

ADVANCING AQUACULTURE

IN ROCKHAMPTON



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ADVANCING AQUACULTURE IN ROCKHAMPTON

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Margaret Strelow
Mayor
 Rockhampton Regional
 Council

MAYOR'S GREETING

Our Region is re-inventing itself and we need to in an ever changing world.

We are proudly the Beef Capital of Australia and we are proudly the major service centre for the Central West and we remain significant players in the resources sector.

But we are acutely aware that there are opportunities to be had in diversifying into the BioSciences.

Nature has bequeathed our region an amazing set of assets which lend themselves well to aquaculture development.

The State Government has now identified 3600 hectares of prime aquaculture land within our Region, classifying it as an Aquaculture Development Area (ADA). Of all the aquaculture development area land identified across Queensland the Rockhampton Region has over 50% of it.

Considering the magnitude of the economic opportunity, Advance Rockhampton has been tasked to facilitate the implementation of a significant scale aquaculture supply chain.

This will ensure that our region gains the maximum economic benefit whilst developing a premium marine 'place based' brand.

Rockhampton's existing logistical framework is robust and able to assist transporting of aquacultural product. Our internationally capable airport provides additional significant advantages to commercial interests to access global markets.

I commend this work to you and thank the Queensland Government for their strong encouragement and support as we have ventured towards cementing our place in this exciting economic growth area.



Tony Cullen
General Manager
 Advance Rockhampton

ADVANCE ROCKHAMPTON

As Council's economic body we will advance aquaculture within our Region by:

- Developing an Aquaculture Industry Development Plan.
- Advocating for a development code for ADA's.
- Advocating for a timeframe limit on development applications.
- Working with landholders, local businesses and government to build a local aquaculture supply chain.
- Identifying aquaculture infrastructure needs and working with government to develop ADA's.
- Continuing business and trade attraction initiatives for domestic and international investors.

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.

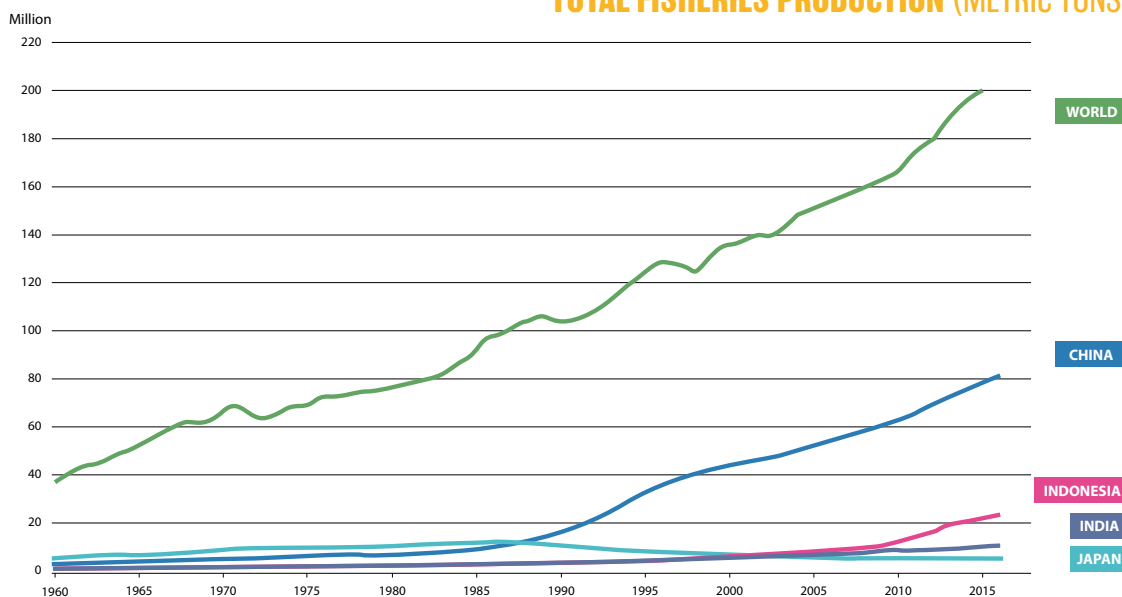
Aquaculture is the business of farming live aquatic animals and plants, under varying degrees of controlled conditions, both in marine and freshwater environments. This industry will be pivotal in providing the world's protein needs as other protein producing industries will struggle to meet demand.

