

# Overseas Travel Report

## Development of International Scientific Partnerships and Insights into Technical Market Access for Shellfish

Belgium and France

June 2009

*Dr Catherine McLeod*



AUSTRALIAN  
SEAFOOD  
COOPERATIVE  
RESEARCH CENTRE

**Project No. 2007/782**



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## Executive Summary

This travel was supported by a Seafood Cooperative Research Centre (CRC) research travel bursary. The travel has enabled SARDI to continue to improve expertise in technical market access issues related to shellfish food safety, gain information of direct relevance to current Seafood CRC research projects and support Australian industries that benefit from knowledge and expertise in the shellfish safety area. Direct outcomes of the travel are:

- Ascertaining the future direction of European shellfish food safety regulation and emerging and current technical barriers to trade.
- Identifying and disseminating potential export opportunities for Australian oyster producing companies.
- Identifying novel methods of marketing live oysters.
- Raising the international profile of the Australian shellfish sector through: (a) disseminating current Seafood CRC research at an international conference; and (b) securing Australia as the host country for the 9<sup>th</sup> International Conference on Molluscan Shellfish Safety (ICMSS) in 2013.
- Identifying potential new areas of international scientific synergy and collaboration between Australia, France and the UK.

## Travel Objectives

The purpose of this travel was to:

- Deliver two presentations at the International Conference on Molluscan Shellfish Safety on:
  - (a) the Seafood CRC project on human enteric viruses in shellfish (2008/741.1); and
  - (b) International guidance on the regulation of putative marine biotoxins.
- Present a bid for the 9<sup>th</sup> International Conference on Molluscan Shellfish Safety to be held in Australia in 2013
- Meet with the European Commission staff in Brussels to discuss technical barriers to trade including:
  - (a) future market access for Australian abalone to the European Union; and
  - (b) potential new marine biotoxin requirements for bivalve molluscs.
- Meet with bacteriological and virological representatives of the European Commission Community and National Reference Laboratories to discuss future regulatory and laboratory requirements for seafood.
- Meet with oyster industry representatives and testing laboratories in Archachon and Sete to discuss current and past food safety issues and risk management approaches.

## Overview

In September 2008 SARDI employed a post doctoral scientist (Shellfish Food Safety) via funding provided by the Australian Seafood CRC. Key deliverables of the post doctoral scientist are to:

- (a) Increase diagnostic capability for shellfish contaminants (chemical and microbiological); and
- (b) To improve overseas market access for Australian shellfish by resolving current, on-going and future food safety related technical barriers to trade.

In April 2009 SARDI was contracted by the Seafood CRC to undertake research to support market access of abalone to the European Union (Market Access for Abalone: Seafood CRC Project 2008/909). In order to gain information on the technical barriers to trade and assist the abalone industry's desire to regain market access to the EU a meeting was held between Dr Catherine McLeod (Post Doctoral Scientist, Shellfish Food Safety, SARDI) and Dr Paolo Caricato (DG SANCO, European Commission, Health and Consumers Directorate-General, Directorate E - Safety of the Food Chain) on 11 June 2009 in Brussels. Informal agreement was reached that the current implementation of the EC mollusc legislation is a problem for the Australian wild capture abalone sector and is likely inappropriate relative to the risk. The EC suggested that the approach used to manage marine biotoxins for the capture scallop industry would be more appropriate. Follow up to this meeting will involve submission (industry and AQIS agreed) of data gained through Project 2008/909 to the European Commission to assist in regulatory decision making and facilitate market access of wild capture abalone to the EU.

The biennial ICMSS is the premier event for shellfish safety issues where industry, regulators and scientists come together to discuss emerging food safety trends and challenges, regulatory management issues, research outcomes, new analytical techniques and research priorities. The 2009 conference was attended by 249 delegates from 30 countries spread across all continents. There were 18 separate sessions covering all aspects of shellfish food safety consisting of 71 oral presentations and 117 posters. A notable theme from this conference was that researchers from a number of countries reported on developments in the use of real-time PCR as an analytical tool for the detection of pathogenic viruses, pathogenic strains of *Vibrio* species, toxic strains of phytoplankton and as a tool for faecal source tracking in shellfish production areas. Regulators and industry are also beginning to routinely apply these techniques to assist in management of food safety risks. One extraordinary aspect of the conference was the demonstration staged by the French Shellfish Producers Association (CNC) to protest against on going production area closures caused by false positive results in the regulatory mouse bioassay test for biotoxins (Figures 1 and 2). The demonstration involved 'storming' the conference venue, release of multiple smoke bombs and the presence of riot police to quell the mob.

Following the eventful conference, several field trips were undertaken to oyster and mussel production areas on both the Atlantic and Mediterranean coasts, and meetings were held between Australian regulators, scientists and industry members and various French oyster industry representatives and research providers. Discussions focussed on oyster production techniques in France, current disease and water quality issues facing the French industry (notably high mortality rates and false positive biotoxin results) and French research activities related to shellfish safety. The French oyster industry is currently experiencing significant mortalities of juvenile pacific oysters, approaching 100% in some areas. The fact that the deaths are being experienced across a number of geographically diverse production areas suggests that the cause is a disease outbreak. The French research organization IFREMER is devoting significant resources into researching the cause of the problem and potential solutions for industry. However, with a 3 year production cycle and few juvenile oysters currently surviving through the first year the French oyster industry is in a desperate state. If a solution cannot be found and implemented soon, French oyster production of ~140,000 metric tons per annum worth EU\$518M is likely to decrease markedly. This may provide significant export opportunities for Australian oyster producing companies over the next few years.

