money was spent through projects, each of which is described here. The projects were split up into five research priority areas: 1) influence of a changing environment on marine ecosystems, 2) impact of the fishery on the marine ecosystem, 3) fishery management, 4) key expertises and 5) small research projects. All of these areas fall under the wider WUR kennisbasis themes.

Much of the money was allocated to EU funded projects to act as matching funding (or co-financing) of the projects. This has the advantage of adding value to the existing WOT KB programme. All the projects carried out in 2006 were reviewed and agreed by the KB WOT permission team and must be seen to fit into the overall WOT programme. The reasoning behind the selection process is fully described in Grift and van Beek (2006)¹.

Financing

The programme leadership was very proactive in 2006, and this resulted in all the €621 000 being successfully spent, as planned at the beginning of 2006. The allocation of funds to priority research areas also was also approximately as projected (Table 1). During 2006, some budgets were re-allocated from projects that were non-productive and these funds were used to improve access to WOT data via the web, and to increase the expertise base at IMARES (e.g. spending more resources on quality control of egg surveys, learning from stock assessments in countries outside the EU). In terms of adding value, by using KB WOT funds as co-financing for EU projects, over €300K of extra funding was added to the KB WOT programme in 2006 through the projects NECESSITY, COMMIT, FISBOAT, EFIMAS and INEXFISH.

Priority Research Area A. Influence of changes in the environment on marine ecosystems

Planned Budget: €57 430

Realised Budget: €46 329

¹ Grift, R & van Beek, F (2006). Uitvoering Kennisbasis Wettelijke Onderzoek Taken programma. CVO 06.007. Juli 2006.

The productivity of the sea has been observed to change 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 and other areas in the North East Atlantic). 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 . 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.

The three projects funded in 2006, were felt to reflect the general interest of the WOT programme by looking at general effects, flatfish and the specific influence of environmental effects on fisheries and fisheries advice.

A1. KB WOT Klimaat (439.19005.17)

This project fed directly into the developing climate research programme of IMARES. The project was closely associated with the preparation and kick off of the EU project RECLAIM (Resolving Climatic Impacts on fish stocks). Funds were used to win the RECLAIM project, for initial project management and to set up the first international project meeting. IMARES is the coordinating laboratory of the project which brings together over 10 European institutes to work on climate change and fish stocks. Some of the funds were also used to carryout a literature review on the effect of climate change on commercially exploited fish species.

A2. Climate and juvenile flatfish (439.25002.01)

This project was funded for publishing scientific papers based on previous (project) work. The KB-budget is doubled by NIOZ financing with the agreement that specific papers are written. This project runs from 2006 to 2007. In 2006, time was spent on working up data and writing text for 2 papers. The first is a paper on modelling larval dispersal based on the Maasvlakte 2 research carried out in 2005. The second is a paper on trends in Wadden Sea fish fauna based on work previously carried out for the Wadden Sea Quality Status Report 2004. Both papers have not been submitted yet, this is planned for 2007.



A3. INEX FISH (439.13003.01)

INEX FISH (Incorporating Extrinsic Drivers into Fisheries Management) is an EU project for which KB money is used for matching funding. This project was viewed by the review committee to fit well into the KB WOT priority research area A and it began in 2006. The project carried out work on simulation the population dynamics of fish incorporating current understanding of biological processes (e.g. growth, recruitment, fecundity and predation) and how other factors (such as temperature) affect these processes. A literature study was carried out into how external factors can effect fish populations and biology. Two workshops were carried out; one in June into the use of the programming language FLR, which is a useful tool for simulating populations, and one in October into modelling the populations themselves. The project is on course to deliver its products and a mid term report was submitted and accepted by the EU. More information can be found at: www.inexfish.org

Priority Research Area B. Impact of the fishery on ecosystems

Planned Budget: €172 000 Realised Budget: €170 027

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 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 2007 or 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.

The four projects originally proposed to be funded reflected the key area for WOT including cetacean bycatch, discarding, and impact of fishing on benthos. The fisheries induced change is a new and developing field of research that may also in the long impact on the way in which WOT research is carried out, and advice is given. Sadly, due staff resource changes, the benthic work was not completed in 2006, and will be carried out in 2007.

