HEALTHY RIVERS TO REEF PARTNERSHIP
MACKAY-WHITSUNDAY

Results for the Mackay-Whitsunday Report Card 2015

Report card released October 2016

Final Report
Healthy Rivers to Reef Technical Working Group
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HEALTHY RIVERS TO REEF PARTNERSHIP
MACKAY-WHITSUNDAY

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Terms and Acronyms

AIMS	Australian Institute of Marine Science
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
Chl-*a*	Chlorophyll-*a*: A measure of overall phytoplankton biomass. It is widely considered a useful proxy to measure nutrient availability and the productivity of a system
Contaminants (as an indicator)	Contaminants comprise the five priority PSII photo-synthesising herbicides (ametryn, atrazine, diuron, hexazinone, and tebuthiuron). These herbicides are reported as the most damaging for the Great Barrier Reef, and are used extensively in sugarcane farming (ametryn, atrazine, diuron, hexazinone) and grazing (tebuthiuron) management practices
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAF	Department of Agriculture and Fisheries Queensland
DATSIP	The Department of Aboriginal and Torres Strait Islander Partnerships
DDL	Declared Downstream Limit
DEHP	Department of Environment and Heritage Protection Queensland
DIN	Dissolved Inorganic Nitrogen
DO	Dissolved Oxygen
Ecosystem	A dynamic complex of plant, animal and microorganism communities and their non-living environment interacting as a functional unit
Fish (as a fauna indicator)	Fish community health is assessed and included in the ecosystem health assessments (coasters). Inclusion in the report card will contributes to an assessment of the health of local fish communities
Fish Barriers (as an indicator)	Fish barriers relate to any barriers which prevent or delay connectivity between key habitats which has the potential to impact migratory fish populations, decrease the diversity of freshwater fish communities and reduce the condition of aquatic ecosystems (Moore, 2015a)
Flow (as an indicator)	Flow relates to the degree that the natural river flows have been modified in the region's waterways. This is an important indicator due to its relevance to ecosystem and waterway health

FRP	Filterable Reactive Phosphorus
GBR	Great Barrier Reef
GBR report card	Great Barrier Reef Report Card developed under the Reef Water Quality Protection Plan (2013)
GBRMPA	Great Barrier Reef Marine Park Authority
GV	Guideline Values
Impoundment (also impoundment length)	An indicator used in the 'in-stream habitat modification' indicator for freshwater basins in the region. This index reports on the proportion (%) of the linear length of the main river channel inundated at the Full Supply Level of artificial in-stream structures such as dams and weirs
Index	Is generated by indicator categories (e.g. water quality made up of nutrients, water clarity, chlorophyll-a and contaminants)
Indicator	A measure of one component of an environmental dataset (e.g. particulate nitrogen)
Indicator category	Is generated by one or more indicators (e.g. nutrients made up of particulate nitrogen and particulate phosphorus)
In-stream Habitat Modification (as an indicator)	This basin indicator category is made up of two indicators; fish barriers and impoundment length
Macroalgae (cover)	An indicator used in part to assess coral health. Macroalgae is a collective term used for seaweed and other benthic (attached to the bottom) marine algae that are generally visible to the naked eye. Increased macroalgae on a coral reef is often undesirable, indicating reef degradation (Diaz-Pulido and McCook, 2008)
MMP	Marine Monitoring Program: the Great Barrier Reef Marine Park Authority's Marine Monitoring Program, which provided water quality data for the Central and Whitsunday reporting zones in the report card
ms-PAF	multi-substance Potentially Affected Fraction
NRM	Natural Resource Management
Overall Score	The overall scores for each reporting zone used in the report card are generated by an index or an aggregation of indices
Partnership	Mackay-Whitsunday Healthy Rivers to Reef Partnership
Phys-chem	The physical-chemical indicator category that includes two indicators: dissolved oxygen (DO) and turbidity

PN	Particulate Nitrogen
PONSE	Proportion of Native (fish) Species Expected
PP	Particulate Phosphorus
PSII-HEq	Photosystem II herbicide equivalent concentrations, derived using relative potency factors for each individual PSII herbicide with respect to a reference PSII herbicide, diuron (Gallen *et al.* 2014)
QPSMP	Queensland Ports Seagrass Monitoring Program
Riparian Extent (as an indicator)	An indicator used in the assessments of both basin and estuarine zones in the pilot and 2015 report cards. This indicator uses mapping resources to determine the extent of the vegetated interface between land and waterways in the region
Satisfaction (as an indicator)	Used in the social health indicator component of the report card assessments. Relates to a community satisfaction of experiences, waterway health, management, access and decision-making
Secchi	Secchi depth (m) – measure of water clarity
Stewardship	Responsible planning and management actions
TORG	(Mackay Whitsunday) Traditional Owner Reference Group
TSS	Total Suspended Solids
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

1.1. General

The Mackay-Whitsunday Healthy Rivers to Reef Partnership (Partnership) was established in October 2014 with the primary objective to develop an annual report card on waterway health in the Mackay-Whitsunday region. The report card includes assessments of the freshwater environment, the estuarine environment and the marine environment (to the eastern boundary of the Great Barrier Reef Marine Park). Different indicators are assessed to provide the overall scores for the environmental zones throughout the Mackay-Whitsunday region. Social, cultural and economic information relevant to waterways and the marine environment is also provided, along with an assessment of stewardship in relation to waterways. Stewardship is reported as, the effectiveness of environmental best practice management within the agricultural, tourism, ports, heavy industry, aquaculture and urban sectors of the region.

In 2015 the pilot report card was released and reported on the 2013-14 year (1 July 2013 to 30 June 2014). Following this, a significant review was 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, continue to provide social and economic context, report on stewardship activities (management effectiveness) and, for the first time, report on indigenous cultural heritage associated with the region's waterways and marine environment.

