White Paper: Prawning

River & Inshore Beam Trawl Fishery

Noosa River & Lakes System

inc. Laguna Bay/Coastal Areas

December 2021

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Recommendation

That the T5 Noosa RBIT Prawn Fishery continues to be managed, monitored, and assessed by the Department of Agriculture and Fisheries under the Sustainable Fisheries Strategy 2017-27 without any need for structural change such as licence buy-backs.

Introduction

To fully understand prawn beam trawling in the Noosa Region, you need to understand the macro context first. Looking only at the local level, quickly can and does, lead to erroneous hypothesis, assumptions, and conclusions. This review examines in detail the performance of the T5 Noosa beam trawling fishery not in isolation as has typically been the case, but as part of, and compared to the overall prawn fisheries in Queensland and Australia.

Are there fewer prawns being caught in the Noosa River system?

Yes! Statistically, fewer prawns were caught in the past decade compared to the 1990's-2000's.

But does this mean that there are fewer prawns to be caught?

Public opinion on commercial prawn trawling varies greatly as to the extent or what role that it does play. It is a highly emotive discussion in some areas and can be quite polarising. The commercial fishers involved argue that there is no threat on the resource and that in combination with Federal and State fisheries management laws and requirements, Noosa's very small-scale, modern day prawning is very much a sustainable industry.

This view is supported by the Australian Government Department of Sustainability, Environment, Water, Population and Communities assessment of the Queensland River and Inshore Beam Trawl Fishery (2012) which stated that the stock status for Noosa's dominant species retained in the RIBTF was reported in fisheries Queensland's Stock status of Queensland's fisheries resources 2011 as considered at low risk of being overfished.

Furthermore, the Queensland Department of Agriculture and Fisheries scientists under the 2017-2027 Sustainable Fishing Strategy ERA's (Environment Risk Assessment of fisheries) have also deemed the fishery to be sustainable and that there are no risks to prawn stocks.

So why is there is an ongoing effort to prove otherwise? Is there something in the local metadata we have, or information that we do not currently have, that contradicts or potentially overturns these formal assessments?

Some argue that the prawn biomass has been destroyed due to anthropogenic factors such as sedimentation, disturbance to natural environments, diminished habitat such as seagrasses, damaged riparian, littoral and benthic zones and of course the most visible being commercial fishing. But what if this view is wrong and we find that there is no contradiction nor anomaly in the data?

Do we then simply acknowledge that current commercial fishing practices are sustainable as measured by both the State and Federal Governments and embrace this activity as part of Noosa's heritage and future?

Or should we move the discussion on the suitability of local prawn trawling on, or based upon, purely environmental grounds aimed at banning commercial fishing, to a philosophical question about what the river should 'look like' in the future. For example, should it be one that is accessible for recreational and commercial pursuits as it is today? Or should we move to the other end of the spectrum, where the river becomes a limited access national park with very restrictive use where commercial fishing has no role at all?

As much as we could not convince some people that fishery reforms were needed to maintain sustainable fish stocks in the past, at the other end of the spectrum, we were also not able to convince those who believe that any human commercial interference or activity is acceptable, nor it is sustainable.

The hard-line environmental view here will always hold the belief that commercial fishing of any kind must be banned because over some 60 years, local commercial fishing activity has irreparably damaged and continues to damage the habitat. They go on and state that there has been no ability for the fishery to recover and that this is the reason prawn catches are at record lows. They demand that it must be declared a marine park and that part of this journey is the cessation of all commercial fishing.

The time has come to move beyond the limited, selective, purpose designed research that has been communicated and promoted to date, to researching what the real facts are when it comes to commercial prawn trawling.

The aim of this paper focuses upon the published Federal and State data, empirical facts and evidence. What this objectively aims to do is to:

- provide general recommendations.
- provide fact-based previously non-cited work that is relevant to the discussion.
- provide the knowledge and fact base to the public so that they can form fair and reasonable perspectives on commercial prawn beam trawling.
- review the data and supporting materials quoted and used to form the foundation for the arguments to ban commercial prawn beam trawling and convert the river system into a marine park.

The ban fishing position - So, what is the argument used to try and ban commercial prawn beam trawling in the Noosa River and waterways?

The protagonists of the charge to ban or severely limit commercial prawn beam trawling include eight local environmental/community groups (Noosa News 17/3/2019). They are - Noosa Parks Association, Noosa Shire Residents and Ratepayers Association, Noosa, and District Landcare, Ozfish, Sunshine Coast Environment Council, Noosa Integrated Catchment Association, Friends of Lake Weyba and Friends of Kinaba.

The foundation for cessation of commercial prawn beam trawling used by these groups is essentially based upon Thurstan's[1] and Skilleter's[2] reports and subsequently, followed by Council's 'Noosa Fishing Futures' report which cited both reports as an empirical basis for recommendations to buy-out fishing licenses and to close the fishery.

These groups interpretation of the information and data contained within these reports has been quoted on many occasions in the media, Council meetings, public forums, etc. The central themes quoted from each as proof positive include:

1. Dr Ruth Thurstan's 2015 'Historical Ecology of the Noosa Estuary Fisheries' (funded by Noosa Council, The Thomas Foundation and the Nature Conservancy) has been interpreted by the anti-prawn trawling lobby on the argument that there are no longer any prawns to catch. This is evidenced by the fact catch rates are significantly down in the last decade versus earlier decades.

2. Dr. Greg Skilleter's work in the Noosa River has also been used extensively to provide an indirect scientific basis or argument to promote the premise that commercial prawn beam trawling activity from the 1950's through to the 1980's, had decimated the benthic layer of the lakes and waterways to the extent that the benthos has never been able to recover. The research work Dr. Skilleter completed in two separate non-related studies 20 years apart has been used to suggest that there is a problem within the benthic layer in the waterway caused by commercial prawn beam trawling amongst other things.

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[1] Historical ecology of the Noosa Estuary fisheries. Dr Ruth H. Thurstan School of Biological Sciences and Australian Research Council Centre of Excellence for Coral Reef Studies The University of Queensland.

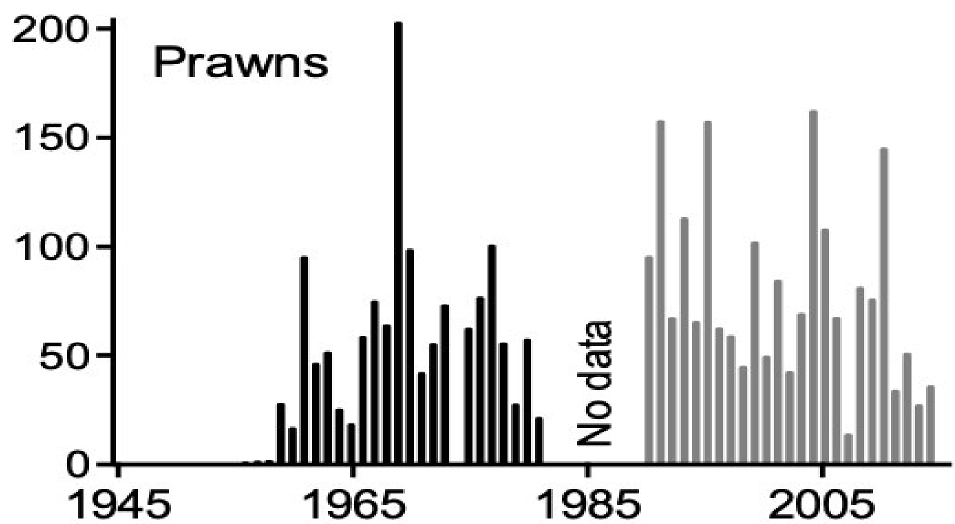
[2] Biodiversity in the Noosa River System Assessment of the status and options for recovery of prawns & estuarine biodiversity in the Noosa River. Greg A. Skilleter Dylan Moffitt Neil R. Loneragan. The University of Queensland Murdoch University. 2020

But why can't we rely upon Thurstan's and Skilleter's reports?

There are two very important points Thurstan specifically stated within her report…firstly…... 'Commercial fishing records are limited and for the most part do not provide us with Noosa-specific catch. It is clear from the available records that landings of the main species have always been variable, and **no** significant declines in catch are recorded, although the numbers of commercial fishers have declined over time…. historical data cannot provide quantitative estimates of change for the Noosa Estuary fisheries…' [3]

The second, and most significant issue, is that e.g., the prawn catch data provided by Thurstan (Fig.1) is misleading or open to significant misinterpretation because it is based upon 3 different data sets and reporting methodologies. The pre-1981 data is Tewantin Fish Board data which includes all locally caught species plus 'out of area' catches (Fundamentally W35 grids 15, 16, 21 or some 40 square nautical miles of waterways predominately beam trawled) whereas the post-1993 data Thurstan used is the whole W35 zone which is a 30 nautical mile x 30 nautical mile fishing site (or some 900 square nautical mile area) which includes all Beam and Otter trawl catches. This W35 site starts in the north near the 'Cherry Venture' wreck on Teewah Beach to Peregian Beach in the South and extending 16 nm east offshore from Noosa Heads to Boreen Point in the west. This broad, high-level data is not specific enough or relevant for meaningful discussion and consideration on the specific T5 Noosa RIBT zone.

Figure 1. Thurstan Prawn Data



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[3] Historical ecology of the Noosa Estuary fisheries. Dr Ruth H. Thurstan School of Biological Sciences and Australian Research Council Centre of Excellence for Coral Reef Studies The University of Queensland. Page 26

Thurstan's graph[4] above shows the quantity of prawns processed through the Tewantin Fish Board (1946-1981; black bars) and reported as caught within the Queensland Fisheries grids W35 and V35 (1990-2014; grey bars) by otter and beam prawn trawls. Source: Queensland Department of Agriculture and Fisheries.

Regarding Skilleter's report, profoundly critical, is the fact that Skilleter stated *that "…. the current study was not done though to examine specifically any impacts from prawn trawling (Major findings 1 (iii)…***'**, but rather to investigate the status of the benthic communities (of which prawns are one part) within the system and to examine the potential for using prawns as a sentinel species for detecting impacts. Essentially saying that if there are questions regarding prawns, further research is needed.

Another significant fact is that where Skilleter sampled the benthic layer (i.e., along the foreshore and in other parts of the river), these areas do not get trawled because they are inaccessible to commercial vessels or are prohibited by DAF to trawl. This is one reason why Skilleter could not draw any conclusions nor make any connections between the status of a benthic layer and commercial prawn beam trawling because there was/is no trawling activity in those areas where he sampled.

Importantly, Skilleter did however state that he believed that sedimentation was the key issue - a point that many in the community regularly subscribe to.

Noosa Fishing Futures Report 2019 – the author of Noosa Council's submission quoted this report and used it as the basis of their submission to the State on Fishing Futures 2017. Broad interpretations of data were used as the underlying premise or basis that commercial prawn beam trawling needs to stop because it has/is causing problems within the environment based upon evidence in both Thurstan's and Skilleter's reports.

Council even went one step further by publicly expressing concerns over the compatibility of trawling in the Noosa River and lakes, particularly due to current projects underway aimed at the restoration of the waterways, such as 'Bring Back the Fish'. This is even though Beam Trawling in the Noosa River only starts some 10 kilometres upstream from the river mouth and then heads a further 13 kilometres north into Lake Cootharaba whereas the oyster project is located nowhere near commercial trawling being located within only 2 kilometres from then river mouth and 8 kilometres from the start of beam trawling.

[4] Historical ecology of the Noosa Estuary fisheries. Dr Ruth H. Thurstan School of Biological Sciences and Australian Research Council Centre of Excellence for Coral Reef Studies The University of Queensland. Page 27

The Australian Seafood Industry - Summary

The growth of imports, prices, and aquaculture in combination with changing consumer demand and the impact of Covid-19 has seen an ongoing decline in fishing effort and catch in response. The last 30 years has seen a major reduction in fishing licences, fishing effort and a shift away from catching low value seafood to higher value seafood by commercial operators as they adapt to new market conditions.

The Facts (Dept. of Agriculture, Water, and the environment ABARES[5] Data 2021)

- Australian seafood consumption has decreased 11.7% from 2005-6 (15.5kgs per person) to 2017-18 (13.7 kgs per person).
- Seafood prices have risen some 50% since 1998 (indexed) compared to poultry around 10% price rise.
- Seafood imports now account for some 70% of consumption
- Imports generally are of a lower unit value (cheaper) than prawns produced domestically.
- Since 1999, the volume of wild-caught prawns caught in Australia has decreased by some 42% to 2018
- The decline in wild-caught GVP (Gross Value of Production) from 2000–01 to 2011–12 was driven by Australia's exchange rate appreciation over the period, structural change in the sector to achieve more sustainable wild-caught fisheries and adverse environmental and disease factors that affected the availability of some species, as well as adjustment to changing commodity demand patterns in the global market.
- Covid -19 has had a significant impact on Australia's fisheries and aquaculture industry seeing the GVP fall over 8% in 2020-21
- Most Australian prawn production is wild caught, but the share of aquaculture prawns is increasing steadily.
- Aquaculture's share in total Australian fisheries and aquaculture GVP continues to grow. In 2005-6 aquaculture was 34% of fisheries GVP. In 2025-26 it is projected to be 55%
- Since 1999 the GVP of wild-caught has fallen 50% offset by a 50% increase in GVP via aquaculture.
- In 2018-19, Australia farmed prawn production increased by 18.1% to 4,630 tonnes and is expected to grow to 20,000 tonnes over the next five years.
- Through to 2025–26 the value of Australian prawn production is projected to fall. Given the subdued demand conditions internationally, most local production is expected to supply local markets, at lower price points.
- Queensland's Fisheries – GVP declines by 5% in 2017-18. Wild-catch GVP declined 7% in the same period driven by a decrease in landed prawns – 39% of total value of wild-catch $70.1 million.

[5] Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), the science and economics research division of the Department of Agriculture, Water, and the Environment.

- In Queensland, there has been a 60%+ increase in prawn aquaculture production since 1989.
- Queensland aquaculture GVP decreased by 2% in 2017–18 to $114.2 million. This was largely due to a 4% decline in the GVP of Prawns (including Black Tiger Prawns, Banana Prawns and Eastern King Prawns) to $74.7 million—down from $77.8 million in 2016–17.
- Prawns are Queensland's biggest contributor to the aquaculture sector. The volume of aquaculture Prawns harvested for commercial purposes declined by 8% from 4,264 tonnes in 2016–17 to 3,921 tonnes in 2017–18.
- In the Qld RIBT (Rivers & Inland waters Beam Trawling), there were some 160 prawn beam trawl licences in the mid 1990's with some 95 licences active. Macro-economic pressures have led to major changes in the industry and by 2017 there were nearly half left with only 83 licences in total of which only 48 were active[6].
- In the T5 area that includes Noosa there were some 50 beam trawl licences in the 1990's increasing to 60 in the 2000's with around 48-50 active during this time. Today there are 36 licences with only 26 active.
- Looking at the W35 fishing grid around Noosa (which includes both otter board and beam trawling) there was a peak of 73 licences in the 1990's and today only 35.
- Over the past 30 years, the RIBT fishery in Noosa has had between 6 and 13 active licences with less than 5 operating in recent years.
- Fewer licences (and active licences) results in either significantly reduced catch effort which results in fewer prawns being caught and/or fishers diverting effort to higher yield catches.
- Given the nature of the beam trawling operations (relatively few operators, slow trawl speed) and the suite of management arrangements in the fishery, including permanent area closures and gear restrictions, ecosystem risks from the operation of the fishery are considered low.

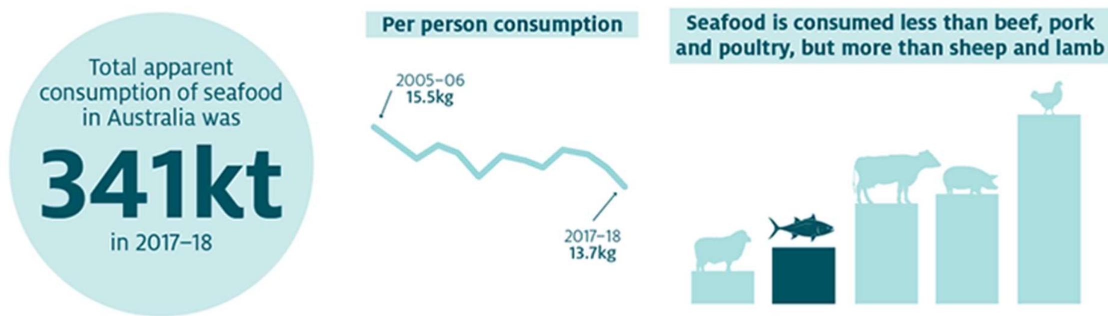
Adverse macro-economic factors are what has, and continues to drive, catch effort and results for wild-caught prawns everywhere in Australia including Noosa!

[6] Department of Agriculture and Fisheries Queensland – Commercial Fishing Data 5/2020

An overview of the Seafood Industry - Let's start by examining the Seafood Industry in Australia. What facts do we know?

Seafood Consumption - **Australians are eating less seafood……**

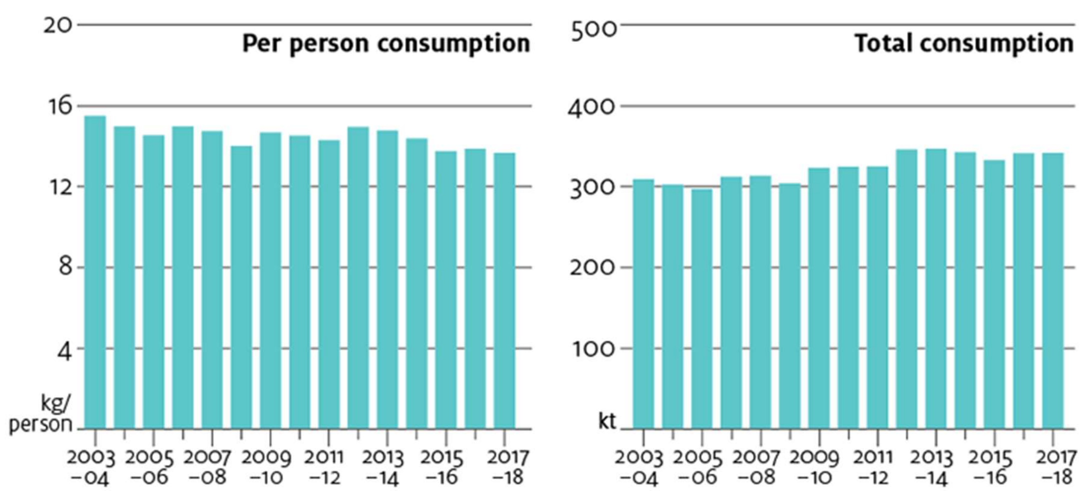
Figure 2. - Australia's consumption of seafood



Source: ABARES

Australia's apparent consumption of seafood increased, on average, at an annual rate of 1.9% between 1998–99 and 2017–18, from an estimated 238,968 tonnes in 1998–99 to 341,272 tonnes in 2017–18 (Figure 3). However, per person apparent consumption of seafood decreased slightly between 2007–08 and 2017–18 (trending down from 14.7 kilograms per person in 2007–08 to 13.7 kilograms per person in 2017–18).

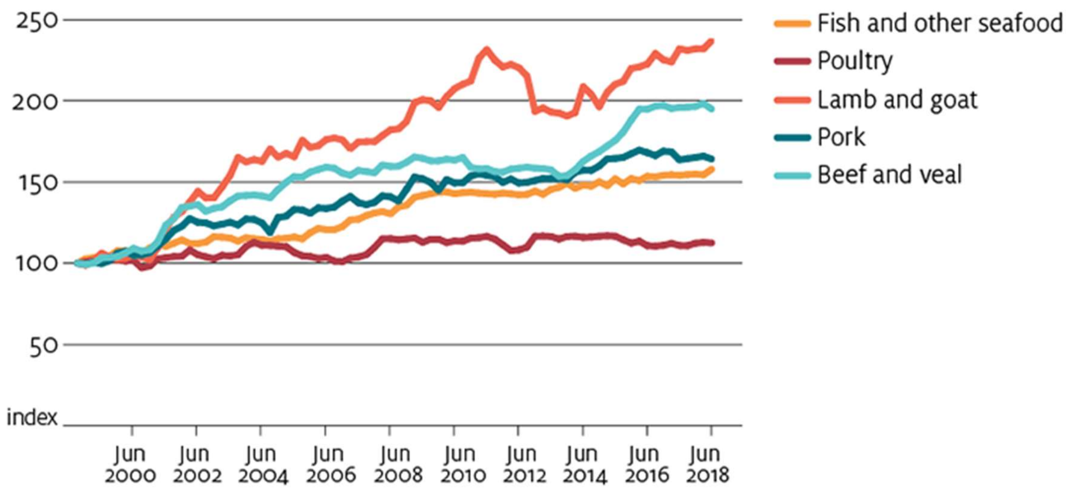
Figure 3 - Apparent consumption of seafood in Australia, 2003–04 to 2017–18



Source: ABARES

Seafood Pricing - seafood has become relatively expensive compared with poultry but less expensive relative to beef and veal.