B1. KB WOT BEWG (439.19005.18)

This project was to fund the attendance of a member of IMARES staff at the ICES Benthic Ecology Working Group. However, due to a sabbatical of that member of staff the project was not carried out and the funds were re-allocated to other projects half way through 2006.

B2. Necessity (3.21.12421.01)

Necessity is an EU project for which KB money is used for matching funding. The project looks at minimising the bycatch of non-target species in Nephrops and pelagic fisheries (particularly cetaceans), with specific attention to working with the fishing industry. IMARES is the coordinator of 23 institutes. Project coordination meetings were held for both topic groups, Nephrops (Barcelona May 2006) and cetaceans (Dun Laoghaire, Ireland June 2006).. The economists met in Copenhagen, September 2006 to work on the social-economic repercussions of the bycatch issue. Sea trials were also carried out on the "Walter Herwig" in 2006 to investigate fishing gear and dolphin interactions. The results are still being worked up. Work was also carried out in Belgium on the effect of pingers on dolphins, and also work on the stomach contents of dolphins thought to be killed as a result of being caught. A prize winning poster was also presented at the "ICES-Symposium Fishing Technology in the 21st Century – Integrating Fishing and Ecosystem Conservation" Boston, USA in November 2006 entitled: 'Finding the cause of bycatch of Atlantic white-sided dolphins (*Lagenorhynchus acutus*) by pelagic trawlers: following the biological approach' by A.S. Couperus, C.J.G. van Damme and H. van Steen, which suggested that there may be a link between discarding behaviour and the bycatch of dolphins. More information on Necessity can be found at: www.rivo.dlo.nl/sites/necessity

B3. Fisheries Induced Change (439.19005.19)

This project investigates fisheries induced change in the life history characteristics in fish (growth, maturation, reproduction) and on the population genetics (genetic diversity, inbreeding). The research activities are linked to the Marie-Curie Research and Training Network FishACE in which IMARES collaborate. Within this research project IMARES receives a 3 year PhD grant funded by Marie Curie (2006-2008; Mollet). The WOT contribution is used for supporting the activities of the permanent staff of IMARES on the collaborative projects and participating to relevant meetings. Papers were produced (see table 1) and a start was made with the sectioning of plaice otoliths and image grabbing in order to back-calculate individual growth curves. Statistical techniques were also developed to fit energy allocation models through the back-calculated length at age of individual fish. Part of the funding was used to gain a new EU project FINE, which builds on the analytical approach interpreting changes in life history characteristics by linking these to the molecular biological analysis of the DNA retrieved from samples of archived otoliths. The project funded 7 meetings and workshops in 2006: Adaptive dynamics; size-structured population, eco-genetic models, energy allocation models (May, Mallorca), Fisheries induced change in flatfish (June, IJmuiden), Annual Project meeting (July, Iceland), Food web models (August, Oregrund), ICES Annual Science Conference (Theme session on fisheries induced evolutionary change, Maastricht), Developing methods to determine the maturation, growth rate and reproductive investment from back-calculated growth patterns from otolith (October, Brest), Young scientist workshop (December, Copenhagen).

B4. ICES SGNSBP (439.19005.16)

This project was to fund the attendance of a member of IMARES staff at the ICES Study Group on the North Sea Benthos Project 2000. However, due to a sabbatical of that member of staff the project was not carried out and the funds were re-allocated to other projects half way through 2006.

Priority Research Area C. Fishery management

Planned Budget: €176 360 Realised Budget: €172 798

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.

By adding funding from the EU, the WOT KB programme has benefited greatly in this area with projects on developing management evaluation tools, new approaches to stock assessments and participation in ICES study groups that consider more difficult stock such as Crangon and elasmobranchs.

