



Australian Government

Department of the Environment, Water, Heritage and the Arts

Marine and Tropical Sciences Research Facility (MTSRF) Project Milestone Report, 28 May 2009

Program 1:	Status and Trends of Species and Ecosystems in the Great Barrier Reef
Project 1.1.3:	Condition, trend and risk in coastal habitats: Seagrass indicators, distribution and thresholds of potential concern http://www.rrrc.org.au/mtsrf/theme_1/project_1_1_3.html
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Report Summary

Seagrass-Watch monitoring results over the last six months indicate that intertidal seagrass meadows on the east coast of Queensland appear to be in a relatively **fair** condition in terms of abundance. Abundance of intertidal seagrasses at locations in Cape York and the Wet Tropics are generally stable, however locations from the Dry Tropics to the southern Great Barrier Reef World Heritage Area (GBRWHA) are either variable or have declined over the past six to twelve months.

For locations which had severe losses in 2006 (e.g. Gladstone and Urangan), the significant increases in abundance in the Late-Dry 2008 were followed by significant declines in the Late-Monsoon 2009. Results and updates of Seagrass-Watch monitoring have been fed back to participants via newsletters and are available at www.seagrasswatch.org for general public access as well as being circulated widely to a subscriber list.

Thresholds (including duration of impact and light intensity) and indicators of low-light stress have been identified for five tropical species. Experiments are currently in final stages and expect to be completed shortly.

Light and temperature continues to be monitored at both intertidal and sub tidal seagrass meadows at four locations established in 2008 in the Wet and Dry Tropics.

In December 2008, the adequacy of the spatial datasets that delineated the distribution of hazards in the report '*Spatial Risk Assessment for Coastal Seagrass Habitats in the GBRWHA: A case study of the Dry and Wet Tropics*' was reviewed (to download, visit http://www.rrrc.org.au/mtsrf/theme_1/project_1_1_3.html). A working group was convened in February 2009 to assess the applicability of the case study approach to seagrass habitats in the entire Great Barrier Reef. The working group designed a new system of evaluating the risk of coastal seagrass habitats to their threats based on the method of Halpern and others (*Conservation Biology*, 2008 21: 1301-1315). An online survey was developed that asked survey participants to evaluate the vulnerability of coastal seagrass communities by considering the spatial scale, frequency, and functional impact of each threat identified during the workshop held in May 2008; the resistance of seagrass to disturbance by each threat; the resilience (i.e. recovery time) of seagrass following a disturbance; and the

certainty of their estimates. The online survey was sent to 32 experts in seagrass ecology and management. Survey outputs are currently being analysed.

Milestone Reporting Requirements

2008/2009 Outputs Milestones	Date
<p>Report 2 submission by QPIF (with appropriate attribution of MTSRF Funding):</p> <ul style="list-style-type: none"> • Findings of Seagrass-Watch intertidal: locations, abundance, community structure and distribution at agreed sites (newsletter) (a); • Assist with maintenance of light loggers at selected field sites (b3); • Host, attend and assist in the organization of the risk assessment working group meetings. <p>Report 2 submission by JCU (with appropriate attribution of MTSRF Funding):</p> <ul style="list-style-type: none"> • Progress report on experimental work and the development of spatial risk assessments via working group activities (b and c). 	<p>28 May 2009</p>

Project Results

a) Observing change in seagrass habitats of the Great Barrier Reef: Seagrass-Watch monitoring (QPIF)

- All milestone activities have been successfully achieved.
- Seagrass-Watch monitoring of intertidal seagrass abundance, community structure, and physical parameters was conducted at most intertidal Seagrass-Watch and Reef Rescue Marine Monitoring Program sites in Queensland over the late Dry and Monsoon season (a1 and a2).
- Two Seagrass-Watch newsletters (Issues 35 and 36) were produced and distributed in December 2008 and March 2009 updating participants on program developments and findings from ongoing monitoring. Refer to either of the following URLs:
http://www.rrrc.org.au/mtsr/theme_1/project_1_1_3.html
<http://www.seagrasswatch.org/magazine.html>
- Issue 37 is currently in development and will be available in late June 2009 (a3).
- Seagrass-Watch training workshops were successfully conducted in Cairns (9-10 March 2009) and Cooktown (26-27 March 2009), to build the capacity of local participants to assist with monitoring and feedback the monitoring results. Workshop proceedings are available at http://www.seagrasswatch.org/Training/proceedings/Cairns_Cooktown_Mar09.pdf
- The late Monsoon Season monitoring of seagrass abundance, community structure and distribution was conducted at all 28 intertidal Seagrass-Watch/Reef Rescue Marine Monitoring Program sites in April/May 2009. All sampling was successfully completed (see <http://www.seagrasswatch.org/sampling.html>) (a1).
- Light loggers were deployed at selected intertidal coastal and reef seagrass field sites in the Townsville and Cairns regions (b3) over the past six months.
- Regular (1-2 per month) e-bulletins are distributed electronically to Seagrass-Watch participants and related international forums/discussion groups on seagrass related news events and Seagrass-Watch activities.

