



## Project no. 0022745

Project acronym: POORFISH

Project title: Probabilistic assessment, management and advice model for fishery management in the case of poor data availability

Specific targeted research or innovation project Thematic Priority: PRIORITY 8, Research for Policy Support

## Publishable final activity report

Period covered: from 01/10/2005	to 30/09/2008	Date of preparation: 15/10/08
Start date of project: 01/10/2005		Duration: 36 months
Project coordinator name: Pierre Fa	iller	
Project coordinator organisation nar	ne: UoP	Revision [draft, 1]

## 1. Project execution

## Context and objectives:

The ultimate objective of the project is to create an advisory system (assessment, advice, and/or management) approach based on methods able to deal with data poor systems (utilizing both expert knowledge and published information in addition to existing data sets). Guidelines will be developed for assessment and management of fisheries for sustainability in data poor situations.

There are basically at least three types of data poor situations:

- Small scale fisheries with usually several target species of otherwise mixed fisheries (many coastal fisheries in Mediterranean and northern Baltic areas)
- Large scale, but recently developed fisheries (many deep sea fisheries belong to this group)
- Large scale fisheries, where the quality of data is getting worse (poor data due to e.g. misreporting and discarding)

The project focuses on each of these types, examining a number of case studies within each category. These case studies will have unique characteristics, allowing appropriate tools to be developed and modelled within a diverse range of examples. The approach proposed is a continuation of the work carried out within current EU projects EFIMAS and COMMIT. These projects developed and used a simulation framework to evaluate candidate management strategies before implementation. The framework models both the "real" and observed systems (data collected, assessment and reference points used to guide management) and tests management strategies against plausible hypotheses about the system dynamics. The current project is more focused on management and advice issues, rather than testing of assessment and management combinations within the operational modelling framework. The experiences obtained in the COMMIT salmon case on including stakeholder interview results within the management model will be utilized and further improved here (by methods of KNOWFISH). Moreover, the consortium aims to simplify the somewhat complicated approach used within COMMIT of applying Bayesian assessment approaches. There are also likely to be links between this project and task 4 (risk analysis). Specific questions within the project will be examined with the simulation framework developed under EFIMAS, using it to populate probabilistic advice where necessary and complementing the use of PAMAM. However, it is worth noting that this approach is mainly appropriate where knowledge of species dynamics is reasonable. High degree of uncertainty in parameter estimates will mean that the Bayesian approach is more appropriate in many cases.

The project will also establish some links with the ISTAM project. The two African case studies will be used as a platform to articulate the work done in both project. A more detailed presentation is done in the work plan presentation.

## Contractual partners

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1	CRODT	Centre de recherches océanographiques de Dakar Thiaroye PO Box 2241 Dakar Senegal	Moustapha Dème	221-8340536	221-8342792	mdeme@crodt.isra.sn

## Activities

Activity 1: to review the potential assessment and management approaches applied in *data poor fisheries.* In work package 1, the project will review the potential assessment and management approaches applied in data poor fisheries around the world. It will define the case studies in terms of assessment and management, and obtain expert opinions from actors within the case study fisheries, identifying key problems and issues.

Activity 2: to develop the basic linkages within the probabilistic assessment and management advice model. In work package 2, the information gained will be used to develop the basic linkages within the probabilistic assessment and management advice model on a case study basis. Current and alternative assessment and management processes will be identified, and utility functions developed, so that performance of alternative approaches can be assessed.

Activity 3: to apply the probabilistic assessment and management advice model to case studies. Based upon the resulting structure, work package 3 will develop probabilistic data using approaches to develop prior information from literature studies. With this prior information and case study structure, the model will be applied in work package 4 to examine the performance of assessment and management approaches, compared to the current approach used. This will also define the applicability of the model over a wide range of case studies, and identify information of specific value to assessment and management.

Activity 4: to produce guidelines for assessment and management in poor data situation. Work package 5 will synthesise the cross-case study findings, identifying operational management tools, evaluating the mutual dependencies of management and success, and identify the benefits and failings of the approach across and within case studies. As a result, guidelines will be developed for assessment and management in data poor situations.

