HEALTHY RIVERS TO REEF PARTNERSHIP
MACKAY-WHITSUNDAY

Development of Methods for the Mackay-Whitsunday Report Card 2015

Stewardship and Cultural Heritage Reporting

Final Report
Healthy Rivers to Reef Technical Working Group
November 2016

HEALTHY RIVERS TO REEF PARTNERSHIP
MACKAY-WHITSUNDAY

Contents

Terms and Acronyms

ALUM	Australian Land Use and Management Classification system
Basin	An area of land where surface water runs into smaller channels, creeks or rivers and discharges into a common point and may include many sub-basins or sub-catchments (also known as river basin or catchment)
BMP	Best Management Practice
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAF	Department of Agriculture and Fisheries Queensland
DATSIP	The Department of Aboriginal and Torres Strait Islander Partnerships
DEHP	Department of Environment and Heritage Protection Queensland
Ecosystem	A dynamic complex of plant, animal and microorganism communities and their non-living environment interacting as a functional unit
EMS	Environmental management systems
GBR	Great Barrier Reef
GBR report card	Great Barrier Reef Report Card
NRM	Natural Resource Management
Partnership	Mackay-Whitsunday Healthy Rivers to Reef Partnership
P2R	Paddock to Reef
SELTMP	Social and Economic Long Term Monitoring Program for the Great Barrier Reef
Stewardship	Responsible planning and management actions
TORG	(Mackay Whitsunday) Traditional Owner Reference Group
Waterways	Freshwater creeks and rivers, estuarine environments and wetlands within the five nominated basins in the region, and the inshore/offshore marine environment

1. Introduction

The Mackay-Whitsunday Healthy Rivers to Reef Partnership (Partnership) was established in October 2014, and the pilot report card was released in 2015. The pilot report card reported on the 2013-14 year (1 July 2013 to 30 June 2014), and included assessments of the freshwater environment, the estuarine environment and the marine environment (to the eastern boundary of the Great Barrier Reef Marine Park). Economic context as provided, along with a social assessment and stewardship levels within different industries in the region. Different indicators were assessed to provide the overall scores for the environmental zones throughout the Mackay-Whitsunday region.

Significant review has since been undertaken of the indicators and scoring methods used in the pilot report card, across each of the environmental zones. The 2015 report card uses updated analyses and improved scoring methods to: assess the condition of environmental indicators, report on stewardship activities and, for the first time report on indigenous cultural heritage associated with the region's waterways.

In the 2015 report card, there was no social assessment. Instead, social and economic data was provided as contextual information on the report card. Social contextual information was taken from data collected in the Social and Economic Long Term Monitoring Program for the Great Barrier Reef (SELTMP). Economic contextual information was obtained directly from relevant industries.

For more detail on the Mackay-Whitsunday report card and Partnership, refer to the Program Design: Report Card 2015 document[1].

1.1. Purpose of this Document

The purpose of this document is to provide detailed information on the methods used to produce condition assessments of the stewardship and indigenous cultural heritage. Specifically, this document describes:

- The data collection methods; and,
- The scoring methods.

Methods used to assess environmental indicators in the region's waterways can be found in the Development of methods for the Mackay-Whitsunday report card 2015: Environmental Indicators document[2].

[1] http://healthyriverstoreef.org.au/report-card/program-design/
[2] http://healthyriverstoreef.org.au/report-card/technical-reports/

2. Stewardship

Stewardship will be represented as the level of effective environmental management practice implemented across the region in relation to waterways and the marine environment. Stewardship is an important aspect to include in the report card as it provides information on the voluntary actions landholders and organisations in the region are implementing (such as improved land management practices) to provide benefits to ecosystems. Stewardship activities have a direct link to the water quality in the region. Stewardship reporting can be used to demonstrate how on-ground activities (*responses* undertaken by landholders/organisations in the region) impact water quality (the *state* of the natural environment).

Stewardship reporting assists in meeting various Partnership and report card objectives. In particular, the stewardship information aids the Partnership to achieve its objective on reporting on the *pressures* acting upon the water quality and ecosystem health in the region's waterways. Additionally, reporting on levels of stewardship assists Partnership objectives in achieving its objectives around effectively communicating relevant information and supporting decision making for management activities and interventions.

The level of stewardship implemented by the different sectors is reported on in the Mackay-Whitsunday report card in terms of the amount of each sector operating under each management practice level. Stewardship reporting is presented for the major industries in the Mackay-Whitsundays region and is based on suitable frameworks (Table 1).

Table 1. Frameworks and stewardship reporting of the major industries in the Mackay-Whitsunday (MW) region.

Sector	Framework used to assess stewardship
Horticulture	Reef Plan Water Quality Risk Framework.
Grazing	Reef Plan Water Quality Risk Framework.
Sugarcane	Reef Plan Water Quality Risk Framework.
Ports	Developed for the MW report card
Industry Heavy industry – mining, mills, ERA/licenced activities, etc.	Developed for the MW report cards
Tourism	Developed for the MW report card with alignment to ECO Tourism certification.
Aquaculture	Developed for the MW report card
Urban Construction and operational activities under councils, i.e. STPs, developments, etc.	Reef Catchments' ABCD framework for MW (included in the Mackay Whitsunday Isaac Water Quality Improvement Plan).
TBC- Fishing	To be developed through the MW Fisheries Regional Working Group, in conjunction with consultants and Reef Catchments.
TBC - Community	To be developed by Partnership staff in conjunction with Partners.

2.1. Management Frameworks

Available environmental management practice frameworks are used to provide the basis for stewardship reporting. In agriculture, frameworks that have been developed, reviewed, and endorsed by industry are currently available for grazing, sugarcane, and horticulture and are based on Paddock to Reef (P2R) reporting that uses "Water Quality Risk frameworks" (previously "ABCD Frameworks"). Outside of agriculture, specific management frameworks have been developed. For the purposes of this report and the Mackay-Whitsunday report card, the term "Management frameworks" will be used, noting that different sectors use slightly different terminology.

