A Regional Approach to Monitoring Change in Seagrass Meadows

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Objectives

- Monitor the condition of seagrass meadows across Queensland
- Examine relationships between trends in seagrass abundance and climate change
- Examine effects of localised impacts on seagrass meadows
- Promote awareness of seagrass ecology and protection

Seagrass Watch has established 64 monitoring sites in 6 regions in Queensland, Australia. Monitoring occurs 4 times per year.

Results and Discussion

Cairns/Townsville: Seasonal change
- Seasonal pattern evident in 2000-2 (Fig. 1).
  - Low seagrass cover in May-Aug (winter)
  - High seagrass cover in Nov-Feb (spring-summer)

Whitsundays: Climate related change
- Seasonal pattern evident in 2000 (Fig. 2).
  - Low seagrass cover in May-Aug (winter)
  - High seagrass cover in Nov-Feb (spring-summer)

- Seasonal pattern not evident in 2001-2 (Fig. 2).
  - Intertidal meadows (Fig. 2)
  - Subtidal meadows (Fig. 3)
- Low seagrass cover in 2001-2 coincided with low rainfall, high seawater temperatures (>29°C) (Figs. 4, 5) and a low Southern Oscillation Index (Fig. 6).
- Possible causes of poor seagrass growth:
  - High water temperatures reduce photosynthesis and increase respiration
  - Desiccation due to high temperatures and low humidity
  - Low nutrient availability

The Southern Oscillation Index

Indicates the stage of La Niña or El Niño events in the Pacific Ocean (Fig. 6).
A strongly positive SOI (>10) in 2000-1 depicts La Niña, above average rainfall in Australia.
A strongly negative SOI (<-10) in 2001-2 depicts El Niño, below average rainfall in Australia.

Shoalwater Bay: Seagrass-turtle interactions
- The seasonality and inter-annual variability of seagrass abundance and its relationship with green turtle (Chelonia mydas) populations is being investigated.
- Evidence suggests a strong link between mass nesting of turtles and Southern Oscillation related weather conditions (Limpus and Nicholls 2000).
- Mass nesting has been found 2 years following El Niño and low nesting 2 years following La Niña events.
- The study will aim to determine the possible mechanism of the SOI linkage to green turtle population fluctuations and potential links to seagrass meadow abundance.

Hervey Bay: Climatic events
- Flooding of the Mary River in February 1999 caused total loss of intertidal Zostera capricorni, at 2 localities, Urangan (mainland) and Fraser Island (Fig. 7).
- Meadows at Fraser Island recovered after 2 years, meadows at Urangan recovered in 3 years (Fig. 7).
- Proximity to urban/catchment inputs may have delayed seagrass recovery at Urangan (Fig. 8).
- Recovery of Z. capricorni from seeds suggests seeds dormant for at least 3 years.

Shelf: El Niño events (ie. high air and seawater temperatures) may inhibit seagrass growth in some regions.
- Recovery of intertidal seagrass meadows after flooding disturbance is likely to take 2-3 years in the absence of additional impacts.
- Ongoing monitoring will allow investigation of seasonal responses and inter-annual variability of seagrass abundance in relation to climate change - on a regional basis.

Summary:
- Ongoing monitoring will allow investigation of seasonal responses and inter-annual variability of seagrass abundance in relation to climate change - on a regional basis.

Website: www.seagrasswatch.com