## Work performed

The work completed in the project consisted mainly of: 1-the review of the potential assessment and management approaches applied in data poor fisheries (WP1); 2-the development of the basic linkages within the probabilistic assessment and management advice model (WP2); 3- the application of the probabilistic assessment and management advice model to case studies (WP3); 4-the application of the probabilistic assessment and management advice model to case studies (WP3); 5-the application of the probabilistic assessment and management advice model to case studies (WP4) and; 5-the synthesis of the project (WP5). In detais:

#### WP1 Assimilation

The aims of WP1 were:

• To ensure all partners have a basic understanding of the approaches to be used within the project

- To review the available knowledge base of potential assessment and management approaches applicable to data poor fisheries and compile the information to inform Work Packages 2 and 4
- To review the case study fisheries in terms of current data sources, assessment and management approaches to inform the development of priors under WP 3
- To obtain expert opinions from actors within the case study fisheries on problems and issues to inform Work Packages 2, 3 and 4

Deliverables under WP1 are:

- Manuscript for submission to peer review journals on assessment and management approaches used in data-poor fisheries (global review) (Month 19, April 2007)
- D8 Database of literature on data poor fisheries assessment and management (Month 13, October 2006)

#### **Understanding of approaches**

To ensure all project members had an understanding of the approaches to be used within POORFISH, a training workshop was held in Helsinki in May 2006. Training courses on the three proposed software packages were successfully run:

- Bayesian belief networks
- WinBUGS
- FLR

#### Development of information on the case study fisheries

As part of Work Package 1, Consortium members developed questionnaires to obtain information on their case studies from the variety of fishermen, assessment and management groups involved in the case study fishery. These questionnaires were based upon a basic design developed by the Work Package leaders. Consortium members then used these questionnaires in interviews to identify issues and concerns and new knowledge of interest for the case study design and analysis. These questionnaires have been used in case studies to assist in the development of management questions.

## Manuscript on assessment and management approaches used in data-poor situations

During the reporting period, a review of assessment and management in data poor fisheries was developed to synthesise the information available from the case study fisheries and that gained during the literature review. The outlet selected for this review was the Cefas peer-reviewed book to commemorate 50 years of the seminal publication of Beverton and Holt (1957), who were scientists at the Lowestoft laboratory. This book is now in press and will be published by Blackwell publishing.

The Beverton and Holt chapter examines a number of case studies in detail, to illustrate the problems in assessing and managing fisheries where data is poor. The case studies are:

- Tropical fisheries
- Spanish fisheries

- Cyclades (Greek) study on Marine Trophic Index
- Deep sea fisheries
- Blue shark

The reference for the chapter is: G.M. Pilling, P. Apostolaki, P. Failler, C. Floros, P.A. Large, B. Morales-Nin, P. Reglero, K.I. Stergiou, and A.C. Tsikliras. (In press) Assessment and management of data poor fisheries. *In* Advances in Fisheries Science: 50 years on from Beverton and Holt (Ed. A.I.L. Payne, A.J.R. Cotter and T. Potter). Blackwell Publishing.

#### D8 Database of literature on data poor fisheries assessment and management.

A database of scientific literature on the assessment and management of fisheries, with particular reference on data poor situations, has been developed in Endnote v6.0.2 (Thompson ISI ResearchSoft). It allows the storing, managing, and searching of bibliographic references within the developed reference library. This software allows references to be directly embedded within Word documents, automatically generating a reference list of those article details inserted. The software allows reference lists to be imported and exported from and two a wide range of alternative reference manager software.

The structure of the database contains a wide range of different details, which vary according to the reference type (paper, book, book section, report etc.). In many cases, the abstract of the paper is also available for viewing, although it should be noted that this is not available in all instances. Currently there are over 250 individual references within the database. This database will continue to be expanded as the project progresses. The database is hosted on the POORFISH website (http://www.poorfish.eu).

