ADVANCING AQUACULTURE

IN ROCKHAMPTON

ADVANCE ROCKHAMPTON

Rockhampton Regional Council

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AQUACULTURE

THE INDUSTRY THAT WILL HELP MEET THE WORLD'S PROTEIN NEEDS IN THE 21ST CENTURY

The global community will face enormous challenges by the middle of the 21st century when the world's population is expected to be over 9 billion people.

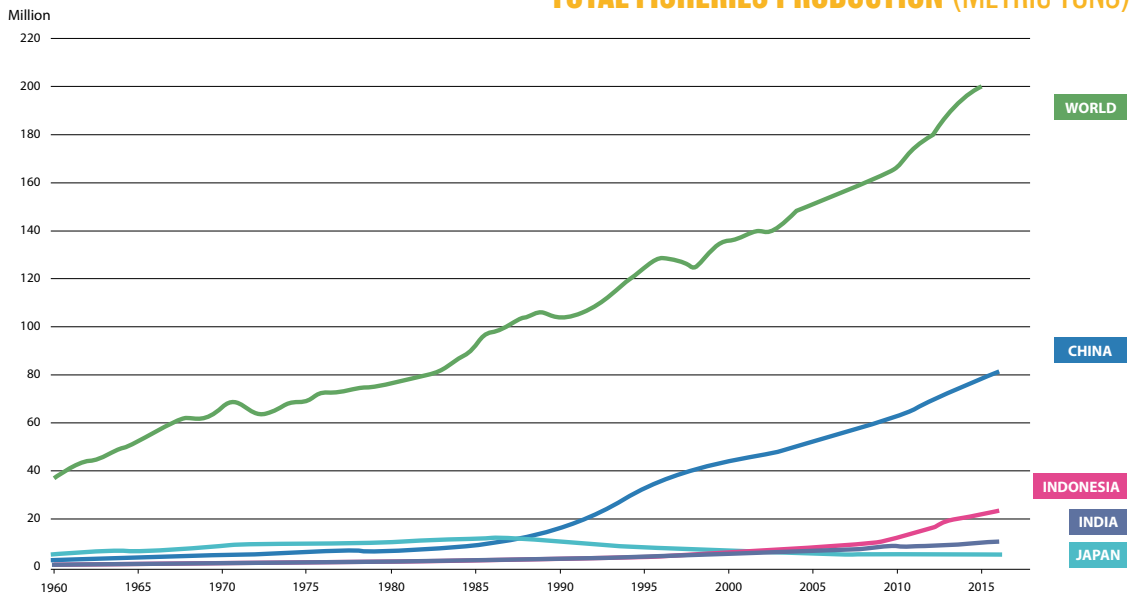
Aquaculture is the business of farming live aquatic animals and plants, under varying degrees of controlled conditions, both in marine and freshwater environments. This industry will be pivotal in providing the world's protein needs as other protein producing industries will struggle to meet demand.

MARKET DYNAMICS

- Aquaculture is the fastest growing food industry globally and demand is increasing as wild capture fisheries are not able to meet the growing demand for seafood.
- According to the World Bank, Food and Agriculture Organisation, total world fisheries production in 2015 was 199 million metric tonnes with aquaculture production constituting 106 million metric tonnes of the total world fisheries production.
- In 2017 the global aquaculture market was valued at a reported US$176.45 billion*.
- By 2022 the global aquaculture market is expected to have a market size of US$219.42 billion*.
- The Queensland aquaculture industry is worth an estimated $120 million (2016/17 FY).

*Source: Global Aquaculture Market – Forecasts from 2017 to 2022, Research and Markets.

TOTAL FISHERIES PRODUCTION (METRIC TONS)



Source: The World Bank, Food and Agriculture Organization

WHY DO WE NEED AQUACULTURE?

Aquaculture is highly regarded as a great source of marine protein to meet an increasing demand for seafood as wild capture fisheries struggle to meet the demand as the world population grows. This is why aquaculture is the fastest growing food industry globally.

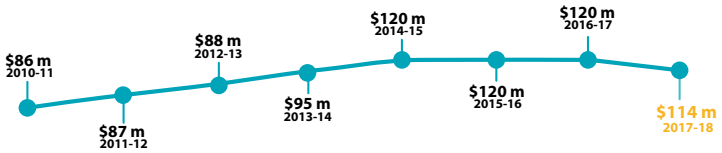
The contribution from aquaculture to the world total fish production has increased dramatically. Since the mid 1990's world capture fisheries supply to the market plateaued with aquaculture increasing its production year on year to help meet global demand.

CURRENT STATUS OF AQUACULTURE IN QUEENSLAND

Queensland aquaculture is a high quality agribusiness based on Australian native species produced in an environmentally sustainable manner.

The aquaculture industry directly employs over 525 full-time staff, with numerous other part-time and off-farm employment.