C1. COMMIT (3.22.12411.01)

COMMIT (Creation of Multi-annual Management Plans for Commitment) is an EU project for which KB money is used for matching funding. COMMIT is a sister project of EFIMAS (see below) which goes into more depth than EFIMAS on some subjects such as Bayesian methods for stock assessments (trying to better describe the uncertainties), development and evaluation of multi-annual TACs and quotas and research into the commitment of stakeholders. In 2006, several reports were produced that are used within the North Sea Flatfish Case Study of COMMIT. Also, several presentations were made to the ICES Symposium on Fisheries Management Strategies. The efforts in COMMIT resulted in a number of manuscripts that have been (provisionally) accepted by peer-reviewed journals. As EFIMAS and COMMIT are two sister projects, products are generally funded by both projects simultaneously. 3 meetings were attended as part of COMMIT; a plenary meeting May 2006 in Spain, the Flatfish Case study subgroup in November, 2006, London, the economic aspects of flatfish Case study in June 2006 in Den Haag. More information is available at: www.commit-fish.info

C2. EFIMAS (3.22.12412.01)

EFIMAS (Operational evaluation tools for fisheries management options) is an EU project for which KB money is used for matching funding. EFIMAS is a sister project of COMMIT (see above). EFIMAS is developing a framework and methods for simulations of fish populations to test management scenarios. In 2007, several reports were produced that are used within the North Sea Flatfish Case Study of EFIMAS. Also, several presentations were made to the ICES Symposium on Fisheries Management Strategies. The efforts in EFIMAS resulted in a number of manuscripts that have been (provisionally) accepted by peer-reviewed journals. It should be noted that, EFIMAS and COMMIT are two very similar projects, and that products are generally funded by both projects simultaneously. Four meetings took place in 2006; EFIMAS Steering Group Group

Meeting, September 2006, Maastricht, FLR Developers meeting, March 2006, Amsterdam, EFIMAS Case Study meeting March 2006, London, and EFIMAS Plenary meeting, April 2006, Nantes, France. More information on EFIMAS visit www.efimas.org.

C3. FISBOAT (3.22.12445.01)

FISBOAT (Fisheries independent survey based operational assessment tools) is an EU project for which KB money is used for matching funding. FISBOAT works along two lines. One derives parameters from survey data which will be examined for changes in trends that signal changes in the population at an early stage. The other designs fishery independent assessment models to build a simulation testing evaluation framework for full scale testing and comparing survey based assessment procedures and management procedures based on them. IMARES is responsible for applying the methods and models developed in both approaches to North Sea Cod data from the IBTS survey. The suite of population indices developed have been applied to the NS Cod data (tables of annual demographic, abundance and spatial indicators 1985-2005). Parameters have been estimated to fit the biological operating model and assessment models to the NS Cod population characteristics. FISBOAT funded 3 meetings in February (San Sebastian), in May (Aberdeen) and in November (Ijmuiden). More information on FISBOAT at: www.ifremer.fr/drvecohal/fisboat.

C4. KB WOT ICES ASC (439.19005.20)

This project covered the time of 14 scientists that were sent to the ICES annual science conference in Maastricht. Over 15 papers were given by IMARES scientists and the scientists attend over 8 different sessions on a range of issues. This ensured that IMARES scientists that operate in the WOT programme were kept up to date on new methods, technologies and ideas in the area of marine science and fisheries. It also allowed for new initiatives to be developed, results on ongoing projects exchanged and new networks to be built. More information can be found at www.ices.dk/iceswork/asc/2006



C5. KB WOT WGFE (439.19005.11)

The project funded participation in the ICES Working Group on Fish Ecology. Two IMARES staff joined the working group in March 2006. The working group answers and investigates applied issues in fish ecology. It reports to ICES. More information can be found at: www.ices.dk/iceswork/wgdetailacfm.asp?wg=WGFE

C6. KB WOT WGCRAN (439.19005.14)

The project funded participation by IMARES staff in the ICES Working Group on Crangon Fisheries and Life History. This is an ongoing working group that investigates the ecology and fisheries on Crangon. It reports to ICES and met in early June. More information can be found at: www.ices.dk/iceswork/wgdetailacfm.asp?wg=WGCRAN

C7. KB WOT WKDRCS (439.19005.03)

The project funded participation by IMARES staff in the ICES Workshop on the Decline and Recovery of Cod Stocks throughout the North Atlantic including tropho-dynamic effects. It met in May 2006. The general conclusion of the workshop was that humans may have limited ability to “rebuild” cod stocks that have declined to very low levels. Simply turning off directed fishing may be insufficient to promote recovery. The properties of the stocks themselves and the state of the ecosystems in which the cod are embedded may be such that the stocks remain constrained to their new levels of low abundance for a considerable time. More information can be found at: www.ices.dk/iceswork/wgdetail.asp?wg=WKDRCS

