

## REPORT OF AN AD HOC WORKING PARTY ON POST-HARVEST RESEARCH ON AUSTRALIAN SEAFOODS

### INTRODUCTION

In response to the publication of the report of the Australian Science and Technology Council entitled "Casting the Net - Post-harvest Technologies and Opportunities in the Fishing Industry" the CSIRO obtained funding from the Fishing Industry Research and Development Council to hold a meeting of a working party consisting of research workers, academics and representatives of industry and government to plan an integrated approach to post-harvest fisheries research and development. That meeting took place at Hawkesbury Agricultural College on December 5th and 6th 1988. This is the report of its deliberations.

### MEMBERS OF THE WORKING PARTY

A list of members and their affiliations follows:

Mr.Allan Bremner (Chairman)	CSIRO
Mr. Stephen Thrower	"
Ms.Elisabeth Gorczyca	Royal Melbourne Institute of Technology
Mr. Adrian Chambers	" " " " "
Ms. Susan Poole	Queensland Department of Primary Industry
Dr. Hilton Deeth	" " " " "
Mr. Bruce Goodrick	" " " " "
Mr. Paul Baumgartner	Hawkesbury Agricultural College
Mr.Robert Greig	" " "
Mr. Max Ball	National Fishing Industry Council
Mr. Graeme Haling	" " " "
Mr. David Townsend	" " " "
Mr. Deon Mahoney	Australian Maritime College
Professor Ken. Buckle	University of NSW

### INVITED OBSERVERS

Dr. Peter Jernakoff	Bureau of Rural Resources
Mr. Bernard Bowen	Fishing Industry Research and Development Council

## AGENDA

The Agenda was as indicated in Appendix 1. This report will follow the same sequence.

### OPENING REMARKS

In his opening remarks the chairman noted that this was the first time that the different interests in the post-harvest sector in the Australian fishing industry had been brought together. Noting that there had long been a need for such a meeting, he expressed appreciation to FIRDC for its recognition of the obvious advantages of the meeting and its prompt response to the grant application from CSIRO (Appendix 2). He drew parallels between the working party and similar groups which meet regularly in Europe and America where research results, methods, technologies and problems are discussed, where workers meet their peers and colleagues and where approaches to codes of practice, standards and regulations are discussed. He expressed the hope that this meeting might form the basis of further regular meetings.

### POSITION STATEMENTS

Each institute then presented its position statement (Appendix 3). These presentations led to discussion on a number of topics which will lead to cooperation between workers with similar interests. Several resources such as analytical expertise, libraries, and access to vessels and pilot plants were identified. A summary of the research personnel available to support this industry worth over \$A800 million is given in Table 1.

**Table 1. Personnel Engaged in Direct Research on Seafoods**

Institute	Personnel / years	
	Full time research	Student Projects <sup>1</sup>
Qld Dept of Primary Industry	8.5	Nil
Hawkesbury Agricultural College	3.0	2.5
University of NSW	1.6	10'0
Royal Melbourne Institute of Technology		
Australian Maritime College	0.2	0.8
CSIRO	3.0	Nil

<sup>1</sup>NOTE: Some of the students come from overseas countries and the topics on which they work may not be directly applicable in the Australian context.

## COMMENTS ON "CASTING THE NET"

The working party noted that the post-harvest sector of the fisheries industry is a difficult field to analyze. The committee is therefore to be congratulated on the speed, thoroughness and breadth of coverage of its investigation. This report focussed attention on the importance of the sector to the continued viability and increasing profitability of the fishing industry.

Some concern was expressed that more specific recommendations were not made concerning funding of the implementation of the very important initiatives recommended. More specific comments of the working party on the Committee's recommendations (Appendix 4) follow:

**ASTEC Recommendation 1:** Whilst it was agreed that post-harvest concerns must be a prominent consideration in management plans for Australia's fisheries, it was felt that it would prove difficult for every management committee to have a member from the post-harvest research area. The advisory committees should, however, be encouraged to seek advice from experts in post-harvest technology as the need arises, since the committees have the power to co-opt members. That process would be facilitated by the formation of an association of Australian seafood scientists and technologists (see below). If recommendation 2 is implemented, the point of first contact could be through the CSIRO Seafood Technology Centre in its recommended role of maintaining a network of workers in this field. Another possible mechanism discussed was a revamp and an expanded role for the Fishing Industry Technology Advisory Committee (FITAC).

**ASTEC Recommendation 2:** The working party endorsed the current role of the CSIRO's Seafood Technology Section and provided the following comment on this recommendation: The working party points out that the CSIRO's Seafood Technology Section has been performing the functions listed for several years. Strong concern is expressed at the decrease in staff and funding of the Section in recent years and the working party asserts that the CSIRO must maintain and develop the Section as a seafood technology centre with national responsibilities.

The working party stressed the importance of effective technology transfer of present and past research results to the Australian seafood industry. Several initiatives in this area were endorsed: The planning and conduct of research projects is discussed in some detail below.

\* The working party endorsed the opinion that the CSIRO seafood technology section was in urgent need of staff and funds to enable it to carry out its responsibilities in providing both tactical and strategic research backup for fisheries development.

\* A need to compile a list of theses, reports and other publications on Australian research into seafoods was identified. Much of this material is not readily accessible through

existing channels. Officers of the CSIRO seafood technology section agreed to investigate the possibility of mounting the list on the 'Australis' database.

\*The establishment of a network of workers in post-harvest research would be assisted by the formation of an association of seafood technologists (see below).

\*The working party noted that the Section had, in the past, provided facilities and supervision that enabled students to gain research experience, and it recommended that this practice continue and that provision of such placement did not imply a tertiary role for CSIRO but a vocational one.

**Recommendation 3:** Rather than endorsing this recommendation, the working party asserted that the Departments of Primary Industries and Energy (DPIE) and Industry Technology and Commerce (DITAC) were not the appropriate bodies to develop marketing and promotional strategies for seafoods, although as a group of research workers in the post-harvest area, the working party was of the view that coordination of such activities at a national level would be advantageous. Given the present industry structure, any direct involvement in marketing by government would be counter-productive. The call for a national survey to examine characteristics associated with domestic consumption of whole and processed seafoods was strongly supported.

**Recommendation 4:** The working party expressed concern at the lack of due recognition given in the report to existing structures for determining courses run by TAFEs, tertiary institutions and the fishing industry training committees (FITCs), in development and skills training. Any direct involvement by DPIE and DITAC in this area could result in confusion and duplication of effort. The role of these departments should be to support training through the training committees and the Department of Employment, Education and Training (DEET).

It was noted that there is no state training committee in Western Australia. The establishment of a post-graduate course in food science and technology at Curtin University could lead to developments in this area.

**Recommendation 5:** The working party expressed similar concerns to those on recommendation 4 about the lack of recognition given to the extensive training system that operates in the eastern states. The working party felt that any further training should be organised by DEET and the FITCs; this is not a function of DPIE.

