Project no. SSPE-CT-2003-502329

PANDA

Permanent network to strengthen expertise on infectious diseases of aquaculture species and scientific advice to EU policy

Coordination Action

Scientific support to policies

Final activity report (44 months)

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Contents **Page**

List of appendices

Appendix 3j - Annex 10 to deliverables 2 & 3 (*Gyrodactylus salaris* qualitative risk assessment)

Appendix 4 – Deliverable 4 (database of network members)

Appendix 5 - Deliverable 5 (database of training opportunities)

Appendix 6 - Deliverable 6 (database of epidemiological characteristics)

Appendix 7 - Deliverable 7 (recommendations for the prevention of disease hazards)

Appendix 8 - Deliverable 8 (report on the best methods for detection of the main disease hazards)

Appendix 9 - Deliverable 9 (report on the implementation of diagnostic methods)

Appendix 10 - Deliverable 10 (report on control and containment strategies and assessment of their impact)

Appendix 11 - Deliverable 11 (report on training needs)

Appendix 12 - Deliverable 12 (network of experts)

Appendix 13 - Deliverable 16 (consortium agreement)

Executive Summary

The PANDA project aimed to form a permanent network of specialists in aquatic animal health, and to use this network to advise the European Commission on the most important exotic disease hazards facing the EU and how to prepare for them in the event of an incursion. This networking approach was adopted to ensure all interested parties had an opportunity to participate and contribute to the outputs.

A network of almost 350 experts in the EU and elsewhere in the world has been created, the hub of which is the project website (www.europanda.net) where members details and areas of expertise are stored on a searchable database. The project website is also used for dissemination of information and has on-line forums for discussion of scientific topics. An automatic emailing facility alerts network members to the latest 'What's new' items and any new postings in the forums they have registered an interest in, and there is an email broadcasting system that the co-ordinator can use to contact all network members at the same time.

The PANDA network of experts, through a series of task forces and workshops, has identified the most significant exotic and emerging disease hazards to European aquaculture and aquatic wildlife, gathered information onto a database of their epidemiological characteristics, devised surveillance schemes for them, identified the best available diagnostic methods for them and advised how they could be implemented in the EU, and identified the available control strategies for them. A database of aquatic animal health related training opportunities has been constructed, and a report on the training needs and opportunities in the EU has been prepared. A number of areas requiring improvement or further research have been identified, and recommendations made.

A total of 26 diseases of fish, molluscs, crustaceans and amphibians with the highest hazard scores were considered. The quality and quantity of published epidemiological information on them varied greatly. Greater awareness of these disease hazards at all levels would improve surveillance. Although acceptable diagnostic methods for these diseases exist, laboratories in the EU are not generally familiar with them. Different disease control options are available depending on the disease, but improvements in husbandry and bio-security practices are likely to be cost effective in most cases. Training in these areas typically takes the form of short courses or conferences, and more training opportunities in diagnostics, risk analysis and epidemiology are needed.

The network has comprehensively assessed the risks posed by exotic diseases to aquatic animals in the EU and has identified limitations in diagnostic capacity and surveillance in the case of future incursion(s) into one or more Member States. The network has the expertise and capacity to address most if not all future scientific issues associated with EC policy on aquatic animal health in the EU, including further risk assessments. However, no formal means for ensuring the continuation of this newly-established comprehensive network of experts has been found. Without future funding support, it is likely that the main aim of the PANDA project, i.e. to make the established experts network become permanent, will not be achievable over the long term. The Commission and EFSA are strongly requested to address this problem and find a solution.

Key recommendations

1. Greater expertise in, and better understanding of, risk analysis in aquatic animal health is required, and the flexible platform of risk analysts established by PANDA should be strengthened and maintained in order to provide scientific support for EU policy development in this field.

2. The PANDA epidemiology database should be published as a free-access, peer-reviewed electronic journal to expand the range of diseases covered, to keep the information as up to date as possible, and to make it accessible to as wide an audience as possible,

3. Further research into pathogen survival parameters, host ranges, and diagnostic methods for the disease hazards identified by PANDA is needed to fill the knowledge gaps and improve EU capacity for rapidly identifying any incursion.

4. Community Reference Laboratories for crustacean and amphibian diseases should be appointed as soon as possible to provide scientific leadership and training in these newly emerging areas of aquatic animal disease concern in the EU.

5. More EU opportunities should be developed for training in the newer diagnostic methods for bacterial and viral diseases, as well as in epidemiology and risk analysis.

6. The PANDA network should maintain a pool of expert knowledge to provide rapid information and advice on disease risks and developments in emerging areas of aquaculture (e.g. new aquaculture methods and species).

7. The PANDA network should assist in the development of detailed contingency plans for rapid response to the incursion of the identified exotic serious diseases of farmed and wild aquatic animals in the EU.

8. An assessment is needed of the potential impact that climate change may have on the occurrence and severity of the identified disease hazards for aquatic animal populations in the EU.

9. Periodic reviews of the list of exotic and emerging disease hazards, epidemiological information, status of diagnostics, control methods and training opportunities are required to ensure the information on this dynamic situation is current.

10. The European Commission and EFSA are strongly advised to identify means by which financial support can be provided to ensure the future maintenance of the PANDA network in order for it to assist in the implementation of the above recommendations and to continue to provide scientific advice and support in the development of EU policies for aquatic animal health.

1 Project objectives and major achievements

The overall aims of this project were to develop a permanent network of experts in the field of aquatic animal health to strengthen scientific knowledge and technical competencies, and to use this network to address specific issues according to the current need for scientific information in support of policy. Despite the existence of Community and National Reference Laboratory networks for fish and molluscan diseases, untapped expertise exists in a large number of institutes, universities, private companies, *etc*. A mechanism is required for drawing from these resources so the Commission can make better informed decisions on policies, regulations and research priorities. The specific issues addressed by the project, via a series of work packages, are detailed below.

- *WP 2 - Risk analysis*
  Identification of the most significant exotic, emerging and re-emerging disease hazards for the EU.

- *WP3 - Epidemiology*
  Production of a database of epidemiological characteristics of the major disease hazards for the EU, and development of surveillance and containment schemes.

- *WP4 - Diagnostic methods*
  Assessment of the best diagnostic methods and recommendations for improvements, standardisation, validation and implementation.

- *WP5 - Environmentally safe disease control*
  Recommendations for the best control techniques and policy/legislation options for the application of environmentally safe control methods.

- *WP6 - Training needs and opportunities*
  Production of a database of training opportunities and identification of training requirements not currently met.

A consortium of 8 institutes forms the management team for the project, and their responsibilities are listed in below.