C8. KB WOT WKNEPH (439.19005.13)

This project sent staff to the ICES Workshop on Nephrops Stocks. This workshop investigates problems specific to the biology and fisheries of Nephrops. This workshop met in January 2006 and tends to meet every two years. More information can be found at: www.ices.dk/iceswork/wgdetailacfm.asp?wg=WKNEPH



Picture of Nephrops

C9. KB WOT WGFS (439.19005.21)

This project funded participation by IMARES staff in the ICES Working Group on Fishery Systems in April 2006. The WGFS central assignment for 2006 was to review the results of research projects relevant to the fisheries systems. It came to the conclusions that there is widespread interest in changing the advisory system and that the institutional set up for providing advice must be re-examined. More information can be found at: www.ices.dk/iceswork/wgdetailacfm.asp?wg=WGFS

C10. KB WOT Elasm (439.19005.22)

This project was funded to write a synthesis on the developments in elasmobranch assessments since 2000. The synthesis would be based on the EU project DELASS (development in elasmobranch assessments) and the latest reports of the ICES WG on Elasmobranch Fishes. However due to staffing difficulties the work was not carried out in 2006, and the money was used within the KB WOT budget to fund other projects near the end of the year. This project has been funded for 2007. For more information see www.ices.dk/iceswork/wgdetailacfm.asp?wg=WGEF

Priority Research Area D. Maintenance of key expertise

Planned Budget: €171 080 Realised Budget: €184 965

Further, kennisbasis resources are 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 and data collection. Courses, workshops and exchanges are an important part of maintaining and developing core skills.

D1. KB WOT age estimation (439.19005.12)

This project funds the expertise and training to maintain the quality of age reading for WOT projects at IMARES. The following tasks are essential for the maintenance of the key expertise age reading.

Training of new age readers in 2006- the training of 3 new readers for the fresh waters species, including a formal "training-workshop" with protocols and tests. The training for pikeperch and perch is almost completed, the trainees will do their "exams" in spring 2007. Time was also invested in the training of a new reader for horse mackerel, and the continuation of the training of the new gadoid reader.

International exchanges and workshops- this year IMARES participated in the North Sea cod exchange with 2 readers and the North Sea sole exchange with 3 readers. Furthermore IMARES organised and coordinated the horse mackerel exchange and workshop. The workshop was held in IJmuiden, 12-14 December 2006. Extended summaries of all these events will be presented in the PGCCDBS report of the 2007 meeting. Full reports will be made in available in 2007 by the coordinating institutes.

Development of QA procedures- [what is this] this is an ongoing development of protocols and tests for training of new readers in IMARES. More information can be found at: www.ices.dk/iceswork/wgdetailacfm.asp?wg=PGCCDBS



Sectioned Cod Otolith

D2. KB WOT expertise in fecundity (439.19005.10)

This project funds the maintenance and development of expertise in fecundity estimation in IMARES. In August 2006, a visit to the Institute of Marine Research, Bergen, Norway took place to work on horse mackerel fecundity. Problems arose with the tank held fish, and thus the project has been extended to 2007. Results have not yet been published.

D3. KB WOT Acoustic Expertise (439.19005.09)

This project funded the participation by one IMARES staff member in the ICES assessment working group for Northern pelagic fish. This was a training visit designed to show the main research scientist on acoustic estimation of fish how the data are used in the stock assessment and the advisory process. The project was viewed as a success as the survey expert played a full role in the assessment working group and now has a better understanding of assessment methods and approaches.

D4. KB WOT WKAFAT (439.19005.01)

This project funded the participation of two IMARES scientists in the annual ICES stock assessment training course in January 2006. Both members of staff gained a lot of insight from the course and now play an active role in the WOT stock assessment process. More information can be found at www.ices.dk/iceswork/wgdetailacfm.asp?wg=WKAFAT

D5. KB WOT SGRECVAP (439.19005.02)

The project funded the participation of scientists in the ICES Study Group on Recruitment Variability in North Sea Planktivorous Fish. The study group met in IJmuiden in January, 2006 and found that the variability in sand eel, Norway pout and herring recruitment was similar and that they showed similar trends. The group also used time series analysis and other statistical techniques to test hypotheses about the trends in recruitment. This maintained the expertise to investigate ecosystem changes and time series trends. This work will be continued in 2007. More information at: www.ices.dk/iceswork/wgdetailacfm.asp?wg=SGRECVAP