Concern was also expressed that a conflict of roles may arise if inspectors charged with enforcing fisheries regulations were also asked to assist the industry as quality assurance officers. It was noted that AQIS inspectors already perform this role in export premises.

**Recommendation 6:** The working party noted that relatively little published

material is available about the specialised handling requirements of many aquaculture products. Since this material will provide unique opportunities for development of new products, it is important that precipitate and possibly inappropriate regulations be avoided.

### **CUSTOMERS OF RESEARCH AND DEVELOPMENT PROJECTS**

The CSIRO tabled a list of the sources of its enquiries received over a 12 month period (Appendix 5). Other members expressed surprise at the relatively low incidence of enquiries from the general public, possibly because the CSIRO's regional information services and libraries field many enquiries from that sector. Hawkesbury Agricultural College presented an outline of how its HAWKAID scheme serves the food industry and generates considerable funds, especially from the meat industry.

A discussion then ensued as to how research programs were initiated. It appears that most institutes try to respond to their own perception of those problems that are amenable to solution with the available resources. Attention was drawn to the practice of the Australian Bureau of Agricultural and Resource Economics of circulating a list of potential research projects to industry and asking for them to be ranked in order of preference. A possible role for industry advisory committees was discussed using the research committee structure that advises the Queensland Department of Primary Industry as an example.

Industry representatives made it clear that whilst they felt that more consultation between industry and research workers in determining research programs was vital, they recognised that in some cases researchers had a wider view of industry's needs and that in many instances industry had difficulty in defining its problems, and therefore scientists should not be discouraged from proposing their own projects.

There was a very clear difference in emphasis between industry and research workers on two key points. Industry work on a short time frame and regard 12 months as a fairly long project, whilst most researchers would regard 3 years as the minimum period necessary to complete most worthwhile research projects. Industry places great store on confidentiality of information, which is in conflict with the desire of many scientists to publish in journals with a wide international circulation. It was pointed out that in most cases, delays in the writing, refereeing and publishing system allow a lead time of at least 12 months before papers appear in print.

It is evident that there is a role here for FIRDC as the prime source of fisheries research funding in Australia to provide for research that falls in between such short term 'in house' research as industry is willing to fund, and longer term strategic projects which are appropriation funded. Mr. Bowen then gave a very valuable outline of how to prepare an application to FIRDC, emphasising choice of topic, statement of objectives, and dissemination of results (Appendix 6).

### **COMMUNICATION WITH CUSTOMERS**

It was obvious from the ASTEC report and from the discussions at the meeting that

the traditional methods used by research workers to communicate with industry are not effective. To improve contact between research institutes and industry the working party supported a suggestion that the AFS be asked to include a list of seafood technologists on its Australian Fishing Industry Directory. Novel methods more in tune with the technology of the 1980s and 90s need to be explored to supplement the publication in scientific journals so favoured by scientists. Suggestions varied from more readable articles in trade journals to workshops, videos and professionally drafted business plans to identify cost factors. Mr Bowen indicated that well thought out plans of this nature could assist in the success of an application. It was pointed out that there is no longer anyone in Canberra to summarise new developments reported in the scientific literature in plain words.

### **ASSOCIATION OF SEAFOOD SCIENTISTS AND TECHNOLOGISTS**

It was agreed that the formation of some grouping of seafood research workers could be of considerable value to the industry, government and the tertiary teaching institutions. This was in accord with recommendation 2 of the ASTEC report. This group could serve a number of functions and could provide a focus for post-harvest research and development. There was some debate as to the most appropriate way of forming such a group. It was decided to form a committee that would draft a statement of objectives and determine the best form of organisation for the group and the feasibility of forming it as a properly constituted group within the Australian Institute of Food Science and Technology Inc.(AIFST) will be explored by the chairman. It is hoped to have the group operating by May 1989 when the annual convention of the AIFST will be held in Perth.

### **JOINT RESEARCH PROJECTS**

During the presentation of research position statements a number of areas of common interest were identified. several of these could provide fruitful ground for joint research. Several will be discussed here:

A frequent subject of enquiries to all institutes is information about the nutritional composition and technological properties of Australian species. A previous grant application to compile a database of such information was unsuccessful, possibly because of some confusion about an apparently similar project to be undertaken by health authorities. The working party, recognising the inherent variability of marine animals and the special needs of industry and of regulatory authorities in this area, strongly supported the concept and resolved to present a joint application to FIRDC.

Another subject of frequent enquiry is utilisation of waste material. From information in the position statements, it was apparent that several institutes in Australia have worked on different aspects of this problem, and it was considered desirable that a document be prepared outlining the options available to industry.

A third subject of enquiry is the utilisation of the prawn by-catch. there has been a considerable overseas research effort in this topic over the years. The working party



considered that the main constraints to the application of this technology were economic; it is not sensible to allocate valuable stowage space to low value product.

It was pointed out that a considerable proportion of the seafood packed in Australia uses raw material imported from countries that do not have hygiene regulations as strict as those in Australia. Those members of the working party who had worked on overseas aid projects expressed some concern that adequate safety and quality tests should be done on this material.

## RESOLUTIONS AND RECOMMENDATIONS

The working party recommends that:

\*A group of Australian research workers be set up to provide a focus for communication within the post-harvest sector between industry, research workers and government agencies.

\*The compilation of a database of nutritional and technical information on Australian marine species.

\*The commissioning of a national survey to examine characteristics associated with domestic consumption of seafood.

\*The support and maintenance of the CSIRO Seafood Technology Section as a Seafood Technology Centre with national responsibilities.

\*The support of workshops and other training programs by DPIE and DITAC acting through DEET and the FITCs.

\*The AFS be asked to include a list of seafood technologists and scientists on its Australian Fishing Industry Directory.

## CONCLUSION

As will be seen from the above report most members of the working party found this meeting to be a fruitful exercise and we are very grateful to FIRDC for funding the exercise. This was the first gathering of Australian seafood technologists and scientists; we hope it won't be the last.



## **List of Appendices**

APPENDIX 1 Agenda of the ad hoc meeting held at Hawkesbury Agricultural College 5th and 6th December 1988

APPENDIX 2 Extracts from CSIRO grant application to FIRDC 1988

APPENDIX 3 Extracts from "Casting the Net" ASTEC 1988

APPENDIX 4 Position statements from research institutes

- (a) Queensland Dept. of Primary Industry
- (b) Hawkesbury Agricultural College
- (c) University of NSW
- (d) Royal Melbourne Institute of Technology
- (e) Australian Maritime College
- (f) CSIRO
- (g) Letter of Intent from Curtin University

APPENDIX 5 Sources of enquiries to the CSIRO Seafood Technology Section 1987-1988

APPENDIX 6 Notes on preparation of applications for FIRDC grants

APPENDIX 1 Agenda of the ad hoc meeting held at Hawkesbury Agricultural College  
5th and 6th December 1988

Proposed Agenda for Meeting at Hawkesbury Agricultural College  
5th & 6th December 1988.