2.2. General Data Collection and Reporting

Data on stewardship is collected and reported in the Mackay-Whitsunday report card annually. The stewardship reporting is not broken down to the reporting zones used in the environmental assessment nor the local government areas that exist within the region.

The displays for stewardship reporting in the report card vary depending on the sector being reported. The agricultural sectors of grazing, sugarcane, and horticulture adopt the same display style as used in the GBR report card (Figure 1), since the data and structure of assessment is identical. The bar chart represents the percentage of land under the best management practice (BMP; i.e. lowest or low-moderate risk, as defined by the water quality risk frameworks) for the specified activity (e.g. pesticide management).

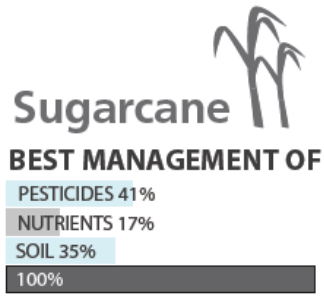


Figure 1. Example of stewardship displays for agricultural sectors.

The stewardship result displays for the other sectors (ports, tourism, heavy industry, urban and aquaculture) are reported in the report card using 'fire rating' style diagram shown in Figure 2, with the arrow indicating the average operational level of the industry in the region.

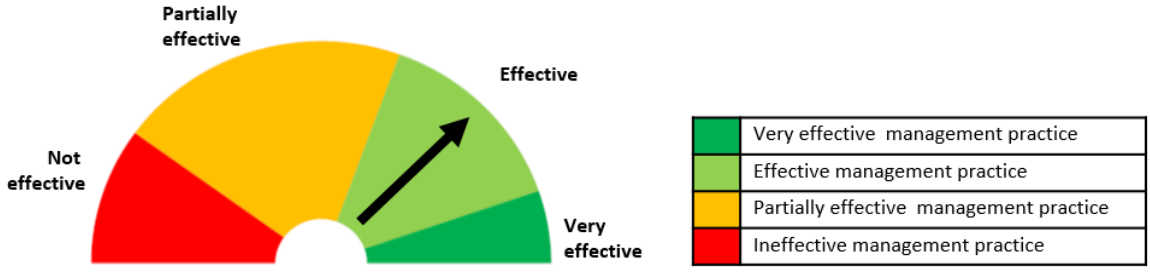


Figure 2. Example of stewardship displays for ports, tourism, heavy industry, urban and aquaculture sectors.

All stewardship reporting covers the Mackay-Whitsunday natural resource management region, with the addition of the Don Basin. The agricultural stewardship reporting includes the Don Basin and therefore the results may vary slightly from the reporting presented in the GBR report card because in that report card the Don is incorporated in assessment of the Burdekin region.

It should be noted that the agricultural assessments and subsequent reported results of land under improved practices is limited to only those with direct influence or assistance from recognised service providers. It is expected that this may result in a conservative estimate of the number of growers implementing improved practices (Australian Government and Queensland Government, 2015a). This is relevant for the three sectors of grazing, sugarcane, and horticulture.

2.3. Agricultural industry

2.3.1. Horticulture

Growcom have established the horticulture BMP program 'Hort360'. This program is accepted as the industry best practice. It was designed to help growers identify potential areas of operation (specifically within water use efficiency, soil nutrient, water quality and energy) that could be improved, and to provide guidance on how to improve them. Growcom and the P2R program identified a subset of practices within Hort360 that have the greatest influence on the risk of off-farm movement of sediment, nutrients, pesticides, and water. These practices form the Horticulture Water Quality Risk framework (Table 2).

Table 2. P2R classification of management practices in the cropping industries (sugarcane, bananas, grains, and horticulture). Source: Australian Government and Queensland Government (2016a)

Water Quality Risk	Low	Moderate-Low	Moderate-High	High
Description	Lowest water quality risk, commercial feasibility not well understood	Best Management Practice	Minimum Standard	Superseded

2.3.1.1. Data collection and analysis

Management practice data presented for the horticulture sector was data collected through Growcom's Farm Management System as part of the P2R program. In particular, the water quality module of the FMS, which allows for detailed assessment of water quality risks and the key actions to reduce those risks. The assessments were conducted between growers and Growcom or Natural Resource Management (NRM) officers, and aligned with the Water Quality Risk framework to estimate the proportion of growers operating within each category (from low risk to high risk) on a year-by-year basis.

The management practice assessments and subsequent reported improved practices is limited to those that successfully implemented Reef Programme Water Quality Grants. In the 2014-15 financial year growers who implemented Reef Programme Water Quality Grants was limited to growers in the

Don Basin only. The results reflect management assessments from the Bowen, Gumlu, Guthalungra, Inkerman, and Merinda districts, with a sample area of 11,833 ha, and 58 businesses.

2.3.2. Grazing

Data collected through the P2R program and reported in the 2015 GBR report card was used as the basis to report on stewardship within the grazing industry in the Mackay-Whitsunday region. These assessments utilised the Water Quality Risk framework for grazing within the region, which focuses on practices impacting upon land condition, soil erosion, and water quality. Table 3 provides a summary of the classifications and the full Water Quality Risk framework for the grazing industry can be found at:

http://www.reefplan.qld.gov.au/measuring-success/paddock-to-reef/assets/paddock-to-reef-grazing-water-quality-risk-framework.pdf

Table 3. P2R classification of management practices in the grazing industry based on relative risk to water quality. Source: Australian Government and Queensland Government (2016)

2013 Water Quality Risk	Low	Moderate-Low	Moderate-High	High
Resource condition objective	Practices highly likely to maintain land in good (A) condition and/or improve land in lesser condition	Practices are likely to maintain land in good or fair condition (A/B) and/or improve land in lesser condition	Practices are likely to degrade some land to poor (C) condition or very poor (D) condition	Practices are highly likely to degrade land to poor (C) or very poor (D) condition

2.3.2.1. Data collection and reporting

The process for data collection for the grazing sector was the same as used for the GBR report card. The process also included a review of data by expert (regional) panels to identify gaps and errors, and advise on interpretation of management practice change.

