

# Ross Lobegeiger Report to farmers

## Aquaculture production survey Queensland 2009-10

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Department of Employment, Economic Development and Innovation  
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## Dedication

There has been widespread support for the renaming of this report to the *Ross Lobegeiger Report to farmers*. This change is to help acknowledge and honour the pivotal role that Ross played in developing and supporting the Queensland aquaculture industry. As Supervising Extension Officer, Ross provided the aquaculture industry with almost 20 years of dedicated service. Ross was responsible, as co-author, for producing the very first annual edition of this report in 1991. He then went on to produce a total of 19 issues of the Report to Farmers. As such, Ross Lobegeiger's name has become intrinsically linked with the report and it seems only fitting for the publication to be renamed accordingly.

Tragically, Ross Lobegeiger passed away on Saturday the 9th of October 2010. Ross was such a well known and enormously liked individual that his loss will be felt deeply by a great many people from all facets of Ross' extensive social and professional network, including the aquaculture industry.



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## List of acronyms

<b>DEEDI</b>	Department of Employment, Economic Development and Innovation
<b>FCR</b>	Feed conversion ratio
<b>FTE</b>	Full-time equivalent
<b>QSWAMP</b>	Queensland Shellfish Water Assurance Monitoring Program

## 1. Production summary

The total value of the Queensland aquaculture industry has increased by 20.5% over the last 12 months, with the value of production increasing from \$85.5 million in 2008–09 to \$103 million in 2009–10. This increase was largely due to a 33% increase achieved by the prawn farming sector, with the value of the prawn sector rising from \$55.8 million to \$74.3 million.

Although the value of aquaculture production has increased by 20.5% over the last 12 months, the value of the wild harvest fishery has remained steady at around \$223 million. Therefore the relative importance of aquaculture to Queensland's total fisheries production has increased from 27.7% to 31.6% over the last 12 months (Table 1). In Queensland the total value of fisheries production, including aquaculture, in 2009–10 was \$325.7 million, which was 5.6% higher than the previous year. Similar trends in Queensland's fisheries and aquaculture production can be seen in the ABARE figures (which differ slightly from the Queensland figures in that they exclude hatchery production that is sold to supply aquaculture growout operations).

**Table 1:** Queensland fisheries production—gross value (2005–06 to 2009–10)

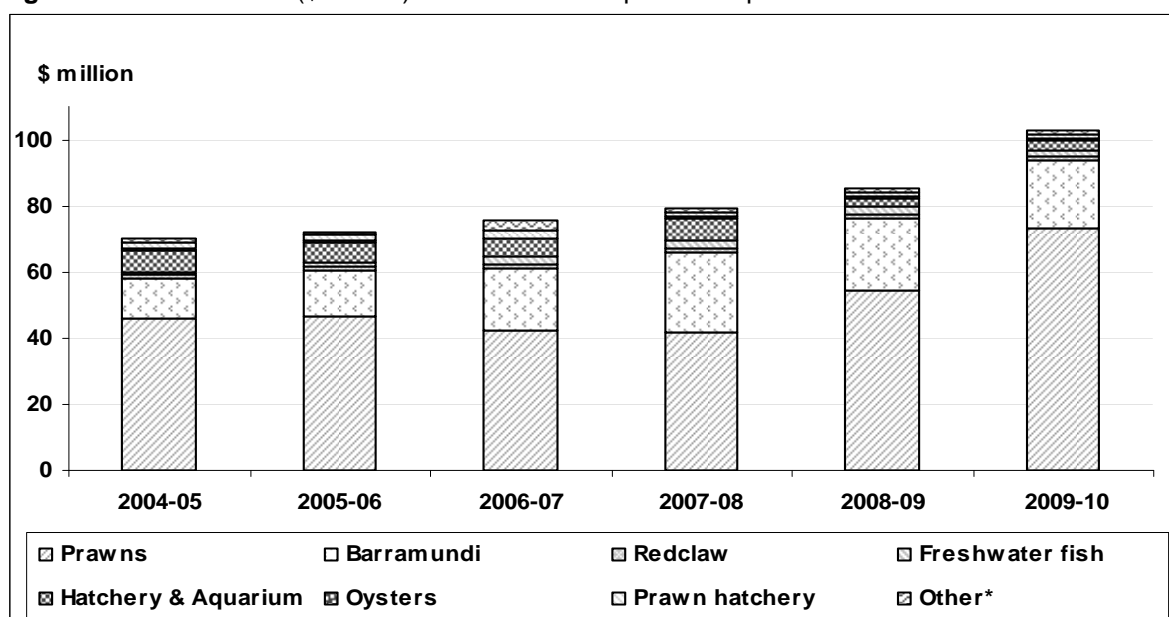
Queensland figures <sup>(1)</sup>			
Year	Total fisheries (\$m)	Aquaculture (\$m)	Aquaculture (%)
2005–06	261.1	72.1	27.6
2006–07	282.4	77.4	27.4
2007–08	288.5	80.3	27.8
2008–09	308.5	85.5	27.7
2009–10	325.7	103.0	31.6
ABARE figures <sup>(1)</sup>			
	Total fisheries (\$m)	Aquaculture (\$m)	Total fisheries (\$m)
2005–06	256.7	67.7	256.7
2006–07	276.9	71.9	276.9
2007–08	283.5	75.3	283.5
2008–09	306.6	83.6	306.6
2009–10	323.3	100.6	323.3

(1) The Queensland figures include hatchery production for farm stocking and impoundment stocking. Farm stocking details are excluded from the figures used by ABARE.

Sources: Australian Bureau of Agricultural and Resource Economics (ABARE), Fisheries Queensland, part of the Department of Employment, Economic Development and Innovation (DEEDI).

The trend of aquaculture industry growth in Queensland over recent years can be seen in Figure 1, with the most valuable sectors of the industry consistently being prawns and barramundi. Actual dollar value of each sector is given in Table 2. This increase in overall industry value corresponds with production increases over the same period. While tonnages grown by different sectors of the industry have varied with some years producing larger crops than others, the overall industry trend is one of increasing production, as seen in Figure 2. Actual production figures (tonnes) are given in Table 3.

**Figure 1:** Trend in value (\$ million) of Queensland aquaculture production



\* 'Other' includes crabs, sea scallops, marine fish and eels.

**Table 2:** Queensland aquaculture production—gross value by sector (\$ million)

	2005-06	2006-07	2007-08	2008-09	2009-10
Prawns (includes prawn hatchery)	\$47.9	\$44.4	\$43.0	\$55.8	\$74.3
Barramundi	\$14.0	\$18.5	\$24.3	\$21.4	\$20.7
Redclaw crayfish	\$1.3	\$1.4	\$1.1	\$1.1	\$1.0
Freshwater fish	\$1.5	\$2.2	\$2.3	\$2.6	\$2.2
Hatchery and aquarium	\$3.4	\$3.5	\$6.6	\$2.7	\$3.2
Edible oysters	\$0.6	\$0.5	\$0.6	\$0.5	\$0.5
Pearl oysters	n/a*	\$1.7	\$1.3	n/a*	n/a*
Other <sup>(1)</sup>	\$3.4	\$5.2	\$1.1	\$1.5	\$1.2
<b>Total</b>	<b>\$72.1</b>	<b>\$77.4</b>	<b>\$80.3</b>	<b>\$85.5</b>	<b>\$103.0</b>

\* Not available for publication (included in 'Other').