b) Understanding the drivers of seagrass change, indicators of seagrass health and thresholds of potential concern (JCU and QPIF)

- All milestone activities have been successfully achieved.
- Temperature experiments were completed August-September 2008. These identified short-term and long-term thresholds of temperature stress in tropical seagrasses. These experiments also identified some key temperature-related stress indicators that will be useful for interpreting monitoring data.
- Light experiments were conducted from February 2009 to present. After initial attempts in 2008 failed due to outbreaks of grazing fauna, the successful 2009 experiments are now being drawn to a close. Thresholds (including duration of impact and light intensity) have been identified for five tropical species. Indicators of low-light stress have also been identified. The experiment is currently in the final stages; it will be completed in about three weeks.
- Both of the temperature and light experiments have highlighted important areas for future research. Some of these will be addressed in the final year of Project 1.1.3 (see below: future plans) while others will be used to help guide future research priorities post June 2010.
- Light and temperature continues to be monitored at both intertidal and sub tidal seagrass meadows at four locations established in 2008 in the Wet and Dry Tropics. Picnic Bay (Magnetic Island) was the first site to be established and has been visited for biological monitoring every two to three months since January 2008; a total of eight sampling times. Light/temperature loggers are exchanged more frequently to minimise fouling and to ensure data quality. The other sites were established in May to November 2008. Monitoring will continue at all sites every two to three months at least until the end of Project 1.1.3 in June 2010. Processing of data and samples from the field monitoring program is ongoing.
- Plans for the maintenance and deployment of turbidity/chlorophyll loggers at the seagrass sub tidal sites have been discussed with AIMS (Dr Britta Schaffelke). Loggers have been purchased by the Queensland Environmental Protection Agency but have not yet been delivered or installed. The co-ordination and maintenance of these will partially fall under the JCU component of Project 1.1.3 in collaboration with AIMS.
- Several manuscripts relating to the experimental work are currently being prepared.

c) Risk assessment for coastal seagrass habitats: Values, threats and vulnerabilities (JCU and QPIF)

- All milestone activities have been successfully achieved.
- In December 2008, we conducted a review on the adequacy of the spatial datasets that delineated the distribution of hazards in the report '*Spatial Risk Assessment for Coastal Seagrass Habitats in the GBRWHA: A case study of the Dry and Wet Tropics*'. Modelled trawl data was compared with actual trawl locations detected using VMS, and found to be congruent. A working group was convened in February 2009 to assess the applicability of the case study approach to seagrass habitats in the entire GBR. During the May 2008 workshop, concerns were raised by workshop members on the adequateness of a simple rank and weight system to quantify the vulnerability of coastal seagrass habitats to their various hazards. The system does not explicitly allow for issues such as scale and resilience to be included within hazard weights, and was considered incomplete. The working group designed a new system of evaluating the risk of coastal seagrass habitats to their threats based on the method of Halpern and others (*Conservation Biology*, 2008 21(5): 1301-1315).

- We developed an online survey using 'Survey Monkey' that asked survey participants to evaluate the vulnerability of coastal seagrass communities by considering the spatial scale, frequency, and functional impact of each threat identified during the workshop held in May 2008; the resistance of seagrass to disturbance by each threat; the resilience (i.e. recovery time) of seagrass following a disturbance; and the certainty of their estimates. The online survey was sent to 32 experts in seagrass ecology and management. Survey outputs are currently being analysed.
- Our intention is to combine the various rankings using the method of Halpern and others and display the results geographically. The end result will be a map of the vulnerability of coastal seagrass communities to their various anthropogenic threats in the GBRWHA.
- Two manuscripts relating to seagrass distribution and risk are being prepared:
 - *Spatial assessment of the risk to a marine mammal from bycatch*; and
 - *Spatial management of a penaeid shrimp trawl fishery in the Great Barrier Reef World Heritage Area, Queensland Australia*.

Communications, major activities and events

During this milestone reporting period

- Two Seagrass-Watch training workshops for monitoring seagrass habitats in Cape York Peninsula were conducted on 9-10 and 26-27 March 2009 in Cairns and Cooktown respectively.
- Discussions and collaboration are ongoing with AIMS and the Queensland Environmental Protection Agency for the deployment and maintenance of turbidity/chlorophyll loggers. Project 1.1.3 team member will join the AIMS June 2009 water quality monitoring expedition to learn the deployment protocols for the turbidity/chlorophyll loggers.
- Cath Collier (JCU), Rob Coles (QPIF) and Alana Grech (JCU) presented papers on their respective projects at the Third MTSRF Annual Conference in Townsville on 28 and 30 April 2009.
- An online survey has been developed and sent to workshop participants and other experts in seagrass ecology and management. The survey results are currently being collated.
- Informal workshops and/or meetings (including use of teleconference) were conducted on 11 February 2009, 3-4 March 2009 and 29 April 2009 to discuss feedback from Grech and others (2008) and prepare an online questionnaire requesting experts to evaluate and rank the vulnerability of coastal seagrass habitats to anthropogenic hazards. Experts on seagrass ecology and biology, marine and terrestrial management, water quality, and spatial information were invited to participate in the questionnaire.
- Newsletters (http://www.rrrc.org.au/publications/seagrass_watch_newsletters.html)
 - McKenzie, L. J. and Yoshida, R. L. (eds.) (2008) *Seagrass-Watch News Issue 35*, December 2008 (24pp.); and
 - McKenzie, L. J. and Yoshida, R. L. (eds.) (2009) *Seagrass-Watch News Issue 36*, March 2009 (16pp.).
- Workshop proceedings (<http://www.seagrasswatch.org/publications.html#Training>)
 - McKenzie, L. J. and Yoshida, R. L. (2009) *Seagrass-Watch: Proceedings of a Workshop for Monitoring Seagrass Habitats in Cape York Peninsula, Queensland*,

