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IRELAND ATLANTIC AREA
PORTUGAL ESPAÇO ATLÂNTICO
U.K. ATLANTIC AREA

With the participation of the European Union
Project co-financed by the ERDF

INTERREG III B « Atlantic Area »

FINAL REPORT FORM

PROJECT IDENTIFICATION

CODE and ACRONYM: Sustainable harvesting of *Ensis* (Razor shellfish)
INTERREG IIIB – Project 90 – SHARE

CONTENTS

INTRODUCTION

The aim of the Final Report of the project is to gather together, in a single document, all the information about the results of each project co-financed within the framework of the INTERREG IIIB "Atlantic Area" 2000 2006 Community Initiative Programme. It accompanies and completes the application for payment of the final balance.

This report is an opportunity, for the Lead Partner and Partners, to take part in action to promote and disseminate the results of the programme. The information supplied will be used in the annual implementation report, as well as in the final programme report sent to the European Commission. In this way, by providing information on the working of the partnership, the action carried out and the results of the trans-national cooperation project, each project will contribute to the success of the programme.

The Lead Partner must also take this opportunity to review the project steering and monitoring activities and ensure that each partner has the items and information required to provide evidence of the implementation of the project to the competent regional, national and European authorities. The purpose is to check that the audit trail has been complied with through to the final beneficiary of Community aid, including by filing all the supporting documents relating to implementation, achievements and ERDF payments.

In order to facilitate this work, the Final Report is structured as follows:
- Identification of the project and Lead Partner,
- Evaluation of the steering of the trans-national project,
- Reminder of the initial objectives and overall outcome of the project,
- Review of the different trans-national actions and activities conducted to achieve these objectives,
- Review of information and communication measures,
- Prospects for the future,
- Reminder of the main obligations and corresponding declaration of the Lead Partner,
- A set of technical annexes on the project schedule, filing of supporting documents, follow-up of ERDF payments and of indicators.

The purpose of this plan is to facilitate uniform processing of all this information for each of the projects. As far as the form of the document is concerned, the text zones and the number of actions conducted are provided as an indication only and may be extended if required.
For each point, the part corresponding to the application form is indicated (NB: depending on the version of the form used. If they are different, the first number corresponds to the application form of the first call for proposals, and the second number to the one used for the second call for proposals).

This final report must be prepared by the Lead Partner, possibly in liaison with the other partners, and must be examined jointly to ensure the accuracy and compliance of the information featured in it. Each partner in the project must be sent a copy by the Lead Partner. The national authorities responsible for the first-level (Article 4) control procedure will also be sent the report which will accompany the application for the final balance sent by each partner. The Lead Partner will transmit a copy to the Joint Secretariat at the same time as the application for the final balance of the project, in an electronic copy and a hard copy including the signature of the authorised person.

For all questions or information about this report, the contact details of the Joint Secretariat and the National Correspondents are attached. This document is available in the four languages (French, Spanish, Portuguese and English) on the programme website: interreg-atlantique.org

Sustainable harvesting of *Ensis* (Razor shellfish) [SHARE – 090]

Introduction, Background and Rationale

To meet increasing market demands both within and outside Europe, a number of European countries, including Ireland and the UK, have been developing razor-clam fisheries predominantly for export. Major problems exist with these fisheries, as their sustainability is uncertain. In addition, there is limited information on the population genetics of European razor clams.

SMEs located in peripheral and coastal regions throughout the Atlantic Area can benefit from the successful development of sustainable production methods for razor clams through diversification of fishing and aquaculture. Better handling protocols will increase market access, reduce waste and improve consumer safety. Improved capture methods together with the development of hatchery production and low-cost extensive stock enhancement techniques will further reduce environmental impacts.

PROJECT IDENTIFICATION

(Cf. Application Form point 1)

PROJECT NUMBER: 090

ACRONYM: SHARE

NAME: Sustainable harvesting of *Ensis* (Razor shellfish)

PRIORITY: C

MEASURE: 2

NUMBER OF PARTNERS PER COUNTRY:
ESP 2
FR 0
IRL 1
PT 1
UK 1

LEAD PARTNER IDENTIFICATION

(Cf. Application Form point 2.1)

ORGANISATION OF THE LEAD PARTNER: Queen's University, Belfast

NAME OF THE REPRESENTATIVE OF THE LEAD PARTNER: Dr David Roberts ; Mr Michael Daly

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COUNTRY: UK

CONTACT DETAILS OF THE PERSON IN CHARGE OF DRAWING UP THIS REPORT

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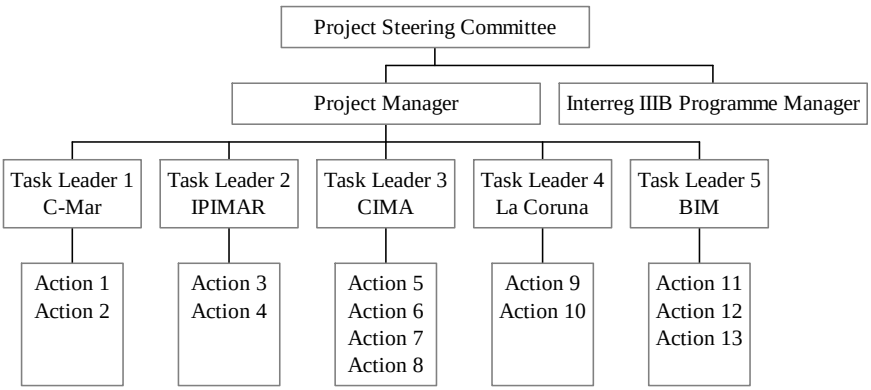
EVALUATION OF THE WORKING OF THE PARTNERSHIP

(Cf. Application Form 11 and 3.12)

PROJECT STEERING STRUCTURE: List the different Committees and groups formed and briefly define their working.

The specific actions described in this report were grouped into Tasks in the original proposal. Committees were established in the institution leading each Task as follows: Lead Partner C-Mar, Queen's University, UK – Coordination, Partner 2 IPIMAR, PT – Environmental impacts associated with razor clam harvesting ; Partner 3 – CIMA, ES , Developing cultivation technology for razor clams; Partner 4, University of La Coruna, ES – Genetic investigations; Partner 5 BIM, IRL – Quality and transport to market. Each committee comprised the PI, staff directly employed on the SHARE project and respective finance officers for the particular institution. Most communication was electronic and, because of the small numbers of staff involved, meetings were held on a needs basis. Action leaders (PIs) ensured delivery of individual tasks. Partner committees reported through the PIs and finance officers to the lead partner and lead partner's finance office and formally through the Project Steering Committee (see below). The Steering Committee comprised all PIs and key research staff working on the SHARE project. The Steering Committee managed overall financial resources, organised partner meetings, disseminated information and monitored progress



Organisational chart illustrating the management structure for the SHARE project.

PROJECT STEERING

(Cf. Application Form point 8 and 3.7)

SCHEDULE OF MEETINGS AND ACTIVITIES OF THE STEERING STRUCTURES (Type of communication and frequency)

Six partner meetings were held over the course of this project at approximately six-monthly intervals (Table 1). Minutes were taken at each of these project co-ordination meetings and are held by each partner. These were circulated amongst the partner organisations and used to monitor progress. Partners were in more frequent contact by email (roughly on a monthly basis) either through the lead partner or with other partners to address issues of common interest.

Table 1 Location and dates of Project partner meetings.

	Location	Host Institution	Dates
1	**Portaferry, Northern Ireland**	**Centre for Marine resources and Mariculture (**C-Mar**), Queen's University, U.K.**	**2-3 June 2004**
2	**Olhão, Portugal**	**Instituto de Investigação das Pescas e do Mar (**IPIMAR**), Portugal**	**3-4 February 2005**
3	**Dublin, Ireland**	**Bord Iascaigh Mhara (**BIM**), Republic of Ireland**	**19-20 September 2005**
4	**Ribadeo, Spain**	**Centro de Investigacións Mariñas (**CIMA**), Ribadeo, Spain**	**26-27 April 2006**
5	**Belfast, Northern Ireland**	**Queen's University, U.K.**	**27-28 September 2006**
6	**Lisboã, Portugal**	**Instituto de Investigação das Pescas e do Mar (**IPIMAR**), Portugal**	**14-15 February 2007**

WORKING OF THE PARTNERSHIP – POSITIVE, NEGATIVE ASPECTS AND POINTS THAT COULD BE IMPROVED...

The partnership is of the view that it established very positive working relationships during the SHARE project. However, one partner was not able to attend all partnership meetings and staff changes in the institution of the lead partner did lead to administrative delays.

TRANS-NATIONAL OBJECTIVES OF THE PROJECT

(Cf. Application Form point 3.4)

Reminder of the **expected** results

To date the SHARE project has been the only trans-national collaborative project in Europe to investigate either razor clam fisheries or razor clam aquaculture. The proposed project involves five partners from the following four Atlantic Area countries: UK / PORTUGAL / SPAIN / IRELAND

Most razor clam harvesting in Europe occurs within Atlantic Area countries. Therefore, the countries associated with this economic activity must approach its sustainable development in an integrated way. The project concerns a shared resource located in the shared waters of the European Atlantic Area and a long-term strategy for its sustainable exploitation must be jointly developed to be meaningful and effective. This collaboration, involving input from development agencies and SMEs, will ensure progress towards the long-term sustainable production of razor clams in the Atlantic Area.

Description of the results **achieved**

SHARE has developed our understanding of razor-clam resources in the Atlantic Area that will inform policy for their sustainable management.

Key outputs have been:

- **Recommended strategies to mitigate against impacts of razor-clam fishing**
- **An appraisal of the genetic diversity of razor clam stocks that is relevant to their sustainable management within the Atlantic Area**
- **Techniques for razor-clam aquaculture**
- **Identification of protocols for best practice in handling, transport and marketing of razor clams produced within the Atlantic Area**

Contribution of trans-national cooperation to the ADDED VALUE of the project. Give a figure from 1 (negative) to 4 (remarkable) and **explain your choice**.