D6. KB WOT WKMHMES (439.19005.08)

This project funded participation in the ICES Workshops on Mackerel and Horse Mackerel Egg Staging and Identification and Mackerel and Horse mackerel fecundity estimation. This expertise is crucial to maintaining the quality of the triennial mackerel and horse mackerel eggs surveys. The work, which occurred in October 2006, looked at the quality of plankton sorting,

egg identification and the use of sampling gear and standardisation of the estimation of fecundity. More information can be found at: www.ices.dk/iceswork/wgdetailacfm.asp?wg=WKMHMES

D7. KB WOT WSFF (439.19005.06)

The project funded the further development of an international regional database with biological sampling results and technology transfer on sampling data. The workshop on fish frame held two meetings in January and February in 2006. Participation in this workshop ensured that expertise was maintained and further developed to keep the high quality of the WOT projects.

D8. KB WOT Plankton torpedo (439.19005.15)

This project funded quality control and gear comparison for high speed plankton samplers used for the herring larvae, triennial mackerel and North Sea egg surveys. The performance of the old sampler was compared to the new sampler. First survey took place from 15 till 19 of May and the preliminary results are reported in Reisverslag Tridens Vergelijkend vissen met planktontorpedo's Gulf III en Gulf VII, week 20, 2006. The second survey took place from 18 till 25 September and the preliminary results are reported in Reisverslag Tridens week 38 & 39, 2006, haringlarvensurvey. The study is still ongoing but initial findings were presented to the planning group of herring surveys (PGHERS) in January 2007. The project is still being fully written up. More information at: www.ices.dk/iceswork/wgdetailacfm.asp?wg=PGHERS



Priority Research Area E. Small research projects

Planned Budget: €48 990

Realised Budget: €46 882

Most of the resources of the Kennisbasis in 2006 were allocated to a few larger projects which had a high priority on the research agenda, i.e. areas A to D. However, there are always a few smaller projects which can generate on an ad hoc basis information in specific research field in an efficient way. Often this is research involves more risk which, when successful, can result in

obtaining larger research programmes. For instance, literature reviews can be executed which then articulates research questions around new policy themes.

E1. KB WOT programme coordination (439.19005.07)

The KB WOT programme was coordinated through 2006 using resources from this project. The leadership of the programme changed in 2006 from Dr Grift to Dr Dickey-Collas. The change over was generally smooth and did not result in an overspend. The overall coordination costs were less than 3% of the total KB WOT programme.

E2. KB WOT Historical stock trends (439.19005.04)

This project was designed to rebuild the historic time series of plaice, cod and herring catches in the North Sea. This is important to allow a longer period to be considered in the analysis of environment and climate change on the fish and fisheries. However, due to the loss of staff, this project did not progress and the money was transferred to other projects during 2006.

E3. KB WOT Spawning origin of herring (439.19005.05)

This project was initiated in 2005, and investigates, using otolith microstructure, the spawning origin of herring, in terms of spawning time. This technique allows autumn, winter and spring spawners to be identified. The initial work from the project was used by the herring assessment working group and a paper was presented at the ICES annual science conference. However, due to staffing problem no progress was made in 2006, other than the collection of more otoliths for analysis. The staffing issue has now been resolved and the project will continue in 2007 by working up the backlog from 2006.



E4. KB WOT Herring Review (439.19005.23)

The opportunity arose for the leading herring assessment scientist within the WOT programme to review the Bay of Fundy (Canada) herring assessment. This was viewed as a strong training opportunity. Thus this project funded the time required for one scientist to take part in the stock assessment review in November 2006 in New Brunswick Canada. Other costs were met by the Canadian government.

E5. KB WOT Survey reporting (439.19005.24)

A web based annual survey report format has been developed replacing paper survey reports. This template consists of 2 elements: text and data presentation pages. All data available from the IMARES database can now be uploaded into this data presentation format while explanatory text pages still need to be edited by responsible project leaders.

Each survey requires a unique template which has to be checked thoroughly by responsible project leaders, this is still ongoing. A final run as well as implementation of WUR web format will be made after completing this step. Furthermore, a physical location for automated data presentation pages still needs to be found.

