# Understanding Extension & Adoption in the Fishing Industry

## Final Report

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Prepared For

**Fisheries Research and Development Corporation**

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# Acronyms

| | |
|---|---|
| AFMA | The Australian Fisheries Management Authority |
| ANSA | Australian National Sportfishing Association |
| APFA | Australian Prawn Farmers Association |
| BCA | Benefit Cost Analysis |
| CFOC | Caring for our Country |
| DPIPWE | The Department of Primary Industries, Parks, Water and Environment (Tas) |
| DAFF | The Department of Agriculture, Fisheries and Forestry |
| E&A | Extension and Adoption |
| GABIA | The Great Australian Bight Industry Associations |
| GGA | Growers Group Alliance |
| NRM | Natural Resource Management |
| FRGF | Fisheries Resource Grant Fund |
| FRDC | Fisheries Research and Development Corporation |
| IAP2 | International Association for Public Participation |
| IMAS | Institute of Marine and Arctic Studies |
| NTSC | The Northern Territory Seafood Council |
| PIRSA | Primary Industries and Resources of South Australia |
| QA | Quality Assurance |
| RDEA | Research Development Extension and Adoption |
| RDP | Regional Dairy Program |
| R&D | Research and Development |
| SELN | State Extension Leaders Network |
| SETFIA | The South East *Trawl* Fishing Industry Association Ltd |
| SIV | Seafood Industry Victoria |
| The Network | Fisheries and Aquaculture Extension and Adoption Network |
| USA | United States of America |
| VBIFA | Victorian Bays and Inlets Fisheries Association |
| VFARM | Victorian Fishery Association Resource Management |

# Executive Summary


- A literature review of extension was conducted, including a contemporary definition of extension, historical developments, and a description of current models of practice that are used to frame the fishing industry's extension and adoption (E&A) experiences. The five key models of extension described are: the Group Facilitation/Empowerment Model, Technology Development Model, Training/Programmed Learning Model, Information Access Model, and Individual Consultant/Mentor Model.

- A literature review of existing fishing industry E&A activities was conducted using a range of criteria. These criteria formed the basis of two dedicated survey questionnaires for capturing general E&A activity, and Best Practice case study activity. The key criteria applied include: *Extension target, Level of disaggregation of target audience, External stakeholders, Extension tools, Extension models, Timing of adoption, Level of adoption, Performance measures, Cost effectiveness*, and *Outcomes*.

- This review identified and surveyed over 50 industry people who identified 41 extension and adoption activities. This review also identified and collected data on 10 best practice case studies drawn from the Australian fishing industry (8), the Australian dairy industry (1), and, the USA (1).

- Overall, the models of engagement that are widely used across the fishing industry include: technology development/problem solving, information access, and training/programmed learning. The technology development model was used by fishers to work with researchers to trial and develop new technologies. Brochures, web sites and any means that allowed fishers to access information without direct contact were classified as fishers using the information access model. Training through workshops was mentioned a number of times. Training workshops and one-on-one extension are most commonly used in the aquaculture industry with media, television, and magazine articles being used more often in the larger commercial and recreational fishing industries, particularly at the national level.

- To assess effectiveness, respondents to the survey were asked: *On a scale of low, medium and high: How effective do you think your extension project has been in achieving adoption across the intended audience?* Their assessment of how long it took for adoption to take place was also taken into account. A total of 32 out of 41 (78.04%) who answered this question stated that there was a high level of adoption. A further four stated that there was a medium level of effectiveness. In the opinion of the majority of respondents to the survey, extension projects across all sectors were effective. A total of 40 gave an answer for how long it took to achieve adoption and of those 31 (79.5%) stated that it occurred during the extension project and a further seven (17.9% stated that it was within 2 – 5 years). Therefore, 33 out of 35 (94.3%) of respondents stated that adoption from their activities took place at most with in five years. This is a very good result.

- A quantitative assessment of the cost-effectiveness of extension and adoption was not undertaken, largely because there are insufficient data in this area and baseline data do not exist. The main data gaps are level of adoption and the timing of adoption, hence the existing information surrounding FRDC's return on investments is limited. Using qualitative data only, inferences regarding cost-effectiveness are drawn from the projects examined, with most projects reporting medium to high levels of cost-effectiveness.

- To assess the appropriateness of the current mix of extension and adoption activities, data were used about the level of disaggregation in the industry and what types of extension models or tools were used. One would expect that if a particular extension project was aimed at a part of the industry that was highly disaggregated, a broad scale type of model such as the information access model would be used and that opposite is also true. The data show that this was largely the case, the more dispersed the fishers, the broader the model of extension.

- The combined findings of the literature review and the best practice case studies are discussed to inform recommendations for consideration by FRDC to improve existing and future extension activities.

## *Recommendations*

- Based on this review, most applications of extension methods are considered to be working well, so to this extent they should continue. Although improvement is always possible and this review provides guiding remarks.

- Continue and strengthen the work of the *Fisheries and Aquaculture Extension and Adoption Network* and it is recommended that members of this network consider joining professional development groups like the *Australasian and Pacific Extension Network* so that the success and learnings can be shared (and received) across all primary industries given the success of the fishing industry with regard to adoption.

- Professional development and training in extension should be encouraged for members of the fishing industry, particularly those people engaged in extension delivery. Greater awareness of the discipline and practices of extension is likely to increase confidence and capacity to deliver more efficient and effective projects and programs, as well as facilitate inter-industry learnings.

- Currently the industry, and in particular the FRDC, is effectively enabling the delivery of extension and adoption activities through project and program support, but this could be improved if both the industry and FRDC could enhance existing capacity to enable change by better connecting the boats of the industry with the boardrooms.

- Establishing coordinated communication hubs that reside at the state-regional level may be a suitable method for the fishing industry to better enable change and promote the role of extension throughout existing RDEA activities. A further opportunity is for these hubs to apply the concept of regionalisation to a greater extent than already occurs, as well as embrace social networking and other electronic media.

# 1 Introduction

Australia has particularly diverse marine and freshwater habitats that support many aquatic species and fishing industries. Over the past 15 years, the Fisheries Research and Development Corporation (FRDC) has planned, invested and managed fisheries research, development and extension to maximise the economic, social and environmental benefits of its stakeholders. The FRDC is a co-funded partnership between the Australian Government and the fishing industry.

The FRDC's stakeholders are the Australian Government and the three sectors of the fishing industry: commercial (wild catch and aquaculture), recreational and indigenous. It is also guided by state and territory governments, other funding bodies, research providers, community and interest groups, and ultimately the people of Australia.

The research undertaken by FRDC is well regarded. However, recently the organisation and its stakeholders identified a need to improve the extension and adoption of the research being undertaken. This led to the creation of the *Fisheries and Aquaculture Extension and Adoption Network* (hereafter referred to as *The Network*). It is comprised of range of stakeholders across states, sectors, and organisations. The Network identified the need to further understand extension and adoption practices, and to identify lessons to be applied across the sector and organisation.

This research will provide background information on extension and adoption activities and approaches that have been and are being used in the fishing industry. In addition, the research will highlight best practice examples (case studies) that have achieved high levels of adoption, practice change and significant outcomes. This research will also provide insight into which extension activities should form the foundation for future planning and the approaches and activities that should be considered.

## *1.1 Specific objectives of the review*

The following key evaluation objectives were identified in the brief for this review and refined through the start up process:

- Provide a review of all relevant literature regarding extension and adoption activities, including linkages to research and development for commercial (wild catch), aquaculture and recreational sectors of the fishing industry.
- Evaluate and report existing extension and adoption practices, including target audiences, cost effectiveness and industry impact of extension and adoption practices across the commercial, aquaculture and recreational sectors of the fishing industry.
- Identify and document best practice extension and adoption activities, tools and methods as case studies across the commercial, aquaculture and recreational sectors of the fishing industry.
- Identify factors leading to successful and unsuccessful extension and adoption activities.
- Identify and document case studies of extension and adoption activities beyond the Australian fishing industry (e.g. Australian agriculture industries or international fishing industries) to provide lessons, recommendations and a benchmark of best practices.
- Identify and document the key factors required to strategically plan future extension and adoption investments across the fishing industry to improve the outputs and outcomes of tomorrow's research and development activities.
- Provide and present all findings in an appropriately formatted report and give presentations to key stakeholders to ensure the greatest understanding and adoption of these recommendations (including FRDC Board and the Network).

# 2 Methodology

The key research questions this reports aims to respond to are:

1. What is the range of extension and adoption activities used in the recreational, commercial and aquaculture industries?
2. How effective are the extension and adoption activities across the sectors?
3. How appropriate is the current mix of extension and adoption activities across the sectors?
4. What are the best management practices of extension and adoption activities across the sectors?
5. What lessons from other industries can provide the efficacy of fisheries related extension and adoption activities?
6. What improvements can be made to existing and new extension and adoption activities?
7. How can extension and adoption activities across the industry be more strategic in terms of delivering outputs and outcomes of research and development?

To inform this research, a mix of methods was used. The first step included a reverse brief, which provided FRDC, Rufus Jennings and Roberts Evaluation an opportunity to discuss and inform the objectives and direction of the research.

The second step included a literature review of extension and adoption. This was informed by evidence and a significant amount of theory across a range of sectors – including, but not limited to: dairy, horticulture, meat and livestock, grains, fisheries, forestry, and others. The literature review can be found in *Section* 3, and the references used in *Section 7.*

The literature review was particularly useful for identifying the principles of extension, the models of extension, and the criteria for assessing extension activity. This was used to inform the questionnaires for the key stakeholders (*See Appendix 8.1*2) and the case studies (*See Appendix 8.3*).

Approximately 50 key stakeholder interviews were undertaken across commercial, aquaculture and recreational sectors in all states (including Commonwealth fisheries). This was used to identify and document the extension and adoption practices currently occurring (*See Section 4).*

In conjunction with the interviews, ten case studies were completed to provide further in-depth analysis of best management practices. While the focus was on the commercial, recreational and aquaculture sectors of the fishing industry, two international and domestic dairy case studies were undertaken to provide external insights. These case studies can be found in *Section 5.*

Comments, presentation and feedback has been provided by FRDC, and this was directed at informing and supporting the *Fisheries and Aquaculture Extension and Adoption Network.*

# 3 Literature Review

This review of literature is presented as background information on the history, recent developments, and current thinking regarding the theory and practice of extension. The definition of extension used in this report, and that is becoming increasingly accepted by extension experts and practitioners who work in primary industries in Australia, is that developed by the Sate Extension Leaders Network (SELN 2006):

> *Extension is the process of enabling change in individuals, communities and industries involved in the primary industry sector and with natural resource management.*

The State Extension Leaders Network, as the name suggests, is a group of expert extension practitioners in Australia who regularly exchange information about current and innovative practice. Their definition is relevant to all three sectors of the fishing industry, because aquaculture and commercial fishing are primary industry activities, and while both these plus the recreational sector are all concerned with natural resource management. In addition, all are concerned with the engagement of the individuals, communities and stakeholders.

The justification for using this definition of extension is four-fold. First, it conveys a clear, simply stated, and hence universally acceptable notion of extension that is based on the axiom of *enabling change*, which importantly does not limit the array of methods that could be used to achieve change. Second, this definition has an emphasis on *enabling*, which implies that change can (and preferably does) occur through voluntary, non-coercive engagement processes. Third, this definition is considered relevant to the Australian fishing industry now, and in the future, principally because the definition is sufficiently broadly defined; and finally, it was developed by a senior group of Australian extension experts who work across the primary industries.

There are a number of typologies that categorise engagement and participation. Programs in natural resource management in Victoria tend to use the IAP2 spectrum (the International Association for Public Participation) which has its roots in the ladder of participation developed by Sherry Arnstein (1971). The parts to the IAP2 spectrum are: *Inform, consult, involve, collaborate, empower* (Victorian Government Department of Sustainability and Environment, 2005). The typology that was used for this research is by Coutts (1997; cited in Coutts *et al.* 2005) and later added to by the State Extension Leaders Network (2006). This typology is made up of seven models of extension and particularly relevant for this research because it comes from the collective work of this senior group of experts in Australia.

Compliance is at the extreme end of the extension spectrum, which is not the focus of here although it is noted that compliance can be used to achieve a learning and adoption outcomes. Extension, in the context of this review, is concerned with achieving outcomes through building individual, community and industry capacity, not legislative coercion.

The next two sections address the historical development of extension, and describe the models of extension that are considered relevant to the Australian fishing industry.

## *3.1 Principles of extension and their development*

The origin of extension is traced back to the 1500s by Jennings (Section 1 in Jennings *et al.* 2011). Extension (in a form that can be related to contemporary practices and institutional arrangements) emerged with the advent of tertiary level study of agriculture as a discipline, the rise of the off-farm, agricultural improvement, a coincidental growth in science-based approaches, the rise and use of rural market mechanisms and, ultimately, the rise of capitalism across increasingly clearly defined nation states of Europe.

These, amongst other key factors such as the promotion of the national interest through higher tax revenues from agricultural economic growth, led to a community of *agricultural improvers* (including scientists) who increasingly developed their beliefs and practical recommendations away from the direct site and commercial context of working farms: For example, on university research stations, and through the combined academic pursuits of chemistry, medicine, anatomy and others. As a result of this separation between on-farm management and off-farm research, the need arose for considered practical recommendations to be *extended* back to the target audience with the intent of improving on-farm productivity by influencing, and hence changing, the management practices of those who worked the land.

Over the ensuing centuries up to the 1900s, extension was increasingly practiced in a range of forms, including: authorship and publications of various forms such as leaflets, market reports, newspapers, and books, as well as, agricultural fairs, and training offered by formal institutions such as schools, colleges, university and research organisations.

Turning more specifically to Australia, extension efforts of the late 1800s up to the post World War Two period largely took the form of publicly funded demonstration farms and related training centres, which were recognised as a critical component for lifting national agricultural surpluses through the principle and practice of teacher-student education. This relatively long-running and uniform early phase of the development of extension was followed by a comparatively dynamic period in terms of the dominant extension principles and associated movements up to the 21st century. SELN (2006) appropriately documents these transitions in the following figure.

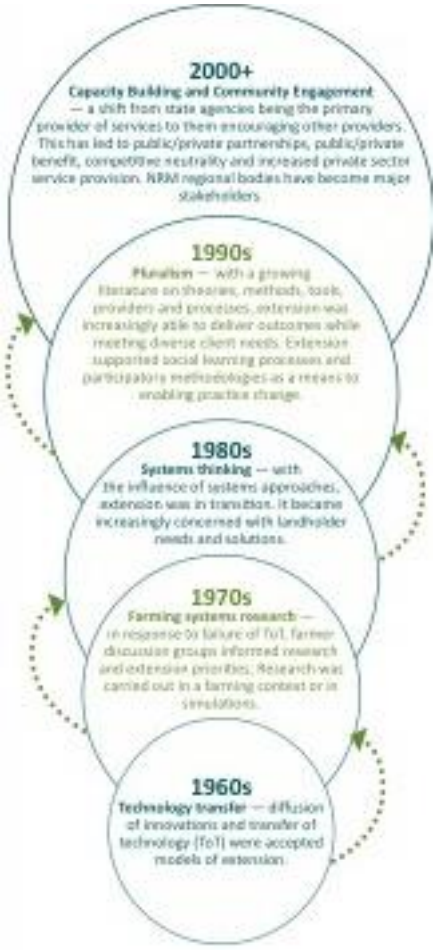


**Figure 1: Timeline of Extension Methods**

Extension activities used across the Australian fishing industry are influenced by these historical changes as much as extension in other primary industries.

## *3.2 Research, Development, Extension and Adoption*

The link between research, development, extension and adoption (RDEA) in agriculture and fisheries has been developed based on theories of practice change (Bennett, 1979; Coutts et al., 2005; SELN, 2006; Jennings *et al.* eds 2011), adult learning principles (Fell, 1997; Knowles, Holton and Swanson 1998) and new product development (Ulrich, *et al.,* 2004;). In general terms:

- The research is identified and undertaken in alignment with industry-defined priorities
- The development is undertaken in terms of commercialising the research
- The extension is crucial to the promotion of the product through the implementation of various activities that have their roots in social theories of (practice) change
- The products are adopted[1] if they are seen as useful by the target audience.

The process of going from research to adoption is often neither linear nor straightforward. It is often cyclical in that research produces more research questions. In addition, there are times when research results progress to the development stage, but the researchers have to go back to the drawing board to solve particular problems that have arisen when the results are tested.

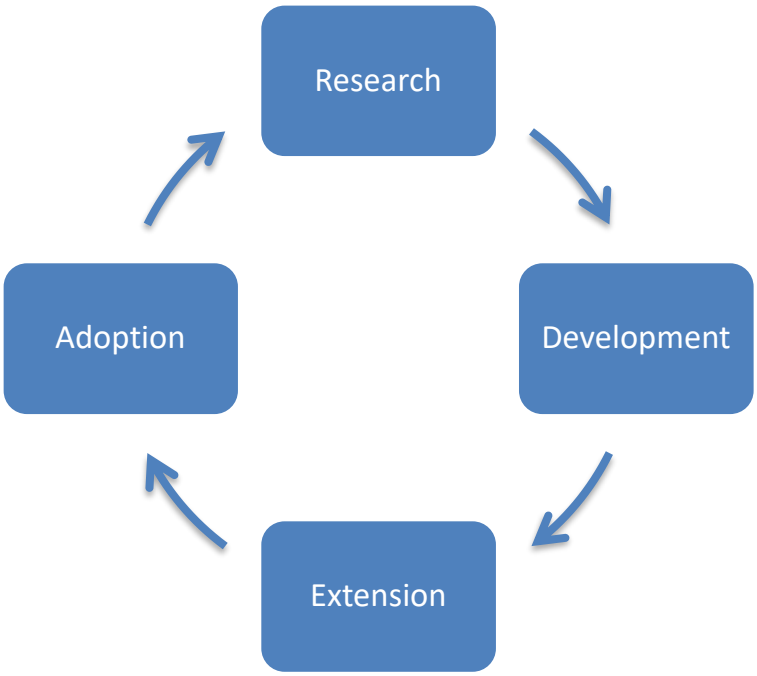


**Figure 2: Linking research, development, extension and adoption**

The RDEA framework is utilised by the FRDC in a general sense, in that it funds the primary research across the fish supply chain as well as the commercialisation there of, supporting the extension and adoption with industry. This literature review focused upon the role of extension within the broader RDEA framework, in recognition of the renewed focus by FRDC to improve the outcomes and impacts related to the research and development activities they fund. It is through extension activities that adoption is achieved and the benefits of research and development are realised.

[1] Bennett's Hierarchy discusses practice change in terms of improving knowledge, attitude, skills and aspirations to achieve practice change. This is the engagement aspect of 'extension'.

## *3.3 Models of Extension*

Extension projects in Australia can generally be described as imitating at least one of seven models identified by Coutts (1997), Coutts *et al.* (2005) and the State Extension Leaders Network (2006). The models can be applied to different primary industries and communities, and extension practitioners often draw on multiple models to present their information. The table below is a summary of the models with more details following.

**Table 1: Coutts Five Models of Extension (1-5), SELN models in development (6,7)**

| Model | Description |
|---|---|
| **1. Group Facilitation/ Empowerment Model** | The central pillars of this model are: 1) A group of individuals, 2) An agreed agenda for on going learning, and 3) Individuals have a long-term commitment to the group. This model focuses on increasing the capacity of participants in planning and decision-making and in seeking their own education/training needs based on their situation. The project will often provide or fund a facilitator to assist groups to define their own goals and learning needs and to help them realise these. |
| **2. Technology Development / Problem Solving Model** | This model is about working with individuals and groups to develop specific technologies, management practices or decision support systems which will then be available to the rest of the industry or community. It often involves local trials, demonstrations, field days and on-site visits. Commitment of individuals is to the project not to the group. Once the project is complete, the group disbands. |
| **3. Programmed Learning / Training Model** | This model is about delivering specifically designed training programs/ workshops to targeted groups or community members to increase understanding or skills in defined areas. These can be delivered in a variety of modes and learning approaches. The use of adult learning principles is very important. [2] |
| **4. Information Access Model** | This model is about providing a range of information that individuals and groups can access at a time that suits them. It can be based in a library, information centre, on a website, or other centralised location. |
| **5. Individual Consultant/ Mentor Model** | This model is about individualised one-on-one support. It may be a technical expert visiting and providing advice, diagnosis and recommendations. It may be an on-going facilitating mentor relationship that provides a sounding board for decision-makers. |
| **6. Multi-stakeholder Negotiation** | This model supports collective decision-making in complex multiparty situations (eg. in public good issues) using facilitation approaches that build on the enthusiasm of participants, target creativity and innovation as well as enabling effective participation of interested parties. |
| **7. Institutional Development** | This model supports the facilitation of network building, learning and negotiation processes within and amongst institutional stakeholders, programs and networks. |

The models describe extension activities that go from intensive 1:1, face-to-face mentoring to accessing information remotely via media such as websites. The diagram below represents the models on this continuum of intensive interaction to remote access.

[2] For a description of adult learning principles, see Appendix 1 (Section 8.1)


**Figure 3: Models on an extension continuum from intensive to remote interaction**

Models 6 and 7 are still being developed. Models 1 – 5 are now described in more detail.

### 3.3.1. Group Empowerment and Facilitation Model

The main considerations of the group empowerment and facilitation model are that: individuals work in groups; as a group they decide what it is they want to learn; and as individuals, they commit to a long term association with the group. Use of this model results in the establishment of learning groups. Each learning group usually has between 6 – 10 participants. Membership tends to be homogenous, such as a group of fishers, or farmers, or industry representatives. In the fishing industry it could be used where fishers (or individuals from a business) form a learning group and meet regularly to decide what it is they want to learn about. The focus is on participants increasing their capacity in various aspects to do with their business. They seek out their own education and training based on their situation.

The way this model operates is captured by Ison and Russell (2011) when they describe the exchange of information of the individuals in the group as a conversation between like-minded people with common interests. Outcomes from using this model are: improved business performance, a culture of learning, an increase in personal attributes and skills, and increased knowledge about new technologies (McKenzie 2007).

Underlying assumptions of this model of extension are that people in specific situations are best able to understand and act on issues of direct concern to them, and that groups are best served by having a facilitator who works with group members to define their problems and how best to address them. Some elements of this model are that:

- Membership is by invitation with the impetus for forming a group coming from its members
- The group meets regularly and incorporates a planning cycle into its processes
- Facilitators are often engaged to help group members define and realise their own goals and learning needs
- Group members are encouraged to benchmark their knowledge, attitudes and practices so that they can measure change.[3]

In contrast to the technology/problem-solving model that tends to focus on one particular issue or problem at a time (see below), this model centres on the on-going needs of a group and will address a range of issues over time (e.g. some groups in the wool industry started in the mid 1990s).

[3] Coutts J, Roberts K, Frost F, and Coutts A. 2005, *Extension for Capacity Building: What Works and Why?* Rural Industries Research and Development Corporation, ACT http://rirdc.infoservices.com.au/collections/cvcb.