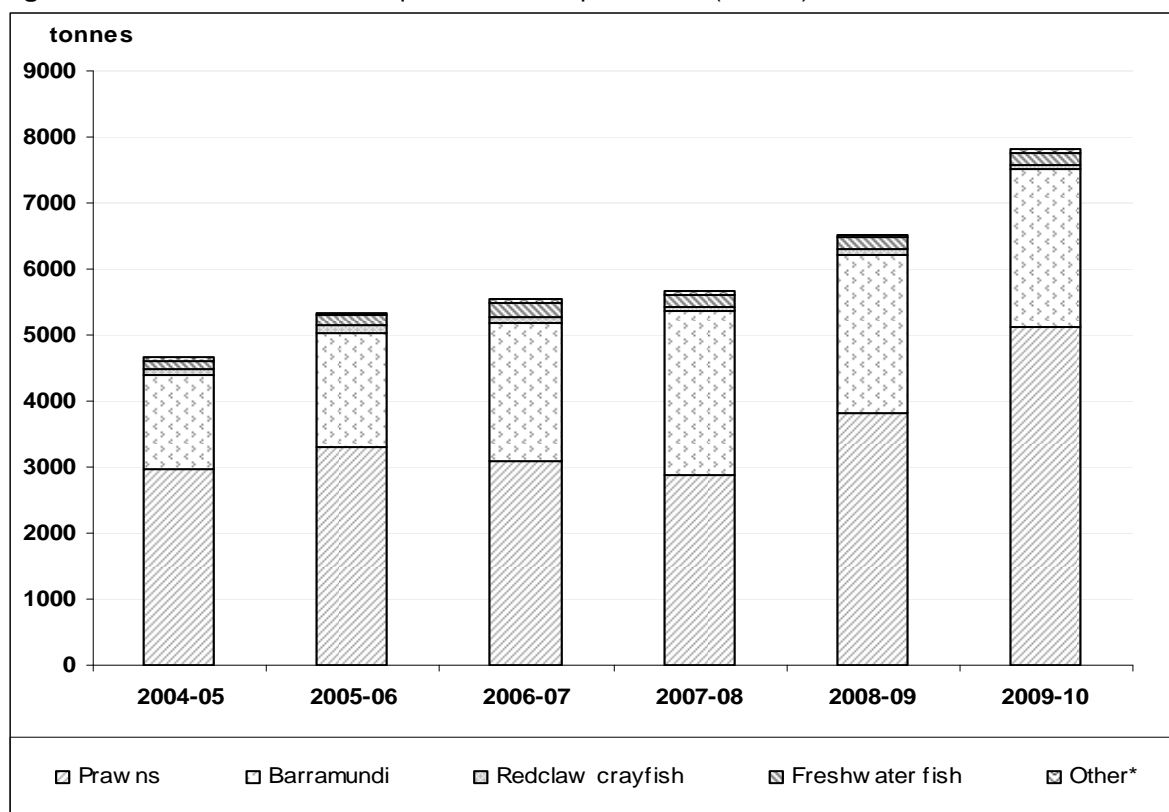
(1) Includes marine fish, eels, crabs and pearls in some years.

In 2009–10, the prawn industry saw annual production increases in excess of 30% for the second consecutive season. Queensland farms produce three species of prawns—black tiger (*Penaeus monodon*), banana (*P. merguensis*) and kuruma (*P. japonicus*). The kuruma prawn sector is currently represented by just one small farm.

Prawn production has increased by 33.8% from 3821 tonnes in 2008–09 to 5115 tonnes in 2009–10, while the value increased by 33.7% from \$54.6 million in 2008–09 to \$73 million in 2009–10. The average price decreased marginally from \$14.28/kg in 2008–09 to \$14.27/kg in 2009–10. Hatchery sales for the year were \$1.33 million compared with \$1.18 million in 2008–09.

The area harvested increased by 11% from 747 hectares in 2008–09 to 827 hectares in 2009–10. The number of producing farms increased from 22 farms in 2008–09 to 24 farms in 2009–10.

**Figure 2:** Trend in Queensland aquaculture total production (tonnes)



\* 'Other' includes crabs, sea scallops, marine fish and eels.

**Table 3:** Queensland aquaculture production (tonnes) by sector

	2005-06	2006-07	2007-08	2008-09	2009-10
Marine prawns	3300	3085	2888	3821	5115
Barramundi	1745	2091	2464	2400	2410
Redclaw crayfish	105	100	65	68	57
Freshwater fish	152	210	198	192	177
Other *	25	64	58	39	63
<b>Total</b>	<b>5328</b>	<b>5550</b>	<b>5673</b>	<b>6520</b>	<b>7822</b>

\* 'Other' includes marine fish, eels, sea scallops and crabs.

Barramundi (*Lates calcarifer*) production remained steady over the last 12 months with 2410 tonnes sold in 2009-10 (only marginally greater than the 2400 tonnes produced in 2008-09). The value of the industry has decreased by 3% from \$21.4 million in 2008-09 to \$20.7 million in 2009-10. This is a reflection of the 3% decrease in the average price (whole fish basis) from \$8.90/kg to \$8.60/kg since the previous reporting period.

The majority of production came from pond-based and cage-based systems. Over this period the number of producing pond-based farms rose from 23 to 24. The number of tank-based systems remained at three. There was just one sea cage operation.

Redclaw crayfish (*Cherax quadricarinatus*) production peaked during the period from 2004-2007 where annual harvests totalled around 100 tonnes. Since that time there has been a sharp decline in production, with harvests of 67.8 tonnes in 2008-09 falling to 57 tonnes in the current reporting



period (the lowest since the mid 1990s). Value of the redclaw sector has slipped to \$956 000 (down from \$1.12 million in 2008–09). The number of producing farms in 2009–10 was 29, which was three less than in 2008–09. Average prices increased marginally from \$16.54/kg in 2008–09 to \$16.76/kg.

The freshwater fish growout sector currently produces silver perch (*Bidyanus bidyanus*), jade perch (*Scortum barcoo*), golden perch (*Macquaria ambigua*), Murray cod (*Maccullochella peellii peellii*) and sleepy cod (*Oxyeleotris lineolatus*). The total production of freshwater fish (species other than barramundi) decreased 8% from 192 tonnes in 2008–09 to 176.5 tonnes in 2009–10. Over the same period the value of the sector also decreased, falling from \$2.6 million to \$2.18 million.

Silver perch production has continued to increase over recent years with a yield of 99.6 tonnes for 2009–10. This accounts for 55% of all freshwater fish production in 2009–10. In contrast, jade perch production has fallen significantly this season to 17 tonnes, down from 58.9 tonnes in 2007–08 and 41.8 tonnes in 2008–09. This season, jade perch production accounted for just over 9% of the freshwater fish harvest, whereas in previous years it played a more significant role in the sector. While Murray cod remains a significant contributor to this sector, in 2009–10 so few growers sold Murray cod that production data cannot be published this year as it would compromise client confidentiality.

The hatchery sector, producing native fish fingerlings and ornamental aquarium species, sold 10.1 million fish during 2009–10; this is 32% more than the 7.6 million fish sold in 2008–09. The value of the hatchery sector has increased by nearly 20% over the past year, from \$2.65 million in 2008–09 to \$3.18 million in 2009–10.

Total edible oyster production decreased from 105 600 dozen in 2008–09 to 97 500 dozen in 2009–10. Current value of the edible oyster industry is \$513 000, marginally above sales of \$510 000 in 2008–09. The average price per dozen oysters has increased by 9% from \$4.83 per dozen in 2008–09 to \$5.26 per dozen in 2009–10. This production came from 25 oyster areas.

The Queensland aquaculture industry employed 565 full-time equivalents (FTEs calculated by combining numbers of permanent and casual labour). This equates to three more FTEs than in 2008–09. The marine prawn sector was the largest employer at 330 FTE workers, or 58% of the industry's total labour force.

## 2. Survey methods

Production statistics for the 2009–10 financial year were collected from all sectors of the Queensland aquaculture industry. The requirement to complete the production survey is a mandatory condition imposed on all holders of a current aquaculture development authority.

In 2008–09, a web-based electronic version of the production survey was offered for the first time, along with the regular paper-based statistical return. Although the online version was generally well regarded by those producers who accessed the web page, uptake was less than half of all producers across the industry and that year saw a lower than average response rate to the production survey. In addition, some limitations were revealed in the processing of electronically-collected statistical returns, particularly in relation to farms producing multiple crops across different species sectors. As a result, for the current year, the survey was undertaken only on the paper-based format.

Aquaculture operators working under the self-assessable code were included in the survey for the first time in 2009–10. Non-producing farms across the industry were able to respond to the survey by selecting the 'nil production option' and were not required to provide further details about their operations. Of the 530 current registered aquaculture authority holders in Queensland, only 354 producers completed the production survey this year. This is a response rate of 67%. Although a great deal of effort was expended chasing up some of the more significant producers to ensure that a meaningful statistical return was received, the total response rate was still considerably lower than in previous years (e.g. 85% in 2007–08; 78% in 2008–09).

The results presented in this report reflect the information provided by the industry through the statistical returns. In order to more easily interpret and document the data provided by farmers, this report groups the information into chapters which reflect the major industry sectors or species groups.

In some sectors, non-response by some of the larger growers can provide a result that under represents the true industry situation. Since this report is produced largely as a service to the Queensland aquaculture industry, we strongly encourage growers to participate in the yearly production survey and remind them of the mandatory requirement to lodge production data as a condition of their aquaculture development authority.

The following are conversion factors and definitions used in the report:

#### **Conversion factors**

Fish production is reported on a whole fish basis. For example, gilled and gutted barramundi to whole fish (0.89:1 on weight basis) and filleted barramundi to whole fish (0.48:1 on weight basis).