For the 2015 report card, annual condition is reporting on the 2014-15 year (1 July 2014 to 30 June 2015). This includes data from the majority of water quality indicators, coral and seagrass indicators. Some data from 'habitat and hydrology' indicators in the freshwater basins and estuaries are not reported annually and condition scores are repeated pilot data for the 2013-14 year. This includes impoundment, riparian extent, wetland extent and mangrove and saltmarsh extent indicators. New indicators for the 2015 report card are: fish barriers, fish condition, indigenous cultural heritage and urban stewardship and are based on data collected up to July 2016.

For details on indicator selection, data collection, scoring methods and the changes resulting from the review of the pilot report card, refer to the Development of Methods for the Mackay-Whitsunday Report Card 2015: Environmental Indicators document and the Development of Methods for the Mackay-Whitsunday Report Card 2015: Stewardship and Cultural Heritage reporting documents[1]

For more detail on the design of the Mackay-Whitsunday report card and Partnership, refer to the Program Design: Report Card 2015 document[2].

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

1.2. Purpose of this Document

The purpose of this document is to provide detailed results to support the 2015 Mackay-Whitsunday report card. The results presented in this document are for environmental indicators, stewardship (management effectiveness) and cultural heritage condition. Social and economic information is provided for context only in the report card, thus no further detail is included in this document.

This document presents indicator scores in their original scale along with their standardised scores (where relevant) used for aggregation. Included in this document is the confidence associated with the results based on assessment of the methods and analysis used to obtain the data and scores. The 2015 results are also compared to the results that would have been obtained in the 2014 pilot report card if the revised and improved scoring methods and analysis had been applied to the same data. The data collection period associated with the results presented in this report card is clearly labelled throughout this document.

This document includes:

- The 2015 results of condition scores;
- Confidence associated with 2015 results;
- Comparison of 2015 results to relevant revised 2014 pilot report card results; and
- Data collection period associated with results.

1.3. Terminology

The terminology used in this document for defining the level of aggregation of indicators is as follows (Figure 1):

- Overall score is generated by an index or the aggregation of indices;
- Index/indices (e.g. water quality) are generated by indicator categories;
- Indicator categories (e.g. nutrients) and generated by one or more indicators; and
- An indicator is measured (e.g. particulate nitrogen).

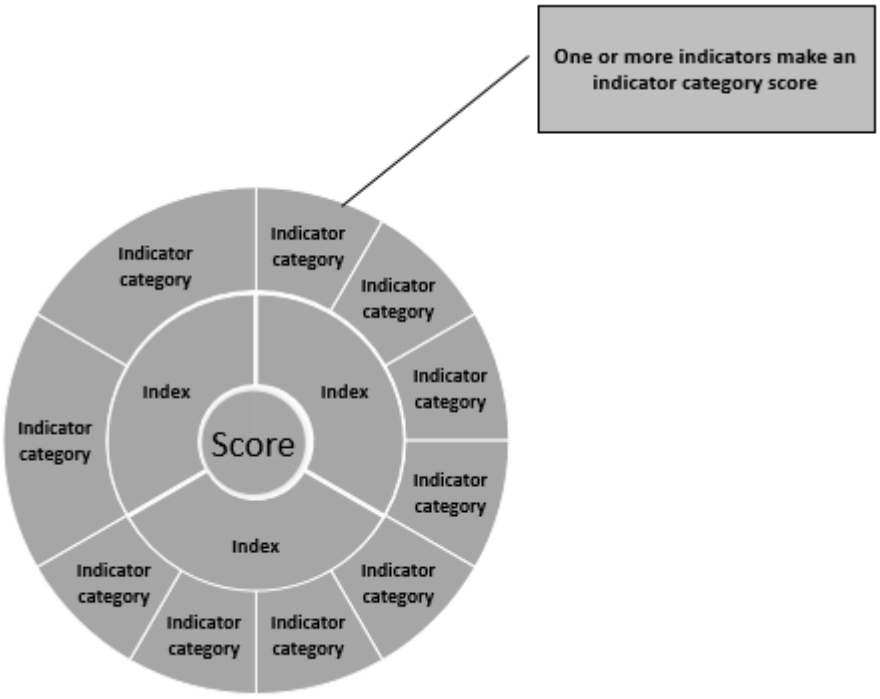

Figure 1. Terminology used for defining the level of aggregation of indicators and how they are displayed in the coasters in the report card.

1.4. General scoring of condition assessments

Different indicators contribute to the overall grade. Ordinal categories are used to describe the scores for condition of indicators, indicator categories and the overall grade. This follows a five-point scoring system:

Very Good (A), Good (B), Moderate (C), Poor (D), Very Poor (E).

Each indicator is scored according to indicator specific scoring ranges. Scores are then aggregated (rolled up) from the indicator or indicator category level to generate an index score, which is subsequently rolled up to produce an overall grade (A to E) for an individual reporting area in an environmental zone.

In order to translate results for indicators that had divergent scoring ranges and bandwidths, standardising across indicators was required before aggregating (rolling up) scores. Scores in marine zones were standardised so that they fell into the same range used by the Great Barrier Reef Water Quality Protection Plan report card (GBR report card), while scores for freshwater basin and estuary zones were standardised so that they fell into the same scoring range used for water quality in these zones (Table 1).

For details on each individual scoring range see the Development of Methods for the Mackay-Whitsunday report card document.

Table 1. Overall range of scores (Marine zone scoring source: GBR report card).

