Australian Prawn Farming Manual

HEALTH MANAGEMENT FOR PROFIT

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Acknowledgments

This publication is the product of considerable effort by a diverse range of people with extensive experience in both the Australian and international shrimp farming industry. The content of the *Australian Prawn Farming Manual* is drawn from their knowledge as prawn farmers, research scientists, consultants, government extension providers or trainers who assist in the development of the prawn farming sector. Contributors were invited to provide written sections on their specialised area of expertise, and the draft document was collated and edited according to a plan formulated by the Prawn Manual Steering Committee.

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Roger Chong graduated in Veterinary Science from the University of Sydney in 1987. He has worked in companion animal practice for many years in Wollongong and Sydney and was Fish Health Officer with the Hong Kong Agriculture, Fisheries & Conservation Department from 1999 - 2003. Roger is currently employed by the Queensland Department of Primary Industries and Fisheries as Veterinary Officer (Fish Health) at the Animal Research Institute

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Alistair Dick has spent most of his working life with Seafarm Pty Ltd, Australia's largest prawn farming company based in North Queensland. He started out as a Pond Technician and now manages Seafarm's Mossman 25 hectare prawn farm facility. Alistair has managed environmental monitoring & management for the company's operations and investigated new technologies such as zero water exchange and intensive growout methods for banana prawns. He has a Bachelor of Applied Science and a Diploma of Aquatic Resource Management, and completed disease pathology and diagnostics courses at the University of Arizona. Alistair is also a member of the Australian Prawn Farmers Association R&D Committee.

Derek Foster is an extension specialist and was the international coordinator of extension for the "Shrimp Health Project". He has extensive world wide experience in extension processes as a program designer, reviewer, lecturer and project coordinator with all levels of Government in Australia and National governments throughout the Asia/Pacific region. He has taught at the University of Queensland since 1995 specialising in extension studies. His work has covered agibusiness, indigenous and Natural Resource Management genres and he has specialised in fisheries extension work.

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Jeff Harrison is General Manager of Australian Prawn Farms based south of Mackay, where they operate a 33 hectare prawn farm and a large hatchery that supplies to the industry around Australia. Jeff has been a prawn farmer for more than 15 years with a reputation for high quality product and consistent production.

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Matt Kenway is Manager of the AIMS Tropical Aquaculture Facilities near Townsville and plays a key role in the planning and development of the Black Tiger Prawn aquaculture genetics and Domestication project. Matt graduated from James Cook University in 1980 with a Bachelor of Science (Hons) in Marine Biology/Zoology. Prior to working at AIMS, Matt designed and managed two commercial penaeid prawn hatcheries and was responsible for the technical management of a commercial prawn grow-out farm. In 1994 he was awarded a Winston Churchill Fellowship to investigate techniques used in South East Asia to minimise the impact of prawn aquaculture effluents on coastal environments.

Warren Lewis of Aqua-Marine Marketing has 30 years of experience in the food service and fishing industry and with the Australian aquaculture industry. He had an early involvement in the early development of the barramundi, Atlantic salmon and prawns farming sectors, covering all areas of marketing, sales, harvesting and production. He continues to work towards improving the quality of Australian aquaculture products to compete in the market place with increasing quantities of cheap imported seafood.

Ross Lobegeiger joined DPI&F in 1970 as an Agricultural Economist. He graduated from the University of Queensland with a Bachelor of Agricultural Science as well as a Diploma in Agriculture (Honours) from Gatton College. He has had various roles in DPI&F including Agricultural Economist (12 years) and Regional Extension Leader (8 years) in the Rockhampton Region. Ross transferred to the newly established Bribie Island Aquaculture Research Centre in 1991 as DPI Supervising Extension Officer for the Queensland Marine Farming Prawn Industry and is now the Senior Aquaculture Extension Officer, involved in all aspects of DPI&Fs role in aquaculture industry development and extension.

David McNamara is General Manager of Ponderosa Prawn Farm near Cairns, operating a 20 hectare prawn farm and hatchery. Dave has been involved in the aquaculture industry for more than 15 years and has developed innovative hatchery systems in partnership with various prawn farming companies.