#### **Feed conversion ratio (FCR)**

Estimated average FCRs are published for most species sectors. However this information is only an estimate as it is reported as a direct ratio of the weight of feed provided versus the weight of product sold. Therefore a number of other relevant factors, such as the weight of stock remaining in ponds at the end of the reporting period (i.e. fed but not yet harvested), are not considered.

#### **Fingerling fish**

Fingerling fish are small fish in the 2–10 gram range.

#### **Juvenile crayfish**

Juvenile crayfish are immature crayfish in the 1–15 gram range.

#### **Labour conversion**

Labour FTEs are calculated by adding the total permanent labour units to the casual labour units converted to FTEs. Forty hours per week casual labour for 48 weeks per year is considered one FTE labour unit. Information collected in hours per week for permanent labour was converted to FTEs by dividing total hours by 40 hours.

## 3. Prawns

### 3.1 General

The value of the Queensland prawn growout industry has increased by 33.7% from \$54.6 million in 2008–09 to \$73 million in 2009–10. Total production increased from 3821 tonnes in 2008–09 to 5115 tonnes in 2009–10. Additionally, the prawn hatchery sector sold post-larvae to a value of \$1.3 million (\$1.2 million in 2008–09).

Up until two years ago this report separated kuruma prawn (*Penaeus japonicus*) production from the other two main prawn species—black tiger (*P. monodon*) and banana (*P. merguensis*). Kuruma prawn production has almost ceased in Queensland, with only one farm producing limited quantities for the Australian market. This sector has now been included in the general prawn group.

From the 74 aquaculture approvals authorising prawn production, 24 farms produced prawns in 2009–10 (22 in 2008–09) and two independent hatcheries produced post-larvae.

Prawn prices (excluding the small amount of higher valued kuruma prawns) ranged from \$12.00/kg to \$18.10/kg and the average farm gate price (all prawns) decreased marginally from \$14.28/kg in 2008–09 to \$14.27/kg in 2009–10 (Table 4). In 2009–10 two percent of the total harvest was exported, whereas there was no export at all in the previous year.

### 3.2 Prawn production

#### 3.2.1 Growout

Table 5 illustrates prawn production from 2007–08 to 2009–10. The prawn farming sector had an exceptional year in 2009–10 with the total production being 34% higher than the best production previously achieved (2008–09). The number of producing farms increased from 22 to 23. Increase in production was largely due to a 21% increase in the yield per hectare and there was also an 11% increase in the area harvested.

In 2009–10, 19 farms (18 in 2008–09) produced over 20 tonnes. In 2009–10, 18 farms (14 in 2008–09) produced over 50 tonnes, while 12 farms (eight in 2008–09) produced over 100 tonnes (Table 5). In 2009–10, 11 farms (seven in 2008–09) averaged over 6000 kg/ha/crop.

The total ponded area on prawn farms was 669 hectares at the end of 2009–10. This was unchanged from 2008–09. Over the same period the area stocked increased by 16%, rising from 734 hectares to 851 hectares and the total harvested area increased by 11% from 747 hectares to 827 hectares. The reason the total stocked/harvested area figures are greater than the total ponded area is due to a number of northern farms producing multiple crops per pond per season. In fact, across the sector the average number of crops per pond per year has increased from 1.1 to 1.24.

The average pond size for individual prawn farms ranged from 0.6 to 1.77 hectares with the industry average being 1.02 hectares. While stocking rates varied from 5 to 53 post-larvae per square metre, the average stocking rate of 42 per square metre was slightly higher than last year's average of 41 per square metre. There were ten farms stocking at 40 or more per square metre (compared with 7 farms the previous season).

**Table 4:** Prawn production in Queensland—summary (2007–08 to 2009–10)

	2007–08	2008–09	2009–10
<b>Total production (tonnes)</b>	<b>2888</b>	<b>3820</b>	<b>5115</b>
Average price (\$/kg)	\$14.37	\$14.28	\$14.27
Total value (\$ million)	\$41.5	\$54.6	\$73.0
Average yields (kg/ha/crop)	4054	5118	6181

**Table 5:** Number of approved prawn farms and production levels in Queensland (2007–08 to 2009–10)

	2007–08	2008–09	2009–10
Production (tonnes)	<b>No.</b>	<b>No.</b>	<b>No.</b>
0.1 to 5.0	10	1	1
5.1 to 10.0	3	1	3
10.1 to 20.0	1	1	1
20.1 to 50.0	4	4	1
50.1 to 100.0	7	6	5
100.1 to 200.0	5	3	7
Over 200	5	6	5
Number of producing farms	25	22	23
Number of producing hatchery-only operations	3	2	2

The quantity of feed used increased by 58% from 7307 tonnes in 2008–09 to 11 578 tonnes in 2009–10. Over the same period the estimated FCR increased from 1.9:1 to 2.3:1. There was a change in the source of feed with a slight decrease in the use of Australian produced feed. In 2009–10 feed sources were 44% from Australia (50% in 2008–09) and 56% from overseas (50% in 2008–09).

### 3.2.2 Hatchery

Thirteen prawn hatcheries (same as in 2008–09) produced an estimated 382 million post-larvae (337 million post-larvae in 2008–09)—Table 6. Successful domestication programs with banana prawns and more recently with black tiger prawns have meant that the industry is no longer entirely reliant on wild-caught spawners and that the majority of spawners are now grown on-farm, rather than purchased.

**Table 6:** Prawn hatchery production in Queensland (2007–08 to 2009–10)

	2007–08	2008–09	2009–10
Number of spawners purchased	2712	2759	2471
Number of spawners used	NA	6795	9552
Number of post-larvae produced (million)	310.0	336.6	381.7
Number of post-larvae stocked (million)	264.7	305.8	354.8
Number of post-larvae sold (million)	285.0	74.3	76.3
Value of post-larvae sold (million)	\$1.48	\$1.18	\$1.33
Average value of post-larvae (cents)	1.56	1.59	1.74

Of the thirteen operational prawn hatcheries, eight (six in 2008–09) sold post-larvae to supply the rest of the growout sector. Of these hatcheries only two (also two in 2008–09) operated as

independent hatcheries and were not part of a business that also engaged in growout production. Queensland prawn hatcheries sold 76.3 million post-larvae in 2009–10, with a value of \$1.33 million. The total amount of post-larvae sold amounted to 21.5% (24.3% in 2008–09) of all the post-larvae stocked, with the remaining 78.5% being produced by hatcheries for their own growout requirements.

### 3.2.3 Labour – growout

The total labour employed on growout prawn farms over the last three years is shown in Table 7. Although there has been some fluctuation in the proportion of permanent and casual labour employed on prawn farms, the total amount of labour utilised has risen steadily over this period rising from 301 FTEs in 2007–08 to 330 FTEs in 2009–10.

Not only is the labour force increasing, but the productivity of the labour force has also risen substantially. The productivity per labour unit (in terms of tonnes produced) has risen by 58% over the last three years, rising from 9.6 tonnes in 2007–08 to 15.2 tonnes 2009–10. Over the same period the dollar output per labour unit has increased by 60%.

**Table 7:** Labour use on prawn farms in Queensland (2007–08 to 2009–10)

	2007–08	2008–09	2009–10
Total permanent (units)	210	200	221
Total casual labour (hours)	174 280	227 300	209 100
FTE labour units	301	319	330
Output per FTE (tonnes)	9.6	12.0	15.2
Output per FTE (\$)	\$138 110	\$171 250	\$221 410

### 3.3 Labour – hatchery

The majority of prawn hatcheries are operated as part of a growout business and the labour component of the hatchery is therefore included with the total prawn farm labour. In 2009–10 there were only two hatcheries operating independently of growout farms and they employed a total of 3.4 permanent staff (six in 2008–09). No casual staff were employed by this sector in 2009–10. Total output per labour unit cannot be published as this would compromise client confidentiality relating to the two farms in this category.

### 3.4 Publications

O’Sullivan, D 2009, Gold Coast Prawn fully stocked with domesticated black tiger prawns – a world first, *Austasia Aquaculture* 24(4): 16–19.

Robertson, C (Ed.) 2006, *Australian prawn farming manual: health management for profit*, DPI&F (available at [www.aciar.gov.au/web.nsf/doc/ACIA-6XBTR9](http://www.aciar.gov.au/web.nsf/doc/ACIA-6XBTR9))

Biosecurity Australia policy memorandums relating to the importation of prawns and prawn products are available at [www.daff.gov.au/ba/ira/current-animal/prawns](http://www.daff.gov.au/ba/ira/current-animal/prawns)

## 4. Barramundi

### 4.1 General

Production in the barramundi (*Lates calcarifer*) growout sector remained steady over the last 12 months. The product marketed (converted to a whole fish basis) totalled 2405 tonnes in 2009–10, which was only marginally greater than the 2400 tonnes sold in 2008–09. These production figures remain slightly down on the 2464 tonnes produced in 2007–08 (Table 8).