#### WP2 : Model building

Objectives of WP2 were to develop stock assessment models suitable for data poor fisheries by constructing case study specific model structures and model codes. Due to the specific features of project case studies, the modelling approach resulted slightly different to that originally anticipated in the technical annex and required active participation from the case study coordinators in the model formulation and analysis. This also meant that a larger contribution than initially foreseen was necessary from UHel, who provided methodological expertise and support. This WP focused in the construction of case study specific model structures and model codes (software). UHel contributed in the development of case study specific model structures and codes (software) to be used in the case studies no 3, 4, 6, and 7. UHel contributed the following model software to the project in this work package (some of the work was already started in the first reporting period):

1. Bayesian age-structured fish stock dynamics model including growth, maturity, fecundity, and stock-recruitment dynamics. This model can be easily applied to any temperate pelagic fish stocks, and very little data is required to operate the model. This is a PAMAM model for temperate pelagic fisheries. This model was also used as the basis for the case study 7 model.

2. Bayesian cohort-based model to analyse the Mauritanian Octopus vulgaris fishery (case study 3) including economical aspect.

3. Bayesian state-space population dynamics model to analyse the Senegalese shrimp fisheries (case study 4) including the life history traits of shrimps, hydrologic effects on the recruitment, and migrations of the shrimp population.

4. Bayesian biomass based model for the Cyclades case study (case study 6) which models recruitment separately from aggregated adult biomass.

5. Bayesian age-structured model for case study 7 (Baltic herring; Finnish Environment Institute has main responsibility). This includes, for example, a novelty work of using Bayesian inference in the analysis of acoustic data.

UHel organised and hosted a workshop in Saaremaa, Estonia in June 2007. The purpose of this workshop was to disseminate modelling knowledge and techniques to deepen the understanding of project members on the methodologies applied within the project case studies. Training on the following two proposed software packages were ran successfully:

- Bayesian belief networks (Teacher: Laura Uusitalo / UHel)
- WinBUGS (Teacher: Samu Mäntyniemi / UHel)

The deliverables included in this WP were completed successfully:

- Deliverable D2: The PAMAM model, written entirely by UHel.

- Deliverable D6: Manuscript 1 for submission to peer review journals on probabilistic assessment, management and advice model, written mainly by UHel with collaboration from SYKE.

#### WP3 Development of prior information for case studies

The aims of WP3 were:

- identify data availability for case studies
- gather prior information for case studies
- collect expert information, where necessary
- meta-analysis of data, where necessary
- formulate current assessment, advice or management approach within specific case studies
- identify questions for study within PAMAM

The work under WP3 results in two sets of documents to be delivered to the Commission, Deliverable 3as "Report on case study data identification, collection and validation" and Deliverable 3bs "Case studies data report".

During the 2nd half of 2006 and the first months of 2007 the work on collating data available to the case studies have progressed satisfactorily. After the methodological meeting in Helsinki (May 2006) partners have been able to approach the subject of prior computation. Given the nature of the problem in a context of poor data availability, the computation of priors has not been easy. As reported for WP1, the task has been aided by interviews with stakeholders and experts. The following table presents the methodological approach used for each case study.

Case study	Methodological approach	Leading (Co-	Additional data req.
		operating)	
		institutes	
Case study 1	FLR, (economic analysis)	Cefas	French catch data, deep sea
Blue ling		(IFREMER, UoP)	spp. price data from France
U			(OFIMER), Faeroes. SRR
Case study 2	FLR (BAYESNETS,	Cefas,	French price data, French catch and
Edible crab	BAYES and economic	(IFREMER, UoP)	effort, lfreq?
	analysis)		
Case study 3	BAYES and economic	IMROP (UHel,	International prices: Japan,
Cephalopods	analysis in parallel	UoP)	Spain, Italy (see FAO).
			Landing and export prices
			time series from Maur. UHel
			to focus questions for
			RIVOT scientist
Case study 4	BAYESNETS, BAYES	CRODT (IRD,	Expert knowledge through
Shrimps		UHel)	future workshop
Case study 5a	FLR	CSIC (IMEDEA,	
Artisanal	(WinBugs/BAYESNET,	Cefas)	
Barcelona	economic analysis)		
Case study 5b	FLR	CSIC/IMEDEA	Sampling to be completed
Artisanal	(WinBugs/BAYESNET,	(Cefas)	
Majorca	economic analysis)		
Case study 6	FLR, simple multispecies	AUTH (UoP(FL),	
Cyclades	simulation models	Cefas/UHel)	
Case study 7	BAYES	SYKE (UHel)	Fisher logbook information
Baltic Herring			for priors. Selectivity
			information?
Case study 8	FLR (BAYES, economic	UoP (FL) (Cefas)	Further information to be
Saronikos	analysis)		gathered
Gulf			

Table 1: Methodological approach used for each case study

Deliverable D3as, following a template suggested by the workpackage leader (CSIC), has been finalized in October 2007. D3bs have been finalized timely in November 2007.