Figure 4. Retail meat and seafood prices in Australia, September 1998 to June 2018



September 1998 = 100. Prices are taken as the weighted average of eight capital cities. Fish and other seafood defined as fresh, chilled or frozen fish and seafood (Crustaceans and other shellfish); dried, smoked or salted fish and seafood. Adapted from Taylor & Butt 2017. Source: ABARES, ABS

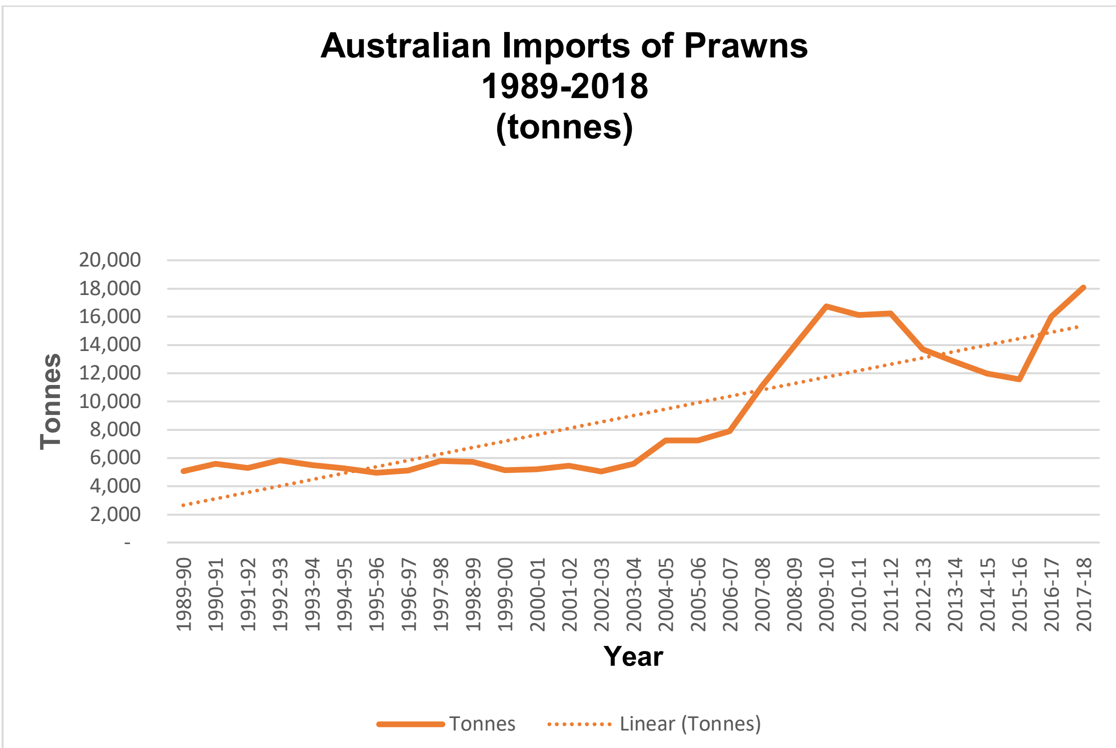
Recent **consumer research** *Unpacking the consumer seafood experience* sheds light on recent trends among Australian seafood consumers (Intuitive Solutions 2019). The survey sampled 2,002 adult grocery buyers in 2019 and is an update on similar research from 2016. According to the results of the survey, 78% of Australians had consumed seafood in the previous 12 months, largely unchanged from 77% in 2016. The results of the survey showed these seafood consumers fall into one of three categories: frequent eaters, regular eaters and infrequent eaters. The survey results showed that frequent eaters (those that consume seafood once a week or more) accounting for only 33% of consumers but accounted for 77% of consumption. Price is important to consumers but was found not to be the key driver of seafood consumption. Consumers reported that freshness and food safety are more important than price, but that **price was more important than quality** (whether the seafood is fresh or has been frozen) and presentation. The 2019 findings reiterated that uncertainty about choosing, preparing and cooking seafood is a barrier to seafood consumption.

Global demand for prawns declined significantly during 2020–21, driven by COVID-19 based disruptions on the global travel, food service and accommodation sectors. Australia produces a relatively low volume of prawns, but our exports comprise several high unit value species focused on markets that have been significantly impacted by COVID-19. The resulting subdued global prawn prices during the year led to lower unit export returns(prices) for Australian exporters.

Imports - On the other hand, **Australia imports a significant quantity of prawns to meet domestic demand, but these imports are generally of a lower unit value than prawns produced domestically**. As such, to what extent price-sensitive domestic demand can absorb high-priced diverted exports is unclear but many are fearful that prices will further be depressed.

Seafood imports (Figure 5.) play an important role in Australian seafood consumption and are required to fill the gap between seafood consumption and local seafood supply. Between 1998–99 and 2013–14 seafood imports increased from 132,396 tonnes to peak at 237,511 tonnes **(+80%**). During this period the **proportion of seafood accounted for by imports (by volume) increased from 55% to 69%**, while domestic seafood supply remained broadly steady at around 112,000 tonnes.

Figure 5.



Lower value of Australian fisheries and aquaculture production in 2019–20 and 2020–21

COVID-19 has had a significant impact on Australia's fisheries and aquaculture industry. The impact has been complex and resulted from both demand-side disruptions to domestic and international markets and supply-side disruptions from social distancing measures across fishing and aquaculture activities and issues in crewing vessels and sourcing inputs in some sectors.

Some impacts have been mitigated as select segments of the industry have adjusted to the pandemic, such as by pivoting from food service to retail sales. However, despite these mitigating actions, **lower demand** for much of the sector is estimated to have reduced the gross value of Australian fisheries and aquaculture production (GVP) to $3.11 billion in 2019–20. This represents a $258 million (or 8%) downward revision from the December 2019 outlook.

The value of fisheries and aquaculture production is not expected to return to pre-2019–20 levels over the projection period due to the ongoing effects of COVID-19. GVP in 2020–21 is expected to decline to $2.94 billion (down 6% from 2019–20) in real dollars, before commencing a slow recovery.

Figure 6. Australian fisheries and aquaculture production value, 2005–06 to 2025–26

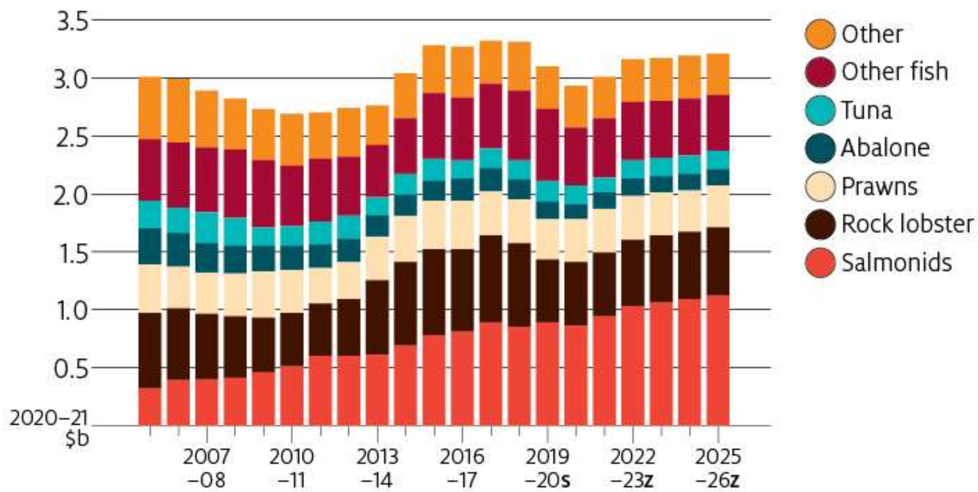


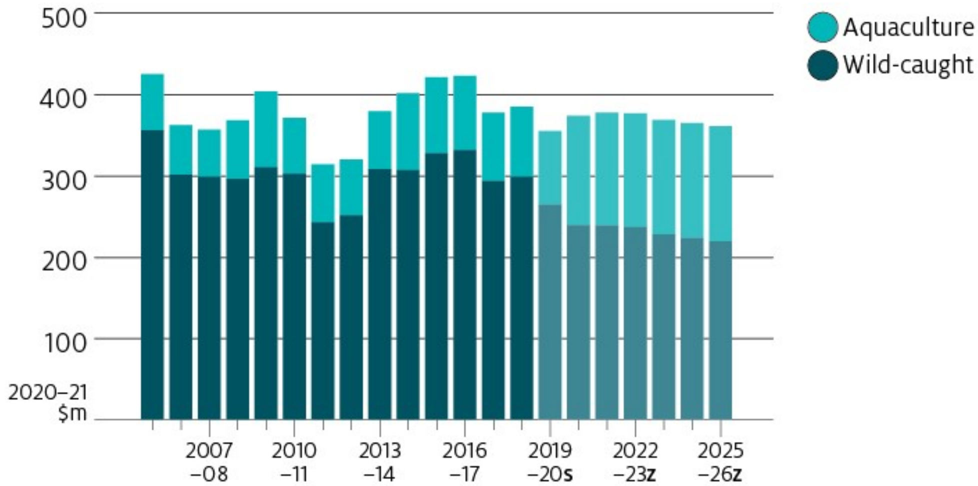
Fig.7 Prawns GVP outlook

ABARES forecast

Australian fisheries and aquaculture GVP are forecast to recover slowly but steadily at 1.6% average annual growth to $3.21 billion (real dollars) by 2025−26. Compared with ABARES forecast in early 2020, this estimate represents a cumulative reduction in GVP of $1.9 billion over the period 2020–21 to 2024–25. That is, approximately two-thirds of a year of GVP value will have been lost over the 5-year projection period due to the range of external shocks impacting the sector from 2019–20.

Through to 2025–26 the value of Australian prawn production is projected to fall. Given the subdued demand conditions internationally, most local production is expected to supply local markets, **at lower price points**. Export conditions are expected to improve over the medium term.

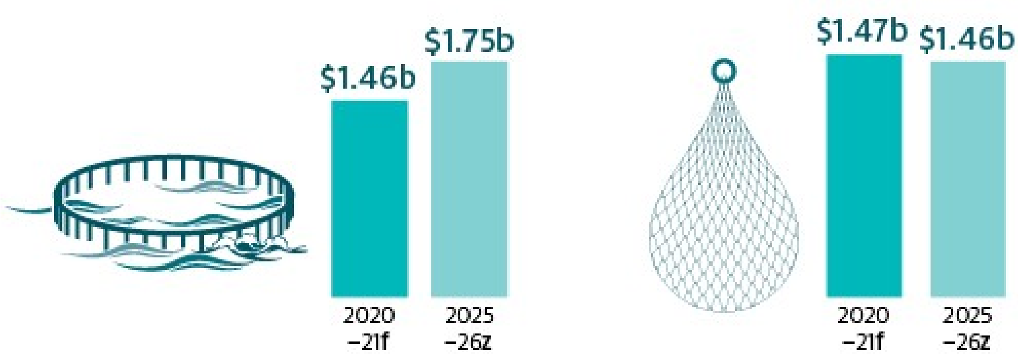
Fig. 8 Australian prawn production value, by sector, 2005–06 to 2025–26



ABARES forecast

Australia – Wild-catch vs aquaculture trends (Australian Government Department of Agriculture, Water and the environment ABARES) Annual fisheries and aquaculture production 2018.

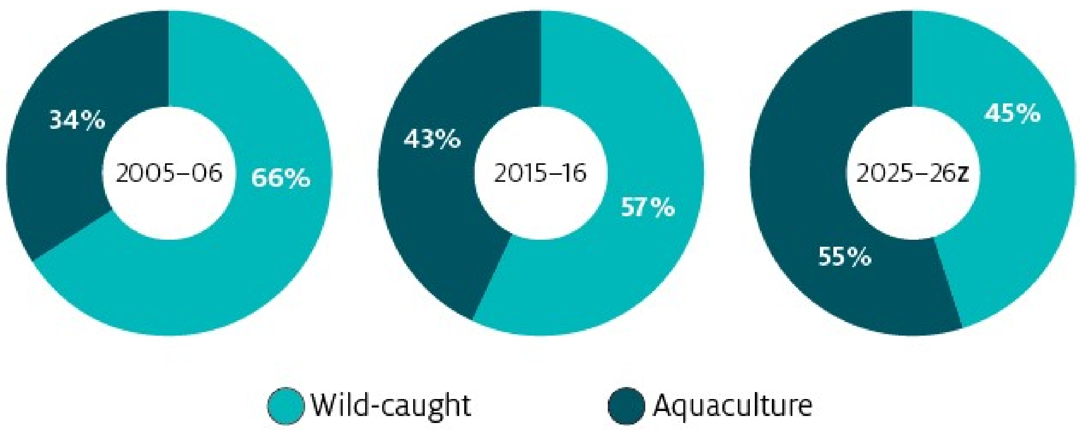
Figure 9. Aquaculture's share of production value to rise - GVP of aquaculture projected to rise



Share of aquaculture in total Australian fisheries and aquaculture GVP rising

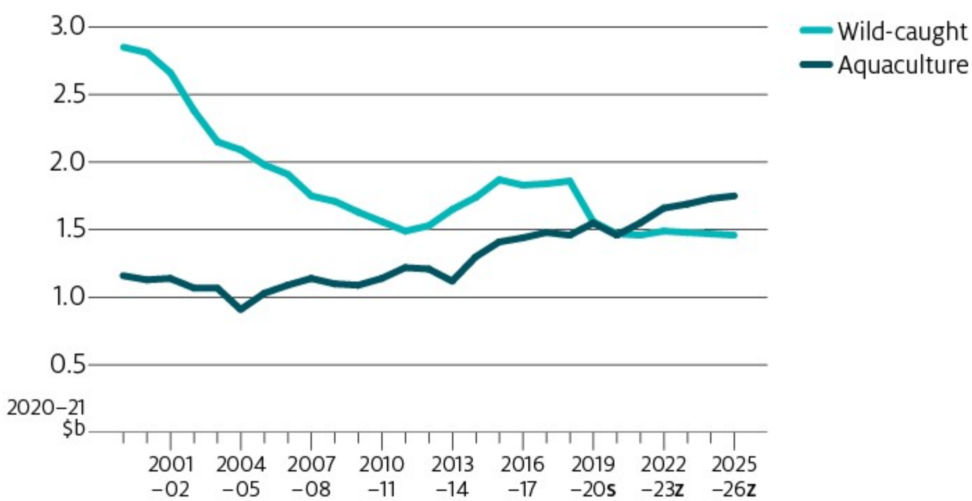
Most Australian prawn production (Figure 10) is wild caught, but the share of aquaculture prawns is increasing. A planned large-scale prawn farm in northern Queensland is expected to add between 2,000 tonnes and 2,500 tonnes to aquaculture output over the outlook period. Another project in the Northern Territory could significantly increase aquaculture prawn production beyond projections if the farm becomes operational over the outlook period.

Figure 10.



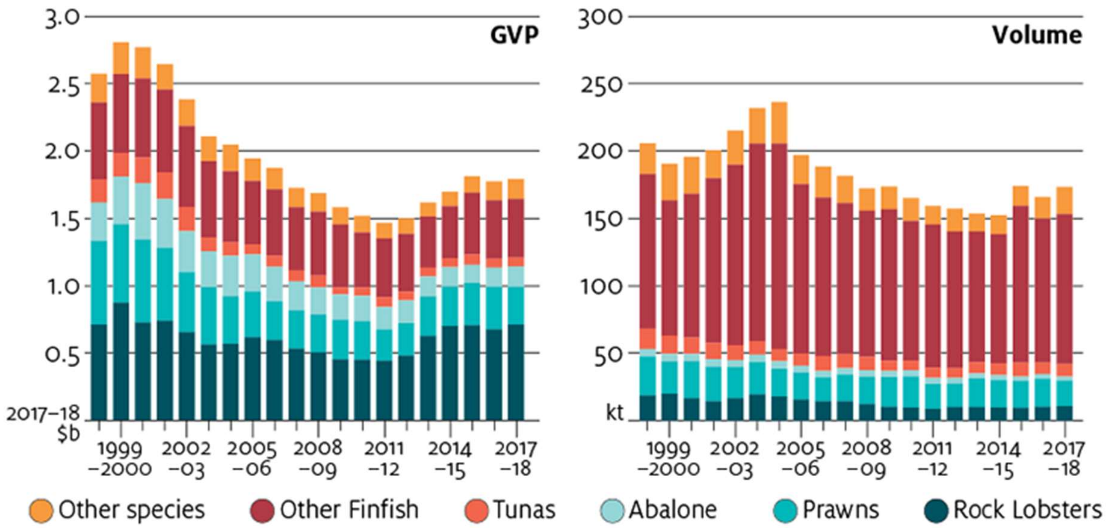
ABARES forecast

Figure 11. Australian fisheries and aquaculture GVP, by sector, 1999–2000 to 2025–26



ABARES forecast

Figure 12. Wild-catch GVP and volume by major species group, 1998–99 to 2017–18



Total prawns are one of the three most valuable species groups (wild-catch and aquaculture) in 2017–18: ($361 million, a 9% decrease from 2016–17).

Wild-caught prawns also were one of the three most valuable species in 2017–18: ($280 million, but a 10% decrease from 2016–17). **Since 1999, the volume of wild-caught prawns caught in Australia has decreased by some 42% to 2018.**

The **decline in wild-caught prawns** GVP from 2000–01 to 2011–12 was **driven by Australia's exchange rate appreciation over the period, structural change in the sector to achieve more sustainable wild-caught fisheries and adverse environmental and disease factors that affected the availability of some species, as well as adjustment to changing commodity demand patterns in the global market.**

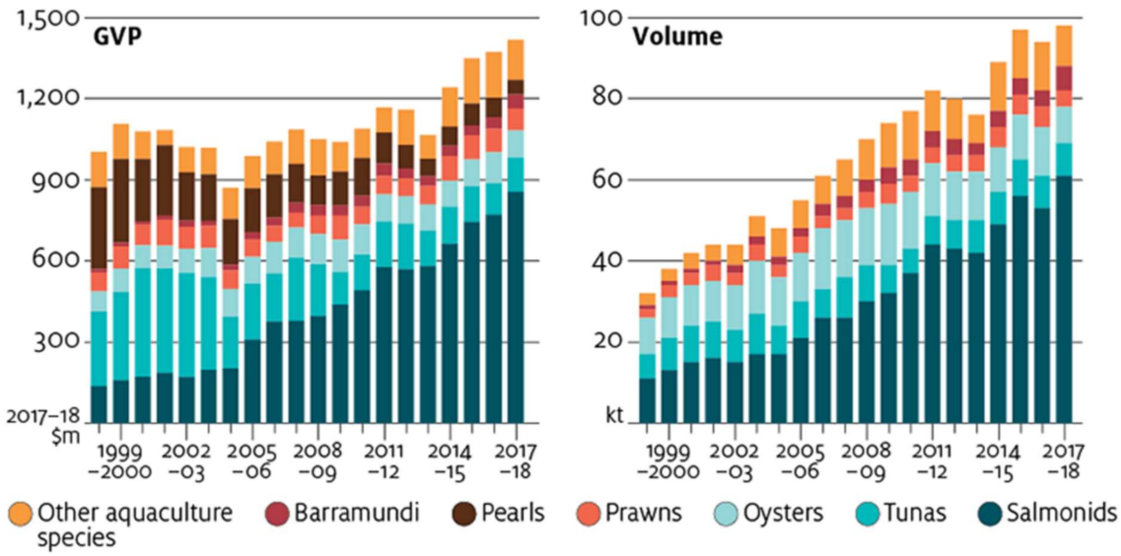
Growth in the global aquaculture industry has also contributed to the declining relative value of the wild-catch sector, because of increasing import competition from this sector in the domestic market. The global growth of aquaculture-produced species in Asia during this period may have **negatively affected prices** for Prawn species through increased competition from these products in the domestic market.

Aquaculture's growing contribution

Aquaculture Prawns GVP was $80.5 million in 2017–18, accounting for 6% of aquaculture GVP in that year. In 2017–18 the GVP of aquaculture prawns decreased by 6% and production decreased by 9% as the industry recovered from White Spot Disease, which led to the destocking of prawn farms in the Logan River region of southern Queensland in 2016–17. Most aquaculture-produced Prawns are from Queensland. There are significant plans for expansion of the aquaculture Prawns industry in coming years. For example, Tassal is planning to expand their Gregory

River prawn farm to reach an annual production of 20,000 tonnes of Prawns (ABC 2019). There is also a large-scale project to build a large-scale prawn farm in northern Australia for the export market (SBS 2019).