- (1) Welcoming address and introduction by Chairman.
- (2) Position statement from each institute.
- (3) Discussion of points from ASTEC report.
- (4) Identification of customers of R&D projects.
- (5) Communication with customers.
- (6) Formation of an association of Australian seafood technologists and establishment of an annual workshop.
- (7) Possible areas for joint research projects
- (8) Draft resolutions and recommendations.
- (9) Discussion of report to FIRDC.
- (10) Discussions on a note for *AUSTRALIAN FISHERIES*.

APPENDIX 2 Extracts from CSIRO grant application to FIRDC 1988

#### 7. Objectives:

The specific objective is to bring together a group of workers in the field of post-harvest technology for discussions on matters raised in the ASTEC report 'CASTING THE NET Post-harvest technologies and opportunities in the fishing industry' and for discussions on research directions, techniques and priorities. It is anticipated that from this meeting considerable agreement, in principle, on suitable national directions for seafood research can be achieved. It is also anticipated that this meeting will be the forerunner of an annual meeting with a wider range of participants including professionals from industry, at which research results are presented and discussed, problems and methodologies are sorted out, and policies and potential clashes of interest are resolved and cooperative ventures are mooted.

#### 8. Justification:

The ASTEC report has clearly recognised the need to bring together workers in seafood science and technology and has recommended that the CSIRO Seafood Technology Section "establish and maintain a network of Australian researchers in fisheries post-harvest". The proposal contained in this application is the first formal step in this direction.

Despite the importance of the seafood industry, Australia has very few workers in the field of seafood technology and research and there has long been a need to bring them together in a suitable forum. Not only are they relatively few in number but they are widely spread in location and it is important that provision be made to bring them together to discuss their work among their peers, to discuss seafood research problems and topics of national importance, to examine ways and means of tackling large scale problems beyond the resources of any individual worker or institute, to receive advice and encouragement, to share methodology and up-to-date information, to minimise duplication of effort and to obviate re-inventing the wheel.

APPENDIX 3 Extracts from "Casting the Net" ASTEC 1988

ASTECC recommends:

That the Department of Primary Industries and Energy, in consultation with State and Territory Governments and representatives of the fishing industry, prepare strategic plans for the management of Australian fisheries which incorporate post-harvest concerns such as processing and marketing.

Recommendation 1

That CSIRO establish the Seafood Technology Section of the CSIRO Division of Fisheries as a Seafood Technology Centre with national responsibilities for fisheries post-harvest research and development. Amongst its functions the Centre would:

- . undertake short and longer term research;
- . provide liaison, information and advisory services to government and industry;
- . establish and maintain a network of Australian researchers in fisheries post-harvest; and
- . provide placements for graduate students and industry nominees.

Recommendation 2

That the Department of Primary Industries and Energy initiate discussions with relevant Commonwealth and State government authorities and with industry to develop more effective mechanisms for market research, marketing and promotion of Australian fisheries products in Australia and overseas. Measures considered should include:

- . the establishment of a national body which would have responsibility for market research for, and promotion of, Australian fisheries products on local and export markets; and
- . a national survey examining characteristics associated with domestic consumption of whole and processed seafoods.

Recommendation 3

ASTECC recommends:

That the Departments of Primary Industries and Energy and Industry, Technology and Commerce, in consultation with State agencies, organise a series of workshops to bring together manufacturers from the seafoods processing sector and from other relevant manufacturing sectors, fishing industry representatives, food scientists and technologists and marketing representatives to identify possible areas for development. The aim of these workshops would be to encourage seafoods processors and members of other industry sectors to explore the potential for further (value added) processing of fisheries product and by-product.

Recommendation 4



That the Department of Primary Industries and Energy, in close consultation with State authorities, initiate a review of the current status and future directions of Australian aquaculture in order to plan for the infrastructure needed to support and encourage industry growth. This should be a joint Commonwealth-State undertaking and include consultations with representatives of the aquaculture industry and with representatives of the catching, processing and marketing sectors of the fishing industry.

Recommendation 6

ASTECC recommends:

The Department of Primary Industries and Energy enter into discussions with its State counterparts, with the National Fishing Industry Training Council and with industry on proposals that:

- representatives from all sectors of the fishing industry, the Fishing Industry Councils and TAFE develop a course or series of courses in business management which reflect the special needs and characteristics of the fishing industry;
- extension services be developed to provide information, assistance and training in quality assurance procedures at all stages of the industry, from the catching through to the retail sector. The potential for fisheries inspectors from existing Commonwealth and State inspectorate services to play a role in such a service should be explored;
- courses providing qualifications for skippers or crews of fishing vessels, where appropriate, include a component on quality assurance in the treatment of catch; and
- representatives from the fishing industry (particularly the marketing and retail sectors), the FITC and TAFE develop short courses for seafood retailers which cover aspects of product knowledge and seafood handling and presentation.

These proposals are designed to raise levels of business management skills, quality maintenance and product knowledge within the fishing industry.

Recommendation 5

APPENDIX 4 Position statements from research institutes

- (a) Queensland Dept. of Primary Industry
- (b) Hawkesbury Agricultural College
- (c) University of NSW
- (d) Royal Melbourne Institute of Technology
- (e) Australian Maritime College
- (f) CSIRO
- (g) Letter of Intent from Curtin University

(a) Queensland Dept. of Primary Industry

QUEENSLAND FOOD RESEARCH LABORATORIES  
QUEENSLAND DEPARTMENT OF PRIMARY INDUSTRIES

POSITION STATEMENT - SEAFOOD RESEARCH

DECEMBER 1988

1. Personnel

- Dr Hilton Deeth, Principal Food Technologist (Group leader, 25%)  
chemical/biochemical research
- Mr Bruce Goodrick, Food Technologist (100%)  
product development, handling, storage, transport
- Mrs Sue Poole, Microbiologist (100%)  
microbiology, storage trials, irradiation
- Mr David Williams, Chemist (50%)  
chemical analyses, HPLC
- Mr Ron Marschke, Chemist (50%)  
biochemical research
- Mr Alan Reed, Chemist (20%)  
lipid chemistry, HPLC, GLC
- Mr Ross Smith, District Experimentalist (100%)  
chemical analyses
- Mr Steve Slattery, Laboratory Technician (100%)  
marine biology, live transport, chemical analyses
- Mr Rob Roberts, Senior Technician (100%)  
microbiological and sensory analyses
- Mr John Mayze, Laboratory Technician (100%)  
microbiological and sensory analyses
- Mrs Pamela Palm, Laboratory Technician (100%)  
microbiological, sensory analyses and product development
- 3 temporary technicians

## 2. Areas of interest - past and present

### Tuna

- . development of longline fishery in Queensland;
- . sashimi handling and quality;
- . temperature and colour studies.

### Prawns

- . storage lives and microbiology;
- . use of metabisulphite.

### Tropical fish

- . quality of product from selected Northern Territory fisheries (barramundi, King Threadfin, shark, mackerel and reef fish), (Consultancy);
- . reef fish storage lives.

### Northern scallops

- . water content and detection of soaked scallops.

### Sand crabs

- . causes of mushiness, protease studies.