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.

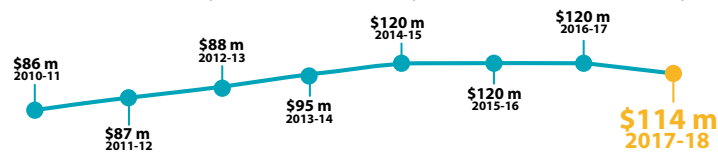
The contribution from aquaculture to the world total fish production has increased dramatically. Since the mid 1990's world capture fisheries supply to the market plateaued with aquaculture increasing its production year on year to help meet global demand.

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 530 full-time staff, with numerous other part-time and off-farm employment.

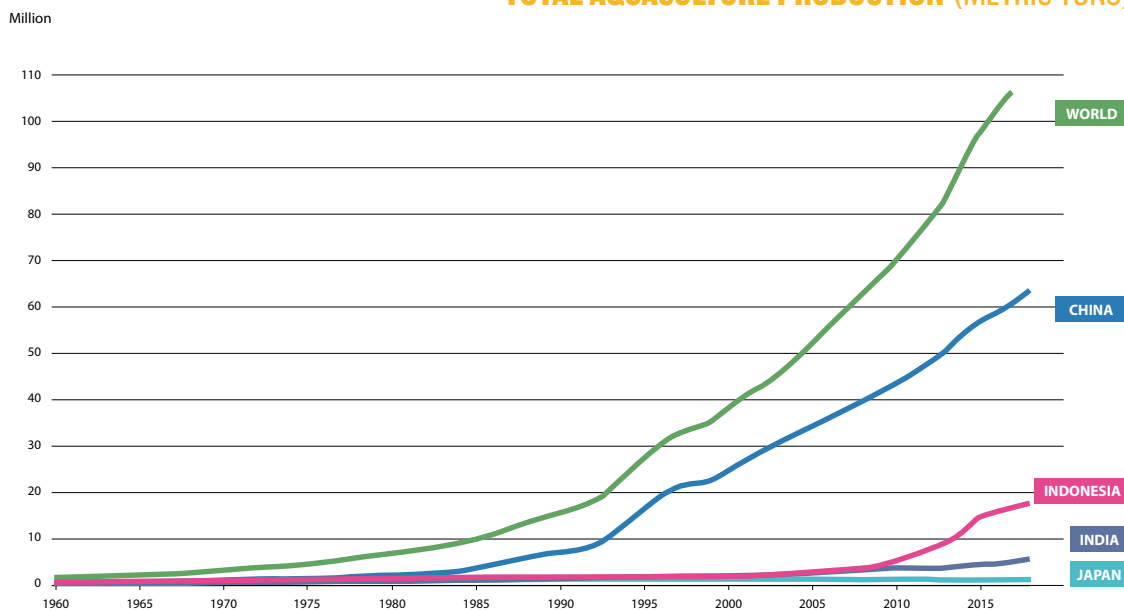
The Queensland aquaculture industry's total production value was around \$120 million in 2016-17 and accounts for approximately 40% of Queensland's total fisheries production. The most valuable sectors are currently prawns (\$77.8 million in 2016-17) and barramundi (\$28.4 million in 2016-17).



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
- / West Rockhampton Aquaculture Precinct (pending investigation and subject to Council approval)
- / 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
- NEW IN 2019: 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.