Associate Professor Owens is the current head of the Discipline of Microbiology and Immunology, School of Veterinary and Biomedical Sciences at James Cook University. He graduated (BSc Hons) from University of Queensland and James Cook University (PhD). He undertook several postdoctoral positions on aquaculture disease at JCU before joining the academic staff. His current interests are the infectious diseases of aquatic animals and the use of bacteriophages for controlling animal and human diseases.

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Doug Pearson began working in the Australian prawn farming industry not long after its conception in Australia. He managed commercial farms for 15 years, experiencing the production of five different prawn species. He has travelled extensively overseas investigating shrimp farming methods, is a co-author of a number of R&D and industry publications, and a member of the APFA R&D committee. Doug is currently Manager of Proaqua Pty Ltd, the agent for CP Aquafeeds in Australia and supplier of aeration equipment, consulting and hatchery equipment.

Ben Pohlner, B. App. Sc - Fisheries and Aquaculture, originally started in the Aquaculture industry working for Gold Coast Marine Aquaculture and Rocky Point Prawn Farm. He then started an aquaculture and environmental consultancy firm in 1999 (BTEQ Pty Ltd) and has undertaken work for over 40 aquaculture clients in Australia, plus a growing number from around the world. BTEQ also have a base in Florida (USA) where they are operating a barramundi farm and developing markets for Australian product

Phil Read is an Aquaculture Extension Officer with NSW DPI in Grafton. He has a Bachelor of Science in Biology/Ecology and a Diploma in Aquaculture, and has been involved in aquaculture for the past ten years providing extension support for all land-based aquaculture. Phil has designed and managed experiments based on recirculating technology, helped survey the NSW coastline for marine aquaculture sites and is senior author of a disease diagnostic manual for silver perch. Previously, Phil managed the first NSW commercial marine fish hatchery where he oversaw the hatchery refurbishment and production of snapper and Sydney rock oysters.

Chris Robertson has been the Senior Aquaculture Development Officer with DPI&F in Cairns for the north Queensland region since 1995. He was a prawn farmer for 11 years, commencing in 1983 as the founding Manager of Seafarm Pty Ltd, now Australia's largest prawn farming company based in North Queensland. He then developed and operated his own prawn and barramundi farm near Cardwell. He has more than twenty years of experience in tropical aquaculture, research, development and extension, and in the facilitation of industry investment. He has a Bachelor of Science from University of Melbourne with an Honours Degree in Marine Biology from University of Tasmania, and has provided aquaculture consulting services in Australia and SE Asia. Awarded a Churchill Fellowship in 1999 to investigate recirculation technologies in shrimp farming, he successfully developed and trialled Australian prawn farm recirculation methods with industry.

Steve Slattery CBLT, BSc (Marine Biology), M.Sc Applied Science (Food Technology), is a Seafood Technologist with the Seafood Team at the DPI&F Centre for Food Technology in Brisbane. His expertise is in post harvest seafood handling and processing, crustacean cooking methods, chemical treatments and avoidance of enzymic damage to seafood.

Serena Zipf has a Degree in Arts/Law and is co-owner of Rocky Point Prawn Farms near Brisbane and Bundaberg, as well as the Rocky Point prawn hatchery. She has extensive management experience in the Australian prawn farming industry and has worked hard to promote and highlight innovative environmental practices, seafood quality and marketing programs. Serena has been an active member of the Australian Prawn Farmers Association, is an independent director of Queensland Sea Scallops, and a member of the National Food Industry Strategy's Trade & Market Development Committee.

Using this manual

Throughout this manual the following coloured boxes contain:

Important facts

Useful information

Handy hints

Part 1

Establishing a prawn farm
– what you need to know

Prawn farming in Australia

Overview of the prawn farming industry

The Australian prawn farming industry produces more than 3500 tonnes of prawns a year, valued at over $47 million, and is based on approximately 900 hectares of ponds and 12 hatcheries (Lobegeiger and Wingfield 2004) (see Figure 1.1). The industry is based primarily in Queensland, the bulk of production being in north Queensland between Ayr and Port Douglas. Other significant prawn farming areas in Queensland include Mackay, Bundaberg and the Sunshine Coast and Gold Coast regions. Prawn farms in New South Wales are located in the Northern Rivers region from Ballina south to Coffs Harbour. Prawn farming is also conducted in the Northern Territory near Darwin and is under development on the northern coastline of Western Australia.