### Aquaculture

- . post harvest handling and quality of penaeid and fresh water prawns, red claw lobster and barramundi;
- . feed composition in relation to barramundi nutrition.

### Live storage and transport

- . penaeid prawns.

#### Product development

- . smoking, marinating, drying;
- . development of a smoked product from longtail tuna.

#### Seafood composition

- . proximate composition (moisture, fat, protein, ash) on range of species;
- . oil fatty acid compositions.

#### Seafood packaging

- . vacuum packaging;
- . special product packaging.

#### Irradiation

- . bacteriology and sensory analyses of scallops and several fish species irradiated at different doses;
- . detection of irradiated seafood;
- . storage trials of irradiated fish.

#### Quality evaluation

- . survey of the bacteriological quality of retail seafoods;
- . effect of shucking practice on quality of northern scallops.

#### Industry services

- . a wide range of services (analytical, technological, advisory) are provided in response to requests and enquiries from the seafood industry.

### 3. Facilities

The seafood group is one of four commodity groups (with dairy, meat, and fruit and vegetable) housed in well equipped laboratories at Hamilton in Brisbane. There is a wide range of equipment and facilities for chemical, biochemical, microbiological and technological research. Limited facilities are available for processing. Specialised items include a Malthus Growth Analyzer, Instron texture tester, a custom built smokehouse, vacuum packer, cold rooms and taste panel facilities.

#### 4. Complementary services

Staff at QFRL have ready access to a broad range of expertise within the Queensland DPI. Of particular relevance are the Fisheries Research and Fisheries Management Branches with whom close liaison is maintained. Research vessels and aquaculture facilities are available through these Branches.

Other services of importance are the library facilities through a central library-branch network, biometrical expertise and service, and data processing equipment.

#### 5. Funding

Internal	-	Salaries	230,000
	-	Other	18,000
External			70,000

(Approximate for 1988)



(b) Hawkesbury Agricultural College

## SEAFOOD RESEARCH AT HAWKESBURY

### Personnel

All seafood research, extension and consultancy at Hawkesbury is carried out by the Muscle Foods Research Unit. This unit is an independently funded research laboratory in the Faculty of Food and Environmental Sciences. Director of the unit is Paul Baumgartner and Deputy-Director, Robert Greig. The unit employs a Research Associate, 2 Research Assistants and funds a visiting Professorial Fellow. The director would devote 10% of his time to seafood research whereas the Deputy-Director and Research Associate would allocate approximately 50%+ to seafood research. Research funding within the Unit provides annual on-going research projects for three (3) final year undergraduate projects and currently supports 2 MAppSc and 1 Postgraduate Diploma student.

The unit has access to other Faculty staff who are paid on a contract basis for individual research and consultancy projects.

### Areas of Interest

Because of the location of the Campus, it is extremely difficult to become involved in the catching sector. Areas of expertise developed and promoted by Hawkesbury concentrate post-harvest handling and seafood product development. Major current research projects and consultancies include:

- development of a rapid technique for species identification of fresh and processed product using HPLC;
- species identification in surimi and surimi based products;
- utilisation of low value species and by-catch for value added export product and import substitution;
- preparation of a data base including information on the proximate analysis and nutrient composition of the major commercial fish species and processed product;
- preparation of a data base on freshness and spoilage indicators for fin-fish of commercial importance in Australia;

- market research analysis (consumer awareness of fresh product, preparation of fresh fish etc);
- product development (value added products) for the food processing industry; fish fermentations;
- microwave processing;
- microbiological stability of fisheries products.

### **Facilities**

An extensive range of facilities are available at Hawkesbury for seafood research. These include a well equipped Pilot Plant, refrigeration and freezing facilities, chemical and microbiological testing laboratories, Product Development laboratory, data processing and library facilities and a cold temperature laboratory/processing area (maintained at 10°C or less). As stated before, the only real facility lacking is immediate access to the water and associated activities.

### **Funding**

The unit relies upon research grants and consultancy contracts to provide money for salaries for staff and research students (except the Director and Deputy-Director), consumables and the purchase/lease of equipment. The unit has sufficient funding to maintain viability into 1989 but, like all similar ventures, requires an urgent injection of funds from mid 1989 to adequately provide a service to the fishing industry of NSW. Two FIRDC grants are currently in preparation for the next round. The majority of fisheries research projects undertaken at Hawkesbury are the result of direct industry contribution or consultancies.

### **Other**

The research unit is heavily involved in the following areas:

1. industry liaison and consultancy;
2. overseas consultancy/short courses/collaborative research;

3. collaboration with the NSW Fish Marketing Authority and the NSW Fishing Industry Training Council in the areas of quality measurement and the preparation of training manuals and courses.

(c) University of NSW

The University of New South Wales  
Department of Food Science and Technology

Position Statement for Seafood Technology Meeting  
at Hawkesbury Agriculture College, 5-6 December 1988

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## 1. Background

The Department of Food Science and Technology at The University of New South Wales has been conducting research and teaching seafood technology since its inception in the early 1950s. Within the last 10 years research activities have increased markedly and considerable external funds have been obtained. Currently, seafood technology is taught to both undergraduate (full-time BSc, part-time BSc(Tech)) and postgraduate (Graduate Diploma, Master of Applied Science) students as part of the subjects Animal Food Science or Animal Food Products, and elective subjects in Marine products have been available for undergraduate and postgraduate students.

The Department was designated in May 1988 by the Commonwealth Department of Education, Employment and Training as a Key Centre of Teaching and Research. Funds provided by DEET for a minimum of 3 years have enabled the establishment of a Food Industry Development Centre that will assist industry in product and process development, especially for export markets and to increase import replacement.

## 2. Personnel

### 2.1 Academic Staff

Dr Ron Edwards, Professor and Head (Research); Dr Ken Buckle, Associate Professor (Research); Dr Ron Wills, Associate Professor (Research); Dr Michael Wootton, Associate Professor (Teaching and Research); Dr Graham Fleet, Senior Lecturer (Research); Dr Prakash Potluri, Lecturer (Research).

Professors Buckle and Wootton and Dr Fleet devote up to 1 day/week on fisheries related activities, other staff less.

### 2.2 Technical Staff

Mr Richard Souness, Professional Officer, is employed full-time on a fish drying project sponsored by the Australian Centre for International Agricultural Research (ACIAR).

### 2.3 Current Research Students

See Appendix 7.2 for thesis topics.

R. Aryanta, S. Berhimpon, E. Ishak, N. Ismail, Z. Lubis, J. Silalahi (PhD F/T); R. Souness (PhD P/T); K. Wheeler (MSc P/T); F. Ariyani, V. Ramos, A. Varamit (MAppSc F/T).

## 3. Areas of Interest

### 3.1 Present and Past Research

#### 3.1.1 Shellfish microbiology and depuration

Extensive surveys were conducted of microbiological contamination of oysters in Sydney and coastal NSW waterways, with particular reference to organisms of public health significance. The technology for the depuration of the Sydney rock oyster, now compulsory for oysters sold in NSW, was established at UNSW in conjunction with major NSW oyster growers, processors and Government Departments. The technology developed for oyster depuration in NSW is now being implemented throughout SE Asia for purification of oysters and other shellfish.