Table 1. The project consortium

Partner	**Representative**	**Role**
1. CEFAS Weymouth, UK	Barry Hill	Project coordinator
2. Danish Veterinary Institute, Aarhus, Denmark	Ellen Ariel	Steering group member
3. IFREMER, La Tremblade, France	Isabelle Arzul	Steering group member
4. CIDC, Lelystad, The Netherlands	Olga Haenen	Diagnostic methods
5. National Veterinary Institute, Oslo, Norway	Edgar Brun	Epidemiology
6. Federation of European Aquaculture Producers, Belgium	Panos Christofilogiannis	Environmentally safe disease control
7. National University of Ireland, Galway, Ireland	Maura Hiney	Training needs and opportunities
8. IRTA, Tarragona, Spain	Chris Rodgers	Risk analysis

The project was extended to 44 months to allow more time to find a means of ensuring the continuation of the network after the FP6 project terminates.

All deliverables except two have been achieved, and are attached as annexes to this report. The consortium agreement (deliverable 16) was not signed by two partners due to a problematic liability limit in the event of default. The lack of a consortium agreement has not affected the work of the consortium in any way. Although a network of experts has been established (deliverable 12), its permanence cannot be assured at this point, as no firm commitment to finance the maintenance of the network has been obtained so far.

Of greatest importance however, the scientific deliverables will provide the Commission and other interested parties with information on exotic disease hazards which may affect European aquaculture, and how to prepare for and deal with them should they appear.

2. Work package progress

2.1 WP1: Project co-ordination, supervision and secretariat, and electronic database of experts in the network.

2.1.1 Work package objectives

The objectives of this work package were the continuing co-ordination and supervision of the activities in the other work packages, the provision of a project secretariat to provide support to the other participants, and the ongoing recruitment of experts to this network. The co-ordinator (CEFAS) was the leader of this work package, and Partner 2 (DFVF) and Partner 3 (IFREMER) were also involved as members of the Steering Group.

Table 2. WP1 deliverables

Del. no.	Deliverable name	Workpackage no.	Lead contractor
D4	Database of members constructed	WP1	CEFAS
D12	Permanent network of experts established	WP1	CEFAS

2.1.2 Progress towards these objectives

A secretariat has been provided by Partner 1 throughout the project lifetime, and has assisted the co-ordinator and the consortium with administration and the drafting of meetings, activity and management reports.

A total of 10 consortium meetings and 7 steering group meetings were held during the project lifetime. These have been concerned with project management, direction, progress and outputs. Reports of these meetings are attached as annexes to this report.

The two deliverables for this work package, a database of experts (D4) and a permanent network of experts (D12) are closely related. The database was developed by CEFAS early in the project (month 1, subsequently improved in month 11). It is an access based database, with the front end linked to the website via a custom application programmed in the C-sharp language. It allows experts to register online, and holds personal details (name, address etc) as well as details on each members fields of expertise and interest. It is fully searchable.

Recruitment of experts to the network started as soon as the database was constructed and has been ongoing throughout the project. All consortium members have contributed to network recruitment activities. Major initiatives to this end include promotional stands at relevant conferences, oral/poster presentations and circulation of promotional leaflets at relevant meetings/conferences, and articles and advertisements in relevant publications. Experts have also been encouraged to join through word of mouth by consortium and network members. The development of good relationships with associated organisations has also helped publicise the project and its aims.

By the end of the project 345 members. The majority (67%) are resident in Europe, but overall over 50 countries are represented from all inhabited continents. A wide range of

primary specialisms were reported, covering all disciplines relevant to aquatic animal health. Although most work with fish diseases, molluscs and crustaceans were also well represented. There is little expertise in diseases of amphibians however, particularly within Europe. Overall, it is concluded that the network contains sufficient expertise to effectively answer most questions concerning aquatic animal health in the EU. In the event that suitable expertise is not available within the network, it is likely that it could be sought from outside the network though contacts of existing network members.

Examples of the type of pertinent science in support of policy questions/issues that the consortium believe it would be useful for the network to address in the future include:

- Development of wild stock surveillance schemes (especially for patrimonial species which are not necessary of commercial interest) for biodiversity maintenance.
- How global change can modify aquatic disease map.
- Crisis plans in response to aquatic disease outbreaks.

The ultimate aim of D12 was to establish a permanent network by the end of the project lifetime. Any mechanism for its continuation would need to provide ongoing financial support for co-ordination of the network and maintenance of the website, and provide travel and salary costs to any experts attending scientific discussions. A useful network has been established, but no mechanism for its continuation has been established.

The project was extended and discussions were held with the European Food Standards Agency (EFSA), the body recently established to be the sole provider of risk based scientific advice to the Commission in this area. Although EFSA expressed an interest in the network and its capabilities, they have established their own mechanism for obtaining expert advice but would like to see the continuation of the PANDA network in the future.

The formation of the European Aquaculture Technology Platform (EATP) has been noted and discussed by the PANDA consortium. Although there is overlap in the expertise involved, EATP is primarily concerned with the commercial development of the industry so its purpose differs from that of the PANDA network. Although some experts who are members of the PANDA network will be involved in the EATP, the EATP has developed its own *modus operandus* and may not be willing to provide support for the continuation of the PANDA network in its current form.

2.1.3 Summary of conclusions arising from WP1

- A network of experts has been established, with their details stored on an on-line searchable database.
- The network consists of almost 350 experts in Europe and around the world and has an overall field of expertise suitable for providing scientific information and advice on most if not all EU policy issues related to aquatic animal health.
- Attempts to find funding to support the continuation of the network have been unsuccessful, and it is likely that the network will fade away over the next few years unless a solution can be found.

2.1.4 Summary of recommendations arising from WP1

- The European Commission and EFSA are strongly advised to identify means by which financial support could be provided to ensure the future maintenance of the PANDA network in order for it to assist in the implementation of the project's key recommendations.

2.1.5 Dissemination and use of these results

- A copy of the database of experts will be passed to the Commission to use as they see fit.
- The database will remain online (without maintenance) and accessed via the PANDA website so it can be continued to be used in the short term by network members to search for and make contact with other members as required, and discuss issues via the forums.

2.2 WP2: Risk analysis of exotic emerging and re-emerging disease hazards

2.2.1 Work package objectives

The overall objectives of this work package were to identify the exotic, emerging and re-emerging disease hazards of potential risk to Europe, assess their potential impact on aquaculture and aquatic wildlife in the EU, and recommend those which should receive priority attention in work packages 3 – 6. This work package was led by Partner 8 (IRTA), under the guidance of partner 2 (DFVF).

Table 3. WP2 deliverables

Del. no.	Deliverable name	Workpackage no.	Lead contractor
D2	Platform of experts for risk analysis	WP2	IRTA
D3	Identification of the most significant exotic, emerging and re-emerging disease hazards for European aquatic animals	WP2	IRTA

2.2.2 Progress towards these objectives

Five risk analysis experts were selected to form a task force to identify the most significant exotic/emerging and re-emerging disease hazards.