ROCKHAMPTON (ROK)

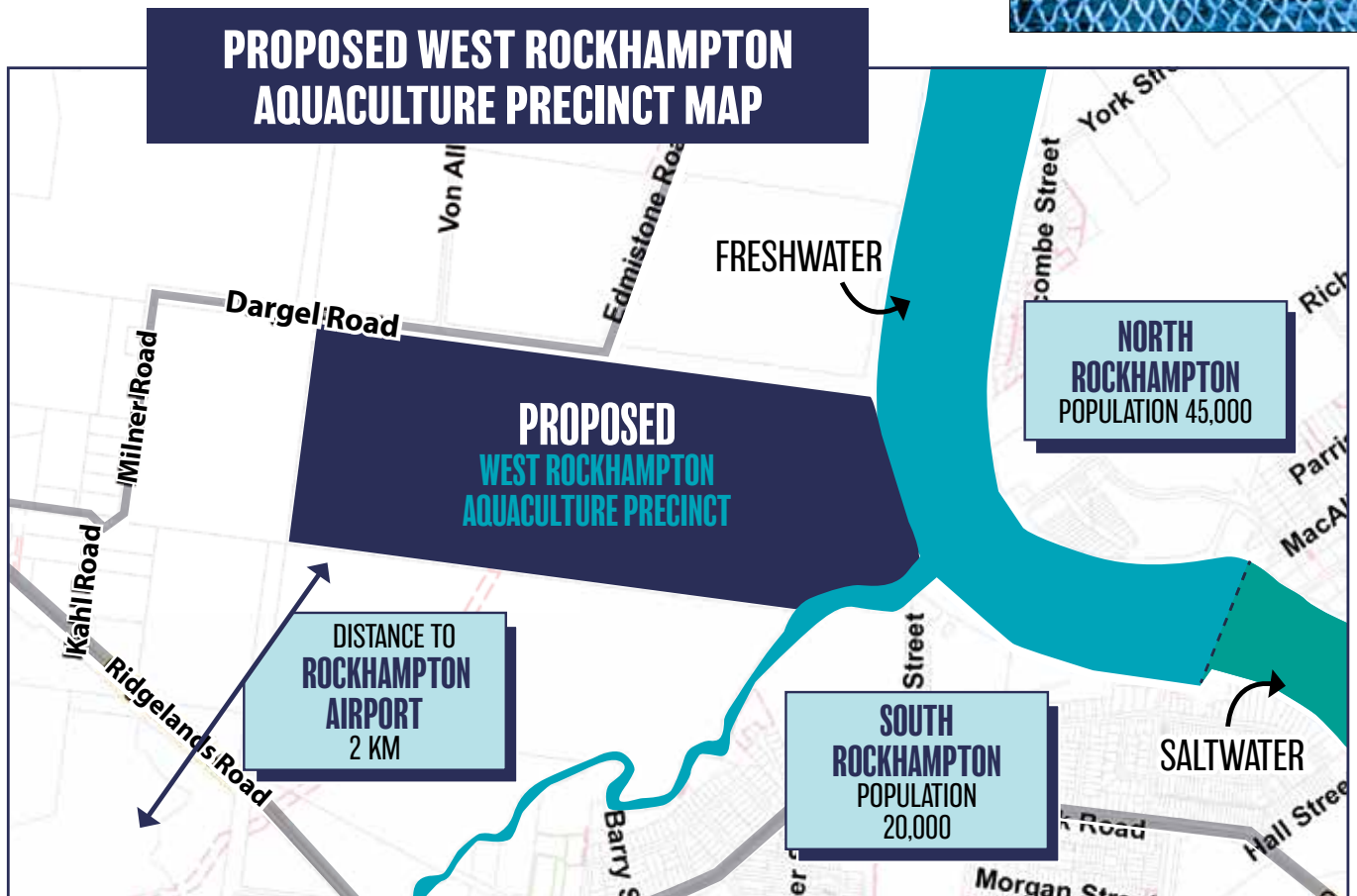
Rundle Range National Park

WEST ROCKHAMPTON AQUACULTURE PRECINCT

The Rockhampton Regional Council has, under its stewardship, a significant parcel of land near the international capable Rockhampton Airport, 1.7 hectares in size, accessing both saltwater and freshwater. This land is currently under investigation for an aquaculture precinct and Advance Rockhampton is open to discussing opportunities for aquaculture in the areas of:

- / HATCHERY FACILITIES
- / FISH FARM FACILITIES – TANK BASED
- / EDUCATION FACILITIES
- / RESEARCH FACILITIES

The proposed West Rockhampton Aquaculture Precinct has the potential to access both freshwater and saltwater due to its close proximity to the city's barrage.