1 ☐ 2 ☐ 3 ■ 4 ☐

The output from the project could not have been achieved without trans-national co-operation. Project partners are leaders in Europe in their particular expertise with reference to razor clams: IPIMAR – fisheries management of marine bivalve resources; environmental impacts of dredging. CIMA – razor-clam aquaculture; University of La Coruna – population genetics and cytogenetics of razor clams. BIM – is the state agency with primary responsibility for developing the seafish and aquaculture industries in Ireland**.**The partnership shared this expertise freely to ensure delivery of the project. The partnership also resulted in technology transfer in which CIMA facilitated the development of aquaculture techniques at C-Mar.

INNOVATIVE ASPECTS

(Cf. Application Form point 3.3)

The project will develop novel technology for the low-cost extensive cultivation of a burrowing and mobile bivalve mollusc. Current aquaculture techniques for molluscs have concentrated on cultivation of epibenthic bivalves such as oysters and mussels and shallow sessile burrowing bivalves such as Manilla clams (*Ruditapes semidecussata*). These techniques are not suited to the cultivation of a deep-burrowing bivalve and technological developments will also be required to establish the best methods of holding, transporting or processing this species to meet market demands.

Project partners include industry-related groups (development agencies), that will ensure technological information from the project is disseminated to end users through outreach programmes and publications.

Number of job creations **FORECAST** **7**	Number of job creations **ACHIEVED** **7**
Men **3** Women **4**	Men **3** Women **4**

PROJECT OBJECTIVES

(Cf. Application Form point 3.5 and 3.8)

Reminder of the objectives and of the main results **achieved**

In addition to coordination of the project,described above and in action co-ordination below, **SHARE objectives** were to:

1. Assess the impacts of razor clam fishing and strategies to mitigate against these impacts.
2. Develop understanding of the genetic diversity of razor clam stocks within and between different regions of the Atlantic Area.
3. Develop technical measures for seed production and ongrowing of two commercially important razor clam species (*Ensis siliqua* and *Ensis arcuatus*).
4. Develop improved strategies for handling, depuration, transport and marketing practices for razor clams produced within the Atlantic Area.
5. Collate new information and best practice to enable recommendations to be made towards the development of a sustainable management strategy for the exploitation of razor clams within the Atlantic Area that will:
    - minimise environmental impact
    - maximise potential for sustainable development
    - produce a high quality product for European and global markets.
    - safeguard employment in rural, coastal communities.

Main results achieved

1 Strategies to mitigate against impacts of razor-clam fishing

1.1 *Impacts of different harvest methods* : Different methods used for fishing razor clams were ranked according to the severity of their environmental impacts based on a multi-criteria analysis. Hand harvesting presents the lowest environmental impacts both in intertidal and subtidal areas. Within deeper subtidal areas, where diving is not possible, the use of more mechanized techniques or gears should take into consideration the balance between the economic value of the fishery and the local environmental sustainability. Mechanized harvesting methods may be suitable for highly hydrodynamic clean sandy areas, as communities from these areas are very resilient and recover quickly after physical disturbance. However, high-impact fishing gears should not be used in habitats known to be very diverse and sensitive to disturbance. Based on this information SHARE identifies the most appropriate techniques for fishing razor clams in different habitats.

1.2 *Impacts on target species* : A case study of impacts of fishing on target razor-clam species showed that razor clams along the southern Portuguese coast have been over-exploited for years. Management by daily quotas resulted in recovery of razor clams in the region between 1997 and 2005 when, due to poor enforcement, stocks started to decline again. Such studies show that sustainable management of razor clam resources is possible, particularly if it is supported by restocking with hatchery-produced seed.

2 Genetic diversity of razor clam stocks within the Atlantic Area

2.1 *Molecular markers*: Genetic diversity of razor clams from the genera *Ensis* and *Solen* from a number of populations from Portugal, Spain and the UK were investigated using: *Ribosomal region 5S rDNA*, mtDNA: 16S ribosomal RNA, cytochrome c oxidase subunit I (COI) and RAPDs. RAPDs and RFLPs of mtDNA were shown to be appropriate for the study of the genetic structure of different razor-clam populations.

2.2 *Genetic diversity*: Genetic variation was consistent with the life-history features of razor clams being high within but not between populations from different regions. Reduced polymorphism in Strangford Lough may be attributable to its isolation whereas in Setúbal and Olhão it may reflect a transient bottleneck arising from reduced population size due to heavy fishing pressure. The discovery of moderate genetic differentiation between the Galician and Portuguese populations and the high variation between these and the Irish populations of razor clams could play an important role in developing a management strategy for this marine resource. In particular, the information should be used before any aquaculture/restocking is started following the general principle that seed for restocking should be as genetically close as possible to the populations being re-stocked, such as those from Galicia and Portugal. Populations that are more genetically distinct, such as those from Strangford , should only use seed from local broodstock.

3 Cultivation technology for razor clams

3.1 *Broodstock conditioning*: Maturation can be achieved 1 to 2 months before the natural spawning season in the wild. The best time to start conditioning is at the beginning of gametogenic cycle. Conditioning in *Ensis siliqua* was achieved by increasing the water temperature to between 18-20 ºC. However, in *E. arcuatus* increasing water temperatures did not accelerate gonad development whereas diet did.

3.2 *Larval rearing*: During SHARE, CIMA developed a new method to induce spawning in *Ensis arcuatus*. This consisted of simulating a tidal cycle by changing water levels within holding tanks, with brief periods of emersion. The same method also proved successful for *E. siliqua* in the C-Mar laboratory in Northern Ireland whereas in the CIMA laboratory thermal shock was the only stimulus that induced spawning in *E. siliqua*. In both species, ripe individuals began to spawn 1-2 hours after the application of the induction stimulus. Larval rearing techniques have been developed for both species with better survival rates being observed in *Ensis siliqua*. Development to metamorphosis in *E. siliqua* was temperature dependent.

3.3 *Nursery systems*: In CIMA, postlarvae of both *Ensis siliqua* and *E. arcuatus* reached 1 mm in length one month after fertilization, whereas in C-Mar *E. siliqua* postlarvae took 45 days to grow to this length. After four months in the CIMA hatchery seed had reached a length of 25-30 mm, whereas in C-Mar seed (cultured at colder water temperatures) were roughly only 17 mm in length after the same time. It is recommended that postlarvae should be held in high densities in small containers, as the mass of individuals on top of each other reduces mortalities due to shell gaping .

3.4 *Intermediate cultivation*: Bivalve spat produced in a hatchery require a period of intermediate cultivation until they reach a size suitable for final growout. Intermediate cultivation trials on rafts showed very low survival due to the absence of substrate suggesting that this method is not technically realistic. Trials in cages embedded within the sediment proved excellent for intermediate cultivation of juvenile *Ensis*. However, growth and survival was variable and improvements of this technology are required. Consequently, although ongrowing in cages is technically feasible it is unlikely to be suitable for large scale culture of razor clam.

4 Handling, transport and marketing of razor clams produced within the Atlantic Area

4.1 *Quality*: A protocol for organoleptic trials has been devised although it was not possible to test this during the project.

4.2 *Markets and marketing*: The import value of the razor clam market within the EU is estimated to be € 550m. Key countries within this market are Spain, Italy, France, Portugal and the Netherlands. EU countries that supply the European market with different species of razor clams are Ireland, the United Kingdom, Portugal and The Netherlands. Outside the EU, Argentina is the primary exporter to the EU.

The biggest markets for razor clams outside the EU are in countries such as South Korea, China, Singapore and Hong Kong. To increase access to Asian markets, European exporters are considering diversifying produce by pasteurising and cooking the razor clams before export.

4.3 *Commercial handling and live transport*: In Europe razor clam catches are generally landed within a time frame no longer than 15 hours after capture. The clams are banded into 1 kg bundles on board fishing vessels and are left in a bin full of water for 2 to 3 hours to help clean the animals. After that the razors are removed and placed flat in boxes on the deck of the vessel. It is usual to have 24 bunches in a box and for the box to be covered. Catches are chilled to 1°C, transported to distribution centres, marketed and consumed within 8/9 days of capture.

METHODOLOGY

(Cf. Application Form point 3.5/3.7 and 3.5/3.6)

Description of the methodology, with the links between the objectives and actions.

Workplan and key tasks

Co-ordination of the project was the responsibilty of the lead partner (C-Mar, UK) in collaboration with other partners. Co-ordination included management of financial resources, dissemination of information and production of reports. Progress was monitored at partner meetings. The management structure used to achieve this is outlined in project steering section above.

Each partner organisation was responsible for one of the five project objectives listed below:

Objective No 1 : To assess the impacts of razor clam fishing and strategies to mitigate against these impacts. (IPIMAR, Portugal). This objective was addressed by investigating the impact of harvesting on the environment and associated species (**Action 1.1**) and the direct mortality related to the harvesting of target species (**Action 1.2**).

Action 1.1 investigated the impact of mechanical and manual harvesting on sediment, non-target species and juvenile razor clams and to identify protocols for the most efficient and least environmentally damaging harvesting methods.

Action 1.2 investigated the direct impact of dredging and manual harvesting on *Ensis siliqua*, *Ensis arcuatus*, *Solen marginatus* and other large macrofauna. Traditional harvesting techniques, using dredges, divers and salting will be assessed in terms of harvest efficiency (proportion of available catch retained), and impact on razor clams captured.

Objective No 2 : To develop an understanding of the genetic diversity of razor clam stocks within and between different regions of the Atlantic Area. (University of La Coruna, Spain). This objective was addressed by developing appropriate genetic markers (**Action 2.1**) and assessing genetic diversity within Atlantic Area stocks (**Action 2.2**).