The management practice data presented represents P2R data from 84 businesses and 448,000 ha of grazing land in the Bowen, Proserpine, O'Connell, Pioneer, and Plane Creek basins. It is assumed to be representative of grazing land management in the adjacent Don River basin for the purposes of this Report Card.

The management practice levels within the grazing industry have been analysed and reported on in terms of the percentage of grazing land under each of the four classified management practice levels for each of the three main erosion processes; pastures (hillslope erosion), streambanks, and gullies.

2.3.1. Sugarcane

The information on management practice within the sugarcane sector collected through the P2R program (and contained in the GBR report card) was used for the Mackay-Whitsunday 2015 report card. The assessments utilised the Water Quality Risk framework for sugarcane within the region, which focuses on practices with greatest potential influence on the movement of nutrients, pesticides, and sediment. Table 2 provides a summary of the classifications and the full Water Quality Risk framework for the sugarcane industry can be found at:

http://www.reefplan.qld.gov.au/measuring-success/paddock-to-reef/assets/paddock-to-reef-sugarcane-water-quality-risk-framework.pdf

2.3.1.1. Data collection and reporting

The only reported improvements to sugarcane management during the 2014-15 year were through the Australian Government's Reef Programme. This program, delivered in the region by Reef Catchments NRM group, improved farm management on 79 farms and over 17,000 hectares.

The Reef Programme does not describe the potential impacts of other significant initiatives such as the Smartcane BMP program, which engaged with 260 growers managing 44,294 hectares during 2014-15. These growers completed self-assessments of their current farm management, with a view to identifying areas for possible improvement. It is expected that in future years the Smartcane BMP will be able to quantify these impacts for inclusion in GBR Report Cards.

2.4. Paddock to Reef Reporting

P2R has developed Water Quality Risk frameworks for each agricultural industry. These frameworks articulate best practice in relation to the Reef Plan adoption target. Features of the P2R water quality risk frameworks are:

- **Suites of practices relevant to each pollutant are described in the frameworks** – this does not mean all of the practices in the production system, only those practices that pose the greatest potential water quality risk through movement of sediments, nutrients, or pesticides off-farm;
- **Not all practices are equal** – the P2R frameworks allocate a percentage weighting to each practice depending upon its relative potential influence on off-farm water quality; and
- The **'best practice'** level is that targeted by Reef Plan investments.

These practices are described now in terms of their relative water quality risk, from Low to High. This is a departure from the ABCD management practice frameworks which were the basis for prioritising and reporting investments under Reef Plan 2009. For the purpose of describing industry status and progress in relation to the Reef Plan 2013 adoption target, BMP is defined as the area managed under Low and Moderate-Low risk levels. For grazing systems, the framework describes management practices related to dominant sources of soil erosion; pasture (hillslope), streambank, and gully erosion. For cropping systems the water quality risk frameworks describe management practices related to managing nutrients, pesticides, sediments, and water.

All stewardship reporting covers the Mackay-Whitsunday NRM region, with the addition of the Don Basin. The agricultural stewardship reporting includes the Don Basin and therefore the results may vary slightly from the reporting presented in the Reef Plan report card (which presents separately on the Mackay-Whitsunday region and on the Burdekin region).

It should be noted that the agricultural assessments and subsequent reported results of area under BMP is limited to only those with direct influence or assistance from recognised service providers. It is expected that this may result in a conservative estimate of the number of growers implementing improved practices (Australian Government and Queensland Government, 2015a). This is relevant for the three sectors of grazing, sugarcane, and horticulture.

2.5. Non-agricultural industries

The methodology outlined below is summarised from the stewardship reports by Eco Logical Australia and Adaptive Strategies (2015) and Eco Logical (2016). For full detail please refer to this report, which can be requested at info@healthyriverstoreef.org.

2.5.1. Data collection and reporting

To assess environmental stewardship an implementation plan was first developed with the Partnership, which identified key stakeholders within the sectors being assessed. Relevant contacts (e.g. Environmental Manager) at each company, industry representative body or organisation were then contacted and invited to participate in the stewardship assessment.

Participation was through the completion of a confidential survey on the environmental management practices and the provision of supporting information relevant to the organisation. The responses provided in completed surveys were assessed and scored in accordance with stewardship frameworks developed for each industry (Eco Logical Australia and Adaptive Strategies, 2016).

A disadvantage of this self-reporting approach is the potential perception of bias in the results. That is, companies may shape their responses to 'make themselves look good'. This was countered by specifically tailoring questions to target issues for which 'supporting evidence' would be readily available (e.g. EMS ISO14001 accreditation; number of environmental incidents). This made the data largely objective rather than being merely the unsubstantiated opinion of companies (or individuals within companies) (Eco Logical Australia and Adaptive Strategies, 2016).

Further rigour was introduced into the data collection process by including information in the public domain where relevant to the assessment of environmental stewardship (e.g. annual reports of companies or regulatory agencies) and by assessing compliance data (Eco Logical Australia and Adaptive Strategies, 2016).