INVESTMENT OPPORTUNITIES

There currently 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.

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

BAJOOOL 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.

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

WEST ROCKHAMPTON AQUACULTURE PRECINCT

Advance Rockhampton is currently investigating an aquaculture operation in close proximity to the Rockhampton Airport. Advance Rockhampton is open to discussing opportunities in the areas of:

- / Hatchery facilities
- / Fish farm facilities (tank based only)
- / Education facilities
- / Research facilities

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

POTENTIAL AQUACULTURE LAND

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

For further information, 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.

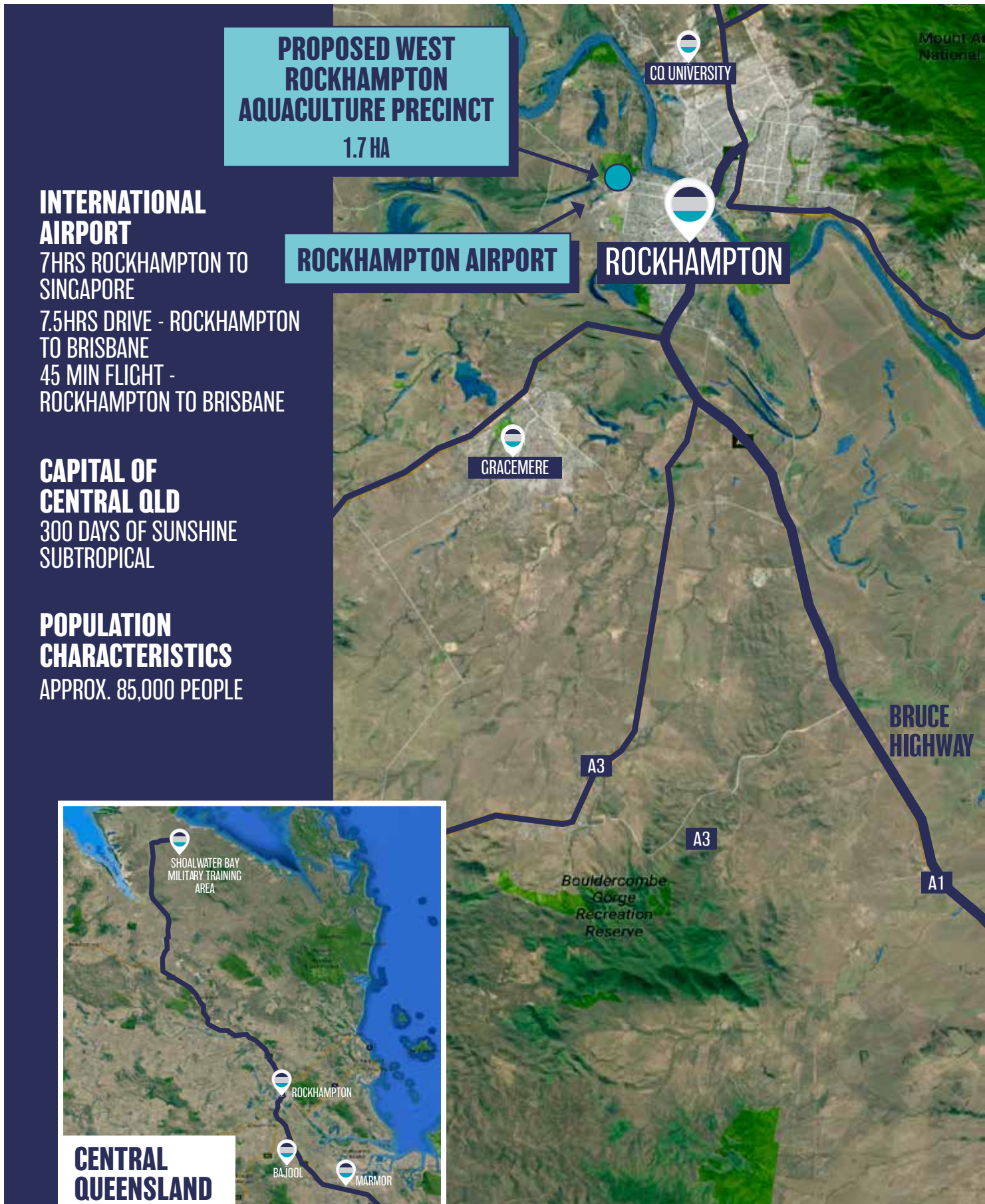
FUTURE SUPPLY CHAIN OPPORTUNITIES

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.

To discuss international trade please call Young Beamish on +61 428 175 226 or 0428 175 226.



**PROPOSED WEST
ROCKHAMPTON
AQUACULTURE PRECINCT**
1.7 HA

**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. 85,000 PEOPLE



**CENTRAL
QUEENSLAND**



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)

ROCKHAMPTON REGION AQUACULTURE DEVELOPMENT AREAS

PORT ALMA SHIPPING TERMINAL

PORT ALMA ROAD

BAJOO

33MIN ROCKHAMPTON TO BAJOO

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 by Advance Rockhampton and owned by the Rockhampton Regional Council.

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

Advance Rockhampton 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.