#### 3.1.2 Metal contamination of shellfish

Shellfish (oysters, mussels) and shellfish growing areas in SE Australia were examined for levels of heavy metals (mercury, lead, cadmium, copper, nickel) and arsenic.



### 3.1.3 Product development

A number of novel seafood products have been developed, including 'rollmop' analogues from mullet, a range of intermediate moisture fishery products based on mullet and sardines, and fermented fish sausages.

### 3.1.4 Seafood salting and drying

Extensive studies have been conducted in recent years on the effects of salting and drying regimes on the chemical, microbiological and sensory properties of a range of marine species, including morwong, sardine (Indonesian and Australian), shark, squid and jellyfish, and on salting and drying kinetics. Some of this work has been done in Indonesia as part of an ACIAR project in fish drying.

### 3.1.5 Fish drier development

A natural-draught, rice husk furnace and drier have been developed, as part of the ACIAR project, and show considerable promise for seafood drying in developing countries. Further drier development and trials in Indonesia and Thailand and possibly the Philippines will be conducted shortly.

### 3.1.6 Post-harvest handling of prawns

Research into quality and handling of royal red prawns was carried out in association with Crusader Trawling Company. The investigation involved assessment of chemical and sensory quality of royal red prawns and their relation to capture and on-board handling procedures.

### 3.1.7 Prawn processing wastes

Prawn processing wastes (e.g. heads) have been converted to a range of powders suitable for incorporation into traditional Oriental foods (e.g. prawn crackers); and hydrolysed by autolysis or added proteolytic enzymes into peptones that have properties similar to or better than commercial products for the growth of a variety of microorganisms. Current research is examining the production of a variety of silages from prawn processing wastes.

### 3.1.8 Amine determination in seafoods

An HPLC method was developed for the determination of volatile and non-volatile amines (including histamine) in marine products, and its application to a variety of seafoods examined.

## 3.2 Consultancy Areas

Professor Buckle conducted in February and April 1988, for the Food and Agriculture Organization, an evaluation of a FAO/Australia Government Cooperative Program on Support to the Network for Cooperation between Asian Fish Technology Research Institutes, an activity of the Indo-Pacific Fishery Commission (IPFC) Working Party on Fish Technology and Marketing. The recommendations currently are being assessed by the Australian International Development Assistance Bureau (AIDAB). He is currently consultant on Fermentation Technology to the Faculty of Natural Resources, Prince of Songkhla University, Haad Yai, Thailand, overseeing research on fish paste and fishery waste treatment.

Dr Fleet has consulted extensively to the NSW oyster industry, and continues to consult to organisations overseas concerning oyster microbiology and purification.

Professor Wootton consults to a number of seafood processors and distributors on aspects of product quality and composition.

### 3.3 Course Material

Subjects offered to undergraduate and postgraduate students include:

#### 49.133 Animal Food Science S1 L3

Prerequisites: 2.102A, 2.102B, 2.102D, 38.421, 38.521, 41.101, 44.101

Nature and distribution of world animal food resources. Meat: Muscle structure, function, slaughter, conversion of muscle to meat; chemical, biochemical factors in postmortem glycolysis; meat microbiology; chilling, freezing, curing, processing of meat and meat-derived products; processing equipment; meat marketing systems; nutritional and sensory properties of meats. Milk and dairy products: Chemical, physical properties, microbiology of milk; technology of milk-derived products including cheese, fermented products, butter, frozen, chilled and dried milk-derived foods. Marine products: Nature and distribution of world fishery resources; teleostean and elasmobranch species, spoilage mechanisms, quality assessment; preservation by chilling, freezing, salting, drying, smoking, marinating and fermentation; fish meal and fish protein concentrate. Egg products: Structure and composition of the avian egg; changes during storage of whole eggs; egg quality assessment; functional properties of egg components; preservation of the intact egg; pulping, freezing and drying of whole egg pulp, yolk and albumen.

#### 49.163G Marine Products S2 L2

Prerequisite: 49.154G

World fisheries, oceanographic factors and fish populations. Biochemistry and microbiology of growth, culture, harvesting and post-harvest handling. Cultivation of fish, molluscs, crustacea -- modern and traditional methods. Biochemistry and microbiology of marine products in relation to freezing and preservation by the use of heat, chemicals and fermentation, quality control parameters and fish inspection. Role of marine products in world nutrition. Possibilities for further exploitation of marine resources.

#### 49.166G Postharvest Storage of Foods S1 L2 T4

Prerequisite: 49.155G

Preharvest considerations, postharvest physiology and biochemistry, postharvest factors affecting quality, methods of storage and handling, marketing strategies for selected food commodities.

Laboratory classes include exercises on fish composition, biochemistry, microbiology, processing and storage.

### 4. Facilities

Well-equipped general laboratories are available for research on food science and technology. A range of analytical equipment is available, including automated protein (Kjel-Foss), HPLC (several, with one dedicated for amino acids), GLC (several), TLC, gel electrophoresis, Instron, spectrophotometers etc. Processing equipment include retort, spouted bed and cabinet dehydrators (including one cabinet drier with precise control of air velocity, RH and temperature devoted to fish drying, with in-situ product weighing and interchangeable drying cabinets), etc. A well-equipped kitchen and 6-booth sensory evaluation area is available. Extensive University and Department computer facilities are available.

The Department has comprehensive facilities for work on food composition, including proximate, fatty acids and cholesterol, vitamins and minerals, carbohydrates (sugars, acids), amino acids, and energy.

The Department in mid-1989 will occupy two additional buildings adjacent to the current teaching laboratories and ACIAR research laboratories. Staff offices, research laboratories, and pilot plant will be relocated from the Applied Science building and 2 huts.

#### 5. Complementary Services

The Department makes use of the University's extensive technical library that provides full computer searches, inter-library loan facilities, as well as monographs and journals and has ready access to electron microscope and other sophisticated facilities (e.g. GC-MS) in other Faculties.

#### 6. Funding

Academic staff use a proportion of recurrent funds for teaching and research activities related to fisheries technology. Postgraduate students studying on IDP or AIDAB awards are eligible for research grants of up to \$1640/annum.