Marine zones	Freshwater basin and estuary zones	Condition grade and colour code
81-100	Assigned 100^	Very Good
61-80	Assigned 100^	Good
41-60	66.7 to 99.9	Moderate
21-40	33.4 to 66.6	Poor
0-20	0 to 33.3	Very Poor

^ To aggregate freshwater basin and estuary indictor scores, 'Good' and 'Very Good' scores were assigned a value of 100 instead of standardised to fall within a specific bandwidth. A set of decision rules were followed when aggregating indicators/indicator category/index scores which included a score of 100. See the Development of Methods for the Mackay-Whitsunday report card document.

Indicator/indicator category/index scores for the 2015 report card are presented throughout this document. When a score is presented in its raw format (i.e. before standardisation) the units of measurement are clarified in the column heading of the relevant table and the relevant scoring range is presented as a footnote below the table; otherwise scores presented are standardised scores and fall into the ranges outlined in Table 1. For freshwater basin and estuary indictor scores that were 'Good' or 'Very Good' and were assigned a score of 100 to allow for aggregation, the colour code relevant to the grade is used to differentiate from 'Good' or 'Very Good'.

1.5. Rainfall in the Mackay-Whitsunday region

Rainfall is strongly linked to water quality in our waterways and marine environments. During the 2014/15 period rainfall was below average. The extent to which rainfall was below average ranged from 50 – 66 % lower than the long-term annual mean rainfall across the different reporting zones (Table 2). This resulted in lower river discharge in the O'Connell River, Pioneer River and Plane Creek compared to the long-term mean.

Table 2. Rainfall from the 2014-15 period in the Mackay-Whitsunday reporting zones. Data source: Bureau of Meteorology.

Reporting zone	Average annual rainfall (mm)	Amount below annual mean (%)
Don basin	464	50
Proserpine basin	810	57
O'Connell basin	917	57
Pioneer basin	872	59
Plane basin	945	63
Northern marine inshore	523	52
Whitsunday marine inshore	846	53
Central marine inshore	936	57
Southern marine inshore	947	66
Offshore marine	496	51

2. Freshwater ecosystem condition

Overall grades for each freshwater basin did not change between the 2014 and 2015 report cards. The Don, Pioneer and Plane basins remained a 'D' overall and the Proserpine and O'Connell basins remained a 'C' overall (Table 3). While guideline values were met for 'nutrients' in the O'Connell basin and for 'sediments' in the Plane basin, 'contaminants' remained a high risk for streams in both the Pioneer and Plane basins.

A better understanding of habitat and hydrology was provided with the 'fish barriers' indicator, which contributed to the condition of 'in-stream habitat modification'. The other habitat and hydrology indicators reported in the 2015 report card were a repeat of the 2014 pilot report card scores, due to the reporting frequency of these indicators being every four years, reflecting the gradual nature of change likely associated with these indicators.

Table 3. Results for aggregated indices and overall scores for freshwater basins in the 2015 report card in comparison to scores reported in the previous year's 2014 pilot report card.

	2015 report card					Pilot report card (revised)	
Freshwater basin	Water quality	Habitat and hydrology	Fauna	Overall score		Overall score	
Don		59		59	D	59	D
Proserpine		84		84	C	82	C
O'Connell	92	66		79	C	80	C
Pioneer	76	42		59	D	54	D
Plane	58	54		56	D	53	D

Standardised scoring range: *■ = very good (assigned 100), ■ = good (assigned 100), ■ = moderate (66.7 – <100), ■ = poor (33.4 – 66. 7), ■ = very poor (0 – 33.3)*

2.1. Water Quality

For the 2015 report card, nutrients in the O'Connell basin scored Very Good indicating that more than 80% of the monthly median concentration of Dissolved Inorganic Nitrogen (DIN) and Filterable Reactive Phosphorus (FRP) were better than the guideline value for this basin (Table 4). The annual median in the Pioneer and Plane basins did not meet guideline values for nutrients (Table 4).

Table 4. Results for DIN and FRP indicators and overall nutrients indicator category score for water quality in freshwater basins in the 2015 report card (2014-15 data) in comparison to scores reported in the previous year's 2014 pilot report card (2013-14 data).

	2015 report card			Pilot report card (revised)		
Freshwater basin	DIN	FRP	Nutrients^	DIN	FRP	Nutrients^
Don	no data	no data	no data	no data	no data	no data
Proserpine	no data	no data	no data	no data	no data	no data
O'Connell	100	100	**100**	94	88	**91**
Pioneer	79	97	**88**	56	98	**77**
Plane	29	61	**45**	6	47	**27**

DIN and FRP*: ■ = very good (≥ 80% met GV, assigned 100), ■ = good (≥ 50-80% met GV, assigned 100), ■ = moderate (66.7 – <100), ■ = poor (33.4 – 66. 7), ■ = very poor (0 – 33.3);*
^Standardised scoring range: *■ = very good (assigned 100), ■ = good (assigned 100), ■ = moderate (66.7 – <100), ■ = poor (33.4 – 66. 7), ■ = very poor (0 – 33.3)*

Sediment condition across all three basins in the 2015 report card is shown in Table 5. Only in the Plane basin did the annual median concentration of Total Suspended Solids (TSS) meet guideline levels, resulting in an assessment of 'Good' (Table 5), however, sediment scores in both the O'Connell and Pioneer were on the border between 'Moderate' and 'Good'.

The distribution of monthly median concentrations of DIN, FRP and TSS can be found in Appendix A.

Table 5. Results for TSS indicator and overall sediment indicator category score for water quality in freshwater basins in the 2015 report card (2014-15 data) in comparison to scores reported in the previous year's 2014 pilot report card (2013-14 data).