Compliance data (with confidential information removed) was provided by the Department of Environment and Heritage Protection (DEHP), noting the number of inspections completed for each industry and the level of compliance with legislation or approval conditions (i.e., the results of the inspection). A compliance rate for each industry was calculated. The Department of Agriculture and

Fisheries (DAF) also provided compliance data for the Aquaculture industry, which was assessed in a similar manner (Eco Logical Australia and Adaptive Strategies, 2016).

Stewardship scores were generated for management themes and activity groups in accordance with the relevant industry framework method. Stewardship was assessed on a scale comprising four levels: Very Effective, Effective, Partially Effective and Ineffective. The lowest of the three management theme scores was utilised as the overall stewardship rating for the sector (Eco Logical Australia and Adaptive Strategies, 2016).

2.5.1.1. Ports

A Port Management framework was developed for the Gladstone Healthy Harbour Partnership to evaluate stewardship within the ports industry (Eco Logical Australia and Adaptive Strategies, 2015). This framework and associated questionnaire was reviewed and adapted as required to be appropriate to operations and activities within the Mackay-Whitsunday region. A series of activities were identified which formed the basis for the development of criteria against which the management effectiveness (stewardship) could be evaluated:

- Administration
  - Extension and research projects;
  - Compliance approach;
  - Environmental management systems (EMS);
  - Training, knowledge and staff awareness;
  - Community engagement; and
  - Tenancy management.
- Operations
  - Operation and ancillary services (including all operational elements that may affect ecosystem health, such as landside waste, hazardous substance storage, refueling vehicles, quarries, loading and unloading, spill management, stock pile management); and
  - Maintenance dredging.
- Development
  - New capital development and/or significant upgrades; and
  - Capital dredging.
- Shipping
  - Movement;
  - Anchorage;
  - Discharges; and
  - Biosecurity.

The questionnaire for the Ports sector was developed to specifically address each activity listed above as well as theme (planning, implementation and outcome) (see Eco Logical Australia and Adaptive Strategies, 2015).

There are three ports in the region (Abbot Point, Port of Mackay, and Hay Point) and one port authority, North Queensland Bulk Ports, who manage the ports. However, there are other companies in the region that are port tenants and undertake activities that could be classified as "port" activities, such as dredging and shipping. Thus, all activities undertaken by the port authority, and all dredging and shipping activities undertaken by any other company, were included in the port stewardship framework (Eco Logical Australia and Adaptive Strategies, 2016). For all other activities (not dredging and shipping) port tenants were included in the heavy industry framework (Eco Logical Australia and Adaptive Strategies, 2016).

For the 2015 report card, a response rate of 100% was achieved from the companies and agencies invited to provide information to inform the Port stewardship assessment (Eco Logical Australia and Adaptive Strategies, 2016).

2.5.1.2. Heavy industry

A heavy industry framework was developed specifically for the Mackay-Whitsunday region in the 2014 pilot report card (Eco Logical Australia and Adaptive Strategies, 2015) and was utilised again this reporting year (2015/16). For the purposes of the Mackay-Whitsunday, "heavy industry" is defined as large industrial facilities such as coal terminals, sugar mills, meat processing facilities and mineral processing and storage facilities (Eco Logical Australia and Adaptive Strategies, 2016). The stewardship assessment covered the following criteria across three management themes, being planning, implementation and outcome:

- Involvement in extension and research projects related to ecosystem health;
- Compliance with environmental approvals/licences, legislation and level of engagement with regulators;
- Development and implementation of an Environmental Management System;
- Training, qualifications, knowledge and awareness of environmental management issues for key staff;
- Community engagement on programs related to ecosystem health;
- Environmental standards are in place for tenants through lease conditions (if applicable);
- Biosecurity plans and protocols are in place and well established;
- Long term strategies are in place to manage activities that may cause environmental harm, like maintenance dredging or stormwater; and
- Further development or expansion is undertaken in line with a master plan and takes into account environmental issues.

The stewardship results for the 2015 report card were generated from six companies across the sugar milling, meat processing, coal handling and mineral sands industries. Compliance data from the DEHP and a range of relevant studies and publications were also utilised, including annual reports of companies and industry bodies. A response rate of 64% was achieved from the companies and agencies invited to provide information to inform the assessment (Eco Logical Australia and Adaptive Strategies, 2016).

2.5.1.3. Aquaculture

A management framework for the aquaculture industry was developed specifically for the Mackay-Whitsunday region in the 2014 pilot report card (Eco Logical Australia and Adaptive Strategies, 2015) and was utilised again this reporting year (2015/16). Guidance was taken from the Environmental Code of Practice for Australian Prawn Farmers during development of the framework. The stewardship assessment covered the following criteria across three management themes, being planning, implementation and outcome:

- Involvement in extension and research projects related to ecosystem health;
- Compliance with environmental approvals/licences, legislation and level of engagement with regulators;
- Development and implementation of an Environmental Management System;
- Training, qualifications, knowledge and awareness of environmental management issues for key staff;
- Community engagement on programs related to ecosystem health;
- Environmental standards are in place for tenants through lease conditions (if applicable);
- Biosecurity plans and protocols are in place and well established;
- Long term strategies are in place to manage activities that may cause environmental harm, like maintenance dredging or stormwater;
- Further development or expansion is undertaken in line with a master plan and takes into account environmental issues; and
- Processes are in place to monitor and manage the incidence of disease (aquaculture).

The aquaculture industry in the Mackay-Whitsunday region is comprised of a small number of prawn, barramundi and red-claw crayfish farms. The industry is highly regulated, primarily in relation to wastewater discharges and the management of biosecurity issues such as disease (Eco Logical Australia and Adaptive Strategies, 2016).

The stewardship results for the 2015 report card were generated from four companies and liaison with three representative bodies in the prawn, barramundi and red claw crayfish farming industries. Compliance data from the DAF and a range of relevant studies and publications were also utilised (e.g. research from CSIRO and publications from industry representative bodies). A response rate of 67% was achieved from the companies and agencies invited to provide information to inform the assessment (Eco Logical Australia and Adaptive Strategies, 2016).