Summaries of the travel itinerary (Appendix One), key contacts made (Appendix Two), meeting notes (Appendix Three), and a copy of the International Conference on Molluscan Shellfish Safety programme (Appendix Four) are included.

**Figure 1: Demonstration by French Oyster Producers Association, Nantes, France**



**Figure 2: Demonstration inside conference venue**



## Benefits from Travel

The following sections detail the benefits from this international travel.

### Benefits to Shellfish Food Safety Science in Australia

This travel has assisted Australia to maintain a high level of recognition for its capability in risk assessment and food safety research, both nationally and internationally. Specific outcomes of the travel were:

- Promotion of Seafood CRC research projects, especially projects focussed on viruses in shellfish, market access for abalone and pinnatoxin related work. This was facilitated through two presentations by Dr McLeod at the ICMSS and a series of pre and post conference meetings.
- Information exchange with key international regulators and researchers to assist in current Food Safety research projects (e.g. Market Access for Abalone: Seafood CRC Project 2008/909).
- Identification of potential areas of collaborative research between French and UK research providers and Seafood CRC researchers (particularly in the area of human enteric virus research)

Discussions with key staff from the French National Reference Laboratory for Bacteriological and Viral Contamination of Bivalve Molluscs (IFREMER) and from the Community Reference Laboratory for Bacteriological and Viral Contamination of Bivalve Molluscs (CEFAS, UK) have shown opportunities where collaborative research/science may be undertaken in Australia and France/UK. In particular:

1. The UK and Australia utilise similar methodologies for human enteric virus detection in shellfish. Potential for an inter laboratory study to investigate method comparability between Australia, the UK and other countries was discussed. This project would support and underpin trade access for the Australian shellfish sector. Such collaboration will assist the Seafood CRC to develop a National Reference Laboratory for Viral Contamination of Shellfish within Australia (limited capacity for this currently).
2. Joint expertise in the biology of virus uptake, retention and elimination from shellfish was identified. Synergistic research in this topic area could be addressed by an exchange of French and Australian researchers to work on related projects. Funding to support these activities may be able to be obtained through the French Australia Science and Technology Program (International Science Linkages, DAFF).

### Benefits to Australian Shellfish Industry

The knowledge and experience gained during this overseas travel assists in enhancing the productivity and sustainability of Australia. Specific outcomes from this travel that directly benefit the Australian shellfish industries include:

- Ascertaining the future direction of European shellfish food safety regulation. Assists in minimising technical barriers to trade and allowing ease of export of shellfish to Europe
- Identifying potential export opportunities for Australian oyster producing companies (French oyster production is likely to decrease markedly over the next 1-3 years, this may provide significant export opportunities for Australian oyster producing companies).
- Identifying novel methods of marketing live oysters (see Appendix 3 for notes on the 'Staylive Oyster Bar' system).
- Raising the international profile of the Australian shellfish sector through: (a) disseminating current Seafood CRC research at an international conference; and (b) securing Australia as the venue for the 9<sup>th</sup> International Conference on Molluscan Shellfish Safety.
- Identifying potential new areas of international scientific synergy and collaboration between Australia, France and the UK.

## Recommendations and Actions

- SARDI Food Safety to confirm with the European Union Community Reference Laboratory (UK) regarding collaboration on an inter-laboratory study for norovirus and HAV in shellfish.
- When completed submit abalone project data (CRC project 2008/909) to DG SANCO, European Commission (with AQIS and industry agreement) to assist in the revision of European legislation pertaining to gastropods.
- Seek Seafood CRC funding to support the peer review of the EFSA opinions on marine biotoxins, commission the peer review work and submit the reviews to DG SANCO, European Commission in September 2009.
- Communicate with key members of the Australian oyster industry (via ASQAAC and industry AGM's) regards:
  - (a) The method of selling oysters 'direct' to the public in France; and
  - (b) The large gap in oyster availability in France over the next two years and potential market opportunities; and
  - (c) The 'Staylive oyster bar' system for maintaining and promoting the sale of live oysters.
- Exchange specific ideas regarding collaboration with French researchers (IFREMER) on norovirus/shellfish related projects. Seek funding to support the potential collaborative research programme through the International Science Linkages fund (DAFF).
- Facilitate the organisation and promotion of the International Conference on Molluscan Shellfish Safety in Sydney, Australia in 2013. Seafood CRC participants (SARDI and UTAS) to hold the Chair of the 2013 Conference.



## Appendix One – Travel Itinerary

Dates	Brief Purpose	Location / Destination
08 - 10 June 2009	Travel to Belgium	Brussels
11 June 2009	Meeting with European Commission re market access issues (note: Australian attaché no longer stationed in Brussels so not able to meet)	Brussels
12/13 June 2009	Travel to France Finalise presentations for ICMSS conference.	Paris
14 -19 June 2009	International Conference on Molluscan Shellfish Safety. Meetings with IFREMER (lab 1) and EU Community Reference Laboratory, CEFAS.	Nantes
20 June	Drive to Archachon	Archachon
21-22 June	Visit to oyster production areas. Meeting with IFREMER (lab 2), Archachon.	Archachon
23 June	Travel from Archachon to Sete (~5 hr drive)	Sete
24 June 2009	Meeting with IFREMER (lab 3)	Sete
25 June 2009	Meeting and field visit with French oyster producers	Sete
26 June	Visit to mussel production area in Leucate	Sete
27 – 30 June	Recreational Leave (2 days)	Sete
1-4 July	Travel from Sete, Carcassonne, London, Singapore, Adelaide (lost day in transit due to time differential)	Adelaide