The total value of production has decreased by 3% from \$21.36 million in 2008–09 to \$20.68 million in 2009–10. This is a reflection of the 3% decrease in the average price (whole fish basis) from \$8.90/kg to \$8.60/kg since the previous reporting period. This year, all barramundi were sold on the domestic market, whereas in 2008–09 a small portion (1%) was exported.

Hatcheries sold barramundi fingerlings for growout, stocking and the aquarium trade. These figures are reported under sections 8.2 and 8.3.

### 4.2 Industry production

From the 302 aquaculture approvals authorising barramundi production, only 28 farms produced market-ready fish in 2009–10 (9 hatcheries also produced fingerlings). This was similar to the previous year when 26 farms sold barramundi, but down on 2007–08 which had 35 producers. Most production came from pond-based systems (24 farms), while one farm used sea cages and three farms used recirculating tank systems (Table 8).

**Table 8:** Barramundi production and authorities in Queensland (2007–08 to 2009–10)

	2007–08	2008–09	2009–10
<b>Total production (tonnes whole fish basis)</b>	<b>2464</b>	<b>2400</b>	<b>2405</b>
Average price (\$/kg)	\$9.87	\$8.90	\$8.60
Total value (\$ million)	\$24.31	\$21.36	\$20.68
<b>Pond production (tonnes)</b>	<b>No.</b>	<b>No.</b>	<b>No.</b>
0.01 to 1.0	4	2	3
1.1 to 10.0	7	2	2
10.1 to 50.0	9	9	10
50.1 to 100.0	4	4	5
Over 100.0 <sup>(1)</sup>	5	6	5
Number of producing farms <sup>(1)</sup>	29	23	25
<b>Tank production (tonnes)</b>	<b>No.</b>	<b>No.</b>	<b>No.</b>
0.01 to 1.0	0	1	2
1.01 to 5.00	5	1	0
5.1 to 10.0	0	0	0
Over 10.00	1	1	1
Number of producing farms	6	3	3
<b>Pond and tank production</b>	<b>No.</b>	<b>No.</b>	<b>No.</b>
Total number of producing farms	35	26	28

(1) Includes one sea cage farm.

## 4.3 Pond production

Farm area available for barramundi growout was similar to the previous year at 180 hectares of ponded area, consisting of 359 ponds averaging half a hectare each. Of these, the number of ponds actually stocked was 209 (up slightly from 202 in 2008–09).

The reported number of fingerlings stocked into ponds was 3.11 million in 2009–10 (18% less than the 3.8 million stocked in the previous year). Fingerlings were stocked at an average rate of 30 100 per hectare.

The total feed used in ponds and cages increased from 3580 tonnes in 2008–09 to 4070 tonnes in 2009–10. Data for this period includes details from Queensland's only sea cage farm that cannot, for confidentiality reasons, be released in its own category. However, this sea cage data has not been included in the pond volume and density calculations as it is not directly comparable and would significantly alter these averages. The estimated average feed conversion ratio in the current period was 1.7:1 which was slightly higher than the FCR of 1.5:1 achieved in both of the previous two years. The majority of feed (93%) was manufactured in Australia. See Table 9 for the comparative summary of barramundi pond production.

**Table 9:** Barramundi pond production information in Queensland (2007–08 to 2009–10)

	2007–08	2008–09	2009–10
<b>Total production (tonnes whole fish basis) <sup>(1)</sup></b>	<b>2464</b>	<b>2400 <sup>(2)</sup></b>	<b>2405 <sup>(2)</sup></b>
Average price (\$/kg) <sup>(1)</sup>	\$9.87	\$8.76	\$8.48
Total value (\$ million) <sup>(1)</sup>	\$24.31	\$21.36 <sup>(2)</sup>	\$20.68 <sup>(2)</sup>
Market (% sold within Australia) <sup>(1)</sup>	100%	99%	100%
Number of ponds stocked	218	202	209
Total area stocked (hectares)	97	99	103
Average area (hectares)	0.44	0.49	0.49
Total fingerlings stocked (million) <sup>(1)</sup>	1.97	3.83	3.11
Fingerlings stocked/hectare	20 300	39 600	30 100
Feed used (tonnes) <sup>(1)</sup>	3230	3580	4070
Feed source (% manufactured in Australia) <sup>(1)</sup>	97%	91%	93%
Estimated FCR <sup>(1)</sup>	1.5:1	1.5:1	1.7:1

(1) Includes one sea cage farm.

(2) Includes all barra production so as not to disclose tank-based production details.

## 4.4 Tank-based production

In 2009–10, only three tank-based farms reported production of barramundi (same as in 2008–09). Because of the low number of producing farms and the fact that most of the reported tank-based production came from a single farm, it is not appropriate (due to confidentiality issues) to release detailed information on this sector of the industry.

In recent years, the tank-based sector of the industry has produced just under 100 tonnes of fish (96 tonnes in 2006–07 with a value of \$950 000 and 82 tonnes in 2007–08 with a value of \$890 000). Traditionally, tank systems have been able to achieve a higher average price than pond systems due to the increased focus on direct sales to niche markets and a higher proportion of live sales. Tank-based systems are generally able to stock more densely and achieve better FCRs due to the more highly controlled culture environment.

## 4.5 Fingerling production

Barramundi fingerling production decreased from 8.7 million in 2008–09 to 6.5 million in 2009–10. Nine hatcheries produced barramundi fingerlings during the year (Sections 8.2 and 8.3 of this report for restocking and aquarium sales).

Fingerlings that are retained by the hatchery farm for their own growout are not considered as sales. Such operations account for a substantial proportion (>20%) of the fingerlings produced. There were 4.5 million fingerlings sold to other farms for growout (valued at \$895 000) which compared with 3 million sold for \$621 000 in 2008–09. The average price per fingerling fell marginally from \$0.21 in 2008–09 to \$0.20 in 2009–10.

## 4.6 Farm labour

Total permanent labour employed in the industry increased from 80 units in 2008–09 to 84 units in 2009–10. Productivity has fallen slightly from 30.1 tonnes of fish per permanent labour unit in 2008–09 to 28.7 tonnes of fish per permanent labour unit in 2009–10.

Total casual labour for the sector decreased from 35 900 hours in 2008–09 to 20 200 hours during the current period.

When permanent and casual labour inputs were combined for the barramundi farming sector, total number of FTE labour units decreased from 98 in 2008–09 to 94 in 2009–10. Over the same period the dollar output per labour unit for the sector remained similar at \$219 000 worth of sales returned per labour unit.

## 4.7 Publications

Curtis, M and Wingfield, M 2004, *Recirculation aquaculture systems information*, Information Series QI 04047.

Macbeth, M et al. 2002, *Selective breeding in barramundi: technical report for the Australian Barramundi Farmers Association*, Information Series QI 02067.

Department of Primary Industries and Fisheries 2008, *Queensland barramundi farming status report (2008)* State of Queensland  
[available at www.dpi.qld.gov.au/documents/Fisheries\\_Aquaculture/Barramundi-status-report-2008.pdf](http://www.dpi.qld.gov.au/documents/Fisheries_Aquaculture/Barramundi-status-report-2008.pdf)



## 5. Redclaw

### 5.1 General

Production of redclaw crayfish (*Cherax quadricarinatus*) in Queensland peaked during the period from 2004–2007 where annual harvests totalled around 100 tonnes. Since that time there has been a sharp decline in production, with harvests of 68 tonnes in 2008–09 falling to 57 tonnes in the current reporting period (the lowest since the mid 1990s). Correspondingly, the value of the sector has also declined, with sales of adult redclaw (sold primarily as food, with some broodstock sales) returning \$956 000 (down from \$1.12 million in 2008–09).

From the 241 aquaculture approvals authorising redclaw production in 2009–10, there were 29 farms that reported production of redclaw, compared with 32 farms in the previous year (Table 10).

### 5.2 Growout

The number of farms that produced more than 1 tonne decreased from 14 in 2008–09 to 12 in 2009–10 (Table 10). These 12 farms produced 89% of the state's redclaw production, with the top four farms producing 57% of the total production.

In 2009–10, the average price obtained for redclaw crayfish was \$16.76, which was slightly higher than the \$16.54 achieved in 2008–09. Average prices reported ranged from \$12.00/kg to nearly \$23/kg, although most sold in the \$14/kg to \$18/kg range.

