

# Adapting to Climate Variability

*Climate Variability will bring challenges to many agricultural industries across the South Coast region of Western Australia. Understanding the risks of projected climate variability may help us to plan and adapt to a more variable climate.*

## AQUACULTURE

Aquaculture is the fastest growing primary industry in Australia. Although production statistics suggest that WA represents only a small proportion of Australian total aquaculture production, several different types of aquaculture can be found along the South Coast region, and the farm gate value of WA aquaculture is now in the region of \$20 million. The most important aquaculture products are oysters and mussels in the waters off Albany, and abalone in Bremer Bay and Augusta. Sydney Rock Oysters and Blue Mussels are cultivated in Oyster Harbour. Oysters are grown in intertidal baskets attached to long lines, on the Eastern side of Oyster Harbour, whilst mussels are grown suspended from long lines just north of Green Island. The Bremer Bay abalone farm produces juveniles that are transported to Augustus where they are on-grown on artificial substrates placed into the sea.

The growth rates of oysters, mussels and abalone are heavily dependent on temperature, growth increasing with temperature. Rubio (2007) documented a growth model for the Sydney Rock oyster, showing that optimum growth occurred between 13°C and 25°C. Temperatures higher than this can, however, be detrimental because of associated increases in rates of development of disease organisms and parasites.

Not only are oyster, mussel and abalone producers concerned about product quality and safety, profitability is also an important aspect of running a farm.

A profitable shellfish farm needs stable environmental conditions in which the animals flourish, whilst also ensuring these conditions lead to products that are safe for human consumption. As an example, the oyster farm in Oyster Harbour currently experiences temperatures ranging from 18.5°C to 21.4°C with the average being 20.56°C, but if climate changes results in increased water temperature, this could have detrimental effects on shellfish culture.



### What are the changes to South Coast region climate?

**Higher temperature in all seasons with more frequent hot days;  
Decrease in rainfall (relative humidity, soil moisture and run off) in winter and spring;  
Increase in drought duration and frequency;  
Increase in solar radiation in winter and evaporation rate;  
Higher sea levels; and  
Higher sea surface temperature and more ocean acidification.**

Climate Change in Australia: <http://www.climatechangeinaustralia.gov.au>

## POTENTIAL RISKS ASSOCIATED WITH CLIMATE VARIABILITY AND MANAGEMENT ACTIONS TO REDUCE THE RISK

The climate projection	Potential risk	Management action to reduce the risk
Higher water temperatures	Interfere with normal reproductive cycles	Abalone and Oysters – use temperature-controlled hatchery  Mussels – move spat collectors to more appropriate location
Higher water temperatures that increase shellfish metabolic rate	Higher metabolic rate may increase feeding rate of shellfish	Abalone – use formulated diet matched to environmental temperature, adjust feeding rates  Oysters and mussels - ensure farm is located at site with high phytoplankton productivity
Increased water temperature affecting disease organisms	Increased disease risk	Ensure use of disease-free stock Reduce stocking density to reduce stress
Increased water temperature -effect on dissolved oxygen	Low oxygen level in warmer water	Abalone – increase water flow rates  Oysters and mussels – reduce stocking density

### References

Rubio, A.M. 2007, Environmental influences on the sustainable production of the Sydney

Rock Oyster, *Saccostrea Glomerata*: A study in two South Eastern Australian estuaries, Centre for Resource and Environmental Studies (CRES), the Australian National University

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