Action 2.1 established nuclear and mitochondrial DNA markers (using RAPDs and RFLPs) for three species of razor clam (*Ensis arcuatus*, *Ensis siliqua* and *Solen marginatus*).

Action 2.2 used molecular markers developed in action 3.1 to investigate genetic diversity and possible gene flow among European Atlantic coast razor clams relevant to correct species labelling in the marketplace and stock management. The partners in each geographical area supplied tissue samples for genetic characterisation of local razor clams.

Objective No 3 : To develop technical measures for seed production and ongrowing of *Ensis siliqua* and *Ensis arcuatus* (CIMA, Spain & C-Mar, UK) . This objective aimed to assess the potential for commercial cultivation and/or stock enhancement of razor clams from hatchery to marketable size. It was addressed by four actions : broodstock conditioning (**Action 3.1**), larval rearing (**Action 3.2**), nursery cultivation (**Action 3.3**) and intermediate cultivation (**Action 3.4**).

Action 3.1 established optimal holding and feeding methods to accelerate gonad development (conditioning) in adult razor clams used as broodstock.

Action 3.2 investigated a range of cultivation techniques, temperatures, diets, salinities and grading regimes to optimise culture conditions to maximise growth and survival in larval culture.

Action 3.3 investigated techniques for on-growing razor clam from newly settled "spat" firstly through to a size at which they may be transferred to a nursery system and then to a size at which they may be transferred into intermediate culture. Temperature, flow rate and dietary regimes were investigated.

Action 3.4 investigated systems whereby small "seed" are held in intermediate culture for a period of time until they are large enough to be transferred to a final grow-out system or for restocking wild fisheries.

Objective No 4 : To improve handling, depuration, transport and marketing practices for razor clams produced within the Atlantic Area (BIM, Ireland). This objective aimed to establish methods and best practice in maintaining quality during processing, handling and marketing of razor clams. It was addressed by 3 actions : developing a quality index for razor clams (**Action 4.1**) reviewing potential for product development (**Action 4.2**) and developing a protocol of best practice for live transport of razor clams to market (**Action 4.3**).

Action 4.1 developed a post-harvest protocol for organoleptic and microbiological test for measuring and transmitting information on the quality of razor clams.

Action 4.2 undertook a desk study of potential markets for different species of razor clam and for razor clam products, including seasonal variations in market demands.

Action 4.3 developed a protocol for best practice for live transport of razor clams to market using information developed in actions 1.2 and 4.1.

Objective No 5 : To collate new information and best practice to enable recommendations to be made towards the development of a sustainable management strategy for the exploitation of razor clams within the Atlantic Area. This objective aimed use information gained through objectives 1-4 above to recommend methods of razor-clam exploitation and aquaculture that minimise environmental impact, maximise the potential for sustainable development, produce a high quality product for European and global markets and safeguard employment in rural, coastal communities.

ACTIONS CONDUCTED: Co-ordination

(Cf. Application Form point 3.7 and 3.5)

Action	NATURE OF THE ACTION
Co-ordination	Project management

Expected results (according to the Application Form)

Co-ordination (Task 1 in the application) covers management of the project including financial resources, dissemination of information and progress monitoring. This action is essential to ensure that the study progresses as indicated in the proposal. The proposed management structure to achieve this is outlined in Section 8 of the application (Co-ordination of Actions).
This section outlines the organisational, management structure and communication strategies for the SHARE project. Overall project management will be undertaken by Queen's University, Belfast (QUB), Centre for Marine Resources and Mariculture (C-Mar). QUB have considerable experience of managing EU contracts and C-Mar have been involved in four previous EU funded projects and managed over 30 regionally funded projects.
Based on this experience and to ensure effective control, the project will be broken down into five specific **tasks**. Overall responsibility for project co-ordination will lie with the **project manager**, appointed by and reporting to the **co-ordinator**. A **project steering committee** consisting of the lead representative from each partner will be established to assist the project manager with co-ordination between actions. Leaders will be identified for each task (**Task Leaders**). Task leaders will usually be partners who have a significant input into the task and have sufficient resources to undertake the role. Progress will be monitored and reviewed in relation to the deliverables and milestones indicated in the project schedule. These have been set as achievable objectives in the light of current knowledge. Task leaders will report to the project manager and steering committee at biannual meetings. Formal reporting to the contractor (Interreg IIIB Managing Authority) will take place using this mechanism.

Describe the way in which the action was implemented

Co-ordination was achieved through the project steering structure outlined above. Co-ordination was implemented as outlined below and involved partner meetings and communication as outlined above in the SCHEDULE OF MEETINGS AND ACTIVITIES OF THE STEERING STRUCTURES above.

Partners involved in implementing the action

Partner name	Country	Role in implementing the action	Place(s) implemented
Lead partner (1): Queen's University Belfast, C-Mar	UK	Preparing agendas and minutes. Reporting to steering committee; co-ordinating partnership meetings; organising & hosting regional meeting(s); co-ordinating regional and consolidated budgets & reports.	Northern Ireland; Portugal; Ireland; Spain;
Partner 2: Instituto Nacional De Investigação Agrária E Das Pescas/Ipimar	PT	Reporting to steering committee; organising and hosting regional meeting(s); co-ordinating regional budgets and reports; contributing to consolidated budgets and reports.	Portaferry, Northern Ireland; Olhão, Portugal; Dublin, Ireland; Ribadeo, Spain; Belfast, Northern Ireland; Lisboã, Portugal.
Partner 3: Consellería de Pesca, Marisqueo e Acuicultura de la Xunta de Galicia (CIMA)	ESP		
Partner 4: Universidade da Coruña (UDC)	ESP		
Partner 5: Bord Iascaigh Mhara (BIM)	IRL		

Description of the results **achieved**

Partnership Meetings; Records of meetings (minutes); Final detailed report (available as PDF); **the present review report**.

Key dates of the action

Coordination milestone dates were delayed approximately six months after those indicated in application

Actions	Partners	2004			2005				2006				2007			
		Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Coordination	1															
Finances	All															
Meetings	All															
Reports	All															
Dissemination	All															
Evaluation	All															

Justification of any discrepancies between the action as planned and as implemented, if any

None

Total cost of the action (in Euros) including VAT 237393; Preparation cost 2803.12

ACTIONS CONDUCTED: Strategies to mitigate against environmental impacts of razor clam fisheries: impacts of different harvest methods

(Cf. Application Form point 3.7 and 3.5)

Action	**NATURE OF THE ACTION**
1.1	Impacts of different harvest methods

Expected results (according to the Application Form)

Successful implementation of the project will result in: An assessment of the impacts of razor clam fishing and strategies to mitigate against them.
Action 1.1 (Action 3 in application) will establish changes to the substrate and water column relating to harvest activity. Mechanical harvesting may result in significant environmental change, while manual harvesting may cause fewer changes. This action will consider physical changes related to both mechanical and manual harvesting techniques in surface sediments, interstitial water and near bottom water samples. Samples will be taken with automated samplers and by diver, both before and after harvesting, and at control sites where no harvesting activity occurs.

Describe the way in which the action was implemented

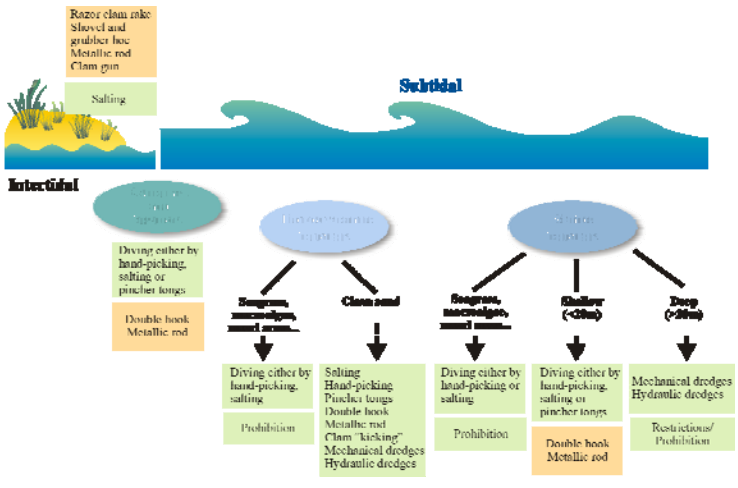
The main methods used in bivalve fishing worldwide were reviewed in terms of their impacts on the sediment, water column, associated biological communities and on target species. Few studies concerned razor clam fishing. Moreover, scientific knowledge concerning adverse environmental effects varied considerably among gears/fishing techniques. For example, dredges and hydraulic dredges are relatively well studied whereas no information is available for clam "kicking" and "gancho". To evaluate the main effects caused by different techniques and gears, a multi-criteria analysis, based on either published data or the knowledge of experts, was carried out. For this purpose, five researchers were convened to rate habitat impact, by-catch and target species damage for each of the thirteen fishing techniques used in razor-clam fisheries. Habitat impacts were categorized into two types: (1) effects on physical structures (e.g., boulders, cobbles, gravel, mud, or sand seafloor), and (2) effects on associated biotic communities; by-catch was considered as a whole, that is, it was not divided into different categories; impacts on target species were categorized into two groups: above and below the Minimum Landing Size (MLS). Impacts due to recreational fishing were not considered. Based on the information gathered from the literature review, the expert judgment of the five researchers and discussions between them, the effects of each fishing technique were rated. Each category was analysed separately and a qualitative classification was given to each one of the techniques or gear, impacts were rated as *high*, *moderate*, *low* or *negligible*. By-catch classification was similar, but without the class *negligible*.

Partners involved in implementing the action

Partner name	Country	Role in implementing the action	Place(s) implemented
Partner 2: Instituto Nacional De Investigação Agrária E Das Pescas/Ipimar	PT	Action leader	Southern Portugal.