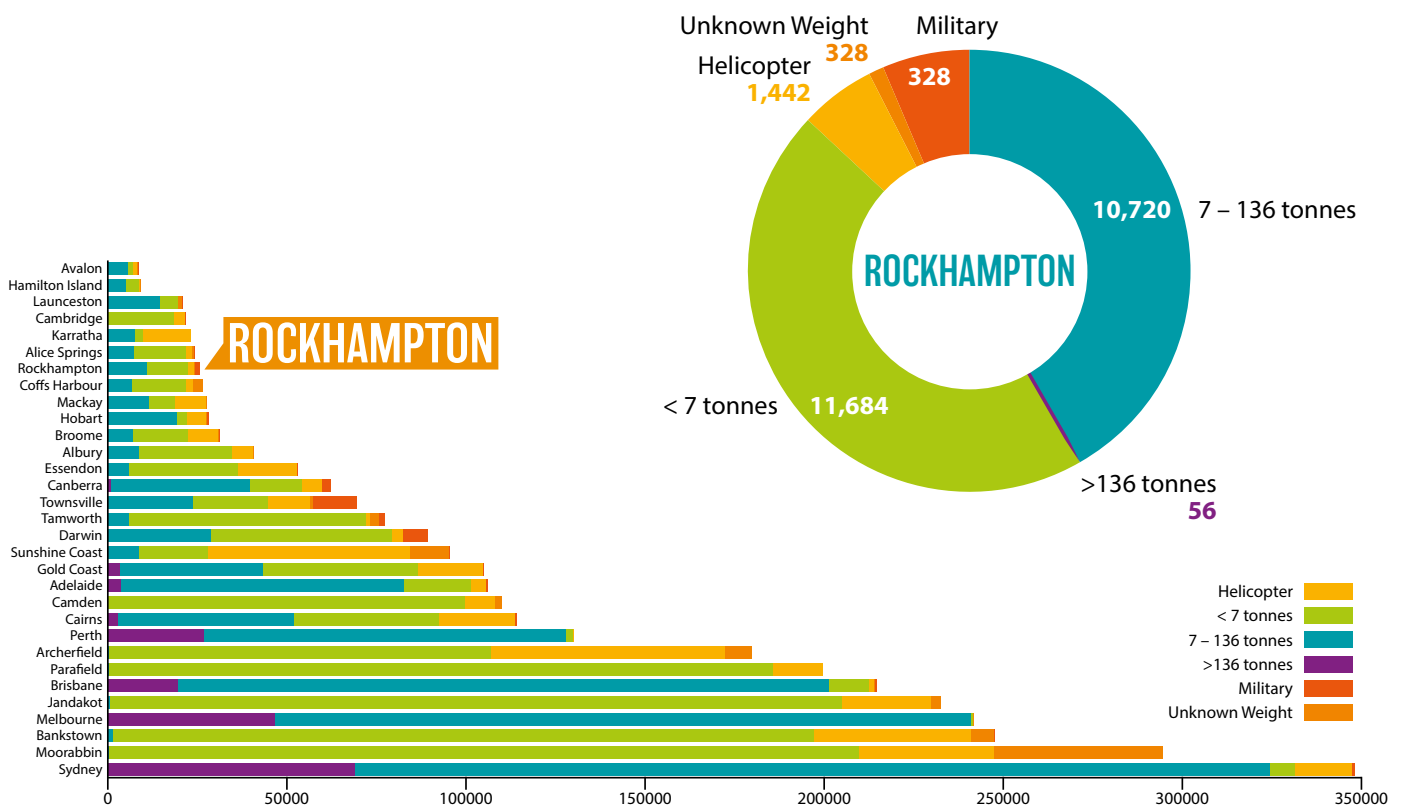
SECONDARY RUNWAY 04/22

- / 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 properly 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 1.1 metres. 