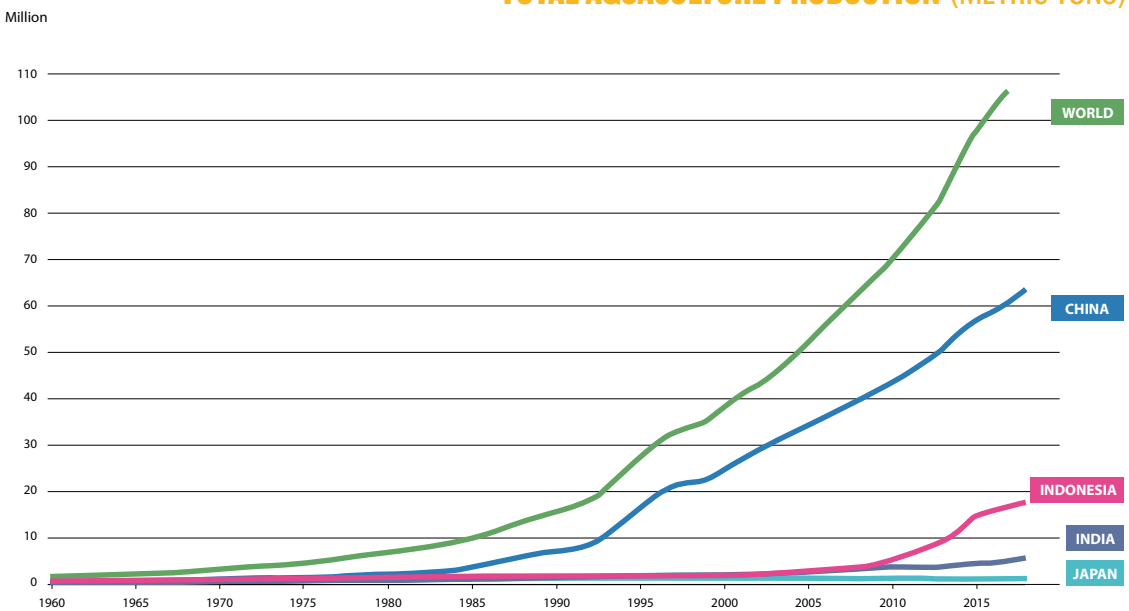
The Queensland aquaculture industry's total production value was around $114 million in 2017-18 and accounts for approximately 40% of Queensland's total fisheries production. The most valuable sectors are currently prawns ($74.7 million in 2017-18) and barramundi ($26.9 million in 2017-18).



Source: Ross Lobegeiger report to farmers Aquaculture production summary for Queensland 2016-17.

There is a substantial opportunity for investment into the industry locally. The Queensland Government and the Rockhampton Regional Council are focusing efforts to grow the aquaculture industry substantially through dedicated Aquaculture Development Areas and economic development initiatives.

TOTAL AQUACULTURE PRODUCTION (METRIC TONS)



Source: The World Bank, Food and Agriculture Organization

AQUACULTURE INDUSTRY DEVELOPMENT

IDENTIFYING SITES SUITABLE FOR AQUACULTURE

In 2016, the State Government released its response to a report by the Queensland Competition Authority's review on aquaculture regulation in Queensland. A number of recommendations were endorsed by government to facilitate expansion of aquaculture in Queensland including the identification of land based marine Aquaculture Development Areas (ADA's).

The identification of ADA's focuses on coastal areas that are suitable for culturing a wide range of marine species in earth embankment or sophisticated tank based systems that require access to seawater. This is referred to as 'land-based marine aquaculture'. Cultured species for land-based marine aquaculture might include prawns and marine fin fish, such as barramundi, coral trout, grouper, cod or cobia.

Identification of ADA's will assist in protecting areas with potential for land-based marine aquaculture development and provide investors with a list of suitable and supported areas.

THE PROCESS OF IDENTIFYING ADA'S

Consultation has been undertaken with the aquaculture industry, government agencies and local Council's using the following selection criteria:

- Physical criteria: necessary features for the construction or location of aquaculture infrastructure such as land with suitable elevation, topography and distance to seawater access.
- Environmental criteria: minimise any ecological impacts that may be a consequence of the aquaculture development, such as impacts on protected areas.
- Planning criteria: address tenure issues and compatibility with State regional plans and local government planning schemes.

Potential ADA sites would be recognised for possessing the basic requirements for operating an aquaculture business with minimal environmental and land use constraints. Access to supporting infrastructure was also considered for selecting suitable areas.

Given the size of the Fitzroy Delta and all of the supporting infrastructure, the Rockhampton Regional Council is highly supportive of the State Government identification of ADA's in the region.

ROCKHAMPTON REGION – QUEENSLAND'S FUTURE AQUACULTURE CAPITAL

Advance Rockhampton has been working with the Department of Agriculture and Fisheries on the identification of ADA's in the Region. There is enormous potential for saltwater aquaculture developments.

With the scale of major development for aquaculture, a subtropical climate, an international capable airport, dedicated resources to implement an aquaculture supply chain and a close proximity to the Asian market, Rockhampton will be Queensland's future aquaculture capital.

ROCKHAMPTON AQUACULTURE INDUSTRY DEVELOPMENT PLAN (RAIDP)

Advance Rockhampton is currently building a comprehensive plan to develop the aquaculture supply chain within the Rockhampton Region.