- Chris Rodgers (CA-IRTA, Spain) – WP 2 Leader
- Giuseppe Bovo (IZSV, Italy)
- Edgar Brun (NVI, Norway)
- Laurence Miossec (IFREMER, France)
- Larry Paisley (DVI, Denmark)
- Ed Peeler (CEFAS, UK)

The task force initially drew up a dialogue document to address the deliverables and milestones of the work package. This document formed the basis of a series of discussions and four group meetings based on the available data. Subsequently, the task force used the information for the identification of most aquatic disease hazards of fish, molluscs, crustaceans and amphibians from a European perspective. Each hazard was assessed by susceptible host species, geographical distribution, its disease listing (EC/91/67 and OIE) and exotic status (relevant to the EU). In addition, the hazards were subjected to a pre-filter related to whether they satisfied the OIE disease listing/notification criteria for consequences and spread. In order to prioritise the hazards that satisfied the criteria, a scoring system based on 29 questions divided into five sections was developed. This system considered each hazard by presence or absence in the EU and its regulatory status, the potential pathways of introduction, establishment, consequences, and risk mitigation measures.

A network of experts associated with WP2 was established in order to provide a risk analysis platform. The network was initially formed from the database of registered PANDA members, but was subsequently augmented by a proactive invitational approach.

The platform was used to provide specialised input to the hazard scoring exercise and to provide background data on specific disease hazards.

The resulting hazard scores and their uncertainty estimates were used to identify the list of the most significant disease hazards to the EU. This was then made available to the other work packages.

Table 4. List of exotic identified disease hazards

	Disease agent	Susceptible species
Fish	**Epizootic haematopoietic necrosis virus**	***Perca fluviatilis*** **and** ***Oncorhynchus mykiss*** **(EHNV)**
	Red sea bream iridovirus	***Pagrus major***, ***Seriola quinqueradiata***, ***Seriola*** **spp.**, ***Lateolabrax*** **sp.**, ***Oplegnathus fasciatus***, ***Epinephelus malabaricus***, ***Epinephelus*** **spp.**, ***Lates calcarifer*** **and** ***Thunnus thynnus***, **as well as possibly Perciformes, Pleuronectiformes and Tetradontiformes**
	Streptococcus agalactiae	***Sparus aurata, Liza klunzingeri, Pampus argenteus, Oreochromis*** **spp.**
	Trypanoplasma salmositica	**Salmonids and other freshwater fish**
	Ceratomyxa shasta	**Salmonidae**
	Parvicapsula pseudobranchicola	***Salmo salar***
	Neoparamoeba pemaquidensis	***Salmo salar***
	Aphanomyces invadans	***Anguillidae*** **spp.**, ***Caranx*** **spp.**, ***Plecoglossus altivelis***, ***Clarius*** **spp.**, ***Channa striatus***, **Cichlidae, Cyprinidae,** ***Lates calcarifer***, ***Mugil cephalus,*** **Siluridae and many other different species (incl. possibly** ***Brevoortia tyrannus***)
Mollusc	***Perkinsus marinus***	***Crassostrea virginica***, ***C. gigas*** **and** ***C. ariakensis***
	Marteilioides **spp. (*M. chungmuensis* : Marteilioidosis)**	***Crassostrea gigas and C. nippona***
Crustacean	**Yellowhead**	***Penaeus monodon***, ***P. japonicus***, ***P. vannamei***, ***P. setiferus***, ***P. aztecus***, ***P. duorarum***, ***P. stylirostris***, ***Palaemon styliferus***, ***Fenneropenaeus merguiensis***, ***Metapenaeus ensis***, ***Euphausia*** **spp. and** ***Acetes*** **spp.**
	Taura	***Penaeus vannamei***, ***P. stylirostris***, ***P. setiferus***, ***P. schmitti***, ***P. aztecus***, ***P. duorarum***, ***P. chinensis***, ***P. monodon*** **and** ***P. japonicus***
	Infectious hypodermal and haematopoietic necrosis	***Penaeus vannamei***, ***P. stylirostris***, ***P. occidentalis***, ***P. monodon***, ***P. semisulcatus***, ***P. californiensis***, ***P. japonicus***, ***P. setiferus***, ***P. aztecus*** **and** ***P. duorarum***
	Coxiella cheraxi **(crayfish systemic rickettsiosis)**	***Cherax quadricarinatus***
Amphibian	**Ranavirus**	**Amphibians**

Table 5. List of non-exotic identified disease hazards

	Disease agent	Susceptible species
Fish	**KHV**	***Cyprinus carpio***
	ISAV	***Oncorhynchus kisutch*, *Salmo salar*, *Salmo trutta*, *Oncorhynchus mykiss*, *Clupea harengus* and *Lepeophtheirus salmonis***
	Streptococcus iniae	***Oncorhynchus mykiss*, *Paralichthys olivaceous*, *Sardinops melanostictus*, *Brevoortia patronus*, *Morone saxatilis*, Cichlidae and *Lates calcarifer***
	Lactococcus garviae	***Oncorhynchus mykiss, Seriola quinqueradiata* and *Coris aygula***
	Gyrodactylus salaris	***Salmo salar*, *Oncorhynchus mykiss*, *Salvelinus alpinus*, *S. fontinalis*, *Thymallus thymallus*, *Salvelinus namaycush* and *Salmo trutta***
Mollusc	***Candidatus Xenohaliotis californiensis***	***Haliotis* spp. (e.g. black abalone *H. cracherodii*, red abalone *H. rufescens*, pink abalone *H. corrugata*, green abalone *H. fulgens* and H. tuberculata, white abalone *H. sorenseni and possibly H. discus hannai*)**
	***Nocardia* spp. (Pacific oyster nocardiosis)**	***Crassostrea gigas* and possibly *Ostrea edulis***
	Perkinsus olseni/atlanticus	***Haliotis ruber*, *H. cyclobates*, *H. scalaris*, *H. laevigata*, *Anadara trapezia*, *Ruditapes decussatus*, *R. philippinarum* *Austrovenus stutchburyi* and *Pitar rostrata***
Crustacean	**White spot**	***Penaeus japonicus*, *P. chinensis*, *P. indicus*, *P. merguiensis*, *P. monodon*, *P. setiferus*, *P. stylirostris*, *P. vannamei*, *P. aztecus* and *P. duodarum***
Amphibian	**Ranavirus**	**Amphibians**
	***Batrachochytrium dendrobatidis* (amphibian chytridiomycosis)**	**Amphibians**

Additional work carried out under WP2 includes a report identifying potential zoonotic agents associated with aquatic animal species, and a risk assessment of the spread of *Gyrodactylus salaris* through the movement of salmon in coastal waters.

2.2.3 Summary of conclusions arising from WP2

- A full picture of the most significant exotic, emerging and re-emerging disease hazards for aquatic animal health in the EU has been obtained.
- Those of greatest importance have been listed for detailed consideration by the other work packages.
- The data gathered during this study forms the basis for improved understanding of these diseases and has provided valuable input to the other work packages, and further more detailed analysis of the results could be carried out.

2.2.4 Summary of recommendations arising from WP2

- A full risk analysis for each identified disease hazard is needed, but was beyond the scope of this study.
- The hazard ranking should be an ongoing flexible process as the disease situation is dynamic.
- Greater expertise in and better understanding of risk analysis in aquatic animal health is required, and a flexible platform of risk analysts should be retained in order to support policy decisions.
- Further research into pathogen survival parameters, host ranges, and diagnostic methods is recommended for the identified diseases.