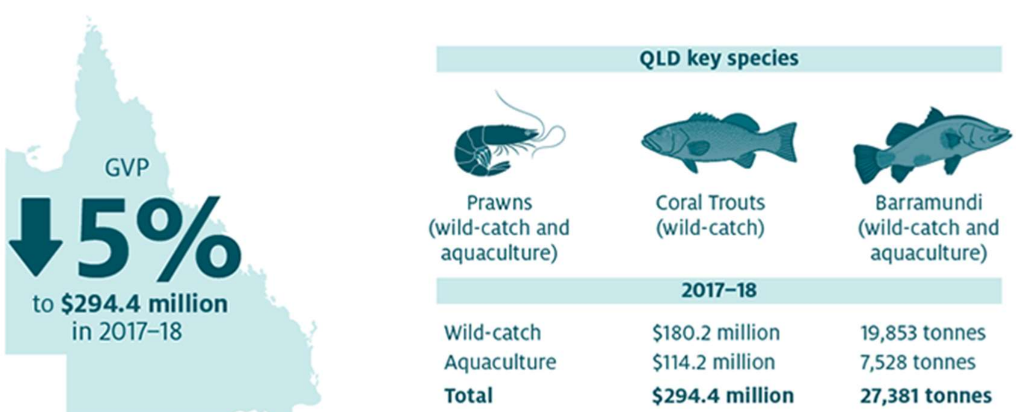
Fig.13 Australian Aquaculture GVP and volume by major species group, 1998–99 to 2017–18



Source: ABARES

Queensland's Fisheries

Fig.14 GVP declines by 5% in 2017-18



For detailed statistics, see Table S9 in ABARES fisheries data products. Source: ABARES, DAF

The GVP of Queensland fishery and aquaculture decreased by 5% in 2017–18. GVP declined in both the aquaculture and wild- catch sectors (Figure 9).

In 2017–18 Queensland wild-caught production was dominated by Prawns and Coral Trouts, which together comprised 54% of GVP. The **aggregated wild-caught GVP of Prawns**, comprising mainly King Prawns, Tiger Prawns, Banana Prawns and

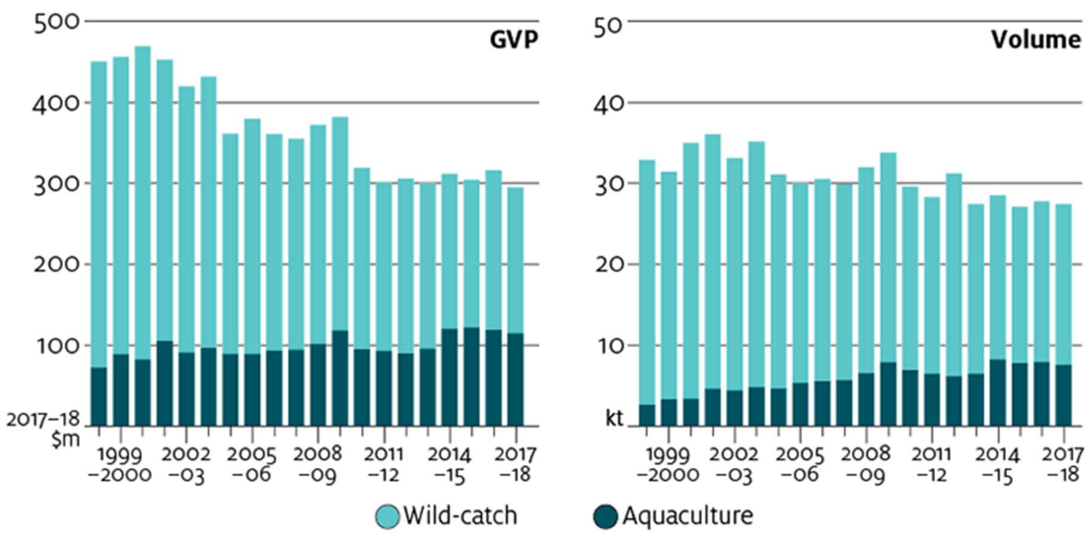
Endeavour Prawns, **decreased by 12%.** This decline saw a decrease in the landed volume of Prawns of 39% of total value of wild-catch or $70.1 million.

Aquaculture - Queensland aquaculture GVP decreased by 2% in 2017–18 to $114.2 million. This was largely due to a **4% decline in the GVP of Prawns** (including Black Tiger Prawns, Banana Prawns and Eastern King Prawns) to $74.7 million—down from $77.8 million in 2016–17. **Prawns are Queensland's biggest contributor to the aquaculture sector.**

The volume of aquaculture Prawns harvested for commercial purposes declined by 8% from 4,264 tonnes in 2016–17 to 3,921 tonnes in 2017–18. In 2016–17 prawn farms in the Logan River region of southern Queensland were destocked following an outbreak of White Spot Disease (McCarthy 2016; Mobsby & Curtotti 2019), with industry still rebuilding in 2017–18. In 2017–18 Queensland aquaculture production was dominated by Prawns and Barramundi, which together comprised 89% of GVP.

Queensland aquaculture… there has been a **60%+ increase in prawn aquaculture production since 1989.**

Figure 15. Queensland fisheries and aquaculture GVP and production volume by sector, 1998–99 to 2017-18



Source: ABARES, DAF

Queensland Commercial Prawn Trawl Fishery – The Industry

History

Queensland's prawn trawling fishery started in a very humble fashion in 1849 and continued in that vein for over a century before taking off in the 1950's[7]. In those days, there were only a handful of fishermen using seine, scissor nets, bow shaped scoop nets and cast nets along the shallow edges of the Brisbane River, either while wading or operating from small dinghies.

The growth of the prawn fishery lagged well behind the growth of the population because of the arduous and uncomfortable nature of the work and the restricted market opportunities. These factors, in combination with the perishable nature of the produce and limited transportation, dictated that prawning could only occur close to populous areas such as Brisbane city and not necessarily in the best fishing grounds. Adding to the industry's woes was the fact that during the first century of existence there was no central market and very primitive retail distribution facilities (mainly horse drawn hawkers' carts).

Noosa's prawn trawling fishery was mostly non-existent during this 100-year with all prawns caught in the traditional manner. As the potential of the fishery became apparent during the 1950's, the DPI began trials of trawling techniques and eventually granted licences to beam trawl the Noosa River and Lakes in the mid-1960's[8]. The trials were commercially very successful but concurrently temporarily damaging to the habitat by use of otter boards (a practice quickly dismissed).

It was reported in the 1961 'Report Of The Department Of Harbours And Marine For The Year Ended 30th June, 1961' -

"……...The estimated production of edible fish for the State for 1960-61 declined significantly versus the previous year. This decline was due, in the main, to reduced supplies of mullet……. Furthermore, there was reduced effort on the part of fishermen as, for example, in the Noosa area where the occurrence of prawns in Lake Cootharaba caused many men to transfer their activities to that fishery……….Prawn production on all established grounds has been comparatively poor throughout the year, this being almost certainly a reflection of the prolonged spell of dry weather in Queensland.

There were, however, two bright spots in the prawning scene during the season. One was an excellent run of large king prawns on ocean grounds off the Tweed area in February, a time of the year when weather conditions normally prevent trawlers

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[7] Trawlers, Trollers and Trepangers – The story of the Queensland commercial fishing industry pre-1988. Noel Haysom. 2001 Queensland Department of Primary Industries publications.

[8] Trawlers, Trollers and Trepangers – The story of the Queensland commercial fishing industry pre-1988. Noel Haysom. 2001 Queensland Department of Primary Industries publications. P57.

crossing the river bars. The other was the phenomenal season for prawns in Lake Cootharaba on the Noosa River.

Previously prawn fishing in that lake had been limited to the use of scissors-nets, scoop nets and small “tow-row” nets, the catch being used principally for fresh-bait purposes. On the 9th December, 1959, the area was thrown open to the use of beam trawls. The first beam-trawling efforts were not particularly successful, though catches made with otter trawls showed that the area had considerable potential. With the aid of advisory visits and demonstrations by Fisheries Officers and following several modifications suggested by local fishermen, a type of beam trawl was developed to suit the shallow, muddy conditions in the lake, and during the summer months of 1960-61 almost a million pounds of prawns were netted. The bulk of the catch consisted of school prawns {Metapenaeus macleayi). It is considered that the continued presence of such huge numbers of prawns was due to the lack of any summer washout rains, which is supported by the fact that prospecting activities failed to locate any concentrations of these prawns in nearby off-shore areas.

The Noosa River and Lakes supported a large population of juvenile school prawns which subsequently migrated offshore to Laguna Bay as they matured. A smaller population of greasy back prawns inhabited Lake Weyba and migrated to Laguna Bay also. Seasonal catches supported a strong local industry and probably could have continued had it not been for the change in the river hydrography (Noosa Sound and River mouth) in the 1970’s was the consensus by DPI scientists and local fishermen alike.

Many argued at that time that the demise of the prawn (and other) fishery was a direct result of:

- The conversion of large tracts of mangrove swamps and other productive wetlands into residential real estate and canal development.
- The construction of groins at the river mouth which interferes with the free passage of normal migration of juvenile prawns and fish in and out of the river.
- Other interferences such as stormwater runoff, accidental effluent discharges, regular problems with sludge and algae killing off benthic organisms, etc.

Today, the fishery is managed by QDAF under the *Queensland Fisheries Act 1994,* the Queensland Fisheries Regulations 2008, and the Queensland Fisheries (East Coast Trawl) Management Plan 2010. Implemented in 1999 and last updated in 2010, the *Fisheries (East Coast Trawl) Management Plan 2010* underwent a comprehensive statutory review via the *Department of Agriculture and Forestry* (DAF). The primary objective of the *Fisheries (East Coast Trawl) Management Plan 2010* is to:

“... provide for the use, conservation and enhancement of the community’s fisheries resources by managing the east coast trawl fishery in a way that seeks to —

1. *(a) apply and balance the principles of ecologically sustainable development; and*
2. *(b) promote ecologically sustainable development.*

From a management perspective, the *Fisheries (East Coast Trawl) Management Plan 2010* is applied in a manner that is consistent with an *Ecosystem Based Fisheries Management* (EBFM) approach. This approach requires management initiatives involving the ECTF to take into consideration the economic, environmental and social impacts of any proposed changes. From an environmental perspective this includes having due consideration of the level of impact the ECTF has on target species, non-target species and regional ecosystems.[9]

Queensland Beam Trawling Licences – Trend History

In the RIBTF (River & Inshore Beam Trawl Fishery), the situation surrounding the number of active licences is complicated by the fact that some operators will hold multiple beam trawl symbols and may access multiple management areas within a given year *e.g.,* the T5 and T6 or T6 and T7. From a reporting perspective this will present as a single licence being 'active' in each region.

Similarly, beam trawl symbols are frequently used as part of a *multi-endorsed and diversified fishing operation*.[10] *multi-endorsed and diversified fishing operations* spread their effort across multiple fisheries (*e.g.* line, pot, beam trawl) and, on occasion, utilise the temporary transfer of symbols to gain access to additional fisheries. In these instances, the catch and effort reporting system will show that two separate licences were active in the fishery: despite the operators using the same fishery symbol at different times of the year. Consequently, the number of 'active' licences may be higher than the total number of symbols.

From a regional perspective, licencing data revealed that over half (51% on average) of the active beam trawl licences were from the T5 area (Table 2; Fig. 2). While showing a small degree of variability, these proportions have remained relatively stable through time (Fig. 2). The T5 symbol also experienced the largest decline in the number of active licences (n = 22 between 1995 and 2017) which, for the most part, is attributed to licence buybacks associated with the Port of Brisbane development. This buyback commenced in 2010 and resulted in 13 symbols being removed from the fishery. While not directly linked to the fishery, a further eight beam trawl symbols were surrendered as part of buybacks connected to the introduction of net-free zones in 2015 and 2016 (Department of Agriculture and Fisheries, 2016a; b). Both of these factors would have contributed to the observed decline in the number of active licences.

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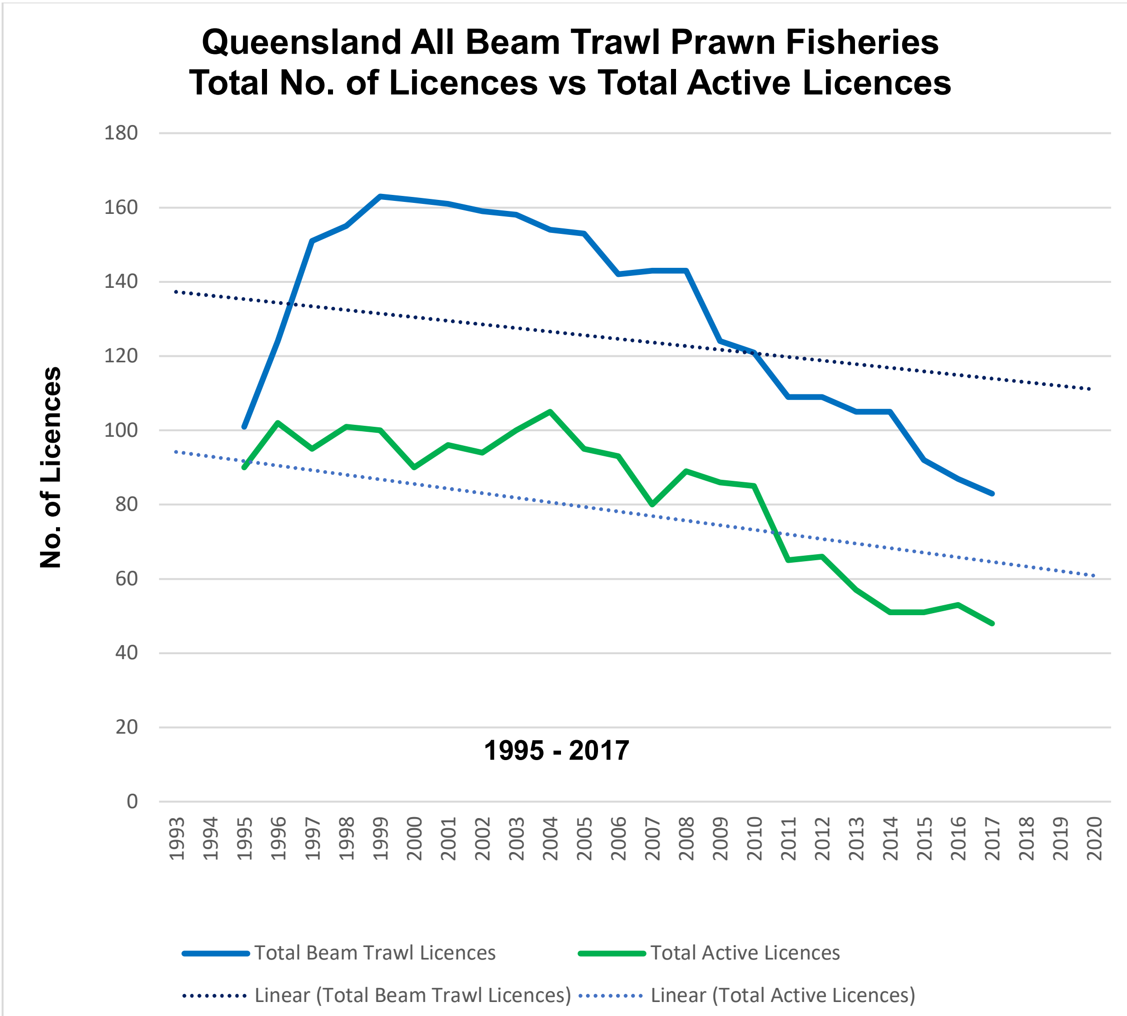
[9] An Ecological Risk Assessment of the Southern Queensland East Coast Otter Trawl Fishery & Inshore Beam Trawl Fishery. Jacobsen, Zeller, Dunning, Garland, Courtney & Jebreen. DAF 2018

[10] Multi-endorsed and diversified fishing operations refers to (generally) smaller operators where the fisher accesses multiple fisheries throughout the year (e.g. line, beam trawl and crab fishing) verses concentrating all their effort on a single fishery.

From an ERA (environment risk assessment) perspective, understanding regional differences in the number of 'active' licences will be important when taking into consideration the risk posed by the fishery to key species / species complexes.



State Level Overview of Prawning Licenses

Trawl fisheries are Queensland's largest commercial fisheries. The River and Inshore Beam Trawl Fishery (RIBTF) is one of three sub-fisheries within the Queensland East Coast Trawl Fishery (ECTF). It represents the smallest component of the ECTF in terms of annual effort and number of vessels with an estimated Gross Value of Production (GVP) of approximately $1.3 Million. Operators in the fishery tow small beam trawls targeting prawns in rivers, creeks and inshore areas within 3 nautical miles of the coast.

The East Coast Otter trawl fishery, which operates in more open waters, is by far the larger, accounting for about 95% of the total harvest taken each year. The River and Inshore Beam Trawl Fishery which operates in estuaries produces 5%

of the catch. License Composition as at 1/2020 - East Coast Otter Trawl (Prawn, saucer scallop & bugs) - 408 active licenses operating in:

1. 368 - T1. Can operate in the whole area excluding closed waters, estuaries and Moreton Bay.

2. 16 - T2. Are only permitted to operate south of the Great Barrier Reef World Heritage Area (GBRWHA)

3. 47 - M1. Are permitted to otter trawl in the T1 area and in Moreton Bay during weekdays provided the vessel is not greater than 14 m in length.
4. 24 - M2. Are permitted to otter trawl only in Moreton Bay during weekdays provided their vessel is not greater than 14 m in length. License holders are not limited by the number of nights they can fish, as is the case with the other fishery symbols.

River and Inshore Beam Trawl[11] (Banana prawn, bay prawn & tiger prawn) – 81 active licenses operating in:

- T5 – 36
- T6 – 5
- T7 – 5
- T8 – 27
- T9 – 20

The T5 Trawl Fishery – inc. Noosa

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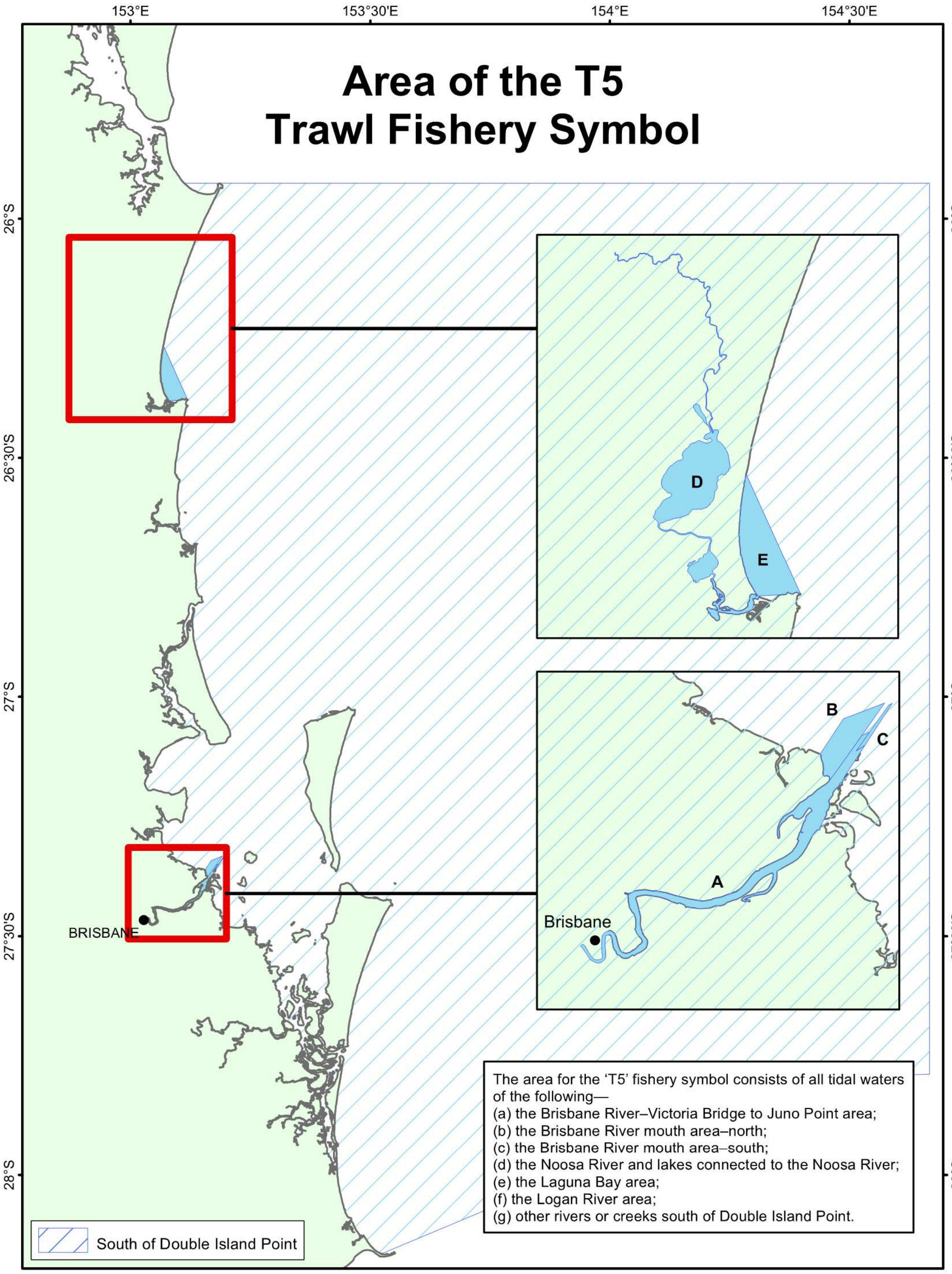
[11] Submission for the reassessment of the Queensland River and Inshore Beam Trawl Fishery Wildlife Trade Operation approval under the *Environment Protection and Biodiversity Conservation Act 1999* A report prepared by the Queensland Department of Agriculture and Fisheries, December 2018