Both are are presently available in a published format on the Poorfish portal (www.poorfish.eu).

#### WP4 Application of the model to case studies

The initial objectives of this WP as reported on the technical annex were the following:

- Apply the model to case studies to examine specific questions hypothesized in WP2
- Assess the model applicability
- Examine value of information for assessment and management
- To create assessment, management and advice models that take into account high uncertainty in data poor assessments
- To test the models with real and simulated data sets

However, during the development of the project and specifically of WP2, these had to be changed. At Syros meeting on 2006, it was noted that the modelling approach undertaken in the project was slightly different to that originally anticipated in the project technical annex. It was agreed that, based upon the experiences of the first year of the project, the generic approach suggested within the technical annex would not result in meaningful outputs for management evaluation. The cases studies seem to have so specific features, that one generic model cannot be applied. Both the type of life cycles and the management tools applied lead to the need of case specific models. This means also that case study coordinators must actively participate to the model formulation and then carry out the analysis. The opinion was that the case studies fell under three general areas:

1. Northern European fisheries with TAC management and age-related data (e.g. Baltic herring)

2. 'Mediterranean' fisheries with CPUE and in some cases length data, covering both effort and technical measure controls (e.g. Spanish and Greek case studies, edible crab) and TAC and technical measure controls (e.g. deep water case study)

3. 'African' fisheries with environmentally driven, short lived species where management was aiming to maximize fishing opportunities while sustaining stocks Generic guidelines were anticipated from a synthesis across the case studies as a whole and within these three groups, while there seems to be some generic features inside of the groups above. However, it must be noted that a generic model is no longer anticipated to cope with the specifics across each of the range of case studies.

After completion of WP3 and in the Thessaloniki meeting on 2008, it was agreed to include in the WP deliverables a series of considerations on the selected models, their applicability, the quality of the results and its associated uncertainty, the management applicability and the identified gaps to be solved in future developments.

Within this work package, the specific models developed in WP3 are populated and applied to examine the selected range of plausible assessment and management approaches for the case studies. Thus enabling the demonstration of subjective choices of scientists and/or managers and making it easier to decide which parts of the knowledge should be improved by new studies. This will focus future data collection programmes.

The developments in the model implementation by each case study in WP4 in relation to WP3 are described below:

Case study	Model applied WP3	Development WP4
Blue ling deep water fishery (North Atlantic, Europe)	Effort distribution	Closed areas effects on fishing effort distribution
Edible crab (English Channel, Europe)	Schaeffer fitted with Bayesian estimation and FLR length area structured simulation model	Schaefer fitted with Bayesian estimation and FLR length area structured simulation model
Cephalopod fishery (Mauritania, West Africa)	Bio economic analysis of the Mauritanian cephalopod fishery	Age-structured intra-annual Bayesian population dynamics model based on biological parameters adopted from literature. This probabilistic stock assessment model is implemented with economic information – relative value of commercial size groups
Shrimp fishery (Senegal, West Africa)	Cohort model with Bayesian approximation	Impact of environmental variations (upwelling and freshwater inputs) and fishing effort on the sequential shrimp fisheries
Barcelona/Majorca artisanal fishery (Spain, Mediterranean Sea)	Barcelona recompilation of data, Majorca Schaeffer production, Bayesian unsuccessful	Barcelona Schaeffer fitted with Bayesian approximation Majorca bio-economic model using MEFISTO
Cyclades fishery (Greece, Mediterranean Sea)	MTI Bayesian single stock study	MTI with improved catch estimates Bayesian single stock study
Baltic herring (Baltic Sea, Europe)	Probabilistic age-structured model of Baltic Sea herring	The probabilistic age-structured stock assessment model is tuned with probabilistic hydro acoustic data. Besides, .g. the predation mortality estimates are included.
Saronikos Gulf Beach Seine fishery (Greece, Mediterranean Sea)	Fox&Schaeffer&Pella Tomlinson models	FLR bio-economic model

Report D4, deliverable of the WP4 included D4-1 to 8, reporting the case studies results and D4-9 to D4-16 including the publications resulting from the studies undertaken. Some of them are already published on SCI Journals whilst others are still in the draft level.