2.2.5 Dissemination and use of results

- The Deliverables, together with supporting information are submitted to the Commission appended to this report, which will be made publicly available via the website in due course.
- A peer reviewed publication detailing the hazard scoring system will be published in due course.
- A peer reviewed publication on the application of the Delphi technique will be published in due course.
- A peer reviewed manuscript on the G. salaris risk assessment has already been published in a peer reviewed journal (Peeler *et al*, 2006).

2.2.5 Reference

Peeler, E., Thrush, M., Paisley, L., Rodgers, C. (2006). An assessment of the risk of spreading the fish parasite Gyrodactylus salaris to uninfected territories in the European Union with the movement of live Atlantic salmon (*Salmo salar*) from coastal waters Aquaculture 258(1-4), 187-197.

2.3 WP3: Epidemiology database and methods for disease surveillance and containment

2.3.1 Work package objectives

The overall aims of this work package were to establish an epidemiological database of the current epidemiological knowledge of the most serious infectious diseases for EU aquaculture and aquatic wildlife, and to provide recommendations for active surveillance for the diseases identified in WP2 and their containment should outbreaks occur in Europe. The work package was lead by Partner 5 (NVI Norway) under the guidance of Partner 2 (DFVF).

Table 6. WP3 deliverables

Del. no.	Deliverable name	Workpackage no.	Lead contractor
D6	Database of the epidemiological characteristics of the diseases of most hazard to European aquaculture and aquatic wildlife	WP3	NVI Norway
D7	Recommendations for prevention, vigilance and contingency plans for the main disease hazards identified in WP 2	WP3	NVI Norway

2.3.2 Progress towards these objectives

Five epidemiologists were selected to form a task force to develop the epidemiology database and surveillance schemes.

- Edgar Brun, National Veterinary Institute, Norway (WP3 leader)
- Marios Georgiadis, Aristotle University of Thessaloniki, Greece
- Vlasta Jencic, University of Ljubljana, Slovenia
- Nacho de Blas, University of Zaragoza, Spain
- Chris Rodgers, IRTA, Spain
- Kenton Morgan, University of Liverpool, UK

The database was constructed in Microsoft® Access (Microsoft Corporation, Redmond, WA, USA) with a custom front end. Information concerning the diseases identified by WP2 was compiled, pre-reviewed by experts of the different diseases before being entered into the database. Data is recorded by pathogen, with seven sections for each one (Agent properties, host susceptibility and pathogenicity, related diseases, transmission, diagnostic tests, sanitary policies and bibliography). It contains hyperlinks to supporting information (e.g. study conditions). It is structured in a way which is suitable for expanding its contents to include any pathogen of aquatic animals.

It includes all relevant available information in such detail that it can be used as the scientific basis for activities such as risk analysis, surveillance, surveys to assess freedom from disease as well as design and implementation of disease prevention and control schemes. It is also anticipated that the database will be useful in supporting actions in emergency situations.

A large number of data gaps were identified during the course of compiling and reviewing the information included on the database. Additional functions which would be desirable to include, but were beyond the constraints of the project include a search function and a mechanism for visualising disease occurrence in time and space.

For the purpose for which the database was designed, it is vital that information is kept up to date. To sustain the database the task force has suggested that the database is made public available as a free-access peer-reviewed electronic journal published at the PANDA website. Although tentative plans have been discussed, no firm arrangements have been made for this as yet.

Recommendations for prevention, vigilance and contingency plans for the main disease hazards identified in WP 2 have been developed. Directive 2006/88/EC focuses on risk based surveillance as both cost-effective and cost-efficient method to reveal the status of specific diseases in aquatic animal production. This implies the use of methods such as risk assessment and mathematical disease modelling which are generally well established in animal disease science. Risk profiling the specific disease threats should be a part of the different members/regions basic awareness.

As much as these methods focus on defined diseases there is also a need for a continuous flow of basic information to establish a general awareness of the unexpected as well as baseline knowledge of diseases both in aquaculture and in the wild. It is suggested that such information be gathered by making use of the people in the closest contact with the animals. These are field operators in the industry, fishermen etc. Possible psychological and social barriers for reporting should be identified and overcome. By encouragement and a systematic flow of information to inform the public of diseases in aquatic animals (campaigns) also emphasising the society's need for this information, interest and necessary competence may then be established to fulfil data collection to an adequate level of accuracy.

A technological platform facilitating data collection needs to be made easily available for reporting. Adequate scientific competence should then analyse the input data and through a communications system within EU linking competent authorities and laboratories, an alert could be flagged with the appearance of diverging results from base line in time and space. Such a system at EU level could facilitate a rapid coherent response involving specialized (outbreak) investigating teams for evaluation of the situation.

2.3.3 Summary of conclusions arising from WP3

- The epidemiology database provides comprehensive epidemiological information on the identified disease hazards and is designed in a way that permits the addition of information on other diseases.
- The general principles of surveillance for exotic diseases have been detailed.

2.3.4 Summary of recommendations arising from WP3

- To expand the range of diseases covered, to keep the information as up to date as possible, and to make it accessible to as wide an audience as possible, the database should be published as a free-access, peer-reviewed electronic journal.

2.3.5 Dissemination and use of results

Items identified for dissemination arising from WP3 include:

- The Deliverables, together with supporting information are submitted to the Commission appended to this report.
- The epidemiology database will be made available to the public via the PANDA website, and may be developed and expanded into a peer reviewed electronic journal in due course.
- The surveillance report will be made available via the website in due course.
- A peer reviewed publication detailing the development and structure of the database will be published in due course.
- A peer-reviewed publication on the surveillance scheme will be published in due course.

2.4 WP4: Diagnostic methods: evaluation and recommendations for standardisation and validation

2.4.1 Work package objectives

The overall objectives of this work package were to identify the optimal diagnostic methods currently available for the most serious diseases identified in WP2 and to provide recommendations for their standardisation and harmonisation procedures throughout Europe and for any needs to improve their accuracy, rapidity and applicability. The work package was lead by Partner 4 (CIDC-Lelystad), under the guidance of Partner 3 (IFREMER).

Table 7. WP4 deliverables

Del. No.	Deliverable name	Workpackage no.	Lead contractor
D8	Report on the current best methods for rapid and accurate detection of the main disease hazards and requirements for improvements and their eventual standardisation and validation.	WP4	CIDC
D9	Report identifying how to achieve harmonised implementation throughout Europe of the best diagnostic methods for the main disease hazards	WP4	CIDC

2.4.2 Progress towards these objectives

Five diagnosticians were selected to form a task force to assess the diagnostic methods available for the identified disease hazards.