**Table 2: Checklist for the Group Empowerment and Facilitation Model[4]**

| Element | Comments |
|---|---|
| Participants have expressed the need for assistance. | Impetus could come from either a project team or potential participants themselves. The key point is that it is not imposed. |
| Groups are self selected and membership is on-going, often for many years. | There are various approaches to self-selection. |
| Facilitators are selected or endorsed by the group participants. | These could be public, private or community people. |
| A planning cycle is incorporated into the process – including reflection on progress. | A planning cycle provides some confidence that issues will be dealt with in a systematic way. |
| Groups meet regularly to share experiences, learn and plan. | How often they meet is affected by localities and the types of issues facing the groups. |
| Boundaries for use of funder resources and reporting needs are negotiated and agreed to by funders/project team and group members. | Funders need some boundaries and broad objectives for monitoring and accountability purposes. These need to be clear – as well as the type and level of reporting against these. |
| Opportunities are made for professional development of group members. | Facilitators need to be connected between each other and further develop their facilitation and *technical* knowledge to ensure they are of maximum benefit to the groups. |
| Group members are encouraged to benchmark their knowledge, attitudes and practices. | Benchmarking is a way of measuring and reinforcing individual and group progress and growth. |
| Group members contribute an increasing level of their own resources to group activities. | This assists with ownership and sustainability beyond the life of a project. |

Examples of groups using this model include:

- ***Landcare*:** From the late 1980s, Landcare provided a model that demonstrated how group facilitation could be an effective framework for involving people in natural resource management activities at a local level but also on a large (national) scale.
- ***BestWool/Bestprac:*** Commencing in Victoria in July 1998, this program is based on neighbourhood discussion groups that meet regularly for facilitated discussion, farm walks, training workshops and information sessions aimed at improving farm business profitability.[5] Each year the facilitator takes a group through a needs assessment process and then has the mandate to look for the best training or learning opportunities to meet the group's needs (Coutts et al. 2005: 26-27).

### 3.3.2. Technology Development and Problem Solving Model

The main pillars of this model are: a problem that needs solving (or technology that needs developing); and a group of individuals who can solve it. Members focus on one issue at a time and membership is mixed, in that anyone who has skills, expertise or resources to solve the problem is part of the group.

[4] Coutts J, Roberts K, Frost F, and Coutts A. 2005, *Extension for Capacity Building: What Works and Why?* Rural Industries Research and Development Corporation, ACT http://rirdc.infoservices.com.au/collections/cvcb.
[5] BestWool/BestLamb n.d., "What we do", accessed 29 April 2011; http://bestwoolbestlamb.com/pages/about/what_we_do/

Each member of this group is considered equal and their input of equal value. There is no division between researcher and practitioner (fisher); they are in partnership and it is recognised that each has a vital role to play in arriving at a satisfactory outcome. Membership can change as experts come and go as and when needed although there is usually a central core of individuals to see the work through. Group members meet regularly to progress the work.

The outputs from the use of this model are *ad hoc* research groups; and the outcomes are technologies and solutions that can be tested and applied by others.

An assumption of the implementation of this model is that effective technologies or practices are not generally developed in isolation of a waiting industry or community. An example of the use of this model from the fishing industry is the pearl fishers who commission research as and when they need it. This model often involves local trials, demonstrations, field days and on-site visits. Membership in this model ends when the problem has been solved, unlike the group empowerment model where membership is ongoing. To operate using this model:

- All key stakeholders must be convinced of the specific need, which is the focus of their activities. There should be a process to inform and involve stakeholders in the problem definition and the approaches to tackling this.
- Benchmarking is a key feature so that stakeholders can gauge the change and impact of the activities.[6]

**Table 3: Checklist for the Technology Development/Problem Solving Model[7]**

| Element | Comments |
|---|---|
| Issue or need identified by individuals or industry. | The point is that the perceived need may arise for any group, but all key stakeholders need to be convinced of the need. |
| Membership is open to those who have expertise and skills to solve the problem. | Membership lasts only for as long and the group is working on solving the problem. Once the task is complete, the group disbands. |
| Facilitation provided to mobilise and assist in process. | Facilitative extension skills are critical in gaining broad involvement and providing a participatory framework. |
| The process is designed to allow researchers/experts and producers/community participants to work together. | The point is that this should be a participative process recognising the strengths of all. |
| There is a strong on-farm/on-site trial and demonstration and assistance component. | In some cases, on-farm trials may mirror – or extend – formal research sites. |

Examples can be found of groups using this model to address specific issues relating to productivity, resource and pest management. These include:

- **Growers Group Alliance** (GGA) was set up in Western Australia in 2002 among broadacre grain and livestock farmers with one of its main aims being to *enhance the participation of grower groups in collaborative projects developed between grower groups, research providers and*

[6] Coutts J, Roberts K, Frost F, and Coutts A. 2005, *Extension for Capacity Building: What Works and Why?* Rural Industries Research and Development Corporation, ACT http://rirdc.infoservices.com.au/collections/cvcb.
[7] Coutts J, Roberts K, Frost F, and Coutts A. 2005, *Extension for Capacity Building: What Works and Why?* Rural Industries Research and Development Corporation, ACT http://rirdc.infoservices.com.au/collections/cvcb.

*industry*.[8] The GGA strategic advisory group includes representatives of three research organisations and an agribusiness representative to facilitate collaborative projects.

- Businesses in the fishing industry commissioning their own research and contributing the expertise to the findings. Their relationship with researcher only lasts as long as the research. Subsequent research needs will be met by different researchers. There is no expectation of an on-going and continuous relationship[9].

### 3.3.3. Programmed Learning/Training Model

The main focus of this model is one the development of specifically designed information for targeted groups of individuals. These individual are together for the duration of the training. There is usually no expectation of a commitment to other participants beyond the time of the training. At the heart of this model is the delivery of information through training programs that follow a specific curriculum with learning outcomes. At the conclusion of the training, it is expected that participants can identify what they have learnt and how they can apply it to their own situation. It is this model that is most often used to deliver messages and content of research and is about how to make the messages and their delivery more effective (Leewis 2004; Pannell and Vanclay eds 2011; Jennings *et al.* eds, 2011, Section 2; Aslin and Brown, 2004).

The outputs of the implementation of this model are training programs, training materials and manuals; and the outcomes are increased knowledge and skills. The rationale for developing programmed learning and training projects is the belief that knowledge can be transferred and will bring about change. In contrast with the group empowerment or the technology development/problem solving models, participants are unlikely to have direct input into the content and process of programmed learning events.

To operate with the programmed learning/ training model:

- Programs should result from the needs expressed by potential participants.
- Up-to-date information is accessed from a full range of sources and integrated into a cohesive package with pilot programs used to rigorously assess the program. Where possible the course material is aligned with competencies under training packages in the Vocational Education and Training system. A transparent and dependable quality control mechanism is in place throughout the development and implementation of the program.
- Adult and experiential learning principles are incorporated into the delivery with direct opportunities provided for participants to relate learnings to their own situations.
- Provision is made to support participants between workshops and/or at completion[10].

**Table 4: Elements of the Programmed Learning/Training Model[11]**

[8] Growers Group Alliance 2007, *Role of the Alliance*, 29 April 2011; http://www.gga.org.au/role-of-the-alliance
[9] Invasive Animals Cooperative Research Centre 2010, *Invasive animals CRC*; accessed 4 May 2011; http://www.invasiveanimals.com/
[10] Coutts J, Roberts K, Frost F, and Coutts A. 2005, *Extension for Capacity Building: What Works and Why?* Rural Industries Research and Development Corporation, ACT http://rirdc.infoservices.com.au/collections/cvcb.

| Element | Comments |
|---|---|
| The project is based on extensive market research and/or demand. | Projects should result from identified or expressed need and be supported by representatives of potential participants. |
| Up-to-date information is accessed from the full range of potential sources and integrated into a cohesive package. | Some effort needs to be made to ensure that information is balanced and incorporates the most up-to date information. |
| A transparent and dependable quality control mechanism is in place in the development and implementation of the project. | There are some *off the shelf* materials that work for training, otherwise those used need to be relatively obvious and dependable. |
| Pilots are undertaken and rigorously assessed. | Before launching a project training product, pilots can refine their potential usefulness. |
| Adult and experiential learning is incorporated into the delivery. | These are about recognising participant experience and engaging people in the process of learning. |
| Participant feedback is provided for and made available to funders. | Feedback sheets should be developed as part of the process. It is also good to seek feedback six months after an event. |
| Provision is made to support participants between workshops/and or at completion. | Approaches may include e-mail contact, local mentors, phone hook-ups etc. |
| Direct opportunities to relate learnings to own businesses/situations are included. | This is a crucial component and exercises can be designed to this purpose. |

This model acknowledges that not all people who want to learn are accessible through groups; that research findings may be applicable across a range of practical situations, and that there is a recognised need across a wide geographical area. Workshops and courses cover specific areas such as food safety and product quality as well as leadership and business management, for example:

- ***EDGEnetwork*:** Meat and Livestock Australia's EDGEnetwork provides a range of workshops including *Business Edge* – a two day workshop focused on financial and business management; PROGRAZE – directed towards managing productive resources on-farm; plus more production focused workshops, including genetics and breeding, grazing and nutrition.[12]

### 3.3.4. Information Access Model

The central pillar of this model is accessible information. There is no expectation that individuals meet directly and materials that contain information are designed to be accessed remotely. Use of this model recognises that people require different information at various stages of their decision-making processes and in a form that suits them. It is about providing a range of information that individuals and groups can access when required.

Methods to deliver information through this model are: the internet (websites, YouTube, Facebook, Twitter, blogs, chat sites), information centres, libraries, museums or other centralised locations. Outputs produced through this model are materials such as: brochures, fact sheets, posters, learning materials, best practice guidelines, audio and visual materials, displays etc.

[11] Coutts J, Roberts K, Frost F, and Coutts A. 2005, *Extension for Capacity Building: What Works and Why?* Rural Industries Research and Development Corporation, ACT http://rirdc.infoservices.com.au/collections/cvcb.
[12] Meat and Livestock Australia, 2011 *EDGEnetwork*; accessed 29 April 2011; http://www.mla.com.au/Research-and-development/Extension-and-training/EDGEnetwork

Andrew Campbell (2006) laments the fact that there is so much good information that is inaccessible to most people even though the technologies are there to make sharing easier. He suggests that there should be rewards for knowledge sharing. This model is used as both an information repository and a gateway for information dissemination.

**Table 5: Checklist for the Information Access Model[13]**

| Element | Comments |
|---|---|
| There are clear objectives and clear identification of information client groupings. | The default option of providing information *because it is there* should be avoided. |
| There is opportunity to monitor usage, and obtain on-going feedback and client needs. | This is a critical element that is central to this model. It may include external evaluation. |
| There is opportunity to link to *real people* and peers who may be searching for similar information – or have relevant information. | There are a number of mechanisms – both virtual and physical – to link people in with other *searchers* and staff. |
| QA systems are in place to ensure currency, relevance and quality of information. | There are a range of QA approaches – the transparency and rigour is important. |
| There is *space* for people to *play* and experiment with their information seeking. | Information access projects should be fun and allow user experimentation. |

Examples include:

- Dedicated web pages (such as www.frdc.com.au) with links to practical resources such as guidelines, legal requirements (such as http://www.frdc.com.au/resources/australian-fisheries-statistics); targeted newsletters (such as http://www.frdc.com.au/resources/fish), social and market research.
- Use of social networking such as Facebook and Youtube. The fishing industry uses both these methods (see Queensland seafood industry – Mud Crab Fishing Industry in Queensland, Australia; www.**facebook**.com/pages/**Fishing-industry**/109300402428799).
- Libraries, museums and other places where collections are held.
- Brochures, posters, books and articles that are accessed independently.

### 3.3.5. Consultant and Mentor Model

This model is about one-on-one support where a mentor (or consultant) works over time with an individual to improve their business, technological, social or environmental situation. This work is expected to develop into a long term, formal relationship where the consultant (or mentor) acts as a sounding board for their clients. It is expected that the consultant or mentor is able to add value by being familiar with a diverse range of research and development material and he/she is an avenue of extension and key supporter of adoption. A contract (formal or informal) forms the framework for the relationship and both consultant and client choose with whom they want to work.

The outputs of the use of this model are mentors/consultants working with mentees/clients. The outcomes are: better businesses and better-informed individuals. There is growing evidence that agricultural producers are increasingly turning to outside professionals to provide expert advice, although many of these relationships rely on an informal advisory approach (Coutts *et al.*, 2005). Successful use of this model requires:

[13] Coutts J, Roberts K, Frost F, and Coutts A. 2005, *Extension for Capacity Building: What Works and Why?* Rural Industries Research and Development Corporation, ACT http://rirdc.infoservices.com.au/collections/cvcb.

- The client is organised and clear about what they want and have a purpose and goal in-mind. At the same time, both parties understand it as a two-way relationship.
- The client and consultant negotiate a written contract in terms of time, costs, outputs, and delivery timeframe.
- The client has as much relevant farm business data as possible for review by, and discussion with, the consultant.
- The client *walks around* with *the consultant* (on-site) and participates in information gathering, analysis and decision-making but the clients make the ultimate decisions themselves.[14]

**Table 6: Checklist for the Consultant/Mentor Model[15]**

| Element | Comments |
|---|---|
| Mentor and client are organised and are clear about what they want. | This is different to *ad-hoc* visits. It is about having a purpose and goal in-mind. |
| The client and consultant negotiate a written *contract* in terms of time, costs, outputs, and delivery timeframe. | Written contracts ensure a *business-like* relationship. It provides a basis of assessing how well the relationship has met expectations. |
| The client has as much relevant business data as possible for review by, and discussion with, the mentor. | Decisions are based on the most up-to-date data available to maximise the potential value of the time used. |
| The persons being mentored make the ultimate decisions themselves. | This is important in terms of litigation. Some consultants are reluctant to *take risks*, but this can be minimised if the client takes the responsibility for decisions made. |
| The relationship continues over time. | There is value in consultants/mentors knowing a situation over-time and making suggestions in context. |

Examples of clearly identifiable mentoring programs aimed at building capacity and leadership skills include:

- ***DairySage:*** The DairySage mentoring program brings together potential leaders and existing or past leaders with the aim of developing a new generation of business leaders and decision-makers for the dairy industry[16]

- ***Dairy Focus Farms***: In Victoria, the Focus Farms program currently includes a mentoring component where young service providers are mentored by the group's' facilitators.[17] The aim is to help them build an understanding of the whole farming system so they can provide better service to their dairy farmer clients.

### 3.3.6. Extension Programs

Extension activities may not rely exclusively on one model but include aspects of different models. In their review of extension activities in rural industries, Coutts *et al.* found that the different models work well together by providing a suite of complementary, capacity building avenues (2005: 19). For example,

[14] Coutts J, Roberts K, Frost F, and Coutts A. 2005, *Extension for Capacity Building: What Works and Why?* Rural Industries Research and Development Corporation, ACT http://rirdc.infoservices.com.au/collections/cvcb.
[15] Coutts J, Roberts K, Frost F, and Coutts A. 2005, *Extension for Capacity Building: What Works and Why?* Rural Industries Research and Development Corporation, ACT http://rirdc.infoservices.com.au/collections/cvcb.
[16] Dairy Australia 2011, *DairySage*; 3 May; http://www.thepeopleindairy.org.au/projects/dairysage-mentoring.htm
[17] GippsDairy 2011, *Focus Farms*; accessed 3 May 2011; http://www.gippsdairy.com.au/Projects/FocusFarms.aspx

the programmed learning model may be relied on for projects using the group empowerment and facilitation model to provide appropriate training. Both the group empowerment and technological development models are commonly supported by the information access model where access may also include links to peers and other relevant people. There is also evidence of a one-on-one extension component, as identified by the consultant/mentor model, for some technology development projects where research is carried out on trial sites or fishing vessels.

Extension also relies on funding as pointed out by Marsh, Pannell and Llewellyn (in Jennings *et al.* eds, 2011). These authors look at extension through an economic lens, and suggest that improvements in the uptake of new technologies and the capacity of participants, depends on an effective extension sector across all models of extension.

McGowan's article (in Jennings *et al.* eds, 2011) is a reminder of the effect of women in agriculture. Not just because they are partners in many businesses, or have their own business, but also because they perform roles such as encouraging learning and are often leaders in documenting and monitoring the business in various ways (including financial). McGowan's notion in part also supports the notion that more diverse workplaces can benefit from a larger pool of ideas and skills that can lead to greater opportunities and their associated advantages if realised.

This literature review was used to identify the characteristics of extension programs and to develop the questionnaires.

# 4 Characteristics of Extension and Adoption Practices

Based on the above literature review and the brief put forward for this research by FRDC, a list of characteristics have been developed for designing, implementing and evaluating extension based programs within the RDEA framework. These characteristics stratify the fishing industry according to stakeholders (who they are and where they are); the type of extension methods currently used; and the current rate of adoption.

Data from current evaluation projects were distributed according to these characteristics to assist with identifying the current effectiveness, appropriateness and efficiency of fish related extension programs, and to analyse strengths and weaknesses, and identify gaps. Data were obtained from interviews with stakeholders and through a review of documents from stakeholders.

## *4.1 Characteristics of organisations and stakeholders*

The characteristics of fisheries organisations and stakeholders that were thought to be important to analyse extension are:

- **Sector**: aquaculture, commercial, recreation.
- **Fishery type**: fish species, or other defining character.
- **Location**: state, territory or commonwealth.
- **Research agency**: the agency that commissioned the primary research.
- **Client**: the users or investors in the primary research and commercialisation thereof.
- **Driver of research**: the proponents of the research.
- **Responsibility for extension**: the organisation responsible for the extension and promoting the adoption of the research or development thereof.
- **Extension target**: the key stakeholders being targeted for adoption.
- **Level of disaggregation of target audience**: a ranking of the diversity of the target audience, based on number of fishers, type of equipment, location, *etc*.
- **External stakeholders**: organisations with a stake in the delivery or outcomes of adoption.

## *4.2 Characteristics for delivery and implementation*

The characteristics for delivery and implementation include:

- **Extension tools**: the practical methods used for engaging, communicating and broadly extending the information to stakeholders:
    - Engagement: how people are initially contacted (e.g. through groups, industry bodies, *etc*).
    - Communication: how information is provided to the audience (e.g. through mass media, one-on-one interactions, *etc*).
- **Extension models**: the model used, based on the above theories (see above and see toolkit sources at the end of the *References* section).

## *4.3 Characteristics of outcomes and influences*

Characteristics associated with outcomes and influences are:

- **Timing of adoption**: the time it has taken from research and development to extension and adoption (including during or after the extension program).
- **Level of adoption**: the scale and scope of adoption by the stakeholders.
- **Performance measures**: any key performance indicators used for measuring the success of the program.
- **Cost effectiveness**: assessment of costs relative to various outcomes.
- **Outcomes**: the longer-term impacts of the extension and adoption in terms of sustainability, profitability, social and other measures.

It is recognised that as these characteristics differ substantially across aquaculture, commercial and recreational fishing, and hence the methods of extension that are most appropriate also differ. The table below identifies extension practices across the sectors.

## *4.4 Extension and adoption activities across the Australian fishing industry*

The following Table 5 shows that fishing industry extension programs display a variety of practiced methods practiced, including:

- Group empowerment to a limited extent,
- A high reliance on the technology development model,
- Some use of the programmed learning model,
- Integration of information access model across other communication and engagement, and
- A limited use of the individual consultant and one-on-one mentoring model.

The technology development model is used significantly within the fishing sector, as extension is integrated within the RDEA model. Therefore, it has typically focused upon identifying problems, prioritising those issues, and researching methods for solving the problems in a collaborative manner.

It is also worth noting that there are various methods employed for extension and these are based on the industry characteristics, for example, the more concentrated the industry, the greater the institutional infrastructure surrounding extension. The more disaggregated the sector, the higher the reliance on broad scale tools such used in the remote access model. This association between industry characteristics and the extension model used will be demonstrated to a greater extent in the case studies.