Freshwater basin	2015 report card		Pilot report card (revised)	
	TSS	Sediment^	TSS	Sediment^
Don	no data	no data	no data	no data
Proserpine	no data	no data	no data	no data
O'Connell	96	**96**	91	**91**
Pioneer	97	**97**	89	**89**
Plane	100	**100**	85	**85**

TSS: *■ = very good (≥ 80% met GV, assigned 100), ■ = good (≥ 50-80% met GV, assigned 100), ■ = moderate (66.7 – <100), ■ = poor (33.4 – 66. 7), ■ = very poor (0 – 33.3);*
^Standardised scoring range: *■ = very good (assigned 100), ■ = good (assigned 100), ■ = moderate (66.7 – <100), ■ = poor (33.4 – 66. 7), ■ = very poor (0 – 33.3)*

The results for contaminants (ms-PAF area under the curve method for the five priority PSII pesticides) in the 2015 report card for the three freshwater basins are shown in Table 6. The O'Connell basin scored 'Moderate', the Pioneer basin scored 'Poor', and Plane basin scored 'Very Poor'.

Table 6. Results for ms-PAF indicator and overall contaminants scores for water quality in freshwater basins in the 2015 report card (2014-15 data) in comparison to scores reported in the previous year's 2014 pilot report card (2013-14 data).

Freshwater basin	2015 report card		Pilot report card (revised)	
	ms-PAF (% species affected)	Contaminants^	ms-PAF (% species affected)	Contaminants^
Don	no data	no data	no data	no data
Proserpine	no data	no data	no data	no data
O'Connell	8	**81**	4	**100**
Pioneer	17	**44**	25	**31**
Plane	31	**29**	36	**27**

ms-PAF (% species affected): *■ = very good (1.0%), ■ = good (1.01 – 5.0%), ■ = moderate (5.01 – 10.0%), ■ = poor (10.01 – 20.0%), ■ = very poor (≥ 20.0%)*
^Standardised scoring range: *■ = very good (assigned 100), ■ = good (assigned 100), ■ = moderate (66.7 – <100), ■ = poor (33.4 – 66. 7), ■ = very poor (0 – 33.3)*

It is logical that the Plane basin is in the poorest condition for both nutrients and contaminants compared to the other reported basins. The Plane basin has the highest area of sugarcane in the Mackay-Whitsunday region and land used for sugarcane production contributes higher volumes of nutrients and contaminants to waterways than other land uses in the region, such as grazing and forestry (Packett et al. 2014).

After aggregating the water quality indicator categories together, water quality scores were higher in the Pioneer and Plane basins in the 2015 report card compared to the 2014 report card (Table 7).

However, only in the Pioneer basin did this result in a grade change from 'Poor' to 'Moderate'. There was little change to water quality scores in the O'Connell basin in 2015 compared to 2014.

Like the 2014 results, the overall water quality result for 2015 again highlighted that contaminants and nutrients were the key areas of concern for the region's freshwater ecosystems, and that the Plane basin was of the highest concern.

Table 7. Results for aggregated water quality indicators and index scores in freshwater basins in the 2015 report card (2014-15 data) in comparison to scores reported in the previous year's 2014 pilot report card (2013-14 data).

Freshwater basin	2015 report card				Pilot report card (revised)			
	Sediment	Nutrients	Contaminants	Water quality	Sediment	Nutrients	Contaminants	Water quality
Don								
Proserpine								
O'Connell	96	100	81	**92**	91	91	100	**94**
Pioneer	97	88	44	**76**	89	77	31	**66**
Plane	100	45	29	**58**	85	27	27	**46**

Standardised scoring range: ■ *= very good (assigned 100),* ■ *= good (assigned 100),* ■ *= moderate (66.7 – <100),* ■ *= poor (33.4 – 66. 7),* ■ *= very poor (0 – 33.3)*

While below average rainfall in the region it is likely linked to the changes in the overall scores, interpreting the cause and direction of changes in results should be undertaken with caution. Subsequent report cards may allow for the identification of trends in the results, which can improve our understanding of the direction of changes.

Consideration should also be given to confidence in the results (Table 8). Confidence for sediment, nutrients and contaminants in the 2015 results for all three basins is shown in Table 8. There is more confidence in sediment and nutrients results than in the contaminants results. This is because the ms-PAF method for assessing contaminants is still being refined.

A key factor contributing to lower confidence ratings (ranking of three and two out of five) in the results for all three indicator categories is due in particular to low confidence in 'representativeness'. While sampling occurs monthly for sediment and nutrients and in the wet season months for contaminants, providing acceptable temporal coverage, there is low spatial representation of the basins. All samples occur at only one water quality monitoring site in each of the three basins: O'Connell River (at the caravan park; O'Connell basin), Pioneer River (at Dumbleton pump station; Pioneer basin) and Sandy Creek (at Homebush; Plane basin). Thus, caution should be used when inferring that results apply to all streams in a basin.

Table 8. Confidence associated with sediment, nutrients and contaminants results in freshwater basins in the 2015 report card. Unless specified, confidence scores are the same across basins.

Water quality indicator category	Maturity of methodology	Validation	Representativeness	Directness	Measured error	Final	Rank out of 5
Sediment	1.5	3	1	3	1	9.5	**3**
Nutrients	1.5	3	1	3	1	9.5	**3**
Contaminants	0.5	2	1	2	1	6.5	**2**

2.2. Habitat and hydrology

Fish barrier density was 'Poor' in the Proserpine and Plane basins, indicating that, on average, there could be a barrier every 2.7 and 2.4 km respectively, on streams order ≥3 (Table 9). The condition of the Pioneer basin was 'Very Poor' when considering the proportion of stream to the first barrier (on stream orders ≥3); only 0.7% of the total length of the stream in the basin was connected above the DDL (Declared Downstream Limit). When considering the proportion of stream to the first low "passability" barrier (on stream orders ≥4 only), the Pioneer was also 'Very Poor', indicating that there is very little area (0.5% of total stream length) that is ever passable for freshwater fish upstream from the DDL. While the condition of the Proserpine and O'Connell basins was at best 'Moderate' for barrier density and proportion of stream to the first barrier, these basins were 'Good' when considering proportion of stream to the first low passability barrier. Thus, despite barriers existing in the lower reaches of the streams, at certain times of the year, fish would likely have the opportunity to pass through these barriers.