To help facilitate the growth of an aquaculture industry, the RAIDP will be comprised of:

/ Formal identification of sites for aquaculture in the Rockhampton Region

/ Supply Chain Development Plan

/ Infrastructure Plan

/ Education and Training Plan

/ Environmental Plan

/ Indigenous Aquaculture Opportunities Plan

Advance Rockhampton will be working closely with Government, industry representatives and the community to development this plan.

To discuss the RAIDP please contact Advance Rockhampton's Wade Clark on +61 458 579 457 or 0458 579 457.

RESEARCH SUPPORTING RAIDP

Advance Rockhampton has teamed up with CQUniversity to support research and development of Rockhampton aquaculture. CQUniversity's primary research focus is to provide real-world solutions that sustainably enhance the productivity of industry and community well-being.

Current research strengths include:

- Monitoring and management of fresh, estuarine, and marine water quality (chemical and biological pollutants)
- Assessment of fish health and wild stocks
- Environmentally sustainable development of water-based industries
- Providing clean energy solutions for industry, enhanced by 'intelligent systems' computers
- Fish hatchery research for re-stocking of wild populations

For further information on research, contact Dr Andrew Irving on +61 400 118 825 or 0400 118 825

For further information on vocational education and training, contact Kim Harrington on +61 437 443 069 or 0437 443 069

SUBTROPICAL CLIMATE

With temperatures ranging from 22°C to 32°C in the summer months, and from 9°C to 23°C in winter, the region provides a perfect subtropical climate for the production of various species.

SUNSHINE YEAR ROUND

With over 300 days of sunshine a year, the Rockhampton Region provides a great working environment for aquaculture operations.

CONSISTENT WEATHER

Air freight services are less likely to be affected by inconsistent or inclement weather in Rockhampton.

ROCKHAMPTON REGION

ABILITY TO DELIVER

- / Uncongested airspace
- / Runway capability (up to A380, B747 and Antonov class aircraft or Code F)
- / Apron parking and multiple taxiways
- / Existing training academies on site
- / Large GA Apron
- / Site at airport for physical building
- / Easy access to main airport from freight area designated

LOCATION, ACCESSIBILITY, LIVEABILITY

- / Connectivity to Brisbane, Cairns, Townsville and Mackay
- / Community supporting infrastructure – jobs for partner and provision for family
- / Accommodation availability and affordability
- / Ideal weather climate for year round operations

PARTNERSHIP AND INCENTIVES

- / Significant development incentives from Council
- / Airport is seeking to expand its operations and work with the private sector for mutually beneficial arrangements
- / Rockhampton Regional Council owns the internationally capable airport

HOW FAR?

ROCKHAMPTON AIRPORT (FROM CBD)	**4MIN**
BRISBANE (BY AIR)	**45MIN**
SYDNEY (BY AIR)	**1.75HRS**
SHANGHAI (BY AIR)	**8.5HRS**
SINGAPORE (BY AIR)	**7HRS**
HONG KONG (BY AIR)	**8HRS**
TOKYO (BY AIR)	**8.2HRS**
SEOUL (BY AIR)	**9HRS**

SALT

Queensland's most significant sea salt producer. The Rockhampton Region produces salt for the domestic and international market.