2.5.1.4. Tourism

A management framework was developed to assess the level of stewardship within the tourism industry in the Mackay-Whitsunday region for the 2014 pilot report card (Eco Logical Australia and Adaptive Strategies, 2015) and was utilised again this reporting year (2015/16). Commercial marine tourism activities operating in the Mackay-Whitsunday region include cruises and boat tours, organised diving and snorkelling, air charters and water sport operations. For the purposes of the stewardship framework, individual recreational activities and self-hire boats/yachts have been

excluded, as have resorts and hotels. This latter group is considered to be within the urban category for the purposes of stewardship evaluation (Eco Logical Australia and Adaptive Strategies, 2016).

The framework was similar to those for port, heavy industry and aquaculture so that comparisons could be made. However, given that systems for the industry are well established and there were a much larger number of operators than for other industries, it had a greater focus on certification and training and participation rates (Eco Logical Australia and Adaptive Strategies, 2016).

The tourism industry is highly reliant on the maintenance of high water quality and ecosystem health within the region. Indeed, this is often the key experience tourists are seeking as part of their participation in tourism activities. Therefore, the stewardship assessment of the tourism industry was focused on management efforts to maintain or improve the ecosystem health of marine and coastal waters.

Data collection for the 2015 report card was based primarily on publically available data. The response rate to the survey of tourism operators was low (10%) thus the assessment was of the industry as a whole, rather than the averaged results of individual companies. Compliance data was not used in the overall assessment of the tourism industry for the 2015 report card (Eco Logical Australia and Adaptive Strategies, 2016).

2.5.1.5. Urban

The urban stewardship framework was designed to evaluate environmental management efforts within urban environments for a range of stakeholders including councils, commercial operators and developers who develop, operate or manage urban development. This includes activities such as residential and commercial development, airports, racecourses, golf courses and tourism resorts (Eco Logical Australia, 2016).

Urban development within the Mackay-Whitsunday region is concentrated along the coastal zone. Urban land uses occur predominantly within cities such as Mackay and large regional centres. Several small towns are also located inland and along the coast.

The stewardship results were generated for the first time in the 2015 report card from a range of information sources, including surveys completed by companies involved in urban development, commercial airport facilities, local governments, compliance data from the DEHP and a range of relevant studies and publications (e.g. Council annual reports). A response rate of 54% was achieved from the companies and agencies invited to provide information to inform the assessment (Eco Logical Australia and Adaptive Strategies, 2016).

The nation-wide State of the Environment Report management effectiveness framework was used as a basis for developing the stewardship framework (summarised in Table 4; Eco Logical Australia, 2016). It captures information on management efforts to maintain or improve ecosystem health of the Great Barrier Reef. The approach was consistent with stewardship reporting for ports, heavy industry, tourism and aquaculture.

Table 4. Guiding criteria for planning, implementation and outcome themes in the Mackay-Whitsunday stewardship framework Effectiveness rating.

Effectiveness rating	Theme	Guiding criteria
Very effective	Planning	Understanding of environmental factors affecting waterway and ecosystem health is good. Effective plans are in place for significant activities. Plans and operational procedures clearly establish management objectives for major risks. Responsibility for managing issues is clearly and appropriately allocated and there is a clear willingness to effectively manage issues.
	Implementation	Financial and staffing resources are adequate to implement plans and this is secure over the longer term. Evidence-based biophysical and socioeconomic information is available and used to inform management decisions. Well-designed management systems are being implemented to monitor or manage activities and these are regularly reviewed. Low instance of minor administrative non-compliances; zero non-compliance resulting in potential environmental harm.
	Outcome	Management responses are progressing in accordance with planned programs and are achieving their desired objectives. Targeted threats are being monitored, reported and responded to.
Effective	Planning	Understanding of environmental factors affecting water quality and ecosystem health is generally good, but there is some variability across activity. Effective plans are in place, management responsibilities are allocated appropriately and there is a willingness to effectively manage issues. Plans and operational procedures clearly establish management objectives and priorities for addressing major risks, but may not specify implementation procedures, objectives or other key elements or be reviewed on a regular basis.
	Implementation	Financial and staffing resources are mostly adequate to implement plans, but may not be secure over the longer term. Biophysical and socioeconomic information is available to inform decisions, although there may be deficiencies in some areas. Well-designed management systems are in place or under development, but are not yet being fully implemented. Low instance of non-compliances; matters resulting in potential environmental harm are temporary and responded to immediately.
	Outcome	Management responses are mostly progressing in accordance with planned programs and are achieving their desired objectives. Targeted threats are understood and there are measures in place to monitor and report.
Partially effective	Planning	Understanding of environmental factors affecting water quality and ecosystem health is only fair. Planning systems are not comprehensive and are not regularly reviewed. There may also be a lack of clarity regarding a willingness to effectively manage issues and/or a lack of clarity associated with who has management responsibility.
	Implementation	Financial and staffing resources are unable to address issues in some important areas. Biophysical and socioeconomic information is available to inform management decisions, although there are significant deficiencies in some areas. Management systems provide some guidance, but are not consistently delivering with regards to stakeholder involvement, adaptive management or reporting. Notable non-compliances resulting in potential environmental harm that are responded to immediately and effectively.

Table 4. Continued.