QUEENSLAND GOVERNMENT

Co-ord Sys: GCS GDA 1994
Datum: GDA 1994
Units: Degree

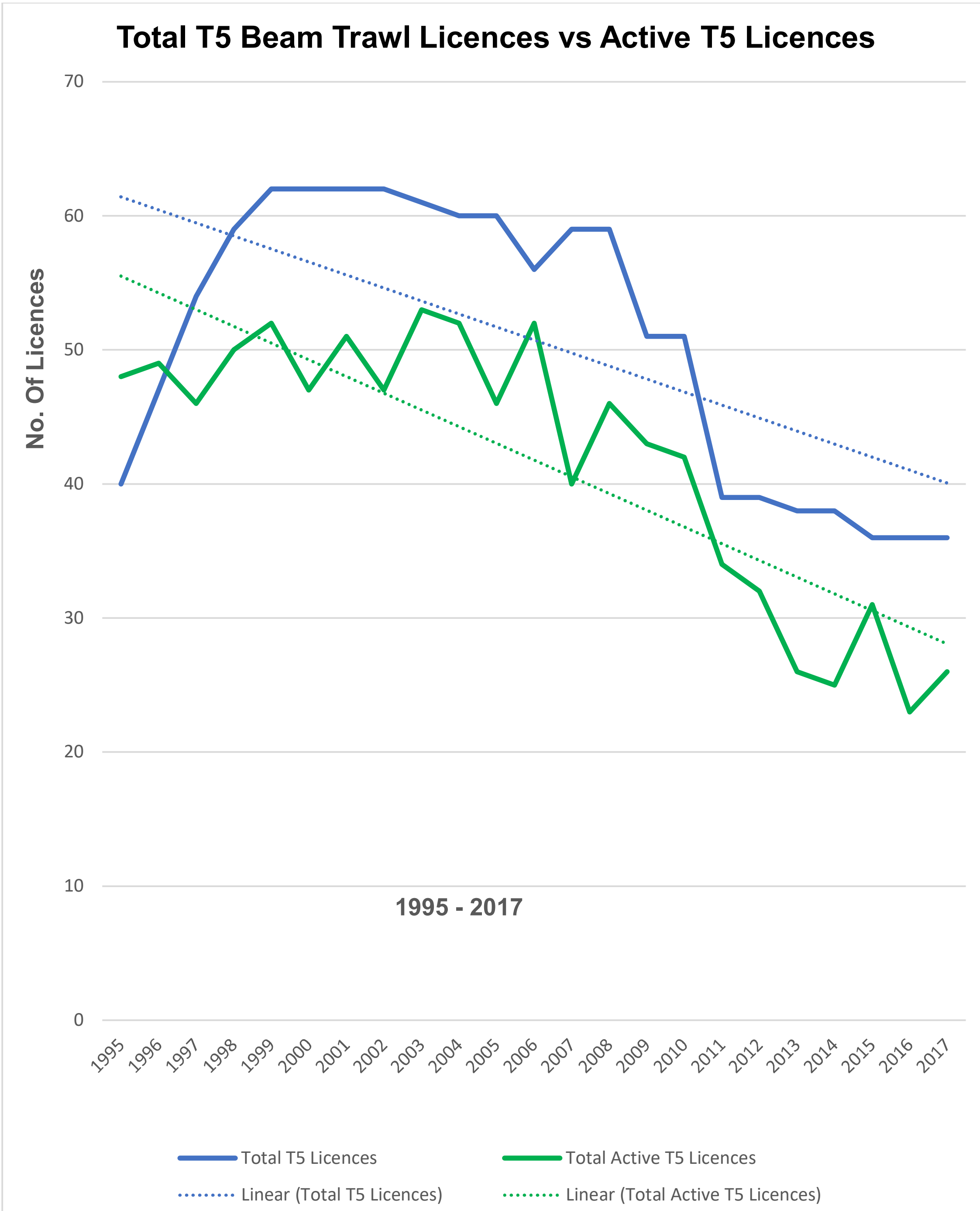
0 10 20 Km

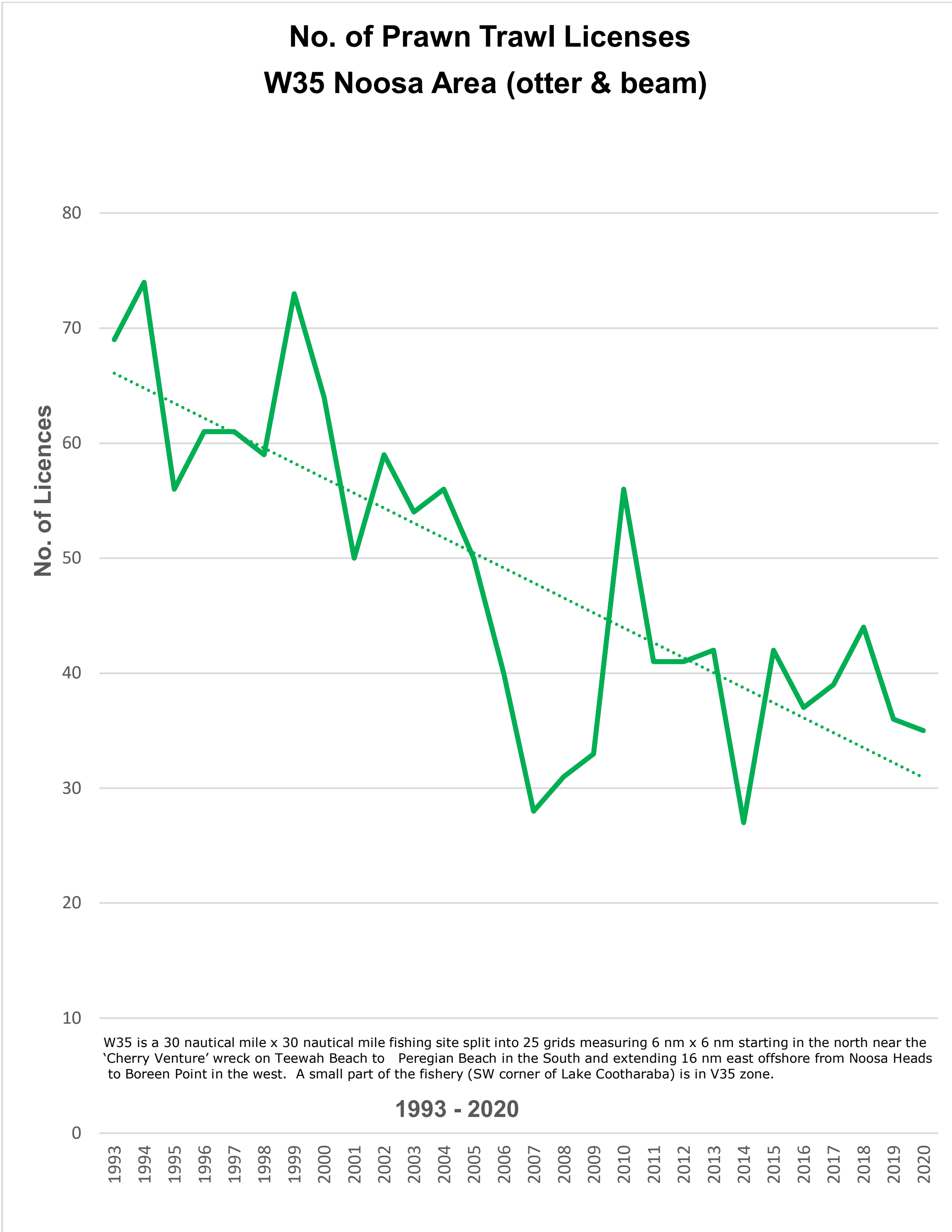
N

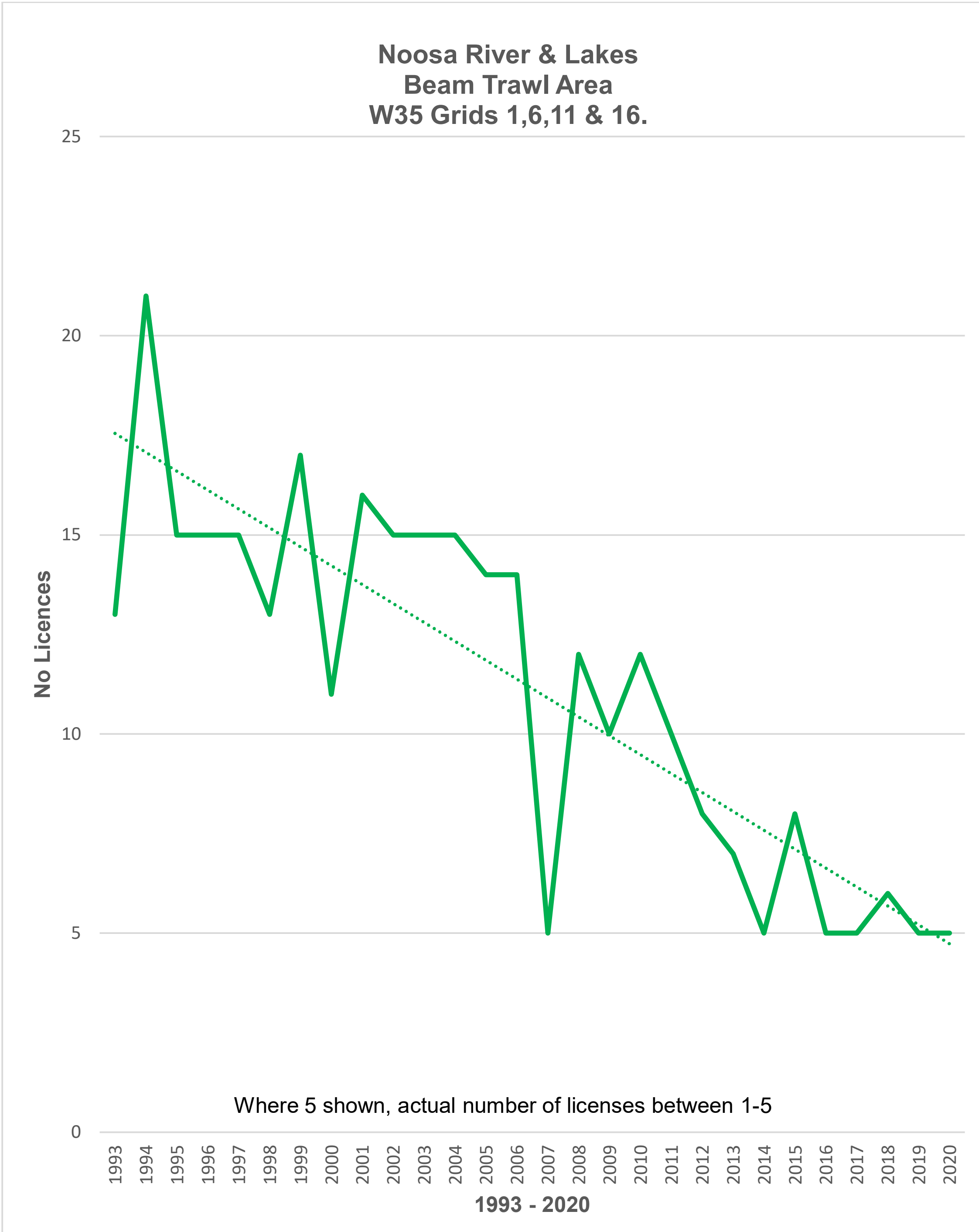
This map represents the approximate fishery area where fishing operations are permitted under the fishery symbol. Please refer to the relevant fisheries legislation (eg Regulation or Management Plan) for the exact boundaries of an area.

T5 Trawl Fishery Licences - Trend History

The impact of the macro-economic factors mentioned at the outset are clearly visible at a local level as demonstrated in the graphs below.




No. of Prawn Trawl Licenses
W35 Noosa Area (otter & beam)
No. of Licences
80
70
60
50
40
30
20
10
0
W35 is a 30 nautical mile x 30 nautical mile fishing site split into 25 grids measuring 6 nm x 6 nm starting in the north near the 'Cherry Venture' wreck on Teewah Beach to Peregian Beach in the South and extending 16 nm east offshore from Noosa Heads to Boreen Point in the west. A small part of the fishery (SW corner of Lake Cootharaba) is in V35 zone.
1993 - 2020
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020


Noosa River & Lakes
Beam Trawl Area
W35 Grids 1,6,11 & 16.
No Licences
25
20
15
10
5
0
Where 5 shown, actual number of licenses between 1-5
1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
1993 - 2020

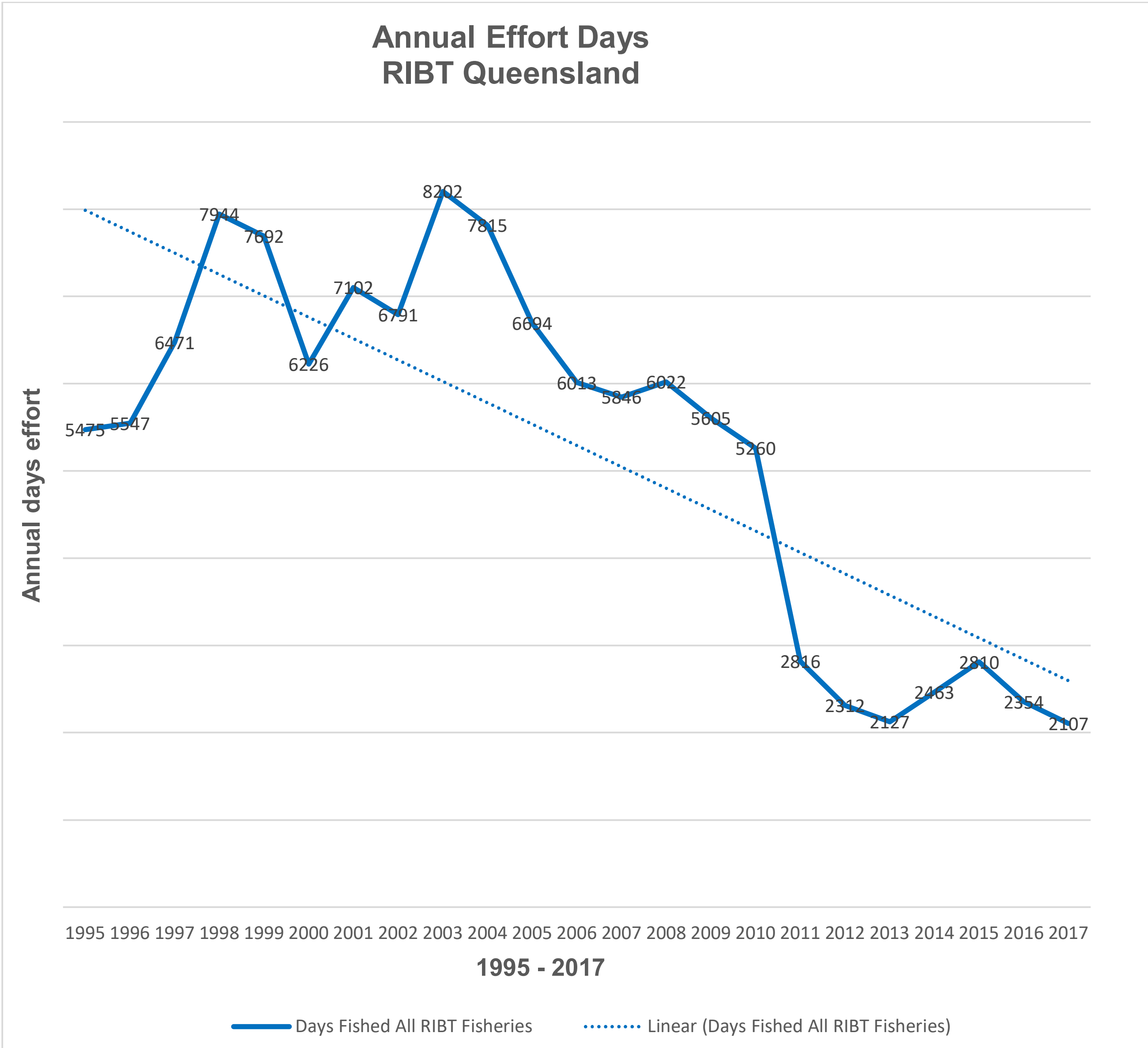
Catch & Effort Summary

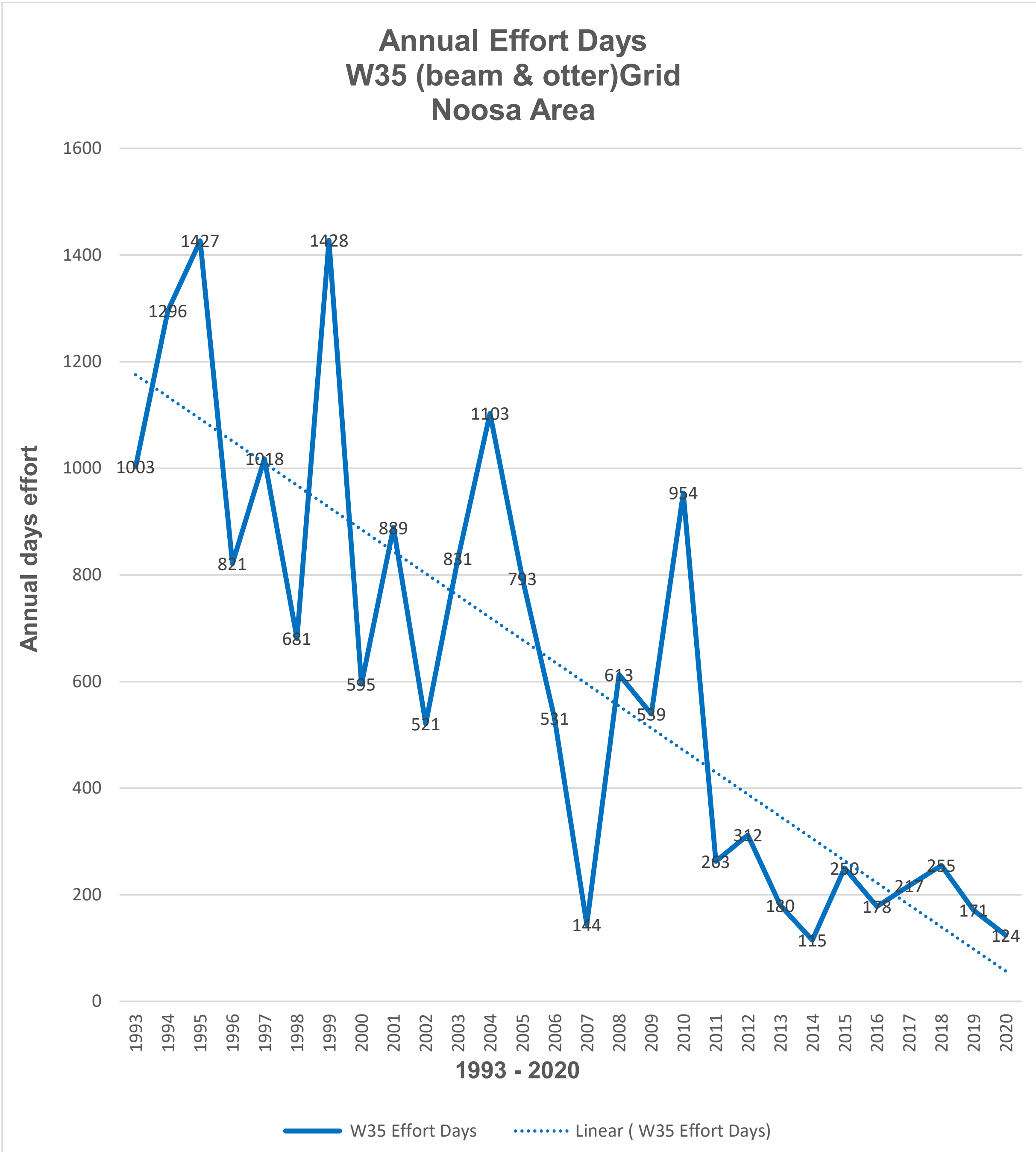
Effort in the RIBTF can be analysed at both the whole of fishery and regional level (Table 3; Fig. 3). At a whole of fishery level, the effort data can be subdivided into a pre and post 2011 period. From 1995 to 2010 (inclusive) effort in the RIBTF was elevated and fluctuating between 5260 and 8202 fishing days per year (Table 3; Fig. 3). After which, total RIBTF effort showed a marked decline (~46%) with annual effort coming in at less than 3000 fishing days (Table 3; Fig. 3). From a regional perspective, the **T5 fishery contributed most to the total effort levels**. This region of the RIBTF has accounts for more than half (55–69%) of the RIBTF effort since 2011 (Fig. 3).