## Appendix Two – Key Contacts

Dr Paolo Caricato	DG SANCO, European Commission Health and Consumers Directorate-General, Directorate E - Safety of the Food Chain	Paolo.Caricato@ec.europa.eu
Dr David Lees	Director of the European Community Reference Laboratory for Monitoring Bacteriological and Viral Contamination of Bivalve Molluscs, CEFAS, Weymouth, UK	D.N.Lees@cefasc.co.uk
Dr Rachel Rangdale	Community Reference Laboratory Co-ordinator, CEFAS, Weymouth, UK	rachel.rangdale@cefasc.co.uk
Ms Dorothy Leonard	Ocean Equities, Maryland, USA	msmussel@oceanequities.org
Mr Phil Busby	Senior Program Manager, New Zealand Food Safety Authority	phil.busby@nzfsa.govt.nz
Dr Philipp Hess	Directeur de Département, Environnement, Microbiologie & Phycotoxines Ifremer, Nantes, France	Philipp.Hess@ifremer.fr
Dr Roger Kantin	Director Arcachon, IFREMER.	Roger.Kantin@ifremer.fr
Mr Jean Charles Mauviot	Director, Section Regionale Conchylicole Arcachon Aquitaine, Arcachon, France	srcarcachon@yahoo.fr
Ms Annie Castaldo	Director, 'Ultra Marine', Marseillan, France	annie.castaldo@wanadoo.fr
Dr Thierry Laugier	Head of Laboratory, Environment Resources of Languedoc-Roussillon, IFREMER, Sete, France	thierry.laugier@ifremer.fr
Dr Valerie Derolez	IFREMER, Sete, France	valerie.derolez@ifremer.fr
Mr Laurent Brignone	Sealife Equipment (Pty) Ltd., Somerset West, South Africa	laurent@sealife.co.za

## Appendix Three - Meeting Notes

The following is an account of the major meetings held. Outcomes requiring follow up action are detailed in the 'Recommendations and Actions' section of this report.

### 1. 11<sup>th</sup> June 2009. Brussels, Belgium.

**Present:** Dr Catherine McLeod (SARDI) and Dr Paolo Caricato (DG SANCO, Directorate General for Health and Consumer Affairs), European Commission.

**Meeting Objective:** To discuss (1) future market access for Australian abalone to the European Union and (2) potential new (European Food Safety Authority) marine biotoxin requirements for bivalve molluscs.

#### Meeting Notes:

##### Abalone Requirements

- Agreed that implementation of the bivalve mollusc legislation was a problem for capture abalone and inappropriate due to lower level of risk.
- PC raised the possibility of derogation similar to pectinidae (scallops), whereby a sample is tested upon landing and after processing (no production area classification testing).
- ***PC noted that while the Commission believe that an approach similar to scallops could be taken for abalone they lack data to support this. Particularly data on the distribution of toxins in abalone. He welcomed information gained through the CRC project to assist in revising their legislation.***
- PC offered the input of the EU Community Reference Laboratory on biotoxins into our project.
- PC agreed that any research we undertake should utilise an official EU method of testing, such as the Lawrence HPLC method.
- PC noted that there was very little in the literature on abalone intoxication so any information we can provide will assist the Commission to revise their legislation.
- Agreed that it will be important for the Commission to have information/data on where toxin is located in abalone.
- PC mentioned a species of cockle in the EU where cooking is accepted as a control step to reduce toxin levels.

##### European Food Safety Authority (EFSA) Opinions on Marine Biotoxins

- PC provided a pre-release summary of the EFSA opinions to date.
- 9 Opinions to be done in total.
- PC view that the EFSA opinion on cyclic imines may not include an assessment of pinnatoxins at this stage. The Commission may look at pinnatoxins separately from EFSA.
- The 'current toxin' opinions (okadaic acid, azaspiracid, yessotoxins, saxitoxin, pectenotoxin and domoic acid) will all be finalised by EFSA by the end of July 2009. The Commission is convening a Working Group comprising representatives from the EU Member States in September 2009 to discuss the opinions and recommend changes to regulation.
- The EFSA opinions on 'new toxins' (cyclic imines, brevetoxins, palytoxins) will be completed by December 2009. Consultation with the Member States will be undertaken soon thereafter.
- PC noted that he did not personally agree with the 400 g portion size used in the EFSA opinions and that a portion size of 250 g seemed more reasonable to him. He expressed a personal opinion that the current levels for marine biotoxins seemed to protect human health and that he would be in favour of the maintenance of the status quo with respect to the current levels.

- **PC welcomed Australian input into the consultation process at any time and noted that our input may support his efforts to maintain the current marine biotoxin levels, as this was a decision for the 27 member states. To effectively influence this process input would be required by September 2009.**
- With respect to potential changes in analytical methods, PC is hopeful that the legislation can be altered soon to remove the lipophilic mouse bioassay. However, he does not believe that single laboratory validation of alternative analytical methods is acceptable – new methods must be validated in an inter laboratory study.
- PC noted that he did not agree with laboratories making modifications to the EC approved Lawrence method for PSP toxins e.g. CEFAS.
- PC noted that the lipophilic mouse test may need to be retained as the reference method for developing countries.

#### Norovirus

- PC not convinced that bacteriophage will work as an indicator for viruses
- PC noted that norovirus testing by real time PCR is not as much of certainty as CEFAS imply.
- We discussed the application of norovirus testing on a risk basis in shellfish growing areas and there was general agreement with this approach.
- **PC noted a need for hard data on the actual numbers of norovirus outbreaks related to shellfish consumption.**

#### Vibrio

- PC noted that Vibrios are not seen by the Commission as a human health problem for Europe.
- PC conceded that it may become a legislative problem for Europe in the future.