- Olga Haenen, CIDC-Lelystad, Netherlands (WP4 leader)
- Inger Dalsgaard, Danish Institute for Fisheries Research, Denmark
- Niels Olesen, National Veterinary Institute, Denmark
- Jean-Robert Bonami, Université Montpellier, France
- Jean-Pierre Joly, IFREMER, France
- Isabelle Arzul, IFREMER, France

Tables detailing current available diagnostic methods, and their validation status, with literature references, were created for each of the identified disease hazards. These tables were put at the PANDA website to get input from network members. Additionally, the draft tables were sent to leading experts per pathogen, who provided comments and feedback. During the plenary PANDA workshops in Lelystad (April 2006) and Weymouth (March 2007), the WP4 results were discussed, and plans for making the reports were made.

The tables and discussions formed the basis of the two deliverable reports. It was concluded that there are many well-established tests for diagnosis of disease and detection of the pathogens identified by WP2, but that most laboratories in the EC are not familiar with many of these diseases or their diagnosis.

For fish diseases, especially for the recently listed aquaculture diseases in Directive 2006/88, acquisition of expertise into the EC, and training in screening and diagnostic techniques on the viruses Epizootic Haematopoietic Necrosis (EHN), Koi Herpes Virus Disease (KHVD), Epizootic Ulcerative Syndrome (EUS) was recommended. The Community Reference Laboratory (CRL) for Fish Diseases currently organizes workshops and ring tests for important and current EC listed viruses (Viral Haemorrhagic Septicaemia Virus (VHSV), Infectious Haematopoietic Necrosis Virus (IHNV) and Spring Viraemia of Carp Virus (SVCV)). Extension of the training and ring tests with the fish pathogens EHNV, KHV and EUS is advised. For the three mentioned fish bacteria, fast and accurate additional tests are needed for confirmation. For the four fish parasites, expertise is lacking in Europe for screening for these parasites, and typing them. However, as these parasites are not listed yet by EC or OIE, they have a lower priority.

The mollusc diseases and pathogens are well covered in expertise and training via the CRL for Mollusc Diseases, which organizes workshops on endemic and exotic important diseases and pathogens for NRL's. Furthermore, they already take the exotic pathogens into account in their ring test.

For the crustacean diseases, appointment of a CRL by the EC is necessary, and training on clinics and diagnosis of Yellowhead disease, White Spot Disease, and Taura syndrome should be provided. The task force furthermore recommended to develop wider expertise in testing for the non-WP2 listed crayfish plague (*Aphanomyces astaci)*, as this disease is a threat to crustaceans all over Europe.

The amphibian pathogens ranavirus and *Batrachochytrium dendrobatidis* (a fungus) are new to most laboratories. Appointment of a CRL for Amphibian Diseases by the EC is necessary, after which laboratories in member states should get expertise and skills in testing via training.

Many of the internationally available tests are non-validated, but as they are in daily use at some laboratories they are well established. However, these tests need validation and ring testing, after they have been implemented into European laboratories.

Several bodies are responsible for achieving harmonised implementation throughout Europe of the best diagnostic methods for the identified disease hazards: The European Commission, Community Reference Laboratories, and the National Reference Laboratories will have to put much effort and money, using the PANDA network and world wide experts, to get the necessary diagnostic expertise into Europe and to the CRL's, NRL's and regional labs. *Ad hoc* expert advisory groups will need to be appointed to prioritise these tasks. The PANDA network could be further used to achieve this in the future.

2.4.3 Summary of conclusions arising from WP4

- Suitable diagnostic tests exist for the detection of all of the identified disease hazards.
- Although these are not all fully validated, they are well established.

- European diagnostic laboratories are generally not familiar with most of the identified exotic disease hazards and their diagnosis.

2.4.4 Summary of recommendations arising from WP4

- CRLs for crustacean and amphibian diseases should be appointed as soon as possible.
- Implementation of the diagnostic tests in Europe for the diseases identified by PANDA and in the new Directive 2006/88 should be co-ordinated through the CRLs, but this is a large task which will take time and will need prioritisation.

2.4.5 Dissemination and use of results

Items identified for dissemination arising from WP4 include:

- The deliverables are submitted to the Commission appended to this report.
- A summary of the WP4 outputs will be produced in colour format for dissemination via the website.

2.5 WP5: Environmentally safe disease control strategies

2.5.1 Work package objectives

The overall objectives in this work package were to consider the currently available methods for the prevention, containment and treatment of the most serious diseases hazards identified in WP2, to identify those which are applicable in different production systems as well as being environmentally safe and to advise where research is needed to develop alternative measures to those which may have adverse effects on the environment. The work package was lead by Partner 7 (FEAP), under the guidance of the co-ordinator (CEFAS).

Table 8. WP5 deliverables

Del. No.	Deliverable name	Workpackage no.	Lead contractor
D10	Report on current best control and containment methods and assessment of their known or likely impact on the environment with recommendations for a strategy of improvement.	WP5	FEAP

2.5.2 Progress towards the objectives

Five main areas of relevance were identified:

- Antimicrobial chemotherapy
- Vaccine technology
- Antiparasitic treatments
- Genetic resistance
- Alternative treatments

A number of disease control specialists were selected to form a task force.

- Panos Christofilogiannis, FEAP, Belgium/Greece, (WP3 leader)
- Myriam Algoet, CEFAS, UK (Alternative treatments)
- Tony Ellis, FRS, UK (Vaccine technology)
- Pete Smith, NUIG, Ireland (Antimicrobial chemotherapy)
- Kurt Buchmann, RVAU, Denmark (Antiparasitic treatments)
- Pierre Boudry, IFREMER, France (Genetic resistance)

Later in the project, due to the lack of availability of some of the task force members, a new task force was formed which subsequently wrote the bulk of the report.

- Panos Christofilogiannis, FEAP, Belgium/Greece, (WP3 leader)
- David Verner-Jefferys, CEFAS, UK (Alternative treatments)
- Tony Ellis, FRS, UK (Vaccine technology)
- Pete Smith, NUIG, Ireland (Antimicrobial chemotherapy)

- Fotoni Athanasopoulou, Uo Thessalay, Greece (Antiparasitic treatments)
- Richard Paley, CEFAS, UK (Genetic resistance)

Disease cards (or chapters) were created individually for each of the disease hazards identified by WP2. These incorporate some summary text giving background information on the disease, in particular that of relevance to treatment and avoidance. They also list available treatment methods under four headings (vaccines, chemotherapy, immunostimulation and resistance breeding) with a fifth section detailing general husbandry practices of use in preventing or mitigating against the disease.

In addition to this, further chapters were researched and compiled on treatment methods (antimicrobial chemotherapy, biosecurity considerations, vaccination strategies, alternative treatments, antiparasitic treatments, advances in genetic resistance). These discuss the state of the art of these treatment methods in a general manner rather than with specific attention to the identified disease hazards. From these, knowledge gaps were identified and a comprehensive list of recommendations for future research and for the practical application of control measures was developed.