Effectiveness rating	Theme	Guiding criteria
Partially effective	Outcome	Management responses are progressing and showing signs of achieving some management objectives. Targeted threats are understood and measures are being developed to manage them. The expected impacts of management measures on improving resilience of environmental values are yet to be seen. Managed threats remain as significant factors influencing water quality and ecosystem health.
Not effective	Planning	Understanding of environmental factors affecting water quality and ecosystem health is poor. Planning systems have not been developed to address significant issues. Responsibilities are unclear and there is a lack of willingness to effectively manage issues.
	Implementation	Financial and staffing resources are unable to address issues in many areas. Biophysical and socioeconomic information to support decisions is deficient in many areas. Adequate management systems are not in place. Lack of consistency and integration of management across activities is a problem for many issues. Regular non-compliances; resulting in potential for environmental harm with limited response to address the issue.
	Outcome	Management responses are either not progressing in accordance with planned programs (significant delays or incomplete actions) or the actions undertaken are not achieving their objectives. Unmitigated or poorly understood threats remain as significant factors influencing water quality and ecosystem health.

A list of key activities undertaken by urban stakeholders that may influence ecosystem health and water quality was developed based on consultation with industry personnel, review of environmental authorities and industry knowledge. These activities were then a basis for the development of criteria against which the management effectiveness (i.e. stewardship) of companies or organisations could be evaluated (Eco Logical Australia, 2016).

The development assessment and planning frameworks of Council's in the region contributed to 50% of the overall score, with the contributions of each Council weighted according to their urban footprint. The remaining 50% of scores came from companies or public operators of urban infrastructure (including Councils) (Eco Logical Australia and Adaptive Strategies, 2016).

2.5.1.6. Fishing

The assessment framework and methods for stewardship within the fishing industry (recreational and commercial) are being considered so that stewardship in the fishing industry can be reported in future report cards.

2.5.1.7. Community

A community stewardship assessment is being developed in the 2016/17, likely for inclusion in the 2016 report card (released 2017). The aim of the indicator will be to measure community stewardship effort in the reporting year, possibly by local government area.

3. Indigenous cultural heritage

For the first time there will be an indigenous cultural heritage indicator for the Mackay-Whitsunday report card. Below is a summary of the approach taken to develop the indigenous cultural heritage indicator for the 2015 report card. The full report (Golden and Chisholm, 2016) can be requested at info@healthyriverstoreef.org.

The Partnership worked closely with the Mackay-Whitsunday Traditional Owner Reference Group (TORG), coordinated by Reef Catchments, to undertake initial work on establishing indigenous cultural heritage assessment indicators for use in the annual Mackay-Whitsunday report card. Terra Rosa Consulting were engaged to facilitate this process given their history with developing similar assessments for the Gladstone Healthy Harbour Partnership.

The TORG includes representatives of the Gia, Yuwibara, Koinmerburra, Ngaro, Barada/Wiri and Juru Traditional Owner groups.

The objective for the 2015 report card was to establish a baseline condition assessment of key indigenous cultural heritage sites relating to the region's waterways, intact floodplains, freshwater wetlands and marine areas. It is the objective of the Partnership to establish further Indigenous cultural heritage indicators in future years (for example a Connectedness to Country indicator) in addition to the baseline condition assessment as well as non-indigenous cultural heritage indicators for the region.

3.1. Data collection and reporting

Drawing from best-practice frameworks of heritage management, the approach and methodology for developing the indigenous cultural heritage indicators for the Mackay-Whitsunday region was based on these three key guiding principles:

- Indigenous people as primary stakeholders;
- A holistic understanding of heritage values; and
- Adopting a cultural landscape approach.

As representatives of the TORG, the Gia, Ngaro, Juru, Yuwibara, Koinmerburra, Barada and Wiri Traditional Owners had an active role in all stages of the project's heritage management process.

The established partnership with the TORG, Terra Rosa and Reef Catchments allowed for joint decision-making and power sharing, and an approach to indigenous cultural heritage management that prioritises collaboration and co-management and ensure that the project is based on holistic understanding, management and awareness of both tangible and intangible heritage values in the Mackay-Whitsunday region.

During the 2016 project, the field work was informed by the available desktop material and consultation with the TORG, and so focussed on the following areas:

- St Helens Beach;

- Hook Island, Whitsunday Island and South Molle Island;
- Cape Hillsborough including Andrews Point, Wedge island, Finlayson Point and Haliday Bay

During field work, the indicators for each of the zones visited were scored based on the scoring system in Table 5.

Table 5. Scoring system for indigenous cultural heritage.

Score	Grade	Value
4.51 – 5	A	Very High
4.1 – 4.5	B+	High
3.51 – 4	B-	
3.1 – 3.5	C+	Medium
2.51 – 3	C-	
2.1 – 2.5	D+	Low
1.51 – 2	D-	
1 – 1.5	E	Very low

To arrive at each indicator score, evidence was collected from a broad range of sources, including Traditional Owner consultation, scientific data, online resources such as the ALUM classification system, and research (as defined above).

During the field work it became apparent that there is a vast difference in preservation and management strategies across the regions of the study, and that the fragile heritage places within the littoral zone are under heavy pressure from climatic, development and recreational impacts.

A major contributor to the score this year is the inaccuracy of the existing Department of Aboriginal and Torres Strait Islander Partnerships (DATSIP) records which hampered the ability of the project to evaluate the areas in detail.

3.2. Indicators

Indicators were developed at the zone level and enable a holistic assessment of the heritage values, sites, cultural landscape and management activities within each zone. The information on indicators is taken directly from Golden and Chisholm (2016), which can be requested at info@healthyriverstoreef.org. The indigenous cultural heritage health for each zone is assessed as a combination of five indicators:

1. Spiritual / social value of the zone;
2. Scientific value of sites within the zone;
3. Physical condition of sites within the zone;
4. Protection of sites; and
5. Cultural maintenance activities within the zone.