## **2. 17<sup>th</sup> June 2009. Nantes, France.**

### **Present:**

- Dr David Lees (Director of the European Community Reference Laboratory for Monitoring Bacteriological and Viral Contamination of Bivalve Molluscs, CEFAS, Weymouth, UK)
- Dr Rachel Rangdale (Community Reference Laboratory Co-ordinator, CEFAS, Weymouth, UK).
- Dr Catherine McLeod (SARDI) (Meeting Chair)
- Mr Ken Lee (SASQAP, PIRSA)
- Mr Anthony Zammit (Shellfish Manager, NSWFA)
- Mr Ray Brown (Shellfish Manager, Tasmanian Dept of Health)
- Mr Tony Troup (Camden Haven Oysters, NSW Oyster Grower)
- Ms Judith Fernandez (University of Tasmania)
- Ms Brenda Hay (AquaBio Consultants)
- Ms DJ McCoubrey (Aquaculture New Zealand)
- Mr Phil Busby (Senior Program Manager, New Zealand Food Safety Authority)
- Ms Dorothy Leonard (International Advisory Committee, ICMSS)

### **Meeting Objective**

To gain up to date information on: (a) state of the art detection methods for viruses in shellfish (which is a key goal of CRC project 2008/741.1) used in Europe; and (b) future direction of regulation of

viruses in shellfish in the European Union in order to assist the Australian shellfish industry in overcoming technical barriers to trade.

### Meeting Notes

- The management of shellfish production areas after viral related human illness outbreaks was discussed. There was general agreement that the most important aspect is to ensure that all the pollution sources have been identified and if necessary fixed.
- DL mentioned that norovirus testing after outbreaks is not mandated in Europe or necessarily undertaken in a voluntary manner either.
- DL noted that the EU Community Reference Laboratory had attempted to introduce bacteriophage as a routine monitoring tool in production areas but the Member States (MS) voted against this. He further noted that the system of MS agreement in Europe made it difficult to implement changes.
- DL commented that it may be possible that bacteriophage could be re-visited as a tool to be used immediately after sewage spills.
- The Kalang River closures were discussed and the requirements for norovirus testing to be undertaken (3 clear rounds). DL and RR were supportive of this approach and noted that this guidance may be included in the Codex Code of Hygienic Practise for viruses.
- **DL noted that the EU CRL method for norovirus is currently being validated through CEN and will likely become a 'Standard Method' by 2012.**
- DL noted that the European legislation currently states that norovirus testing may become mandated for shellfish if a standard method is available.
- RR noted that *Vibrio* is not a huge problem in Europe, though there are pathogenic strains and a low level of illness has been associated with *Vibriosis* (particularly in France). She noted that it is likely that *Vibrio* related illness is under reported (similar to norovirus) as in healthy individuals symptoms are minor (e.g. diarrhoea).
- RR described that there are currently two commonly used *Vibrio* methods in Europe. One is a membrane hybridisation based method and the other is a real time RT-PCR method.
- RR noted that real time RT PCR methods are advantageous in some ways over the membrane hybridisation method as they distinguish pathogenic and non pathogenic strains of *Vibrio*.
- RR noted that the EU CRL have undertaken method comparison studies comparing the European Union real time RT PCR method and the US FDA method and have found that the EU method performs better and detects a wider range of strains.
- RR expressed hope to have one ISO standard PCR method.
- **RR and DL agreed to provide SARDI with the pre release norovirus CEN method (standard operating procedures) and collaborate on an interlaboratory study for norovirus and HAV.**

### 3. 21-22 June 2009. Arcachon, France.

#### Present:

- Dr Philipp Hess, Directeur de Département, Environnement, Microbiologie & Phycotoxines IFREMER, Nantes, France
- Dr Roger Kantin, Director Arcachon, IFREMER.
- Jean Charles Mauviot, Director, Section Regionale Conchylicole Arcachon Aquitaine
- Dr Catherine McLeod (SARDI) (Meeting Chair)
- Mr Ken Lee (SASQAP, PIRSA)
- Mr Anthony Zammit (Shellfish Manager, NSWFA)

- Mr Ray Brown (Shellfish Manager, Tasmanian Dept of Health)
- Mr Tony Troup (Camden Haven Oysters, NSW Oyster Grower)
- Mr Douglas McLeod (Glenelg Shellfish Ltd.)

#### Visit Objective:

To learn more about shellfish production methods and shellfish safety issues on the Atlantic Coast of France, ways in which key issues have been dealt with, and identify opportunities for the Australian shellfish sector.