Aquatic animal health management is a wide complex area of research since disease impact depends on species, farming systems, environmental conditions and pathogen characteristics. Good husbandry and management practices at farm level shift the balance in favor of farmed animals against opportunistic or real pathogens and is in all cases the cornerstone of any successful health strategy. Appropriate water quality and stocking densities, correct feeding strategy and good hygiene standards as well as appropriate vaccination plans are factors that could play significant role in the improvement of farm health status. Quarantine involving thermal or chemical water disinfection is a necessary precaution for imports of live animals and gametes. Appropriate protocols for disinfection and sanitary handling and disposal of mortalities and appropriate methods for treatment of infected fish by products are essential to contain the disease in a farm or an area. Site selection and farm carrying capacity significantly influence disease patterns. Clean water supply or appropriate inlet water treatment as well as disinfection of the effluent water in land-based farms are important means of disease control. Quarantine protocols for imported broodstock, disinfection of eggs prior to introduction from reliable sources, minimised handling induced stress, year class separation, species appropriate stocking densities are significant factors affecting farm health management that are not well understood and are not supported by applied research. Parasitic biological cycle and intermediate hosts knowledge is paramount in effective prevention, containment and treatment of these pathogens. New options are occasionally made available and always the most environmentally friendly method should be utilised. Selection of disease resistant stocks does not always coincide with fast growing populations and selection for resistance to one disease might be associated with increased susceptibility to others. Fast growing families have also been proven more susceptible to disease. Multifactor genetic selection is very important in order to be relevant for the industry. Disease prevention by the application of vaccines and immunostimulants as well as alternative treatments, where applicable, have in recent years advanced reduced the risk from major especially bacterial diseases. Vaccines significantly reduce the need for chemotherapy, saving costs, and reducing problems such as antibiotic resistance and concerns over residual levels or

environmental impact. Definition of customised vaccination strategies with the selection of the right type of vaccines, application method and schedule to adapt to the epidemiology of the disease in the farm is important to alleviate pressure especially in culture and health management of new species. While vaccination, strictly speaking, is not applicable in the case of mollusc diseases because of the lack of antibodies, the use of chemotherapeutics may be relevant for aquaculture in some particular conditions such as hatchery-nursery, but is not practical in the natural environment.

The aim of this report is to illustrate the main areas of importance in terms of prevention, containment and treatment, not only for the diseases identified in WP2. While the focus in aquatic health management is on animal health and welfare, the compliance with current EU, state and regional legislation and the consumer safety is closely interlinked with the environmental future sustainability in terms of effects on the aquatic environment and the wild fauna as well as the aquaculture industry's economic viability.

2.5.3 Summary of conclusions arising from WP5

- Treatment methods for the identified disease hazards have been identified where available.
- Culture conditions conducive to healthy animals and good bio-security are important in preventing disease outbreaks.
- Effective vaccines are important tools for preventing specific diseases in vertebrates but their development and licensing is costly.
- Antimicrobials may be of use in certain situations, but should be used prudently and may have environmental consequences.
- Strains resistant to a certain disease may be more susceptible to another disease, or be slower growing, so multifactor genetic selection is important if genetic resistance is to be of use to industry.

2.5.4 Dissemination and use of results

Items identified for dissemination arising from WP3 include:

- The deliverable is submitted to the Commission appended to this report.
- The deliverable will be made available to the public via the project website in due course.

2.6 WP6: Training needs and opportunities in research and diagnostics

2.6.1 Work package objectives

The overall objectives of this work package were to identify current training opportunities and deficits in aquatic animal disease research and diagnosis, including the specific training needs identified in WP 2-5, and to provide recommendations for future training provisions within the EU, and Candidate States, to raise the skill base, and thus the standard of practice in aquatic animal disease research and diagnosis. The three focus areas of training were: test methods (disease diagnosis, validation, QA), epidemiology/risk analysis and environmentally friendly disease control measures. The work package is lead by Partner 6 (NUIG), under the guidance of the co-ordinator (CEFAS).

Table 9. WP6 deliverables

Del. No.	Deliverable name	Workpackage no.	Lead contractor
D5	Database of training opportunities in Europe for aquatic animal disease research and diagnosis	WP6	NUIG
D11	Report on knowledge gaps, training needs and strategies for increasing opportunities where necessary	WP6	NUIG

2.6.2 Progress towards these objectives

The following training experts contributed to WP6 task force activities:

- Maura Hiney, NUIG, Ireland
- Sandra Adams, University of Stirling, Scotland
- David Murphy, AquaTT, Ireland
- Hervê LeBris, University of Nante, France
- Kurt Buchmann, RVAU, Denmark
- Kantham Papanna, Nireus SA, Greece

A desk study of useful training and other internet links was undertaken. As anticipated, there was a significant amount of repetition between searches and web sites. Taskforce members, PANDA coordinator and subscribed experts were also invited to suggest additional links to training information and opportunities going forward. An initial database of training sites was uploaded to the PANDA website in February 2006, and was significantly enhanced over 2006. This database is now in its third iteration and contains over 60 links, most of which are portals, which in turn provide comprehensive information on and links to other relevant sites. The Database now contains sections on Training Information Portals, Specific Training Sites, General Resources for aquaculture and fisheries research and diagnostics and other useful links (e.g. to relevant industry and academic associations and reports). Additions to the database need to be ongoing to keep it up to date.

A survey on training needs and participation among aquatic animal health professionals was carried out over 2005/06. The focus of the survey was training in disease diagnosis, method validation and quality assurance, epidemiology, risk analysis and environmentally sustainable practices. The survey objectives were to:

- identify current uptake of training opportunities
- identify primary stakeholders
- identify primary delivery methods for training
- seek stakeholder experience on utility of, and access to, training (both for themselves and other stakeholder groups)
- seek stakeholder experience on current training deficits
- seek stakeholder opinion on best methods of training delivery.

The survey was primarily distributed in Europe and responses were received, in order of number, from researchers and regulatory personnel, aquaculture and allied services companies and professional associations.

Analysis of the data revealed that in terms of training participation, over 65% of responders had participated in training within the previous 6 months and this training consisted predominantly of short courses or conferences. However, 20% of responders had not participated in training in the previous 3 or more years, with time and money being the major reasons cited for non-participation. Occupation and location in Europe would also appear to have an impact on frequency of training and on the type of training undertaken. Responders own organisations played a key role in training provision, while international training bodies were an important applied training provider. Universities did not play an important role in training in these subjects

In terms of training needs, newer diagnostic methods for bacterial and viral diseases were the principle training needs identified. Epidemiology and risk analysis were also identified as training needs that are not been fulfilled at the moment. The majority of responders felt that the EU should have more involvement in training provision and formulation of policy around training. A fuller analysis of the data, along with input on training needs identified by other work package coordinators confirmed the preliminary findings.

2.5.3 Summary of conclusions arising from WP6

- A comprehensive links based database of training opportunities has been created.
- A survey of aquaculture professionals indicated the most common form of training undertaken was short courses/conferences, and the most important training providers were their own organisations and international training bodies.

2.5.4 Summary of recommendations arising from WP6

- More training opportunities in the newer diagnostic methods for bacterial and viral diseases, as well as in epidemiology and risk analysis are required.

2.5.4 Dissemination and use of results

Items identified for dissemination arising from WP6 include:

- The deliverables are submitted to the Commission appended to this report, and will be made available to the public via the website in due course.