The total available ponded area on farms decreased marginally from 58 hectares in 2008–09 to 56 hectares in 2009–10. The number of growout ponds stocked with redclaw decreased from 414 to 394 in 2009–10, totalling 38 hectares (45 hectares in 2008–09). While some survey data was incomplete, 36 hectares of ponds were reported as harvested during the current period, down slightly from the 40 hectares reported in 2008–09. The average pond size has remained at 0.11 hectares.

Average farm productivity across the sector (calculated from harvested growout area data, where provided) declined slightly this year to 1550 kg/ha, compared to 1680 kg/ha achieved in 2008–09. However, this figure doesn't provide the full picture because across the span of producers, yield per hectare tended to improve in the larger (and higher producing) farms. For instance, of the farms that produced up to 1000 kg, average productivity was 811 kg/ha (where data was provided); while of the farms that produced over 1000 kg, average productivity was significantly greater at 1723 kg/ha.

Total feed purchased in 2009–10 was 106 tonnes, which was 26% less than the 144 tonnes used in 2008–09. The estimated average feed conversion ratio improved from 2.1:1 in 2008–09 to 1.86:1 during the current period.

In 2009–10, the majority of product (99%) was sold on the domestic market. The proportion of domestic sales was the same as the previous year.

**Table 10:** Redclaw crayfish production and authorities in Queensland (2006–07 to 2009–10)

	2006–07	2007–08	2008–09	2009–10
<b>Total production (tonnes)</b>	<b>100.2</b>	<b>65.5</b>	<b>67.8</b>	<b>57.1</b>
Average price (\$/kg)	\$14.45	\$16.39	\$16.54	\$16.76
Total value (\$'000)	\$1448	\$1074	\$1121	\$956
<b>Pond production (kg)</b>	<b>No.</b>	<b>No.</b>	<b>No.</b>	<b>No.</b>
1 to 100	9	9	6	5
101 to 500	12	7	6	7
501 to 1000	8	5	6	5
1001 to 5000	11	11	9	8
Over 5000	6	5	5	4
Number of producing farms	46	37	32	29

### 5.3 Tank-based production

No tank-based production was reported in 2009–10.

### 5.4 Juvenile production

Farmers reported that 123 000 juvenile redclaw were purchased as seedstock during 2009–10. This contributed to the 3 million juvenile redclaw reported to be stocked into 25 farms during this period. This is a significant increase above the 2 million juveniles stocked in the previous year. The average stocking rate of juveniles into growout ponds was at 8/m<sup>2</sup>, up from 4.4/m<sup>2</sup> in 2008–09.

### 5.5 Labour

Survey returns for the redclaw crayfish sector show that it now has 21 permanent workers (19.5 in 2008–09). The total hours of casual labour employed on farms doubled to 1506 (from just 700 in 2008–09). This equates to 22 FTE workers across the sector (compared with 20 FTE labour units in 2008–09).

Labour efficiency (combining permanent and casual workers) was 2600 kg per FTE (\$43 533). This is a reduction from the 3410 kg per FTE (\$56 500 per labour unit) achieved in 2008–09.

### 5.6 Publications

Bitomsky, J 2008, *Scoping analysis: redclaw industry development* (available through Kleinhardt Business Consultants or DEEDI).

McPhee, C, Jones, C and Shanks, S 2004, Selection for increased weight at nine months in redclaw crayfish (*Cherax quadricarinatus*), *Aquaculture* 237: 131–40.

Mosig, J 2008, Redclaw growers win funds, breed a better product, *Austasia Aquaculture* 22(4): 9–14.

Stevenson, J 2005, *Notes from the 6<sup>th</sup> annual redclaw conference*, 9 and 10 September 2005, Queensland Crayfish Farmers Association.

Wingfield, M (Ed.) 2004, *Proceedings of the 5<sup>th</sup> annual conference*, Queensland Crayfish Farmers Association, Conference and Workshop Series QC 04001.

## 6. Freshwater fish

### 6.1 General

This category includes a range of species from the freshwater fish growout sector (excluding barramundi). The bulk of production comes from three species: silver perch (*Bidyanus bidyanus*), jade perch (or Barcoo grunter, *Scortum barcoo*) and Murray cod (*Maccullochella peelii*). Other species that also contribute to this sector include sleepy cod (*Oxyeleotris lineolatis*), golden perch (*Macquaria ambigua*) and Australian Bass (*Macquaria novemaculeata*) although production levels for these species remain low by comparison.

The total production from the freshwater fish sector (species other than barramundi) decreased 8% from 192 tonnes in 2008–09 to 176.5 tonnes in 2009–10. Over the same period the value of the sector also decreased, falling from \$2.6 million to \$2.18 million.

Silver perch production was valued at \$1.09 million with an average price of \$10.97/kg, and jade perch production was valued at \$195 000 with an average price of \$11.53/kg. While Murray cod remains a significant contributor to this sector, in 2009–10 so few growers sold Murray cod that production data cannot be published this year as it would compromise client confidentiality.

Silver perch production has continued to increase over recent years with a yield of 99.6 tonnes for 2009–10. This represents a 13% increase from the previous year, and accounts for 55% of all freshwater fish production in 2009–10. In contrast, jade perch production has fallen significantly this season to 17 tonnes, down from 58.9 tonnes in 2007–08 and 41.8 tonnes in 2008–09. This season, jade perch production accounted for just over 9% of the freshwater fish harvest, whereas in previous years it played a more significant role in the sector (e.g. 30% in 2007–08; 22% in 2008–09).

Of the 305 aquaculture authority holders authorised to grow freshwater fish, 11 growout farms and 9 hatcheries reported production of at least one species in 2009–10. This is the same number of growout farms producing freshwater fish as in 2008–09. Eight of the producing farms primarily used pond-based systems and three primarily used recirculating tank systems. All freshwater fish authority holders are approved to grow a number of different freshwater species as well as barramundi. As such, most farms that grow freshwater fish produce and sell a number of different species.

In 2009–10, the vast majority of freshwater fish were grown in ponds, with just three producing farms using recirculating tank systems.

### 6.2 Silver perch

Nine farms produced and sold silver perch in 2009–10. Eight of these farms used pond-based systems while one farm grew fish in tanks, so figures quoted are based on pond-based production only (to maintain client confidentiality).

In 2009–10 silver perch production increased by 13% from the 87.8 tonnes produced in 2008–09 to 99.6 tonnes. This is the greatest silver perch yield to date in Queensland. The average price (whole fish basis) decreased slightly (7%) from the \$11.75/kg achieved in 2008–09 to \$10.97/kg for the current period. While the price per kilogram fell, the increase in overall production placed the total value of the sector at \$1.09 million in 2009–10, a rise of 6% over the previous year.

### 6.2.1 Production details

The silver perch harvested in 2009–10 were produced in 13.7 hectares of ponded area (29 ponds averaging 0.47 hectares). The average yield was 7275 kg per hectare, which was a significant productivity increase over previous years (Table 11).

The number of ponds stocked with fingerlings can provide a comparative indication of industry interest in the species and future harvest size. In 2009–2010, the area stocked with silver perch fingerlings was 27.7 hectares, compared with 18.8 hectares in the previous year. However, this is tempered by the average stocking rate which decreased from 12 400 to 8600 fingerlings per hectare. Overall, a similar number of silver perch were stocked in 2009–10 (236 800 fingerlings) as in 2008–09 (233 000 fingerlings).

**Table 11:** Silver perch production in Queensland (2007–08 to 2009–10)

	2007–08	2008–09	2009–10
<b>Total production (tonnes whole fish basis)</b>	<b>76.2</b>	<b>87.8</b>	<b>99.6</b>
Average price (\$/kg)	\$9.20	\$11.75	\$10.97
Total value (\$'000)	\$701	\$1031	\$1092
Average yield (kg/ha)	3500	5890	7275
Number of farms	10	10	9

Total food used increased from 176 tonnes in 2008–09 to 317 tonnes in 2009–10. Based on harvest figures, this equates to a FCR of 3.2 kg of feed per kilogram of fish produced. While an FCR of 3.2:1 is significantly worse than the FCR of 2.0:1 achieved in the previous period, the calculation doesn't take into account fish still in ponds (i.e. fed but not yet harvested), which would drive up food usage statistics. In 2008–09, 72% of feed was imported, whereas in the current period there is an even split between imported and locally produced feeds.

