



Wheatbelt Snapshot Series: Aquaculture and Aquaponics

OVERVIEW

The Wheatbelt region in Western Australia comprises of five Sub-regions, 42 local government areas and has five main service centres located in the Shires of Dandaragan, Northam, Narrogin, Merredin and Moora.

The Region accommodates a widely dispersed population of 75,000¹ people, making it the third most populous region in the State. Rising populations on a global scale, accompanied by rising per capita income and changes in dietary preferences are increasing the global demand for protein in the form of aquaculture and aquaponics. The inability of the wild catch fisheries to meet demand has led to aquaculture being the fastest growing animal based food producing sector in the world² with Australia's domestic consumption of seafood trending upwards³. Of this rising demand, aquaculture accounted for 42% of total fish consumption in 2006, and is expected to account for 62% in 2030².

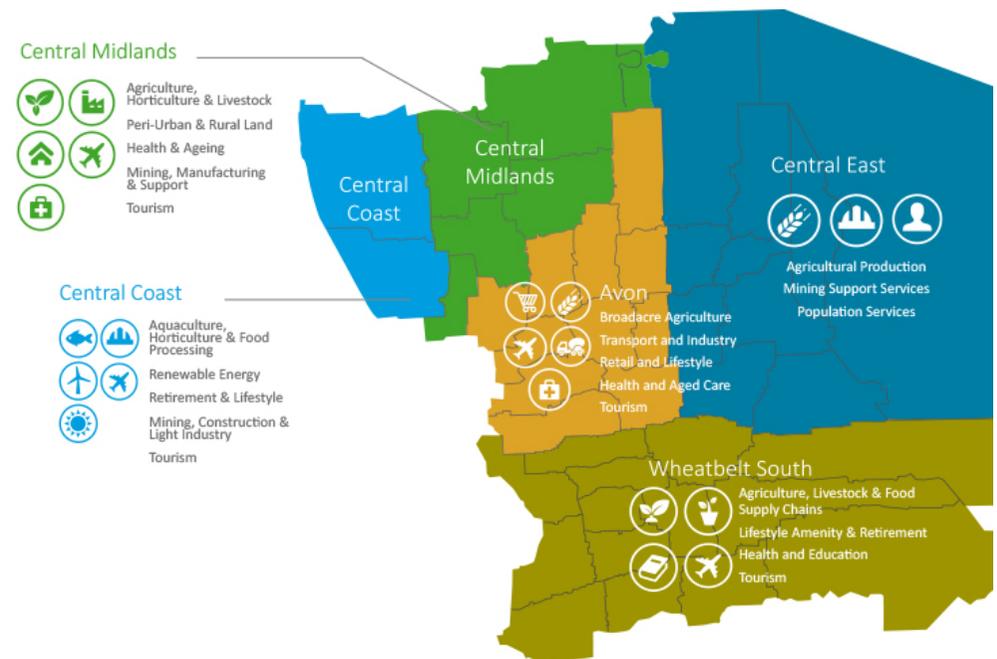


Figure 1: Wheatbelt Region (WDC 2012)

¹ ABS 2011, Wheatbelt Time Series Profile

² Western Australian Marine Science Institution 2015

³ ANZ 2015

The Wheatbelt has an opportunity to significantly expand in aquaculture operations as domestic and international markets grow.

In 2011-12, the value of aquaculture production in the Wheatbelt was valued at \$818,000⁴. This year also experienced an increase in the value of finfish in the Region to \$600,000, representing 73% of the Wheatbelt's total aquaculture worth. The rising value of finfish presents an opportunity for further finfish production along the State's coastline, with the potential of marine finfish aquaculture believed to be greater than WA's entire wild-catch fisheries⁵.

Although the majority of the Wheatbelt is inland, the Central Coast Sub-region has a vast coastline of temperate waters and is home to a lucrative fishing industry. The Wheatbelt's Central Coast Sub-region has comparative advantages in aquaculture production, including:

- Close proximity to Asia's markets;
- Close proximity to Perth and other domestic markets; and
- The physical characteristics of the coastline.

The Wheatbelt Central Coast is in an advantageous position due to its close proximity to domestic markets, international supply chains and competitive advantages. Government investment should be considered to facilitate the growth of this sector, to target foreign markets and expand existing aquaculture facilities. More specifically within the Central Coast, Jurien Bay's geology and location give the town a comparative advantage in the industry⁶. The town of Jurien Bay includes a sizeable boat harbour that has recently become the focus for the expansion of the aquaculture industry.

⁴ Wheatbelt Regional Investment Blueprint 2015

⁵ Department of Regional Development (2014)

⁶ Department of Parks and Wildlife (2005)

EMERGING OPPORTUNITIES

Aquaculture

Aquaculture offers important economic diversification to the Wheatbelt – the industry fosters innovation and requires technical support from various work disciplines including engineers, marine experts, environmental scientists, and fish health specialists. Aquaculture also creates demand for educational and training services, development services, infrastructure and locally produced goods. Significant investments into the industry brings with it new skills, jobs and opportunities to the Wheatbelt region.