Conclusions

The majority of projects in 2006 were successful. Suitable expertise and knowledge capable of underpinning the WOT programme was developed. The added value projects, through EU funding has allowed the development of stock assessment and management simulation tools. It has enabled further expertise to be developed into climate and fisheries-induced change. Work on by-catch has also taken place. Almost all these projects have resulted in both internal and external publications.

Important experience and knowledge was obtained on species such as *Nephrops*, cod, crangon and the elasmobranchs. The understanding within IMARES of fisheries system analysis, recruitment variability and fish ecology was broadened through participation in ICES working groups.

Key expertise was also strengthened and quality assured in age determination of fish, estimation of fecundity, acoustic estimation of fish biomass, stock assessment techniques, databases, sampling and identifying ichthyoplankton. Novel ideas, with relevance to the WOT programme were also funded and the access to WOT information through the internet was also instigated.

Unfortunately 4 projects suffered from staffing problems, two due to the sabbatical of one individual and two due to a reduction in relevant staff capacity. This problem reaffirms the need to maintain a vibrant KB WOT programme to ensure that the experience, ability and knowledge base within IMARES is broad and can cover the requirements of the WOT programme as a whole.

Table 1. Outputs and expenditure from KB WOT 2006

	Project leader	planned	realised	project name	Internal Report	External Report
A1	Asjes	11000	11573	KB WOT Klimaat	Tulp et al (2006), Effects of climate change on North Sea fish and shellfish, IMARES rapport C057/06	RECLAIM project proposal to the EU
A2	Bolle	32500	20071	Effect klimaat op platvis		Papers in prep
A3	Piet	13930	24164	INEX FISH		Mid term project report to the EU
B1	Craeymeersch	0	0	KB WOT BEWG	Project cancelled	
B2	Van Marlen	105000	105000	Necessity	H. van Steen. Stomach contents of Dolphins. A biological approach to the reduction of White-sided dolphin by-catch by freezertrawlers southwest of Ireland	Finding the cause of bycatch of Atlantic white-sided dolphins (<i>Lagenorhynchus acutus</i>) by pelagic trawlers: following the biological approach' by A.S. Couperus, C.J.G. van Damme and H. van Steen
B3	Rijnsdorp	67000	65027	Fisheries Induced Change	Mollet FM, Kraak SBM, Rijnsdorp AD (2006) Fisheries-induced evolutionary changes in maturation reaction norms in North Sea sole (<i>Solea solea</i>). ICES CM 2006/H:14. Grift RE, Heino M, RijnsdorpAD, Kraak SBM, Dieckmann U (2007) Three-dimensional maturation reaction norms for North Sea plaice. Marine Ecology Progress Series in press. Kraak SBM (2007) Does the probabilistic maturation reaction norm approach disentangle phenotypic plasticity from genetic change? Marine Ecology Progress Series in press. Mollet FM, Kraak SBM, Rijnsdorp AD Fisheries-induced evolutionary changes in maturation reaction norms in North Sea sole (<i>Solea solea</i>). Submitted to Marine Ecology Progress Series.	
B4	Craeymeersch	0	0	ICES SGNSBP	Project cancelled	
C1	Poos	22207	22207	COMMIT	Machiels, M.A.M., Kraak, S.B.M., van Beek, F.A. 2006. Evaluation of a management plan as proposed by the European Commission in 2006 for fisheries exploiting stocks of plaice and sole in the North Sea. IMARES report (draft).	Kell, L., Mosquera, I., Grosjean, P., Fromentin, J-M, Garcia, D., Hillary, R., Jardim, E., Mardle, S., Pastoors, M., Poos, J.-J., Scott, F., Scott, R.D. 2007. FLR: An open source framework for the evaluation and development of management strategies. ICES Journal of Marine Science 64:
C2	Poos	22207	22207	EFIMAS	Pastoors, M. A., Poos, J. J., Machiels, M.A.M. 2006. Evaluation of a proposed management plan for Northsea flatfish. Poos, J. J., Machiels, M.A.M., Pastoors, M.A. 2006. Investigation of some management scenarios for North	Pastoors, M. A., Poos, J. J., Kraak, S. B. M., Machiels, M.A.M. 2007. Validating operating models in simulations of management plans and the implications for how the results can be communicated. ICES Journal of Marine Science. In revision.