**Table 5: Extension activities and projects across the Australian Fishing Industry**

| ID # | Title project | Sector | Fishery Type | Location | Research Agency | Client | Driver of Research | Responsibility for Extension | Extension Target | Level of Disaggregation of Target | External Stakeholders | Extension / Communication Tools Used | Extension Model | Timing of Adoption | Level of Adoption | Performance Measures | Cost Effectiveness | Outcomes | Links to Documents, Projects Etc. | Other Comments | Source(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Western Australia** | | | | | | | | | | | | | | | | | | | | | |
| W-1 | Underwater video transecting for improved stock assessing. | Commercial – Abalone diving | WA | Esperance to Perth (20-odd sites for video) | WA Fisheries | FRDC and Abalone / commercial & recreational | WA Fisheries - research | WA Fisheries - research | Abalone Association – whole industry approach/info | low | Recreational fishers<br><br>Wider community | Annual meetings – reports given<br><br>National abalone conferences<br><br>Site meetings<br><br>-Verbal presentations, FRDC report | Technology development | Immediate / on-going | 100% - abalone association and it's membership<br><br>Use the info as part of annual assessment process of | Year to year comparisons of stock health viability | Was expensive but with commercial divers it is much more cost-effective. | Better info on stock. Levels/condition. Mutual respect between industry and research. Has increased capacity of both groups | FRDC report | | Ian Taylor – EO of Abalone Industry Association of WA<br><br>Anthony Hart |
| W-2 | Establishing count of juvenile pearl oysters | Commercial | Pearl | Kimberly region | Dept of Fisheries in WA | Dept of Fisheries, with Pearl Producers Assoc support | PPA through its RD&E sub-committee | PPA while working with the Dept of Fisheries | Pearl producers | Low – 6-7 pearl producers | General community. Banks, Dept of Fish<br><br>Industry bodies | Printed material<br><br>Delivered templates and guidelines<br><br>Workshops held showing graphs and modelling results | Technology development<br><br>Programmed learning.<br><br>Group facilitation | During and shortly after project | High – 100% | Can now predict fishery 3yrs ahead | High cost-effectiveness<br><br>Efficiency from working with local producers | Greater collaborative research, higher trust and recognition that technical research is of value. | Final report available - FRDC | | Bret McCallum PPA (Also FRDC board member) |
| W-3 | Reducing Dolphin Bycatch in the Pilbara Finfish Trawl Fishery | Commercial | Trawl, wildcatch finfish and demersal | Pilbara region | Murdoch University | FRDC | Unacceptable rates of dolphin bycatch | Murdoch University and Nickol Bay Professional Fishers Association | Trawl fishers | Low | WA Dept of Fisheries | Preliminary workshop, regular research updates as 1:1 sessions, frequent interim communications | Technology development | Immediate | 100% of adoptable items, work is on-going | Reduced dolphin bycatch fatalities, more than halved from project impact.<br><br>Successfully renewed WTO permit to trawl. | Medium-high. Relatively low-cost project with significant in-kind leveraging. | Allay community concern.<br><br>Discovery of sign't dolphin biology and behavioural knowledge. | Reports to FRDC. Various peer reviewed papers generated. | Knowledge can be applied to other similar fisheries. Research on-going. | Greame Stewart<br><br>Prof. Neil Loneragan<br><br>Simon Allen |
| W-4 | Samson Science | Recreational | Recreational | WA | Dept of Fisheries, Murdoch University (rec fishers also gathering data). | Department of Fisheries, FRDC | Learn about the impacts of catch and release on Samson fish and promote best practice. | Recfish West | Rec fishers | High | Fishing clubs, general public | Community meetings, brochures, newsletters, media releases, updates and info sessions, Social media | Group facilitation<br><br>information and remote access | During or soon after | Clinics - high; media releases - medium. | Level of awareness of protocols<br><br>Attendance at workshops<br><br>Survival rate recordings | Medium (media releases and clinics have med to high costs). Volunteer anglers are cost effective. | "High number" reported seeing ads on catch & release, "high take up" of protocols Documented changes in fishing practices | Brochure: http://www.recfishwest.org.au/data/client/files/1194_catching_caring_for_samson_fish.pdf | Bill Sawynok is leading the way for rec fishing extension | Andrew Rowland |

| ID # | Title project | Sector | Fishery Type | Location | Research Agency | Client | Driver of Research | Responsibility for Extension | Extension Target | Level of Disaggregation of Target | External Stakeholders | Extension / Communication Tools Used | Extension Model | Timing of Adoption | Level of Adoption | Performance Measures | Cost Effectiveness | Outcomes | Links to Documents, Projects Etc. | Other Comments | Source(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| W-5 | Recfish West Fishing clinics | Recreational | Recreational | WA | Recfish West | Recfish West, Health-way, Woodside Energy. | To promote best practice in school children. | Recfish West | School children | High | General public | Fishing clinics | Group facilitation | During or soon after | High | Testimonials from participants (available online) | Medium (med to high costs) | Change in knowledge | http://www.recfishwest.org.au/content/fishing-clinics/ | | Andrew Rowland |
| **Tasmania** | | | | | | | | | | | | | | | | | | | | | |
| T-1 | Channel and Huon Waters Clean up | Aquaculture | Salmon, Oysters | Bruny Island, Huon Channel | NA | Coastcare - Caring for Our Country | Problem-debris from marine farms | Tasmanian Seafood Industry Council/ OceanWatch SeaNet EO | Marine Farms | Low | Coastal communities | Direct negotiation, maps, leaflets, media releases for "Fishing today" | Technology development | During extension | High - all three marine farms targeted accepted responsibility | No. of operators involved; no. of cleanups | High - Based on comments from funders - CfoC | Solution to a problem the community identified and were lobbying for | | The salmon farmers have instigated cleanups on their farms in western Tasmania | Fiona Ewing, OceanWatch; Neil Stump, TSIC |
| T-2 | Seafood Industry Partnerships in Schools | Commercial fishing, aquaculture | All | Tasmania wide - 10 pilot schools | NA | FRDC funded: "2009/328 Tactical Research Fund: Seafood Industry Partnerships in Schools - Program Pilot, Tasmania" | Seafood industry engaging with community to attract future employees; dispel myths | OceanWatch Senate EO, fishermen and marine farmers adopted by schools | Future seafood industry employees; school children | High | General public | Direct involvement of fishers/farmers; public launch; documents; registration forms, etc | Mentoring fishermen and marine farmers, information and remote access | During extension | High - greater demand than places available | No. of schools taking up pilot program | High | Myths debunked; future employees interested in seafood career | Fisheries Extension Literature\Tasmania\Senate SIPS | Pilot overcommitted after two weeks, some schools doing it off their own bat, going directly to local fishers, farmers | Fiona Ewing, OceanWatch |
| T-3 | Using GPS technology to collect data on abalone in Tasmania | Commercial fishing, | Commercial abalone Diving | Tasmania wide , also sectors of SA, NSW and Vic | IMAS, University of Tasmania | FRDC has funded two projects; Abalone industry | Collection of data on abalone stocks to optimise resource planning | UTAS researchers, Tasmanian abalone divers | Commercial abalone divers | Low | Fisheries managers | Workshops, use of champions; Direct industry communication | Technology development | During extension | High - the use of GPS devices in Tasmania will be mandatory from 1 Jan 2012. NSW - 95% of divers; parts of SA and Vic | Amount of data collected versus expected data | Compared to "fisheries independent surveys - highly cost effective. collects more data and on a smaller scale | Fisheries managers able to manage quota on smaller scale | FRDC project 2006/029: http://www.aanro.net/VRESEARCH.html?projectID=23047 | Technology could be applied to other fisheries in the future | Matt Bradshaw, DPIPWE, Dr Craig Mundy, IMAS |

| ID # | Title project | Sector | Fishery Type | Location | Research Agency | Client | Driver of Research | Responsibility for Extension | Extension Target | Level of Disaggregation of Target | External Stakeholders | Extension / Communication Tools Used | Extension Model | Timing of Adoption | Level of Adoption | Performance Measures | Cost Effectiveness | Outcomes | Links to Documents, Projects Etc. | Other Comments | Source(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| T-4 | REDMAP: Range Extension Database and Mapping Project | All fisheries sectors | All sectors | Tasmania | IMAS, University of Tasmania | TAFI - now IMAS; Tasmanian Community Fund | The collection of data to record changes to species distributions in Tasmania to help with sustainable planning. It may also highlight changes that require further information or targeted studies | IMAS - interactive website: http://www.redmap.org.au | All fishers and divers | High | DPIPWE, and other government agencies and research institutions | Website; DPIPWE Recreational Sea Fishing Guide (goes to all rec fish licence holders | Technology development<br><br>Information and remote access | During extension; within 2-5 years | Fishers are logging data but the extent of the data logging is not assessed. In 19 months 110 fishers have logged sightings, of those 25 have been verified with a photo | Number of fishers logging sightings | No information | Many sightings logged http://www.redmap.org.au/sightings/view/#survey<br><br>Redmap sightings data have been cited in 3 OS scientific journal articles | http://www.redmap.org.au/ | Plans to expand the website to the whole Australian coast | IMAS coordinator - Dr Gretta Pecl |
| T-5 | Statewide rec fishing survey | Recreational | All recreational | Tas | UTAS - TAFI | Recreational licence trust DPIPWE Fisheries | To understand behaviours and catch levels, etc for better management & long term responsible fishing behaviour | DPIPWE Fisheries | Recreational fishers | High | General public | 4 - 8 page summary document. Fold out section in fishing guide | Information and remote access | During and ongoing | High | Have not done formal evaluation. Compare to previous surveys | Depends on the value given to having information | Very high application of info for management measures, etc | DPIPWE - links to surveys; Rec fishing survey report 2008 | Scientists often do it particularly well. Performance not judged on extension | Jeremy Lyle (also conducts social research in rec fishing at national level.) Rod Pearn |
| T-6 | Post release survival of flathead | Recreational | Flathead | Tas | Inst of marine and arctic studies (IMAS) | FRDC Rec license trust | To increase the post release survival rates of fish. | Infofish | Recreational fishers | High | Fishers, research agencies | Colour 2 page summary. Code of practice | Information and remote access | During and ongoing | High | Awareness in general rather than specific measures | Not calculated | Increased survival of released fish (anecdotal) | Fishing guide. 2011 | Released Fish Survival Initiative – vehicle to extend info | Jeremy Lyle |
| T-7 | Fishcare | Recreational | Sea fishing | Tas | Multiple, ongoing research | Recreational licence trust DPIPWE Fisheries | To promote long term responsible fishing behaviour | Fishcare coordinators Fishcare volunteers | Recreational fishers | High (geographical and time of year, socioeconomic) | General public; commercial fishers | Face to face, fishing hotspots, in schools | Training<br><br>mentoring of the volunteers<br><br>information and remote access | During (ongoing) | Medium - part of many activities | Change in awareness assessed via survey. Not directly attributable to programs. Annual reporting mechanism | Medium | Change in awareness and behaviours. Inaccurate info can be spread by volunteers | | Need to maintain a small and reliable volunteer base - keep control of the program | Rod Pearn |

| ID # | Title project | Sector | Fishery Type | Location | Research Agency | Client | Driver of Research | Responsibility for Extension | Extension Target | Level of Disaggregation of Target | External Stakeholders | Extension / Communication Tools Used | Extension Model | Timing of Adoption | Level of Adoption | Performance Measures | Cost Effectiveness | Outcomes | Links to Documents, Projects Etc. | Other Comments | Source(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | | |
| T-8 | DPIPWE communication in general | Recreational | Sea fishing | Tas | IMAS | | To promote long term responsible fishing behaviour | DPIPWE – fisheries managers | Recreational fishers | High | General public; commercial fishers | Multiple | Information and remote access | During (ongoing) | Medium - part of many activities | Attendance numbers, feedback forms | Medium | Change in awareness and behaviours | | | Rod Pearn |
| T-9 | Yersiniosis Disease of Salmon and Vaccination Use | Aquaculture | Salmonoid | Tasmania | University of Tasmania, DPIPWE | Tasmanian Salmon Growers' Association | Identified need for developing vaccinations and reducing the use of antibiotics | Tasmanian Salmon Growers' Association | Salmon aquaculture industry (Tassals, Huon, Sevrup, Saltas, Van Diemen Aquaculture) | Low | DPIPWE | Direct relationships with research managers | Technology development | During extension | High, complete adoption | None officially. Use of vaccines, direct engagement with stakeholders | High | Decreased reliance on antibiotics, reduced influence of the disease itself. Improved production | | This is one example of vaccine development in the industry. Others include Menine Aeromonics and Viburial | Adam Main, Pheroze Jungawaller (TSGA) |
| **Northern Territory** | | | | | | | | | | | | | | | | | | | | | |
| NT - 1 | Indigenous Marine Rangers | All sectors | All fisheries | Northern Territory coast | Dept of Resources includes Darwin, Charles Darwin University | NT Dept of Resources; funding by DAFF | FRDC; NHT; Northern territory seafood council – commercial sector and rangers | NT Dept of Resources | Marine rangers and indigenous communities, Land councils, schools | High - both geographically and in terms of target species | Land councils general community | Formal courses, involve the community, workshops, seminars, fishers doing their own research | Group facilitation<br>technology development<br>training<br>mentoring | During the training by indigenous rangers | High | Benefit to community, $ value per patrol– knew they had to do 40 per year. Quality assurance measures as well as the 40 patrols a year.<br>Other performance measures being worked on | High – indigenous – 8-10 rangers about $4000 each compared to One fisheries compliance officer $130,000. | 4 boats seized; very good community outcomes – literacy numeracy; creating leaders in communities, kids leaving schools and going straight into rangers' job. Communities development with a lot of initiatives. | http://www.nt.gov.au/d/Fisheries/Content/File/Indigenous_Marine_Rangers_Handbook.pdf | Wild fisheries staff members not trained – a real opportunity for FRDC to find ways to achieve extension and adoption | Ros Vulcano, NT Department of Resources |
| NT-2 | "Tough" fish - saddleback snapper | Commercial | Timor Sea | Timor Sea fisheries, demersal and finfish fisheries in NT | DPI Queensland | NT Seafood council; FRDC | "tough" fish are manifest once caught, giving a rubbery texture which is off-putting for consumers | NTSC | Timor Sea fisheries, demersal and finfish fisheries in NT | Medium | Consumers | Workshops of results; one-on-one with researchers while on boats | Information and remote access<br>Mentoring where researchers on boats<br>Technology development | During extension | For fishers directly involved with project and having had researchers on board - high; all others - low | Not known | Not assessed | Limited outcomes at this stage | http://www.frdc.com.au/documentlibrary/finalreports/2008-208-DLD.pdf | Second part currently underway - likely to involve technology model in extension activities | Katherine Sardeckis, NTSC |

| ID # | Title project | Sector | Fishery Type | Location | Research Agency | Client | Driver of Research | Responsibility for Extension | Extension Target | Level of Disaggregation of Target | External Stakeholders | Extension / Communication Tools Used | Extension Model | Timing of Adoption | Level of Adoption | Performance Measures | Cost Effectiveness | Outcomes | Links to Documents, Projects Etc. | Other Comments | Source(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NT-3 | Juvenile mud crabs | Commercial/ wild catch and recreational | Mud crabs | NT Coastline | NT Department of Resources - Fisheries | NT Seafood Council | Determine if juvenile mud crabs provide an indication of size of future mud crab seasons | Unclear - not really organised | NT Commercial mud crab fishers, recreational mud crab fishers secondary | Low | Recreational mud crab fishers | Poor - not organised | Information and remote access when extension occurs | 2 – 5 years of extension but extension not started as yet | High when results are made known | Not know yet | NA | Some Indigenous rangers have continued to collect data | | This was effective but required greater resources and funding to make use of the findings on an ongoing basis. One on one extension is most successful | Katherine Sardeckis, NTSC |
| **South Australia** | | | | | | | | | | | | | | | | | | | | | |
| SA - 1 | Southern Bluefin Tuna extension | Commercial/ aquaculture | Southern Bluefin Tuna | SA; Tas; NSW; Vic | SARDI; PIRSA, Flinders Uni, University of Queensland, University of Tasmania; CSIRO | Australian Southern Bluefin Tuna Industry Association; FRDC | Health is the main focus (parasites) but the research covers production; happy fish; product quality in terms of flesh characteristics, eating and residues; environmental impact | ASBTIA - extension directly from the research office to the industry; hold 4 meetings a year with stakeholders | Southern Bluefin Tuna fishers/farmers | Low | Consumers | Delivery of research results to industry/ industry trial technology | Technology development<br><br>Training<br><br>information and remote access | During and immediately after extension | High | Key performance indicators for each area of extension activities | High - industry increase contributions to meet research priorities | Healthier fish; more productive farms | http://www.sardi.sa.gov.au/sbt/research__and__development/research_projects/page_contents | | David Ellis, ASBTIA |
| SA-2 | Murray Cod catch and release | Recreational | Murray Cod | SA - Berry, Coorong | SARDI | PIRSA | Managing depleted stocks of Murray Cod | PIRSA | Recreational fishers | High | General public, local communities | Regional TV, newspapers | Information and remote access.<br><br>also public meetings for consultation on range of options) | During extension | Medium | Only ad hoc or anecdotal. High compliance levels | Medium (cheaper just to decide and inform but this had a higher level of effectiveness) | Compliance with catch and release regulations (without removing Murray Cod from the water) | Initial scientific studies of stocking rates (2007) were published. Management Options for Murray Cod in South Australia | Interested in using technology in the future - looking for a cost effective method of getting info from rec fishers | Keith Rowling |

| ID # | Title project | Sector | Fishery Type | Location | Research Agency | Client | Driver of Research | Responsibility for Extension | Extension Target | Level of Disaggregation of Target | External Stakeholders | Extension / Communication Tools Used | Extension Model | Timing of Adoption | Level of Adoption | Performance Measures | Cost Effectiveness | Outcomes | Links to Documents, Projects Etc. | Other Comments | Source(s) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SA-3 | 2007- 2008 Recreational Fishers Survey | Recreational | All recreational | SA | PIRSA | PIRSA (& grant from SA fisheries council). Funds from FRDC to compile database and analyse with UTAS | Understand rec fishers demographics, behaviours, catch rates etc | PIRSA | Recreational fishers | High | Community to show the role of rec fishing. Local govt to understand rates of fishing etc | Surveys - phone, on location. Results published in reports, updates, user friendly pamphlets, interactive rec fishing atlas online (includes species, size, no. caught in each area) | Information and remote access model | After extension | Medium | Only ad hoc feedback (not sure of website hits etc) | Medium - Very expensive method – survey $450k. But a good return - very comprehensive data, compare over time | Greater understanding of fishers' background, behaviours and catch rates | http://www.pir.sa.gov.au/fisheries/recreational_fishing/recreational_fish_survey | Not sure about anyone using other technology, social media. Electronic surveys will not be representative | Keith Jones |
| SA-4 | Great Australian Bight Industry Association | Commercial | Commonwealth Trawl Sector | Port Lincoln to Albany | Funders of research are: AFMA, DAFF, DEWHA, FRDC, CSIRO, BRS, ABARE | AFMA | One of three Commonwealth fisheries trialling fisheries co-management | GABIA, AFMA | GAB fishers holding 10 statutory fishing rights (5 companies) | Low | Commonwealth fisheries managers | Workshops; Operating procedures manuals | Training<br><br>information and remote access | During extension | High | na | High - data collected by industry | Fishers co-manage their own quota | http://www.afma.gov.au/managing-our-fisheries/co-management/great-australian-bight-trawl-fishery-co-management-trial/ | | Jeff Moore, GABIA |
| **Victoria** | | | | | | | | | | | | | | | | | | | | | |
| V-1 | SETFIA Accreditation of Commonwealth Trawl Sector skippers | Commercial | Commonwealth Trawl Sector | Half NSW, all Vic and Tas | SETFIA | SETFIA | To have world's best practice in regards to seabirds (flesh footed shearwater) and seals | SETFIA | Commonwealth Trawl sector fishers | Medium - low | FRDC; General public; Fisheries management agencies and green NGOs | Workshop; Use texting as website and email ineffective | Training<br><br>technological development<br><br>supported by information and remote access | During and immediately after | High; Demand for workshops exceeded original funding | Monthly reporting based on strategic plan - discarded species reporting from 10% to 80% of vessels; SEB plan on 70% of vessels; Surveys at end of workshops - 9.7 average score | High | Reduced bycatch; Possibly cultural change in industry | Final report (balanced scorecard) http://www.frdc.com.au/CustomContentRetrieve.aspx?ID=792814&A=SearchResult&SearchID=1387237&ObjectID=792814&ObjectType=35 | | Simon Boag, SETFIA |
| V-2 | Victorian Fishery Association Resource Management (VFARM) | Commercial | Longline, Danish seine (shark, scale fish) | Port Phillip Bay, Vic | SeaNet Victoria | VFARM | Environmentally sustainable practices for fishery | VFARM | Port Phillip Bay longline and Danish Seine fishers | Low | SIV | Monthly meetings, development of EMS and codes of practice | Group facilitation | During extension | High | Less by catch Sustainable fishery | experimental longline gear out-fished the normal gear by approximately 17% but more work needs to be done to prove this outcome | Link to outcomes http://www.siv.com.au/page/fishing_practises.html | na | na | Steve Hay, OceanWatch; Maria Manias - bay fish@bigpond.com |

| ID # | Title project | Sector | Fishery Type | Location | Research Agency | Client | Driver of Research | Responsibility for Extension | Extension Target | Level of Disaggregation of Target | External Stakeholders | Extension / Communication Tools Used | Extension Model | Timing of Adoption | Level of Adoption | Performance Measures | Cost Effectiveness | Outcomes | Links to Documents, Projects Etc. | Other Comments | Source(s) |
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| V-3 | Victorian Bays and Inlets Fisheries Association (VBIFA) | Commercial | Flathead, John Dory, Gummy shark | Lakes Entrance, Corner Inlet, Vic | FRDC funded research on development of EMS for commercial fisheries | VBIFA | Environmentally sustainable management of fishery | VBIFA | Commercial fishers | Low-medium | SIV | Monthly meetings, development of EMS and codes of practice | Group facilitation; technology development - testing bycatch discard equipment | During extension | High | No information | No information | Voluntary shark exclusion zone for fishers, the successful testing of catch release "discard chutes", introduced by SeaNet | http://www.oceanwatch.org.au/snrojectVicEMS.htm | na | Steve Hay, OceanWatch; Gary Leonard gm.leonard@southernphone.com.au |
| V-4 | Lake Eildon Golden Perch | Recreational | Golden Perch | Lake Eildon | DPI | DPI | To make greater use of a stocked resource by providing information on how to target golden perch | DPI | Recreational fishers | High | Government, public, other lake users | Media release, magazine article, TV program | Information and remote access | During or soon after | High | Anecdotal - increase in numbers targeting golden perch. Discussion of article on online forums and reports from fisheries officers | High (little cost) | Increased numbers targeting and catching golden perch | na | na | Case Study (Marc Ainsworth, John Douglas, Taylor Hunt, Russell Strongman, Bill Classon) |
| V-5 | Angler Diary | Recreational | Recreational | Vic | DPI | VDPI Fisheries | DPI | DPI | Recreational fishers | High | Government and other researchers, fisheries managers | Angler Diary to collect information. Results communicated online | Technology development Information access via website | Anglers, researchers and fisheries managers make changes according to the information that comes in | High for the angler diarists and immediate users. | Number of entries | Data come it at no cost | Used primarily for fisheries management rather than changing practices directly | http://new.dpi.vic.gov.au/fisheries/science-and-research/angler-diary-program/angler-diary-videos | na | Simon Conron, full copy of this report please email Chris Padovani. |
| V-6 | Portland Professional Fishermen's Association | Commercial | Rock Lobster | Portland - west Vic | Andrew Levings PhD research | Portland PFA | Sustainable practices for fishery, including seal bycatch mitigation | Portland Professional Fishermen's Association | Rock Lobster fishers | Low | Other researchers | Monthly meetings, development of EMS and codes of practice | Group facilitation | During extension | High | Not assessed | Not assessed | na | http://www.environment.gov.au/coasts/fisheries/vic/rock-lobster/pubs/vic-rock-lobster-submission.pdf | na | Steve Hay, OceanWatch; Andrew Levings, alevings@hotkey.net.au |

| ID # | Title project | Sector | Fishery Type | Location | Research Agency | Client | Driver of Research | Responsibility for Extension | Extension Target | Level of Disaggregation of Target | External Stakeholders | Extension / Communication Tools Used | Extension Model | Timing of Adoption | Level of Adoption | Performance Measures | Cost Effectiveness | Outcomes | Links to Documents, Projects Etc. | Other Comments | Source(s) |
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| **Queensland** | | | | | | | | | | | | | | | | | | | | | |
| QLD -1 | Turtle bycatch - dehookers | Commercial | Eastern Tuna and Billfish fishery | Cape York to SA | FRDC funded - Caroline Robins | FRDC | By catch issues | SeaNet | Commercial fishers and the 30 Vessels operating in the ET& B fishery | Low | Peak bodies and fishers, public | Workshops, one-on-one with fishers; Videos | Technology development<br><br>training<br><br>information and remote access | During extension - fishers provided with dehookers | High - dehookers provided to fishers | log book changes to capture information | na | 100% uptake Higher level of reporting of endanger specifies – greater reporting in log books and interest in the science behind the reporting. | http://www.oceanwatch.org.au/~oceanwa/arc/documents/Dehooker.pdf<br><br>http://www.environment.gov.au/coasts/fisheries/commonwealth/eastern-tuna-billfish/pubs/att7-workplan.pdf | na | Dave Kreutz, SeaNet |
| QLD -2 | Turtle bycatch mitigation: Circle hooks | Commercial | Eastern Tuna and Billfish fishery | Cape York to SA | BRS | FRDC | Turtle bycatch issues - hooks from lines | SeaNet | Commercial fishers and the 30 Vessels operating in the ET& B fishery | Low | Peak bodies and fishers, public | One-on-one, | Technology development<br><br>training<br><br>information and remote access | Within 2 years - supplies of hooks from importers to facilitate change over | High | log book changes to capture information | Benefits to industry and environment much greater than research cost | 90% uptake Higher level of reporting of endanger specifies – greater reporting in log books and interest in the science behind the reporting. | http://www.afma.gov.au/wp-content/uploads/2010/07/circlehooks.pdf | na | Dave Kreutz, SeaNet |
| QLD -3 | Suntag | Recreational | Recreational | Qld | InfoFish | ANSA Qld (Australian National Sportfishing Assn) | To reduce time lag from collection of info to delivery to end users | InfoFish | Recreational fishers | High | Interested fishers, community. | One page email "best piece of extension ever" | Technology development<br><br>Information and remote access | During extension | High use - more subscribers each time there is an update | Various | na | Improved data quality | http://www.info-fish.net/ | na | Bill Sawynok |
| QLD -4 | Gold Coast prawn farming FRDC project "PMO" | Aquaculture | Prawn farming (ocean water) | Gold Coast and other QLD and NSW | Prawn farmers with FRDC | FRDC with prawn farmers | Industry/prawn farmers | Industry / prawn farmers | Prawn farmers | Medium - geographic & low method/species | Remaining sector of prawn farmers / industry | On-farm trials, technology development with scientists, 1:1 extension; academic papers | Group facilitation<br><br>Mentoring<br><br>technology development | Immediate for target, longer term for others in industry | High for target audience, medium term for others in industry | Size, health, reproduction levels of domesticated prawns | High - implementing /extending findings results in farm profit increases, reduced costs, through better growing seasons | Successfully discovered how to domesticate prawn reproduction, world first | Seafood awards brief, FRDC reports & applications | Excellent example of 'ground-up' research and development including 'built-in' extension. Essentially a closed loop | Neil Moore |

