

Kelp competitive under warmer temperatures

Saturday, 24 August 2013 06:00

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AT HIGHER temperatures, kelp chooses growth over survival according to new research focused on the common kelp's reproductive cycle.

Kelp around the world is in decline due to anthropogenic and environmental factors.

While previous research has shown kelp reproduction is highly sensitive to temperature changes, little is known about how its gametophytes (sexual reproduction cells) are affected.

Co-author and UWA postgraduate student Margaret Mohring observed seasonal patterns in the reproductive cycle and gametophyte growth and survival of the common kelp *Ecklonia radiata*, taken from the Shoalwater Islands Marine Park off Rockingham.

Dr Mohring says since *Ecklonia* is a temperate species, researchers expected reproduction in cooler waters.

"This was not the case. Spore production occurred when waters were warmest, well beyond the thermal tolerances of other kelps," she says.

"It was surprising that gametophytes survived better in low temperatures but grew better in higher temperatures. *Ecklonia* chooses to optimise gametophyte growth over survival."

She says the strategy gives it a competitive advantage over other species by reducing competition for space amongst developing gametophytes.

"*Ecklonia* produces millions of spores, so survival is not a priority. It is more important that once spores settle, they grow as fast as possible, out-competing other species."

"It's an ecological trade off."

Kelp samples were collected at two different sites to investigate factors that may explain seasonal variation in kelp reproduction.

During the fertile period, gametophytes were grown in temperatures ranging from 16 to 22C in a laboratory.

Gametophytes from early in the season had greater rates of growth and survival, declining towards the end of the season.

Growth rates of gametophytes were positively related to day length with fastest growing zoospores released when days were longest.



Ecklonia chooses to optimise gametophyte growth over survival to outcompete other species. Image: Richard Ling

Survival was highest in coolest temperatures (16C) yet optimum growth occurred at higher temperatures (20–22C).

Ecklonia is the main habitat forming species on Australia's temperate reefs and suffered dramatically during the 2011 marine heat wave. The extent of those impacts are not fully understood.

"Microscopic spores are more sensitive to temperature fluctuations than adult plants; the heat wave may have resulted in loss of recruitment in some areas, which may not be detected for several years," Dr Mohring says.

"Little is known about *Ecklonia* reproduction, it has a complex, sensitive life-cycle.

"Without an understanding of how the environment affects it, we cannot predict responses to future climates, and prepare conservation plans."

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