Cairns and Cooktown, 9-10 and 26-27 March 2009. Seagrass-Watch HQ, Cairns (56pp.).

- e-Bulletins (<http://www.seagrasswatch.org/publications.html#Ebulletin>)
 - McKenzie, L. J. and Yoshida, R. L. (2009) Seagrass-Watch e-Bulletin, 19 May 2009;
 - McKenzie, L. J. and Yoshida, R. L. (2009) Seagrass-Watch e-Bulletin, 28 April 2009;
 - McKenzie, L. J. and Yoshida, R. L. (2009) Seagrass-Watch e-Bulletin, 21 April 2009;
 - McKenzie, L. J. and Yoshida, R. L. (2009) Seagrass-Watch e-Bulletin, 30 March 2009;
 - McKenzie, L. J. and Yoshida, R. L. (2009) Seagrass-Watch e-Bulletin, 18 March 2009;
 - McKenzie, L. J. and Yoshida, R. L. (2009) Seagrass-Watch e-Bulletin, 02 March 2009;
 - McKenzie, L. J. and Yoshida, R. L. (2009) Seagrass-Watch e-Bulletin, 15 February 2009;
 - McKenzie, L. J. and Yoshida, R. L. (2009) Seagrass-Watch e-Bulletin, 30 January 2009;
 - McKenzie, L. J. and Yoshida, R. L. (2009) Seagrass-Watch e-Bulletin, 13 January 2009;
 - McKenzie, L. J. and Yoshida, R. L. (2008) Seagrass-Watch e-Bulletin, 24 December 2008.
- Presentations
 - Coles, R. G. (2009) *Modelling risk to seagrass meadows in coastal waters of the Great Barrier Reef World Heritage Area*. Presentation to Northern Fisheries Centre, 21 April 2009.
 - Coles, R. G. and Grech, A. (2009). *Modelling risk to seagrass meadows in coastal waters of the Great Barrier Reef World Heritage Area*. Oral presentation. Marine and Tropical Sciences Research Facility (MTSRF) 2009 Annual Conference, Rydges Southbank Hotel, Palmer Street, Townsville, Queensland, 28-30 April 2009.
 - Coles, R. G. (2009). *QPIF seagrass monitoring and assessment*. Presentation to Bentley Park College, Year 11, Marine Biology class, 20 and 22 May 2009.
 - Collier, C. and Waycott, M. (2009) *Temperature and seagrass death*. Oral presentation. Marine and Tropical Sciences Research Facility (MTSRF) 2009 Annual Conference, Rydges Southbank Hotel, Palmer Street, Townsville, Queensland, 28-30 April 2009.
 - McKenzie, L. J. (2009). *Seagrass Biology and Identification*. Presentation to participants of a workshop for Monitoring Seagrass Habitats in Cape York Peninsula, 9-10 and 26-27 March 2009.
 - McKenzie, L. J. (2009). *Seagrass Ecology and Threats*. Presentation to participants of a workshop for Monitoring Seagrass Habitats in Cape York Peninsula, 9-10 and 26-27 March 2009.
 - McKenzie, L. J. (2009). *Seagrass monitoring*. Presentation to participants of a workshop for Monitoring Seagrass Habitats in Cape York Peninsula, 9-10 and 26-27 March 2009.

- McKenzie, L. J. (2009). Seagrass-Watch: how to sample. Presentation to participants of a workshop for Monitoring Seagrass Habitats in Cape York Peninsula, 9-10 and 26-27 March 2009.
- McKenzie, L.J. (2009). *Seagrass-Watch 1998-2009: How data is used*. Presentation to participants of a workshop for Monitoring Seagrass Habitats in Cape York Peninsula, 9-10 and 26-27 March 2009.

During this milestone reporting period

- Seagrass-Watch Newsletter Issue 37;
- e-bulletins distributed electronically to Seagrass-Watch participants and related international forums/discussion groups on seagrass related news events and Seagrass-Watch activities.
- Undertake detailed experiments on the interactive effects of temperature and light on seagrass thresholds and indicators.
- Continue processing samples and data from monitoring.
- Communicate results to date with stakeholders.
- Publications for scientific journals.