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| **New South Wales** | | | | | | | | | | | | | | | | | | | | | |
| NSW-1 | SeaNET - Beach Seine Project FRDC 2008/036 effectiveness larger mesh size in reducing the capture of juvenile target species in select NSW beach seine operations | Commercial | NSW Mid-North Coast; Beach seine; Bream (mature not juvenile) | NSW Mid North Coast | SeaNet Officer, included Masters degree / with industry support | FRDC | OceanWatch Australia & supportive industry agencies (eg FRDC), industry = actual fishermen of Mid North Coast Regional Beach Haul Fishermen - Southwest Rocks Fishers Limited | SeaNet Team (officer) | Commercial beach seine fishers, recreational fishers and wider community | Low | Dept of Fisheries/ DPI - permits for research; fishers, net builders (YouTube video) | YouTube of nets working underwater; DVD; TV; radio; Interviews; Legislation amendment | Group facilitation<br><br>Mentoring<br><br>technology development | Immediate within extension, plus medium term | High for target audience; community awareness | Success was changing the legislation to utilise new technology | High - strong leveraging & maximum resource usage via coordination | New community support, improved social license to operate, more sustainable species/fishery | SeaNet documents | Good model for extension - similar to DfT and JJ PhD | Michael Wooden - SeaNet |
| NSW-2 | ANSA NSW Angel Ring Project 2007 - 2008 (no. / ID: R4060) | Recreational | Rock fishing mostly | NSW (so far) | Recreational Fishing Community Grants Program with support of NSW Gov and Fishery manager | Recreational Fishing Community Grants Programme (Funder of) | Australian National Sportfishing Associations NSW Branch (ANSA NSW) | Australian National Sportfishing Associations NSW Branch (ANSA NSW) | Rock fishers of all types, general public | High - geographic; High - social/demographic, Low - types of dangerous fishing spots | All recreational fishing bodies (eg tackle shops, clubs etc, local councils | Multilingual workshops and information distribution; Angel Rings posted in public for use | Technology development<br><br>group facilitation<br><br>Information and remote access | Within extension and on-going | High for target audience; On-going for general community awareness | Lives saved by use of Angel Rings | High - saving life reduces major costs to society; and High - low cost project to implement, excellent leverage | Saved 18 lives to date, and growing. Reduced danger risk rock fishing achieved | Funding applications and final reports | Excellent example of identifying target audience and tailoring message to demographic | Stan Constantaris, Recfish Australia and NSW |
| **National** | | | | | | | | | | | | | | | | | | | | | |
| N-1 | The use of Low Water Exchange, Microbial Floc Production on prawn farms | Aquaculture | Prawn farmers | 35 prawn farms mainly in Queensland and with two in NSW | CSIRO | Australian Prawn Farmers Association/ FRDC | Increased harvest yields with the CO2 added to water | Seafood CRC but APFA have had workshop with DAFF to provide interim results | Prawn farmers | Low | Seafood CRC, FRDC, | currently - workshop; farm visits | Technological development. | Before Extension but research ongoing so may be further adoption during or after | Research still being undertaken but farmers have adopted aspects of process after workshop | Low water exchange levels; changes to production and feed | na | na | Refer P.10 of Seafood CRC research projects pdf; http://www.apfa.com.au/research/current-projects/ | na | Emily Mantilla, Seafood CRC; Helen Jenkins APFA |
| N-2 | New markets to China | Commercial, wild catch | Abalone - pilot program | All abalone wild catch fisheries: Tasmania; Victoria | University of Sunshine Coast | Abalone council of Australia | Identify legal dist'n channels (white mkt) to access Chinese market legally & profitably. (Currently access through Grey market.) | University of sunshine Coast | Wild catch abalone exporters | Low - medium | Pilot program so may impact on other exporters to China | Workshops, 9 exporters tested manuals | Technology development<br><br>Group empowerment | Within 2-5 years of extension. | na | Trade measures | High | na | Seafood CRC Seafood Stories December 2010 (p9-11); http://abalonecouncil.com.au/rd/aca-china-research-project/ | na | Emily Mantilla, Seafood CRC; Colin Bishop, Seafood Service |

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| N-3 | Trade and market access: MAD | All sectors | All fisheries | National | SARDI | SARDI | Ability to respond quickly to trade disruptions and help develop marketing strategies | Seafood Services Australia | All sectors | High | Multiple | Comms strategy | Information and remote access (web based database) | After - 2-5 years | Varied | Trade measures | na | na | http://www.seafood.net.au/trade/ | na | Emily Mantilla, Seafood CRC; Colin Bishop |
| N-4 | Australian Fish Names Standard AS SSA 5300 | all Sectors | All fisheries | National | SSA | SSA | Improve information of trade descriptions and improve public confidence, marketing approaches, traceability, food safety, etc. | SSA | consumers; retail and wholesale trade; fisheries managers | High | | Website; posters; | Information and remote access (web based database) | during and 2-5 years after extension | High | consistent naming and identification of fish | High | na | http://www.seafood.net.au/fishnames/; http://www.seafood.net.au/page/?pid=305 | Implications for compliance; fish wholesaling /retailing | Colin Bishop, Seafood CRC |
| N-5 | "Gently Does It" Project title: National Strategy For The Survival Of Released Line Caught Fish | Recreational | All fishery types, with numerous selected target species | National | FRDC - delivery agent was Infofish Services (Bill Sawynok) | FRDC funded: "FRDC-PP-0101 - National Strategy For The Survival Of Released Line Caught Fish" | Infofish Fish release & survival. Sustainable fish stocks. Perceptions of indusrty | Infofish; industry service providers (tackle shop, clubs, agencies etc) | All recreational fishers, targeting the top 10-20%. | High - both geographically and in terms of target species. Method is medium disaggregation (line fishing). | Recreational fishers and related service providers. General public. | Broadcast media – TV; advertisements. Information pack with brochures/leaflets. Print media (magazines) with DVD handout. Group-based facilitated events. | Technological development<br><br>information and remote access<br><br>programmed learning<br><br>group facilitation | during extension; ongoing after extension | high - significant uptake of extension materials (extra print runs required | survey target audience delivered. Survival rates identified and increased for common target species. | High - wide reach and strong leveraginging across Australia | Improved release and survival rates, esp common target species, & improved fish stock sustainability. | surveys conducted, project application and final reports | Best Practice Case Study | Bill Sawynok, Julian Pepperel, ANSA,AFTA, RecFish Australia |
| N-6 | Mentoring – Future Leader | Recreational | Recreational | Australia | | Rec Fishing Advisory Committee | Rec fishing bodies - to mentor the next generation of leaders, create networks. | | Potential leaders within rec fishing organisations | Medium | Government | Week long national workshop, continued support. | Mentoring | Within 2 - 3 years of extension. | High | Positive feedback and outcomes. | Medium | Participants are now in leadership positions - due to doing the course. | na | na | Russell Conway |
| N-7 | Survival of Released Fish | Recreational | Jess also | Aust | Over 27 - 30 research projects. | Multiple | The need to improve catching and handling practices to increase survival rates of released fish. | Recfishing Research | Recreational fishers. Fisheries managers | High | General public. | TV - Escape with ET. Community service announcements. Fact sheets. | Information and remote access | During and after | High | Surveys - before and after. High numbers reported seeing the TV program. Documented changes in practices. | High (high cost but benefits far outweigh the costs). | na | Recfishing Research Business Plan | na | Bill Sawynok (also Doug Joyner; Steve Sutton, Ross Winstanley) |

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| N-8 | SeaNet Team | All sectors | All fishery types | National | Ocean Watch Australia | OceanWatch Australia | OceanWatch Australia & supportive industry agencies (eg FRDC) | SeaNet Team | All sector fishers and wider community, depending on project. | High - both geographically and in terms of target species | All sector fishers and related industry bodies, wider community. | Facilitation, broadcast media, newsletter, leaflets, electronic media, workshops, 1:1 delivery. | Group facilitation<br><br>Technology development<br><br>Programmed learning<br><br>Information and remote access Mentoring. | Within extension, medium and long term | Usually high with target audience | Adoption rates, participation/attendance of target audience, community engagement and response/perception | High - strong leveraging & maximum resource usage via coordination | Strong and demostratable reputation for pro-active pursuit of sustainable fishing | Lowri Price / OceanWatch - Annual Reports, website, regular newsletters online, externernal review | SeaNet is a coordinated network closest to the way DfT Coordinator network functions. | Lowri Price / Brad Warren / Simon Rowe |

End Table 5.

# 5 Case Studies

This section provides in depth analysis of case studies that have been identified to demonstrate existing and best practices in linking extension with research, development and adoption. These have been identified based on their ability to provide lessons for the broader fishing industry. The case studies are:

**CASE STUDY 1 – Aquaculture A**
Tasmanian salmonid industry: Integration from research to end-users

**CASE STUDY 2 – Aquaculture B**
National aquaculture prawn farming: Domestication of black tiger prawns on the Gold Coast

**CASE STUDY 3 - Commercial A**
NSW commercial fishing: Delivering better beach seine operations on the mid-north coast

**CASE STUDY 4 – Commercial B**
South Australian commercial prawn trawling: Improving bycatch reduction systems in the Gulf of St Vincent

**CASE STUDY 5 – Commercial C**
Western Australian commercial finfish trawling: Reducing dolphin bycatch in the Pilbarra region

**CASE STUDY 6 - Recreational A**
Victorian recreational fishing: Extension of Golden Perch Research in Lake Eildon

**CASE STUDY 7 – Recreational B**
National recreational fishing: Improving fish handling, release and survival with *Gently Does It*

**CASE STUDY 8 – Recreational C**
NSW recreational fishing: Saving lives with Angel Rings

**CASE STUDY 9 – Non-Fishing Industry**
Australian dairy industry's NRM strategy: *Dairying for Tomorrow* to improve NRM across NSW

**CASE STUDY 10 – International Fishing Industry**
Virginia (USA) fishing industry: Engaging aquaculture, commercial, and recreational fishers in research and development

## *5.1 CASE STUDY 1 – Aquaculture A*

**Tasmanian salmonid industry:**
**Integration from research to end-users**

Technological development | Information Access

### Context

Tasmania prides itself on its clean, green environment. This is often used as a marketing technique for a whole range of industries, including tourism, agriculture and fisheries. *And it is in the crystal clear waters of its many delightful waterways, where we grow some of the world's finest salmon* (Tasmanian Salmonid Growers Association (TGSA), 2011).

The salmonid industry is a major primary industry in Tasmania. Consisting mostly of Atlantic salmon with some rainbow trout, the industry commenced in the 1980s. It has been growing since to the point where it accounts for almost 60 per cent of aquaculture in Tasmania and over $270m gross value of production (The Tasmanian Salmon Industry, 2009).

### Situation

The market is considered to be highly concentrated geographically and is vertically integrated along the production chain. The industry is concentrated across five major producers: Huon Aquaculture, Tassal Group, Saltas, Sevrup Fisheries and Van Diemen Aquaculture. The businesses are considered vertically integrated, in that most of them farm, process and market the fish (Tasmanian Salmonid Growers Association, 2011). There is some variation in the location of the farms; however this has a minimal impact on the variations in the farming processes.

The produce of the industry is primarily sold to the domestic market on the mainland, with some exported. According to the TSGA, while there are profits to be made in the international export markets, the domestic cost of production is a significant constraint relative to competitors such as New Zealand. Limits to production are based on the marginal cost of production and reduced opportunities for marketing as the domestic market nears saturation. Continued industry promotion requires sustainable production to be increased along with marketability and profitability improvements.

### Actions

According to a Tasmanian Salmon Industry profile (2009), the main challenges are:

- Development of open ocean production areas and husbandry techniques;
- Ensuring achievement of high level environmental and quality assurance programs to maximise marketability of products and demonstrate industry sustainability; and
- Managing fish health issues and predation by seals and improving selective breeding to enhance production.

This was echoed by the Tasmanian Seafood Industry Council (TSIC) and the TSGA. Specifically, they noted that the four key production issues in aquaculture are nutrition, health of the fish, husbandry, and environmental health.

The research to support the industry across these challenges is relatively homogenous. That is, the needs of one business are relatively similar to the needs of other similar businesses. Therefore, the TSGA was set up to represent its five members. The benefit of this is that the Research Advisory

Group (RAG), via the TSGA, is able to be the voice of the industry in terms of identifying and prioritising the research and development needs.

The technical committee of TSGA members has 10 representatives that set the priorities which are taken to researchers. The committee reviews and provides input on the applications to achieve the research they are seeking. Therefore, their engagement throughout the development of research proposals ensures that there is a direct line of sight with the end users of the research. It is this level of involvement by the industry that results in extension being automatically and simultaneously conducted. That is, there is a technical problem-solving aspect of the formation of research and development ideas.

The research and development activities have typically been funded through three avenues: 0.50% of Gross Value of Production (GVP) paid by the Commonwealth Government and guaranteed to FRDC (discretionary spending); 0.25% of GVP co-contribution by the Commonwealth Government and the FRDC; and 0.25% of GVP by industry. Their arrangement has been in place through a Memorandum of Understanding for the past 10-15 years. This excludes any State contributions through, say, the Department of Primary Industries, Parks, Water and Environment (DPIPWE), which is in addition to the above model.

**Results**

The result of the highly coordinated and aggregated structure is that the industry, which provides significant socio-economic benefits to Tasmania, is able to garner support for its research needs. The CSIRO Food Futures Flagship program has been proactive in a selective breeding program to improve the growth, maturation, resistance to amoebic gill disease, and carcass quality; the Tasmanian Aquaculture and Fisheries Institute (TAFI) has researched a range of issues including nutrition, fish health, feeding, as well as climate change impacts; and considerable effort by the University of Tasmania has been placed in researching vaccines for yerseina, menine aeromonis, and vibrial which are local diseases, local issues, and can't gather international research to assist.

Yerseina provides a good example of the effectiveness of the institutional structures surrounding research, development, extension and adoption. As a local disease and a local issue, there were no international alternatives to dealing with the virus. As a significant issue that threatened the industry, the fice salmon growers were able to collaboratively identify the priority for the research which was funded through the TSGA. The funding provided the University of Tasmania the resources required to develop a vaccine, a significantly lower risk for the fish and industry than the use of antibiotics, which consumers do not like. This approach was effective because of success in the formative salmonid research and development era, which provided the institutional infrastructure required to have rapid deployment of research dollars with direct links to the industry and individual businesses.

A further example of success in extension and adoption across the industry is related to the concentrated and closed nature of the five salmonid businesses. Specifically, any externalities of the industry are internalised across the five businesses – be they the positive benefits of research and development, or the public opinion of environmental management practices. As an industry that is seeking to continue to grow, managing public perceptions is very important, particularly in relation to the sustainability of the salmonid industry. Therefore, when concerns were raised with marine debris, particularly near Bruny Island and the D'Entrecasteaux channel, with the assistance of TSIC, Coast Care and SeaNet extension officers, a project was funded to reduce these environmental externalities. The project is funded through *Caring for Our Country*, and involves specific businesses taking responsibility for engaging with the broader community and cleaning up specific areas of coastline. This has been regarded as a success, improving the trust between the industry and community good will, as well as achieving environmental outcomes.

**Lessons**

The lessons that can be learned from this case study are the benefits of having the infrastructure in place to support the high level engagement of end users in the prioritisation and formative aspects of developing research projects. It is recognised that, as a highly concentrated industry with similar issues across businesses, there are significant drivers for forming these strong relationships. However, this also provides a best practice example of how research and development activities can be seamlessly integrated by stakeholders if they are engaged in the governance and project infrastructure. This provides a model for other highly concentrated areas, be it across a whole industry or simply a geographical region.

## *5.2 CASE STUDY 2 – Aquaculture B*

**National aquaculture prawn farming:**
**Domestication of black tiger prawns on the Gold Coast**

Technological Develop | Info Access | Mentoring | Group Facilitation & Empowerment

**Project:** Commercial Penaeus monodon triploid production (PMO)

### Context

**Aim:** PMO aimed to domesticate the black tiger prawn to enable captive breeding for commercial production. Unlike other farmed prawn species, the black tiger was not domesticated prior to PMO.

**Funding & delivery:** PMO was funded by the FRDC, and with prawn industry support, was led by the prawn farm that initiated the project, known as Gold Coast Marine Aquaculture (GCMA). The project is on-going since 1999, and valued at over $2.5 million, although the FRDC funded stages were completed in 2009.

**Target audience:** The target audience is farmers and managers of Australian black tiger prawns, of which there are approximately 36 licences and 25 operators (most farms based in Queensland), although a secondary audience is the wider domestic and global industry of prawn aquaculture in general as the results are transferrable.

### SITUATION

**Extension challenge:** Despite a relatively accessible domestic target audience, only two prawn farming enterprises were actively engaged from the outset, although all were invited to subscribe to the project which required a cash contribution. Consequently, the extension challenge for PMO was two-fold:

i) To extend the findings of the research to farmers and managers in an on-farm context that enabled adoption to occur with respect to commercial considerations.

ii) To extend the on-farm experiences of implementing the research findings (including commercial considerations) to the wider domestic and overseas prawn industry.

### ACTIONS

PMO actively promoted a direct working relationship between the participating prawn farmers and the research organisations (mainly CSIRO scientists, the Australian Institute of Marine Science (AIMS) and the Queensland state government), to conduct, monitor, report, analyse and make recommendations from the research process (including extensive housing of prawns in atmosphere controlled stock ponds). The strength of this relationship was critical to conducting the research, which in extension terms produced a mentor-style relationship regarding the science-based components, as well as a group empowerment-style model regarding the commercialisation of the research findings as they became available and adopted on-farm.

**Extension delivery mechanism/s:** Direct 1:1 communication, often face-to-face but also by other standard means (telephone, email etc) were the main methods of delivering extension content in PMO. This was most appropriate because the research team explicitly included the immediate target audience of prawn farmers and actively considered for their on-site capabilities and commercial considerations.

The broader target audience of domestic and international prawn farmers were exposed to PMO progress and results by holding various workshops, as well as through the publication of academic material, and presentations at relevant industry conferences.

## RESULTS

The main technical achievement of PMO was the successful domestication of black tiger prawns for commercial production. From an extension point of view, the participating prawn farmers seamlessly adopted this achievement because they were integrally linked to the research process. In support of this, the lead prawn farmer considered extension delivery within PMO (for the primary audience) to be *instantaneous* (which is very quick and effective on any scale!).

**Extension Sequence:** The PMO sequence of extension for the participating prawn farmers (primary target audience) was exceptionally effective, with the following comparative visual depictions showing first the standard approach which includes extension to the secondary target audience, and second the PMO approach to the primary target audience.

Standard and PMO secondary target audience extension sequence:


PMO extension sequence for the primary target audience:


The subscript text can be read as *with respect for*, so the second box in the PMO sequence can be interpreted as: *Research conducted with respect for the extension requirements of the project*.

In the primary target audience sequence the standard *RD&E* components are all contained within the same (middle) box, which reflects the close proximity of the stakeholders (researchers and farmers) and the resulting simultaneity within which these activities took place.

The extension sequence for the secondary PMO target audience was essentially traditional, although it should be noted that the extension and adoption components for the PMO secondary audiences are considered more likely to be favourably received (than otherwise would have been the case) because of the high level of farmer input and collaboration delivered in the primary target audience sequence and resulting PMO recommendations.

## OUTCOMES

The outcomes stemming from the commercialised research results of the PMO project are greatest with respect to their transferability to other prawning operations both domestically and overseas. In particular, subsequent adoption by the wider prawning industry has been high, which is a likely reflection of the on-farm oriented research process that made PMO recommendations more easily adoptable.

The commercialisation of research is always a critical component of effective extension, and PMO effectively changed the method of farming black tiger prawns by successfully domesticating them. This led to powerful industry outcomes, such that significant cost savings that could be realised from captive breeding, improved genetic prawn stocks, better feed conversion rates by prawns, improved

natural resource management outcomes stemming from less waste and emissions, reduced dependence on wild-caught prawns, and more controllable and hence profitable growing periods (especially September-October).

**LESSONS**

The main lesson derived from PMO is the high value of close relationships between the primary target audience and other project stakeholders, in this case research scientists and the funding body (FRDC). This critical relationship in PMO was founded on strong and mutually reinforced trust, respect and ownership between the funding body, the scientists and the participating prawn farmers.

To elaborate on this, the prawn farmers trusted the scientists to produce credible results, while the scientists respected the on-farm management practices including commercial confidences. The funding body maintained faith that PMO could produce results over three funding iterations of the project, and collectively all key stakeholders owned the process in a collaborative manner.

Gold Coast Marine Aquaculture site.

## *5.3 CASE STUDY 3 – Commercial A*

**NSW commercial fishing:**
**Delivering better beach seine operations on the mid-north coast**

Techn Develop | Info Access | Programmed Learning | Group Facilt'n & Empower't | Multi Neg

**Project:** Effectiveness of larger mesh size in reducing the capture of juvenile target species in select NSW beach seine operations (BSO).

### Context

**Aim:** The aim of BSO was to examine and quantify the effectiveness of a larger than prescribed beach seine mesh size in reducing the capture of juvenile target *ground fish* including Yellowfin Bream, Luderick and Tarwhine, as well as demonstrate the value of the larger mesh resource to relevant users, related stakeholders and the wider community.

**Funding & delivery:** BSO was an FRDC funded (FRDC 2008/036) and industry-initiated project, facilitated by OceanWatch Australia (NSW SeaNet) from 2008 to mid-2011. Project value was approximately $50,000 cash with an estimated at least three-fold in-kind contribution.

**Target audience:** The primary target audience was beach seine fishers of the mid-north coast of NSW, and comprised two broadly defined groups, namely those participating directly in the project and those not directly engaged but operating in the target area. The secondary target audience comprised research and development groups engaged in the project and the wider community, including indigenous people.

### SITUATION

**Extension challenge:** The extension challenge of BSO was to bring the relevant research and development stakeholders together with end-user fishers to jointly design and conduct the research; induce adoption of the benefits of the research results through effective extension to those fishers not directly engaged in the project; and, disseminate the benefits of the project to relevant industry stakeholders and the wider community.