### 6.3 Jade perch

Production of jade perch in 2009–10 came from just three pond-based farms and one tank-based recirculating system; consequently, production details reported here are limited due to confidentiality reasons. Combined harvests out of both pond and tank systems totalled 17 tonnes in 2009–10 (Table 12). Production of this species has been in decline for the past two seasons, from 58.9 tonnes in 2007–08 and 41.8 tonnes in 2008–09.

In line with declining production, the value of the jade perch sector has also decreased over the past few years, with total sales for the species registering \$195 000 for 2009–10. This is a significant drop from recent years where the value of the sector has been over \$500 000. The average price softened slightly (6%) from \$12.28/kg in 2008–09 to \$11.53/kg for the current period; however, this price remains significantly higher than returns prior to 2008 where the price was consistently below \$10/kg.

In terms of future projections, the total area stocked with fingerlings this period was 3.2 hectares (down from 4.4 hectares). Correspondingly, total numbers of fingerlings stocked was 49 000 (compared with 107 000 the previous year), at a rate of 15 400 fingerlings per hectare.

**Table 12: Jade perch production in Queensland (2007–08 to 2009–10)**

	2007–08	2008–09	2009–10
<b>Total production (tonnes whole fish basis)</b>	<b>58.9</b>	<b>41.8</b>	<b>17</b>
Average price (\$/kg)	\$9.74	\$12.28	\$11.53
Total value (\$'000)	\$573	\$514	\$195
Number of producing farms	7	6	4

## 6.4 Murray cod

While Murray cod remains a significant contributor to this sector, in 2009–10 so few growers sold Murray cod that production data cannot be published this year as it would compromise client confidentiality.

## 6.5 Other species

Other species authorised for production in both pond-based and tank-based systems include golden perch (*Macquaria ambigua*), sleepy cod (*Oxyeleotris lineolatis*), Australian bass (*Maquaria novemaculeata*) and sooty grunter (*Hephaestus fuliginosus*). The relatively small quantities produced and the limited number of producers means that detailed information cannot be provided in this report. The combined production of these species in 2009–10 was 5 tonnes valued at \$90 000 (compared to 3.7 tonnes valued at \$72 100 in 2008–09). Out of all the freshwater species of this sector, sleepy cod command the highest price per kilo (average \$20/kg).

## 6.6 Labour (freshwater fish)

The total number of FTE workers within this sector was 21 labour units in 2009–10, which is a 20% increase from the 17.5 FTEs operating in the previous year. The majority of these (20) were permanent workers with casual labour supplying 2006 hours.

While many of the contributing growers produced several species, the labour distribution for each species was analysed where possible. For silver perch, the output has decreased from 11.7 tonnes per labour unit in 2008–09 to 7.6 tonnes. Over the same period jade perch output fell from 11.7 tonnes per labour unit to 5.7 tonnes. These 2009–10 figures of lower output per labour unit may be a consequence of substantial stock remaining within production systems at the time of survey. In some cases they reflect stock losses where labour was expended without resulting in fish sales.

Given the number of workers in the freshwater fish sector and the value of the sector, the dollar output per labour unit can be calculated. In 2009–10, each equivalent labour unit returned \$116 600 in sold fish. This is lower than in 2008–09 where each equivalent labour unit returned \$149 000. Broken down by species, silver perch returned \$86 700 per labour unit (down from \$137 300 in 2008–09), while jade perch returned \$67 300 (down from \$144 200). Again, lower dollar returns per labour unit in 2009–10 may be a consequence of substantial stock remaining within production systems at the time of survey.

## 6.7 Publications

Rowland S.J. (2009) Review of aquaculture research and development of the Australian freshwater fish silver perch, *Bidyanus bidyanus*. Journal of the World Aquaculture Society 40(3), 291–324.

Rowland S.J., et al. (2007) *Development of a health management strategy for the silver perch aquaculture industry*, New South Wales Department of Primary Industries.

Rowland S.J., et al. (2007) *Diagnosis, treatment and prevention of the diseases of the Australian freshwater fish silver perch (*Bidyanus bidyanus*)*, New South Wales Department of Primary Industries.

## 7. Eel culture

### 7.1 General

Production from the eel aquaculture industry in Queensland has continued to decrease steadily since it peaked at 71.8 tonnes in 2001–02.

In 2009–10 there were only three eel farms selling farmed eels and these farms work closely together effectively selling as a single entity. Due to the very low number of producing farms in 2009–10, no production data from the eel farming sector can be reported as it would compromise client confidentiality. Data from the eel farming sector has therefore been included in the 'Other' category of this report (Production summary – Section 1)

The primary species of eel grown by Queensland aquaculturists is the long-finned eel (*Anguilla reinhardtii*), with much smaller quantities of short-finned eel (*A. australis*) also grown.

Over the last four years all eels produced were exported and marketed live. In addition to the sale of adult eels, management arrangements introduced in 2005 allow for the sale of juvenile eels. In recent years this has resulted in the sale of a substantial quantity of weaned juvenile eels.

## 8. Hatchery and aquarium

### 8.1 General

The hatchery and aquarium sector encompasses growers who produce fish for use in aquaria, commercial growout (aquaculture) and stocking in public impoundments. Table 13 summarises statistics for the major species produced in 2008–09 and 2009–10.

The value of this sector has fluctuated over recent years with returns from sales reaching \$6.66 million in 2007–08, then falling to \$2.65 million in 2008–09. In the current 2009–10 reporting period, the total value of the sector has recovered somewhat to \$3.18 million. Total numbers of fish sold in this period, across all species, was 10.1 million. This is 32% more than the 7.6 million sold in 2008–09. Fingerling sales for most of the common species increased this year, with a notable exception being golden perch fingerlings where sales were down by half of the previous year's figure.

The number of fingerlings sold to the aquaculture sector for commercial growout reached 5.3 million. This is a marked increase from the 1.1 million fingerlings sold in 2008–09, and is largely a result of improved sales of barramundi (up 53%) and jade perch (up 189%), although sales of silver perch fingerlings fell by 50%.

A total of 3 465 000 fingerlings were sold for the state fish stocking program into public impoundments, including silver perch, golden perch, barramundi, Australian bass and Murray cod.

Exotic ornamental sales increased by over 110% from the previous year, returning to similar levels seen in 2007–08. As well, sales of native ornamental fish increased by more than 30% over the previous year. Marine species produced for sale to the aquarium trade and for commercial growout are reported collectively in Table 13 as ‘marine hatchery and aquarium’.

**Table 13:** Hatchery production of native fingerlings and ornamental aquarium species in Queensland (2008–09 and 2009–10)

Species	2008–09			2009–10		
	Sales (No.)	Value (\$)	Avg (\$)	Sales (No.)	Value (\$)	Avg (\$)
Barramundi (combined aquaculture and stocking)	3 641 000	\$926 000	\$0.25	5 136 200	\$1 296 400	\$0.25
Golden perch (combined aquaculture and stocking)	2 461 000	\$521 000	\$0.21	1 173 600	\$250 700	\$0.21
Australian bass (combined aquaculture and stocking)	(1)	(1)	(1)	1 237 900	\$266 700	\$0.22
Silver perch (combined aquaculture and stocking)	432 900	\$102 900	\$0.24	488 400	\$115 700	\$0.24
Jade perch (aquaculture)	179 000	\$47 600	\$0.27	517 400	\$138 000	\$0.27
Murray cod, Mary River cod and sleepy cod (combined aquaculture and stocking) <sup>(2)</sup>	207 700	\$134 200	\$0.64	198 300	\$131 000	\$0.66
Ornamental fish (exotics) <sup>(2)</sup>	546 800	\$278 700	\$0.51	1 163 800	\$510 600	\$0.44
Ornamental fish (natives) <sup>(2) (3)</sup>	140 600	\$142 500	\$1.01	191 500	\$242 100	\$1.27
Other <sup>(6)</sup>	(5)	\$284 300		(5)	\$108 500	
Marine hatchery and aquarium <sup>(2) (4)</sup>	(5)	\$210 800		(5)	\$123 400	
<b>Total (returns received)</b>	<b>7.6 m</b>	<b>\$2.65 m</b>		<b>10.1m</b>	<b>\$3.18 m</b>	

**Notes:**

- (1) Not reported as insufficient producers to maintain individual confidentiality.
- (2) Species grouped as individual species—data was not obtained or there were insufficient producers to maintain individual confidentiality.
- (3) Includes all native freshwater finfish sold to aquarium trade (e.g. rainbows, native ornamentals, saratoga, tandanus, as well as barramundi, golden perch etc.).
- (4) Includes oyster and pearl oyster spat, cobia, marine aquarium fish species, seahorses, corals and sandfish production.
- (5) Combines different phyla and developmental stages and therefore not appropriate to include numbers.
- (6) Includes barramundi sold as larvae, macrobrachium, snails and other invertebrate ornamental species.