Figure 1.1 Prawn farming areas in Australia
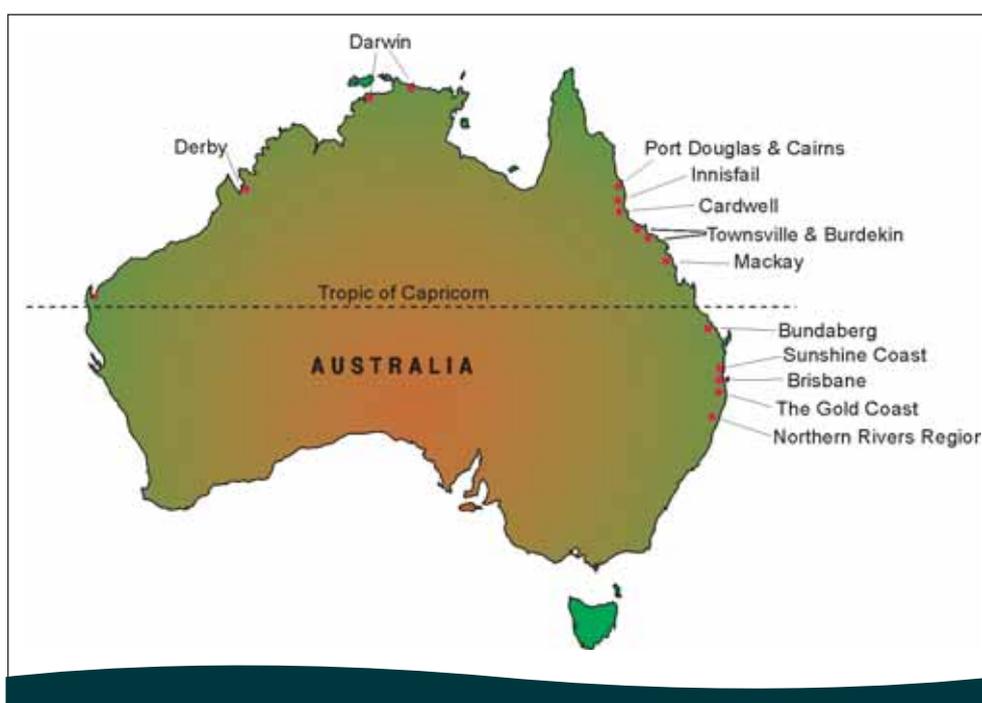
The industry is mostly based on the farming of three endemic species:

- the black tiger prawn *Penaeus monodon* (Figure 1.2)
- the banana prawn *Fenneropenaeus merguiensis*) (Figure 1.3)
- the kuruma prawn *Penaeus japonicus*.

Figure 1.2
The black tiger prawn
Penaeus monodon

Figure 1.3
The banana prawn
Fenneropenaeus merguiensis

Other species such as the brown tiger prawn *P. esculentus*, the school prawn *Metapenaeus* spp. and the eastern king prawn *P. plebejus* were trialled or grown in the pioneering stages of the industry but did not provide significant production results or commercial success. Various other endemic species that are commercially farmed in other countries, including the grooved tiger prawn *P. semisulcatus* and the indicus prawn *P. indicus*, have also been trialled in Australia without any significant uptake in the industry. The three main species listed above have been adopted in the industry primarily due to a combination of their strong market value and successful hatchery/growing technology that is suited to Australian conditions.

Prawn farming is well established as an industry in many other tropical and subtropical regions of the world, although it is more generally known as shrimp farming in the Americas, Asia and the Middle East. The world prawn farming industry grew dramatically from the early 1980s and by 2004 farmed prawns accounted for approximately 2 million tonnes, or 50 per cent of world production. Because of the enormous demand, over-extended fisheries were unable to supply their markets, and shrimp farmers doubled the world's supply of shrimp in 30 years (Rosenberry 2004).