BSO embraced the principle that a high level of end-user participation in the research and development phase is likely to result in higher levels of acceptance and adoption of the project results and associated products. Putting this principle into practice was hence the key extension challenge.

### ACTIONS

BSO actively engaged target audience fishers prior to the formal commencement of the project, as well as made early (pre-project) contact with the relevant research and development organisations to be directly involved. The engagement of fishers was explicitly designed to establish trust between the project and the likely end-users at the earliest possible stage.

The trust of fishers was built by one-to-one dialogue facilitated by SeaNet officers who guided discussion towards the identification and deeper exploration of issues pertaining to beach seine operations, particularly by-catch of juvenile target species. A strong indication of the extent to which fishers, and relevant researchers, were involved was their direct input into the formation of the final research proposal submitted by OceanWatch Australia to the FRDC.

Once BSO had obtained its funding, the project continued to promote a high level of fisher presence and input into the research trials and associated developmental stages up to completion of the final

beach seine mesh size. To this extent, the final solution of larger net mesh was considered by fishers to have largely come from industry. The fishers directly involved in the trial phases were evidently (instantaneously) aware of the value of the BSO project, while the wider audience of ground fishers other fisheries, and many other industry stakeholders (such as government management and research staff, net builders, net suppliers, recreational fishers, fishing bodies, general community, marine discovery centres, and even schools) were regularly updated about project progress through community and industry events.

Once the project was completed and tangible results defined, the BSO project embarked on a series of extension activities based on a mix of on-to-one facilitated forums and a variety of communications such as video footage of underwater netting, television, radio and print media (including *Fish* magazine, OceanWatch and industry publications), broadcast and DVD distribution of a fishing show segment (*Escape with ET*), comprehensive use of internet platforms to such as *Youtube*, community forums and presentations (such as the *Newcastle Show*, *Hawkesbury Seafood Night*, a *Loaves and Fishes BBQ* event attracting approximately 600 attendees etc).

**RESULTS**

The BSO project produced a range of results, including:

- validation of the effectiveness of using a larger mesh size with supporting data, regarding reduced juvenile bycatch;
- *demonstration that increasing mesh size throughout the posterior wings and bunt/codend to 102mm can reduce the capture and subsequent mortality of juvenile ground fish species targeted during March to July* (Wooden 2010);
- BSO recommendations were reflected in legislative amendments regarding Ocean Hauling Fishery. *On 1 April 2010 the regulated maximum mesh size in the seine net for ocean waters within 3 nautical miles of the natural coastline was increased from a maximum of 65mm to a maximum of 102mm in the bunt/codend for the taking of fish other than Sea Mullet* (Wooden 2010);
- increased sustainability of target fish stocks is likely to be an effect of the significant reduction in the capture and subsequent mortality of juveniles may be beneficial;
- efficiency gains from reduced bycatch is likely to benefit fish handling and sorting procedures, including faster return of captured juvenile fish to water; and
- effective BSO demonstrations to the wider community that support the reduction of conflict between recreational and ocean haul fishers, as well as the general community including a significant portion of holiday-makers.

**Extension Sequence:** The BSO project effectively re-sequenced the standard extension model by placing heavy emphasis on early engagement of fishers and related stakeholders, as well as their continuous involvement throughout the process, as shown below.

Standard extension sequence:

BSO extension sequence:


The subscript text can be read as *with respect for*, so the second box in the BSO sequence can be interpreted as: *Research conducted with respect for the extension requirements of the project*.

In the primary target audience sequence the standard *RD&E* components are all contained within the same (middle) box, which reflects the close proximity of the stakeholders (researchers and ground fishers) and the resulting simultaneity within which these activities took place.

**OUTCOMES**

Outcomes from BSO included:

- improving ground fisher's awareness of scientific protocols, for example, regarding methodology, and related requirements to allow scientific analysis to be conducted. This aspect was important in maintaining the fisher's commitment to data collection;
- improved communication and partnerships for future activities between industry, OceanWatch and state agency fisheries managers and research staff; and
- empowerment and increased capacity of fishers to confidently apply the BSO findings, particularly with a view to reducing conflict over *common good* issues with other stakeholders, such as recreational fishers or the general public.

**LESSONS**

The key lesson communicated from the BSO project is the importance of working with industry stakeholders and individuals (especially fishers, fishery managers and researchers) prior to the formal commencement of the project, and particularly in the development of the project proposal. Engaging end-users early is likely to lead to greater adoption, while engaging managers and researchers early is likely to create a collaborative research environment that is critically connected to the end-user circumstances hence creating more relevant results and practical recommendations.

Fishers are (often) the keepers of extensive practical knowledge, and this knowledge should be recognised as a valuable resource and opportunity for delivering better research projects and outcomes.

Creating and maintaining a sense of trust with fishers, and other industry stakeholders, is critical to proactively addressing sensitive issues, such as bycatch reduction. In BSO, progress was made on this topic largely because fishers felt comfortable discussing the matter within an established, trusting relationship maintained by/with SeaNet. This trust also enables progressive actions to be taken, such as the allocation of permits to conduct trial research and adopt new practices.

The trust that SeaNet maintains with fishers is partly enabled by the fact that SeaNet officers are considered to some extent an independent or third party to the commonly polarised positions of government regulation versus profitable fishing.

Good engagement, extension and adoption does not have to be hugely expensive, and the cost-effectiveness of BSO indicates that significant leveraging of people's time and industry resources does support adoption.

## *5.4 CASE STUDY 4 – Commercial B*

**South Australian commercial prawn trawling:**
**Improving bycatch reduction systems in the Gulf of St Vincent**

Technological Develop | Mentoring | Group Facilitation & Empowerment

**Project:** Testing and refining bycatch reduction systems for the Gulf of St Vincent Prawn Fishery (T90).

### Context

**Aim:** The T90 project aimed to reduce bycatch of unwanted prawns (too young) and various non-prawn marine species to increase the efficiency of prawn trawling, increase the sustainability of the local prawn fishery and external perceptions, and reduce the impact of prawn bycatch on other affected fisheries (for example, crabs).

**Funding & delivery:** T90 was primarily funded by FRDC with a range of contributing stakeholders, including the local prawning industry body, state government, local prawn trawlers, SeaNet officers (OceanWatch Australia), and a private net building business. The project was formally funded by FRDC for the 2010-12 period, and valued at approximately $250,000 including cash and in-kind contributions.

**Target audience:** The primary target audience was prawn trawlers and their operators of the Gulf of St Vincent, with a secondary audience being those operating in the (relatively nearby) Spencer Gulf. This secondary audience includes other prawn trawling operations for whom the T90 technology is relevant, across Australia and globally.

### Situation

**Extension challenge:** The key extension challenge was to establish an appropriate project team and operating environment that could achieve the desired bycatch aims through trialling and innovation that produced readily adoptable, pre-tested *in situ* technologies (and associated management practices). This task required a diverse mix of stakeholders to be brought together, including a critical representative role (within the project team) for the known end-users of the technology being developed, that is, prawn trawlers and operators. By establishing the *right*, or most appropriate membership of the project team, the wider primary target audience of local prawn trawlers, as well as the secondary target audiences, were believed to be better enabled to embrace the project's resulting technology because it would have been embodied with locally developed knowledge and proven experience.

### Actions

The T90 project team was identified at the outset, including the local prawning industry body, state government, local prawn trawlers, SeaNet officers (OceanWatch Australia), and a private net building business. These stakeholders were strategically selected for their respective valued inputs to the project, but perhaps more important was the development of a co-management approach as to how this group functioned. In effect, each stakeholder was considered to have a highly valued role within the group, creating mutually respectful, trustworthy, and collaborative relations, which ultimately characterised their interactions as supportive, positive and progressive.

Having set the project team, the T90 activities included a national review of existing similar net-based technologies followed by an iterative trialing process of over twenty types and combinations of nets and associated gear, for example the *grid*. These iterative trials worked from smaller net sizes to larger net sizes until the final (and largest) net was found to be the most appropriate for reducing bycatch

without reducing the profitability of the harvest. Relatively new underwater camera technology was used to better inform and document the trial results, as well as visually communicate the findings to prawn trawlers and operators.

**Extension delivery mechanism/s:** The primary target audience was brought together through direct personal and regular (monthly) communications, which were cleverly delivered through an existing meeting forum that was supported by the state government. This approach included frequent face-to-face contact, especially when trialling new net configurations on prawn trawlers including the skipper and crew, as well as regular informal contact by telephone, email etc.

These communication methods were highly appropriate, particularly because they included:

i) the immediate target audience of prawn trawlers, which by their very presence promoted a necessary and team-wide appreciation for the reality of on-boat capabilities and commercial considerations, and

ii) the key stakeholders needed to allow the project to progress, such as the state regulatory body, which recognised the value of the project (from being a part of it) and consequently issued special licensing arrangements for specified trawlers to operate in pursuit of the project's aims outside of the existing legal limits. In addition, the prawn industry body agreed to equitable financial arrangements with individual trawlers that enabled the research to be supported by the sale of the catch taken during trial work. Again, this opportunity may not have been as readily available had the project team not been as inclusive.

The broader target audience of other domestic and international prawn trawlers were exposed to T90 progress and results by making various group-based presentations to appropriate industry bodies, and informally discussing results on a one-to-one basis where possible.

## Results

The T90 project was successful in trailing and verifying a new *T90 net with grid* configuration that effectively reduced bycatch from approximately 50% of each trawl to between 5-10% of each trawl, that is, a 90-95% reduction in bycatch. The reduced bycatch comprised target species, including juvenile (and hence small) prawns, large fish species (including for example, sting rays), marine flora, and other fishery species, such as crabs.

The impact of reduced prawn trawl bycatch achieved the aims of the project, such as improving the sustainability of prawn fisheries, improving the sustainability of non-prawn fisheries that were previously adversely affected, and improving the reputation of the prawn trawling industry as environmentally responsible.

The innovation of new prawn net configurations was supported by the T90 project team to be commercialised without patent or copyright restrictions, which has been upheld by the net building business involved. This freedom of access to future net building is a form of regionalisation that, if continued, will enable a greater uptake of T90 products. The original FRDC funding also supported the concept of *common good* outcomes by not limiting access to prawn net design.

**Extension Sequence:** A single prawn trawling business initiated the project concept and this influence established the nature of the project as *bottom-up*, which ultimately permeated the delivery of the entire project. As a result, extension was continuously present throughout the T90 project as demonstrated by the co-management approach enacted. This could be viewed as a deliberately devolved version of the traditional hierarchy of science driven RD&E processes.

In keeping with the T90 approach, other local prawn trawl operators were involved early and throughout the project's development, particularly through existing communication forums run by state agencies and industry bodies, as well as engaging them directly in the research development, for example by transferring significant responsibilities of testing and refining technology onto prawn boat operators. This engagement was integrated with the research component through science directed net trials *in situ* and their validation using scientific methods. The T90 extension sequence, as compared to standard RD&E processes are represented as follows.

Standard extension sequence:


T90 extension sequence:


The subscript text can be read as *with respect for*, so the second box in the PMO sequence can be interpreted as: *Research conducted with respect for the extension requirements of the project*.

In the T90 sequence the standard *RD&E* components are all contained within the same (middle) box, which reflects the close proximity of the stakeholders (researchers and prawn trawlers) and the resulting simultaneity within which these activities took place.

The extension sequence for the secondary T90 target audience was essentially traditional, although it should be noted that the extension and adoption components for the T90 secondary audiences are considered more likely to be favourably received (than otherwise would have been the case) because of the high level of prawn trawler input and collaboration delivered in the primary target audience sequence and resulting T90 product recommendations.

## Outcomes

At the time of writing, the impact and adoption of the T90 project was not complete, with final stages of project testing still in action. Despite this, the target audience responses to date have been very positive. Given the relative high cost of purchasing and installing T90 prawn nets with grid, the project continues to work to prove their value within the prawn trawling industry.

An array of unintended outcomes were generated by the T90 project, in particular regarding:

- better flow of water through nets creating less drag on boats,
- less drag on boats reduces fuel consumption,
- less fuel consumption reduces green house gas emissions,
- no crab bites on crew,
- no sand dragged up onto boat (again less drag),
- no big marine species and risk of injury from handling,
- reduced risk of on-board injury improves OH&S status,
- time saving of better targeted catch enables crew to make more *3kg packs* which add value to the catch, and
- crew-labour time savings on-boat could be as much as 1 full crew member per trawl night.

The direct involvement of the local SeaNet officer enabled the OceanWatch network to widely distribute the findings of the T90 project to date, which will likely increase in future.

**Lessons**

The fact that the T90 project concept originated from industry is considered to be a valuable lesson in the success to date. The bottom-up approach is critical to gaining relevance and subsequent adoption of recommended technologies.

Using the dichotomy between modern clinical Western medicines versus traditional folk medicines as an analogy, it is important that contemporary science be used to validate existing practices and their development in order to credibly promote their extension and adoption.

Collaborative professional processes, such as established for the T90 project team, are critical to engaging all stakeholders.

Where possible, it is useful and most efficient to utilise existing communication structures, building on them or modifying as required.

It is critical to consider and involve the *right* people in every step of project delivery with respect to the work and role required, just as it is important to select the right extension tool for the task. Using visual communication methods, such as underwater video footage, was a key lesson in matching the *right* methods to the audience.

Conducting a review of existing options for addressing the research problem is valuable in itself, as well as for engaging primary target audience members. By conducting an early review of existing approaches, a project can *narrow down* on the best solution that is relevant to local circumstances.

Getting fishers and trawlers involved by using face-to-face contact as early as possible is an excellent way to instil ownership and responsibility for project success in target audiences. In terms of T90 project delivery, the enabling of change amongst the primary target audience was developed through a process of:

awareness ➔ knowledge ➔ ownership ➔ responsibility ➔ commitment ➔ trust = enabling change.

The T90 project could be seen, in one sense, as a series of *happy accidents* because several actions occurred through seemingly fortuitous events. Although luck does play a part, it would seem a reasonable interpretation that the T90 project team created a sufficiently progressive and supportive project environment in which fortuitous events could be taken advantage of if and when they arose to maximise project results and success.

The power of the diverse stakeholder group in T90 really worked. The team came together through the T90 project experience, which made some participants feel like they had *graduated from university!* This suggests that a successful group process can and does build the collective capacity and individual confidence of those involved.

## *5.5 CASE STUDY 5 – Commercial C*

**Western Australian commercial finfish trawling:**
**Reducing dolphin bycatch in the Pilbarra region**

Technological development | Multi-stakeholder development | Information Access

**Project:** *Reducing Dolphin Bycatch in the Pilbara Finfish Trawl Fishery* (RDB).

### Context

**Aim:** The prime aim of the RDB project was to reduce bycatch of dolphins in the trawl fishery of the Pilbarra region of Western Australia.

**Funding & delivery:** RDB formally funded Murdoch University with approximately $75,000 from the FRDC's Tactical Response Fund for approximately two years to July 2010, with preliminary work having been conducted by the state department of fisheries. Additional cash funds of $50,000 and $25,000 came from the state fisheries department and the local fishery respectively, with a likely in-kind contribution from both these organisations of approximately $50,000 each.

**Target audience:** The primary target audience was the fishers of the *Nickol Bay Professional Fishers Association*, which is one of the largest demersal fisheries in Australia (by volume) and comprises approximately four licenses and three commercial trawl boats targeting a wide range of scale fish.

The secondary target audiences included the state department of fisheries because the Nickol Bay fishery aimed to maintain its license to fish under the international convention of the Wildlife Trade Organisation that was in part managed by the department. The wider commercial trawling industry, the general public and academic research community were also part of the secondary target audience.

### Situation

The local trawl fishery instigated the RDB project in conjunction with the state department of fisheries based on a genuine interest in reducing dolphin by-catch. The complex nature of dolphin behaviour made it clear that external (to the fishery) expertise, knowledge and analysis was required to better understand and reduce the causes.

Given the aim of RDB was to reduce dolphin bycatch, two broadly defined areas for further investigation were identified, namely:

- management of the fishery, such as changing where and when fishing occurs, and
- trawl design and delivery, including trawl nets, related gear changes, trawl techniques etc.

Given the high community appeal of dolphins as a marine mammal, this project was aware of meeting, managing and maintaining any related community concerns.

### Actions

The project conducted on-boat observation to monitor and measure dolphin bycatch in several ways, including extremely important underwater video footage. Significant analysis of observed dolphin behaviour was conducted, as well as consideration of net designs and trawling procedures. Findings were reported to the project audiences and several academic research papers were published (including an Honours studentship).

**Extension delivery mechanisms:** Given this project was primarily instigated by fishers themselves and their industry fishery association (Nickol Bay), there was a strong component of end-user engagement at the commencement of the project. In order to maintain this interest and further engagement the project delivery agent (Murdoch University) initiated a pre-project workshop in December 2007 with the fishers (face-to-face contact). This effectively set the tone of good collaborative relations between the researchers and the fishers, with a level of professional independence, and hence trust attributed to the former. This resulted in the project being able to develop a strong collaborative relationship that supported extensive on-boat observation and related research arrangements between the researchers and fishers (boat owners, skippers and crew).

Regular communications between the research team and fishers were made throughout the project, using face-to-face, group-based update meetings complimented by substantial interim communications by telephone, email etc. It is interesting to note that the communications methods were so effective and rapid during the delivery of the project that some fishers began adjusting their nets and trawling techniques before final research recommendations had been made – this was identified as a barrier to accurate data recording and limited appropriately.

## Results

The RDB project was effective in approximately halving the annual bycatch of dolphins, primarily through the adjustment of net design and trawl procedures, including a new grid mechanism and a bottom-opening escape hatch that was better suited to identified dolphin behaviours. Further recommendations regarding a top-opening escape hatch have been presented for future consideration by the fishers, with research continuing.

The adoption of the results of this project was successful because the fishers were directly involved from the start of the project, and were continually engaged throughout the research and recommendation phases. Successful reductions in dolphin bycatch led to the renewal of the Wildlife Trade Organisation permit to continue fishing in Commonwealth waters.

## Outcomes

The actual risk of dolphin bycatch was reduced by the RDB project, which enabled it to continue trawl operations as well as provide evidence of significant improvements in dolphin fatalities for the broader community and other relevant fisheries around Australia.

The research developed significantly more knowledge on dolphin biology and behaviour than originally expected, with some of the work being converted into published peer reviewed papers, conference presentations, an Honours thesis, and a subsequent PhD studentship.

## Lessons

A key lesson was the value of having good coordination of managers, researchers and fishers, particularly using face-to-face contact where possible, followed up with appropriate interim contact by telephone, post, email etc.

Quality face-to-face contact at the start of a project is an excellent method for establishing and maintaining good communications throughout the project, even if they are not face-to-face. This process is effective at enabling the establishment of trust between stakeholders.

Engaging fishers directly in the research process is good for increasing the awareness and capacity required to conduct scientifically based research.

## *5.6 CASE STUDY 6 – Recreational A*

**Victorian recreational fishing:**
**Extension of Golden Perch Research in Lake Eildon**

Technological development | Information Access

**Project:** Golden Perch Research in Lake Eildon

### Context

**Aim:** DPI Fisheries aimed to increase the number of recreational fishers targeting and catching golden perch in Lake Eildon by promoting the strength of the fishery and methods to improve catch rates.

**Funding:** DPI Fisheries funded and carried out the research on golden perch habitat and movement. The communication and extension component was supported by Recreational Fishing License funding (administered by DPI Fisheries) and carried out by DPI staff.

**Target audience:** As users of Lake Eildon came from a wide range of locations, the primary target was fresh water anglers from throughout Victoria. It is difficult to know the size of this audience but it has been estimated at between 50 000 and 100 000 anglers. The secondary targets of the extension were other visitors to the lake, possibly numbering 100 000 to 200 000 people per year. Residents and townships surrounding Lake Eildon rely heavily on tourism and activities conducted on the lake such as water skiing, house boating and fishing. Extra impetus for promoting the golden perch fishery arose due to the impact of drought over the preceding years. The lake itself was massively reduced in size and the loss of amenity presented a threat to the livelihoods of individuals living in the area. Such activities include the provision of accommodation, boat hire, bait and tackle, fuel and food.

### Situation

Between 1999 and 2009, over 1 million golden perch were stocked in Lake Eildon. Although considerable investments were made in stocking this fishery, there were few anglers targeting or catching golden perch. Fisheries officers knew that large numbers of golden perch were present in the lake but did not know how to get anglers interested and how to promote Lake Eildon as a perch fishery.

A decision was made to undertake research into the habitat and movement of golden perch throughout the year in order to be able to provide practical information to anglers on how best to target the species in different seasons. Anecdotally, it seemed that accepted methods for catching golden perch elsewhere were not yielding success in Lake Eildon.

### Actions

The Marine and Freshwater Resources Institute (MAFRI) at Snobs Creek undertook a study of the movements and habitat preferences of golden perch by inserting tracking devices into a number of fish. A research report was produced outlining the preferred habitat and locations at different times of year (Douglas, 2009). This included the presence of trees or other objects, distance from the bank and the depth of water in which they were located.

**Extension delivery mechanisms:** Although these scientific results were publicly available, they were not communicated to anglers or presented in a practical and easy to use manner. In order to make this appealing and useful to anglers, fisheries scientists worked in conjunction with a communication expert within fisheries to transform the results of the research into a more accessible format. To reach a large and dispersed target audience, the information and access model of extension was employed. The first step was to develop a media release to promote the research and understanding

of golden perch movements within Lake Eildon. It was recognised that this may have limited success in reaching the target audience and that media accessed by anglers would have a far greater impact. An article was developed for Freshwater Fishing magazine with photos, diagrams of where to fish in different seasons, and five tips on how to catch golden perch based on the results of the scientific tracking research. Subsequent to this, the information was also communicated in an episode of a television fishing program, with footage of anglers catching golden perch using the methods advocated.

The broad scale information approach was also supported by the local fisheries officers who ensured a consistent understanding and message with local tackle shops. This also provided face-to-face contact with anglers on location. This and other aspects of the extension were carried out largely as part of regular staff duties and as such had a relatively low project cost. This was also supported by the interest and involvement of the scientists, communications staff and magazine editor, many of whom also have an active interest in fishing Lake Eildon.

**Results**

In the season following the Freshwater Fishing article there was a large increase in the number of anglers targeting and catching golden perch. It is not possible to isolate the direct effects of the extension activities in this case as no formal monitoring took place and it is possible that a good season and word of mouth combined to yield higher catch rates and interest in golden perch. However, there are a number of positive indications of the effects of the extension activities. It seems that anglers did have access to the information based on the wide distribution of Freshwater Fishing magazine. References to the article appear on online fishing forums and the fisheries staff report instances of anglers with copies of the magazine targeting golden perch at the lake. There are also anecdotal reports of a large tackle shop selling out of the particular type of lure featured in the golden perch articles.

Overall, those stakeholders interviewed reported that the communication and extension activities were very successful in changing fishing practices. Whereas there were previously very few anglers targeting golden perch in Lake Eildon, the numbers are now much higher and the catch rates are greatly increased. Fisheries staff feel this is a very positive result as the stocked resource is now being utilised and there is little concern with the lake being overfished due to the high numbers of perch stocked. It is also expected that the success of the golden perch fishery will contribute to the social and economic well being of the local communities surrounding the lake.