Within the last 10 years, the following external funds have been received:

<u>Australian Centre for International Agricultural Research (ACIAR)</u>	
1984-1988 PN 8313 Fish Drying in East Java, Indonesia	\$491 670
<u>Fishing Industry Research Trust Account (FIRTA)</u>	
1985-86 Royal Red Prawn Quality and Handling	\$85 500
1982-86 Composition and Processing of Australian Jellyfish	\$45 700
1980-82 Oyster Depuration	\$54 687
<u>Rural Credits Development Fund</u>	
1978-80 Microbiological Status of the Sydney Rock Oyster	\$30 300
<u>NSW Oyster Industry</u>	
1978-79 Improving the Microbiological Status of Oysters	\$22 000
<u>Phillips Oysters Pty Ltd</u>	
1975-79 Commercial Depuration of Oysters	\$23 000

#### 7. Appendices

##### 7.1 Past Research Theses

##### 7.1.1 PhD

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- 1987 Suelo, L. Utilisation of the Australian Jellyfish *Catostylus* sp. as a Food Product
- Wuttijumnong, P. Studies on Moisture Sorption Isotherms, Salting Kinetics and Drying Behaviour of Fish
- 1988 Narkviroj, P. The Utilisation of Prawn Processing Wastes

7.1.2 MSc

- 1974 Chew, D. Pigments of New Zealand Abalone (*Haliotis iris* Martyn)
- 1982 Son, T.H. Microorganisms of Public Health Significance in Oysters
- 1983 Rowse, A.J. The Elimination of *Salmonella charity* and *Escherichia coli* from the Rock Oyster *Crassostrea commercialis* during Commercial Purification

7.1.3 MAppSc

- 1974 Williams, R.J. Lead Content of *Mytilus edulis* L. from Various Locations Around Botany Bay
- 1977 Ispahany, L. Composition and Uses of Fish Flesh from Commercially Unattractive Fish
- 1978 McNab, C.E. Microbial Flora of Crabs
- 1979 Souness, R.A. Depuration of the Sydney Rock Oyster *Crassostrea commercialis*
- 1980 Yoovidhya, T. Comparison of Rapid Methods for the Enumeration of *Escherichia coli* in Sydney Rock Oysters
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- 1984 Sharpe, G. Arsenic in the Estuarine Environment
- 1985 Lubis, Z. Composition and Stability of Sardine Oil
- Poernomo, A. Salting and Drying Behaviour of Sardines
- Utomo, B.S.B. Effect of Temperature and pH on the Salting Kinetics of Sardines
- 1987 Berhimpon, S. The Effect of Brine Concentration on the Salting and Drying of Yellowtail
- Priyananda, P. Moisture Diffusion and Ultrastructure Studies of Fish Muscle on Air Drying
- Sastrodiantoro, S. Stability of Minced Fish Dendeng

7.1.4 BSc

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- 1976 Little, R. Nutritional Studies on the Sydney Rock Oyster
- 1977 Chuah, S.H. Use of Mullet for Fish Semipreserves
- Snow, S.J. Artificial Feeding of Oysters
- 1978 Duong Thi, N.H. Isolation of *Yersinia enterocolitica* from Oysters
- Douglass, P.A. Processing Sea Urchin Roe

- Hitchcock, S. Intermediate Moisture Fish
- Knight, D. *Clostridium perfringens* in Oysters
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- 1981 Han, K.H. Aspects of Fish Preservation
- Heinrich, M. Utilisation of Prawn Wastes
- Homarwidjaya, R. Aspects of Prawn Preservation
- 1982 Longley, A. Sensory Evaluation of Purified, Frozen and Stored Oysters
- Newton, R. Processing of Blue Grenadier Fish
- Ng, M. Smoked Fish
- Skinner, P. Depuration of Pathogens from Oysters
- 1983 Welch, D. Metals in Fresh and Salted Jellyfish
- 1984 Jan, S. Royal Red Prawn Spoilage
- Lim, C. Royal Red Prawn Spoilage
- Pryor, W. Royal Red Prawn Handling
- 1986 Gunadi, E. Properties of Jellyfish Protein
- Klieber, F. Development and Stability of an Intermediate Moisture Fish Product from Sardines
- 1987 Evans, K. Isolation of Collagen from Jellyfish
- 1988 Iskandar, L. Fish Roe Processing
- Yee, K. Histamine in Canned Fish
- 7.2 Present Research Student Projects
- 7.2.1 PhD
- Aryanta, W.R. Microbiological and biochemical changes in fermented fish sausages
- Berhimpon, S. Kinetics of salt absorption and modelling of drying behaviour of salted fish
- Ishak, E. Studies on salting and drying of shark
- Ismail, N. A study on the drying of fish

Lubis, Z. Studies on the stability of lipids in dried salted fish

Silalahi, J. Non-protein nitrogen compounds in foods

Souness, R.A. The development of an appropriate technology fish drier

#### 7.2.2 MSc

Wheeler, K.A. Water relations of fungi from Indonesian dried fish

#### 7.2.3 MAppSc

Ariyani, F. Production and stability of prawn head silage

Ramos, V. Thermal properties of prawn and prawn products

Varamit, A. Thermal properties of shellfish

#### 7.3 Publications

Qadri, R.B., Buckle, K.A. & Edwards, R.A. Rapid method for determination of faecal contamination in oysters. *J. Appl. Bacteriol.* 37:7-14; 1974

Hopkirk, G., Wills, R.B.H. & Townshend, P.R. Seasonal variation in lipid content of eels (*Anguilla australis*). *Aust. J. Mar. Freshwater Res.* 26:271-3; 1975

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(d) Royal Melbourne Institute of Technology

ROYAL MELBOURNE INSTITUTE OF TECHNOLOGY

FOOD TECHNOLOGY UNIT

Personnel

Adrian Chambers, Principal Lecturer  
Elisabeth Gorczyca, Lecturer

also 3 other lecturers, one senior demonstrator/tutor  
4 technical staff.

and approximately 20 4th Year students for individual research projects  
and product development.

M.App.Sc students.

Areas of Interest

Animal nutrition, including applications of silage and fish meal  
to stock-feed, pet-food and fish nutrition.

Species identification (electrophoresis); Lipid composition (squalene  
in shark liver). General chemistry of foods.

Microbiological aspects of fish spoilage.

Teaching of fish handling, processing, packaging.

Product development.

Facilities

Pilot-plant processing factory with canning, freezing, packaging  
equipment; taste-panel evaluation.

Microbiological laboratories.

Chemical laboratories - GLC; HPLC, gas analysis, atomic absorption,  
ion chromatography, NMR etc.

Full computing and library facilities.

Full access to statistical and marketing expertise.

Complementary Services

In addition to the staff of the Food Technology Unit, the chemical  
instrumentation is serviced by the technical staff of the Chemistry  
Department, and other members of the Lecturing staff are involved  
in ongoing work on fish ;

HPLC of fish nucleotides

\* Fluoride levels in krill and other crustaceans.

Heavy-metal content of shellfish

The Department of Applied Biology has interest in several areas of  
marine biotechnology, including mariculture of algae, mussels and  
oysters. Biology and Food Technology are co-operating with other  
interested parties. Several 4th Year Food Technology projects have  
contributed to the Biology Department interest in fish lipid content  
and composition (PUFA's)

## Funding

Several recent Master of Applied Science research projects have been on fish-related topics. The students were variously supported by scholarships (Commonwealth and John Storey[RMIT]) and FIRTA .

Shorter projects have been funded to cover the cost of materials, such as mussel and squid product development.