INTERNATIONAL AIRPORT

7HRS ROCKHAMPTON TO SINGAPORE

7.5HRS DRIVE - ROCKHAMPTON TO BRISBANE

45 MIN FLIGHT - ROCKHAMPTON TO BRISBANE

CAPITAL OF CENTRAL QLD

300 DAYS OF SUNSHINE SUBTROPICAL

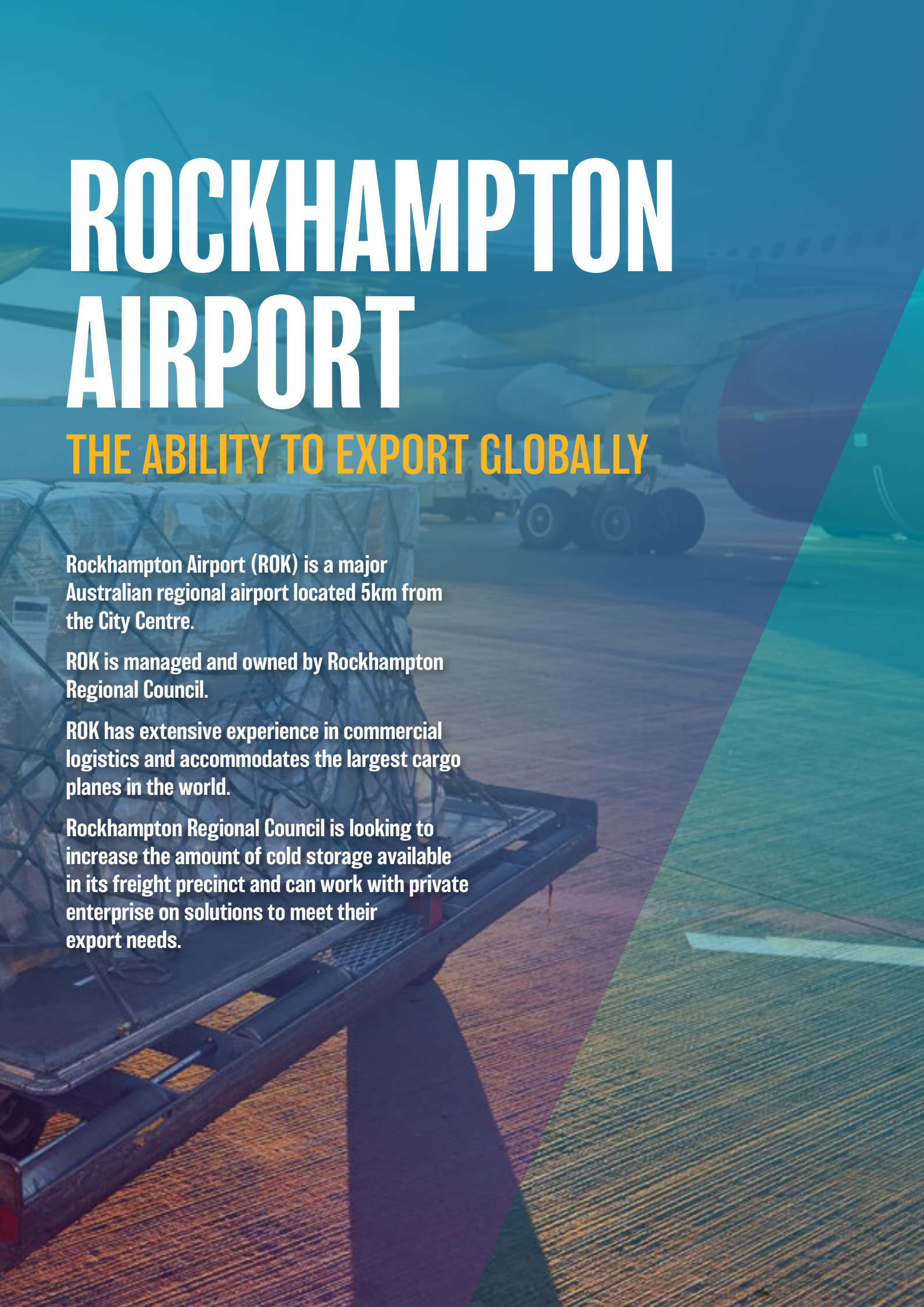
POPULATION CHARACTERISTICS

APPROX. 86,000 PEOPLE


KEPPEL BAY
Keppel Sands
Joskeleigh
FITZROY DELTA
• 70,000 ha in size = 700 square kilometres
• Singapore in size = 721 square kilometres
• Home to barramundi and threadfin
• Independent monitoring for physio-chemical indicators rate is excellent (Ecosystem Health Report)
FITZROY RIVER
FITZROY RIVER
FITZROY RIVER
Thompson Point
ROCKHAMPTON REGION AQUACULTURE DEVELOPMENT AREAS
PORT ALMA SHIPPING TERMINAL
Balaclava Island
PORT ALMA ROAD
BAJOOL
33MIN ROCKHAMPTON TO BAJOOL
MARMOR
41MIN ROCKHAMPTON TO MARMOR

ROCKHAMPTON AIRPORT

THE ABILITY TO EXPORT GLOBALLY



Rockhampton Airport (ROK) is a major Australian regional airport located 5km from the City Centre.

ROK is managed and owned by Rockhampton Regional Council.

ROK has extensive experience in commercial logistics and accommodates the largest cargo planes in the world.

Rockhampton Regional Council is looking to increase the amount of cold storage available in its freight precinct and can work with private enterprise on solutions to meet their export needs.

ROCKHAMPTON AIRPORT
THE ABILITY TO SERVICE HEAVY AIRCRAFT

PRIMARY RUNWAY 15/33

- 2568m long and 45m wide (with 7.5m shoulders) an alignment of 15/33
- Code 4D instrument, non-precision runway
- Capacity for Code F – include A380's
- Grooved flexible pavement, surfaced with asphalt, with a reported pavement strength of PCN 72/F/C/1400/T. At this strength the runway is capable of carrying substantially heavier aircraft such as A380's and the Antonov aircraft class.