#### WP5 Synthesis

The aims of WP5 were:

- Disseminate the project model principles to key fishery stakeholders
- Identify operational management tools (data collection, assessment and management approaches) for data poor situations
- Identify benefits and failings of the modelling approach both across case studies and on a case study specific basis.
- Develop guidelines for assessment and management in data poor situations

The international workshop entitled: "Data poor modelling towards ecosystem fisheries management" was held in the University of the Balearic Islands, Majorca Island, Spain,

8-9 September 2008. The workshop was attended by more than 40 people from Europe, Africa and North America. A workshop report has been produced and available on the portal as D5a.

A synthesis of assessment and management processes in data poor fisheries has been undertaken with the collaboration of the majority of the POORFISH partners. The results of the case studies performed in work package 4 and a review of other methods have been used to identify which characteristics of data poor fisheries are keys in determining the approaches that can be undertaken, and what information is best gathered to improve knowledge and effectiveness of assessment/management by new studies. An examination of the benefits and failings of the main approaches developed in the project has been made with the identification of where improvements should take place. Main results are part of the D5b report.

Guidelines for fishery advice in poor data situations have been developed. The consortium identified which elements of the project should be applied in cases where data are assumed to be of better quality. This framework helps to define the most appropriate routes to formulate scientific advice for successful management of data poor fisheries. Results are part of the D5b report and the D18 paper submitted to Fishery Research in November 2008.



Project Logo:

Project webpage: www.poorfish.eu

# Annex 1 – Plan for using and disseminating the knowledge

## Section 1

Not applicable as there are no results that have potential for industrial or commercial application.

## Section 2

The section below gives information on the two reporting period activities. The indication (Date) in brackets in the Column "Planned/actual dates" corresponds to the initial date as indicated in the TA. It is follows by the actual month and year of delivery.

Planned/ actual Dates	Del. No.	Туре	Type of audience	Countries addressed	Size of audie nce	Partner responsible /involved
		Press release(press/radio/TV)				
August 2008	Not a del.	R. Synge, P.Failler and D. Gascuel (2008), Over- exploitation in West Africa's richest zones, African report, no. 12, Aug-Sept issue, p. 28	Policy makers	All	Aug. 2008	UoP
		Madia briafing	I			<u> </u>
		None				
		Trone				<u> </u>
		Conferences and international workshops				
5-8 Dec. 2005	None	Governance of West African fisheries, PRCM annual forum, Banjul, Gambia,	Research and public policy makers	West Africa Sub-region	250	UoP
13-15 February 2006	None	ISTAM meeting	Research	West Africa and Europe	50	UoP
22-23 March 2006	None	Second scientific committee of the Caribbean Regional Fishery Mechanism	Research and public policy makers	Caribbean	500	UoP
27-30 June 2006	None	Second workshop on methods of the Caribbean Regional Fishery Mechanism	Research	Caribbean	25	UoP
3-4 July	None	UK Defra R&D project	Research	UK	30	Cefas