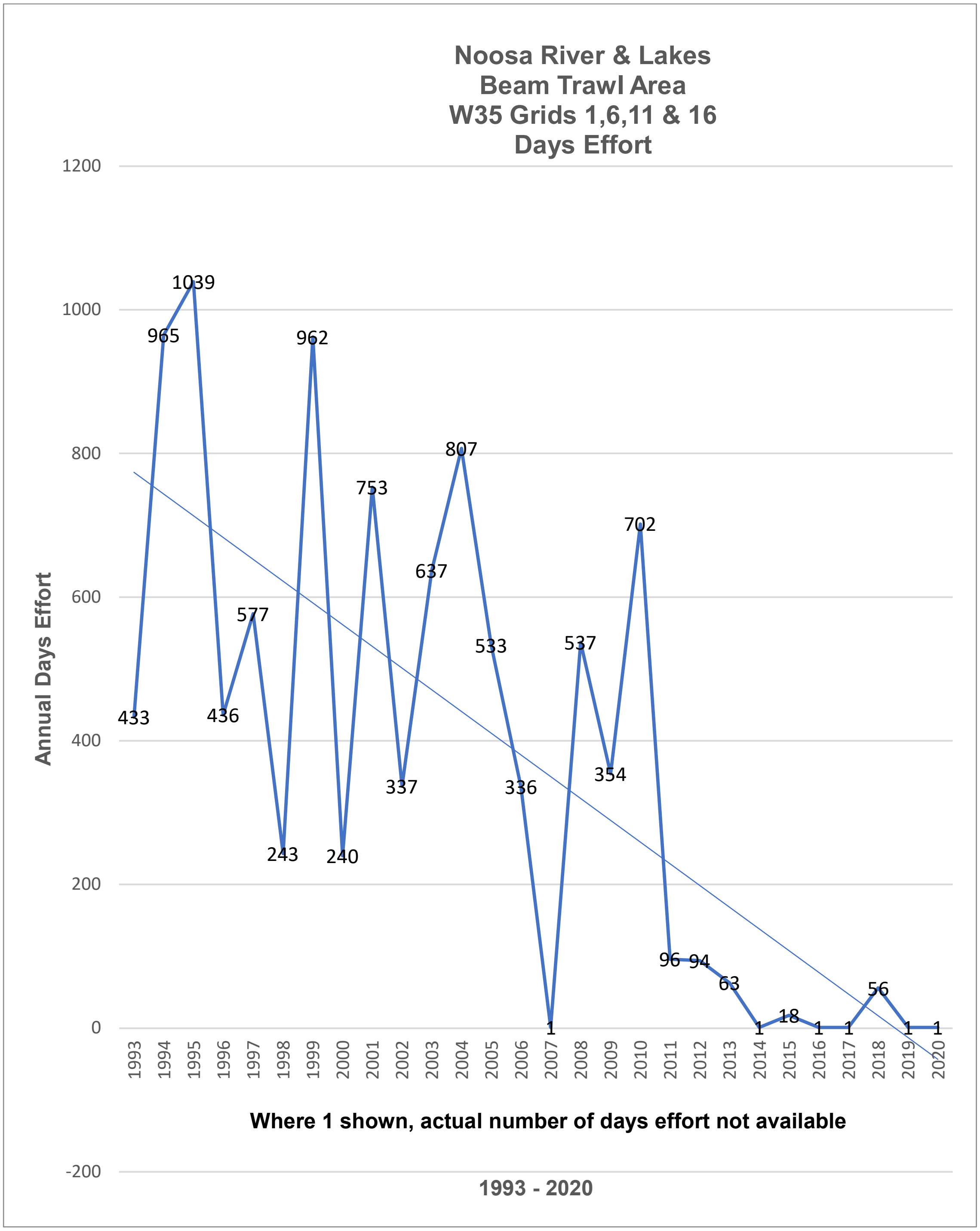
The **decline in effort during 2010 to 2011 period (46%) is attributed to the *2010–11 Beam Trawl Buyout Process*** which resulted in 13 symbols being removed from the fishery. This restructure was followed by the 2011 Brisbane floods which impeded fisher's ability to access the fishery, deposited debris throughout the fishing area and affected key infrastructure *e.g.,* vessels, gear, and mooring facilities. This again would have contributed to the observed declines in effort.

On a smaller scale, effort data for the RIBTF shows a moderate degree of between-year variability. Some of this **variability can be linked to environmental conditions such as rainfall which influences prawn recruitment rates** (Tanimoto *et al.*, 2006; Venables *et al.*, 2011). Conversely, **market demands for product taken from within and outside the RIBTF will have a bearing on the amount of time some operators dedicate to this fishery.** This would be most applicable to licence holders who access multiple fisheries as part of a *multi-endorsed and diversified fishing operation* and sell a wider range of product.

Most of the beam trawl effort is concentrated in the southern portion of the state. This is unsurprising as the most numerous fishing symbol, the T5, limits fishing activities to rivers and inshore areas between the Brisbane River and Double Island point . At a whole of fishery level, RIBTF effort extends unevenly along the Queensland east coast with a second hotspot observed in waters around Rockhampton. This again is consistent with the licencing data which identifies the T8 fishery as the second largest sector of the RIBTF.


Annual Effort Days
RIBT Queensland
Annual days effort
5475
5547
6471
7944
7692
6226
7102
6791
8202
7815
6694
6013
5846
6022
5605
5260
2816
2312
2127
2463
2810
2354
2107
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017
1995 - 2017
Days Fished All RIBT Fisheries
Linear (Days Fished All RIBT Fisheries)


Annual Effort Days
W35 (beam & otter)Grid
Noosa Area
Annual days effort
1993 - 2020
W35 Effort Days
Linear (W35 Effort Days)
1003
1296
1427
821
1018
681
1428
595
889
521
831
1103
793
531
144
613
539
954
263
312
180
115
250
178
217
255
171
124

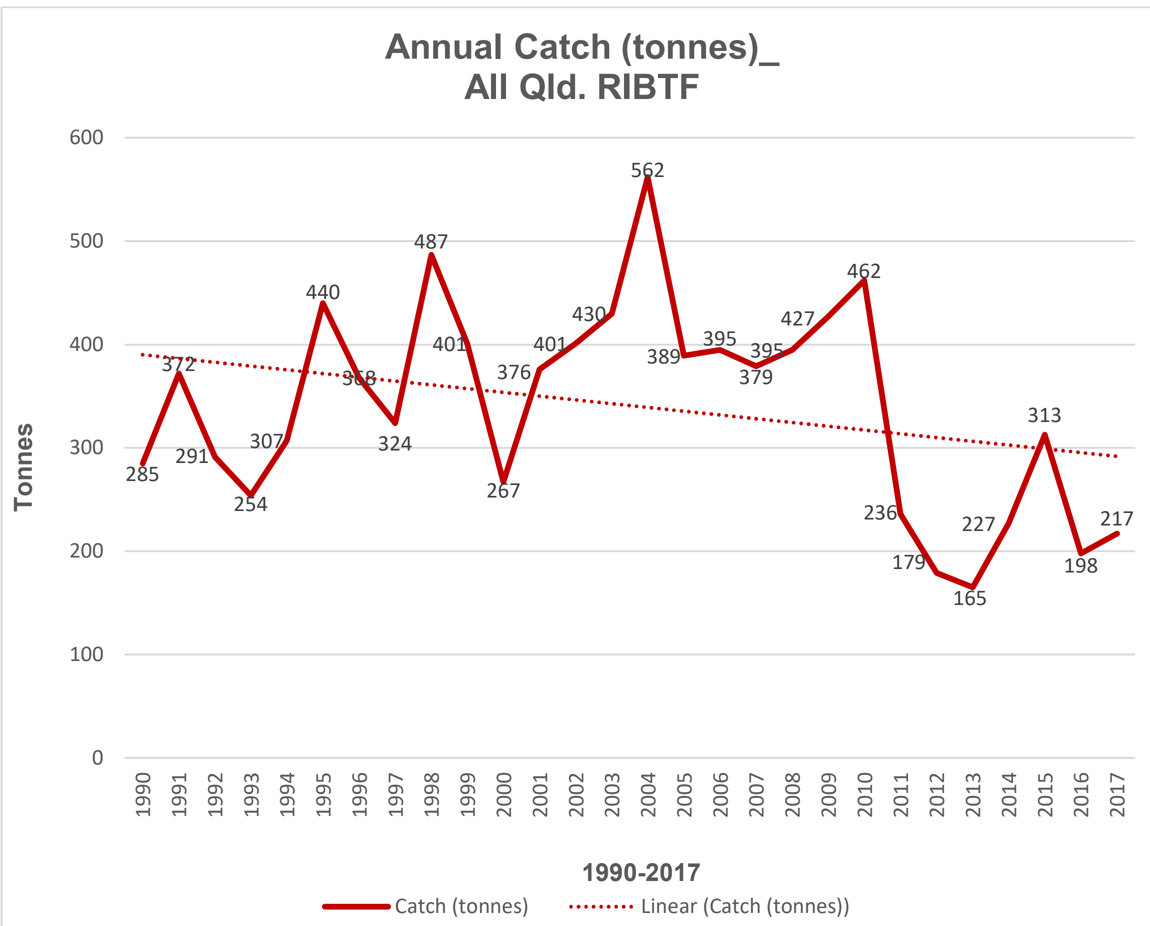

Noosa River & Lakes
Beam Trawl Area
W35 Grids 1,6,11 & 16
Days Effort
Annual Days Effort
1200
1000
800
600
400
200
0
-200
433
965
1039
436
577
243
962
240
753
337
637
807
533
336
1
537
354
702
96
94
63
1
18
1
1
56
1
1
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
Where 1 shown, actual number of days effort not available
1993 - 2020

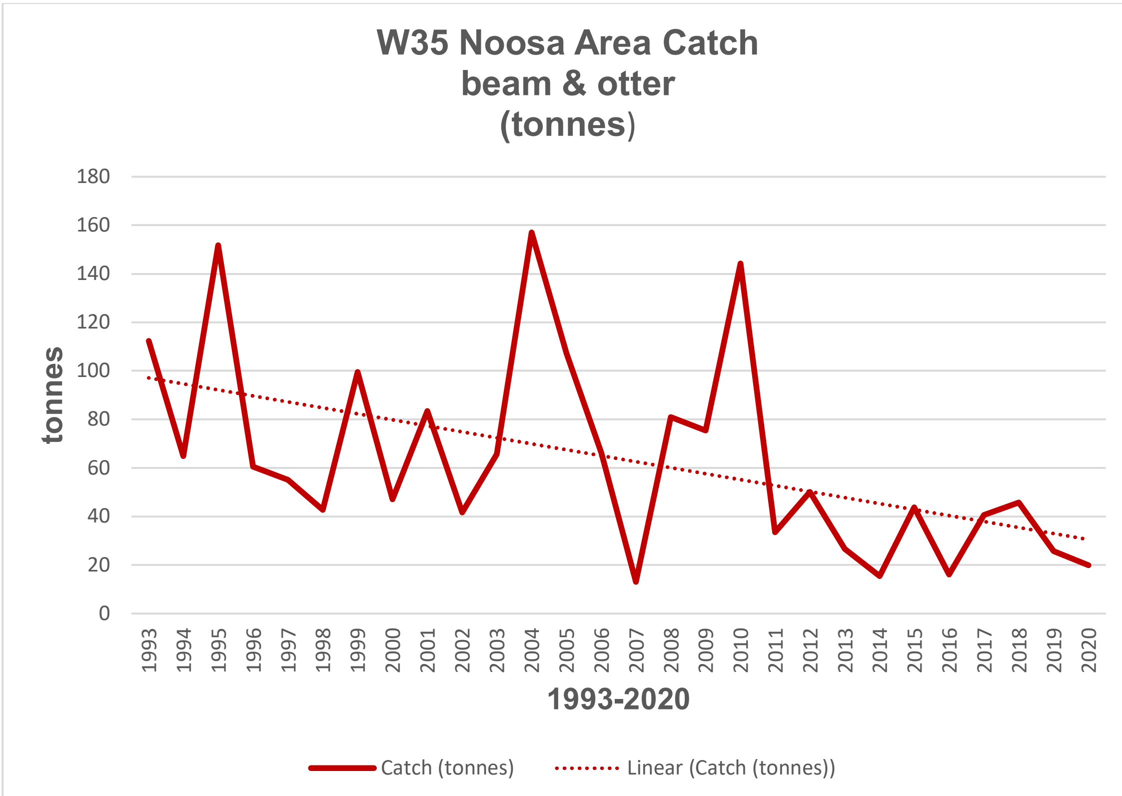
Catch

Catch data for the RIBTF varies more than the effort data and the two parameters seem to have better correlation in the post 2004 period. As with effort, total catch experienced a considerable decline in 2011 (49%) before recovering over the subsequent years. This recovery in total catch was principally driven by T5 operators.

As with the data on the number of active licences and days fished, the greatest amount of catch has been recorded against the T5 symbol (60–86%). As the T5 management area has the greatest number of active licences, effort and catch it will be a considerable factor of influence in subsequent ERAs involving the RIBTF.

Hydrological drought is associated with periods of low flow of coastal rivers (Humphries and Baldwin 2003) and previous research has found that high river flow into marine environments can have positive effects on productivity of commercial fisheries (Loneragan and Bunn 1999). It is possible that the observed decreases in reported total catch from the 2011 season to 2020 season may be in part associated with the drought conditions that Queensland has been experiencing in the past decade. BOM data shows a significant drop in rainfall catchment which may be a significant contributor to lower catch rates in the past 8 years.




W35 Noosa Area Catch
beam & otter
(tonnes)
tonnes
180
160
140
120
100
80
60
40
20
0
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
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2016
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2018
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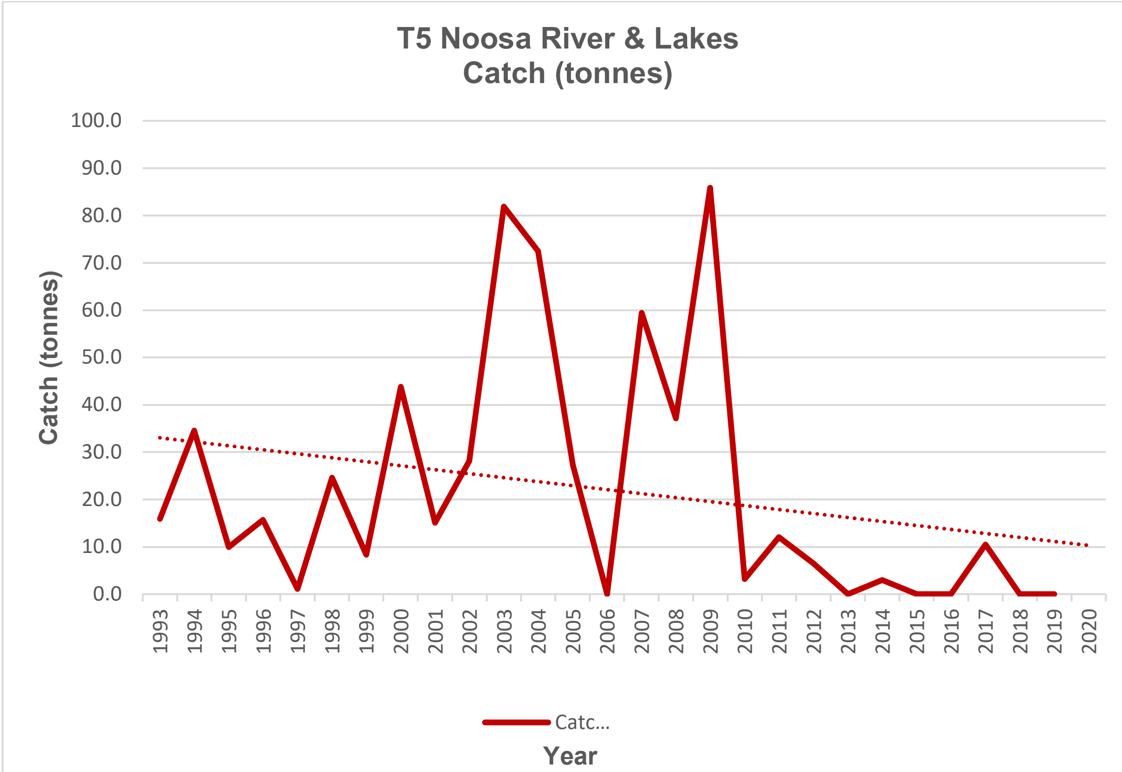
2020
1993-2020
Catch (tonnes)
Linear (Catch (tonnes))



Fishing Method East Coast Otter Trawl – used only in open seas

Demersal otter trawling is used to harvest prawns. Triple and quad net arrangements (three or four towed nets) (Figure 1) are frequently used in the fishery depending on the species targeted, fishing conditions and length of the net allowed under the Trawl Plan. Headrope height varies according to target species, as does the detailed configuration of nets.

Queensland east coast otter trawlers have traditionally used flat, rectangular ‘otter’ boards to spread their nets, but there is an increasing tendency to use more streamlined and smaller boards. While holders of ‘T1’ licences are also able to use a beam trawl, no ‘T1’ licence holder has reported using a beam trawl as their main fishing gear.

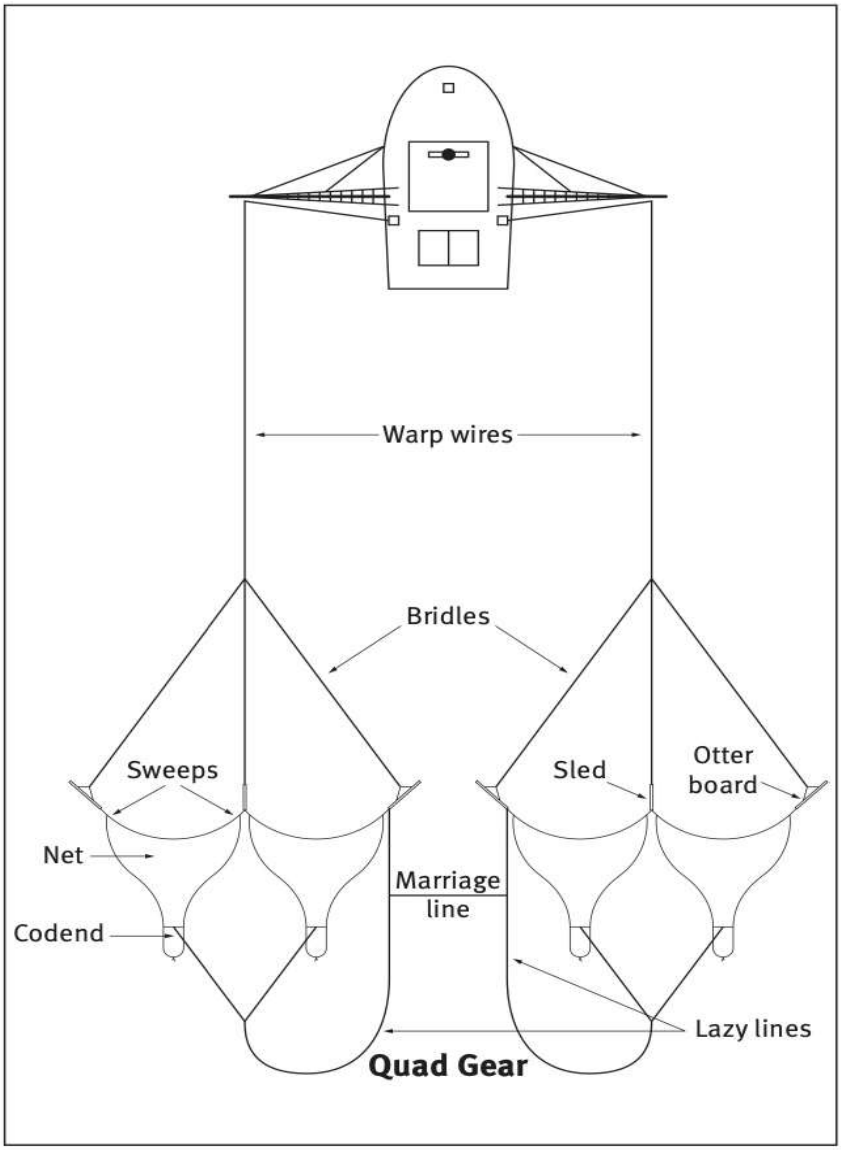


Figure 1: Quad otter trawl gear used in the ECOTF.

Major prawn species caught within the ECOTF are:

- Prawns (Eastern King, Banana, Endeavour, Greasy, Red Spot King and Blue Leg King). Resource defined as sustainably fished by the State.