Description of the results **achieved**

Most fishing methods were considered to have negligible or low physical and biological impacts on associated communities. Only clam "kicking", razor clam dredges and hydraulic dredges (the only two mechanized methods) were found to have moderate to high impacts on biotic communities. Rudimentary tools (e.g. shovels, grubber hoes and clam guns) were also considered to have moderate physical impacts, as they involve sediment disturbance which may additionally release nutrients. In terms of by-catch, highly selective methods affecting only the target species, were considered to have low impact; methods where the target organisms are located by eye but where sediment is disturbed were considered to have moderate impact; methods which are not exclusively directed to the target species were considered to have high impacts. Recommended fishing techniques for razor clams that minimise impacts in different habitats are illustrated in the schematic below.



Key dates of the action

Milestone dates were delayed approximately six months after those indicated in application

Actions	Partner	2004			2005				2006				2007			
		Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Harvest methods	2															

Justification of any discrepancies between the action as planned and as implemented, if any

N/A

Total cost of the action (in Euros) including VAT 67707

ACTIONS CONDUCTED: Strategies to mitigate against environmental impacts of razor clam fisheries: impact on target species

(Cf. Application Form point 3.7 and 3.5)

Action	**NATURE OF THE ACTION**
1.2	Impacts on target species

Expected results (according to the Application Form)

Successful implementation of the project will result in: An assessment of the impacts of razor clam fishing and strategies to mitigate against them.
Action 1.2 (Action 4 in application) will establish the direct impact of dredging and manual harvesting on *Ensis siliqua, Ensis arcuatus, Solen marginatus* and other large macrofauna. Traditional harvesting techniques, using dredges, divers and salting will be assessed in terms of harvest efficiency (proportion of available catch retained), and impact on razor clams captured. Recommendations will be produced with regard to the most suitable techniques for harvest of cultured razor clams.

Describe the way in which the action was implemented

A case study of fishing impacts on razor-clam stocks was carried out in the southern Portuguese coast in 2006. Over 500 samples were collected from over 250 stations in a structured survey between 3 and 25m depth during the SHARE project. Samples were collected using commercial fishing dredges. Samples were used to estimate the yields and population structure of exploited stocks. Survey data were compared with historical data during SHARE.

Although the environmental effects resulting from mechanized methods of harvesting razor clams have been described by several authors, the impacts caused by traditional hand harvesting methods remain unknown. Therefore, a study was undertaken during SHARE in Ria Formosa Lagoon (South of Portugal) addressing the environmental effects resulting from harvesting *Solen marginatus* with salt.

Partners involved in implementing the action

Partner name	Country	Role in implementing the action	Place(s) implemented
Partner 2: Instituto Nacional De Investigação Agrária E Das Pescas/Ipimar	PT	Action leader	Southern Portugal.

Description of the results **achieved**

Razor clam stock along the southern Portuguese coast collapsed in 1997. Fishing effort was restricted by implementing a daily quota of 50kg per boat in the fishery. Quotas are revised annually based on stock assessments undertaken by IPIMAR. The enforcement of this measure proved to be successful and razor-clam beds began to recover during 1998 although abundance never attained the values observed in 1996. The positive trend in terms of abundance was observed until 2005, when abundance declined again. because fishing control was ineffective and recommended daily qotas were exceeeded.

The present study did not reveal significant disturbance resulting from salt fishery. The main effect was the increase of salinity after covering the area with salt, which starts to decrease with the flood tide and after a few hours salinity presented pre-harvesting levels. In the present study, no effects on benthic communities were observed, since similar fluctuation patterns were recorded in control and experimental areas. Thus, observed differences seem to result from natural variability of benthic populations. Salt fishing in intertidal and subtidal areas does not appear to have negative consequences for target species ; by contrast mechanical methods, including those using hand tools, are wasteful because they damage target species.

Key dates of the action

Milestone dates were delayed approximately six months after those indicated in application

Actions	**Partner**	**2004**			**2005**				**2006**				**2007**			
		Q2	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Mortality assessment	2															

Justification of any discrepancies between the action as planned and as implemented, if any

N/A

Total cost of the action (in Euros) including VAT 67707

ACTIONS CONDUCTED: Genetic diversity of razor-clam stocks in the Atlantic Area: development of molecular markers

(Cf. Application Form point 3.7 and 3.5)

Action	NATURE OF THE ACTION
2.1	**Development of molecular markers**

Expected results (according to the Application Form)

An understanding of the genetic diversity of razor clam stocks within and between different regions of the Atlantic Area.

- Genetic markers for three species of razor clam for use in assessing population/stock genetics

Action 2.1 (Action 9 in application) will establish genetic markers for the two target species (*Ensis arcuatus* and *Ensis siliqua*) and a further related razor clam species (*Solen marginatus*). The partners in each geographical area will supply tissue samples for genetic characterisation of local razor clams. Molecular markers will be developed for each species of razor clam using nuclear and mitochondrial DNA. Markers used will be RAPDs and RFLPs.

Describe the way in which the action was implemented

Molecular markers can be used to address questions relating to the sustainable management of exploited aquatic species. Genetic markers can be categorized based on their transmission and evolutionary dynamics. Nuclear markers such as allozymes, randomly amplified polymorphic DNA (RAPDs), and microsatellites (amongst others) are bi-parentally inherited. Mitochondrial DNA (mtDNA) markers are mainly maternally inherited and non-recombining. Different molecular markers were investigated as no one marker type is appropriate for all applications. Nuclear molecular markers (RAPDs) and mitochondrial markers (mtDNA) were developed in this action. The ribosomal rDNA 5S region was also searched for species-specific markers.

Partners involved in implementing the action

Partner name	Country	Role in implementing the action	Place(s) implemented
Partner 4: Universidade da Coruña (UDC)	ESP	Lead delivery of this action	La Coruña

Description of the results **achieved**

In addition, PCR protocols for nuclear and mitochondrial regions were improved and a high number of clones corresponding to the rDNA 5S and mitochondrial regions have been sequenced. The use of RAPDs and RFLPs of mtDNA were shown to be appropriate for the study of the genetic structure of different *E. siliqua* populations. These were applied in Action 2.2.

Key dates of the action

Milestone dates were delayed approximately six months after those indicated in application

Actions	Partner	2004			2005				2006				2007			
		Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Marker development	4															

Justification of any discrepancies between the action as planned and as implemented, if any

N/A

Total cost of the action (in Euros) including VAT 190103

ACTIONS CONDUCTED: Genetic diversity of razor-clam stocks in the Atlantic Area: assessment of genetic diversity

(Cf. Application Form point 3.7 and 3.5)

Action	NATURE OF THE ACTION
2.2	**Assessment of Genetic Diversity Within and Between Atlantic Area stocks**

Expected results (according to the Application Form)

An understanding of the genetic diversity of razor clam stocks within and between different regions of the Atlantic Area.

- Genetic diversity of European Atlantic coast razor clams relevant to correct speciies identification for the marketplace

Action 2.2 (Action 10 in application) will study variability in different Atlantic Area populations and possible gene flow among them using molecular markers developed in action 2.1. This work will also investigate differences between individuals and populations to evaluate potential for utilisation as parental stocks. This information will allow accurate speciation for razor clam shellfish placed on the market.

Describe the way in which the action was implemented

This action focused on determining the genetic composition of different populations of razor clams. Knowledge regarding the genetic composition of a particular stock or population is important for the management of bivalve fisheries. Several questions were addressed: Is the bivalve species being exploited made up of a single panmictic population, or is it composed of several genetically differentiated populations or stocks? Does genetic exchange (genetic flow) occurs between populations? Live samples of razor clams were collected from different localities in Spain, Portugal and Ireland. A piece of foot from each individual was stored in 95% ethanol for subsequent DNA extraction and amplification. Population samples were compared using a combination of nuclear and mitochondrial markers developed in Action 2.1.

Partners involved in implementing the action

Partner name	Country	Role in implementing the action	Place(s) implemented
Partner 4: Universidade da Coruña (UDC)	ESP	Lead delivery of this action	La Coruña
Queen's University Belfast, C-Mar	UK	Sample collection	UK, Ireland
Partner 2: Ipimar	PT	Sample collection	Portugal
Partner 3: CIMA	ESP	Sample collection	Galicia

Description of the results **achieved**

The use of RAPDs and RFLPs of mtDNA were shown to be appropriate for the study of the genetic structure of different *E. siliqua* populations. The results from this SHARE action are consistent with the life-history features of the razor clam *E. siliqua* with a prolonged larval pelagic life span (12-15 days), which suggest a great potential for genetic homogenization over large geographical distances. However, genetic differentiation between Galician and Portuguese populations was moderate and although there was high variation between these and Irish populations the effect of geographic distance on genetic variation overall was moderate. Such information is essential for the development of appropriate management strategies that may involve restocking of this important marine resource. Further investigations are necessary to test the hypothesis that, from the genetic perspective, the management of the *E. siliqua* fishery can be independent of geographic distances.

Key dates of the action

Milestone dates were delayed approximately six months after those indicated in application

Actions	Partner	2004			2005				2006				2007			
		Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Assessment of genetic diversity	4															

Justification of any discrepancies between the action as planned and as implemented, if any

N/A

Total cost of the action (in Euros) including VAT 221375

ACTIONS CONDUCTED: Development of Cultivation Technology for Razor Clams: broodstock conditioning

(Cf. Application Form point 3.7 and 3.5)

Action	NATURE OF THE ACTION
3.1	**Broodstock conditioning**

Expected results (according to the Application Form)

Development of cultivation technology for razor clams was designed to assess the potential for commercial cultivation and/or stock enhancement of two species of razor clam from hatchery to marketable size.
Action 3.1(Action 5 in application) will establish methods to hold and condition adult razor clams that will be used as broodstock. Preliminary cultivation trials in Europe and America have utilised broodstock that has been taken from the wild when it is ready to spawn. However, techniques to condition razor clams within a hatchery are essential if seed are to be supplied for on-growing at times that optimise production cycles, rather than being restricted to production cycles linked to the condition of adults in the wild.