The fish barriers indicator demonstrated that the Pioneer and Plane basins were in the worst condition compared to the other three basins. The Pioneer and Plane basins comprise a high proportion of sugar cane production as well as two of the largest population centres (Mackay and Sarina) in the region (Moore 2016). Both of these land uses result in the construction of weirs, dams and crossings over waterways which frequently form barriers to fish passage and would contribute to the lower condition rating for fish barriers (Moore 2016). For the full report on fish barriers in the Mackay-Whitsunday region see Moore 2016.

Table 9. Results for fish barrier indicators in freshwater basins in the 2015 report card (2014-16 data, no assessment in the 2014 pilot). Indicators assessed on Stream Order (SO) ≥3 or ≥4 as indicated. *Insufficient data was available regarding barrier passability in the Don freshwater basin and this grade was based off expert opinion rather than measured.

Freshwater basin	2015 report card		
	Barrier density (km per barrier on SO ≥3)	Proportion stream to the 1st barrier (SO ≥3)	Proportion Stream to the 1st low passability barrier (SO ≥4)
Don	11	24	*
Proserpine	3	39	91
O'Connell	5	33	85
Pioneer	6	0	1
Plane	3	28	70

Barrier density (km): ■ *= very good (≥ 16.1),* ■ *= good (8.1 – 16),* ■ *= moderate (4.1 – 8),* ■ *= poor (2.1 – 4),* ■ *= very poor (≥0 – 2)*
Stream to 1st barrier (%): ■ *= very good (100),* ■ *= good (50 – 99.9),* ■ *= moderate (30 – 49),* ■ *= poor (10 – 29.9),* ■ *= very poor (0 – 9.9)*
Stream to 1st low passability barrier (%): ■ *= very good (≥ 95.1),* ■ *= good (70.1 – 95),* ■ *= moderate (60.1 – 70),* ■ *= poor (50.1 – 60),* ■ *= very poor (0 – 50)*

The condition scores for the 'impoundment' indicator are presented in Table 10 and Figure 2. There were no impoundments on streams of order ≥3 in the Don basin, giving the overall condition score 'Very Good'. The Pioneer was in 'Poor' condition, with 9.8% of the total length of streams of order ≥3 impounded by artificial structures. It is unlikely that impoundment scores will improve in subsequent report cards as impounded waters are an outcome of significant dams and weirs which are essential for the function of local agriculture and the urban centres in the region. While these impoundments are unlikely to be removed, there is potential that impounded waters could increase in the future.

Table 10. Results for impounded stream indicator in freshwater basins in the 2015 report card (2013-14 data repeated from the previous year's 2014 pilot report card).

	2015 report card (repeat of pilot)			
Freshwater basin	**Not impounded (km)**	**Impounded (km)**	**Total (km)**	**Impoundment (% total)**
Don	954	0	954	**0**
Proserpine	528	37	565	**6**
O'Connell	598	16	614	**3**
Pioneer	498	54	552	**9**
Plane	671	28	698	**3**

Impoundment (% total): ■ *= very good (<1.0%),* ■ *= good (*1.0 – 3.99%*),* ■ *= moderate (*4.0 – 6.99%*),* ■ *= poor (*7.0 – 9.99%*),* ■ *= very poor (*≥ 10.0%*)*

When considering impoundment and fish barriers aggregated together as 'in-stream habitat modification' (Table 11), all except for the Pioneer basin scored 'Moderate'. The Pioneer basin scored a 'Poor' for in-stream habitat modification. The Dumbleton weir on the Pioneer River is a significant contributor to this score. The size of the weir results in a high proportion of impounded waters, while its low passablity and proximity to the coast means it has a significant impact on fish passage.

With impoundments unlikely to be removed, improvement of in-stream habitat modification scores would need to focus on management actions relevant to improving fish barrier scores. The installation of a functioning fishway (or fish ladder) means that a structure that once blocked or delayed fish passage, is no longer considered a barrier, as the fishway allows fish to move past the barriers at any time of the year. The strategic positioning of fishways could contribute towards improvements in connectivity for the region's freshwater fish and thus improve the fish barrier score. Moore (2015) has prioritised the remediation of fish barriers in the Proserpine, O'Connell, Pioneer and Plane basins.