3.2.1. Spiritual / social value

The spiritual / social values of a zone are measured with Traditional Owner consultation focussed on the holistic values of the sites within a zone and their context within any ethnographic narratives. The values are designed to be derived from a framework of anthropological enquiry including ethnographic interviews with key Indigenous community members and elders (where possible). Spiritual / social values are assessed using:

- Knowledge held by the Traditional Owners and the broader ethnographic narrative for each zone and the sites within;
- Sense of connection to the cultural landscape from discussions with Traditional Owners or through using the archaeological record in conjunction with available ethno-historical desktop research;
- Regularity of visitation to the zone by Traditional Owners; and
- The level of ethnographic information available from DATSIP files and any historical research.

3.2.2. Scientific value

Scientific values are measured at a zone level by considering the merits of individual sites within that zone. Measuring the scientific or archaeological value is important in building the baseline record of sites within each zone. Scientific value is assessed by the following measures:

- Diversity – whether there are many different site types within an zone;
- Density – how many sites are within an zone;
- Representativeness – how well sites represent or support the story and traditional land use of the zone;
- Uniqueness – how rare or distinct identified sites are;
- Excavation potential - stratification is assessed through visual inspection and subsurface probing where appropriate; and
- Whether or not the artefacts are *in situ* - Heritage features and elements that are *in situ* have been retained over time in their original positions. This suggests a lack of interference or disturbance to the original fabric of the site and can elicit meaningful data.

3.2.3. Physical condition

The physical condition is the most obvious indication of the health of a zone and the sites within. In measuring condition, thought is given to the following factors:

- Ground surface disturbance - impacted by either environmental, animal or human causes;
- The impact of disturbance on heritage values – the stability or deterioration of the scientific (and often ethnographic) values of the site, as a result of the environmental, animal or human disturbances; and
- The visible impact of threats in a zone. These can include:
    - Environmental threats such as storm surges, inundation and erosion;
    - Animal threats such as burrowing, trampling and animal waste; and

- Human threats such as tracks, vehicles, paths, trampling and boating activities.

3.2.4. Protection of sites

This is based on the physical implementation of protective measures within a zone to mitigate threats and protect the sites within. This involves the following factors:

- The registration of sites on either the ICHD and, where possible, the DATSIP register;
- The management of threats to sites within a zone; and
- The control of access to sites (i.e. through boardwalks, information signage, and fencing).

3.2.5. Cultural maintenance

This indicator is designed to reflect the reality of the cultural health of the zones being managed by the Traditional Owners. In this increasingly proactive role, Traditional Owners will maintain their heritage values through:

- Further identification and research of sites;
- Development of digital and physical cultural resources; and
- Engaging and collaborating with stakeholders to fulfil joint indigenous cultural heritage aims.

4. Confidence associated with results

The assessment results in the report card will be rated in terms of the confidence surrounding the data used in the analysis. To score this the "uncertainty" ratings developed through the GBR report card (Australian Government and Queensland Government 2015b) have been utilised in the Mackay-Whitsunday pilot report card for the stewardship and indigenous cultural heritage assessments. The ratings outlined in the Australian Government and Queensland Government (2015b) have been revised and are described in an unpublished paper submitted to the Independent Science Panel on 28th July 2016. The revised version is outlined below and has been used for the 2015 report card results.

4.1. Methods

A multi-criteria analysis approach was used to qualitatively score the confidence for each key indicator used in the report card. The approach enables the use of expert opinion and measured data.

A multi criteria analysis identifies the key components that contribute to a problem. These are known as criteria. Each criterion is then scored using a defined set of scoring attributes. The attributes are ranked from those that contribute weakly to the criteria to those that have a strong influence. If the criteria are seen to have different levels of importance for the problem being addressed, they can be weighted accordingly. The strengths of this approach are that it is repeatable, transparent and can include contributions from a range of sources. The weaknesses are that it can be subjective and open to manipulation.

The determination of confidence for the report card used five criteria:

- Maturity of methodology (the score is weighted half for this criteria so not to outweigh the importance of the other criteria);
- Validation;
- Representativeness;
- Directness; and
- Measured error.

Maturity of methodology

The purpose of this criterion is to show the confidence that the method/s being used are tested and accepted broadly by the scientific community. Methods must be repeatable and well documented. Maturity of methodology is not a representation of the age of the method but the stage of development. This score is weighted half for this criteria so not to outweigh the importance of the other criteria. It is expected that all methods used would be robust, repeatable and defendable.

Validation

The purpose of this criterion is to show the proximity of the indicator being measured to the indicators reported. The use of proxies is scored lower than direct measures. The reason for this criterion is to minimise compounded error.

Representativeness

The purpose of this criterion is to show the confidence in the representativeness of monitoring/data to adequately report against relevant targets. This criterion takes in to consideration the spatial and temporal resolution of the data as well as the sample size.

Directness

This criterion is similar to "validation" but instead of looking at the proximity of the indicator, the criterion looks at the confidence in the relationship between the monitoring and the indicators being reported against.

Measured error

The purpose of this criterion is to incorporate uncertainty (as defined above) into the metric and use any quantitative data where it exists.

4.2. Scoring

For all indicators where a condition score was reported, each criterion is scored 1 (lowest) to 3 (highest) as defined in Table 6.

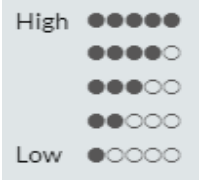
For indigenous cultural heritage reporting, the representativeness criteria was assessed by considering the number of sites recorded as part of the assessment compared to the number listed in the DATSIP register and any known but unlisted sites for the reporting zone.

Once each criterion is scored, these scores are added together and an overall ranking for confidence for each indicator is provided (Table 7).

Table 6. Scoring matrix for each criteria used to assess confidence.