Describe the way in which the action was implemented

Ensis arcuatus and *Ensis siliqua* broodstock were collected from natural beds in Galicia and Northern Ireland by SCUBA diving. Both species were conditioned under 2 temperature regimes in the and *E. siliqua* was conditioned under different feeding conditions at the CIMA laboratory; gonad maturation was monitored gravimetrically and histologically. In the C-Mar laboratory, survival of *E. siliqua* held in sand (to mimic natural conditions) or suspended from glass rods (to reduce contamination) was monitored.

Partners involved in implementing the action

Partner name	Country	Role in implementing the action	Place(s) implemented
Partner 3: Consellería de Pesca, Marisqueo e Acuicultura de la Xunta de Galicia (CIMA)	ESP	Lead partner: Dietary and temperature manipulation experiments	CIMA, Ribadeo, Galicia, Spain
Queen's University Belfast, C-Mar	UK	Trials of different holding conditions	C-Mar, Portaferry, Northern Ireland

Description of the results **achieved**

Results obtained during the *Ensis arcuatus* temperature trial have important implications for hatchery conditioning. Raising the seawater temperature can bring most bivalves into spawning condition. However in *E. arcuatus* increasing seawater temperatures did not cause gonad development. This can be related to the behaviour of adult *Ensis arcuatus* in the wild, with gametogenesis beginning when seawater temperature decreases. The implications of these results are that the cost of heating the seawater in the hatchery during winter can be reduced as lower temperatures are favoured. The effect of increasing seawater temperatures on *E. siliqua* gonad development could not be ascertained due to parasitic infections in the broodstock resulting in high mortality. In dietary trials gonad condition index(GCI) in *E. siliqua* was higher in individuals fed a ration of 6% than in those fed a ration of 9% mean dry meat weight per day although both showed similar gametogenic development. This indicates that adults fed the 6% ration produced more gametes than those fed a 9% ration. Therefore excess feeding can lead to reduced GCI and is therefore wasteful. In holding trials, survival rates indicate that sand is the preferable holding system for broodstock razor clams due to the high mortality observed within the *Enisis siliqua* broodstock held in the plastic rod system (30% survival after 33 days compared with 85% survival within the sand system).

Key dates of the action

Milestone dates were delayed approximately six months after those indicated in application

Actions	Partner	2004			2005				2006				2007			
		Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Broodstock conditioning	3,1															

Justification of any discrepancies between the action as planned and as implemented, if any

N/A

Total cost of the action (in Euros) including VAT 168754

ACTIONS CONDUCTED: Development of Cultivation Technology for Razor Clams: larval rearing
(Cf. Application Form point 3.7 and 3.5)

Action	**NATURE OF THE ACTION**
3.2	**Larval Rearing**

Expected results (according to the Application Form)

Development of cultivation technology for razor clams was designed to assess the potential for commercial cultivation and/or stock enhancement of two species of razor clam from hatchery to marketable size.

Action 3.2 (Action 6 in application) will establish techniques for the production of razor clam larvae and on-growing to settlement. A range of cultivation techniques, temperatures, diets, salinities and grading regimes will be tested in order to optimise culture conditions to maximise growth and survival. Cultivation tanks will be designed to minimise maintenance and reduce the potential for microbial infections.

Describe the way in which the action was implemented

Experiments were conducted to induce spawning in *Ensis siliqua* and *E. arcuatus* using thermal, UV and simulated tidal conditions; gonads were also stripped. Larval rearing trials were conducted under different dietary and temperature regimes. A member of staff from C-Mar was trained in hatchery techniques at the CIMA laboratory (technology transfer).

Partners involved in implementing the action

Partner name	Country	Role in implementing the action	Place(s) implemented
Partner 3: (CIMA)	ESP	Study of effects of temperature and diet on conditioning.	CIMA, Ribadeo, Galicia, Spain
Queen's University Belfast, C-Mar	UK	Study of different systems for holding razor clams in hatcheries.	C-Mar, Portaferry, Northern Ireland

Description of the results **achieved**

Within this action a new method has been developed to induce spawning in *Ensis arcuatus*. This consists of simulating a tidal cycle by changing water levels within holding tanks, with brief periods of emersion. In the CIMA laboratory thermal shock was the only stimulus that induced spawning in *E. siliqua* whereas the method described above for *E. arcuatus* proved successful for this species in the C-Mar laboratory in Northern Ireland. In both species, ripe individuals begin to spawn 1-2 hours after the application of the induction stimulus. Larval rearing techniques have been developed for both species, with better survival rates being observed in *Ensis siliqua* (an average of 40%). At 18ºC larval development to metamorphosis in *E. arcuatus* took 20 days whilst for *E. siliqua* this process took only 14 days. At the lower water temperatures in the C-Mar hatchery (13-15ºC) larval development to metamorphosis in *E. siliqua* took approximately 21 days.

Key dates of the action

Milestone dates were delayed approximately six months after those indicated in application

Actions	**Partner**	**2004**			**2005**				**2006**				**2007**			
		Q2	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Larval rearing	3,1															

Justification of any discrepancies between the action as planned and as implemented, if any

N/A

Total cost of the action (in Euros) including VAT 162544

ACTIONS CONDUCTED: Development of Cultivation Technology for Razor Clams: nursery systems

(Cf. Application Form point 3.7 and 3.5)

Action	NATURE OF THE ACTION
3.3	**Nursery Systems**

Expected results (according to the Application Form)

Action 3.3 (Action 7 in application) will establish techniques to on-grow each species of razor clam from newly settled "spat" firstly through to a size at which they may be transferred to a nursery system and then to a size at which they may be taken to an on-growing site.
The best techniques for holding spat vary with species, but usually involve up-welling or down-welling systems, where the spat are held in mesh lined baskets and seawater, enriched with algae is passed over them. Systems will be designed to meet the requirements of each species of razor clam. Temperature, flow rate and dietary regimes will be established to maximise growth and survival.

Describe the way in which the action was implemented

Experimental culture of postlarvae of *Ensis arcuatus* and *E. siliqua* were carried out under different holding conditions (with and without sediment) at the CIMA laboratory and underdifferent dietary conditions at the C-Mar laboratory.

Partners involved in implementing the action

Partner name	Country	Role in implementing the action	Place(s) implemented
Partner 3: (CIMA)	ESP	Action leader: Studies of growth and survival of post-larval razor clams in experimental nursery holding conditions.	CIMA, Ribadeo, Galicia, Spain
Queen's University Belfast, C-Mar	UK	Studies of growth and survival of post-larval razor clams in experimental nursery conditions using different diets.	C-Mar, Portaferry, Northern Ireland

Description of the results **achieved**

In CIMA postlarvae of both species reached 1 mm in length one month post fertilization, whereas in C-Mar *Ensis siliqua* postlarvae took 45 days to grow to this length. After four months seed reared in the CIMA hatchery reached a length of 25-30 mm, whereas in C-Mar seed (cultured at colder water temperatures) were roughly 20mm long. During nursery culture the provision of a suitable substrate is essential to allow burrowing and prevent shell gaping (and hence death). However, for large-scale seed production it is important to try to reduce the volume of sand used or if possible to avoid the use of substrates. Postlarvae should be held in high densities in small containers, as the weight of individuals on top of each other can have similar effects as if reared within a substrate and help prevent shell gaping. Although seed fed a mixed microalgal diet showed better growth initiallly than seed fed a single species diet no significant difference in length was observed after 12 weeks.

Ensis arcuatus postlarva one month after fertilization.

Key dates of the action

Milestone dates were delayed approximately six months after those indicated in application

Actions	Partner	2004			2005				2006				2007			
		Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Nursery techniques	3,1															

Justification of any discrepancies between the action as planned and as implemented, if any

N/A

Total cost of the action (in Euros) including VAT 174965

ACTIONS CONDUCTED Development of Cultivation Technology for Razor Clams: intermediate cultivation

(Cf. Application Form point 3.7 and 3.5)

Action	**NATURE OF THE ACTION**
3.4	**Intermediate Cultivation**

Expected results (according to the Application Form)

- Systems for holding juvenile razor clams in the open sea
- The size at which each species requires sediment to prevent shell gaping and must, therefore, be transferred to sediment
- Optimum on-growing methods (growth and survival)
- Time from re-seeding to production of marketable animal (re-seeding of part grown wild stock will be undertaken to allow complete growth curves for each species to be produced)

Action 3.4 (Action 8 in application) will determine optimum techniques for reseeding suitable sites with juvenile razor clams produced in a hatchery. For economic reasons, bivalve spat are often purchased from hatcheries at a size at which they are too small to go into the final on-growing or "grow-out" system. These small "seed" are held in intermediate culture systems for a period of time until they are large enough to go into a grow-out system or for restocking wild fisheries. The project will establish whether it is feasible to reduce seed costs to the producer by establishing intermediate culture systems for razor clams.

Describe the way in which the action was implemented

Intermediate cultivation trial were conducted by the CIMA laboratory in collaboration with a local shellfishermen's association. Experiments involved growth and survival trials in holding systems above natural Sediments, in cages embedded within the sediment and in suspended cultivation on rafts.

Partners involved in implementing the action

Partner name	Country	Role in implementing the action	Place(s) implemented
Partner 3: Consellería de Pesca, Marisqueo e Acuicultura de la Xunta de Galicia (CIMA)	ESP	Lead delivery of this action.	Ría of Aldán (NW Spain).

Description of the results **achieved**

In this trial only 2 out of 8 experimental containers survived. Growth in both containers was moderate with the razor clams growing 1 mm within a period of 15 days and survival was high (80 - 94%). However conclusive conclusions cannot be drawn from these trials because of the removal of replicates and the short experimental duration.