Several M.App.Sc projects can be undertaken if finances are available. Scholarships of \$15000 - 20000 each will attract students, and further financial support will be needed to provide cost of materials. More extensive projects may need funding to provide extra labour, or travelling costs if in the nature of the project.

The funding of 4th year projects requires less extensive input, the supply of materials, or money to buy the materials being the major cost.



(e) Australian Maritime College

POST-HARVEST SEAFOOD TECHNOLOGY  
AUSTRALIAN MARITIME COLLEGE

## 1. INTRODUCTION

The Australian Maritime College was established by the *Australian Maritime College Act 1978* as a national facility to provide education and training for the shipping and fishing industries. The College comprises three schools (Fisheries, Nautical Studies, and Engineering), with the first undergraduate students admitted in 1980.

Programmes offered by the School of Fisheries combine coursework with practical training using the dedicated facilities of the flume tank, FTV Bluefin, and the Seafood Processing Laboratory. Programmes offered range from Certificates of Competency to full-time courses leading to the award of degrees and post-graduate diplomas.

**SCHOOL OF FISHERIES PROGRAMMES:**

Graduate Diploma of Applied Science in Fisheries Technology

Bachelor of Applied Science in Fisheries Technology

Certificate of Technology in Fisheries Operations.

Master Class 5

Master Class 4

## 2. FACILITIES

### 2.1 FTV Bluefin

FTV Bluefin is a purpose-built vessel of 34.5 metres length with 634 kW engine power. The vessel has been designed to stern trawl (demersal and pelagic), prawn trawl with twin booms, and purse seine. In addition, FTV Bluefin is capable of demonstrating other types of fishing relevant to the Australian fishing industry eg. squid jigging, long lining, etc.

The vessel is equipped with a small fish processing room, a blast freezer, refrigerated hold, and refrigerated seawater tanks. The vessel has a permanent crew of 6, with accommodation for 14 additional personnel (students, trainees, academic staff, etc).

## 2.2 Investigator

Investigator is a 10 metre long prawn trawler which has been modified to undertake various modes of inshore fishing. The vessel can carry 7 persons, but is suitable only for day trips since she has no facilities for the preservation of fish.

## 2.3 Seafood Processing Laboratory

The Seafood Processing Laboratory consists of a 94 square metre processing area plus cold storage room, coolroom, and constant temperature room. The laboratory is suitable for handling a wide range of wet fish, and is equipped with some pilot-scale processing equipment *eg.* cryogenic freezing chamber, canning equipment, vacuum packing/gas flushing equipment, etc.

In order to satisfactorily service coursework and student projects, and to expand into research and development, a significant investment in equipment is necessary. The acquisition of seafood processing equipment remains a major priority within the School of Fisheries, unfortunately these needs are unlikely to be met in the short-term. Areas where the laboratory is deficient include smoking equipment, pilot-scale freezing equipment, live holding tanks, monitoring equipment, etc.

Adjacent to the Seafood Processing Laboratory is a small analytical laboratory capable of undertaking routine quality evaluation and quality control work.

### **3. PERSONNEL**

Staffing levels for the Seafood Section are currently under review in response to projected student numbers for 1989. At present the section is staffed by 1 full-time member of academic staff employed as a Seafood Technologist, with part-time support (0.4 Academic post) in the area of chemistry. Since the major role of staff is to service academic programmes, little time is made available by the College for research and development programmes.

Nevertheless, there are opportunities for research through the post-graduate programme. Students enrolled in the Graduate Diploma undertake project work, and this represents an important short-term research resource. In the past, these students have spent time in organisations such as the Seafood Technology Section (CSIRO), Department of Sea Fisheries (Tasmania), and the Food Research Laboratories (Qld DPI).

A Master of Applied Science by research is planned for commencement in 1990, and this programme would offer significant opportunities for research in post-harvest seafood technology.

### **4. COMPLEMENTARY SERVICES**

Seafood marketing is a component of the teaching programme for fisheries students, bridging the gap between fisheries economics, business studies, and seafood technology. The lecturer responsible for the programme has interests in the area of pricing, export marketing and channels with emphasis on new product development and marketing strategies. These skills are invaluable when undertaking market surveys and developing value-added products.

The Australian Maritime College is adjacent to the Tasmanian State Institute of Technology (TSIT) which contains the Departments of Aquaculture, Microbiology and Chemistry within the School of Applied Science. The Department of Aquaculture has recently been awarded Key Centre status and is undergoing rapid expansion. There is already considerable collaboration

between the School of Fisheries and Aquaculture in training programmes, and there is interest in extending this into areas of research and development.

As a result of the recently released policy statement on higher education, the Australian Maritime College is involved in discussions with the University of Tasmania and the TSIT about a possible association or amalgamation. A formal association with these other institutions would encourage collaborative work and enhance our ability to undertake applied research.

## **5. AREAS OF INTEREST**

Until recently, the School of Fisheries has not actively pursued research or consultancy in the area of seafood technology, with the exception of post-graduate project work. The Seafood Section has now commenced marketing its services through the College company AMC Search Ltd. It is envisaged that this will extend beyond short-courses designed for managers and process workers, into applied research and consultancy.

In the area of research, the Seafood Section sees its role in exploring the potential for further processing of fish (especially by-catch) and by-products *ie.* the development of value-added products. As such, the section is able to undertake market surveys, evaluate product quality and safety, perform sensory evaluations, and formulate new products.

## **6. FUNDING**

Responsibility for the College rests with the Commonwealth Minister for the Department of Employment, Education and Training, and finance is provided by the Commonwealth. The College policy on short-courses and research and development is that of the user pays, hence all research and development activities must be funded from outside sources. With the consolidation of the teaching programme well advanced, special programme funding from sources such as FIRDC is now being sought by the Seafood Section.

## **7. SUMMARY**

The principal role of the Seafood Section is the training of students in the handling and processing of seafoods. The Section is interested in becoming involved in research programmes, but at present is limited in the extent and nature of the work which may be attempted. Hence, programmes with a broad-spectrum of activities, involving several institutions, would be of interest to the Seafood Section. Where large scale collaborative research programmes are planned, the training vessel FTV Bluefin and post-graduate students are important resources.

**DEON MAHONEY**  
**November 1988**

(f) CSIRO

CSIRO DIVISION OF FISHERIES  
SEAFOOD TECHNOLOGY SECTION

Personnel

J.Olley SPRS(until March 1989)  
A.Bremner SRS  
S.Thrower SES  
A.N.Other RS (FIRDC- to be appointed)

Further staff levels are yet to be set pending the CSIRO response to the ASTEC recommendation that the section be provided with sufficient funds for development in a rapid and effective way. All the staff work fulltime on the section's program.

Currently the section has 72 person/years experience in the field and a total of 90 person/years work experience.

Areas of interest

The program objectives of this section are:- " To investigate the inherent properties of Australian seafoods and their byproducts; to evaluate the effects of methods of culture, catching, harvesting, handling, transporting, processing and storing on these properties; to establish suitable techniques for assessing seafood quality throughout various processes from a biochemical, sensory, physical and microbiological viewpoint; and to provide the seafood industry, government authorities and institutions with advice, technical information and the results of research, and to assist in problem solving."