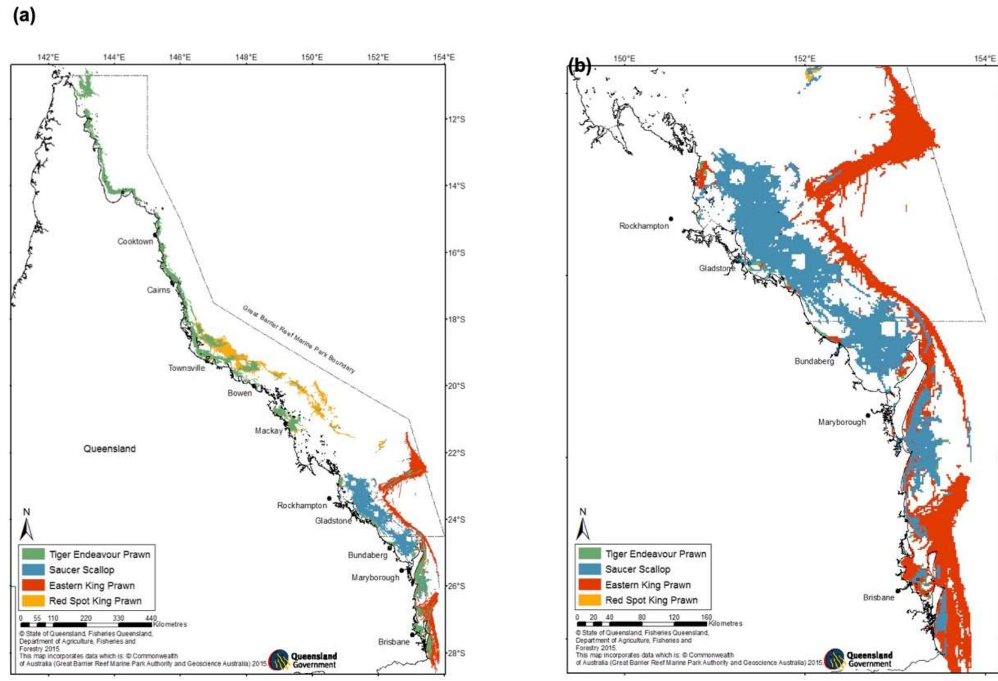


Figure 1.2. *Catch distributions for key species-sectors of the East Coast Otter Trawl Fishery (ECTF) along a) the entire Queensland coastline and b) in Southern Queensland. Boundary of Great Barrier Reef Marine Park (GBRMP) represented by dotted line.*

The East Coast Otter Trawl Fishery is managed using effort units (EU) which are split between East Coast (symbols T1 and M1) and Concessional (T2) users. The quota effort units for East Coast (T1) and Concessional (T2) sectors of the fishery in 2018 were 2.74 million units and 67,866 units, respectively.

River and Inshore Beam Trawling Fishery

Fishing Method

River and inshore beam trawling are effectively confined to an estuarine and inshore operation involving vessels under 9 m in length. These vessels are entitled to work in specified areas in rivers and creeks, towing a single 5 m headrope trawl made of mesh no smaller than 28 mm. A maximum combined net length of 10 m, with mesh size no less than 38 mm and no greater than 60 mm is specified for use on inshore fishing grounds. The only exception is Laguna Bay (Noosa), where a small otter trawl net with a maximum head rope of 8 m may be used.

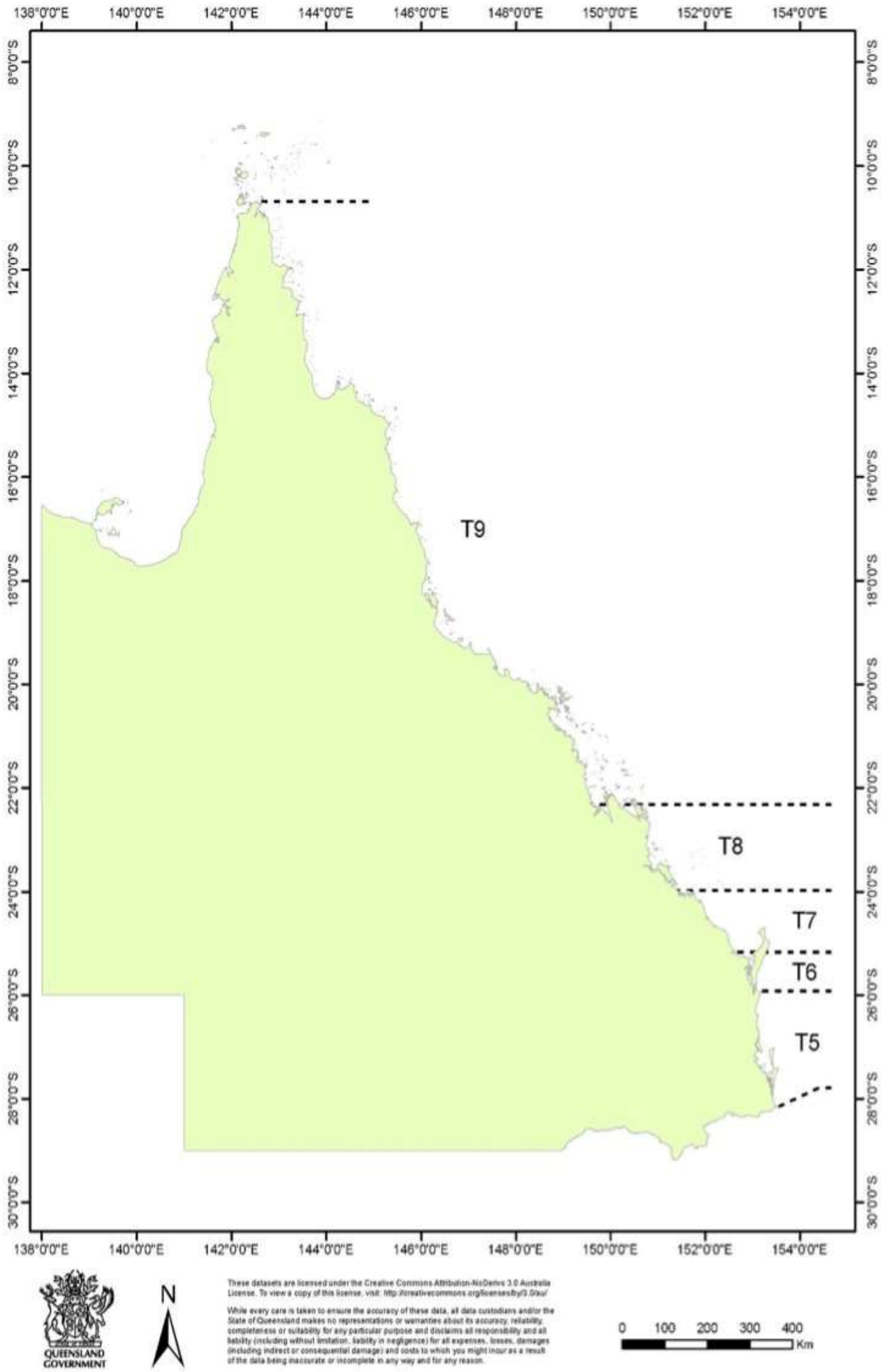


Figure 1.3. *Latitudinal boundaries for each of the respective River and Inshore Beam Trawl Fishery (RIBTF) fishing endorsements (T5 – T9). Note – These areas do not reflect the distribution of RIBTF effort, which is constrained to estuarine/inshore environments.*

Unlike the ECOTF, the RIBTF is subdivided into five regions with fishing endorsements (T5, T6, T7, T8 and T9) used to restrict access to fishing grounds (Fig. 1.3). Of the five specified

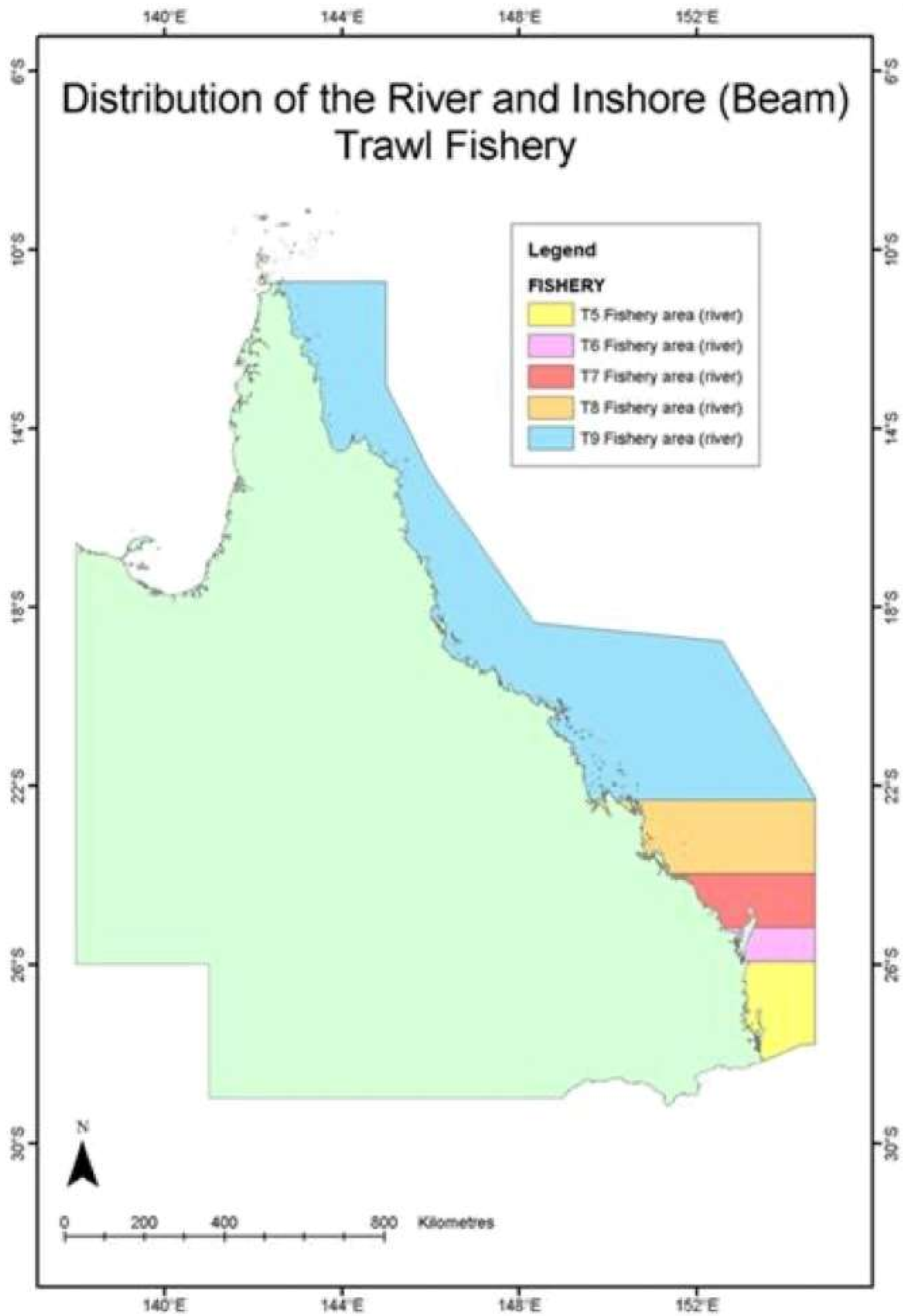


***Figure 1**. Map of the T5 –T9 fishing symbol*

RIBT Key Species:

Bay Prawn

The term 'bay prawn' is a generic marketing term for a mixture of mainly greasyback prawns (Metapenaeus bennettae) and a minor component of other penaeid prawn species. The greasyback prawn inhabits muddy sediments of estuaries and bays at depths to 22 m.

In Queensland, peak supply occurs from October- February. They spawn throughout the year in shallow water. The eggs sink to the bottom and hatch as a nauplius larva within 24 hours. Within two weeks the larvae metamorphose into postlarvae which enter shallow nursery grounds to grow and mature. At maturity greasyback prawns are 12-15 months of age, males have a carapace length of 16 mm and body weight of 4 grams, while females have a carapace length of 20 mm and body weight of 6 grams. Males can reach 80 mm total length and females 110 mm total length.

The official stock status is classified as 'undefined' due to lack of information on the composition of 'bay prawn' catch, but that said, it is considered at low risk of being overfished by all authorities.

School prawn

The school prawn (Metapenaeus macleayi) is endemic to eastern Australian coastal waters within depths of 1-55 m. Eastern School prawn inhabit numerous estuarine habitats in Queensland and a portion of this biomass remains unfished, with fishing effort confined to accessible sections of larger river systems due to vessel size (Taylor et al. 2016).

The average annual catch (4t) in recent years (2012–17) has been well below the long-term average of ~60t (1990–2015). Long term catch levels are variable and nominal catch rates are stable but with occasional very high catch and high catch rate years. In recent years (2012–17), nominal catch rates have remained around the long-term average of ~76 kg per day. A recent ecological risk assessment found that School Prawn was at low risk of being recruitment overfished at 2009 effort levels (Jacobsen et al. 2018). *Commercial effort has reduced substantially since this time with a reduction in the number of licences reporting catch at historically low levels.* ***This evidence indicates that biomass is unlikely to be recruitment overfished and that the current level of fishing pressure is unlikely to cause the management unit to become recruitment impaired. The management unit is currently classified as a sustainable stock*** **(Taylor et al. 2016).**

They inhabit estuaries as post-larvae and adolescent prawns and are abundant as adults in marine waters receiving turbid freshwater runoff from flooded estuaries. The body of the school prawn is hairless & translucent with irregular brown or green spots, antennae are brown and the telson has four pairs of spines.

Adult school prawns are typically caught by trawling coastal waters after heavy rainfall and are also caught by recreational cast net fishers in estuaries. Peak supply of school prawns In Queensland, occurs in March and April, but flood flows during summer months may also lead to higher-than-normal catch rates.

Spawning probably occurs earlier along the southern Queensland coast. After hatching the planktonic nauplius larval stage develops through a series of moults over about three weeks before transitioning to the post larval benthic stage. The postlarvae enter streams during summer and early autumn and afterwards move upstream as juvenile prawns which remain in estuaries and rivers during autumn and winter.

From October maturing sub-adult prawns begin to move downstream and emigrate to oceanic waters between November and April to spawn. Mature prawns spawn in the vicinity of the estuary from which they emigrated. School prawns live for up to 18 months. They grow very little in the cooler months but grow rapidly in spring and summer. School prawns are mature at 18-30 mm carapace length. Females grow to about 160 mm and males to 130 mm total length.

Status of target stocks

Stock status of key target species in the fishery is assessed using protocols described in the national Status of Australian Fish Stocks (SAFS) process. Banana and school prawn stocks are assessed using the SAFS process and are currently classified as sustainable (Table 1). These species are also included in the ongoing 2018 SAFS process. Full reports and more details about the SAFS process can be found at www.fish.gov.au.

Table 1: *Stock status of RIBTF species*

Banana Prawn East Coast School Prawn Queensland

Target stocks

The fishery targets short-lived penaeid prawns with one year life cycles. Target species include: Greentail (Bay) Prawn (*Metapenaeus bennettae*), Banana Prawn (*Penaeus merguiensis*) and School prawn (*Metapenaeus macleayi*).

The stock status for species retained in the fishery was reported in *Status of Key Australian Fish Stocks* (SAFS) 2018 as:

- Bay/greentail prawns - stock status 'undefined’ due to lack of information on the composition of catch, but considered at low risk of being overfished because of high fecundity
- school prawns - undefined in Queensland, however nominal catch rates are stable.

Prawn Trawling Explained

Management

The RIBTF is managed through a complex series of input controls that includes (among others): limited licencing; regional management; temporal and spatial closures; gear restrictions (*e.g.,* vessel size, net head rope length, mesh size); the mandatory use of a bycatch reduction device (BRD); and the use of a Turtle Excluder Device (TED) when operating in waters other than a river or creek (Appendix 3). Unlike the ECOTF, the RIBTF does not operate under an effort unitised system, meaning T5–T9 operators are not required to hold effort units to access the fishery.

While output controls are not used at a whole of fishery level (*i.e.,* quotas), they are employed for *Permitted species* or the list of additional species that can be retained for sale . Output controls used in the RIBTF include minimum legal size limits, the prohibition on retention of females or ovigerous females for some species and weekly/daily possession limits or trip limits.

When compared to teleost-based fisheries, the RIBTF (and trawl fishing in general) has a much smaller recreational component. This is due to a prohibition on the use of beam trawls for non- commercial purposes. Key management arrangements for this sector include spatial closures, gear restrictions and in-possession limits (Department of Agriculture and Fisheries, 2018). A recreational fishing licence does not apply to this sector of the fishery.

Management changes

No significant management changes have been introduced nor are planned since the previous reassessment in 2016. Previous management changes to the RIBTF include:

- The Queensland Government funded licence buyback, removing the effort potential of 17 beam trawl symbols (2014).
- Legislative amendments to the *Fisheries (East Coast Trawl) Plan 2010* were introduced to optimize the performance of approved TEDs and BRDs (2015).
- Changes were introduced to allow inspection of trawl nets “rigged for fishing” to occur while boats are in port or at anchor (2015).

Queensland Sustainable Fisheries Strategy 2017-2027

In June 2017, the Queensland Government released the *Queensland Sustainable Fisheries Strategy 2017–2027* (the strategy). The strategy outlines the government's reform agenda for fisheries management over the next ten years and aims to:

- Modernise fisheries objectives and recognise the interests of key stakeholder groups.
- Clarify the roles of the Minister responsible for fisheries and the chief executive in the management of the State's fisheries; and to allow for more responsive decision making through the use of harvest strategies.
- Strengthen the enforcement powers of fisheries inspectors and penalties under the Fisheries Act to address serious fisheries offences such as black-marketing.
- Make a number of administrative amendments to the Fisheries Act to reduce complexity and remove redundant provisions.

Licensing

The following licensing arrangements apply to Queensland's commercial trawl fisheries:

- The fisher must have a commercial fisher licence.
- The boat must be licensed under a commercial fishing boat licence (CFBL).
- The boat licence must be officially endorsed for the particular fishery (i.e., marked with the symbol that stands for that fishery).

No new licences or symbols are issued for existing fisheries.

To enter a trawl fishery, you must first obtain the correct licence (CFBL), fishery symbols and effort units from an existing licence holder. Licences can be transferred from person to person, and fishery symbols can be transferred from one licence to another licence.

Management areas

Queensland's trawl fisheries operate in all tidal waters out to the Queensland east coast offshore constitutional settlement boundary between Cape York and the New South Wales border, with the following exceptions:

- areas closed to trawling under fisheries legislation
- areas closed to fishing in Queensland marine parks (administered by the Department of Environment and Science)
- areas closed to fishing under the Great Barrier Reef Marine Park Zoning Plan 2003, which is administered by the Great Barrier Reef Marine Park Authority
- waters over 300m deep (trawling at such depths is not feasible)
- otter trawl fishing is not permitted in estuaries.

Trawling in the Gulf of Carpentaria is jointly managed by the state and federal governments.

Trawl fishers target major commercial species, but operators in the east coast trawl fishery are allowed to keep and sell a number of by-product species.

Limits on operating time

Almost all the licences in the otter trawl fishery operate on an effort quota system. Each trawler is permitted to work a certain number of nights based on the quota it holds. Through this system, a trawler can increase its allocation by buying quota from another vessel without the effort in the fishery increasing.

The exceptions is the Moreton Bay trawl fishery, which is limited to fishing weeknights only.

Area closures

There are many areas throughout the fishery where trawling is prohibited or restricted. These areas are declared for a number of reasons, including habitat and nursery ground protection, maintenance of bloodstock and bycatch reduction. In addition, there are a range of fisheries closures that have been introduced by the Department of Environment and Science and Great Barrier Reef Marine Park Authority to manage marine parks.

Boat size restrictions

The size of boats in each fishery is restricted as a further mechanism to regulate fishing effort, the maximums being 20m for the east coast otter trawl fisheries, 9m for the river and inshore beam trawl fishery, and 14m for the Moreton Bay otter trawl fishery. A ‘typical’ Noosa beam trawler is some 5-6 metres in length.

Gear restrictions

Otter and beam trawl nets are also regulated by total length and mesh size. These regulations manage the total amount of 'swept area' in the fishery and minimise the impact on non-permitted species. All otter trawlers are required to have a turtle excluder device and a bycatch reduction device installed in any net being used. Beam trawlers are only required to have a bycatch reduction device installed

Note: From 15 July 2016, the use or possession of trawl spikes, ploughs, rippers and other similar devices that attach to trawl sleds, boards or beams was prohibited. These devices must not be used due to concerns about the impact they could have on the seafloor and the fishery.

Catch limits

There are no catch limits for inshore beam trawling because of the high variability of catches from year to year combined with the fact that most inland waterways are inaccessible to boats.

Changes to the fisheries legislation

From 1 March 2015, new rules applied to the use of turtle excluder devices and bycatch reduction devices to reduce the level of interactions with protected species, including sea snakes. Only 5 bycatch reduction devices will be allowed (with modified designs), and these are:

- square mesh codend
- fisheye
- bigeye
- square mesh panel
- v-cut with bell codend.

When using prawn nets, fishers must use approved bycatch reduction devices.

Monitoring and reporting

Monitoring and assessment of trawl catch remains an integral component of the ECTF management regime. In the ECTF, monitoring of catch is principally done through a logbook reporting system. Logbooks are mandatory for all ECTF operators and provide catch information on all principal and permitted species as well as a number of key species identified as Species of Conservation Interest. The ECTF and Species of Conservation Interest (SOCI) logbooks, collects information on catch composition, location, weights and release condition.

Commercial fishers have a legal obligation to report information about their fishing activities in the compulsory daily logbook. All trawl fishers must contribute data about their day's catch, the location fished, the apparatus used and any interactions with species of conservation interest. Fisheries Queensland uses this data to assess and monitor the status of individual species and fisheries in Queensland and forms part of the regular environmental risk assessment of the fishery.