Cages embedded within the sediment represent an excellent intermediate cultivation system allowing further study of growth in juvenile *Ensis arcuatus*. Although performance was not as good as has been recorded in other, similar studies which reported growth to market size in one year and high survival (60%). Consequently, this system is unsuitable for large scale culture in these species of razor clam.

The raft system investigated has been tested successfully for intermediate cultivation and growout of different species of clams. However, in this action *E. arcuatus* showed poor growth and survival. These results can be explained due to absence of substrate in the bags and also due to the fact that the razor clams siphons could not reach the outside of the bags to enable them to feed. Further investigations on this stage in the culture process are imperative to enable the development of appropriate systems for on-growing razor clams which minimise time taken to reach commercial size whilst maximising survival rates.

Key dates of the action

Milestone dates were delayed approximately six months after those indicated in application

Actions	**Partner**	**2004**			**2005**				**2006**				**2007**			
		Q2	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Intermediate cultivation	3															

Justification of any discrepancies between the action as planned and as implemented, if any

N/A

Total cost of the action (in Euros) including VAT 49684

ACTIONS CONDUCTED Improvement of handling, transport and marketing of razor clams: developing a quality index for razor clams

(Cf. Application Form point 3.7 and 3.5)

Action	**NATURE OF THE ACTION:**
4.1	**Developing a quality index for razor clams**

Expected results (according to the Application Form)

Action 4.1 (Action 11 in application) will establish a quality key for each razor clam species. Organoleptic assessment by an expert panel will link microbiological results with taste, texture and appearance. It is not known whether different species of razor clam spoil at the same rate or demonstrate the same physical and physiological characteristics during storage. A quality assessment scoring scheme for both live and cooked animals harvested and stored using the best conditions determined to date (non mechanical harvesting and banded, wrapped and chilled) will be established.

Describe the way in which the action was implemented

Desk study; development of organoleptic sensory score sheet for razor clams.

Partners involved in implementing the action

Partner name	Country	Role in implementing the action	Place(s) implemented
Partner 5: Bord Iascaigh Mhara (BIM)	IRL	Lead delivery of this action.	Dublin

Description of the results **achieved**

A protocol for organoleptic trials has been devised. This consisted of a 1 (poor) to 5 (good) point scale aimed to assess six quality criteria: 1) raw odour ; 2) raw appearance; 3) cooked odour ; 4) cooked appearance ; 5) cooked flavour ; 6) cooked texture.

Key dates of the action

Actions	**Partner**	**2004**			**2005**				**2006**				**2007**			
		Q2	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Developing a quality index	5															

Justification of any discrepancies between the action as planned and as implemented, if any

Although a protocol for organoleptic trials was developed (see Appendix 2.5.3, full report)it was not possible to complete the experimental part of this Action because the decline in razor-clam dredging activities by the Irish fishing fleet, during the period of the study. This meant that a regular supply of freshly-dredged material could not be guaranteed. This was essential before investing in fairly complex depuration and organoleptic trials using dredged razor clams. However, previous trials have indicated that although it is possible to depurate razor clams within standard depuration systems, results are highly variable and depuration inconsistent and the need for further research remains.

Total cost of the action (in Euros) including VAT 11925

ACTIONS CONDUCTED Improvement of handling, transport and marketing of razor clams: market survey and potential for product development

(Cf. Application Form point 3.7 and 3.5)

Action	**NATURE OF THE ACTION:**
4.2	**Market survey and potential for product development**

Expected results (according to the Application Form)

Action 4.2 (Action 12 in application) will establish the extent of existing markets and the potential for developing new markets based on value-added and processed products. These latter products extend the market and may reduce waste by utilising damaged animals that are not acceptable to the live market. A desk-top study of potential markets for each species of razor clam and for razor clam products, including seasonal variations in market demands, will be carried out.

Describe the way in which the action was implemented

Desk study.

Partners involved in implementing the action

Partner name	Country	Role in implementing the action	Place(s) implemented
Partner 5: Bord Iascaigh Mhara (BIM)	IRL	Lead delivery of this action.	Dublin

Description of the results **achieved**

Razor clam markets and marketing strategies were reviewed in SHARE. The import value of the razor clam market within the EU is estimated to be € 550m. The key countries within this market are Spain, Italy, France, Portugal and the Netherlands. The two types of razor clams that European investors are interested in are *Ensis siliqua* and *Ensis ensis*. Some of the EU countries that supply the European market with *Ensis siliqua* are Ireland, the United Kingdom, Portugal and The Netherlands. Outside the EU, Argentina is the primary exporter to the EU. The biggest market for razor clams outside the EU is the Asian market, including countries such as South Korea, China, Singapore and Hong Kong. The Asian market prefers shellfish from Class A waters, where the product can be eaten straight from the water with no purification required. To get around the harvesting demands of the Asian market, European exporters are considering diversifying produce by pasteurising and cooking the razor clams before export, removing the necessity of harvesting razors from Class A waters only.

Information booklet: *European market for razor clams* (*Ensis ensis* and *Ensis siliqua*) BIM Market development Division 2005. 30pp

Key dates of the action

Actions	**Partner**	**2004**			**2005**				**2006**				**2007**			
		Q2	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Market survey	5															

Justification of any discrepancies between the action as planned and as implemented, if any

N/A

Total cost of the action (in Euros) including VAT 47700

ACTIONS CONDUCTED Improvement of handling, transport and marketing of razor clams: developing protocol for best practice for live transport of razor clams to market

(Cf. Application Form point 3.7 and 3.5)

Action	**NATURE OF THE ACTION:**
4.3	**Developing protocol for best practice for live transport of razor clams to market**

Expected results (according to the Application Form)

Action 4.3 (Action 13 in application) will utilise the key developed in Action 4.1 linked with results from Action 1.1 to establish how quality may be affected by harvesting technique.

Razor clams harvested by mechanical and manual harvesting methods will be compared to establish condition post-harvest. Where depuration (purification) is not required, the potential to store these animals live in seawater tanks, prior to marketing will be assessed. Temperature, salinity and flow rates will be varied to establish the optimum holding conditions. Algal food will not be supplied (this would not be available in a commercial holding system) and survival period for starved animals will also, therefore, be assessed. Survival and quality will be measured at intervals while the animals survive and links between harvesting technique and survival within holding systems prior to transportation will be established.

Once sufficient stock are collected in a commercial holding system they are transported to market. Action 13 will also compare dry transport techniques (chilled, iced etc.) with regard to survival and quality to market and shelf life post arrival at the market. Simulated travel times to European and world-wide markets may be utilised.

Describe the way in which the action was implemented

Desk study; transport simulation trials in which mortalities were noted over time under standard commercial handling protocols. Simulation trials were conducted in Ireland; experimental razor clams used in these trials were harvested by commercial fishermen using Hydraulic Jet Dredges and were not required to undergo depuration because they were obtained from Class A waters. Five trials were conducted.

Partners involved in implementing the action

Partner name	Country	Role in implementing the action	Place(s) implemented
Partner 5: Bord Iascaigh Mhara (BIM)	IRL	Lead delivery of this action.	Dublin

Description of the results **achieved**

Commercial handling protocols are generally similar throughout Europe. Razor clam catches are generally landed within a time frame no longer than 15 hours after capture. The clams are banded on board into 1 kg bundles and are left in a bin full of water for 2 to 3 hours to help clean the animals. After that the razors are removed and placed flat in boxes on the deck of the vessel. It is usual to have 24 bunches in a box and for the box to be covered. Catches are chilled to 1°C, transported to distribution centres ; transit times range from 2-3 days and clams are marketed and consumed within 8/9 days of capture. In transport simulation trials, mortalities ranged from 5-18%. Mortalities in commercial operations range between 2 and 70%. These variations are attributable to seasonal factors such as elevated summer temperatures which indicates the need to follow recommended protocol strictly.
Based on research undertaken during SHARE, a protocol for the live transport was developed (see Appendix 2.5.2, full report).

Key dates of the action

Actions	**Partner**	**2004**			**2005**				**2006**				**2007**			
		Q2	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Transport to market	5															

Justification of any discrepancies between the action as planned and as implemented, if any

N/A

Total cost of the action (in Euros) including VAT 11925

INFORMATION AND COMMUNICATION

(Cf. Application Form point 10 and 3.9)

REMINDER OF THE COMMUNICATION PLAN

(Objectives, review and results)

OBJECTIVES

Methods for Disseminating the Results of the Project (1 in the application)

The project partners are committed to dissemination of information to encourage, support and promote the development of a sustainable strategy for razor clam exploitation in Europe.

Dissemination strategies will include:

Open Meetings and Industry Workshops

From year two onwards, co-ordination meetings will include an open workshop session where interested parties (aquaculture/fishing industry SMEs, scientists and development agencies) can attend presentations from project partners outlining the project's progress and preliminary findings.

Web Site

An interactive web site will be established to provide information on the project and to provide on-line copies of technical leaflets outlining protocols for hatchery rearing and on-growing of razor clams. It will be possible to make on-line queries to the project partners directly via the web site.

Summary Reports

Summary reports on project progress will be made available through the web site and through relevant industry publications (e.g. Fish Farming International, Fish Farmer).

Technical Leaflets

On completion of the project, partners will undertake to produce technical leaflets, manuals and videos on techniques for hatchery production, ongrowing, quality control and marketing of razor clams.

Scientific Papers

Scientific data, which underpin industrial development, will be published through scientific journals (e.g. Aquaculture, Journal of Shellfish Research, Aquaculture International, Marine Biology).

Presentation of papers and posters at conferences

Project partners will be encouraged to attend conferences to present data from the project. Suitable conferences may include international conferences (e.g. European Aquaculture Society Conference), national conferences, and specialist workshops (e.g. UAL Workshop on New Species for Aquaculture, C-Mar Aquaculture Workshop).