Maturity of methodology (weighting 0.5)	**Validation**	**Representat-iveness**	**Directness**	**Measured error**
Score = 1 **New** or experimental methodology	**Score = 1** **Limited** Remote sensed data with no or limited ground truthing or Modelling with no ground truthing or Survey with no ground truthing	**Score = 1** **Low** 1:1,000,000 or Less than 10% of population survey data	**Score = 1** **Conceptual** Measurement of data that have conceptual relationship to reported indicator	**Score = 1** Greater than 25% error or limited to no measurement of error or error not able to be quantified
Score = 2 **Developed** Peer reviewed method	**Score = 2** **Not comprehensive** Remote sensed data with regular ground truthing (not comprehensive) or Modelling with documented validation (not comprehensive) or Survey with ground-truthing (not comprehensive)	**Score = 2** **Moderate** 1:100,000 or 10%-30% of population survey data	**Score = 2** **Indirect** Measurement of data that have a quantifiable relationship to reported indicators	**Score = 2** Less than 25% error or some components do not have error quantified
Score = 3 **Established** methodology in published paper	**Score = 3** **Comprehensive** Remote sensed data with comprehensive validation program supporting (statistical error measured) or Modelling with comprehensive validation and supporting documentation or Survey with extensive on ground validation or directly measured data	**Score = 3** **High** 1:10,000 or 30-50% of population	**Score = 3** **Direct** Direct measurement of reported indicator with error	**Score = 3** 10% error and all components have errors quantified

Table 7. Overall confidence score, associated ranking and how ranking is displayed in the report card.

2015 Confidence Score Categories	**Ranking**	**Display**
≥12 = five bars ranking	Five dots	
10 to 11.5 = four bars ranking	Four dots	
8.5 to 9.5 = three bars ranking	Three dots	
6.5 to 8 = two bars ranking	Two dots	
≤6 = one bar ranking	One dot	

5. Limitations and Recommendations

The agricultural stewardship assessment has limited representativeness as it only assesses management improvement reported through the Australian Government's Reef Programme. Thus, agricultural stewardship reporting is restricted to a particular group of landholders and does not describe the improvements associated with other programs such as extension, industry BMP or landholders not associated with any programs. The GBR report card (and thus the Mackay-Whitsunday report card) is expected to address this for the 2015-16 year by reporting management improvements from:

- Extension programs;
- Industry BMP programs;
- Novel market-based instrument projects funded by Reef Trust (in Wet Tropics and Burdekin regions only); and
- Relevant system repair projects funded through Reef Programme.

The non-agricultural stewardship assessment was limited by low response rates in some industries (i.e. tourism had a 10% response rate). Further, there is concern around the reliability of the self-assessable nature (questionnaires) of data collection. A full review of the data collection methods undertaken for the non-agricultural industries will occur prior to the release of the next Mackay-Whitsunday report card. This review will include:

- Development of improved approaches to gain higher response rates (in certain industries);
- Review of the application of qualitative data (obtained via questionnaires); and
- Exploration of the integration of more quantitative data.

The indigenous cultural heritage reporting was limited by inaccuracy of previously recorded sites (i.e. sites on the DATSIP register), limited TORG knowledge of sites located on private lands, logistical restrictions and limited TORG training (enhanced training would allow for an increase in the amount of site assessments undertaken). Already, the TORG are working with Terra Rosa (coordinated by Reef Catchments) to obtain the necessary training required to undertake site assessments for future reporting, including considering the accuracy of the DATSIP register. For future reporting this could mean an increase in the number of sites assessed and an overall improvement in confidence of the representativeness of the sample.

Further, the indigenous cultural heritage report (Golden and Chisholm, 2016) was reviewed by two independent parties. Future reporting will take comments from these reviews into consideration. In particular, this will include consideration of the validity of combining value indicators (spiritual/social and scientific value indicators) with condition indicators (physical condition, protection of sites and cultural maintenance indicators) to produce an overall score.

References

Australian Government and Queensland Government. 2015a. Scoring system, Great Barrier Reef Report Card 2014. http://www.reefplan.qld.gov.au/measuring-success/report-cards/2014/assets/gbrscoring-system-2014.pdf

Australian Government and Queensland Government. 2015b. Scoring system, Great Barrier Reef Report Card 2014. http://www.reefplan.qld.gov.au/measuring-success/report-cards/2014/assets/gbrscoring-system-2014.pdf

Eco Logical Australia. 2016. Urban Stewardship Framework. Prepared for the Great Barrier Reef Regional Report Card Partnerships.

Eco Logical Australia and Adaptive Strategies. 2015. Mackay-Whitsunday Healthy Rivers to Reef Partnership Stewardship Reporting. Prepared for Mackay-Whitsunday Healthy Rivers to Reef Partnership.

Eco Logical Australia and Adaptive Strategies. 2016. Mackay-Whitsunday Stewardship Assessment – 2015-16. Prepared for the Mackay-Whitsunday Healthy Rivers to Reef Partnership.

Golden, A. and Chisholm, S. 2016. Cultural heritage indicators assessment of the Mackay-Whitsunday region conducted by the Traditional Owner Reference Group comprising Gia, Ngaro, Juru, Yuwibara, Koinmerburra and Barada/Wiri Traditional Owners and Terra Rosa Consulting for the Mackay-Whitsunday Healthy Rivers to Reef Partnership. Terra Rosa Consulting, Perth.

Australian Government and Queensland Government. 2016a. Management practice methods: Great Barrier Reef Report Card 2015. http://www.reefplan.qld.gov.au/measuring-success/report-cards/2015/assets/report-card-2015-management-practice-methods.pdf

Australian Government and Queensland Government. 2016b. Management practice results: Great Barrier Reef Report Card 2015. http://www.reefplan.qld.gov.au/measuring-success/report-cards/2015/assets/report-card-2015-management-practice-results.pdf