Boats operating in certain fisheries or areas are also obliged to have on board a vessel monitoring system (VMS), which tracks the position of their boat, to monitor compliance with closures and other restrictions

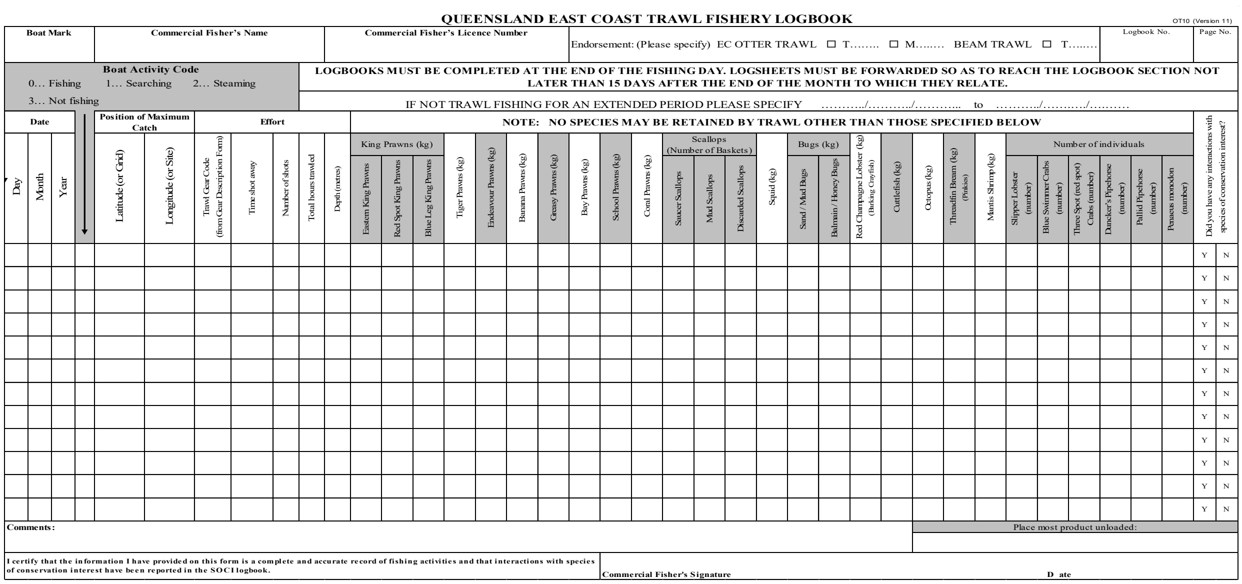
This logbook data is used:

- to provide a comprehensive fisheries information system for managers, researchers and industry
- to aggregate data in summary.

In more recent times – especially since the advent of DAF's Sustainable Fishing Strategy 2017-2027, comprehensive and continuous series of catch and effort data from commercial fishers' logbooks is now providing the basis for:

- scientific stock analysis when used in conjunction with other biological data (e.g., recruitment studies or effects of closures)
- certain economic analysis
- descriptions of current fishing activity
- short and long-term trends in the spatial and temporal distributions of fishing activity
- responsible management and administration.

Fig. 2 Logbook



QUEENSLAND EAST COAST TRAWL FISHERY LOGBOOK

OT10 (Version 11)

Boat Mark | Commercial Fisher's Name | Commercial Fisher's Licence Number | Endorsement: (Please specify) EC OTTER TRAWL ☐ T…….. ☐ M…..… BEAM TRAWL ☐ T…..… | Logbook No. | Page No.

Boat Activity Code
0… Fishing 1… Searching 2… Steaming
3… Not fishing

LOGBOOKS MUST BE COMPLETED AT THE END OF THE FISHING DAY. LOGSHEETS MUST BE FORWARDED SO AS TO REACH THE LOGBOOK SECTION NOT LATER THAN 15 DAYS AFTER THE END OF THE MONTH TO WHICH THEY RELATE.

IF NOT TRAWL FISHING FOR AN EXTENDED PERIOD PLEASE SPECIFY ………../………../……….. to ………../………./……….

NOTE: NO SPECIES MAY BE RETAINED BY TRAWL OTHER THAN THOSE SPECIFIED BELOW

Date: Day, Month, Year

Position of Maximum Catch: Latitude (or Grid), Longitude (or Site)

Effort: Trawl Gear Code (from Gear Description Form), Time shot away, Number of shots, Total hours trawled, Depth (metres)

King Prawns (kg): Eastern King Prawns, Red Spot King Prawns, Blue Leg King Prawns

Tiger Prawns (kg), Endeavour Prawns (kg), Banana Prawns (kg), Greasy Prawns (kg), Bay Prawns (kg), School Prawns (kg), Coral Prawns (kg)

Scallops (Number of Baskets): Saucer Scallops, Mud Scallops, Discarded Scallops

Squid (kg)

Bugs (kg): Sand / Mud Bugs, Balmain / Honey Bugs

Red Champagne Lobster (kg) (Barking Crayfish), Cuttlefish (kg), Octopus (kg), Threadfin Bream (kg) (Pinkies), Mantis Shrimp (kg)

Number of individuals: Slipper Lobster (number), Blue Swimmer Crabs (number), Three Spot (red spot) Crabs (number), Duncker's Pipehorse (number), Pallid Pipehorse (number), Penaeus monodon (number)

Did you have any interactions with species of conservation interest? Y N

Comments:

Place most product unloaded:

I certify that the information I have provided on this form is a complete and accurate record of fishing activities and that interactions with species of conservation interest have been reported in the SOCI logbook.

Commercial Fisher's Signature D ate

The data - Prawn catch and effort data bases

Three data sources are available to compile time-series of prawn catch rates. The first data source was the Queensland compulsory daily logbook records from January 1988 to April 2004 when logbook data entry was complete. These data were collected as part of the logbook program (CFISH) and provided prawn total harvest, fishing effort and catch rates.

The second data source was the Queensland voluntary daily logbook records collected prior to 1988. As this data only represented a portion of the fleet in each year, it only provided data on prawn rates. This data represented voluntary logbook catch data collected between 1968 and 1987 prior to the implementation of the compulsory CFISH logbook system in 1988. The data were of varying quality and quantity. To extract the data in a compatible form for comparison with data obtained from the QFISH system, considerable cleaning and transformation was completed by Mr Norm Good for O'Neill et al (2005).

The third data source was the New South Wales eastern king prawn monthly catch rates from the July 1984 to December 2004. All these data sets were analysed to calculate average standardised catch rates. As well, the first data set was analysed to quantify annual increases in average fishing power of the fleet's operations in each of Queensland's trawl sectors.

The following describes the processing rules applied to the data sets:

The data were based on logbook catch and effort records from each trawl sector over 17 years from 1988 to 2004; the logbooks were compulsory from 1989. The data consisted of the daily catch of each individual vessel. The spatial resolution of catches recorded from the Queensland east coast was based on 30-minute x 30 minute latitudinal and longitudinal grids. All data were recorded by vessel identifying codes, which related to the vessel hull. The prawn data was first supplied from the sql script titled 'dump 9a'. The prawn data in its raw form consisted of a mixture of shot-by-shot, daily and bulk (>1 day) records

Government assessment of fisheries - Impacts of the fishery on the ecosystem[12]

The RIBTF regularly is the subject of an ecological sustainability assessment by the Department of the Environment and Energy (Department of the Environment and Energy, 2019). This assessment is done as part of the *Wildlife Trade Operation* (WTO) approvals process under the *Environment Protection and Biodiversity Conservation Act 1999*. The fishery has had an approved WTO since 2006.

The methodology used by the State to construct the southern Queensland and RIBTF ERA was based on Astles et al. (2009) and Pears et al. (2012a). Under this methodology, the ERA was developed and analysed in four distinct phases: a) risk context, b) risk identification, c) risk characterisation and d) issues arising.

Southern Queensland and RIBTF areas

Most of the harvest species ecological subcomponents had resilience capability scores of high-intermediate (45.2%) or high (41.9%) (Table 3.1 – 3.2). Resilience capability scores for the permitted (by-product) species (n = 16) had a broader range with four species identified as having an intermediate or intermediate-low ability to recover from disturbance or decline. These included the red champagne lobster (Linuparus trigonus), the slipper lobster species complex (Scyllarus spp.), the hammer octopus (Octopus australis) and the red-spot night octopus (Callistoctopus dierythraeus) (Table 3.2).

The completed fishery impact profiles suggest the ECTF exerts a low to intermediate level of pressure on species harvested within the study area. Of the species assessed, the majority had either an intermediate (n = 13, 41.9%) or intermediate-low (n = 13, 41.9%) fishery impact profile. Another four (12.9%) were assessed as having a low fishery impact profile (Table 3.1 – 3.2). The notable exception was the Cuttlefish (Sepia spp.) species complex, whose final score for the fishery impact profile equated to a high-intermediate level of risk (Table 3.2).

Cross-referencing the resilience capabilities of harvest species with their fishery impact profiles produced overall risk ratings of low to high-intermediate (Table 3.1 – 3.2). In general terms:

- overall risk ratings for principal (target) species were lower than that reported for permitted (by-product) species.
- the majority of principal species had a low risk due to trawl fishing activities.
- there was an intermediate risk to around half (56.3%) of the permitted species and species groupings due to trawl fishing activities; and
- Cuttlefish (Sepia spp.) was the only harvest species ecological subcomponent to register an overall risk rating higher than intermediate (Table 3.1 – 3.2).

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[12] An Ecological Risk Assessment of the Southern Queensland East Coast Otter Trawl Fishery & Inshore Beam Trawl Fishery. Jacobsen, Zeller, Dunning, Garland, Courtney & Jebreen. DAF 2018. Page 25

Ecological risk assessment summaries for principal and permitted species are detailed in Table 3.1 and 3.3 respectively.

Table 3.1. Resilience capability scores, fishery impact profiles (FIP) and overall risk ratings for principal species (targeted) retained for sale in the southern Queensland ECOTF and the RIBTF. Analysis shows high resilience and low risk for species of prawns locally found.

Results: Harvest Species

***Table 3.1**. Resilience capability scores, fishery impact profiles (FIP) and overall risk ratings for **principal species** (targeted) retained for sale in the southern Queensland ECOTF and the RIBTF.*

Common Name	Species Name	Resilience	FIP	OVERALL
Tropical saucer scallop	*Amusium japonicum balloti*	H	I	I
Moreton Bay bugs				
– Reef Bug	*Thenus australiensis*	H-I	I	I
– Mud Bug	*Thenus parindicus*	H-I	I	I
Squid spp.	*Family Loliginidae: Uroteuthis (Photololigo) spp.*	H-I	I	I
Brown tiger prawn,	*Penaeus esculentus*	H	I-L	L
Blue-legged king prawn	*Melicertus latisulcatus*	H	I-L	L
Red spot king prawn	*Melicertus longistylus*	H	I-L	L
Black tiger prawn	*Penaeus monodon*	H	I-L	L
Eastern king prawn	*Melicertus plebejus*	H-I	I-L	L
Grooved tiger prawn	*Penaeus semisulcatus*	H	I-L	L
Greasyback (bay) prawn	*Metapenaeus bennettae*	H	I-L	L
Blue endeavour prawn	*Metapenaeus endeavouri*	H	L	L
False endeavour prawn	*Metapenaeus ensis*	H	L	L
School prawn	*Metapenaeus macleayi*	H	I-L	L
White banana prawn	*Fenneropenaeus merguiensis*	H-I	L	L

Table 3.3. A comparison of the resilience characteristics and fishery impact profile scores for principal species whose overall risk rating differed between southern Queensland and RIBTF ERA and the GBRMP ERA (Pears et al., 2012a).

Results: Harvest Species

***Table 3.3.** A comparison of the resilience characteristics and fishery impact profile scores for **principal species** whose overall risk rating differed between southern Queensland and RIBTF ERA and the GBRMP ERA (Pears et al., 2012a).*

Common Name	Species Name	Southern Queensland and RIBTF ERA			GBRMP		
		Resilience	FIP	OVERALL	Resilience	FIP	OVERALL
Moreton Bay Bugs							
– Reef Bug	*Thenus australiensis*	H-I	I	I	H-I	I-L	L
– Mud Bug	*Thenus parindicus*	H-I	I	I	H-I	I-L	L
Squid spp.	*Family Loliginidae, Uroteuthis (Photololigo) spp.*	H-I	I	I	H-I	L	L
Tropical saucer scallop	*Amusium japonicum balloti*	H	I	I	H	I-L	L
Grooved tiger prawn	*Penaeus semisulcatus*	H	I-L	L	H	I	I
Greasyback (bay) prawn	*Metapenaeus bennettae*	H	I-L	L	Not assessed.		
School prawn	*Metapenaeus macleayi*	H	I-L	L	Not assessed.		

The recent ecological risk assessment for the RIBTF describes the fishery area encompassing estuaries and adjacent shallow inshore waters along the Queensland east coast. The fishery operates over fine mud to sand substrates sometimes containing coarser gravel and shell fragments, which may be bare or sparsely vegetated with algae or seagrass. Benthic fauna are characteristically deposit and suspension feeders associated with fine sediments and tidal currents, many of them capable of burrowing to avoid trawl capture.

Observational evidence indicates that <u>beam trawl related physical disturbance is minimal in areas where the fishery occurs</u>, e.g., mud flats. Redistribution of submerged mangrove debris is the main physical disturbance from beam trawling but is likely to have a negligible ecological impact compared to other human activities prevalent in shallow estuarine and inshore areas, e.g., pollution, siltation, and marine infrastructure.

Several studies have shown the composition of the RIBTF bycatch to be dominated by fin fish species, the capture of which can be reduced by an estimated 55% using bycatch reduction devices (BRDs). BRDs are compulsory in all beam trawl and otter trawl operations in Queensland. The RIBTF has potential for interactions with sea turtles, but these occur infrequently. When they do, turtles have a route of escape through a turtle excluder device (TED). Compulsory TED use in beam trawls outside river and creeks (where turtles seldom occur), and in all otter trawls, minimising the impact of interactions with turtles. Sea snakes, sharks and rays are also subject to occasional incidental capture but the biological properties of these species, e.g., large size and body mass, characteristics of the RIBTF operations, e.g., short duration of shot in shallow water, low weight of the catch, and reducing hazards to the fisher and retained catch, ensure these species are discarded soon after capture, thus facilitating their survival and a low risk of overfishing.

Ecosystem impacts and interactions with protected species

The fishery operates over fine mud to sand substrates sometimes containing coarser gravel and shell fragments, which may be bare or sparsely vegetated with algae or seagrass. Benthic fauna are characteristically deposit and suspension feeders associated with fine sediments and tidal currents, many of them capable of burrowing to avoid trawl capture. Observational evidence indicates that beam trawl related physical disturbance is minimal in areas where the fishery occurs, such as mud flats. Redistribution of submerged mangrove debris is the main physical disturbance from beam trawling (Dredge 1983) but is likely to have a negligible ecological impact compared to other human activities.

The extent of the impact on the ecosystem from trawling is dependent on several factors including the type of gear being used, the spatial pattern of the gear employed, the habitat and the frequency of use.

Fisheries Queensland advise that trawling activity in the RIBTF is focused on areas of soft substrate (sand and silt) that contain minimal quantities of large sessile benthic organisms and that operators purposefully avoid areas with hard substrate. As such, physical impacts are likely to be low.

Ecological risks associated with the RIBTF have previously been assessed in published risk assessments including Kingston et. al. (2004), Campbell et. al. (2017) & Jacobsen et al. (2018,). The most recent ERA Jacobsen et al. (2018) is available at https://www.daf.qld.gov.au/__data/assets/pdf_file/0004/1402672/Sth-QLD-Trawl-ERA-Final.pdf.

The Queensland Sustainable Fisheries Strategy 2017-2027 commits to a program of ecological risk assessments. A guideline describes the methods and schedule for this program is available at https://www.daf.qld.gov.au/business-priorities/fisheries/sustainable-fisheries-strategy The program includes a specific ERA for the RIBTF, which is currently being prepared.

The recent ERA of the RIBTF included fishing areas and operations of the ECOTF south of the GBRMP. Results from the assessment indicate **that trawling represents a relatively low risk** for the majority of ecological subcomponents that were assessed. Of the 171 ecological subcomponents assessed, 87.8% were low to intermediate risk from trawling. Twenty-one species were assessed as at high or high- intermediate risk of being overfished in the ECOTF south of the GBRMP, but **not in the RIBTF**.

Based on the analysis, the likelihood of interaction with the RIBTF, or adverse outcomes from RIBTF interactions, is likely to be insignificant for each of these species when compared to the ECOTF. With a significant annual reduction in RIBTF fishing effort since 2009 (Figure 2), removal of 17 RIBTF licence symbols under the 2014 east coast structural adjustment buy-back, and the mandatory uses of BRD's and TED's, significant reductions in risk are almost certain under RIBTF operations.

Beam Trawling in the Noosa River

With commercial trawl fishing there are 2 types of trawl gear - beam and otter - and they are both used to take prawns but in different locations. The main difference is in how they keep the net open.

- Beam trawl is used in inland waterways such as the Noosa River system.
- Otter Board trawling is used offshore.
- In Queensland, only about 5% of the trawl harvest is taken by beam trawling each year.
- The Beam Trawl net is attached to 2 'sleds' connected by a rigid pole, or beam, that holds the net open for fishing.

Noosa Beam Trawl Sled – Contrary to popular belief and what Skilleter states, that a trawl net sleds drag a wide path along the bottom, the fact is that there are only two small permanent contact points between the sled and the bottom are two pieces of metal that are curved at the front – much like a snow ski measuring some 4cm wide by 120cm long pieces -see photo below.

The second important part of the beam trawl is at the opening of the Beam Trawl Net. A chain known as a ‘Tickler chain’ is positioned just above the river/lake bottom either bounces across the bottom depending upon the surface structure or it causes a bow wave in front of it that scares prawns up and into the net.

By law, all nets must be fitted with a By-Catch excluder to allow all non-target species an escape out of the net.

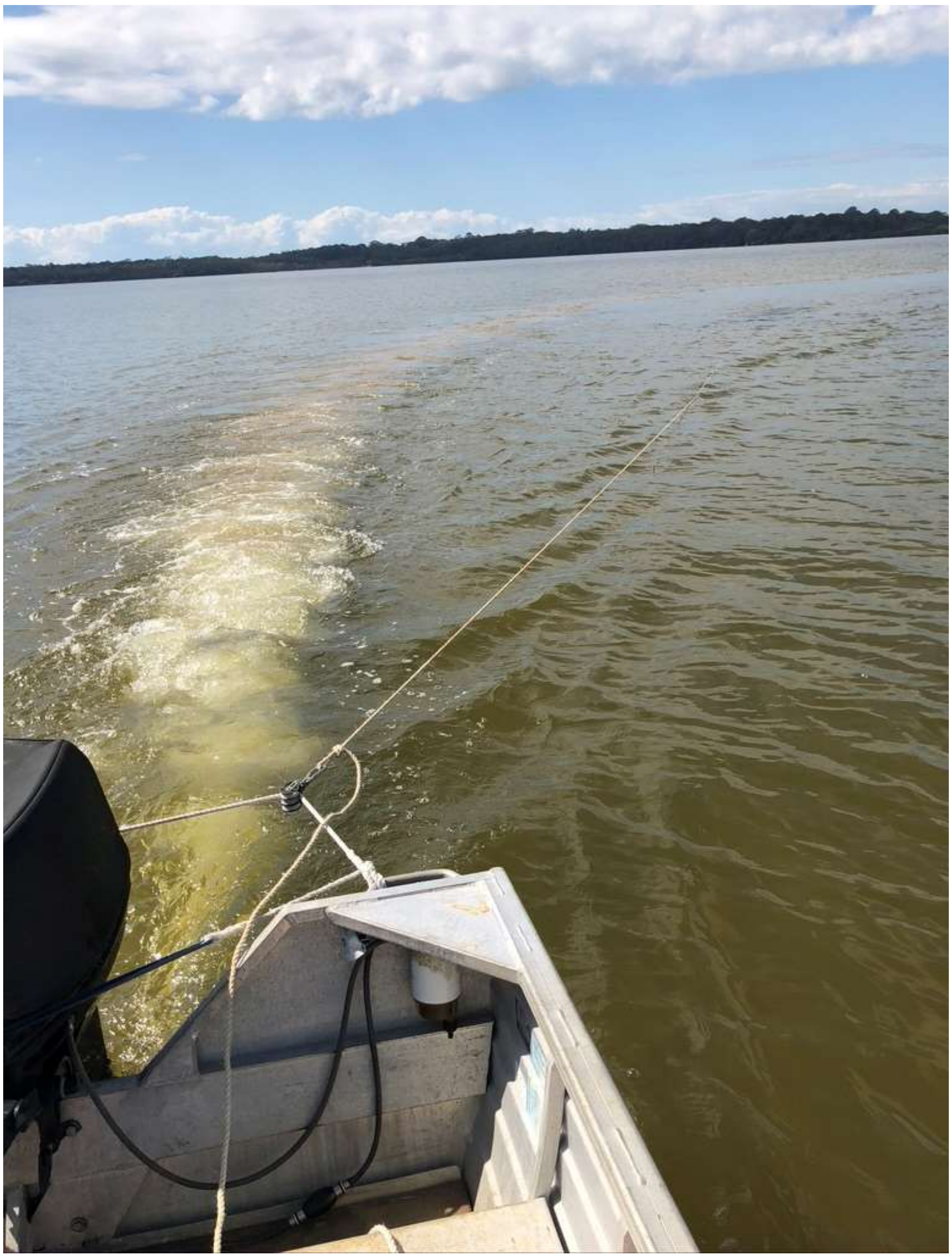
How is beam trawling in the Noosa River actually performed?