REVIEW

Web Site

The web site established as part of the SHARE project www.razorclam.eu was updated through the duration of the project. This website will be subsumed into the website of the lead partner over the coming months. This will ensure longer public access to the information generated through INTERREG Atlantic Area and advertise INTERREG's role.

Summary Reports

Summary reports on project progress were made available through the web site and through relevant industry publications (e.g. Fish Farming International, Fish Farmer).

Technical Leaflets

Partners generated the following technical protocols and information leaflets: A] Recommended fishing techniques for razor clams in different habitats ; B] Technical Razor Clam Production Series for Aquaculture : 1) *Broodstock Conditioning*, 2) *Hatchery Rearing*, 3) *Nursery Rearing*, 4) *Intermediate Culture* ; C] Protocol for live transport of razor clams to market ; Sensory score sheet for razor shellfish. These address Objective No 5 : To collate new information and best practice to enable recommendations to be made towards the development of a sustainable management strategy for the exploitation of razor clams within the Atlantic Area.

Scientific Papers

Scientific data is essential to inform sustainable commercial development in the fishing and aquaculture sectors. Publication in peer-reviewed journals demonstrates the scientific merit of the work to both the authors and sponsors ; the standing (quality) of the work is reflected in the impact factor. Scientific sections in the full SHARE report (available in PDF) were developed into papers targetted at the most appropriate journals with high impact factors. These are listed below.

Presentation of papers and posters at conferences

Aspects of work undertaken during SHARE have been presented orally or as posters at several European conferences (see below for details). A wide range of stakeholder interests (Research scientists, fishers and aquaculture producers, government agencies and NGOs) were represented at these meetings and audiences ranged from 70 to more than 400 people.

DISSEMINATION RESULTS ARE LISTED IN THE INTERREG PROFORMA BELOW

COMMUNICATION ACTIONS IMPLEMENTED			
Type of communication action conducted	**Description**		**Total cost of the action in Euros including VAT**
WEBSITE	Domain	www.razorclam.eu	
	Compliance with publicity standards (logo, EU flag...) (YES/NO)	YES	
	Date created	Created and updated during SHARE. To be subsumed into the Queen's University web site by the end of 2009.	
	Languages (ENG, SP, FR, PT)	ENG	
	Intranet (YES/NO)	NO	
	Number of visits to date	Hit logger not established	
WEBSITE	Domain	http://www.cripsul.ipimar.pt/projectos/projecto.php?id=25	
	Compliance with publicity standards (logo, EU flag...) (YES/NO)	YES	
	Date created	Created and updated during SHARE.	
	Languages (ENG, SP, FR, PT)	ENG/PT	
	Intranet (YES/NO)	NO	
	Number of visits to date	Hit logger not established	
LEAFLETS	Number of copies circulated	NONE	
	Languages (ENG, SP, FR, PT)	ENG	
	Compliance with publicity standards (logo, EU flag...) (YES/NO)		
	Downloadable (YES/NO)		
	Date published		
BOOKLETS	Number of copies circulated		
	Title	*European market for razor clams* (*Ensis ensis* and *Ensis siliqua*) BIM Market development Division 2005. 30pp	
	Languages (ENG, SP, FR, PT)	ENG	
	Compliance with publicity standards (logo, EU flag...) (YES/NO)	INTERREG acknowledged	
	Downloadable (YES/NO)	YES	
	Date published	2006	
Chapters in BOOKS	Number of copies circulated		
	Title	Gaspar M. et al. Impactos medioambientales de las pesqueirias de navajas y longueirones en function de las tecnicas de pesca y de los habitats explotados. In: Navajas y lonueirones: biologia, pesquerias y cultivo.	
	Languages (ENG, SP, FR, PT)	SP	
	Compliance with publicity standards (logo, EU flag...) (YES/NO)	N/A	
	Downloadable (YES/NO)	NO	
	Date published	2008	

COMMUNICATION ACTIONS IMPLEMENTED (cont'd)			
Chapters in BOOKS	Number of copies circulated		
	Title	Martinez-Patino, D & da Costa F. Cultivo de navaja, longueiron y longueiron vello. In: Navajas y lonueirones: biologia, pesquerias y cultivo.	
	Languages (ENG, SP, FR, PT)	SP	
	Compliance with publicity standards (logo, EU flag...) (YES/NO)	N/A	
	Downloadable (YES/NO)	NO	
	Date published	2008	
Chapters in BOOKS	Number of copies circulated		
	Title	Fernandez-Tajes et al. Caracteristicas citogeneticas y moleculares de navajas y longueirones In: Navajas y lonueirones: biologia, pesquerias y cultivo.	
	Languages (ENG, SP, FR, PT)	SP	
	Compliance with publicity standards (logo, EU flag...) (YES/NO)	N/A	
	Downloadable (YES/NO)	NO	
	Date published	2008	

PRESS ARTICLES	Name of paper and article	Shellfish News 21: Development of an optimal broodstock holding and conditioning system for hatchery production of razor clam, *Ensis siliqua*	
	Date	Spring 2006	
	Languages (ENG, SP, FR, PT)	ENG	
	Downloadable (YES/NO)	NO	

COMMUNICATION ACTIONS IMPLEMENTED (cont'd)			
SCIENTIFIC JOURNALS	Name and number of the issue (date)	*Aquaculture Research* 38 (2007)	
	Article title	Genetic variation of the razor clam Ensis siliqua along the European coast based on RAPDs	
	Number of pages	1205-1212	
	Languages (ENG, SP, FR, PT)	ENG	
	Downloadable (YES/NO)	YES	
SCIENTIFIC JOURNALS	Name and number of the issue (date)	*Journal of Agriculture and Food Chemistry* 55 (2007)	
	Article title	Identification of the razor clam species *Ensis arcuatus*, *E. directus*, *E. macha* and *Solen marginatus*.	
	Number of pages	7278-7282	
	Languages (ENG, SP, FR, PT)	ENG	
	Downloadable (YES/NO)	YES	
SCIENTIFIC JOURNALS	Name and number of the issue (date)	Fisheries Science 74 (2007)	
	Article title	Identification of the razor clams *Ensis arcuatus* and *E. siliqua* by PCR_RFLPs analysis of ITSI region.	
	Number of pages	511-515	
	Languages (ENG, SP, FR, PT)	ENG	
	Downloadable (YES/NO)	YES	
SCIENTIFIC JOURNALS	Name and number of the issue (date)	*Journal of Shellfish Research* 24 (2005)	
	Article title	Developing stock enhancement techniques for two razor clam species in the European Atlantic area	
	Number of pages	Abstract p329	
	Languages (ENG, SP, FR, PT)	ENG	
	Downloadable (YES/NO)	YES	
SCIENTIFIC JOURNALS	Name and number of the issue (date)	*Aquatic Conservation: Marine and freshwater ecosystems* 19 (2009)	
	Article title	Environmental impact of razor clam harvesting with salt in the Ria Formosa…..	
	Number of pages	542-553	
	Languages (ENG, SP, FR, PT)	ENG	
	Downloadable (YES/NO)	YES	

COMMUNICATION ACTIONS IMPLEMENTED (cont'd)				
Type of communication action conducted	**Description**			**Total cost of the action in Euros including VAT**
MAJOR EVENTS	**organised** by the project	Seminar name		
		Date and venue		
		Number of participants		
		Type of audience		
		Documentation available (YES/NO) – downloadable?		
MAJOR EVENTS	in which the project took part.	During the course of the SHARE project partners made over 20 oral and poster presentations at 12 international conferences including: INTERREG Seminar, Asturias 2007; EXPOMAR Portugal 2005, 2006, 2007; SIEBM 2006; AQUA 2006; 7th International Conference on Shellfish Restoration *etc*.		

CD	CD title	SHARE: Summary Report: Sustainable harvesting of Ensis (Razor Shellfish) [Ref: Interreg IIIB – Project 90 – SHARE]		
	Number of copies circulated	50		
	Languages (ENG, SP, FR, PT)	ENG		
VIDEO/DVD	Video/DVD title	NO		
	Number of copies circulated			
	Languages (ENG, SP, FR, PT)			
POSTERS	Event (venue/date)	See **MAJOR EVENTS** above		
	Number of copies circulated			
	Languages (ENG, SP, FR, PT)			
TV Programmes	TV channel/programme		NO	
	Date			
	Languages (ENG, SP, FR, PT)			
Radio Programmes	Radio station/programme		NO	
	Date			
	Languages (ENG, SP, FR, PT)			
Total cost of all communication actions (in Euros) including VAT **24372**				

PLEASE ATTACH A COPY OF ANY PUBLICITY OR INFORMATION DOCUMENTS PRODUCED WITHIN THE FRAMEWORK OF THE PROJECT

PROSPECTS

Indicate whether the project or certain actions will be continued in the future (for example, as part of a future territorial cooperation programme).

Co-ordinated collaboration of the full network will be limited in future by success in attracting appropriate RTD funding. However, the network will maintain informal links to avail of future funding opportunities. In terms of outputs from the project our understanding of the needs for and mechanisms to achieve integrated management of razor clam resources has been very much improved. In addition, individual partners will maintain elements of the RTD initiated under this project in the areas of aquaculture, environmental impact monitoring and molecular investigations.

HAS THE PROJECT SUCCEEDED IN CONSTRUCTING A TRANS-NATIONAL NETWORK THAT WILL CONTINUE AFTER THE END OF THE PROJECT? YES
If yes.

In what field and for what types of activities?
Research and technological development (RTD) in the field of sustainable fisheries management and aquaculture development for infaunal bivalves. This is a relatively neglected area of interest in comparison with fisheries management and aquaculture development for epifaunal bivalves such as oysters, mussels and scallops which support major interest in research and production.