## 8.2 Stocking and commercial growout species

The hatchery operations that produced the species listed below for the stocking program and for commercial growout (aquaculture) used 323 ponds in 2009–10. This was more than twice the number of ponds dedicated to fingerling production than the 152 ponds used in 2008–09. Over this period the total ponded area increased from 28.8 hectares to 47.4 hectares. The average size of ponds used to produce these fingerlings was 1500 m<sup>2</sup>. The sector also used 125 tanks totalling 457 m<sup>3</sup> of capacity (average tank volume: 3660 L). This too was an increase compared with 109 tanks totalling 430 m<sup>3</sup> in 2008–09.

### **8.2.1 Barramundi**

Barramundi (*Lates calcarifer*) fingerlings were produced in 9 hatcheries (down from 10 in 2008–09). Total production for 2009–10 was 6.5 million fingerlings, which was down from the 8.7 million produced in 2008–09. A major portion of the barramundi fingerlings produced is from farms that incorporate both hatchery and growout production. Fingerlings that are retained by the hatchery farm for their own growout are not considered as sales. Such operations account for a substantial proportion (>20%) of the fingerlings produced. There were 4.5 million fingerlings sold to other farms for growout (valued at \$895 000) which compared with 3 million sold for \$621 000 in 2008–09. The average price per fingerling fell marginally from \$0.21 in 2008–09 to \$0.20 in 2009–10.

Some barramundi hatcheries in this sector also produce larvae for sale. These larvae are not included in barramundi production figures as numbers and costs of larvae are not comparable with fingerling production and would therefore distort total production figures. For this period, the total value of barramundi larvae sold cannot be reported separately due to client confidentiality, but is included in the overall sector summary (Table 13).

The number of fingerlings sold for the stocking program fell from 668 000 (\$295 600) in 2008–09 to 606 000 (\$401 000) in 2009–10. Over this period the average price for fingerlings sold for stocking increased from \$0.44 to \$0.66. The higher price for barramundi sold to the stocking program (compared to aquaculture growout) is likely related to the larger size of the stocked fingerlings.

### **8.2.2 Golden perch**

Golden perch (*Macquaria ambigua*) fingerling production was undertaken by seven hatcheries (four in 2008–09). The total value of fingerling sales in 2009–10 was \$250 700. Production decreased from 2.46 million in 2008–09 to 1.6 million. Stocking accounted for the vast majority of sales (1.17 million) with only a few hundred fish purchased by the farming sector.

### **8.2.3 Australian bass**

Production of Australian bass (*Macquaria novemaculeata*) occurred in five hatcheries in 2009–10 (only two in 2008–09). Bass fingerlings were produced primarily for impoundment stocking with almost 1.2 million fingerlings stocked into public waters. The combined value of Australian bass fingerling production was \$266 700, with an average price of \$0.22 per fingerling.

### **8.2.4 Silver perch**

Silver perch (*Bidyanus bidyanus*) fingerlings were produced by six hatcheries in 2009–10. While survey returns showed 990 000 fingerlings were produced, substantially less (488 000) were actually sold, for a total value of \$115 650. Nevertheless, this was an increase over the 432 000 fingerlings sold in the previous year. Three-quarters of hatchery-produced silver perch fingerlings (376 000) were sold for impoundment stocking, while the remainder (112 000 fingerlings) were purchased for aquaculture growout. The average price received per fingerling was \$0.24 for stocking and \$0.23 for aquaculture.

### **8.2.5 Jade perch**

Jade perch, or Barcoo grunter, (*Scortum barcoo*) fingerlings came from three hatcheries (four in 2008–09). All sales were to the aquaculture growout sector with a significant number of fry and fingerlings being sold overseas and interstate. Sales totalled 517 000 fish (valued at \$138 000), which was a major increase over previous years e.g. 84 590 fingerlings (\$15 800) in 2007–08 and 179 000 fingerlings (\$47 500) in 2008–09. The average price received was \$0.27 per fingerling.



### **8.2.6 Murray cod, Mary River cod and sleepy cod**

Murray and Mary River cod (*Maccullochella* sp.) and sleepy cod (*Oxyeleotris lineolatus*) sales were combined to maintain confidentiality of the information supplied by the hatcheries that produced any of these fish. As in the previous two years, only four hatcheries produced cod in 2009–10. Sales for these species decreased from 207 700 (\$134 200) in 2008–09 to 198 200 (valued at \$131 000) in 2009–10. The average price for fingerlings was \$0.66 with growout farms purchasing 41% of the fingerlings (40% in 2008–09) and the rest going to the stocking program.

## **8.3 Freshwater aquarium and ornamental species**

The producers growing freshwater aquarium and ornamental species (listed below) used 132 ponds in 2009–10 (compared with 244 ponds in 2008–09). Ponds covered an area of 9.1 hectares in 2009–10 (10.3 hectares in 2008–09). The average size of ponds used for growing ornamentals was 690 m<sup>2</sup>. The sector also used 603 tanks totalling 490 m<sup>3</sup> in 2009–10 (compared with 970 tanks totalling 880 m<sup>3</sup> in 2008–09).

### **8.3.1 Exotic ornamental fish**

Exotic freshwater ornamental fish were produced by 11 hatcheries in 2009–10 (up from six hatcheries in 2008–09). The number of fish sold increased from 547 000 fish in 2008–09 to over 1.16 million fish in 2009–10. Likewise, the value of the sector recovered from \$278 700 to \$510 000.

### **8.3.2 Native ornamental fish**

Native freshwater ornamental fish (including lungfish and saratoga) were produced by 15 farms in 2009–10 (up from seven in 2008–09). The number of fish sold increased from 140 600 (valued at \$142 500) in 2008–09 to 191 500 (valued at \$242 000) in the current period.

## **8.4 Marine hatchery and aquarium**

The marine hatchery and aquarium group covers a diverse range of species including oyster and pearl oyster spat, barramundi cod, cobia, mangrove jack, mullet, aquarium fish, seahorses, corals and sandfish production. There were only three hatcheries that sold product in 2009–10 (compared with 10 in 2008–09). Only the value of sales is reported in this section—the group is so diverse that it is not meaningful to tally and compare numbers of oyster spat with numbers of fish.

The value of production has been strongly influenced by sales of reef fish fingerlings in previous years. Sales have now decreased from \$1.6 million in 2007–08 to \$210 800 in 2008–09, and further during the current reporting period to only \$123 400.

## **8.5 Labour (hatchery and aquarium)**

Statistics for the whole sector show that it now has 41 permanent staff (down from 65 in 2008–09) and employed 13 500 hours of casual labour (16 100 hours in 2008–09). This equates to 48 FTEs employed in the sector, which was a decrease from the 74 units in 2008–09. Output per labour unit increased from \$34 900 in 2008–09 to \$66 250 in the current period.

## **8.6 Publications**

DAFF (2010), *A strategic approach to the management of ornamental fish in Australia*.

Lupton C., Cheetham R. (2009), *Aquaculture Association of Queensland (AAQ) commercial hatchery code of best practice*.

NSW DPI (2010) *Hatchery quality assurance scheme*.

## 9. Pearl oyster culture

### 9.1 General

The value of the pearl oyster industry in Queensland is not available for publication in 2009–10 as a result of farms not supplying full information. Only two farms reported production in 2009–10, with the value of the sector being reported in the ‘Other’ category of this report (Production summary – Section 1). The main species cultured are the gold lip oyster (*Pinctada maxima*), black lip oyster (*P. margaritifera*), and penguin oyster (*Pteria penguin*).

## 10. Edible oyster production

### 10.1 General

In Queensland all aquacultured oyster production occurs south of Hervey Bay and is confined to the culture of rock oysters (*Saccostrea glomerata*) on ‘furniture’ placed on tidal land, predominantly above mean low water.

A total of 106 oyster areas authorised for aquaculture were surveyed during 2009–10, with only 74 statistical returns received. While a 70% industry response to the survey will provide indicative industry statistics, these data are presented with the caveat that not all information was made available.

The total production in Queensland has decreased by 8% from 105 600 dozen in 2008–09 to 97 500 dozen in 2009–10. The industry has been in consistent decline since 2004–05 when annual harvests had been in the order of 200 000 dozen. The current value of the edible oyster industry is \$512 600, marginally above the \$509 600 worth of sales in 2008–09 but well down on the \$620 500 return in 2007–08 (Table 14).