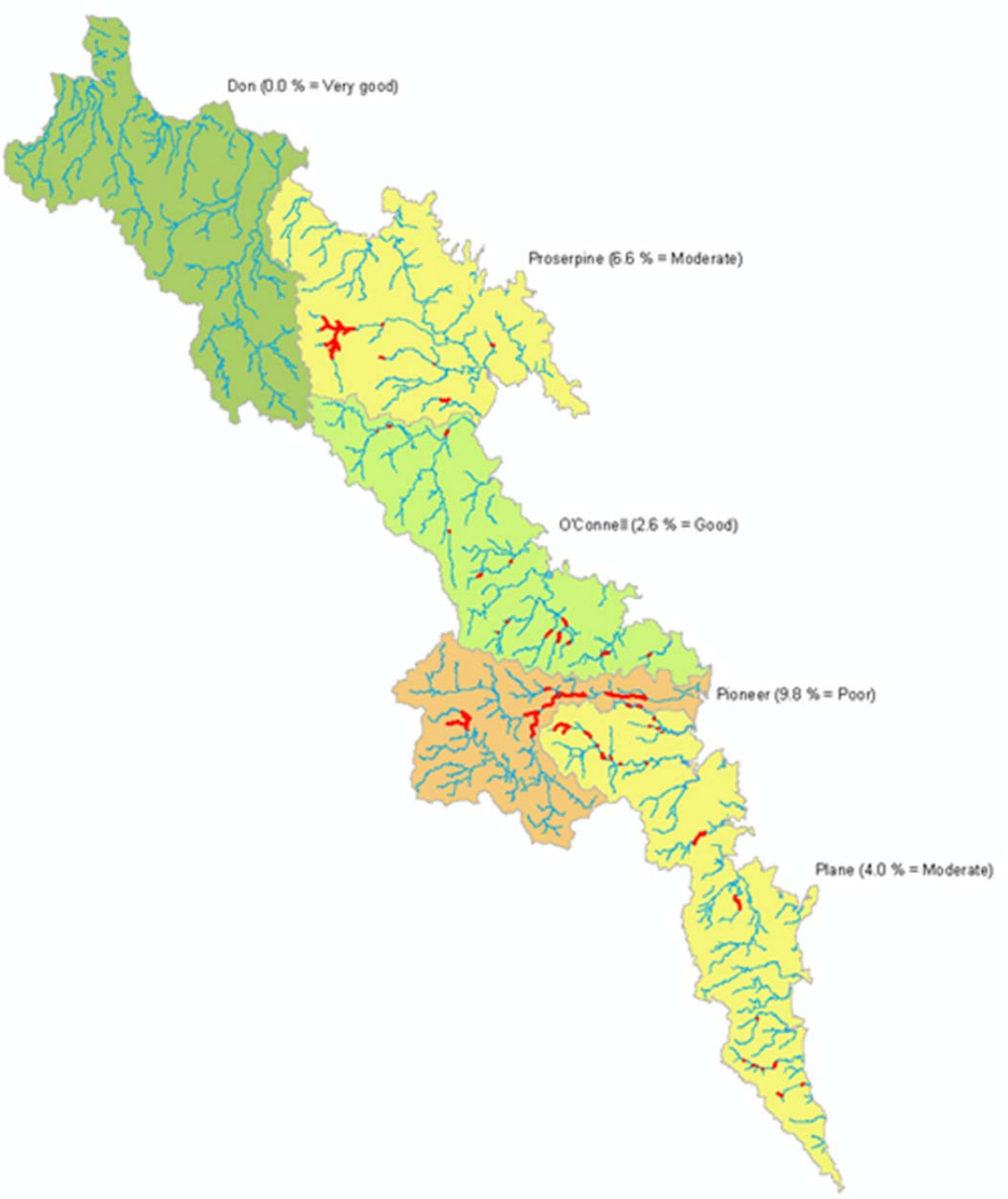

Figure 2. Impoundment of waterways on streams of order ≥3 in the five freshwater basins reported in the Mackay-Whitsunday report card. Red stream segments represent impounded waters.

Table 11. Results for aggregated in-stream habitat modification indicator category in freshwater basins in the 2015 report card (2014-15 data) in comparison to scores reported in the previous year's 2014 pilot report card (2013-14 data). *Data from 'Impounded stream' indicator is repeated data from 2013-14.

	2015 report card			Pilot report card (revised)		
Freshwater basin	Impoundment*	Fish Barriers	In-stream habitat modification	Impoundment	Fish barriers	In-stream habitat modification
Don	100	99	**99**	100		**100**
Proserpine	71	83	**77**	71		**71**
O'Connell	100	99	**99**	100		**100**
Pioneer	36	33	**35**	36		**36**
Plane	99	66	**83**	99		**99**

Standardised scoring range: ■ *= very good (assigned 100),* ■ *= good (assigned 100),* ■ *= moderate (66.7 – <100),* ■ *= poor (33.4 – 66. 7),* ■ *= very poor (0 – 33.3)*

There was no change in the condition of 'riparian extent' and 'wetland extent' indicators in the 2015 report card compared to the 2014 report card because data was repeated for both indicators. This is because the reporting frequency for both indicators is only once every four years; reflecting the gradual nature of change associated with the indicators. These indicators will be reported on again with new data in the 2017 report card (for the 2016/17 year, released in 2018). Wetland extent remained 'Very Poor' in all but the Proserpine basin and there was no basin that was considered to have riparian extent in better than 'Moderate' condition (Table 12). The loss of riparian and wetland extent reflects the high level of habitat modification associated with agriculture that dominates the region as well as urban development that is concentrated in Mackay, Sarina and Proserpine.

Table 12. Results for riparian and wetland extent loss (palustrine wetlands, excluding estuarine) indicators in freshwater basins in the 2015 report card (2013-14 data repeated from the previous year's 2014 pilot report card).

	2015 report card (repeat of pilot)	
Freshwater basin	Riparian extent (% loss)	Wetland extent (% loss)
Don	30	48
Proserpine	23	14
O'Connell	22	56
Pioneer	20	83
Plane	30	45

Riparian extent and wetland extent (% loss): ■ *= very good (<5%),* ■ *= good (*5.0 – 15.0%*),* ■ *= moderate (*15.01 – 25.0%*),* ■ *= poor (*25.01 – 35.0%*),* ■ *= very poor (>* 35%*)*

The new fish barrier data included for the first time in the habitat and hydrology index for the freshwater basins improved our understanding of habitat and hydrology in freshwater systems, however did not lead to big changes in overall scores (Table 13).

Table 13. Results for habitat and hydrology indicators and the aggregated index in freshwater basins in the 2015* report card in comparison to scores reported in the previous year's 2014 pilot report card (2013-14 data). *Data from 'impoundment' indicator that is used to develop the 'in-stream habitat modification' and riparian and wetland extent indicator categories are repeat 2013-14 data from the pilot.