The success of the golden perch extension in Lake Eildon has also been linked to a more recent program to stock one million Murray cod in the lake over three years. This represents a significant investment and is one of the largest native fish stocking programs in Australia. It was reported that the success of the golden perch fishery was integral to the undertaking of such a large program. Moreover, key lessons from the golden perch extension will be drawn upon and improved to promote the Murray cod fishery.

**Lessons**

There are a number of lessons that can be drawn from this case study to support effective extension in any type of fishery. The current example of golden perch in Lake Eildon provides a relatively constrained demonstration of targeted research and extension that allows for informal monitoring. The lessons from this project can be used for similar tracking and extension activities (inland, estuarine or marine) and more generally in guiding research, extension and adoption.

A formal extension plan that is integrated from the beginning of the process would allow greater opportunities for practice change and the chance to properly monitor the impacts. In terms of monitoring, Creel surveys are being conducted in Lake Eildon (as in other areas) that can be used as a

benchmark of effort and catch rates. This will be useful in monitoring change in behaviour and catch results as the Murray cod fishery becomes established.

Conducting research that can be of direct benefit to anglers will maximise the potential to extend the findings and have the recommendations adopted. This requires ongoing engagement with recreational fishers to understand what they believe is important and what type of research and recommendations they would be likely to adopt. This may also be particularly effective where information access approaches are employed, relying to some degree on the interest of the target audience to seek out and make use of the recommended practice changes. Where a broad scale information approach is used as the primary extension method it also seems effective to have one-on-one communication as well, at least in a supporting role.

## *5.7 CASE STUDY 7 – Recreational B*

**National recreational fishing:**
**Improving fish handling, release and survival with *Gently Does It***

Technological Develop | Info Access | Programmed Learning | Group Facilitation & Empowerment

**Project:** *National Strategy for the Survival of Released Line Caught Fish: planning, project management and communications* (GDI).

### Context

**Aim:** GDI aimed to improve fish release and survival rates implemented by recreational fishers across Australia. The GDI extension approach was designed to increase the adoption of best practices as defined by GDI information resources, and hence invoke a cultural change across the recreational fishing sector that could also be demonstrated to external stakeholders.

**Funding & delivery:** GDI was funded by the FRDC and led by a small, reputable consultancy from 2001-2009. For the 2004-07 period total project resources (cash and in-kind) amounted to approximately $7.2m. Awarding such a large project to a relatively small consultancy was considered a novel feature of GDI.

**Target audience:** In addition to all recreational fishers of Australian waters (approximately 5 million), the target audience included conservation groups, school children and the general community, indicating a desire to create a perception beyond the immediate fishing community of sustainable and humane practices (based on demonstrable results).

### Situation

**Extension challenge:** Collectively, the target audiences were demographically diverse and geographically disaggregated, creating a significant challenge for effective extension and resulting adoption. Certain existing information about levels of catch (approximately 100 million fish per year) suggested that fish release was increasing but survival rates were essentially unknown, while public information resources were only available in an *ad hoc* manner, and these were not always based on best practice, or adequately supported by research.

Overall, the target audiences were not readily accessible due to their size and diversity, their prevailing attitudes and practices by demographic category were unclear, and existing developmental or instructional resources were inadequate. The challenge for extension was to engage and induce behaviour change across a massive target population with no comprehensive, pre-defined communication systems in place, as well as conduct the research and development necessary to support best practice fish handling, release and survival. Put another way, in order to achieve such a large task GDI had to actively manage - that is, largely instigate - demand for the extension messages from recreational fishers, as well as oversee their supply and distribution in terms of quality materials and their dissemination.

### Actions

**Audience profile:** Presented with an almost overwhelming extension challenge of engaging 5 million recreational fishers, GDI started by approaching the target audience at the very beginning of the project. An early indication of the strong focus on social engagement was the creation of a social scientist position on the GDI steering committee (held by Southern Cross University) amongst a range of other relevant (more technically and marine oriented) experts.

The first key action was GDI's early initial contact with the target audience, which took the form of a major national telephone survey of recreational fishers to identify their current attitudes and behaviours. By doing this GDI was able to metaphorically start a conversation that also elicited a better understanding of the target audience. This was critical to informing:

- GDI content and identifying the pitch of corresponding extension messages,
- the extension delivery strategy for engaging the target audience, and
- baseline information for benchmarking project progress (evaluation).

A sample survey by telephone is not a particularly intimate form of contact (e.g. compared to onsite face-to-face visits), but it was clearly a realistic, appropriate, and likely the most cost-effective method available given the scale of the target audience. By first creating a knowledge profile of its target audience, GDI was subsequently able to:

- tailor the project's content to be most relevant and accessible because they had the target audience's needs, wants, attitudes and current practices in mind, and
- identify, define, justify and appropriately target additional research propositions and their findings, including 27 related research efforts.

Devising and implementing the most effective delivery of this content into packaged extension material also became possible. For example, GDI realised it needed to address language issues by using positive and easily understood terms like *fish survival* instead of *fish mortality* within a user-friendly format such as the information packs that were printed and widely distributed. A further example of this tailored approach was the strategic selection of a television personality (Andrew Ettingshausen) who appealed to most target audience types, including women and children, and not just the primary target group, for example, males in middle-age and older.

**Extension delivery mechanisms:** The GDI delivery mechanisms were remarkably effective, and worthy of further exploration. Given the lead agent was a small consultancy it is inconceivable that this entity alone could have single-handedly delivered each and every communication to target audience members across Australia (as would be the case for small scale extension challenges). Instead, GDI designed, engineered and activated a system of extension delivery that was simultaneously national, state, regional and local in its execution.

Taking a multi-level and mixed-method approach enabled GDI extension messages to reinforce each other as they found their targets in various contexts across Australia. For example, a single recreational fisher could feasibly have been reached by GDI content by:

- watching nationally broadcast television community advertisements or a fishing show (top-down, one-way communication), and/or
- attending locally facilitated community events run by known (and hence largely trusted) service providers who presented GDI content (bottom-up, two-way communication, 1:1 contact), and/or
- visiting tackle shops and finding GDI content that was supported by the proprietor (bottom-up, two-way communication, 1:1 contact), and/or

- reading GDI content (and watching a DVD where supplied) in desired fishing magazines (bottom-up, one-way communication with option to be two-way if reader contacts editorial).

By utilising this variety of extension delivery mechanisms, GDI leveraged support from over 400 stakeholders across Australia to disseminate highly relevant and accessible content directly to its target audience, as delivered by, for example, fishing clubs, FishCare, Sunfish clinics, other community groups etc.

**Regionalisation:** A key reason for the successful distribution of GDI content was that it was not considered commercially sensitive, and hence was free and publicly accessible to all stakeholders (that is, no copyright restrictions were imposed on GDI content or material). Regionalisation of this type was critical to enabling GDI content to be owned by local service providers who effectively were transformed into a strategically coordinated, standing army of messengers who co-created the widespread impact of GDI. By allowing GDI material to be regionalised, every potential delivery agent was able to associate itself with GDI by promoting and re-branding it as they pleased, essentially to suit their local audiences and gain influence.

The combined acts of allowing GDI content to be regionalised, broadcasting messages (television), and raising a national network of service providers resulted in the following extension actions being taken:

- National distribution of over 150,000 information packs to over 400 tackle shops and related local service providers, resulting in widespread 1:1 delivery of GDI messages.

- Successful dissemination of GDI content at a major trade show (Gold Coast).

- National broadcast television campaign in the twin forms of a fishing show and community announcements over 12 months, delivered consecutively for 3 months per state or territory. The community announcements gained excellent exposure and created additional value for GDI (e.g. approximately $1million worth of exposure was achieved at a cost of approximately $300,000).

## Results

GDI effectively extended its project content to a relatively high proportion of its target audience. The success of the project, and effectiveness of the extension conducted, is demonstrated by the following results:

- Increased documentation and scientific demonstration of improvements in target fish survival rates. For example, prior to GDI only four fish species had credibly estimated survival rates but by 2007 over 30 species were estimated as high or improving.

- Improved fish survival rates from improved fisher practices, for example, through the promotion and adoption of circle hooks, horizontal fish handling for photography, amongst others.

- Promoted community awareness and grew approval of recreational fishing; and

- Grew the industry of recreational fishing by appealing to new-comers and next generations.

These achievements were made possible by the sizable support leveraged across the service provider network, and by information-access based extension, such as television broadcasts (community announcements and fishing shows), which in combination amounted to highly effective extension delivery and adoption by a sizable audience.

**Extension Sequence:** GDI actively and explicitly conducted extension related activities at every stage of the entire project. The traditional linear paradigm of conducting research (R) and associated development (D), followed by an isolated extension component (E) that (hopefully) results in high rates of adoption (A) was supplanted by a process in which extension was continuously present, explicitly stated and acknowledged.

A comparative visual depiction of the extension sequence is presented by the following images, showing first the standard approach and second the GDI approach.

Standard extension sequence:


GDI extension sequence:


The subscript text can be read as *with respect for*, so the second box in the GDI sequence can be interpreted as: *Research conducted with respect for the extension requirements of the project*.

## Outcomes

**Cultural shift:** The main outcome of GDI was the changing, or rather enhancement of, the culture of recreational fishing regarding fish stock security (sustainability) and improved handling practices as perceived by both participants and observers of recreational fishing.

These favourable perceptions of the recreational fishing sector can reasonably be linked to the avoidance (to date) of legislation for the compulsory use of circle hooks because they were effectively promoted by GDI and significantly adopted by recreational fishers. Hence the voluntary change in behaviour stemmed the need for regulated change.

**Replication:** Another outcome was the replication of the GDI project model and methods in a similar project called *Fishsmart* in the USA.

## Lessons

Relatively small agencies *can* successfully deliver large projects, desired results and valued outcomes.

It is critical to use the most appropriate extension method or tool for the task and context at hand. For example, in GDI a large and diverse target audience was engaged at the start of a best practice extension process by a national telephone survey that was statistically valid for the whole population of recreational fishers.

Delivering content by more than one model and method is a valuable technique for reinforcing key extension messages. That is, delivering the extension message by more than one type of messenger.

Delivering extension messages across different levels, such as geographic scale, institutional and organisational scales, is a valuable technique for reinforcing key extension messages. For example, extension by national television has a sense of coming from an overarching national level, while fishing club delivery has a sense of being regional, and further more, tackle shops are essentially local entities.

Regionalisation as an extension strategy is a potentially powerful mechanism for delivering content while maintaining its integrity in terms of accuracy, consistency and relevance, particularly to large-scale audiences within diverse contexts.

Minimising restricted access to extension content, including copyright and cost, generally maximises the opportunity to regionalise content and hence achieve widespread support from available service providers.

Extension activities should be an explicitly stated and acknowledged element throughout the entire project delivery process, with a strong emphasis on target audience engagement in the early / start-up phase (that is, prior to, or at least simultaneously with, the traditional first step of research in the process of RDEA).

*Fisheries management is about managing people - not fish!*

Target audiences and prevailing knowledge are both constantly changing, and these combined attributes mean that all fishing sectors are dynamic over time, and hence extension is a never-ending job.

## *5.8 CASE STUDY 8 – Recreational C*

**NSW recreational fishing: Saving lives with *Angel Rings***

Programmed Learning | Multi-stakeholder negotiation | Information Access

**Project:** *Australian National Sportfishing Association (ANSA) NSW Angel Ring Project (ARP)*

### Context

**Aim:** The aim of the ARP was to provide readily accessible life buoys (Angel Rings) on-site at hazardous rock fishing areas for use in emergencies, to ultimately reduce related injury and fatality.

**Funding:** ARP has received various funding since 1993 valued at an approximate total of $166,000, initially from the (then) NSW Department of Sport, Recreation and Racing, the majority from the *NSW Recreational Fishing Trust Fund*, and approximately one third from the Australian Government's *Recreational Fishing Community Grants* scheme. The ARP is on going.

**Target audience:** The primary target audience is the recreational rock fishing community of NSW, which is considered highly diverse, disaggregated by geography and demographic characteristics, transient and large. A secondary audience is the wider community, who may also have cause to use the Angel Rings, and related stakeholders such as local councils and project participants, including NSW Department of Sport and Recreation, NSW Sporting Injuries Insurance, National Parks and Wildlife Service and the NSW Department of Fisheries.

### Situation

The recreational fishing sector in NSW recognised that rock fishing is at times high risk, especially if appropriate warnings are not heeded, and that fatalities are a reality. In addition to this situation, it was acknowledged that each injury or fatality amounts to an approximate $300,000 cost to tax payers totalling a remarkable $72 million for the period 1998 – 1999 in NSW. Clearly, a reduction in injuries and/or fatalities in recreational rock fishing would be extremely beneficial in both tangible human terms and community-wide outcomes.

### Actions

The key physical actions of the ARP concerned the installation and maintenance of Angel Rings at strategic locations across the NSW coastline, although these were not considered adequate on their own to ensure optimal use by the target audience. As a result the ARP embarked on a sophisticated and multi-pronged extension program to engage their diverse primary and secondary audiences in rock fishing safety.

**Extension delivery mechanisms:** In particular the ARP established a range of methods for promoting awareness and use of Angel Rings, including:

- a 1800 number to report lost or damaged Angel Rings to support on-going maintenance,
- collaborative arrangements with relevant NSW industry and government fishing bodies to deliver rock fishing safety projects,
- development of collaborative arrangements with NSW police to carry Angel Rings in their vehicles including a training DVD (for police),
- delivery of English language and translated DVDs and CDs (over 200,000) for target audiences,

- delivery of English language and translated community workshops with target audiences,
- delivery of English language and translated resource material (hardcopy and web-based) for target audiences, and
- expansion of the ARP to relevant areas of other states, such as Victoria (Wilson's Promontory).

Importantly, the ARP recognised the need to deliver its messages to an audience that was not easily engaged mainly due to language barriers, and in response the ARP took their messages to those communities through local cultural centres and fishing outlets. This enabled a strong degree of regionalisation of the delivery of the ARP content.

**Audience profile:** The value of these efforts (above) are demonstrated in the results section (below) but of particular merit regarding best practice extension is the fact that the ARP identified its target audience by researching the diverse profile of rock fishers. To this end, ARP identified the high risk locations and linked them to the identified high risk populations, particularly non-English speaking people such as Chinese, Korean, and Vietnamese in areas such as Manly, Dee Why, Randwick, Sutherland, Gosford and Bass Coast (Victoria). This approach enabled the ARP to accurately identify the best way to reach its target audience, particularly those people and communities not strong in English language but who do comprise a significant part of the recreational rock fishing community.

The types of information sought by the ARP includes rock fisher's:

- gender,
- age,
- area of residence,
- nationality / place of birth,
- frequency of visitation,
- experience in activity,
- safety measures taken, and
- knowledge of safety advice.

## Results

The ARP has been successful in delivering its project objectives, that of installing and maintaining a growing number of Angel Rings across NSW, and increasingly Australia. This has been achieved through exhaustive collaborative arrangements and partnerships to seek minimal cash funding allocations and leverage significant in-kind contributions from a diverse secondary target audience of stakeholders.

In addition to installing Angel Rings the project effectively delivered its content to a diverse primary target audience using culturally sensitive and appropriately accommodating methods, particularly language-specific communications.

## Outcomes

The key indicative outcome for the ARP is a reduction in rock fisher fatalities, which by 2009 had saved over 30 lives through use of Angel Rings, as formally documented by police and other relevant authorities, with this figure continuing to rise.

## Lessons

The ARP experience demonstrates the value of identifying and understanding the target audience before project engagement, and using this understanding to inform the content and method of

delivery. Segmenting the primary target audience, such as by differentiating language requirements is a good example of best meeting the needs of diverse extension recipients.

Multi-stakeholder negotiation is a valuable extension approach for accessing and leveraging external project resources, particularly in-kind contributions, and increasing the cost-effectiveness of project activities.

The regionalisation of content delivery through multiple local service providers, such as cultural centres and fishing shops, is an effective method for conveying extension content in a manner that best suits the target audiences.

## *5.9 CASE STUDY 9 – Non-Fishing Industry (Australian)*

**Australian dairy industry's natural resource management (NRM) strategy:**
***Dairying for Tomorrow* and the regional development program (RDP) network in NSW**

Techn'l Develop | Info Access | Mentoring | Programmed Learning | Group Facil'n & Empowerment

**Project:** *Dairying for Tomorrow* (DFT).

### Context

**Aim:** The aim of the DFT program is to deliver the Australian dairy industry's strategy for improving NRM, which serves to achieve and demonstrate improved farm management practices across all NRM issues of dairying (including climate change), and enables these improvements to be conveyed to internal and external audiences as appropriate, including to inform community perception. DFT is delivered in NSW by the part-time *Regional NRM Coordinator* position.

**Funding & delivery:** DFT is a major national industry initiative for which significant public and industry funding has been secured since 1999 and is ongoing. For the purposes of this case study the NSW delivery of DFT will be addressed, and to this end the Regional NRM Coordinator position is valued at approximately $50,000 per year for 2 days/week.

**Target audience:** Dairy farmers are the primary target audience of DFT regarding adoption of on-farm changes, while the secondary audiences include a wide range of industry stakeholders (for example milk processors, agri-suppliers, consultants), green groups and the general public.

### Situation

The DFT program is delivered through a national network of 8 *Regional Dairy Programs* (RDP), of which Dairy NSW is one. In NSW, the NRM Coordinator is paid by Dairy Australia (the equivalent of FRDC) to serve the regional body Dairy NSW. This arrangement means that the NRM Coordinator is required to report (contractually) against national priorities (to Dairy Australia) that are delivered regionally and locally to dairy farmers. The NRM Coordinator also reports to Dairy NSW as part of the service provided.

**Extension challenge:** The challenge for DFT is to engage the highest possible proportion of farmers across Australia in NRM activities, that are not always *win:win*. As such, each NRM Coordinator has the challenge of inducing farmers to participate in activities that traditionally are not seen as a high on-farm priority, or even as threats to on-farm productivity and profitability.

### Actions

**Audience profile:** Given the dairy farmer audience is reasonably homogeneous, most Dairy-NRM extension messages can be delivered with a single audience in mind, although significant variation between farming operations must be respected when relevant, for example, geographic and climatic diversity, access to irrigation, pasture species, size of dairy operations etc.

**Extension delivery mechanisms:** The DFT program has been effective at delivering RDEA, especially through the process of *regionalisation*. This process relies on the existence of a two-way, vertical communications structure that effectively connects the Dairy Australia boardroom to farmers in local milking sheds, and vice versa. A simplified representation of this structure is that it functions through the existence of incorporated bodies at the national, state and regional level, with individual (local) dairy farmers linking to the regional incorporated body. These levels of incorporated industry bodies are:

- National level: Dairy Australia and DFT (appointed program manager)
- State level: Dairy NSW and the NRM Coordinator position
- Regional level: various Regional Dairy Groups (RDG)
- Local level: individual farmers with link to RDGs

This tiered system works vertically but also horizontally by accommodating multiple stakeholders at each of the three incorporated levels because each functions as a communications hub that is designed to accommodate a diverse mix of relevant stakeholders. Overall, this structure enables a single local dairy farmer to communicate a personally formulated message to their RDG, which can transfer it to Dairy NSW, which can transfer it to Dairy Australia, and the reverse process is easily utilised to send messages down the chain. Given that a multitude of stakeholders are present or represented at each of the four levels, each hub also serves as an invaluable link for opening and maintaining industry-wide dialogue, across all stakeholders and all levels.

**Regionalisation:** The notion of regionalisation arose from the need for national RD&E priorities to be delivered to local dairy farmers across Australia. A useful example is the development and delivery of an on-farm NRM auditing tool known as the Dairy Self Assessment Tool (DSAT). This tool covers 10 farm management areas and assesses over 200 on-farm practices as either *below acceptable*, *acceptable* or *above acceptable* industry best practice. The farmer is asked to tick which category they fall into for each management practice and management area.

Development of the DSAT required that each farm management topic area be nationally applicable and consistent across the three levels of on-farm performance grading, but also be accurately aligned to reflect environmental legislation that was different in each state of Australia. That is, if a practice was identified as *unacceptable* it could be interpreted that the farmer was probably breaking an existing environmental law in their state. In order to deliver a farmer-friendly DSAT, each RDP was asked by Dairy Australia to *regionalise* the DSAT such that it would be relevant to their circumstances.

While the regionalisation process ensured the regulatory relevance of DSAT for each state of Australia, it also actively supported RDPs to take ownership of the extension methods for delivering DSAT. As a result each RDP had the freedom to tailor its strategy to engage the farming community with whom they were most familiar with and best knew what their preferences were (unlike farmers in another state).

The delivery of the DSAT in NSW was different to any other RDP's approach, in that it required an industry facilitator to deliver the DSAT face-to-face and gather anonymous data directly with either individual or groups of farmers. This was distinct from other states, which for example, mailed the DSAT to individual dairy farmers with little follow up, but notably this was considered appropriate given their regional context.

In NSW the requirement to have DSAT facilitated meant its delivery required significant resources per farm. To achieve these resource inputs DNSW used the DSAT tool as a feature of its funding applications to NRM bodies and other sources (both government and corporate), citing the value of supporting the delivery of DSAT to environmental gain.

## Results

DFT is considered successful for several reasons, with the key ones being the strong level of engagement achieved with farmers and their service providers, as well as major leveraging success that supported on-farm change and improved NRM. In NSW the DFT strategy was successful in realising the delivery of DSAT to over 35% of the NSW dairy industry in the first two years, and remains on going although circumstances have since evolved.

One external evaluation of DFT outlined the following:

*At the industry body level, the networking and improved linkages between the industry body groups and other stakeholders (i.e. farmers, government authorities, etc) seem to have had a major benefit. Respondents believe that having a national NRM structure in place has enabled industry to quickly implement things and get information out to the region. Having an NRM focal point has also improved the awareness of NRM among farmers, and as one respondent put it "farmers do look to their industry bodies for leadership, and previously this was lacking an NRM focus". Moreover, as previously stated, the combination of linkages, networking, and awareness at all levels has actually improved the decision making of farmers through indirect effects such as being able to generate more funding for other projects, and bringing more people to the table* (Roberts Evaluation 2007).

### Outcomes

**Cultural shift:** In NSW, the impact of DFT has been to transform pre-existing dairy industry perceptions that NRM simply implied an added cost to business, to one of seeing Dairy-NRM as an opportunity to increase efficiency, leverage resources that support on-farm change (up-grading), become more environmentally sustainable and increase the extent to which dairy farmers are granted a social license to farm by the wider community. In support of this, Roberts Evaluation (2007) reported:

*In some regions where the communication and relationship building has been well established, the [DFT] project has been remarkable for:*

- *Leveraging resources such as funds and in kind contributions;*
- *Putting farmers through well facilitated groups and an extension process; and*
- *Providing incentives for action.*

*This has been done where previously NRM was not necessarily favourable in the industry (eg DNSW). From the farmers' perspective, the most useful components have been the raising of awareness in conjunction with the prioritisation of [on-farm] issues. This capacity building and learning is what farmers have been highlighting, along with the networks [and] specifically with the NRM coordinator, other NRM experts and group discussions to communicate with similarly positioned farmers.*

### Lessons

The function of *coordination* is a highly effective way to value-add to existing communications structures, it is a way of *oiling* the existing communication cogs to make them turn freely and interact the way they were designed to.