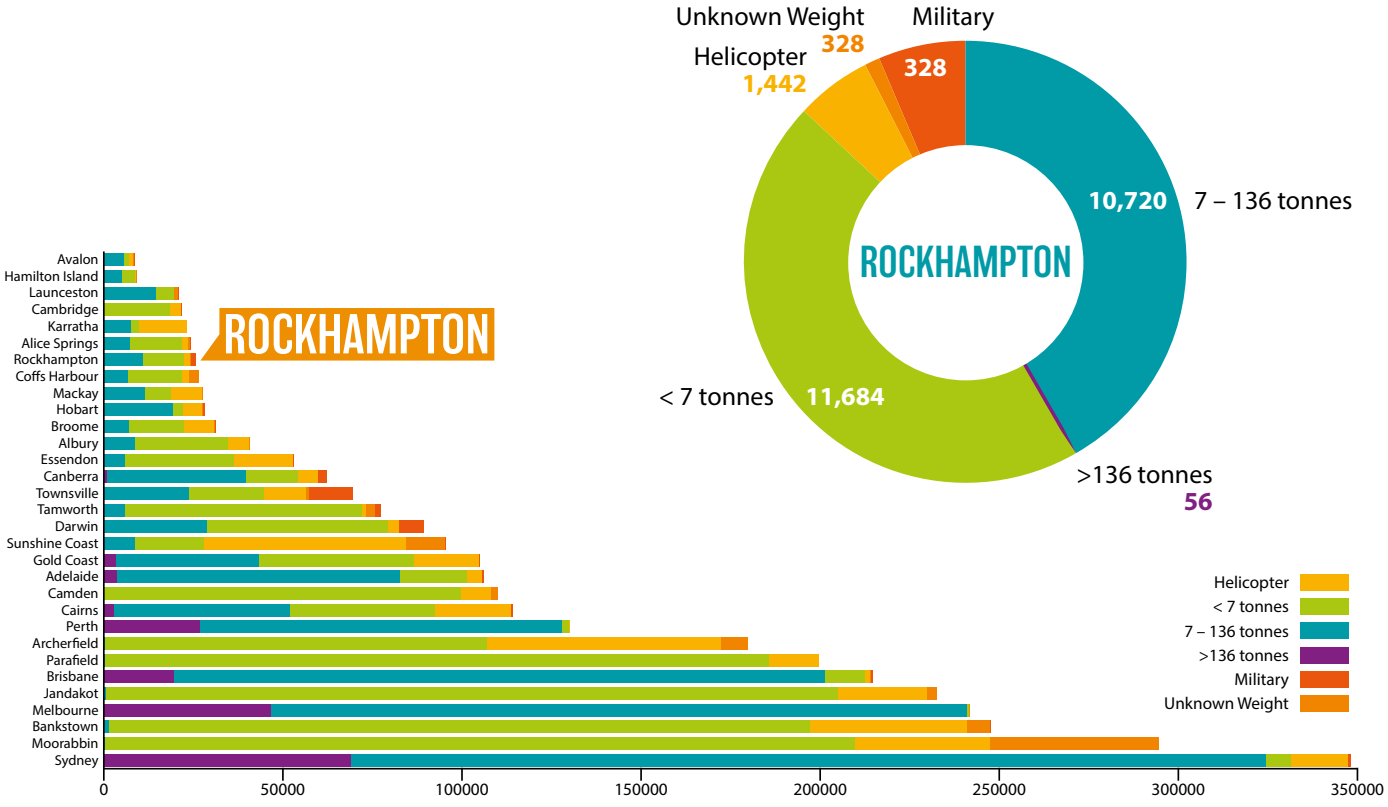
SECONDARY RUNWAY 04/22

- 1645m long and 30m wide (also with 7.5m shoulders) on an alignment of 04/22
- It has a reported pavement strength of PCN 20/F/C/1000/T
- Code 3C non-instrument runway
- Both the airport runways offer a high degree of wind coverage and flexibility for operations. The runways are also aligned with respect to local wind conditions. The effect of these wind conditions is demonstrated in the airport's wind rose.

TAXIWAYS

- The airport's taxiway system system is comprised of four taxiway connections from the primary runway to the general aviation apron (Taxiway E), to the main apron at the Passenger Terminal (Taxiways A and B), and to the main apron via a partial parallel taxiway (Taxiway J)
- Taxiway J also provides a parallel taxiway to the primary runway over a distance of 1000m on the east side of Runway 15/33 enabling larger aircraft landing on Runway 15 to exit the runway without back-tracking
- In addition to these taxiways, there are three taxiways (Taxiways F, G and C) that lead from Runway 04/22 to the general aviation apron, and a further taxiway leading to general aviation hangars in the northeast of the general aviation area

In 2017, Rockhampton Airport recorded a total of 25,826 aircraft movements. The breakdown of these are outlined below.



Total movements at Australian airports 2017 from Airservices Australia by aircraft type

FISH SPECIES
NATURAL TO CENTRAL QUEENSLAND

BARRAMUNDI (Barra, Lates calcarifer)

The name Barramundi is derived from the local Rockhampton indigenous people the Darumbal people. They pronounce the word Bardda Moon Di, as such Rockhampton is the "Home of the Barramundi". This giant perch is fast growing with great texture and flavour.

BARRAMUNDI COD (Cromileptes altivelis)

The Barramundi Cod has a unique body shape with a stocky body, black dots and elongated snout. The Cod is a fast growing fish that is distributed in sub-tropical and tropical waters normally living in/ around reef systems. This ambush predator has a relatively high value.

COBIA (Black kingfish, Rachycentron canadum)

The wagyu of the sea, Cobia is a highly valued species in countries such as Japan, Korea, Singapore and China. Cobia is a pelagic species and as such is a larger fish and is commonly sized around 1.1metres. It is eaten in a variety of ways such as sushi in Japan.

CORAL TROUT (Plectropomus leopardus)

The Common Coral Trout or Leopard Trout is actually part of the Cod family. It has a profusion of small dots over its body except for its fins. Its colour ranges from brown, pink & orange to bright red. This is a highly rated eating fish.

QUEENSLAND GROPER (Queensland grouper, giant grouper, Epinephelus lanceolatus)

The giant grouper is the largest bony fish found in coral reefs and is the aquatic emblem of Queensland. In the wild it is classified as a no-take species however there is aquaculture opportunities.