	Project leader	planned	realised	project name	Internal Report	External Report
					Sea sole and plaice in 2006 and beyond. CVO report 06.004. Anonymous, 2006. WP4. Updated Delivery Matrix by each Case Study, Last and final version by April 2006, Anonymous, 2006. WP4. Updated Gantt charts by each Case Study, Last and final version by April 2006, (Available from EFIMAS internal project website)	
C3	Deerenberg	22207	22207	FISBOAT	Web based tool: R-code and manual to assess the power of the ability to detect a trends in a series of data. Available on the website www.ifremer.fr/drvecohal/fisboat	
C4	Dickey-Collas	41556	48243	KB WOT ICES ASC	No reports, 14 people attended ICES ASC	
C5	Hofstede	13491	13491	KB WOT WGFE	06.IMA0127 IMARES nota	ICES. 2006. Report of the Working Group on Fish Ecology (WGFE), 13–17 March 2006, ICES Headquarters, Copenhagen. ICES CM 2006/LRC:06. 154 pp
C6	Tulp	24148	22894	KB WOT WGCRAN	06.IMA033 IMARES nota	ICES CM 2006/LRC:10 Report of the Working Group on Crangon Fisheries and Life History (WGCRAN)
C7	Daan	10960	10960	KB WOT WKDRCS	06.IMA0138 IMARES nota	Report of the Workshop on the Decline and Recovery of cod Stocks throughout the North Atlantic, including trophodynamic effects (WKDRCS) ICES CM 2006/OCC:12. 159pp
C8	Verver	3615	3615	KB WOT WKNEPH	06.IMA0173 IMARES nota	Report of the Workshop on Nephrops Stocks ICES CM 2006/ACFM:12
C9	Van Densen	3010	3518	KB WOT WGFS	06.IMA0124 IMARES nota	Report of the Working Group on fishery systems. ICES CM 2006/RMC:05
C10	Heessen	12960	3456	KB WOT Elasm	06.IMA0498 IMARES nota	Report of the Working Group on Elasmobranch Fishes (WGEF). ICES CM 2006/ACFM:31
D1	Bolle	50066	46234	KB WOT leeftijdsbepalingen		
D2	Van Damme	10000	11741	KB WOT expertise fecunditeit	Reports still in prep as project ongoing..	

	Project leader	planned	realised	project name	Internal Report	External Report
D3	Ybema	28176	28544	KB WOT Expertise akoestiek	06.IMA0389 IAMRES nota	ICES CM 2006/ACFM:34. 294 pp
D4	Grift	1402	1402	KB WOT WKAFAT	06.IMA0139 IMARES nota	
D5	Dickey-collas	15585	15585	KB WOT SGRECVAP	06.RIV0192 RIVO nota	
D6	Van Damme	14160	20072	KB WOT WKMHMES	06/IMA0525 IMARES nota	Not published yet
D7	Grift	4783	4783	KB WOT WSFF		
D8	Van Damme	46910	56604	KB WOT Plankton torpedo	Tridens Reisverslagen.	Working document to ICES planning group on herring survey
E1	Dickey-Collas	17280	17118	KB WOT programmaleiding	This report	
E2	Pastoors	0	0	KB WOT Historical stock trends	Project cancelled	
E3	Dickey-Collas	13990	7451	KB WOT Paaiplaats haring		Dickey-Collas, van Damme, Worsøe Clausen & Fässler (2005) Within Stock Structure and TACs: an investigation into the spawning origin of North Sea herring using otolith microstructure and the dynamics of Downs herring. ICES CM 2005/K:2
E4	Dickey-Collas	5680	4320	KB WOT Herring Review	Report to the Canadian Government on the assessment framework of Bay of Fundy herring	
E5	Ybema	12040	8514	KB WOT Survey rapportage	IMARES website development	

Justification

This report

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has been produced with great care. The scientific quality has been peer-reviewed and assessed by or on behalf of the Scientific Board of Wageningen IMARES.

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Senior scientist

Signature: _____

Date: April 19th 2007

Drs. E. Jagtman
Hoofd onderzoeksafdeling Visserij

Signature: _____

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