**Table 14:** Edible oyster production in Queensland (2007–08 to 2009–10)

	2007–08	2008–09	2009–10
Total production ('000 dozen)	136.4	105.6	97.5
Total value (\$)	\$620 500	\$509 600	\$512 600

Industry responses to the survey showed there was a total of 25 oyster producing areas in 2009–10. Production levels varied across these 25 areas, ranging from 40 dozen to almost 19 500 dozen (Table 15).

**Table 15:** Analysis of edible oyster production in Queensland (2007–08 to 2009–10)

	2007–08	2008–09	2009–10
Number of oyster areas surveyed	110	107	106
Number of responses	83	66	74
Number of oyster areas not stocked	42	25	16
<b>Production (dozens)</b>	<b>No. of areas</b>	<b>No. of areas</b>	<b>No. of areas</b>
Nil	51	41	49
1 to 500	13	7	8
501 to 1000	5	4	2
1001 to 2000	6	5	4
2001 to 5000	2	4	6
5001 to 10 000	2	3	1
Over 10 000	4	3	4
<b>Total producing oyster areas</b>	<b>32</b>	<b>25</b>	<b>25</b>

The average price per dozen oysters has increased by 9% from \$4.83 per dozen in 2008–09 to \$5.26 per dozen in 2009–10.

Oysters are sold in a range of different sizes to meet market requirements. The three main categories used by the industry are bistro, bottlers and plate size. Table 16 summarises the different product types, average prices and the market percentage of each product type. Bottlers make up 39% of the product marketed at an average price of \$4.43 per dozen (28% higher than 2008–09). The highest value category (\$7.76 per dozen) is the plate product, which makes up 17% of the oysters sold. Prices for this size category remain the same as last year. Bistro oysters at \$6.08 per dozen account for 35% of production, with averages prices up 8% from the previous year.

**Table 16:** Edible oyster marketing information for Queensland (2008–09 and 2009–10)

Packaging type	2008–09		2009–10	
	Price per dozen (\$)	Market (%)	Price per dozen (\$)	Market (%)
Bottlers	\$3.46	47%	\$4.43	39%
Bistro	\$5.63	28%	\$6.08	35%
Plate	\$7.75	19%	\$7.76	17%
Others	\$2.81	7%	\$2.81	10%
<b>Average return—all oysters</b>	<b>\$4.83</b>		<b>\$5.26</b>	

Oyster sales are one measure of change in an industry. Other indicators on industry growth and performance, the numbers of shells introduced to authorised areas, stock losses and stock on hand details are provided in Table 17. The number of shells introduced to leases increased by 2% while the number of shells held on leases at the end of June fell significantly by 51%. Losses of oyster stocks, reported to be principally from theft, predation, processing and water quality issues, increased by 12% during this period.

**Table 17:** Edible oyster introductions, losses and stocks on hand in Queensland (2008–09 and 2009–10)

	2008–09	2009–10	Change (%)
Shells introduced (dozen)	151 000	154 300	+2%
Losses (dozen)	129 000	144 000	+12%
Number on hand (30 June)	515 750	253 300	-51%

## 10.2 Labour

Total permanent labour employed in the industry was 19.8 units (14 units in 2008–09), while total casual employment decreased from 4330 hours in 2008–09 to 2592 hours in 2009–10. This converts to 21 FTEs employed in the industry, which represents an increase of more than five labour units from the previous year.

In terms of labour efficiency, the production per FTE for 2009–10 was 4604 dozen (compared with 6400 dozen in 2008–09). Total industry output (in terms of dollars returned from sales per labour unit) decreased from \$30 800 per labour unit in 2008–09 to \$24 200 per labour unit in 2009–10.

## 10.3 Publications

O'Sullivan, D 2009, Plan allows for expanded oyster production in Moreton Bay marine park, *Austasia Aquaculture* 23(3): 12–16.

DPI&F 2005, *Queensland oyster industry development plan*, State of Queensland (available on the DEEDI website at [www2.dpi.qld.gov.au/fishweb/16413.html](http://www2.dpi.qld.gov.au/fishweb/16413.html))

DPI&F 2007, *Queensland oyster industry development plan: implementation report*, State of Queensland (available on the DEEDI website at [www2.dpi.qld.gov.au/fishweb/16413.html#13](http://www2.dpi.qld.gov.au/fishweb/16413.html#13))

QSWAMP sampling guideline (available on the DEEDI website at [www2.dpi.qld.gov.au/extra/pdf/fishweb/FAMOP005.pdf](http://www2.dpi.qld.gov.au/extra/pdf/fishweb/FAMOP005.pdf))

## 11. Regional summary

Information has been analysed to provide a regional overview of the aquaculture industry in Queensland. The regions are based on the statistical divisions adopted by the Australian Bureau of Census and Statistics.

The information presented in Tables 19 to 22 was compiled from the annual statistical returns received from registered aquaculture authority holders. The totals include all sectors of the industry described in the earlier part of this report.

The results presented in these tables need to be interpreted carefully as they only summarise the information collected from the farms that responded and submitted statistical returns.

The number of returns received varies between years (Table 18) and this can affect the trends. Rounding errors can cause minor discrepancies in some of the totals. It should also be noted that the data from 2009–10 included, for the first time, statistical data from aquaculture operations that are registered under the Self Assessable Code for Aquaculture.

**Table 18:** Response rates—Queensland (2007–08 to 2009–10)

	2007–08	2008–09	2009–10
Number of authorised producers (no.)	580	476	530
Questionnaires received (no.)	665	371	354
Response rate (%)	85%	78%	67%

The following tables (Table 19 through to Table 22) demonstrate how some of the major production parameters such as value, weight of product, ponded area and labour are divided between the respective Queensland statistical divisions. It should be noted that no data is available from 2008–09 as that year’s production data was collected using an online survey that did not provide the data in a format that was suitable for analysing in terms of statistical regions.

The main sectors (prawns and barramundi) have a major influence on the value and quantity of production. The total farm gate value of production is highly dependent on prawns, which contributes 72% (prawn growout and hatchery) of the total industry value and 65%, by weight, of the total production. Barramundi is the next most significant industry sector. In 2009–10 barramundi growout contributed 20% of the total industry value and 30% of the total quantity of product sold. Four divisions (Northern, Far Northern, Moreton and Mackay) account for the majority of the industry value and production (Table 19 and Table 20).

**Table 19:** Farm gate value (\$ million)—Queensland (2007–08 to 2009–10)

Statistical division	2007–08	2008–09	2009–10
Brisbane and Moreton	\$14.1	na*	\$25.1
Wide Bay	\$5.3	na*	\$6.4
Darling Downs	\$0.7	na*	\$1.2
Fitzroy	\$0.5	na*	\$0.4
Mackay	\$8.6	na*	\$7.2
Northern	\$29.1	na*	\$44.0
Far Northern	\$20.5	na*	\$18.7
<b>Total</b>	<b>\$78.8</b>	<b>85.5</b>	<b>\$103.0</b>

\* Not available for publication

**Table 20:** Total production (tonnes)—Queensland (2007–08 to 2009–10)

Statistical division	2007–08	2008–09	2009–10
Brisbane and Moreton	855	na*	1592
Wide Bay	315	na*	366
Darling Downs	48	na*	80
Fitzroy	23	na*	5
Mackay	614	na*	505
Northern	2137	na*	3504
Far Northern	1712	na*	1769
<b>Total</b>	<b>5705</b>	<b>6520</b>	<b>7821</b>

\* Not available for publication

Far Northern and Northern divisions have the majority of the ponded areas in Queensland with Mackay, Moreton and Wide Bay also having significant areas (Table 21).

**Table 21:** Total ponded area (hectares)—Queensland (2007–08 to 2009–10)

Statistical division	2007–08	2008–09	2009–10
Brisbane and Moreton	163	na*	170
Wide Bay	122	na*	138
Darling Downs	16	na*	18
Fitzroy	6	na*	5
Mackay	188	na*	184
Northern	299	na*	265
Far Northern	237	na*	229
<b>Total</b>	<b>1031</b>	<b>995</b>	<b>1010</b>

\* Not available for publication

The greatest employment occurs in the Northern division, which employed over 40% of the aquaculture workforce in Queensland (Table 22).

**Table 22:** Total employment (FTEs)—Queensland (2007–08 to 2009–10)

Statistical division	2007–08	2008–09	2009–10
Moreton	116	na*	99
Wide Bay	61	na*	56
Darling Downs	6	na*	8
Fitzroy	6	na*	8
Mackay	56	na*	47
Northern	186	na*	229
Far Northern	188	na*	117
<b>Total</b>	<b>619</b>	<b>562</b>	<b>565</b>

\* Not available for publication



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