The section has a broad range of interests having worked on virtually all of Australia's resources eg. scalefish (inshore, deepwater, freshwater), molluscs (abalone, mussels, oysters, scallops ), crustacea (scampi, lobster, prawns) and cephalopods (squid) from many aspects (chemical, sensory, microbiological) and many processes (mincing, washing, freezing, canning, salting, drying, smoking, packaging) including utilisation of waste (silage, fish meal) and on heavy metal pollution (oysters, scalefish).

This range of interests is evident from the appended list of publications from the section but this is by no means the full extent of the work covered as a result of enquiries.

The extension and liaison function remains as a cornerstone of the section's role as a full time consultancy and will include such short term tactical work as the situation demands and circumstances dictate.

Training courses and lectures have been and are also given from time to time and AMC and University of Tasmania and overseas students have done project work in the section. The section has had overseas consultancies in Thailand, Malaysia, Sri Lanka, Tuvalu and done collaborative research in Indonesia and



the Phillipines as well as New Zealand.

The section has five current sub-projects:-

- CAA1 Structure of muscle fibre-connective tissue junctions
- CAA2 Technical liaison and consultancy services to industry
- CAA3 Post mortem changes in seafood
- CAA4 Biochemistry & physiology of live and very fresh seafoods
- CAA5 Temperature function integration

#### Future emphasis

The research emphasis of the section is being directed in the future to an understanding of the inherent properties, structure and characteristics of seafoods with a view to seeing how these characteristics can be altered or changed to advantage by catching, handling, processing or rearing techniques or how deleterious changes can be minimised or avoided. This emphasis is directed towards the higher priced end of the market and includes the holding and transport of live seafood. Assessment of the potential and characteristics of unusual or new species will be done as part of the Divisional program of exploration.

#### Facilities

The section currently has ample laboratory space, taste panel area, processing area, freezers, cold labs., processing gear such as mincers, choppers, strainers, canner, cookers and laboratory equipment such as spectrophotometers, HPLC, centrifuges etc. However the section will need to be rehoused within 2 years since it is anticipated that the "Stowell" site will be sold.

The section has extensive library and reprint holdings part of which has been entered in a database for ready access and these holdings represent a unique and invaluable asset since much of the material is not held elsewhere in the country.

#### Complementary services

The Division has just obtained a large research vessel which will be fitted out with areas and equipment for seafood technology such as RSW tanks and supply, blast freezer, temperature controlled laboratory and ice-making facilities. This will allow, for the first time, proper experimentation on on-board handling to be done under controlled conditions. The section has access to expert biological advice and a huge range of sophisticated equipment at the Marine laboratories as well as the extensive library facilities of CSIRO.

Funding

The section's current operating budget is \$16000 augmented by a CSIRO/University grant of \$2000 plus a FIRDC grant of \$8200 ie \$26200.

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(g) Letter of Intent from Curtin University



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School of Community Health



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1 December 1988

Stephen Thrower  
CSIRO Division of Fisheries Research  
Stowell Avenue  
HOBART 7000

Dear Stephen,

As promised, I am sending you information on the developments in training in food science and technology in WA which may be of relevance and interest to your meeting on Monday.

The School of Community Health at the Curtin University of Technology has for a number of years run a Bachelor of Applied Science in Nutrition and Food Science. With the increased interest in the training of food technologists in Western Australia we plan to strengthen our food science area and also to offer a Graduate Diploma in Food Science and Technology in 1990. The objective of this course will be to provide professional training in food science and technology for graduates in Science, Applied Science, Engineering, Nutrition, Environmental Health, Agriculture and other related disciplines. The course will involve one year full time study or two years part-time study. Included in the programme will be a research project. Suitable graduates will be accepted into a Master of Applied Science (Food Technology) programme which will involve a major research project as well as course work. These projects where possible will be carried out in conjunction with the food industry or relevant government departments. Such research should gradually develop the research and development base for the food industry so badly needed in WA.

Looking at the wider view of food training and research in WA, Bentley College of TAFE are also looking at offering training courses in food technology. Therefore there is the both the need and the scope to approach food technology training and research in WA in a cooperative and coordinated manner. To this end I am coordinating a committee whose objective is to try and achieve this.

At the present time food research is limited within the School of Community Health. However we are doing work on fish species identification. As an educational institution about to become involved in the training of food technologists we would be happy to be involved in any food research being conducted in WA especially that of a cooperative nature. I am firmly committed to the idea that research in the food area in WA should be conducted with a coordinated, cooperative and multidisciplinary approach.

Kind regards,

A handwritten signature in cursive script, appearing to read 'Nola'.

Nola Caffin  
Lecturer, Department of Nutrition and Dietetics

APPENDIX 5 Sources of enquiries to the CSIRO Seafood Technology Section 1987-  
1988

**Sources of Enquiries to CSIRO Seafood Technology Section 1987-1988**

Commonwealth Government	20
State Government	36
Municipal	7
Tertiary Institutions	10
Fishermen	5
Processors Large	83
Processors Small	81
Agents	20
Retailers	4
Consultants	23
Overseas	5
FAD etc	9
CSIRO	13
Transport Companies	15
Public	6
Aquaculture	31
TOTAL	368

## APPENDIX 6 Notes on preparation of applications for FIRDC grants

APPENDIX 6

POINTERS GIVEN BY BERNARD BOWEN, CHAIRMAN OF FIRDC, AT SEAFOOD TECHNOLOGY MEETING 5 & 6 DEC 1988 AS AIDS IN WRITING SUCCESSFUL GRANT APPLICATIONS

The objectives of the application must be patently obvious; committee members may not be tempted to read past this statement if it is not clear what the objectives are.

If the idea has come from the researcher and not from industry or MAC's or government etc. then it must be made clear what has generated that idea in the mind of the applicant and establish that it is a legitimate topic for research.

Scientific and technical competence must be demonstrated

The applicant must demonstrate that they have thought three years ahead (or to the end of the grant if it is of shorter duration) as to how progress can be evaluated to see if the objectives can be practically achieved. Performance indicators to evaluate progress can be set out. Where does the work fit into the industry? Where does it fit into FIRDC's charter and list of priorities.

Who are the customers of the research? (with resource assessment applications it is easy to define customers, not so easy with other areas).

Has the industry seen this topic as important? Does all of the industry think it so?

Is there a clear idea of how the results can be used by industry? How are the results to be conveyed to the potential beneficiaries eg. industry? How will the technology transfer be accomplished?

If the researchers are not going to convey the results themselves they must identify and arrange for who will do it eg AFS. Valid mechanisms include meetings, workshops, seminars, pamphlets & videos (if they can be justified as a cost-effective means) as well as the more usual statement that 'results will be published in Australian Fisheries'.

This must be stated from the start (even if only in principle). Where appropriate, money can be requested to engage consultant expertise to draw up some form of business plan as a guide to the economics of the development.

Allan Bremner  
9/12/88