#### Visit Notes:

- Undertook visits to the oyster, mussel and cockle production areas, including identification of potential pollution sources via boat. A meeting with the shellfish industry association representative, IFREMER staff, and the Australian delegation was held. A visit to the IFREMER laboratories in Arcachon was also undertaken. The following are notes made during these visits and meetings.
- The production area of Arcachon produces approximately 10,000 tonnes of market sized oysters/annum, there are approximately 350 different companies that operate in the area with 1000 employees that work directly in the industry. Oysters are produced primarily using purse type systems (Figure 3).
- The area also is a major producer and supplier of spat to oyster production areas on both the Mediterranean and Atlantic coasts.
- While the majority of production is oysters, there is also some commercial gathering of cockles and mussel production.
- Approximately 150,000 people permanently live around the production area (harbour), however these numbers increase to around 500,000 during the summer months (Figure 4). The sources of pollution in the production area were numerous and diverse (sewage treatment plant, recreational boats, bathers, numerous birds etc) and on the day we were taken around the area by boat we could smell sewage in some areas.
- Despite the numerous sources of pollution the production area is divided into several different microbiological classifications with some parts enjoying a category A classification.
- The harvested oysters are sold throughout France but one interesting aspect is that there are many 'shacks' around the harvesting area through which the industry directly sell oysters to the public. Often the oysters are maintained in tanks of seawater at the shacks (wet storage). The public is able to taste the oysters at the shacks accompanied by a drink. The group experienced the direct selling method at the 'La Cabane de L'Aiguillon' hosted by IFREMER (Figures 5 and 6). ***This 'direct' to public method of selling (e.g. tasting etc) is one aspect that could be further exploited in the Australian situation and gives an opportunity to increase the interaction between consumers and industry.***
- We were informed that a key issue that the Arcachon industry is facing at the moment are false positives in the regulatory mouse bioassay for lipophilic toxins resulting in prolonged closures of the production area. These false positives occur periodically every year, because harvesting occurs year round. The closures have a profound effect on the industries productivity.
- The false positives have only been obtained for oysters from the area, not for mussels or cockles. The mice die with death times >10 hours, chemical analysis (e.g. HPLC and LCMS) have not revealed any known compounds.
- IFREMER and other French research agencies have a large research programme to try and establish what is causing the false positive results. To date they have not been able to determine the causative agent. The false positives are unlikely to be caused by pinnatoxins due to the lengthy death times involved.

- Similar to the Australian industry, the French oyster industry would like to utilise an alternative test method to the mouse bioassay, however apparently there is resistance to this from the French authorities (IFREMER and AFSSA).
- Testing facilities at IFREMER, Arcachon include mouse bioassay capability, basic microbiological equipment and testing capability, and a phytoplankton analysis laboratory. A current research project being undertaken in Arcachon focuses on the development of fully automated phytoplankton counting and speciation system. It is estimated that this system will be fully operational within the next 12 months and it will significantly reduce the lengthy analysis times.

**Figure 3: 'Purse' oyster culture in Arcachon**



**Figure 4: Oysters growing amongst populus in Arcachon**





**Figure 5: Oyster 'shack' in Arcachon**



**Figure 6: Wet storage facility at oyster shack in Arcachon**



**4. 24<sup>th</sup> – 26<sup>th</sup> June. Marseillan, Sete and Leucate, France.**

**Present:**

- Dr Thierry Laugier, Head of Laboratory, Environment Resources of Languedoc-Roussillon, IFREMER, Sete, France
- Dr Valerie Derolez, IFREMER, Sete, France
- Mr Laurent Brignone, Sealife Equipment (Pty) Ltd., Somerset West, South Africa



- Ms Annie Castaldo Director, 'Ultra Marine', Marseillan, France
- Dr Catherine McLeod (SARDI) (Meeting Chair)
- Mr Anthony Zammit (Shellfish Manager, NSWFA)
- Mr Tony Troup (Camden Haven Oysters, NSW Oyster Grower)
- Mr Douglas McLeod (Glenelg Shellfish Ltd.)

**Visit Objective:** To learn more about shellfish production methods and shellfish safety issues in the lagoon systems on the Mediterranean coast of France, ways in which key issues have been dealt with, and identify opportunities for the Australian shellfish sector.

#### Visit Notes:

- Undertook visits to the oyster and mussel production areas in the Thau Lagoon (Sete and Marseillan) and the Leucate Lagoon, including boat trips to investigate the unusual growing methods utilised. Several meetings with shellfish industry representatives, IFREMER staff, and the Australian delegation were held. A visit to the IFREMER laboratories in Sete was also undertaken. The following summarises notes made during these visits and meetings.
- A visit and boat trip out to oyster and mussel growing sites was undertaken at Marseillan (near Sete on the Thau Lagoon). The method of growing oysters is different to methods used in Australia. Juvenile oysters are cemented onto long lines (droppers) in groups of three and then grown sub tidally (there are only very small tidal fluctuations in the lagoon systems on the Mediterranean coast). Mussels are predominantly grown on droppers. Figures 7, 8 and 9.
- The Thau Lagoon has typically produced around 10-12,000 tonnes of oysters per annum.
- ***One key issue for the industry in recent years has been a high level of oyster mortality with 80 – 90 % of juvenile oysters dying through a number of significant growing areas in France. This is causing significant hardship for the industry with massive reduction in productivity, and there is likely to be a very large gap in oyster supply. This is likely to provide significant export opportunities for Australian oyster producing companies over the next few years.***
- Two years ago around 60 % of the oyster spat was triploid and obtained from hatcheries with 40 % being naturally collected spat from the Arcachon production area. Because of the recent high mortalities the industry are now favouring natural spat from the Arcachon area.
- Birds roosting on the infrastructure have been a big problem with high *E. coli* levels being correlated with key roosting areas.
- ***A demonstration of the processing (harvesting, cleaning, grading) methods was given. One novel aspect of operations was the use by one oyster company of the 'Staylive Oyster Bar'. This system can keep oysters (up to 500) alive for several months, in prime condition, and 'in specification' microbiologically. The system is tank based and designed in an attractive manner for use in restaurants, retail shops etc. More information on this system can be found at: <http://www.sealife.co.za/index.html>. This system offers a new marketing opportunity for the Australian oyster industry.***
- The IFREMER Sete laboratory has marine biotoxin testing capability and a microbiological laboratory for shellfish work.
- Their main research focus at the present time surrounds the problems of high oyster mortalities in the Thau Lagoon. The fact that the deaths are being experienced across a number of geographically diverse production areas suggests that the cause is a disease outbreak, however it is still unknown what the causative agent is.
- 10 % of Pacific oysters in the Thau Lagoon have been found to be resistant to the mortality problem. Therefore IFREMERs research effort is focussed on the development of a breeding programme for mortality resistant oysters. They are also undertaking molecular and microbiological analysis of the oysters to try and determine the causative agent for the disease. They believe the most probable causative agent is a virus.