Strategically designed and implemented communication hubs can be effective for growing the coordination of communication across an industry.

Significant leveraging can be achieved from pro-active coordination roles, making it likely that such functions can pay for themselves, either by leveraging cash and/or in-kind contributions and this should be factored into their instigation.

## *5.10 CASE STUDY 10 – International Fishing Industry*

**Virginia (USA) fishing industry:**
**Engaging aquaculture, commercial, and recreational fishers in research and development**

Programmed Learning | Multi-stakeholder negotiation | Information Access

**Project:** *Virginia Sea Grant* (VSG).

### Context

**Aim:** The VSG is run by the Virginia Institute of Marine Science (VIMS) which aims to be an *honest broker* between researchers, regulators, fishers and the general community. VSG is delivered by VIMS as part of a federally funded program that is state-run in all major sea states of America. The aim of VSG is to transfer research and development benefits to users and related stakeholders.

**Funding:** In 2010, the VSG program was allocated approximately $1.455m of federal funds for grants to support a range of extension staff and related operational and administration services. Significant leveraging was pursued in most projects that received grants, creating an annual budget for 2010 of $3.4m including state-level contributions.

**Target audience:** The primary target audience for VSG (and VIMS) is the entire fisher community in Virginia and direct stakeholders, such as local and state government, industry groups, research organisations, various supply-chain members, and the wider community (especially where they are affected by sea and/or fishing related activities). With over 35 different types of stakeholders, it is clear that the VSG is responsible for engaging a large and extremely diverse target audience.

### Situation

The VSG is delivered by the VIMS and builds and maintains a *two-way bridge* between the researchers and the end-users (fishers and the general public) through using extension and engagement (often known as *outreach*).

VSG has four key themes through which research and development is delivered, namely:

1) *Sustainable fisheries*,
2) *Healthy coastal ecosystems*,
3) *Coastal community adaptation and development, and*
4) *Coastal and ocean literacy*.

Projects in the *Sustainable fisheries* and *Healthy coastal ecosystems* themes have a longer history with VIMS and hence tend to be granted the most funds.

Projects in the *Coastal and ocean literacy* theme have effectively trained schoolteachers to teach about ocean related issues.

Projects in the *Coastal community adaptation and development* theme are typically targeted at residents of flood-prone areas (marine waters), especially given the threat of sea level rise that requires emergency planning for evacuations, or zoning of flood areas versus other uses.

### Actions

In general, all VSG funding is matched to an *economic partner*, ensuring that a co-contribution is tied to most grant allocations. The majority of VSG money is distributed through a competitive grants

process that has a well established profile within, and contact database of, the target stakeholder community and hence VSG does not (need to) advertise in the general media.

VSG is linked to its target audiences through the VIMS extension staff network, to which each member is connected in their assigned area of interest. These staff are well placed (and required) to intimately understand and navigate the complexities that multi-stakeholder environments often create, including policy and politics, personalities, industry sensitivities, regulatory limits, industry statistics and external forces to best engage the target audience with the VSG.

**Extension delivery mechanisms:** There are two notable engagement practices under the VSG program that support best practice extension relevant to this review by FRDC. The first is a collaborative fellowship that has been piloted to encourage students to find their own industry partner and, thereby reduce the gap between research and adoption through increased relevance of research.

The second progressive extension approach is a sub-program called the *Fisheries Resource Grant Fund* (FRGF), which is only available to workers/operators in the relevant industries, such as fishers and related employees. To best engage its target audience, the FRGF uses a range of conventional extension methods, such as local media listings, industry event calendars, known mailing lists of *watermen* (as fishers are commonly called), and annual notices, but the most notable is the running of a series of *in situ* workshops that promote the availability of the grant and how to apply for it.

These workshops are organised, coordinated and delivered to best suit the availability and preferences of the industry men and women, such as:

- at wharves or bars near the workplace,
- in conjunction with existing local industry meetings,
- outside normal work hours,
- by using the language and terminology most familiar to the target audience, and
- within an atmosphere that is a safe learning environment where people can ask questions without being embarrassed or inhibited.

Achieving this secure learning environment in part comes from ensuring that the target audience dominates the attending population. This approach is deliberately designed to empower the fisher community to participate in research and development processes, including setting the agenda for RDEA (further reading on this approach is suggested in Jennings 2005). These relatively small grants to fishers ($1000-$10 000) are commonly directed to development proposals that often later become the starting point for more detailed science-based research.

VIMS extension staff are relatively well resourced in full time employment positions, but also get involved in larger projects that can attribute external funds to VIMS for their services. Currently 13 full time equivalent extension staff positions are in operation, and these roles create a network of coordinators with exceptional reach (rapid and flexible contact) across the fishing industry. Extension staff have been in operation for over 30 years at the VIMS, with strong succession plans implemented when staff leave or retire, typically with the retiree coming back in a part-time role to ensure the transition is smooth and stakeholder confidence is maintained. This clearly demonstrates the high value placed on the relationships being managed by VIMS.

VIMS and the VSG program actively promote use of the electronic media. Examples include:

- a website presence and portal (recently updated),
- a social media presence of *facebook*, *twitter* and *flikr*,

- popular *YouTube* postings of video content, including research footage and VIMS annual reports, and
- an impending strategic development plan for increased use of electronic media in future.

### Results and outcomes

The overarching result of the VSG program, as delivered by the VIMS, is the optimal distribution of RD&E funds by developing and maintaining relationships with all relevant sectors and their stakeholders.

Some specific results in the past include the establishment of best management practices in soft crab growing and scallop medallions (which better utilised proteins to create multi-million dollar benefits to operators and industry).

The *Fisheries Resource Grant Fund* generally achieves a ninety per cent success rate for projects applied for and conducted by fishers, which is considered a strong result over 20 years. Unsuccessful projects are usually due to external issues such as family or personal matters.

### Lessons

A key lesson from the VSG program, as delivered by the VIMS, is that trust in stakeholder relationships is earned. And this process is continually in action!

Knowing the target audience is critical, especially when dealing with diverse and disaggregate audiences. Value is created when the delivery agent can respond differently to different stakeholders using tailored communications and engagement methods. Delivery agents must engage their end-user clients in the way he/she needs and prefers to be engaged.

Maintenance of trust through contact on the end-user's terms is a winning formula, noting that end-users can be fishers and/or researchers alike.

Working with different audiences needs good face-to-face relationship management.

Commonality of the key themes makes the VSG program able to work because there is some overlap across the themes and to that extent they reinforce each other and do not work in total isolation. Coordination and integration is important to implementing the VSG themes.

The VIMS extension staff are a mix of teaching graduates, former commercial and industry professionals, or research professionals, all of whom create a diverse pool of available talent that matches the diversity of the target audience.

# 6 Discussion

This section takes each of the key research questions and answers them with the data that were collected by the review. The key research questions were:

1. What are the range of extension and adoption activities used in the recreational, commercial and aquaculture industries?
2. How effective are the extension and adoption activities across the sectors (including cost-effectiveness?
3. How appropriate are the current mix of extension and adoption activities across the sectors?
4. What are the best management practices of extension and adoption activities across the sectors?
5. What lessons from other industries can improve the efficacy of fisheries related extension and adoption activities?
6. What improvements can be made to existing and new extension and adoption activities?
7. How can extension and adoption activities across the industry be more strategic in terms of delivering outputs and outcomes of research and development?

## *6.1 Range of existing extension and adoption activities*

To recap, the models of extension are:

I. Facilitation and group empowerment: fishers meet regularly to discuss and work on issues as they arise. These groups are on going and can exist for many years.

II. Technological development/problem solving: fishers in groups doing their own experimenting and research. Fishers commission others to help and the group disbands when the problem is solved or the technology is developed.

III. Training/Programmed Learning: direct contact with fishers through pre-programmed workshops, seminars or other structural engagement process.

IV. Remote access to information: fishers access their own information e.g. through brochures, fact sheets, guidelines, websites.

V. Mentoring: fishers using consultants on a 1:1 basis and establishing mentoring-type relationships between themselves and preferred service providers.

Overall, this research found that the models of engagement widely used across the fishing industry include technology development/problem solving, information access, and training. Mentoring and group empowerment are less often used. Training workshops and face-to-face extension are most commonly used in the aquaculture industry with media, television, and magazine articles being used more often in the larger commercial and recreational fishing industries, particularly at the national level.

The table below shows: Column 1: the sector and its location; column 2: the number of extension projects that were used for this review; column 3 – 7: the number of times each model was mentioned; column 8: the types of extension products that were developed.

**Table 6: Range of extension and adoption models used by the fishing industry**

| Sector and State | Group Empowerment | Technology | Information Access | Training | Mentoring | Types of Extension Methods and Related Products |
|---|---|---|---|---|---|---|
| **Aquaculture** | **1** | **3** | **1** | **1** | **1** | |
| National | | | | 1 | | Workshops and farm visits. |
| Queensland | 1 | 1 | | | 1 | On-farm trials, technology development with scientists, 1:1 extension; academic papers. |
| Tasmania | | 2 | 1 | | | Direct negotiation and relationships, maps, leaflets, media releases for *Fishing today.* |
| **Commercial** | **5** | **9** | **6** | **6** | **2** | |
| National | | 1 | | 1 | | Workshops and manuals. |
| New South Wales | 1 | 1 | 1 | | 1 | Videos and TV items, radio, interviews; legislation amendment. |
| Northern Territory | | | 1 | | 1 | Workshops and one-on-one. |
| Queensland | | 2 | 2 | 2 | | Workshops and one-on-on, some videos. |
| South Australia | | | 1 | 1 | | Workshops and manual. |
| Western Australia | 1 | 3 | | 1 | | |
| Victoria | 3 | 2 | 1 | 1 | | Workshops, EMS and codes of practice documentation, texting and monthly meetings. |
| **Recreational** | **5** | **5** | **12** | **5** | **3** | |
| National | 1 | 1 | 2 | 1 | 1 | TV, media, print media, magazines, DVD, brochures and handouts, workshops. |
| New South Wales | 1 | 1 | 1 | 1 | | Multilingual workshops held and information distributed, Angel Rings posted in public. |
| Queensland | | 1 | 1 | | | Email. |
| South Australia | | | 2 | | | TV, public meetings, surveys, newspapers, reports, pamphlets and online resources. |
| Tasmania | 1 | 1 | 4 | 2 | 2 | Printed documents, school visits, face-to-face. |
| Victoria | | 1 | 1 | | | Angler diary, online resources, media (magazines and TV). |
| Western Australia | 2 | | 1 | 1 | | |
| **Cross Sector** | **1** | **4** | **7** | **3** | **2** | |
| National | 1 | 1 | 3 | 1 | 1 | Facilitation, broadcast media, newsletter, leaflets, electronic media, workshops, 1:1 delivery, websites and posters. |
| Northern Territory | | | 1 | | | *Unknown.* |
| South Australia | | 1 | 1 | 1 | | *Unknown.* |
| Tasmania | | 2 | 2 | 1 | 1 | Direct involvement of fishers/farmers; public launch; documents; registration forms, workshops, State Govt *Recreational Sea Fishing Guide*, website, use of champions. |
| **Grand Total** | **12** | **22** | **26** | **16** | **8** | |

## *6.2 Effectiveness of extension and adoption activities*

The key evaluation question was: *How effective are the extension and adoption activities across the sectors?* To assess effectiveness, respondents to the survey were asked: *On a scale of low, medium and high: How effective do you think your extension project has been in achieving adoption across the intended audience?* Their assessment of how long it took for adoption to take place was also taken into account. A total of 32 out of 41 (78.04%) who answered this question stated that there was a high level of adoption. A further four stated that there was a medium level of effectiveness. In the opinion of the majority of respondents to the survey, extension projects across all sectors were effective. A total of 40 gave an answer for how long it took to achieve adoption and of those 31 (79.5%) stated that it occurred during the extension project and a further seven (17.9% stated that it was within 2 – 5 years). Therefore, 33 out of 35 (94.3%) of respondents stated that adoption from their activities took place at most with in five years. This is a very good result.

**Table 7: Level of effectiveness of extension projects for adoption**

| Sector | High | Medium | Unknown |
|---|---|---|---|
| **Commercial** | 14 (77.8%) | 0 | 2 |
| **Aquaculture** | 4 (66.7%) | 0 | 1 |
| **Recreational** | 13 (76.5%) | 4 | 0 |
| **All sectors** | 2 (40%) | 0 | 1 |

### 6.2.1 Cost effectiveness of extension and adoption activities

Another formalised measure of effectiveness is cost-effectiveness. This is generally accepted as a comparative quantitative measure that identifies the most efficient method for achieving a desired outcome. This research acknowledges the difficulty in undertaking genuine Benefit Cost Analysis (BCA), as this requires valuations of both the costs of the research, development, extension and adoption, and the benefits in terms of economic, social and environmental outcomes related to adoption. Some benefit to cost analysis has been undertaken for FRDC by Chudleigh and Simpson (2010), highlighting the return on investments of a range of selected research programs where data exist.

Through the literature review based interviews with fishers and some economists, it has been identified that a true cost-effectiveness assessment is difficult to make. Specifically:

- Cost effectiveness of extension and adoption is generally not assessed or measured consistently in quantitative or qualitative terms in the fishing sector, with a view to conducting BCA per project, program or other E&A activity.
- Insufficient data in this area has restricted BCA in this research, specifically regarding E&A.
- Generally there are not many monitoring and evaluation activities undertaken in the fishing sector, partly because good baseline data does not exist with which to make BCA type calculations and comparisons.
- Most BCA or cost-effective assessments use a range of assumptions of the level and timing of adoption to infer some value for benefits.
- The main data gaps are knowledge of the level of adoption and the timing of adoption both before and after E&A activities, and the associated economic impacts.

The existing information surrounding FRDC's return on investments is limited. This makes it difficult for this research to have any strong findings on the cost and effectiveness of the extension and adoption models. There is interview evidence, however, that where it is known, the level of adoption is high (82.1% of cases). Even so, there is a need for improved planning and collection of baseline data if BCA or other productivity analysis are desired by FRDC in future. This could be integrated with other

recommendations surrounding improved planning of extension and adoption activities in general. It is worth nothing that *factor productivity analyses* of agricultural industries does exist as conducted by Mullen et al and presented in Jennings (et al, eds 2011) that could be used as a guide to embarking on such research.

Of the interviews conducted, most projects were reported as being medium to highly cost-effective, with the common reasons being:

- significant in-kind and cash contributions from contributing project stakeholders,
- significant industry productivity gains resulting from the project investment,
- relatively low actual project funding levels with strong participation achieved, and
- major cost savings resulting from the project delivery.

## *6.3 Appropriateness of extension and adoption*

To assess the appropriateness of the current mix of extension and adoption activities across the sectors, responses to a number of questions were used. These questions asked about the level of disaggregation in the industry and what types of extension models or tools were applied. One would expect that if a particular extension project was aimed at a part of the industry that was highly disaggregated, a broad scale type of model would be used such as the information access model and the opposite is also true. The table below shows that this is largely the case, the more dispersed the fishers, the broader the model of extension.

There are some exceptions. The table below shows that in a cross sector project and in three projects from the recreational industry, the group empowerment and facilitation model was used. This model is usually used for fishers who live in close proximity to each other.

On the whole, the models were used according to their capabilities and there was a mix. For example, for nine projects in the commercial industry where there was a low disaggregation of fishers, the group empowerment was model was used (as one would expect) but this was also supplemented with a more broad scale method of information provision through newsletter, brochures and the electronic media.

**Table 8: Level of disaggregation and the types of extension models used**

| Sector and Level of Disaggregation | Group Empowerment | Technology | Information Access | Training | Mentoring |
|---|---|---|---|---|---|
| **Aquaculture** | **1** | **3** | **1** | **1** | **1** |
| Low | | 2 | 1 | 1 | |
| Medium | 1 | 1 | | | 1 |
| **Commercial** | **5** | **9** | **6** | **6** | **2** |
| Low | 5 | 8 | 4 | 5 | 1 |
| Medium | | 1 | 2 | 1 | 1 |
| **Cross Sector** | **1** | **4** | **7** | **3** | **2** |
| High | 1 | 2 | 5 | 1 | 2 |
| Low | | 2 | 2 | 2 | |
| **Recreational** | **5** | **5** | **11** | **5** | **3** |
| High | 5 | 5 | 11 | 5 | 2 |
| Medium | | | | | 1 |
| **Grand Total** | **1** | **21** | **25** | **15** | **8** |

## *6.4 Best management extension practices*

A preface to this section is that what constitutes *best management* extension and adoption practices can only be defined within the context in which they occur. That is, no single practice can be deemed universally *the best*, especially over time where methods and circumstances are constantly evolving. For example, what was considered best practice extension practice in the 1960s is quite different to what is considered best practice now, and since that time the definition of extension itself has also changed significantly.

### 6.4.1 Choosing the right extension tool for the job

One of the most critical aspects of conducting good extension is *choosing the right model and related tools for the job*. This step requires several considerations such as:

- knowledge of the range of extension models available,
- knowledge of how to implement the extension models,
- knowledge of the target audience remembering there may be more than one,
- knowledge of the context within which the extension models and the target audience will be brought together, and
- knowledge of the desired impact, results, and outcomes (target).

### 6.4.2 Extension exists throughout the RDEA process

Perhaps not surprisingly the best practice case studies presented in this review all have a stronger than usual emphasis on the extension component in the RDEA process. Importantly, the extension

component is clearly recognised as critical both at the start of, and throughout RDEA activities. This point is also supported by the data from interviews where 80% of respondents stated adoption takes place during extension. This implies that extension was already occurring in the research phase (or earlier) or that the phases of RDEA were blended. The best practice case studies show that extension is explicitly present both:

- at the earliest possible stage of the RDEA process, as well as
- throughout the delivery of the RDEA process.

This explicit acknowledgement of the role of extension creates a continuous link between research, development and adoption and hence desired outcomes. Individuals who were interviewed for the best practice case studies believed their project stages of research and development were conducted with extension in mind or, in other words, were intentionally aligned with the need to extend the products of research and development.

### 6.4.3 Managing and maintaining multi-stakeholder relationships

Best practice extension was found to be about successfully managing multi-stakeholder relationships, and the case studies generally highlighted this as a feature of their project delivery. Most case studies recognised the need to create positive group dynamics and an atmosphere founded on genuine inclusion of stakeholders, regardless of their status, authority or power within the group. Several case studies pointed out the strong engagement experienced by people often not even recognised as being part of the project such as crewmembers on boats, or fish packing-line workers.

This sentiment of inclusion is a key underlying extension principle that is critical to participants gaining ownership of RDEA processes, particularly for the target audience who are (usually the only ones) expected to change their behaviour. Traditionally, extension has been conducted as an add-on to research and development, but data from some case studies indicate that extension is done well when all stakeholders, including the target audience, feel like they are a part of the process. There are two extension models that expect this level of inclusion: the Group Empowerment and Facilitation model and the Technology Development/Problem Solving model.

### 6.4.4 Achieving stakeholder ownership and responsibility for RDEA processes

The first step in becoming part of an RDEA process is raising the awareness of stakeholders, and particularly that of the target audience. As described in one case study (number 4), an inclusive process initiates awareness and then supports the evolution of increased stakeholder knowledge, ownership, responsibility, commitment, and ultimately trust to achieve adoption. All these factors contribute to enabling change.

It is worth nothing that the individuals interviewed for the best practice case studies all reported high levels of ownership and hence responsibility by the participants for the project. The value of this achievement bears further reflection: particularly that people who take responsibility for a project process, including end-users, often do so regardless of whether the project is a success or failure. That is, a sense of ownership generally leads people to take responsibility for positive and negative outcomes, which is important given the challenging nature of scientific research, development and the competitive commercial realities of most industry sectors.

Having project participants, and especially target audience members engaged to the point of feeling a sense of ownership and responsibility in any project, even if it is deemed a failure is important because it lets people know that earnest efforts have been made – often on their behalf – and that they themselves may have had a role in this failure and they can (perhaps) more readily accept this outcome, preferably with a view to doing better in future. One alternative to not having participants

engaged to the extent that they take ownership and responsibility for a project is that their lack of engagement from the project gives them opportunity to criticise from a distance, and perhaps discount the full value of resources and efforts contributed. The key message is that early and active engagement of project participants, particularly the target audience is critical – regardless of whether the messages delivered, or the outcomes achieved, are positive or negative.

With regard to the best practice case studies by sector, the recreational sector has delivered projects that:

- Engage target audiences early in the RDEA process and focus on establishing a good knowledge profile of the audience(s) so that messages can be tailored to large, diverse and disaggregated audiences.
- Create and utilise an informal network of service providers to convey messages.
- Regionalise projects/content where possible, which is highly relevant for large scale and national communication projects.

In the commercial sector, which typically is less disaggregated than the recreational sector, best practice extension is demonstrated by the project team where research processes are integrated with each other, that is, R&D occurs with clear links to the target audience. This approach has been proven to produce highly relevant project outputs for adoption by both primary and secondary target audiences.

Best practice extension within the aquaculture sector is typically conducted in a *closed-loop* scenario in the sense that the end-users are often the instigators of research and development projects. Although this process works well by the very nature of close proximity between research stakeholders and target audiences, the value of these projects is enhanced when extension is explicit and acknowledged throughout the process and ownership and responsibility for the project process are clear traits of those involved (regardless of their status or role).

## *6.5 Lessons from other industries*

The Australian dairy industry was used as the domestic non-fishing case study for this review. The extension approach of *regionalisation* (see case study 9) appears to be a concept that could be applied to great effect in the fishing industry, across all sectors although it lends itself more to recreational and commercial fishing.

In addition to the use of regionalisation as a strategy to mobilise resources, enable change and better deliver project outputs and outcomes, the dairy industry example shows that strong regional networks are needed in order to apply the practice of regionalisation. It should be noted that the SeaNet network (OceanWatch Australia) has many similarities with the dairy industry's natural resource management (NRM) Coordinator network, although a notable difference might be that the dairy coordinators are better placed to service the entire dairy industry, while the SeaNet field officer network currently does not have the capacity to service the entire Australian fishing industry and they are essentially NRM focussed. This difference is explained to some extent by the higher level of diversity and disaggregation of the fishing industry in comparison to dairy, but it is also the characteristic that most justifies the promotion of regionalisation.

Better coordination of the relationships that support national, state, regional and local networks is of value, particularly if the coordination is applied to essentially ensure that the prevailing communication structures are being used efficiently and effectively (or even at all in extreme cases). Notably, the Dairy-NRM Coordinator role does not deliver any RDEA project work as such (like providing technical agronomic advice) but rather the role is simply to coordinate activities, which could be described metaphorically as being *the oil on the institutional relationship cogs of industry*.

This approach complements a notable comment made in one fishing case study that: *Fisheries management is about managing people - not fish!* Another way of looking at this matter is that industry coordination roles enable the supply of and demand for RDEA activities to be better matched (optimised).

## *6.6 Improvements to existing and new extension and adoption activities*

### 6.6.1 Extension must be explicit and up-front

One key way to improve existing and future extension and adoption activities is to promote the use and awareness of the characteristics described as best practice (section 5). The celebration of these case studies is one way in which greater awareness of, and respect for the methods used can be achieved. Particular focus could be brought on a strong and continuous presence of extension throughout the RDEA process that characterised most of the best practice case studies.