	2015 report card					Pilot report card (revised)
Freshwater basin	In-stream habitat modification	Flow	Riparian	Wetland	Habitat and hydrology	Habitat and hydrology
Don	99		51	27	**59**	**59**
Proserpine	77		74	100	**84**	**82**
O'Connell	99		77	23	**66**	**66**
Pioneer	35		83	9	**42**	**43**
Plane	83		52	28	**54**	**60**

Standardised scoring range: *■ = very good (assigned 100), ■ = good (assigned 100), ■ = moderate (66.7 – <100), ■ = poor (33.4 – 66. 7), ■ = very poor (0 – 33.3)*

In future report cards the inclusion of the 'flow' indicator should increase our understanding of habitat and hydrology in freshwater basins throughout the region.

Confidence for habitat and hydrology indicator results for the 2015 report card is shown in Table 14. There is less confidence in the fish barrier results in the Don basin compared to results in the other four freshwater basins. This is due to the low confidence that all potential barriers had been identified (representativeness), that ground truthing of barriers was unknown (validation) and that there was no known measured error. Confidence in results of other indicators was higher Table 14.

Table 14. Confidence associated with habitat and hydrology indicator results in freshwater basins for the 2015 report card. The confidence of the result associated with the Don basin is in parenthesis when it is different from the other four basins. Unless specified, confidence in results is the same across all other basins.

Indicator	Maturity of methodology	Validation	Represent ativeness	Directness	Measured error	Final	Rank out of 5
Impoundment	1	2	3	2	1	9	**3**
Fish barriers	0.5	2 (1)	3 (1)	2	2 (1)	9.5 (5.5)	**3 (1)**
Riparian extent	1	2	2	2	2	9	**3**
Wetland extent	1	2	2	2	2	9	**3**

2.3. Fauna

There is no overall fauna score for the freshwater environments in the Mackay-Whitsunday region, however for the first time 'fish' community condition is assessed for the report card in three of the basins (Table 15). The proportion of observed native fish species compared to modelled Proportion of Native Species Expected ('PONSE') was 'Good' in the O'Connell and Plane basins compared to 'Moderate' in the Pioneer basin. This means that for the O'Connell and Plane basins, the freshwater fish community is similar to what is expected in streams across the region that have similar landscape and land use attributes. This means scores are compared to what is expected under *current* conditions (i.e. not pre-European conditions).

The location and variation in condition of the sample sites within and between the three basins can be seen in Figure 3. For the O'Connell basin, observations for the 2015 report card are based on sampling in the O'Connell River only (see Figure 3), while in the other two basins a number of different streams were sampled. Though in the Plane basin there was no sampling in Plane Creek.

It should be noted that sampling for this assessment was conducted by electrofishing (undertaken by DISITI and Catchment Solutions) which identifies all species regardless of size in the sampling location, thus results are not necessarily a good reflection of the expected catch of an angler fishing in the same location.

There were three sites in the Proserpine basin (Figure 3), however no score was provided for this basin. These sites represented three 'minimally disturbed' reference sites at Repulse Creek. Despite these sites contributing to the overall model of fish condition, there were not enough sites to contribute to a score for the Proserpine basin.

'Pest fish' in 2015-16 scored 'Very Good' in the Plane basin and 'Moderate' in O'Connell and Pioneer basins. Primarily, tilapia species contributed to this score.

Table 15. Results for fish indicators in freshwater basins in the 2015 report card (2015-16 data). These indicators were not reported in the 2014 pilot report card.

Freshwater basin	2015 report card	
	Native species richness (PONSE)	Pest fish (Proportion of sample)
Don		
Proserpine		
O'Connell	0.749	0.058
Pioneer	0.620	0.094
Plane	0.738	0.017

Native richness (PONSE): ■ *= very good (≥ 0.800),* ■ *= good (≥ 0.667),* ■ *= moderate (≥ 0.533),* ■ *= poor (≥ 0.400),* ■ *= very poor (< 0.400)*
Pest fish (proportion): ■ *= very good (≤ 0.025),* ■ *= good (≤ 0.050),* ■ *= moderate (≤ 0.100),* ■ *= poor (≤ 0.200),* ■ *= very poor (> 0.200)*