- Similar disease outbreaks in oysters have occurred previously in Australia and potential exists for similar events in the future. Key contacts at IFREMER Sete may be of value to the Australian industry for developing solutions if these issues emerge.

**Figure 7: Oyster 'tables' in the Thau Lagoon**



**Figure 8: Oysters growing on a dropper in the Thau Lagoon**



**Figure 9: Oyster tables in the Thau Lagoon**



## Appendix Four – Conference Programme



7 <sup>th</sup> International Conference on Molluscan Shellfish Safety / ICMSS09 - Session plan Cité Internationale des Congrès, Nantes, France, 14 <sup>th</sup> - 19 <sup>th</sup> June 2009			Duration
<b>SUNDAY 14<sup>th</sup> JUNE</b>			
	05.00 - 06.30 pm	Registration	1h30
	06.30 - 08.00 pm	Welcome Cocktail Party Cité Internationale des Congrès, Nantes	1h30
<b>MONDAY 15<sup>th</sup> JUNE</b>			
	08.00 - 09.00 am	Registration (continued)	1h00
<b>SESSION 1</b>		<b>Chairman : Patrick Lassus</b>	<b>Introduction</b>
	09.00 - 09.40 am	P.Lassus, J.Y.Perrat, and local representatives	Opening ceremony
	09.40 - 10.10 am	L.Ababouch (keynote)	International initiatives to promote shellfish safety
	10.10 - 10.30 am		Coffee break
<b>SESSION 2</b>		<b>Chairman : Joe Silke</b>	<b>Toxicology</b>
	10.30 - 11.00 am	T. Aune (keynote)	Oral toxicity of mixtures of lipophilic marine algal toxins in mice
	11.00 - 11.20 am	J.A.Aasen	Distribution of Azaspiracid-1 alone and in combination with Yessotoxin as measured by LC-MS/MS in different tissues of NMRI mice during an oral toxicity study
	11.20 - 11.40 am	G.P.Rossini	Proteomic approaches to the characterization of the modes of action of marine biotoxins and the identification of biomarkers of algal toxin contamination in shellfish
	11.40 - 12.00 am	M. Gueguen	First approach to the localization of lipophilic toxins in mussel digestive gland
	12.00 - 12.20 pm	N. Rutz	Potential synergistic toxicity of peptaibols produced by marine strains of <i>Trichoderma</i> sp with domoic acid
	12.20 - 01.40 pm		Lunch
<b>SESSION 3</b>		<b>Chairman : Tore Aune</b>	<b>Atypical toxicity and emerging toxins</b>
	01.40 - 02.10 pm	P. Hess (keynote)	Of mice and mussels : performance of the EU harmonised mouse bioassay for azaspiracides and case studies of atypical toxicities
	02.10 - 02.30 pm	D. Mackenzie	Bioassay guided fractionation and identification of the agent responsible for the atypical toxicity seen in the UK's DSP MBA
	02.30 - 02.50 pm	R.De la Iglesia	Evaluation of DSP Mouse Bioassay Positive Mussel Samples ( <i>Mytilus galloprovincialis</i> ) from the NW Mediterranean with LC-MS/MS, Cell-based Assays and Phosphatase Inhibition Assay
	02.50 - 03.10 pm	J.P.Antignac	Development and application of a metabolomic approach based on liquid chromatography coupled to high resolution mass spectrometry as new screening tool for assessing toxicity in oysters





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	03.10 - 03.30 pm	R. Biré	The National Program Arcachon: towards the elucidation of the unexplained positive results in the mouse bioassay observed in 2005 and 2006 as part of the routine monitoring for lipophilic marine biotoxins in shellfish harvested in the bay of Arcachon	0h20
	03.30 - 03.50 pm	C. McLeod	Detection of potential toxins and guidance on regulation	0h20
	03.50 - 04.20 pm		Coffee break	0h30
<b>SESSION 4</b>		<b>Chairwoman : Rowena Linehan</b>	<b>Marine Biotoxins detection methods</b>	
	04.20 - 04.50 pm	<b>L.M. Botana</b> (keynote)	<b>Alternatives To Bioassay: Detection And Quantification Of Gymnodimines And Spirolides By Fluorescence Polarization</b>	0h30
	04.50 - 05.10 pm	J.P.Lacaze	Advances in Solid-phase Adsorption Toxin Tracking (SPATT) for Detection of Toxins Produced by <i>Alexandrium</i> Species	0h20
	05.10 - 05.30 pm	R.MacCarron	A certified reference material (CRM) for the analysis of multiple groups of shellfish toxins	0h20
	05.30 - 05.50 pm	W. Higman	The Production of Paralytic Shellfish Poison Reference Materials by Mass Culture of Toxic Algae and Shellfish Feeding Experiments for Method Validation Studies	0h20
	06.50 - 11h15 pm		<b>Tour and buffet at La Plessisière : 'The story of wine'</b> La Chapelle-Heulin	4h25
<b>TUESDAY 16<sup>th</sup> JUNE</b>				
<b>SESSION 5</b>		<b>Chairman : David Lees</b>	<b>Norovirus and enteric viruses</b>	
	09.00 - 09.30 am	<b>G. Richards</b> (keynote)	<b>Pursuit of methods to propagate <i>Norovirus</i> : decades of research</b>	0h30
	09.30 - 09.50 am	S. Le Guyader	<i>Norovirus</i> persistence in shellfish tissues: what do we know?	0h20
	09.50 - 10.10 am	D. Dancer	The use of murine norovirus-1 as a surrogate for human <i>Norovirus</i> in the environment and bivalve shellfish	0h20
	10.10 - 10.30 am	A. Cook	Spatial and temporal pattern of <i>Norovirus</i> contamination in a Pacific oyster fishery	0h20
	10.30 - 11.00 am		Coffee break	0h30
	11.00 - 11.20 am	L. Croci	Survey of enteric viruses presence in seafood products in Italy (1999-2008)	0h20
	11.20 - 11.40 am	J. Hewitt	Oyster-borne <i>Norovirus</i> outbreaks, identification of a novel recombinant <i>Norovirus</i>	0h20
	11.40 - 12.00 am	A. Bosch	Lessons from a hepatitis A outbreak linked to imported coquina clams	0h20
	12.00 - 12.20 am	J. Lowther	Correlation between quantitative real-time PCR results for <i>Norovirus</i> in oysters and <i>Norovirus</i> -type illness in consumers	0h20
	12.20 - 01.50 pm		Lunch	1h30