#### **Overview table**

Planned/ actual Dates	Del. No.	Туре	Type of audience	Countries addressed	Size of audie nce	Partner responsible /involved
2006		discussion	and fisheries managers			
1-12 May 2006	None	ICES WGDEEP assessment working group	Research	Europe	20	Cefas
17-21 Sept 2007	None	Kirsi-Maaria Järvenpää et al. (2007), Bioeconomic analysis of the Mauritanian cephalopods fishery, ICES CM 2007	Research and public policy makers	World	400	UHEL
17-21 Sept 2007	None	P. Failler and al. (2007), Probabilistic assessment, management and advice model for fishery management in the case of poor data availability, ICES Conference, Session O	Research and public policy makers	World	400	UoP
26-28 Nov. 2007	None	G. Pilling (2007), presentation of the POORFISH project at "The Bare-foot Ecologist Toolbox workshop", Vigo.	Research and public policy makers	European	150	UoP
19 June 2008	None	P. Failler (2008), the POORFISH project, presentation at the Caribbean Fisheries Regional Mechanism 4th Annual Science Meeting, St. Vincent and the Grenadines	Research and public policy makers	Caribbean	400	UoP
19 June 2008	None	G. Piling (2008), The FLR method, presentation at the Caribbean Fisheries Regional Mechanism 4th Annual Science Meeting, St. Vincent and the Grenadines	Research and public policy makers	Caribbean	400	CEFAS
21-26 July 2008	None	P. Failler et al. (2008), Probabilistic assessment, management and advice model for fishery management in the case of poor data availability, IIFET conference, Vietnam	Research and public policy makers	World	600	UoP
		Exhibition				
		None				
		Raports				
(Jul. 06) Aug. 06	D1	Report on Probabilistic assessment, management and advice model	Research and public policy makers	All	NA	CEFAS
(Sep. 07)	D2	PAMAM model	Research and public	All	NA	UHEL

Planned/ actual Dates	Del. No.	Туре	Type of audience	Countries addressed	Size of audie nce	Partner responsible /involved
Sep. 07			policy makers			
(Jan. 07) Oct. 07	D3as	Report on Case study data identification, collection and validation (Case studies progress report)	Research and public policy makers	All	NA	CSIC
(Sep. 07) Nov. 07	D3bs	Case studies data report	Research and public policy makers	All	NA	CSIC
(Dec. 07) Dec. 07	D4s	PAMAM application to case studies	Research and public policy makers	All	NA	IMEDEA
(May 08) May 08	D4	Report on Practical operational management tool (case studies model application)	Research and public policy makers	All	NA	IMEDEA
(Sep. 08) Oct. 08	D5a	Report on dissemination workshop	Research and public policy makers	All	NA	UoP
(Sep. 08) Oct. 08	D5b	Report on management processes in data poor fisheries	Research and public policy makers	All	NA	UoP
	1		T	ſ		
		Journal papers				
(Dec. 2006) Dec. 2006	D6	Manuscript 1 Uusitalo, L., Mäntyniemi, S., Peltonen, H., Pönni, J., and Kuikka, S. A probability model to estimate pelagic fish stock dynamics and biological reference points: the Bothnian Sea herring as an example. Manuscript to be submitted to ICES journal of Marine Science	Research	Worldwide	NA	UHeL/ SYKE
(Apr. 07) June 08	D7	Manuscript 2 Merino G., B. Morales, F. Maynou, A. Maria Grau, The Majorcan trammel net fishery: status and perspectives, Submitted to Aquatic Living Resources	Research	Worldwide	NA	IMEDEA leader
(May 08) Dec. 08	D9	Manuscript 3 Large P. A., Guzman Diez, Martial Laurans, Graham M. Pilling, David Reid, Jacup	Research	Worldwide	NA	CEFAS leader

Planned/ actual Dates	Del. No.	Туре	Type of audience	Countries addressed	Size of audie nce	Partner responsible /involved
		Reinert, Andrew B. South and Vladimir I. Vinnichenko. The spatial and temporal distribution of spawning aggregations of blue ling (Molva dypterygia) to the west and north-west of the British Isles (ICES Areas Vb, VI, VII and XIIb), submitted to ICES journal				
(May 08) Sep. 08	D10	Manuscript 4 Laurans M, and M.T. Smith, Bayesian production model assessment of edible crab in the English Channel	Research	Worldwide	NA	IFREMER leader
(May 08) Sep. 08	D11	Manuscript 5 Janvenpaa K et al., Bioeconomic analysis of the Mauritanian Cephalopods fishery	Research	Worldwide	NA	UHeL
(May 08)	D12	Manuscript 6 Laë R., Anttii-Poika V.P., Järvenpää K.M., Grüss A., Mäntyniemi S., Juntunen T., Uusitalo L., Deme M., Diadhiou H., Kuikka S., Bayesian shrimp (penaeus notialis) population dynamics state-space modelling: application for Casamance estuary (Senegal, West Africa).	Research	Worldwide	NA	IRD leader
(May 08) Aug. 08	D13	Manuscript 7 Maynou F. Analysis of catch and effort time series of the Barcelona artisanal fishery through Bayesian surplus production models	Research	Worldwide	NA	CSIC
(May 08) Aug. 08	D14	Manuscript 8 Juntunen T., A. C. Tsikliras, S. Mäntyniemi, K. Stergiou, A Bayesian population model to estimate changes in the stock size under poor data availability using Mediterranean bogue (Boops boops) and picarel (Spicara smaris) as an example	Research	Worldwide	NA	UHeL/ leader
(May 08) Oct. 08	D15	Manuscript 9 Peltonen H., S. Mäntyniemi, L. Uusitalo and S. Kuikka, Probabilistic Baltic Sea herring (Clupea harengus L.) stock	Research	Worldwide	NA	UHeL leader