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.

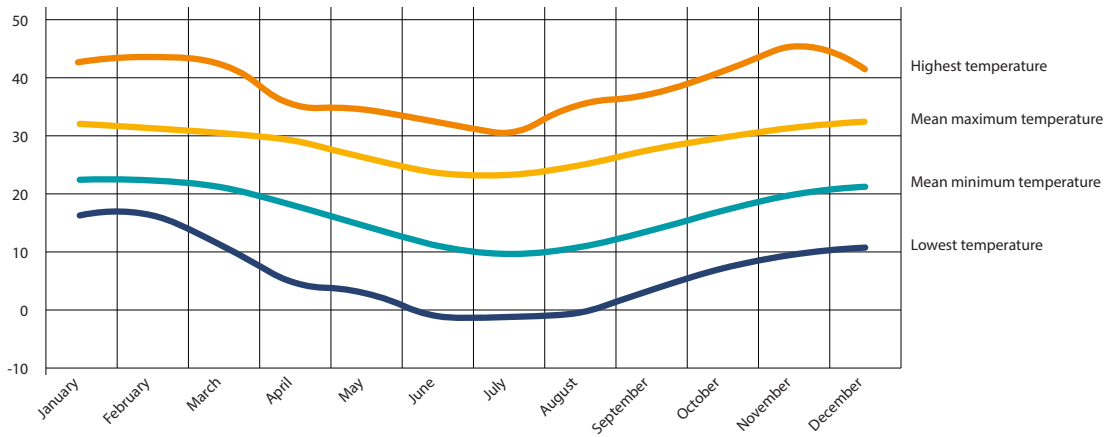
**SEA CUCUMBERS**

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.