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<b>SESSION 6</b>		<b>Chairwoman : Dorothy Leonard</b>	<b>Vibrio spp.</b>	
	01.50 - 02.20 pm	<b>M. Nishibuchi</b> (keynote)	<b>Recent trends in infections by <i>Vibrio parahaemolyticus</i> and distribution of this bacterium in shellfish in Asia</b>	0h30
	02.20 - 02.40 pm	S. Jones	Identification of <i>Vibrio</i> spp. Found In Oysters, Sediments and Water In a Northern Temperate Estuary, USA	0h20
	02.40 - 03.00 pm	D. Hervio	Pathogenicity In vivo and genetic characterization of <i>Vibrio parahaemolyticus</i> Isolates from clinical and environmental sources	0h20
	03.00 - 03.20 pm	J. Fernandez-Plquer	Viability of <i>Vibrio parahaemolyticus</i> In Australian Pacific Oysters ( <i>Crassostrea gigas</i> )	0h20
	03.20 - 03.40 pm	R. Espejo	Clinical and environmental <i>Vibrio parahaemolyticus</i> In Southern Chile and diversification of the clonal pandemic strain	0h20
	03.40 - 04.10 pm		Coffee break	0h30
	04.10 - 04.30 pm	A. Wright	Multi-species qPCR for validation of post-harvest processing for oysters	0h20
	04.30 - 04.50 pm	J. Deter	Ecology of pathogenic and non-pathogenic marine bacteria, <i>Vibrio parahaemolyticus</i> , in Perthuis Breton, France	0h20
	04.50 - 05.10 am	S. Oberbeckmann	The Future of the German Blight: threatened by pathogenic bacteria?	0h20
<b>ROUND TABLE 1</b>	05.10 - 06.10 pm	<b>A. De Paola, D. Leonard, H. Toyofuku</b>	<b>Toward a standardization of <i>Vibrio</i> molecular detection methods</b>	1h00
<b>POSTER SESSION 1</b>	06.10 - 07.10 pm			1h00
	08.00 - 11.00 pm		Reception at Petit Plessis Manor House Sainte-Luce-sur-Loire	3h00
<b>WEDNESDAY 17<sup>TH</sup> JUNE</b>				
<b>SESSION 7</b>		<b>Chairman : Phil Busby</b>	<b>Harmful phytoplankton distribution and monitoring</b>	
	09.00 - 09.30 am	<b>J. Silke</b> (keynote)	<b>Long term data sets and shellfish toxins in Ireland</b>	0h30
	09.30 - 09.50 am	K. Davidson	Spatial and temporal variability of harmful phytoplankton in the Shetland Isles, Scotland	0h20
	09.50 - 10.10 am	J. Graham	Evaluation of Quantitative Real-Time TaqMan PCR for Detection and Quantification of <i>Alexandrium</i> Species In Scottish Waters	0h20
	10.10 - 10.30 am	A. Menesguen	Real-time modelling of <i>Pseudo-nitzschia</i> blooms and ASP risk in coastal waters off Brittany (France)	0h20
	10.30 - 11.00 am		Coffee break	0h30
	11.00 - 11.20 am	C. Bellin	Phycotoxin monitoring In France : risk-based strategy and main results	0h20