During the pioneering stages of industry development, Australian prawn farmers trialled farming methods used in other countries such as Taiwan, Thailand, Indonesia and the USA, but then modified the techniques to suit the Australian environment and workplace. Considerable industry and government investment in research and development (in genetics, growout technology, environmental and health management) has also provided a steady stimulus for the industry to expand. Despite its current small size in terms of gross production, the Australian prawn farming industry is now considered internationally as a leader in best practice management and product quality.

Using an international scale of classification (Table 1.1), virtually all Australian prawn farms are managed as intensive farms.

Table 1.1 Levels of intensification in international prawn farming

Level	Feeding	Aeration	Yields in kg/ha
Extensive	no	no	less than 500
Semi-intensive	yes	no	500–2500
Intensive	yes	yes	2500–10 000
Super-intensive	yes	yes	10 000+

In Australia, the seasonal staging of crops on different farms varies depending on location, marketing strategy, hatchery supply and other issues. Farms south of Mackay tend to produce one crop a year during the summer (because it is too cold in the winter months), whereas farms in the tropical north have the potential to produce two crops. However, many farms in the north stock one crop per year to capitalise on the higher fresh prawn prices around the Christmas period.

What is being a prawn farmer *really* like?

Prawn farming is a high-risk, capital-intensive industry that is site-specific and requires technical expertise. It is clearly more difficult to be financially successful in prawn farming than in conventional farming of livestock or horticulture. If you want to become a prawn farmer, you need to do a great deal of planning and consider financial and lifestyle issues.

Be prepared to work long hours, and forget about the idea of public holidays and weekends — prawns must be fed and looked after! On the positive side, the work is varied and done outdoors, and tasks change throughout the season, although every farmer is glad to see the last day of harvest. Due to the dynamic environment in which the prawns are raised, however, farmers must understand and manage the sudden changes in conditions that can occur at any hour of the day or night.

Prawn farmers must be aware that they are in an agribusiness industry; they should not just concentrate on production, but must also have a firm hand on risk management, marketing and liaison with various government bodies. And it helps if they have a healthy risk threshold!

The success of any aquaculture venture depends on sound initial planning. This is especially important in prawn farming, and should involve the development of a comprehensive business plan that identifies the enterprise goals, market feasibility and the requirements for production. Once these forecasts have been made, it is then possible to predict the financial feasibility and make cash flow projections.

Effective business planning will also assist in the selection of an appropriate site, generally the most critical step in establishing an aquaculture facility and a successful aquaculture business (see Chapter 2). In general, the business plan will dictate the design and size of the farm and specify the equipment and infrastructure required.

Four factors determine the success of any aquaculture venture:

- the production economics, which determines the profits of the venture
- the marketing of the product, which boils down to what price you can get, based on quality and quantity
- the comparative advantages that your product possesses
- the economic opportunity cost of undertaking aquaculture compared with other available activities.

Commercial aquaculture is driven by profit. By choosing to grow prawns for a living, you will be guided primarily by economics. However, technology can be a limiting factor, for example, in the availability of seed stock from hatcheries. Without considering risk, a high-value species would be chosen over a lower-value species. Purely commercial ventures require significant investment and are inherently risky, whereas family or small-scale aquaculture ventures have lower capital and technical requirements, are more easily managed and can provide a relatively stable return.

A wide range of commercial, regulatory, environmental and technical issues involved in establishing a new prawn farm need to be considered. Appendix 1 has more information on these factors, including *PrawnProfit* software that enables financial decision making for new and existing prawn farming ventures.

At a glance

- Prawn farming is a high-risk industry with a strong reliance on technology.
- It is imperative to find a good site. Many aspects of site selection are important, but good water quality and suitable soils for pond construction are vital.
- An important part of establishing a prawn farm is financial analysis of the business model you are considering, depending on the size of the farm, stocking densities etc. Before you commit to significant investment, economic analysis models such as *PrawnProfit* (see appendix 1) can help you in the assessment of business viability.
- State and Commonwealth governments have a wide range of information (technical, legislative and economic) to help you decide whether to invest in prawn farming.