MANGROVE JACK (Jacks, Lutjanus argentimaculatus)

The Mangrove Jack is a target species for recreational fishers as it is a hard fighting and elusive specimen. It can be found in a variety of places such as mangrove estuaries and deeper reef areas – to depths of up to 100m.

RED CLAW (Queensland red claw crayfish, Cherax quadricarinatus)

Cherax quadricarinatus is native tropical Queensland and can be grown commercially with a permit in the Rockhampton Region. Species can grow to around 600 grams with the body colour being predominantly blue green.

RED EMPEROR (Reds, Lutjanus sebae)

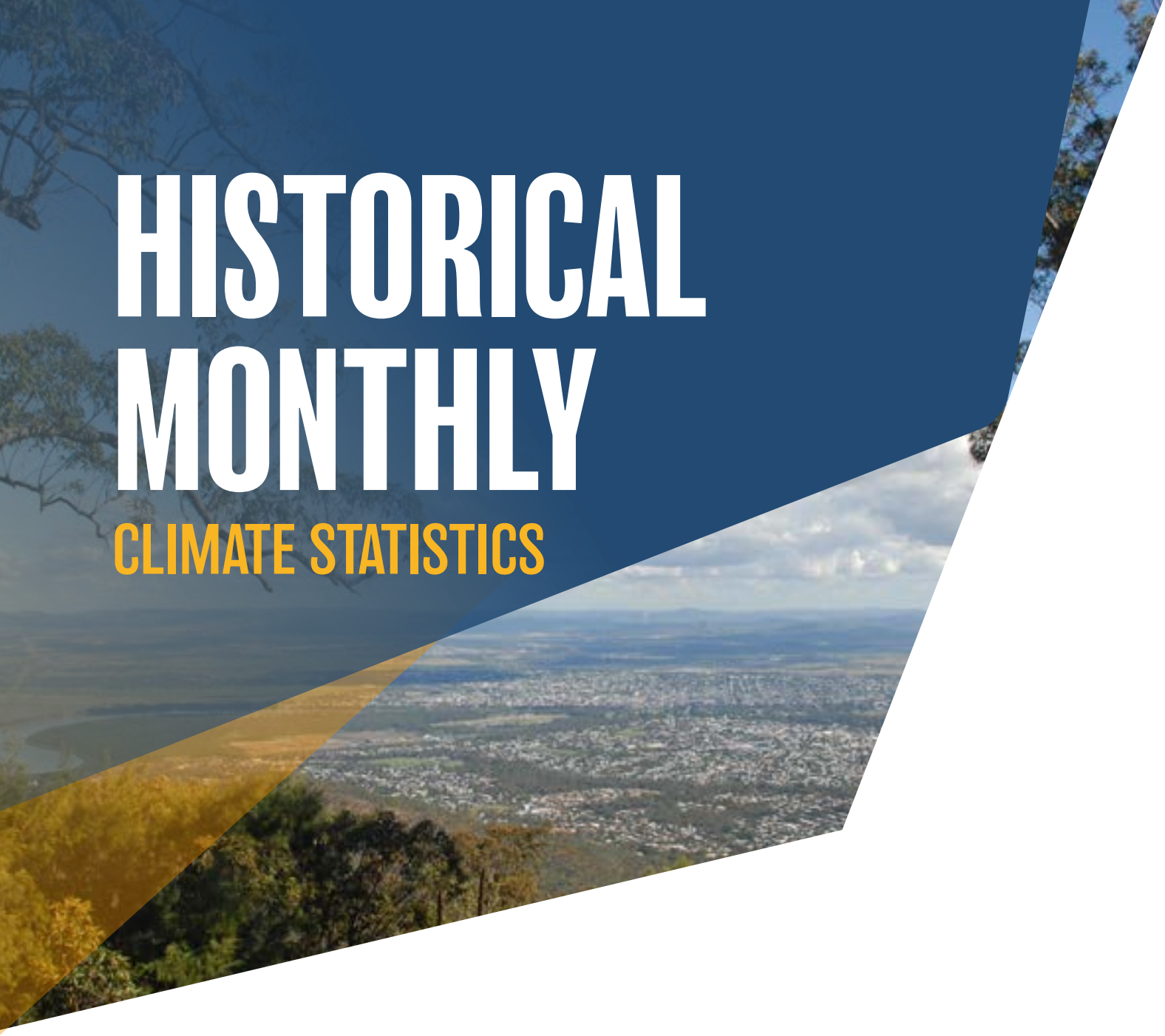
The Red Emperor is a highly valued species due to its superb eating qualities. This species occurs naturally in the broader region and has a distinctive red colouring.

TIGER PRAWNS

The black tiger prawn is a fast growing sub-tropical species that is well suited to warm, brackish water. There are a variety of methods used for farming this species such as tanks and earth embankment ponds.