As the Wheatbelt aquaculture industry primarily consists of finfish and yabbies, the potential exists for aquaculture expansion into other cultivations, including abalone and beta-carotene. Jurien Bay is an ideal location for aquaculture development. The coastal region has moderate water temperatures that range from 18-24°C making it ideal for the production of finfish species such as the Yellowtail Kingfish⁷. With four established zones already allocated as a 'special purpose (aquaculture) zone', the Jurien Bay coastline has significant opportunities for open pen aquaculture. The four aquaculture zones are protected from the high turbidity of the open ocean and are the optimal depth for open pen farming. These zones include the following:

- Seaward Ledge;
- Hill River;
- Emu Rocks; and
- Cervantes Islands.

⁷ Allerding & Associates (2008)

Land-based activities required to support coastal aquaculture include a multispecies hatchery. The Jurien Bay marina precinct has an existing facility designed as a multispecies hatchery that is currently disused, and has the potential to address state government support for ‘a multi-species mollusc hatchery to support growth in existing and emerging sectors of aquaculture such as mussels, black-lip pearl oysters, edible oysters and scallops’. The broader precinct includes land identified to the north of the Marina that has received environmental assessments and approvals for the purpose of light industry.

While coastal aquaculture in Jurien Bay is a realised opportunity for the Wheatbelt, in-land aquaculture techniques also has prospects in sustainable aquaculture production. Cambinata Yabbies located in Kukerin, Dumbleyung is a successful family business that sources yabbies from up to 700 dams and farms across the State for sale, with 70% of yabbies exported interstate or internationally.

Aquaponics

Aquaponics is a combination of aquaculture and hydroponics that creates an environment for growth in vegetable farming and the fishing industry. The symbiotic process of aquaponics uses the waste products from aquaculture as nutrient fertiliser for hydroponically grown vegetables, in turn purifying the water. Aquaponics offers an opportunity for diversification in the Wheatbelt, opposed to being solely reliant on farming. The Shire of Wagin is in the process of working with Curtin University to start up a small scale aquaponics project. This project will utilise the Shire’s recent access to desalinated water from a Unigrain oat mill water desalination system⁸.

⁸ Pepper, F (2016)

ISSUES

Infrastructure

A common issue for the aquaculture industry includes land and water competition, as well as the ability to expand alongside demand in the future. When developing proposed aquaculture ventures, site identification and system requirements are important to consider. Access to local amenities and infrastructure should include consideration to:

- Transport infrastructure including roads;
- Reliable energy and power sources;
- Reliable water sources; and
- Telecommunications.

Water Supply

Aquaculture operations require an adequate supply and suitable quality of water in order to maintain sustainable production. In Western Australia, the *State Water Quality Management Strategy* (2004) outlines environmental quality goals to protect fish species and limit pollution in the aquaculture industry. The legislation relating to water supply and quality is outlined in the *Environmental Protection Act 1986* and includes enforcement tools to ensure water quality criteria is met and the Environmental Monitoring Program protocol are adhered to.

Fish Health and Disease

Overcrowding, particularly for finfish, can result in higher levels of stress and reduced water quality. High concentrations of fish can significantly increase parasite levels in aquaculture facilities; therefore the monitoring of disease in cultured stock is critical to prevent an outbreak. Currently there is no industry-wide disease monitoring and risk minimisation program in Western Australia. The existing process involves aquaculture operators notifying the fish pathology unit in the Department of Fisheries of a disease outbreak when it is identified, creating a reactionary response to fish health and disease instead of a preventative plan with continual risk management.

SOLUTIONS

Infrastructure and Planning

The capacity of local governments to attract new aquaculture investment is substantial and should include the establishment of infrastructure that supports the industry. Improvements and investment in infrastructure will enhance the delivery of aquaculture products to growing markets. Infrastructure and planning requirements include the following:

- Aquaculture ponds;
- Adequate vehicle access;
- Processing facility, cool storage and feed silos;
- Water supply, discharge and treatment systems;
- Workshop space and accommodation;
- Adequate power and back-up power supply; and
- Room for expansion in the future.

Infrastructure development in the Region has the potential to be economically and environmentally sustainable. System requirements could involve the reuse of water and the treatment of wastewater, and investments could be made into the utilisation of fish by-product for commercial production of fish meal or fish oil.

Water Supply

Aquaculture operations require an adequate supply and suitable quality of water in order to maintain sustainable production. Water quality of the site requires ongoing monitoring and evaluation to optimise ongoing success of the practice. Parameters that need to be maintained include the water temperature, acidity, salinity, turbidity and toxicity. Recirculating water systems can maintain good water quality with only a small water quantity and create a stable and sustainable water supply⁹.

Future management of aquaculture in the Wheatbelt should adhere to statewide water quality criteria and complete a site survey prior to operations to avoid sites that are nutrient sensitive or low flushing.

Fish Health and Preventing Disease

The most effective solution to minimising risk of disease outbreaks in aquacultural operations is to farm fish species in waters that are best suited to the fish biology. As the Central Coast Sub-region is situated in temperate waters, the optimal fish to farm would be temperate species as it limits the use of chemicals in operations¹⁰.

⁹ Department of Fisheries (2008)

¹⁰ Department of Fisheries (2013)

To address the lack of statewide disease protocols, the greater Wheatbelt and Central Coast region will need to ensure future management includes an emergency response plan and meets an exemplary level of disease monitoring.

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