2.7 WP7: Dissemination activities and reporting with recommendations to the Commission and other stakeholders

2.7.1 Work package objectives

The overall objectives of this work package were to stimulate scientific exchange and discussions in the network, disseminate project findings and to make recommendations to the Commission on policy issues and the maintenance of the network. This work package was led by the co-ordinator (CEFAS).

Table 10. WP7 deliverables

Del. no.	Deliverable name	Workpackage no.	Lead contractor
D1	Project website operational	WP7	CEFAS
D13	Periodic activity report (covering months 1-12)	WP7	CEFAS
D14	Periodic activity report (covering months 13-24)	WP7	CEFAS
Additional	Periodic activity report (covering months 25-36)	WP7	CEFAS
D15	Final activity report & Final periodic activity report (covering months 37-44)	WP7	CEFAS

2.7.2 Progress towards these objectives

The website was intended to be the communications hub of the PANDA network, and was designed with this in mind. Also, it is an important dissemination tool, and it is recognised that the more interesting and informative it is, the better it will be for stimulating interest and participation among network members. It has been continuously improved, revised and maintained throughout the project lifetime. It contains the following features:

- general information on the project and scientific workpackages
- online registration and searchable database of members
- discussion forums for the consortium, Steering Group, general members, each work package and for associated organisations
- online document editing facility
- selected publications (reports, newsletters etc)
- 'Whats new' page
- online calendar for consortium use
- links to related websites
- list of meetings
- online help form

Statistics of website usage are only available from 1st May 2006 when the website was reprogrammed using a different computer language. From this date to June 6th 2007, the site has attracted an average of 435 hits and 100 visits per day. Average visit time was 2 minutes and 35 seconds. Visits to the site originated from a total of 7476 unique IP addresses.

It was envisaged that scientific discussions on the online forums would gather momentum as the network membership reached a 'critical mass'. Usage of these forums has been very low despite the continual improvements to the system, and this method of seeking scientific opinion and feedback has been unsuccessful on the whole. The reasons for this are unclear.

Website maintenance requirements are minimal, but as Microsoft are constantly updating their platforms further changes to the website structure may be needed at some point in the future to integrate properly into new technologies. Additionally, ongoing vetting of new members is required.

All activity reports have been submitted to the Commission at the appropriate time.

In general, the dissemination activities of the project shifted from publicising of the project and network building at the start, to the dissemination of scientific findings in the latter stages. These have been accomplished by a variety of means as listed in Table 11. Plans for the further dissemination of project outputs are listed in this report under the relevant scientific work package.

Table 11. Specific dissemination activities

Date & venue	**Title**	**Presented at**	**By**	**Outcomes**
March 2004, Åbo, Finland	Overview of the PANDA project	ICES Working Group on Pathology and Diseases of Marine Organisms	CEFAS (Steve Feist)	Increased awareness of the project for members of the ICES Working Group on Pathology and Diseases of Marine Organisms.
June 2004, Brussels	Overview of the PANDA project	Annual meeting of the National Reference Laboratories for fish diseases	CEFAS (Barry Hill)	Increased awareness of the project for members of the Reference Laboratory Network.
June 2004, Brussels	Overview of the PANDA project	Annual meeting of the National Reference Laboratories for mollusc diseases	CEFAS (Barry Hill)	Increased awareness of the project for members of the Reference Laboratory Network.
March 2004, Budapest	The PANDA principle, and WP5 objectives	FEAP Presidents meeting.	FEAP (Panos Christofilogiannis)	Increased awareness of the project for members of the Federation of European Aquaculture Producers.
October 2004, Greece	The PANDA principle, and WP5 activities	Meeting of the Fish Health Commission of Greek Maricultures	FEAP (Panos Christofilogiannis)	Increased awareness of the project for members of the Fish Health Commission of Greek Maricultures.
25/10/04, Barcelona	Overview of the PANDA project	ASEM workshop in Aquatic Animal Health Improvement	CEFAS (Barry Hill)	As well as a general recommendation in the workshop report to support the development of cooperative networks in this field, it was recommended that ASEM members should be encouraged to join the PANDA network

February 2005, Ljubljana, Slovenia	Presentation and discussion of PANDA networking activities	TAIEX seminar on Networking on Aquatic Animal Health in Adriatic Countries	CEFAS (Barry Hill), DFVF (Ellen Ariel), IFREMER (Isabelle Arzul)	Increased awareness of the project and networking methods amongst Adriatic nations.
March 2005, La Tremblade, France	Presentation on the project and leaflet distribution & WP4 workshop	Meeting of the National Reference Laboratories for mollusc diseases	IFREMER (Isabelle Arzul & Jean-Pierre Joly) and CIDC (Olga Haenen)	Increased awareness of the project and network recruitment of experts on molluscan diseases
March/April 2005, Nairn, Scotland	Poster on the PANDA project	Society for Veterinary Epidemiology and Preventative Medicine	NVI (Edgar Brun)	Increased awareness of the project for epidemiologist attending the conference.
April 2005, Philadelphia, USA	Poster on the PANDA project and leaflet distribution	National Shellfish Association Congress	IFREMER (Isabelle Arzul)	Increased awareness of the project by experts in molluscan and crustacean diseases
May 2005, Hydra, Greece	Presentation on the PANDA principle, and WP5 activities	FEAP AGM, Hydra, Greece	CEFAS (Barry Hill)	Increased awareness of the project for Federation of European Aquaculture Producers
May 2005, Hydra, Greece	WP5 PANDA workshop	Associated with FEAP AGM, Hydra, Greece	FEAP (Panos Christofilogiannis)	Environmentally safe disease control strategies. Attracted an audience of 45 scientists and aquaculture technical managers
May 2005, Hydra, Greece	WP5 PANDA workshop	Circulated to FEAP member associations	FEAP (Panos Christofilogiannis)	Circulated to all (23) FEAP member associations in Europe – Dissemination of WP5 PANDA workshop proceedings.
June 2005, Arhus, Denmark	Pilot of WP6 Survey	Annual meeting of the National Reference Laboratories for fish diseases	CEFAS (Barry Hill)	Increased awareness of the project for members of the Reference Laboratory Network.
May 2005, The Netherlands	The EU PANDA project	Published in Aquacultuur, the branche bulletin (in Dutch)	CIDC-Lelystad (Olga Haenen)	Increased awareness of the project for the Dutch Aquaculture branch and related persons
June 2005, Arhus, Denmark	Presentations at session on risk analysis and epidemiology	Annual meeting of the National Reference Laboratories for fish diseases	IRTA (Chris Rodgers) and NVI (Edgar Brun)	Increased awareness of the project for members of the Reference Laboratory Network.
June 2005, Arhus, Denmark	Presentation at session on QA and training in disease diagnosis	Annual meeting of the National Reference Laboratories for fish diseases	CIDC (Olga Haenen)	Increased awareness of the project for members of the Reference Laboratory Network.
July 2006, Minneapolis, USA	Leaflet distribution	American Fisheries Society Eastern Fish Diseases workshop	CEFAS (Peter Dixon)	Increased transatlantic awareness of the project, network recruitment.
September 2006, Copenhagen, Denmark	Promotional stand, leaflets and newsletters	European Association of Fish Pathologists Conference	PANDA consortium	Recruitment of a large number of experts to the network.
October 2006, Brest, France	Poster presentation	8th International Conference on Shellfish Restoration	IFREMER (Isabelle Arzul)	Increased awareness of the project, network recruitment.