The actual beam trawl net is some 5 metres wide and is let out slowly behind the boat (an open aluminium boat or open deck half cabin boat) where it trails the vessel some 30-50 metres behind. The trawling speed is critical. Too fast and the net travels too high off the bottom and you do not catch any prawns. The other danger of a high speed is snags and logs – hit one at virtually any speed and the beam bar will bend easily and end fishing. Too slow and it bogs down and gets caught in the grasses, mud, sand, silt and the net fills with debris and not prawns. Typical speed is about 1.6 – 2.2 knots.

Observing this process, it is clearly evident that the beam net causes very minor disturbance to the river/lake bottom as virtually no sand disturbance evident (see photo below). What is clear is that propeller wash from an outboard motor in very shallow water (i.e., < 1metre depth) has an obvious impact stirring up sand and mud. Whether that be from a beam trawler vessel, tourist's boats or recreational boats in shallow water, the effect is the same.

On the day of photographing our work, we were one of some 6 vessels (5 of which were recreational fishermen) in one area at the northern end of Lake Cooroibah where the Noosa River continues north. Similarly, at the southern end of the lake there were 7 recreational fishing vessels in shallow water. Logic would suggest that it is propeller wash from all vessels – trawlers, commercial, tour operators and recreational fishermen that is what exacerbates and compounds disturbance to the river/lake bottom as opposed to beam trawlers singularly. Increased recreational boat ownership in SE Queensland and increased tourist visitation in Noosa will only see this problem compound.

Sand/mud slurry from propeller as it passed over a sandbank – no disturbance behind the beam trawl net!



Today's commercial prawn industry in the Noosa River supports a bait prawn fishery of up to 5 boats in a season from October to April, with most of the fishermen also involved in mixed-fish, crab, mullet net fishing and other employment if/when needed.

These days, night-time and weekend closure in the river protects the prawn population from over exploitation. Metapenaeus bennettae and Penaeus plebejus form a significant portion of the commercial catch. P. plebejus leaves the river at a non-commercial size and is not present in large numbers on the common commercial fishing grounds or during the day. The timing of the life history of these three species is presented and is used to explain the seasonal nature of the fishery. With present legislative restrictions, the Noosa prawn fishery is unlikely to compete for prawn resource with the offshore king prawn fishery and is unlikely to over exploit the bait prawn populations.

Fisheries today is a highly regulated industry – one that is closely managed and monitored. Modern day legislated requirements result in greater capital investment and in combination with operating costs results in marginal viability form most license holders. Most focus on other fishing actives such as Spanner Crabs, Mullet, etc where operating profits tend to be better.

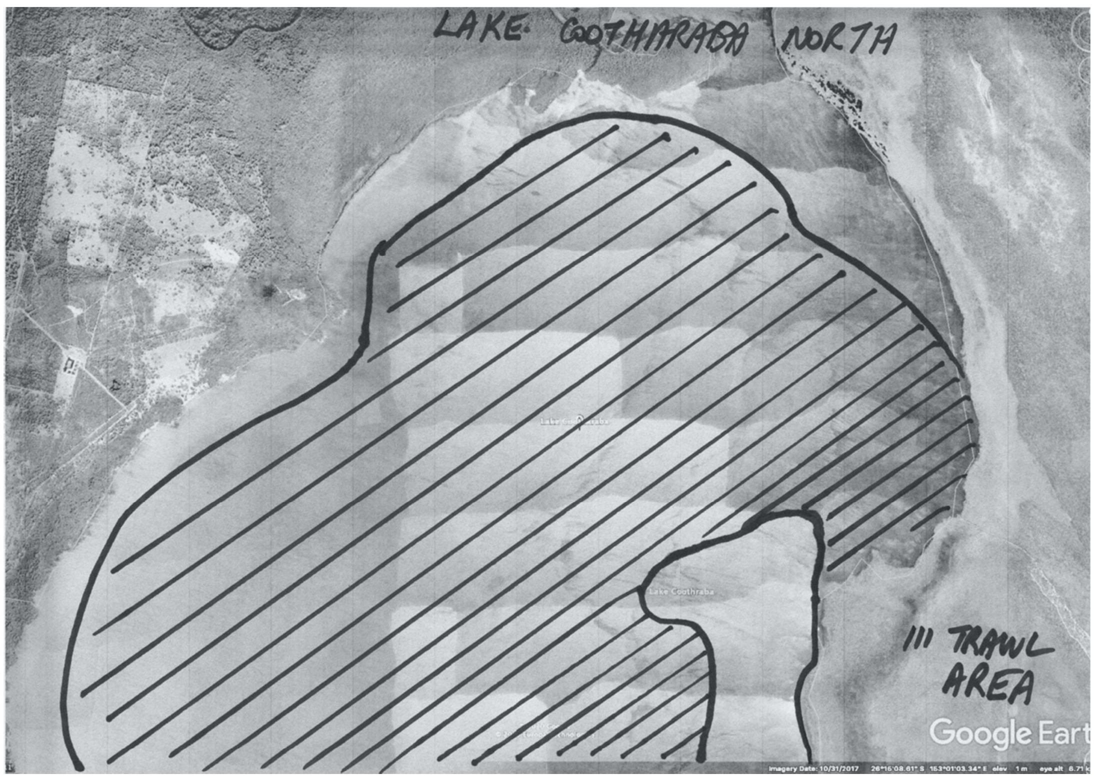
There are only a few areas where the river/lake bottom is suitable to practically conduct beam trawling and only a few areas where 'balls of prawns' aggregate – see photo below. It is not the case where beam trawlers just randomly tow a net anywhere until the net fills. It is a very target-area specific operation in reality. Tides, the moon, temperature, etc, etc all play a significant part in deciding whether there will be prawns in these areas or not.

Prawn beam trawling occurs in parts of Lake Cootharaba, parts of the river connecting Lake Cootharaba and Lake Cooroibah and parts of Lake Cooroibah. Occasionally, hand netting for greasy prawns is conducted in Lake Weyba.

Lake Cootharaba (>75% of total catch) is approximately 10 km long and 5 km wide, with an average depth of 1.5 m. Trawling does not occur along the western bank area nor the entrance to the northern reaches of the river because there is a sand bank running from the entrance to the lake along the bank to Boreen Point and further north rocky outcrops and a rocky bottom precludes any trawling. Trawling at best occurs further than 100 metres from the bank along this section.

There is a large sand bank in the northeast of the lake that creates a channel between it and the mainland. Trawling is not carried out on the sand bank. Similarly, in the southeast near the entrance to the lake is a rocky shoreline that is avoided. The total area of the lake is some 50 square kilometres with approximately 18 square kilometres not trawled. Essentially 32 square kilometres is the trawl area.

1. Northern section Lake Cootharaba

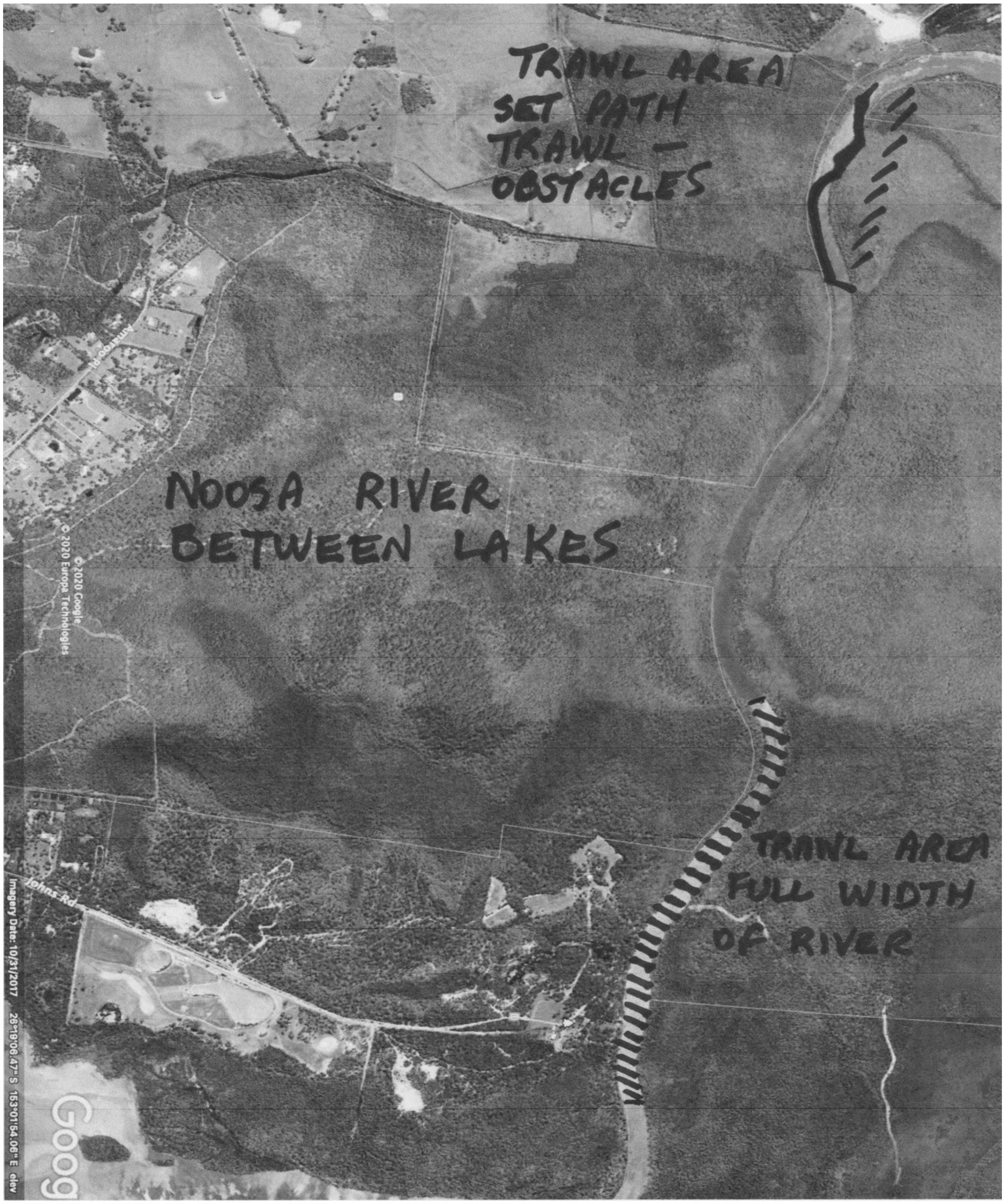


2. Southern section Lake Cootharaba

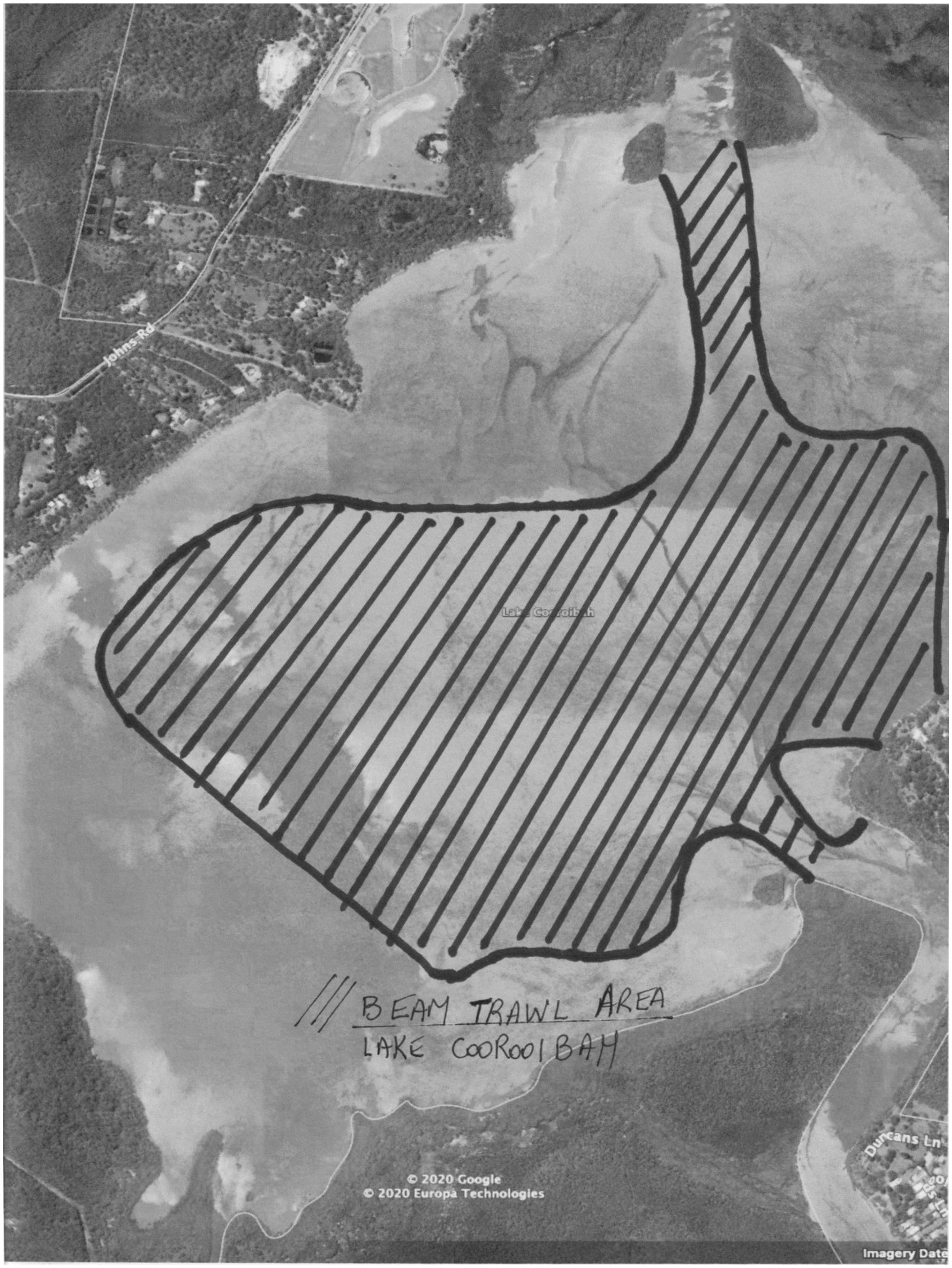
Skilleter and his team sampled 3 areas – Lake Cootharaba, the lower reaches of the river and Lake Weyba. Only one of the sample areas sees beam trawlers – Lake Cootharaba.

Where the benthic layer and trawl samples were taken (see Fig. 1 below) it is important to recognise that commercial beam trawling does not occur in any of these locations, and it becomes easy to understand how non-scientific folk could interpret the Lake Cootharaba-specific data taken in areas where trawling does not occur as a systemic issue – one that could lead to the direct conclusion that this activity is responsible for benthos degradation where samples were taken. Especially when statements such as beam trawl sleds crush creatures in the benthic layer are made in the report?

River between lakes – some 7 kms long and 85 metres wide the total area is approximately 6 square kilometres. Approximately 65% is trawled - 4 kms. In the section of river in between Lakes Cooroibah and Cootharaba being a narrow waterway, all waters cannot be trawled due to riverbed obstacles such as rocks, trees, and other obstructions. The river around John's Landing and the eastern side of the river to the northeast at the entrance to Lake Cootharaba are not trawled.



Finally, Lake Cooroibah. Virtually all the western bank and the south-eastern bank are not trawled because it is too shallow – weed, sand, rocks, etc. measuring some 6 square kilometres about 1 square kilometre is not trawled.



The total area of the 3 waterways is some 62 square kilometres. Of those 21 square kilometres or 35% is not trawled. If 35% is not trawled, then why have we not seen a recovery of the benthic layer (assuming it was trawled in the past) or a much higher level of biodiversity there compared to areas that are trawled today?

This has a direct bearing upon the negative perception that the impact of 6 beam trawlers supposedly have and more importantly places a direct spotlight on the impact of other factors such as sedimentation, poor water quality, pollution, changed habitat conditions, changes to the components of the benthic communities, etc.

Skilleter sampling areas – Lake Cootharaba 2018.

Unlike fin fishing, where electronic equipment such as fish finders, planes and today drones identify the location of schools of fish, there is no equipment or technology to this day used in inshore rivers and waterways apart from experience gained over many years of practice.

Signs such as water discolouration and birds congregating in a specific area can point to a ball of prawns. Local historical knowledge of the river and lake bottom formation also is key – there is nothing random about beam trawling. The enemy of beam trawler fishermen is nets filled with sea grasses and tree branches, etc. Veer too far off a known area and nets and gear are easily destroyed by rocks and other underwater obstacles.

New science

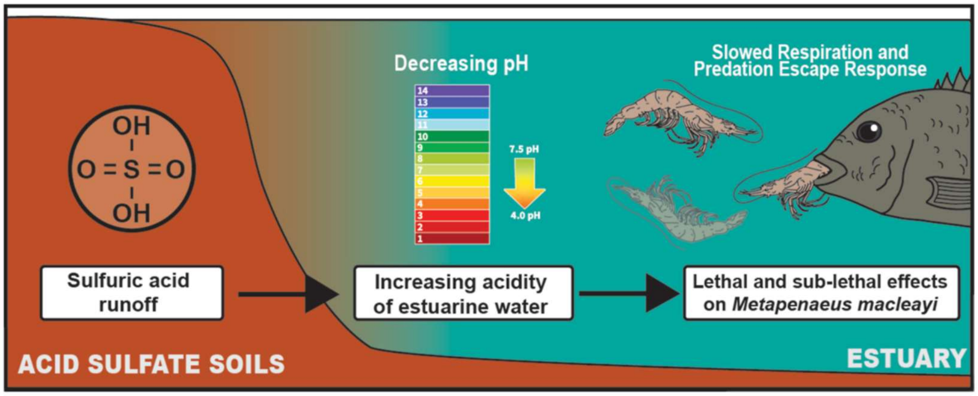
Anthropogenic factors are regularly cited as the major factors affecting not only prawns but many other species. As our climate changes we are seeing less rain (BOM Como site shows 200mm less rain annually over last decade vs previous and some 400mm less annually compared to pre-1970's). Higher salinity levels and the formation of saline wedges further upstream, acid sulfate leaching into waterways, etc. all are a major concern.

Recent studies on the impact of reduced Ph upon our major species of prawn estuarine penaeid shrimp (*Metapenaeus macleayi)* in Elsevier Environmental Pollution Volume 268, Part B, 1 January 2021, 115929

'Effects of reduced pH on an estuarine penaeid shrimp (*Metapenaeus macleayi)*' showed there was:

- Higher mortality at salinity 27 compared to salinity 14.5 (across all pH levels).
- Respiration was significantly slower under acidic conditions.
- Average predation escape response was almost twice as fast at pH 7.5 compared to pH 5.
- School Prawn have increased mortality and predation risk in acidic conditions.

Acid sulfate soils are a major problem in modified coastal floodplains and are thought to have substantial impacts on estuarine species. In New South Wales, Australia, acid sulfate soils occur in every estuary and are thought to impact important fisheries species, such as Eastern School Prawn (*Metapenaeus macleayi*). These fisheries have experienced declining productivity over the last ten years and increasing occurrence of catchment-derived stressors in estuaries contribute to this problem. We evaluated the effect of pH 4–7.5 on School Prawn survival at two salinities (27 and 14.5), pH 5, 6 and 7.5 on the predation escape response (PER) speed at two salinities (27 and 14.5), and pH 4 and 7.5 on respiration rates. While mortality appeared to be greater in the high salinity treatment, there was no significant relationship between proportional survival and pH for either salinity treatment. Respiration was significantly slower under acidic conditions and the average PER was almost twice as fast at pH 7.5 compared to pH 5 ($p < 0.05$), indicating prawns may fall prey to predation more easily in acidic conditions. These findings confirm the hypothesized impacts of acidic water on penaeid prawns. Given that the conditions simulated in these experiments reflect those encountered in estuaries, acidic runoff may be contributing to bottlenecks for estuarine species and impacting fisheries productivity.



Salinity was found to influence survival, with peak survival (77.7%) found to occur at the control salinity (*35%). Any increase or decrease in salinity from this value resulted in a decrease in survival, with the lowest salinity tested (30%) having a significantly negative effect on survival (58.4%) when compared to the control. Only temperature was found to influence the rate of development, with significant increases in development index values being recorded as temperature increased. The recommended conditions for optimal survival and development of M. dalli larvae as determined by this study are, therefore, 25.8 °C and 35% (Effects of temperature and salinity on larval survival and development of the western school prawn Metapenaeus dalli Jason A. Crisp . Gavin J. Partridge . Frances M. L. D'Souza James R. Tweedley . Navid R. Moheimani 2016).