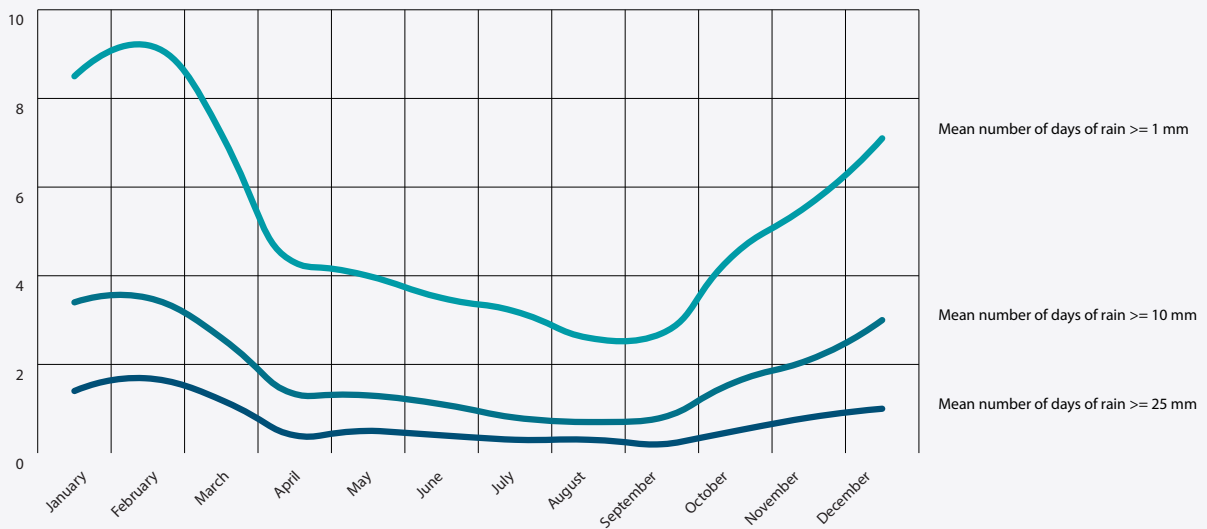


HISTORICAL MONTHLY CLIMATE STATISTICS

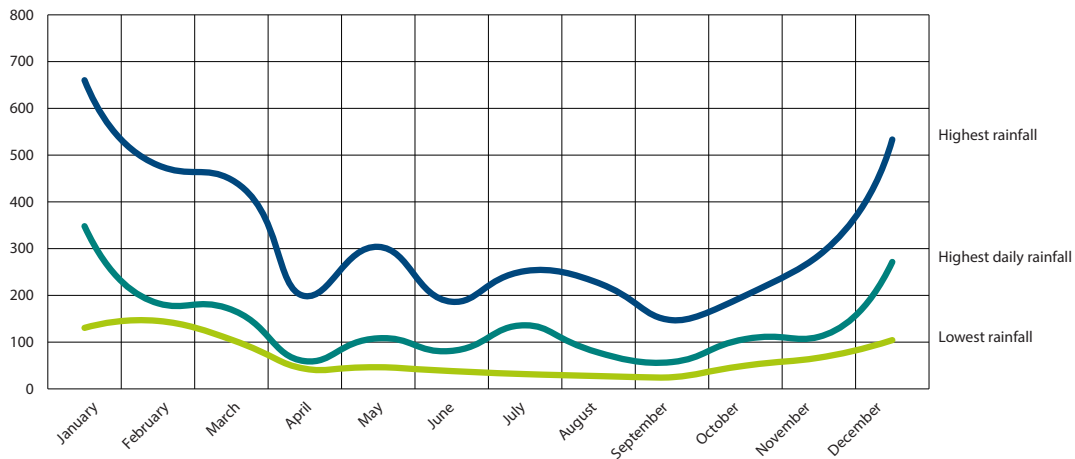
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
Mean maximum temperature (°C)	32	31.3	30.5	28.8	26	23.5	23.2	24.9	27.5	29.7	31.2	32.2	28.4
Highest temperature (°C)	42.5	43.3	42.1	35.4	34.4	32.3	30.6	35.1	37.2	41.1	45.3	41.5	45.3
Mean minimum temperature (°C)	22.2	22.2	20.9	18	14.3	11	9.7	10.7	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

ROCKHAMPTON'S COMPETITIVE ADVANTAGE

The Rockhampton Region boasts a number of existing advantages for aquaculture, and the Queensland Government supports the future development and growth of an ecologically sustainable aquaculture industry.

Rockhampton is well positioned for successful aquaculture development. Our competitive advantages include:

- / Queensland's largest area for potential aquaculture development, the Fitzroy Delta.
- / Ideal growing conditions for subtropical species.
- / An excellent reputation in the international marketplace for high quality seafood and beef.
- / Clean, unpolluted waters.
- / Internationally capable airport with an ability to service heavy aircraft A380 and Antonov class.
- / Well-developed infrastructure to link aquaculture producing areas on the east coast to markets.
- / Proximity to major seafood markets in the Asia-Pacific region.
- / Freedom from certain serious diseases affecting aquaculture in other countries.
- / Dedicated staff from Advance Rockhampton to drive the aquaculture industry development.
- / Council development incentives for aquaculture R&D and education (subject to Council approval)

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