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	11.20 - 11.40 am	B. Krock	Isolation and toxin composition of the azaspiracid-producing dinoflagellate <i>Azadinium spinosum</i> from the Danish west coast	0h20
<b>POSTER SESSION 2</b>	11.40 - 12.10 am			0h30
	12.10 - 01.40 pm		Lunch	1h30
	02.00 - 07.00 pm		Excursions and sightseeing trips*, a choice of : 'Beautiful Nantes', Nantes 'Medieval Guérande', Guérande 'The oyster and its secrets', Bouin (Vendée)	5h00
<b>THURSDAY 18<sup>TH</sup> JUNE</b>				
<b>SESSION 8</b>		<b>Chairwoman : Claudia Heppner</b>	<b>Risk assessment</b>	
	09.00 - 09.30 am	<b>R. Van Leuwen</b> (keynote)	<b>European Risk assessments of marine Biotoxins</b>	0h30
	09.30 - 09.50 am	F. Vernazza	Occurrence of marine biotoxins reported from some EU Member States	0h20
	09.50 - 10.10 am	K. Aligizaki	Toxic Benthic Dinoflagellates Spreading And Potential Risk in the Mediterranean Sea	0h20
	10.10 - 10.30 am	C. Campos	Sanitary Surveys and the Identification of "Worst-Case Scenario" of Microbiological Contamination in Bivalve Mollusc Harvesting Areas	0h20
	10.30 - 11.00 am		Coffee break	0h30
	11.00 - 11.20 am	F. Loisy-Hamon	Integration of the viral risk in the HACCP plan of a French shellfish farmer	0h20
	11.20 - 10.40 am	W. Burkhardt III	Prevalence of Noro- and hepatitis A viruses in US market shellfish	0h20
	11.40 - 12.00 am	N. Ferré-Huguet	Risk Assessment of Metals from Consuming Local Shellfish by the Population Living in the Ebro River Basin in Catalonia, Spain	0h20
	12.00 - 12.20 am	N. Arnich	Is a maximum level for cadmium in sea gastropods relevant to protect public health?	0h20
	12.20 - 12.40 pm	T.A. Nguyen	Shellfish consumption and contamination in South Viet Nam	0h20
	12.40 - 02.10 pm		Lunch	1h30
<b>SESSION 8</b>		<b>Chairwoman : Dinorah Medina</b>	<b>Management and regulation</b>	
	02.10 - 02.40 pm	<b>P. Busby</b> (keynote)	<b>Management of Norovirus Contaminated Shellfish Production Areas: Where Are We Now and Where Are We Going</b>	0h30
	02.40 - 03.00 pm	C. McLeod	Improvements in Sanitary Status of Shellfish Production Areas in Australia and the Role of Science in Remediation	0h20
	03.00 - 03.20 pm	R. Lee	A review of the application of sanitary surveys in Europe	0h20
	03.20 - 03.40 am	K. Joergensen	Review of toxic episodes and management strategies in the Danish mussel production	0h20



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	03.40 - 04.00 pm	V. Derolez	An environmental management tool to achieve microbial water quality standards on Thau lagoon	0h20
	04.00 - 04.30 pm		Coffee break	0h30
	04.30 - 04.50 pm	J. Dupont	An Impedance Method as an Alternative to the MPN Reference Method for Rapid Enumeration of <i>Escherichia coli</i> In Live Bivalve Shellfish	0h20
	04.50 - 05.10 pm	W. Medhloub	Enhancement of detoxification process in the grooved carpet shell, <i>Ruditapes decussatus</i> (Linné)	0h20
	05.10 - 05.30 pm	C.A. De Leon	Oyster production and depuration in central and south Gulf of Mexico	0h20
	05.30 - 05.50 pm	D. McCoubrey	Shellfisheries management, science and consumer protection	0h20
ROUND TABLE 2	05.50 - 06.50 pm	<b>D. McLeod, H. Smale, F.M. Pailler, J. Perez, P. Caricato, L.M. Botana...</b>	<b>The point of view of the producers and of the regulators</b>	1h00
	08.30 - 02.00 pm		<b>Gala dinner 'Voyage to the land of Jules Verne' *</b> Château de la Poterie, Nantes	5h30
<b>FRIDAY 19<sup>th</sup> JUNE</b>				
SESSION 10		<b>Chairman : Maciej Wolowicz</b>	<b>Chemical contaminants</b>	
	09.00 - 09.30 am	<b>A. Abamou (keynote)</b>	<b>An Overview on Persistent Organic Pollutants in Molluscs Bivalves</b>	0h30
	09.30 - 09.50 am	F. Houbrèque	<sup>109</sup> Cd: A Great Tool To Study The Problem of Cadmium Contamination In The Chilean Blue Mussel <i>Mytilus chilensis</i>	0h20
	09.50 - 10.10 am	S. Casas	Coastal monitoring and water management: Dynamic energy budget models	0h20
	10.10 - 10.30 am	F. Cacclatore	Contamination levels and physiological condition of Manila clams ( <i>Tapes philippinarum</i> ) transplanted from a polluted site in the Lagoon of Venice	0h20
	10.30 - 10.50 am		Coffee break	0h20
	10.50 - 11.10 am	V. Milun	Monitoring organochlorines at shellfish aquaculture areas	0h20
	11.10 - 11.30 am	S. Jones	Distribution of Mercury and heavy metals in shellfish and sediments in the Gulf of Maine	0h20
SESSION 11		<b>Chairman : Mitsuki Nishibuchi</b>	<b>Faecal contamination tracking and modelling</b>	
	11.30 - 12.00 am	<b>T.K. Graczyk (keynote)</b>	<b>Spatial and temporal variation in prevalence and genetic diversity of <i>Cryptosporidium</i> contamination in oysters commercially harvested from the Chesapeake Bay, USA</b>	0h30
	12.00 - 12.20 pm	M. Bougeard	Modelling of Faecal Contamination In Water From Catchment To Shellfish Growing Area	0h20





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	12.20 - 12.40 pm	S. Mieszkin	Discrimination Between Human, Pig and Ruminant Faecal Contaminations In A River Catchment By Real-Time PCR Using Host-Specific Markers	0h20
	12.40 - 01.00 pm	C. Baker-Austin	Development and application of eukaryotic-specific mitochondrial DNA analysis for microbial source tracking purposes in shellfish harvesting waters	0h20
	01.00 - 01.30 pm	R. Urehan, H. Smale, P. Lousus	Closing ceremony Cité Internationale des Congrès, Nantes	0h30
	01.30 - 02.00		Optional Lunch*	1h30

Legend

- Scientific programme
- Social events and sightseeing
- Breaks

\* Optional Items.

Information and contacts, please visit the website : [www.icmss09.com](http://www.icmss09.com)