October 2006, Colombo, Sri Lanka	Presentation on the PANDA project and circulation of leaflets	Symposium on Diseases in Asian Aquaculture	CEFAS (Barry Hill)	Increased Asian awareness of the project, network recruitment.
December 2005	Survey on Training needs and opportunities	Web-based survey distributed to 1600 scientists, regulators, veterinarians, biologists and aquaculture practicioners	NUIG (Maura Hiney)	Increased awareness of the project for a wide range of stakeholders.
La Tremblade, France, March 2006	Diagnostic methods for mollusc diseases	Meeting of the NRLs for mollusc diseases	CIDC (Olga Haenen)	
Lelystad, Netherlands, April 2006	Preliminary WP6 Survey Data	PANDA coordinators and Task force members meeting, Lelystad, Netherlands	NUIG (Maura Hiney)	Increased awareness of the project for members of WP2-5 Taskforces and appraisal of PANDA coordinators.
May 2006, Aarhus, Denmark	Results of survey of training opportunities	Meeting of the NRLs for fish diseases	NUIG (Maura Hiney)	Increased awareness of the project for members of the Reference Laboratory Network.
May 2006, Aarhus, Denmark	Diagnostic methods for fish diseases	Meeting of the NRLs for fish diseases	CIDC (Olga Haenen)	Increased awareness of the project for members of the Reference Laboratory Network.
August 2006, Cairns, Australia	Promotional stand, leaflets and newsletters	International Symposiom for Veterinary Epidemiology and Economics	IFREMER (Isabelle Arzul), DFVF (Ellen Ariel), NVI (Edgar Brun)	Increased awareness of the project for epidemiologist attending the conference and recruitment of experts to the network.
August 2006, Cairns, Australia	Database of Epidemiological characteristics	International Symposium for Veterinary Epidemiology and Economics	Aristotle University, Thessaloniki (Marios Georgiadis)	Increased awareness of the database amongst epidemiologists attending the conference, with useful feedback from some exprets.
October 2006, Bregen, Norway	PANDA assessment of training needs and opportunities in aquatic animal health.	OIE Global Conference on Aquatic Animal Health	NUIG (Maura Hiney)	Increased awareness of the project for a broad range of stakeholders internationally
December 2006	Entry submitted to Marine Institute list of Marine Environmental research projects in Ireland	Will be included in European Directory for Marine Environmental Research Projects	NUIG (Maura Hiney)	Increased awareness of the project for a broad range of stakeholders internationally

March 2007, Weymouth, UK	Final PANDA workshop 'Progress report and future perspectives'	Entire workshop devoted to PANDA	All PANDA consortium members and also representatives of associated organisations	Dissemination of project results to key stakeholders, development of relationships with associated organisations, useful feedback on scientific findings

The draft findings of the scientific work packages were presented to invited network members (contributors) and key stakeholders (e.g. from DG SANCO, OIE, EFSA, FAO, EAFP, etc) and representatives from associated organisations at a 2 day workshop held at CEFAS Weymouth, UK on 19-21 March 2007. The programme and presentations are available to view on the PANDA project website.

The scientific deliverables and reports will be made available from the project website (following Commission approval where required). It would be desirable for printed copies of these reports to be circulated, but it was not possible to get them printed before the end of the project. If a mechanism for continuation of the project is found, the printing of these reports and their further dissemination will be a priority.

2.7.3 Summary of conclusions arising from WP7

- As a tool for the dissemination of information, and the building and hosting of a scientific network the PANDA project website has fulfilled its objectives.
- Forum usage by network members has been limited with little scientific discussion taking place but ways to overcome this have been identified and will be implemented if PANDA can be maintained by further funding support.
- All activity reports have been submitted as required.
- Many dissemination activities have taken place to publicise the project and help build the network and to disseminate scientific findings to stakeholders.

2.7.4 Summary of recommendations arising from WP7

There are no specific dissemination related recommendations. Specific major recommendations arising from the project as a whole have been assimilated and are listed in the summary of recommendations on page 6 of this report.

2.7.4 Dissemination and use of results

Plans for dissemination of final project findings have been developed and are listed by workpackage in the relevant section of this report.

3. Consortium management (WP8)

3.1 Work package objectives

The objective of this work package was the management of the project. This work package was led by the PANDA co-ordinator (CEFAS).

Table 12. List of deliverables under WP8

Del. no.	Deliverable name	Workpackage no.	Lead contractor
D16	Signed up consortium agreement	WP8	CEFAS
D17	Periodic management report (months 1-12)	WP8	CEFAS
D18	Periodic management report (months 13-24)	WP8	CEFAS
Extra	Periodic management report (months 25-36)	WP8	CEFAS
D19	Final management report and final periodic management report (months 37-44)	WP8	CEFAS

3.2 Progress towards these objectives

The consortium agreement was not signed by all partners. The reason for this is a clause indicating that in the event of default from the contract, the defaulting partner would be liable to reimburse up to double their project share. This was impossible for NUIG to accept (being a public body) and also unacceptable to DFVF. CEFAS management, who drew up the consortium agreement were not prepared to remove this clause. As a result, the agreement remained unsigned by NUIG and DFVF. Nevertheless, both NUIG and DFVF accept the consortium agreement in principle aside from the double liability clause. All other partners remained signed up to the original consortium agreement. No further attempts have been made to remedy the situation due to time constraints. The lack of a consortium agreement has not caused any problems.

All financial (management) reports have been supplied to the Commission as required, aside from a Form C covering months 25-36 from one partner (NUIG). Additionally, some complications have arisen due to the change of name of one institute (DFVF). These have been rectified in the final management report submitted with this report.

Good relations with associated organisations have been developed and maintained throughout.

The project was granted a no-cost extension of 6 months by the Commission so that the new project duration became 44 months. This extension was to allow further strengthening of the network and to find a financial mechanism to ensure its permanence.

3.3 Contractors

All participants performed to a high standard, and the project finished within budget, albeit with some slight delays in providing some deliverables. One concern with this method of working is that members of the task forces and sub-networks needed to contribute a relatively large amount of their spare time on a voluntary (unpaid) basis in

order to contribute to the PANDA project. Level of commitment to the project varies within the network, but in some cases this may result in delays due to their heavy (paid) official work commitments, which take a higher priority. Some workpackage leaders have reported that the majority of progress is made during task force meetings, and outside of these it can be difficult to maintain the momentum. Most leaders of the scientific work packages also found that there was insufficient personnel costs allocated for them to produce their deliverables to a standard with which they were satisfied within the allocated time.

3.4 Project timetable and status