SEA CUCUMBERS

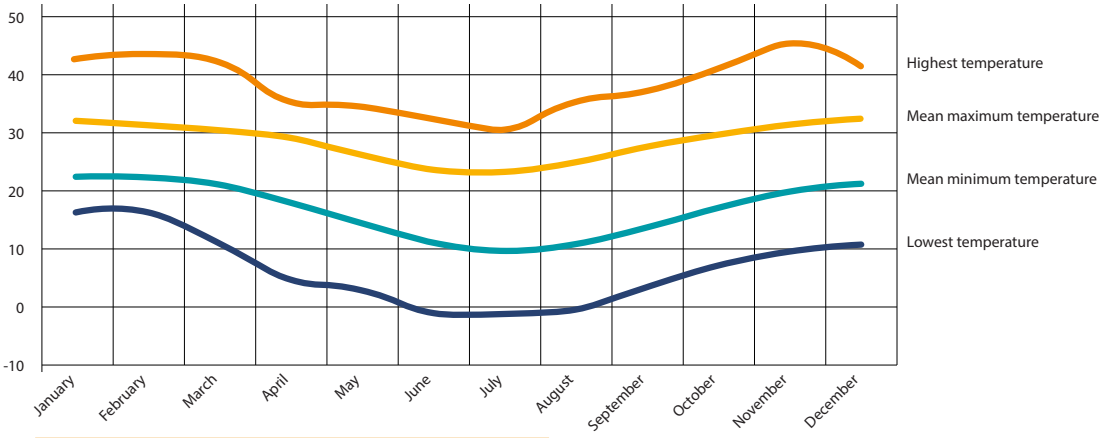
The sea cucumber is considered a delicacy in many Asian countries. This product can be dried and used in various dishes. The species grows well in sub-tropical waters.