Better recognition by industry that extension can and does exist throughout the standard RDEA process, noting it is invariably explicit in best practice extension, may lead to a greater appreciation and respect for extension as a means for delivering project outputs and outcomes, as well as setting an increasingly relevant R&D agenda over time because all stakeholders are better connected.

### 6.6.2 Education, training and professional development in extension

A further approach to improve extension activities and resulting adoption is to consider training opportunities for fishery stakeholders. Given that an earlier point (section 6.4) recognised that people must know what extension models are available, as well as how to use them before they can effectively apply them, it would seem reasonable to suggest that greater education of the depth and breadth of extension may be useful to better equip fisheries stakeholders in future.

**Professional development and networking**

Hosting industry led forums that facilitate discussion amongst extension practitioners is another way in which extension practices can be explored, particularly where these opportunities are not commonly available. Participating in non-fishing industry extension forums, such as professional conferences, workshops etc, is likely to benefit stakeholders of the fishing industry. Organisations that offer these services include APEN, which has a standing international, national and regional conference delivery agenda (including the APEN National Forum in November 2011), and the newly merged (and yet to be re-named) organisations of the *Australian Institute of Agricultural Science and Technology* and *Australian Association of Agricultural Consultants*, and to a lesser extent the Kondinin Group (although their grower group focus is relevant to fishing industry activities).

It is also noted that many extension practitioners in the fishing industry may not recognise themselves as such, or see value in being identified as such, until they have personally experienced greater exposure to dedicated professional development extension activities.

## *6.7 Making industry extension and adoption activities more strategic*

### 6.7.1 Regionalising funding programs

One way in which E&A activities can be more strategic might be to regionalise and even localise the industry's funding process, such that the national rules and guidelines still apply, but create a structure that enables the current funding mechanism to be better conveyed to target audiences and key stakeholders. This could take the form of workshops *in situ* like that conducted in Virginia (USA), although a more comprehensive and lasting approach might be to establish a coordinated regional

network of communication structures that is linked directly to national structures or via state level structures (as is the case for the dairy industry in Australia) discussed in detail the next section.

### 6.7.2 Coordinated communication hubs for the Australian fishing industry

Given the large and diverse nature of the entire Australian fishing industry, it is beyond the scope of this review to make overly specific recommendations of potential changes to the existing system of communications and prevailing institutional arrangements. Nevertheless, inferences can be made that enable the industry to consider possible strategic investments for improving future extension and adoption activities, including structural industry arrangements.

One such suggestion regards the implementation of better-coordinated and integrated communication hubs. FRDC should consider developing an industry network that exists between the national and local levels that is a hybrid of the roles of the state-based Fisheries Research and Advisory Boards (FRAB) and the SeaNet network of field officers. The merits of this amalgamation of functions appear to be that:

- SeaNet provides proof that a coordinated network structure can and does work within the Australian fishing industry context. SeaNet's success stems from the critical linkages it perpetually and professionally manages between industry stakeholders at the regional level horizontally across multiple stakeholders, and from its good two-way vertical communication pathway that promotes local level engagement, right down to individual fishers working on their boats (or aquaculture farms). The limitations of the current SeaNet service is that it does not have the capacity, nor the focus beyond NRM to adequately service (coordinate) the entire Australian fishing industry. Further more, Seanet is owned by OceanWatch, meaning that when valuable local industry knowledge is taken higher to a state or national level, it is primarily dealt with *in-house* by OceanWatch and not the fishing industry *per se*.

- The state-based FRAB organisations appear to have a broader (beyond NRM) and state-focused view of the fishing industry than SeaNet but appear less capable, or responsible for delivering the valuable integration and coordination provided by SeaNet, particularly at the regional and local levels. In essence, the FRAB network could become more interactive industry bodies (than they presently are) that better link state-level knowledge to the national industry and its relevant structures.

Combining these two (FRABs and SeaNet) existing industry functions (not organisations) could potentially create an enhanced network of industry-owned coordinators who reside at the state and regional levels and are simultaneously integrated with the local and national levels of industry. These connections to local and national levels of industry would create a direct and efficient communication pathway for connecting national fishing industry boardrooms to fishers on their boats (and vice-versa).

### 6.7.3 Future role of electronic technology

It is feasible that social networking forums, and other more common electronic media, would be highly valuable tools for augmenting the presence, effectiveness (including cost) and efficiency of the proposed coordinated communication hubs. That is, social networking systems as they currently exist (facebook, bebo etc) appear to lend themselves to use by the Australian fishing industry (and extension services in general). For example, each coordinated communication hub could have its own facebook page that identifies all formal activities, as well as host less formal interactions such as issues discussion and industry chat forums. In addition, key staff and projects could be assigned their own facebook pages which create a network of linked industry entities that are part of the communication

hubs and have the potential to grow across the diverse range of fishing industry groups and stakeholders.

The development of social networking is not suggested as a replacement of the core functions of the proposed communication hubs, but rather a powerful way to compliment their activities, including the allocation of funding from FRDC. Increased uptake of this technology (electronic) is recognised as being dependant on the target audiences adoption levels, but it seems reasonable to suggest that current and future trends are for this domain to expand, especially in the recreational sector.

Short-term interactive electronic options for FRDC to consider trialling include:

- industry-wide or sector-wide webinars (similar to what Dairy Australia has hosted)
- posting Annual Report or similar content as a fisher-friendly video on YouTube; and
- using smartphone applications for industry connectivity and even specific project delivery (Dairy Australia is trialling this).

### 6.7.4 Implementation issues regarding coordinated communication hubs

The extent to which the dairy coordinator example is considered by the fishing industry requires further research into existing institutional, organisational and communications structures. One method for assessing the viability of this approach might be to classify the fishing industry by differing criteria, such as by species, by method of catch, by geographic location, or a logical combination of these. To develop the thinking on this suggestion, Appendix 4 (section 8.4) provides an industry organisation chart by method of catch.

In order for the fishing industry to consider establishing coordinated industry hubs at any level (including regional and/or state), it must clearly identify the desired outcome and people to be involved. The concept of a vertical, two-way communications channel that feeds from boat to national boardroom and back again, and includes the capacity to engage multiple stakeholders is paramount the success of this approach.

Any industry re-structuring (obviously) needs to be considered in light of how existing structures can be enhanced rather than duplicated or marginalised. In addition, it is valuable to use the remote access model and several methods of communication to support the coordinated hubs, such as an online presence, social media, and more traditional communications such as post, print and electronic media to enhance the physical office resources and staffing.

A further point to consider is maintaining a division between industry lobbying and the delivery of RDEA activities. In essence, the two should be kept separate in order to enable the RDEA focussed organisations to legitimately apply for various funding opportunities and leverage related resources.

Currently, FRDC appears to be enabling the delivery of extension and adoption activities, but this could be substantially improved if it could strategically enable change that better connects boats with boardrooms.

End report.

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# 8 Appendices

## *8.1 Appendix 1: Adult learning principles*

**Fell's summary of Adult Learning Principles**

- Build on local experience, use the knowledge within the group or individuals.
- Make the learning environment comfortable and encouraging.
- Ensure that the learning activity meets the needs and relates to the problems of the client group.
- Involve the audience in planning their own learning experience.
- Have activities that involve people, are stimulating and encourage participation.
- Allow time for people to reflect on what they are learning- take difficult subjects slowly - be open to questioning.
- Build group and individual confidence by letting them know they are right. Building a confidence that they are making progress towards their learning goals.

Fell, R. 1997, 'Action Learning and the Application of Adult Learning Principles Give Meaning to Accredited Training for Extensionists', *Managing change - building knowledge and skills, conference proceedings, 2nd Australasian Extension Conference,* Albury, November 1997.

**Malouf's summary of Adult Learning Principles**

- learners must feel the need to learn
- the learning environment must be mentally and socially safe
- learners must set their own learning goals
- learners must participate actively in the learning process
- learning must build on, and use, the learner's experience
- learners must see that their learning has been successful
- learning must involve effective two way communication

Malouf, D. 1993, *How to teach adults in a fun and exciting way,* Business & Professional Publishing, Sydney.

**Burn's summary of Adult learning Principles**

Burns, Robert (1995) offer the following:

- mutuality of responsibility in defining goals, planning and conducting activities that are based on the real needs of the participants
- participation in decision-making
- self-direction
- teacher's role as resource and facilitator
- use of learners' experiences as a basis for learning
- an open, democratic environment
- a concern for the worth of the individual and their self-concept

Burns, Robert 1995, *The Adult Learner at Work,* Business and Professional Publishing, Chatswood, New South Wales p253.

## *8.2 Appendix 2: Questionnaire - Key Stakeholders*

# Understanding Extension and Adoption in the Fisheries Sector

***FRDC, Roberts Evaluation and Rufus Jennings***

## Key Stakeholder Survey

**Preamble**

*Rufus Jennings and Roberts Evaluation / Roberts Evaluation and Rufus Jennings* (introduce yourself first) *have been commissioned by the Fisheries Research and Development Corporation to research extension and adoption activities in the Fisheries Sector. This research will provide a background on extension and adoption approaches that are being used and are expected to inform future planning and investment of extension and adoption.*

*As part of this research we are documenting existing extension and adoption practices. We have been provided with your contact details by* _____ (if nobody, then the National Fisheries and Aquaculture Extension and Adoption Network).

*This interview is expected to take up to 30 minutes. All your responses will remain completely confidential.*

*Are you happy to proceed? (Y/N)*

If No*, is there a preferred time that we can contact you? (Y/N)*

*We define extension as a process of enabling change in individuals, communities and industries involved in the primary industry sectors and with natural resource management. Extension models fall within five categories: facilitation and group empowerment (e.g. learning groups); technological development; training programs (e.g. workshops); information and access (e.g. advertising, media campaigns and seminars); and mentoring (e.g. consultants).*

**Introductory Question**

1. What is your role in terms of research, development and extension activities?

**Extension and Adoption Activities**

*I would like to now turn your attention specifically to extension activities. That is, projects that focuses on achieving the adoption of industry research and development. Extension could form part of a research and development project, or be a specific extension based project.*

2. Can you list what extension projects you are familiar with in the fisheries and aquaculture sectors? [*snowball activities*]
    a. For those projects, would you consider yourself a lead contact? (Q6-19)
    b. For those projects you are not a lead, can you provide contacts?

3. Do you believe that extension in this sector is generally well implemented? Explain

4. Are there any best practice examples of extension projects that you think others could learn from? What did you learn. Provide details and contacts.

5. Are there any significant failures as examples of extension projects that you think others could learn from? What did you learn. Provide details and contacts.

**For projects where the respondent is a lead contact:**
*The following questions are intended as a prompt for the responses we are looking for. Suggest using lines of inquiry in an informal method.*

6. What was the aim and objective of your extension project? Provide documentation.

7. What sector / fishery type is your extension project targeting?
   I. Aquaculture
      i. Fish type: _____
      ii. Locations: _____
   II. Commercial
      i. Fishery: _____
      ii. Method of Catch: _____
      iii. Fish type(s): _____
      iv. Locations: _____
   III. Recreational
      i. Fishery: _____
      ii. Fish type(s): _____
      iii. Locations: _____
      iv. Recreational Fisher: _____
   IV. Other, please specify: _____

8. Which organisations commissioned the initial research that your extension project is promoting?

9. Which organisations are responsible for delivering your extension project?

10. Are there any other stakeholders involved in the delivery of the extension activities?

11. Who are the primary targets of your extension project?
    *Prompt: For example types of fishers, fisheries, etc*

12. Who are the secondary targets of the extension project?
    *Prompt: For example government, industry groups, other fisheries, general public, etc.*

13. Do you believe the targets of your extension project are characterised by a high, medium or low level of disaggregation?
    *Prompt: this can be geographical, fish management practices, target species, equipment, etc*
    I. High
    II. Medium
    III. Low
    IV. Unknown / no answer

*We would now like to turn your attention from the stakeholders involved in the research, development and extension towards the extension activities.*

14. What types of extension approaches/models were used your?
    VI. Facilitation and group empowerment (fishers in on-going learning groups)
    VII. Technological development (fishers doing their own experimenting/research and passing on the knowledge)
    VIII. Training (e.g. direct contact with fishers through workshops, seminars)
    IX. Information and remote access (e.g. media campaigns, advertising blitzes, brochures, fact sheets, guidelines and protocols)
    X. Mentoring (e.g. mentoring, using consultants)
    XI. Other, please specify:_____

15. On a scale of low, medium and high: How effective do you think your extension project has been in achieving adoption across the intended audience?
    I. High
    II. Medium
    III. Low
    IV. Unknown / no answer

16. How quickly did the adoption occur as a result of your extension project?
    I. Before the extension project
    II. During the extension project
    III. Within 2-5 years of extension
    IV. After
    V. Unknown / no answer

17. On a scale of low, medium and high: How cost effective do you believe your extension project was?
    *Prompt: Cost effective is a measure of achieving outcomes relative to the cost of the program*
    I. High
    II. Medium
    III. Low
    IV. Unknown / no answer

18. Are you aware of any performance measures that were used as part of your extension project to measure its success? Explain.
    *Prompt: Examples include understanding practices, changes to levels of awareness or attitude, budget, attendance numbers, etc.*

19. Overall, do you consider your extension project was successful? Explain.
    a. Do you think the industry at large would agree with you? Why or why not?
    b. Have there been any unintended consequences? Explain.

20. Are there any key documents that can assist with our research?

21. Do you have any other comments about extension?

**Thank you very much for your time. If you have any questions, please do not hesitate to contact:**

**Peter Horvat (FRDC, M: 0415 933 557),**
**Jess Jennings (Rufus, M: 0423 224 750) or**
**Byron Pakula (Roberts Evaluation, M: 0431 389 295).**

## *8.3 Appendix 3: Questionnaire – Case Studies*

# Understanding Extension and Adoption in the Fisheries Sector

***FRDC, Roberts Evaluation and Rufus Jennings***

## Survey Questionnaire:
## Best Practice E&A Case Studies

**Basic format consists of:**

1. **Context & Situation - problem addressed / program logic**
2. **Response – extension methods & actions**
3. **Outputs & Outcomes – impacts-adoption / learnings-reflections / value created**

**Preamble**

*Rufus Jennings and Roberts Evaluation / Roberts Evaluation and Rufus Jennings* (introduce yourself first) *have been commissioned by the Fisheries Research and Development Corporation to research extension and adoption activities in the Fisheries Sector. This research will provide a background on extension and adoption approaches that are being used and are expected to inform future planning and investment of extension and adoption.*

*As part of this research we are building case studies of what could be best practice extension within the fishing industry. This includes current or recent extension practices.*

***Setting the scene:*** *We define extension as a process of enabling change in individuals, communities and industries involved in the primary industry sectors and with natural resource management.*

*Extension models fall within five categories:*

*i. facilitation and group empowerment (e.g. learning groups);*
*ii. technological development/problem solving;*
*iii. training programs (e.g. workshops);*
*iv. information and access (e.g. advertising, media campaigns and seminars); and*
*v. mentoring (e.g. consultants).*

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**Context & Situation - problem addressed / program logic**

**Optional Introductory Question** (Ask Q1 and Q2 only if needed, otherwise go straight to Q3)

22. Can you name a few (1-4) past or current E&A projects / activities / programs that you think have worked well, in the fishing industry?

    i. _____
    ii. _____
    iii. _____
    iv. _____

**23.** What is the E&A activity you would like to discuss further?

**a.** What is the official title of the activity, and any informal names if any?

**b.** What form does it take (eg small-medium-large project, or industry-wide program, or voluntary trend etc or other)?

**c.** What are the formal defining characteristics of the activity?
(Answers expected to be similar across interviewees of a particular A&E activity)

**i.** Sector:
**ii.** Species:
**iii.** Type of target audience/s of E&A message/s:
**iv.** Size of target audience:
v. Method of catch by target audience/s:
**vi.** Geographic location/s of target audience/s:
**vii.** Defining characteristics of target audience/s, if any:
**viii.** Time period of A&E activity delivery:
ix. Who funded the E&A activity:
x. What was the overall budget of the E&A activity:
xi. Who delivered the E&A activity:
xii. Who are all the key stakeholders related to the E&A activity:

**Response – extension methods & actions**
*I would like to now turn your attention specifically to the extension activities. That is, the way in which industry knowledge has been effectively communicated to fishers (of any kind), or in other words, how does the key message/s being conveyed get through to the target audience/s and ultimately change their behaviour?*

*To help explore this topic, the following questions are prompts where appropriate:*

24. What was the aim of the E&A activity? (is it documented?)

25. In your own words, please describe how the extension activity was carried out, for example did it have elements of:

*i. facilitation and group empowerment (e.g. learning groups), fishers forming on going learning groups;*
*ii. Fishers getting together to develop some new technological or solve a problem;*
*iii. training programs (e.g. workshops);*
*iv. information distributed via some non face to face means such as. advertising, media campaigns and websites);*
*v. Fishers being mentored by other fishers, Fishers mentoring others or fishers using consultants (e.g. consultants); and*
*Other, please specify.*

26. At what stage (or stages) of the project was the extension delivered?

27. What were the critical success factors of this extension approach?

28. Why were the E&A activities effective?

29. What were the short-comings of the extension approach, if any?

30. Could the E&A activities (being discussed) be applied in other areas/sectors of the fishing industry (specify where, and why appropriate)? Explain.

**Outputs & Outcomes – impacts-adoption / learnings-reflections / value created**

31. How effective do you think your extension project has been in achieving adoption across the intended audience? Explain.

32. How quickly did the adoption occur as a result of your extension project? Explain.

33. How cost effective do you believe your extension project was? Explain.

34. Are you aware of any performance measures that were used as part of your extension project to measure its success? Explain.

    *Prompt: Examples include understanding practices, changes to levels of awareness or attitude, budget, attendance numbers, etc.*

35. Overall, why do you consider your extension project was successful? Explain.
    c. Do you think the industry at large would agree with you? Why or why not?
    d. Have there been any unintended consequences? Explain.

36. Are there any key documents that can assist with our research?

37. Do you have any other comments about extension?

**Thank you very much for your time. If you have any questions, please do not hesitate to contact:**

**Jess Jennings (Rufus, M: 0423 224 750) or**
**Byron Pakula (Roberts Evaluation, M: 0431 389 295) or**
**Peter Horvat (FRDC, W: 02 6285 0400).**

## *8.4 Appendix 4: Fishing Industry Organisational Chart by Method*

This chart is available as an excel file, included with this Final Report to FRDC.

| Souce: ABARES (2010) Australian Fisheries Statistics 2009, ABARES-FRDC, August, 2010, Canberra. | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NATIONAL | FISHING RESEARCH & DEVELOPMENT CORPORATION | | | | | | | | | | | | | | | | | | | | | | |
| SECTOR & SIZE | AQUACULTURE SECTOR: 1,500 businesses? / 2,673 + W? licenses | | | | | | | | | | | | | | | | COMMERCIAL SECTOR: 17,000 businesses / 10,122 licenses | | | RECREATIONAL SECTOR: 3.3m fishers | | |
| METHODS | Rack - Sticks / Longlines / Contained Longlines | | | | Pond / Dam / Recirculation / Flow / Cage / Tank / Benthic | | | | | | | | Seacage | | | | Dive / Hand | Trap / Pots | Trawl /Line / Net / Jig / Dredge | Tackle & Bait Sales / Recreational Boating Sales | | Charter Fishing |
| | | | | | | | | | | | | | | | | | (inc free dive, handharvest, handline) | (inc lobster, crab, fish) | | $665m turnover/yr | $300m turnover/yr | $16m/yr in Q |
| FISHERY TYPE by SPECIES | PEARLS / MUSSELS / OYSTERS / SCALLOP | | | | SALMONIDS / FRESH WATER SPECIES / BARRAMUNDI / ABALONE / YABBIES / PRAWNS / MARRON / ORNAMENTAL / OTHER | | | | | | | | ATLANTIC SALMON / RAINBOW TROUT / TUNA / KINGFISH | | | | ABALONE, Misc. | LOBSTER / CRAB | PRAWN / many mixed fish | Rod-line fish, salt & fresh, spear, hand harvest | | |
| (included species) | (inc Pacifics) | | | | | | | | | | | | (inc Sth Bluefin, Yellowtail) | | | | | | (inc Banana, tiger, endeavour, king & many mixed fish | | | |
| | | | | | | | | | | | | | | | | | Combined key species: PRAWN / SEA MULLET / RL / ABALONE / C.TROUT / CRAB / SNAPPER / BARRA / MACKERAL / TUNA / SHARK | | | | | |
| LICENSES by ALL METHOD - TOTAL | 1,001 + ? | | | | 1,547 + ? | | | | | | | | 133 | | | | 10,122 | | | 3.36m fishers / yr & $1.85bn spent /yr | | |
| NB: "?" denotes figure not available for WA | | | | | | | | | | | | | | | | | | | | | | |
| LICENCES by SPECIES - TOTAL (Australia) | 8 + ? | 67 + ? | 910 | 16 | 25 | 742 | 346 | 61 | 191 + ? | 90 | 34 + ? | 8 | 50 | 42 | 15 | 38 | 38 | 1,618 | 2,660 (inc boats) | 5,844 (inc boats) | Varying licensing regulations by state | | |
| NB: "?" denotes figure not available for WA | | | | | | | | | | | | | | | | | | | | | | |
| LICENSES - STATE PRESENCE | nt W | V W T | N Q S T | S | V | N S V Q | N Q S nt | V S T | N V W S | N Q nt | S W | V | V nt | T | T | S | S | N V Q W S T nt | N V Q W S T nt | © N V Q W S | © N V Q S W T nt | | |
| LICENCES - TOTAL per STATE | 8nt W? | 44V W? 23T | 333N 112Q 348S 117T | 6S 10T | 25V | | | 9V 38S 14T | | 12N 73Q 5nt | W? 34S | 8V | 41V 9nt | 42 T | 15T | 38S | 38S | | | 1,365D + 1,498N 528V 1,570Q 139W 441S 415T 189nt | Expenditure/yr: $554N 396V 320Q | | |
| NB: "?" denotes figure not available for WA | | | | | | | | | | | | | | | | | | | | | | |
| REGISTERED FISHERIES (name) | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | see Commonwealth Fisheries for names, state names mostly generic | | | na | na | na |
| BUSINESSES (Main Operators) | | | | | | | | | | | | | | | | | | | | | | |
| Extension Types Used (SC, 2011): | | | | | | | | | | | | | | | | | | | | | | |
| - Group Empowerment & Facilitation | | | | | | | | | | | | | | | | | | | | | | |
| - Training Model | | | | | | | | | | | | | | | | | | | | | | |
| - Technological Development Model | | | | | | | | | | | | | | | | | | | | | | |
| - Information Access Model | | | | | | | | | | | | | | | | | | | | | | |
| - Consultant / Mentor Model | | | | | | | | | | | | | | | | | | | | | | |
| Key Organisations / Stakeholders | | | | | | | | | | | | | | | | | | | | | | |
| Key Extension Delivery Agents | | | | | | | | | | | | | | | | | | | | | | |
| Key External Stakeholders | | | | | | | | | | | | | | | | | | | | | | |
| Other? | | | | | | | | | | | | | | | | | | | | | | |