Planned/ actual Dates	Del. No.	Туре	Type of audience	Countries addressed	Size of audie nce	Partner responsible /involved
(May 08)	D16	assessment Manuscript 10	Research	Worldwide	NA	CEFAS
Sep. 08		Pilling G., F. Scott, C. Karlou- Riga and I. Anastopoulou, The implications of technical management measures for stocks and fleets in the Saronikos Gulf, Greece				leader
(Jun 08) Sep. 07	D17	Manuscript 11 Reglero P. And B. Morales-Nin, Relationship between first sae price, body size and total catch of trammelnet target species in Majorca, Fisheries Research 92 (2008), pp. 102-106.	Research	Worldwide	NA	IMEDEA leader
(Sep 08)	D18	Manuscript 12 Stergiou K, Pierre Failler, Graham M. Pilling, Sakari Kuikka, Francesc Maynou, Beatriz Morales-Ninf, Rainer Froese, Protolean fisheries, models and management: simple approaches to complex problems, under revision, Fishery Research.	Research	Worldwide	NA	AUTH leader
	1		1	1	1	1
Aug. 07	Not plann ed	Book Chapters Manuscript 2 Pilling, G.M., Apostolaki, P., Failler, P., Floros, C., Large, P.A., Morales-Nin, B., Reglero, P., Stergiou, K.I., and Tsikliras, A.C. 2008. Assessment and management of data-poor fisheries. In Advances in Fisheries Science. 50 years on from Beverton and Holt, pp. 280-305. Blackwell Publishing, Oxford. xxi + 547 pp.	Research	ICES and worldwide	NA	Cefas and other partners
Dec. 08	Not plann ed	B. Masumbuko, M. Ba, P. Morand, P.Chavance, P. Failler (2008), Stakeholders' perceptions on scientific advices for fisheries management in West Africa; Can scientific advices help to cope with global change in marine social- ecological systems? in Ian Perry, Philippe Cury, Dawn Ashby and Rosemary Ommer, Blackwell's FAR series. Chapter	Research and public policy makers	All	NA	IRD/ UoP

Planned/ actual Dates	Del. No.	Туре	Type of audience	Countries addressed	Size of audie nce	Partner responsible /involved
		submitted and under review				
	1	Duoinstauch site		1		
Ianuary		Project web-site Poorfish Portal	Research	a11		II_0P/IIHEI
2006			public policy makers, Higher education	all		/CEFAS
		Dostaus				
		Fosters				
		Flyers				
(Nov 06) April 07	LEA1	Leaflet of POORFISH presentation for wide distribution. Produced in	General public	All	NA	All partners in their mother tong
		Spanish, Catalan, Arabic, Wolof and French				language
Nov. 07	LEA2	Leaflet of presentation of the international worksho, Majorca,	Research, public	All	NA	UoP
Apr 08		8-9 September 2008	makers, Higher education			
Sep 08	LEA3	Leaflet of presentation of the main findings of the POORFISH	Research, public	All	NA	UoP
Oct 08		project	policy makers, Higher education			
	I	1	Γ	T		1
	DC	Electronic databases	D 1	A 11		CEEAC
(Oct. 06)	D8	on data poor fisheries	Research	All	NA	CEFAS
Dec. 06						
		Direct e-mailing				
		Not planned at the moment				
		· · · · · · · · · · · · · · · · · · ·		•	-	
		Film/video				
		Not planned at the moment				

## Section 3

Not applicable