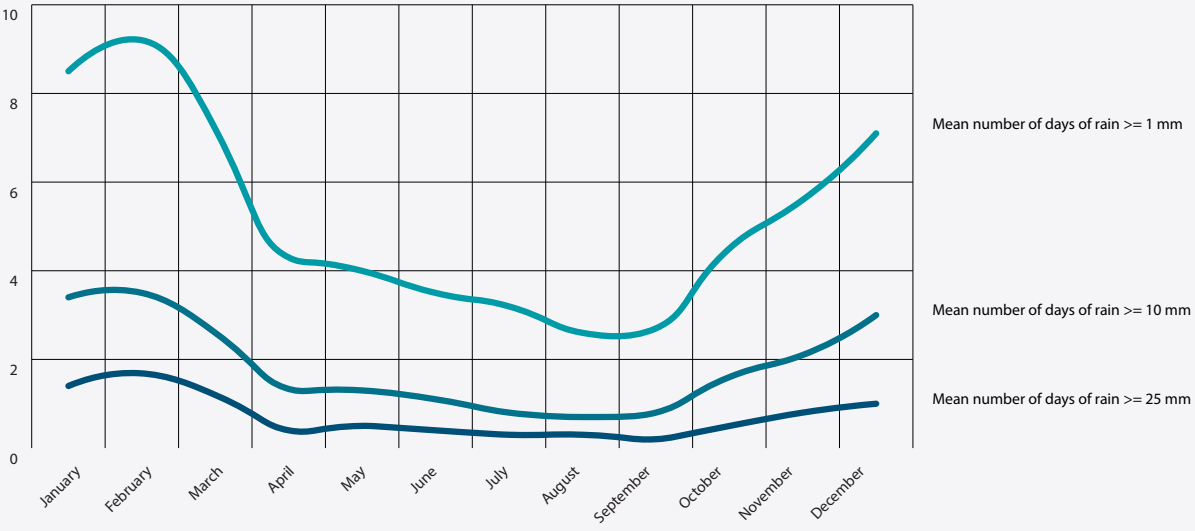
HISTORICAL MONTHLY

CLIMATE STATISTICS

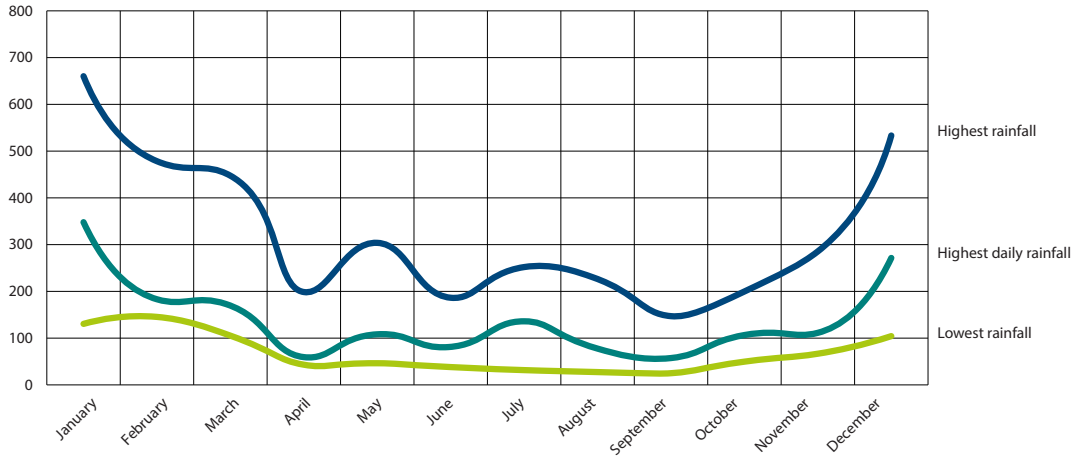
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	**Annual**
Mean maximum temperature (°c)	32	31.3	30.5	28.8	26	23.5	23.2	24.9	27.5	29.7	31.2	32.2	**28.4**
Highest temperature (°c)	42.5	43.3	42.1	35.4	34.4	32.3	30.6	35.1	37.2	41.1	45.3	41.5	**45.3**
Mean minimum temperature (°c)	22.2	22.2	20.9	18	14.3	11	9.7	10.7	13.8	17.1	19.6	21.2	**16.7**
Lowest temperature (°c)	16.3	16.2	11	4.7	2.9	-1	-0.9	-0.3	3.4	7	9.4	10.6	**-1**
Mean rainfall (mm)	130.5	145.4	105.3	43.2	46.3	38.1	31.6	27.4	25	49.7	66.7	104.3	**814.9**
Highest rainfall (mm)	660.2	478.4	447.4	198.6	303.8	186.4	252	228.4	147	199.8	285.6	533.4	**1631**
Date of highest rainfall for years	1974	2008	1990	1990	1989	1967	2016	1998	2010	2017	2000	1990	**1973**
Lowest rainfall (mm)	1.6	2.8	2.3	0	0.3	0	0	0	0	0.4	0	2.8	**360**
Highest daily rainfall (mm)	348	183.1	172.2	59.4	108.2	80	136	77.6	57.4	106.6	111.4	271.5	**348**
Mean number of days of rain	11.2	12.2	10.1	6.6	6.2	5	5.2	4.2	4	6.4	7.7	9.5	**88.3**
Mean number of days of rain ≥ 1 mm	8.5	9.2	7.2	4.3	4	3.5	3.2	2.6	2.7	4.5	5.6	7.1	**62.4**
Mean number of days of rain ≥ 10 mm	3.4	3.5	2.6	1.3	1.3	1.1	0.8	0.7	0.8	1.6	2.1	3	**22.2**
Mean number of days of rain ≥ 25 mm	1.4	1.7	1.2	0.4	0.5	0.4	0.3	0.3	0.2	0.5	0.8	1	**8.7**



TEMPERATURE 1939-2018 (˚C)



RAINFALL DAYS 1939-2018



RAINFALL (MM) 1939-2018

OUR WATER

The Fitzroy River catchment is the largest catchment on the eastern seaboard and second largest in Australia, flowing into Keppel Bay.

Ensuring the highest levels of water quality is the focus of all levels of government, industry and the community. There is a continual water monitoring and improvement program undertaken independently by the Fitzroy Partnership for River Health. Their assessment of the 2017/18 year is listed below

FITZROY RIVER HEALTH REPORT CARD
2017-2018

pH

PHYSIC CHEMICAL
PH – A
SULFATE – B
TURBIDITY – B

NUTRIENTS
NITROGEN – B
OXIDISED NITROGEN – B
TOTAL PHOSPHORUS – B

TOXICANTS
MANGANESE – A
SELENIUM – A
IRON – B
ALUMINIUM – B

INVESTMENT OPPORTUNITIES

THERE EXISTS A WIDE VARIETY OF INVESTMENT OPPORTUNITIES IN THE AQUACULTURAL SPACE HERE IN THE ROCKHAMPTON REGION.

POTENTIAL AQUACULTURE INVESTMENTS

The Rockhampton Region has various local aquaculture business operators open to investment opportunities for the production of marine and freshwater aquaculture products.

BAJOOL AQUACULTURE OPPORTUNITY

The Bajool district has been identified as a key location for aquaculture development. A number of landholders have expressed interest in potential aquaculture business opportunities including potential joint ventures or other collaborative partnerships.

POTENTIAL AQUACULTURE LAND

The Rockhampton Region has real estate agents that focus on the rural sector.

For further information on these opportunities, contact Wade Clark on + 61 458 579 457 or 0458 579 457

FUTURE SUPPLY CHAIN

OPPORTUNITIES

To develop and support a large aquaculture supply chain in the Rockhampton Region, many specialised businesses will be required.

Advance Rockhampton is keen to open discussions with businesses that either work directly within the aquaculture industry or can adapt a part of their business to service this sector.

FUTURE SUPPLY CHAIN OPPORTUNITIES

If you/your business can provide the following, we would like to talk to you –

- / Aquaculture feed
- / Aquaculture feed supplements
- / Hatchery facilities and services
- / Tank based fish farm facilities and services
- / Earth embankment pond construction and services
- / Processing facilities and services
- / Specialised veterinarian services
- / Seafood exporting services (cold storage), domestic and international

To discuss aquaculture opportunities please call
Wade Clark on +61 458 579 457 or 0458 579 457.

ADVANCE ROCKHAMPTON

Rockhampton Regional Council

Economic Development, Tourism,
Events & Marketing

220 Quay Street, Rockhampton Qld 4700
Po Box 1860, Rockhampton Qld 4700
07 4932 9000 Or 1300 22 55 77
advancerockhampton@rrc.qld.gov.au

ADVANCEROCKHAMPTON.COM.AU

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