Description of the network: (number of partners, typology, status, mode of operation…)
At the moment the network consists of 5 partners (from Ireland, Portugal, Spain and UK). The partners include 2 universities, 1 regional and 2 national institutes involved in fisheries and aquaculture management and RTD. The partnership continues to work together completing scientific publications that have arisen from the project and in seeking further funding to develop advances made in the INTERREG IIIB projects SHARE and TIMES.

In the list of priority themes proposed by the Commission for the period 2007 – 2013, identify those which are of interest to you:

Accessibility and Transport NO
Types of activities that could be envisaged.

Water Management NO
Types of activities that could be envisaged.

Maritime Risk Prevention NO
Types of activities that could be envisaged.

Research & Development Networks YES
Types of activities that could be envisaged include RTD to: 1. Improve broodstock conditioning, larval rearing, nursery and intermediate culture for *Ensis* species. 2. Investigate further the impacts of razor clam dredge fishing on marine ecosystems through the calibration of changes in the macrobenthos against natural changes within unfished areas.
3. Expand knowledge on genetic variability and population structure in European *Ensis* stocks by using novel and innovative methodologies and sampling new populations. 4. Develop recommendations for the integrated management of *Ensis* stocks within the Atlantic area. 5. Strengthen outreach and dissemination by engaging with aquaculture producers and seafood processors.

Would you like to receive further information on the future territorial cooperation programme for 2007-2013? YES

COMPLIANCE WITH THE GRANT OFFER LETTER and any addenda.

(For each question, delete the response that does not apply, and if the response is no, give details)
Did the project comply with the terms of the Grant Offer Letter? YES / NO
Specify if there were any addenda to the grant offer letter: number, date and grounds.

Did the project comply with the partnership presented in the grant offer letter? **YES**
Did the project comply with the financial plan? **YES**
Did the project comply with the schedule presented in the grant offer letter? **YES**

Did the project comply with the obligations regarding the inclusion of the programme logo and the European Union flag in all information and publicity actions? **YES**

COMPLIANCE WITH COMMUNITY POLICY

(Cf. Application Form point 7)

Did the project comply with national and Community legislation on:
- public procurement? **YES**
- fair competition? **YES**
- the environment? **YES**
- equal opportunities? **YES**

Justification.
- All partners institutions adhere to national and European legislation concerning public procurement, fair competition, environmental directives, fair employment and equal opportunities. All work undertaken was carried out by appropriately qualified persons.

DECLARATION OF THE LEAD PARTNER

As Lead Partner, I hereby declare that the information in this final activity report is the faithful reflection of the actions and results of the project throughout its duration.

Date: **20 October 2009**

Surname and forename (in capitals) **ROBERTS DAVID**

Position within the organisation **Reader**

Signature and stamp:

ANNEXE 1: PROJECT SCHEDULE AND KEY DATES

	Date	Comments (if any)
Date of submission of the application form	07/03/2003	
Date of final approval of the file by the Steering Committee	17/09/2003	
Date of signature of the grant offer letter by the lead partner	20/04/2004	
Date project started	01/05/2004	
Date of modification application N°1 (if any)	N/A	
Date addendum N°1 signed	12/12/2007	
Date of modification application N°2 (if any)	N/A	
Date addendum N°2 signed	N/A	
Date project ended	31/12/2007	

ANNEXE 2: FILING OF ORIGINAL SUPPORTING DOCUMENTS (of expenditure, income, etc.) in application of Article 4 of the grant offer letter	
Lead Partner and Partners	Place(s) filed
Lead Partner	School of Biological Sciences, Queen's University, Belfast. Hard and Electronic copies
Partner 1	Electronic copies
Partner 2	Electronic copies
Partner 3	Electronic copies

ANNEXE 3: FILING OF KEY DOCUMENTS OF THE PROJECT	
Document	Place(s) filed
Grant offer letter	Finance Office, Queen's University, Belfast School of Biological Sciences, Queen's University, Belfast
Letters of intent	Finance Office, Queen's University, Belfast School of Biological Sciences, Queen's University, Belfast
Partnership agreement	Finance Office, Queen's University, Belfast School of Biological Sciences, Queen's University, Belfast
Modification (if any)	N/A
Addendum (if any)	N/A

ANNEXE 4: SUMMARY OF ERDF PAID

See Excel file attached in the annexes

ANNEXE 5: PROGRAMME INDICATORS

TABLE COMPARING FORECASTS AND ACHIEVEMENTS ON INDICATORS AT THE END OF THE PROJECT

Provide information only for the indicators relating to the measure on which your project was financed *(Cf. Application Form point 12 and 3.10)*

PRIORITY A

Performance and results indicators - (Quantify the indicators)	Forecast	Actual
MEASURE A-1		
Number of information seminars held		
Number of training seminars held		
Number of individuals and organisations taking part in trans-national projects		
Number of partnerships		
Number of studies relating to territorial development / spatial planning		
Number of studies carried out relating to urban / rural interrelations		
MEASURE A-2		
Number of technological research and development organisations that have benefited		
Number of grant beneficiaries		
Number of studies elaborated		
Number of public-private partnerships		
Number of co-operation agreements between organisations and businesses		
Justification of any discrepancies between the forecast and actual performance indicators, if any		

PRIORITY B

Performance and results indicators - (Quantify the indicators)	Forecast	Actual
MEASURE B-1		
Number of intermodal studies - projects		
Number of projects - studies relating to the improvement of accessibility		
Increase in the number of passengers		
Increase in the tonnage of goods		
MEASURE B-2		
Number of public events conducted		
Number of studies relating to NICTs		
Number of co-operation projects relating to NICTs		
Number of partnerships created related to NICTs		
Justification of any discrepancies between the forecast and actual performance indicators, if any		

PRIORITY C

Performance and results indicators - (Quantify the indicators)	Forecast	Actual
MEASURE C-1		
Number of projects for the prevention of pollution		
Number of projects for the protection of the environment and natural resources		
M^3 of water saved		
MEASURE C-2		
Surface area (m2) protected		
Waste ground treated		
Number of activities relating to management of coasts, estuaries and protection of wetlands	**3**	**3**
Number of projects for protection and rehabilitation of native fauna in wetlands and estuaries		
Number of projects for the protection and rehabilitation of wetlands and estuaries		
MEASURE C-3		
Number of training actions carried out		
Number of awareness-raising activities carried out		
Number of renewable energy projects		
Number of participants in the training actions		
Justification of any discrepancies between the forecast and actual performance indicators, if any		

PRIORITY D

Performance and results indicators - (Quantify the indicators)	Forecast	Actual
MEASURE D-1		
Number of studies on cultural and heritage promotion in the Atlantic Area		
Number of cultural events held		
Number of networks in the field of education and / or culture		
Number of actions relating to the development of Atlantic culture		
MEASURE D-2		
Number of tourist products prepared/improved		
Number of studies relating to tourism in the Atlantic Area		
Number of actions to promote cultural heritage		
Number of actions relating to the development of tourism in the Atlantic Area		
Number of strategic marketing actions relating to the promotion of the Area		
MEASURE D-3		
Number of collaborative actions undertaken with other INTERREG areas		
Number of collaborative actions undertaken with countries outside the EU		
Number of strategic marketing initiatives relating to promotion of the Area		
Justification of any discrepancies between the forecast and actual performance indicators, if any		

ANNEXE 6: PROJECT INDICATORS

For projects with indicators in addition to those for the measure in question.

Performance and results indicators on the basis of those proposed by the Project in its Application Form - (Quantify the indicators)	Forecast	Actual

ANNEXE 7: USEFUL CONTACTS

JOINT SECRETARIAT

Région Poitou-Charentes
Programme INTERREG III B "Espace Atlantique"
15, rue de l'ancienne Comédie
BP 575
86021 Poitiers Cedex (France)
Tel: 33(0)5 49 55 82 54
Fax: 33(0)5 49 55 82 55
E-Mail: interreg@cr-poitou-charentes.fr
Website: www.interreg-atlantique.org

SPAIN

Ministerio de Hacienda Dirección General de Fondos Comunitarios.
Paseo de la Castellana 162
28046 MADRID (España)
Contact: Cecilio OVIEDO
Tel: 00 34 91 5835 339
Fax: 00 34 91 5837 317
Email: coviedo@sgpg.meh.es
Website: http://www.mineco.es

FRANCE

Conseil Régional des Pays de la Loire. Direction de la Recherche, de l'Enseignement Supérieur, de l'International et de l'Europe
44966 NANTES CEDEX 9
Contact: Isabelle GARDON
Tel: 00 33 (0)2 28 20 61 70
Fax: 00 33 (0)2 28 20 50 12
Email: isabelle.gardon@paysdelaloire.fr

IRELAND

Border Midlands and West Regional Assembly
The Square. Ballaghadreen.
Co Roscommon (Ireland)
Contact: Michael O'BRIEN
Tel: 00 353 (0) 94 98 62970
Fax: 00 353 (0) 94 98 62973
Email: mobrien@bmwassembly.ie

PORTUGAL

Ministério das Cidades, Administração Local, Habitação e Desenvolvimento Regional
Unidade de coordenação nacional INTERREG III
Rua da Alfândega, nº 160-3°
1100-016 Lisboa (Portugal)
Contact: José SOEIRO
Tel: 00 351 21 881 21 90
Fax: 00 351 21 881 21 97
Email: jose.soeiro@interreg.gov.pt
Website: www.qca.pt

UNITED KINGDOM

ODPM Office of the Deputy Prime Minister
Eland House, Bressenden Place, Floor 3/J5
LONDON SW 1E 5DU (United Kingdom)
Contact: Robert LOWENSTEIN / Barbara CURLEY
Tel: 00 44 20 79 44 39 11
Fax: 00 44 20 79 44 39 19
Email:robert.lowenstein@odpm.gsi.gov.uk
Website: http://www.odpm.gov.uk