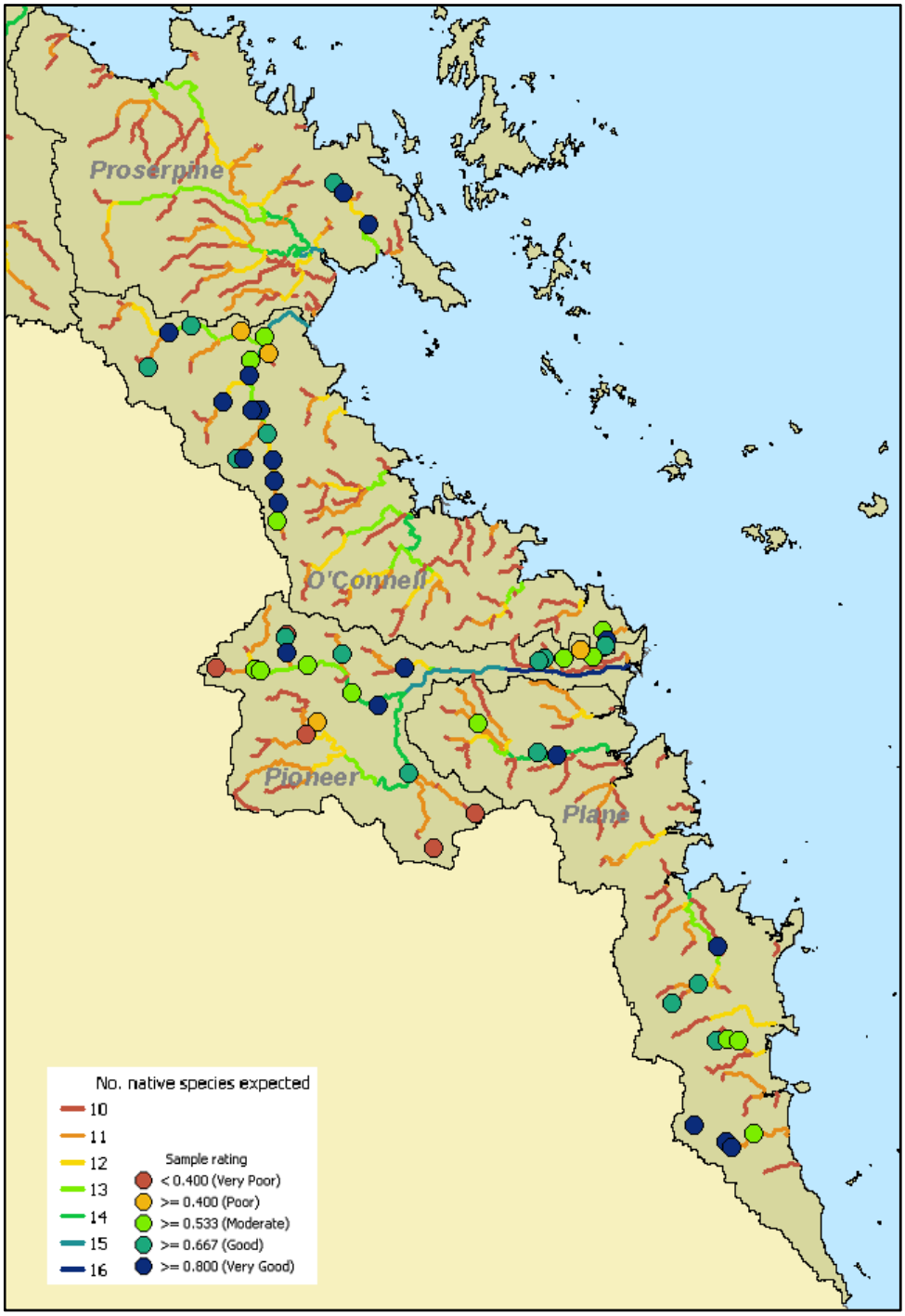

Figure 3. Mackay-Whitsunday basins where fish community condition with PONSE. Stream sections are coloured based on modelled expected species richness and coloured points on the map indicate 2015-16 condition assessment sites. Results for sites not lying on the stream network as displayed were not used.

With only the fish indicator category providing fauna data, the fauna index cannot be calculated based on the minimum data decision rules for aggregating into an index (Table 16).

Table 16. Aggregated results for the fish indicator category in freshwater basins in the 2015 report card (2015-16 data). These indicators were not reported in the 2014 pilot report card.

Freshwater basin	2015 report card		
	Macro invertebrates	Fish	Fauna
Don			
Proserpine			
O'Connell		98	
Pioneer		80	
Plane		100	

Standardised scoring range: ■ = *very good (assigned 100),* ■ = *good (assigned 100),* ■ = *moderate (66.7 – <100),* ■ = *poor (33.4 – 66. 7),* ■ = *very poor (0 – 33.3)*

Confidence associated with the fish condition results for the 2015 report card is shown in Table 17. This indicator category is in its early stages of development and improvements to our understanding of fish community condition in minimally disturbed reference sites in mid and lower stream reaches would help improve the accuracy of the model and thus the overall assessment. However, there are very few locations throughout the region that remain minimally disturbed in the required parts of the landscape. So to improve the model, we will likely be reliant on expert opinion of expected fish communities in these mid and lower reaches. Furthermore, the addition of an indicator that assesses the species assemblage of the fish community would be a significant step to completing our understanding of fish condition throughout the region.

Table 17. Confidence associated with the fauna indicator 'fish condition' for the 2015 report card in the O'Connell, Proserpine and Plane basins. Unless specified, confidence in results is the same across basins.

Fauna indicator category	Maturity of methodology	Validation	Represent ativeness	Directness	Measured error	Final	Rank out of 5
Fish condition	1	2	2	2	2	9	**3**

3. Estuarine ecosystem condition

With the results for the majority of the estuary indicators being derived from data that was used in the pilot report card (except fish barriers data), overall scores for the estuaries were similar for this report card compared to the overall scores in the pilot report card (Table 18); all estuaries scored a 'C'. The inclusion of new data for the fish barriers indicator improved our understanding of estuary condition but did not change their overall scores.

Table 18. Results for aggregated indices and overall scores in estuaries for the 2015 report card (2014-15 data) in comparison to scores reported in the previous year's 2014 pilot report card (2013-14 data).

Estuary	2015 report card					Pilot report card (revised)	
	Water quality	Habitat and hydrology	Fauna	Overall score		Overall score	
Gregory	86	100		**93**	**C**	**93**	**C**
O'Connell	87	73		**80**	**C**	**77**	**C**
St Helens/Murray	90	77		**84**	**C**	**86**	**C**
Vines	96	83		**89**	**C**	**85**	**C**
Sandy	74	64		**69**	**C**	**68**	**C**
Plane	96	75		**86**	**C**	**97**	**C**
Rocky Dam	79	100		**90**	**C**	**90**	**C**
Carmila	99	100		**99**	**C**	**99**	**C**

Standardised scoring range: ■ *= very good (assigned 100),* ■ *= good (assigned 100),* ■ *= moderate (66.7 – <100),* ■ *= poor (33.4 – 66. 7),* ■ *= very poor (0 – 33.3)*

3.1. Water quality

The water quality results for the 2015 report card are derived from the same data as was used for the pilot report card. This is because prior to the development of the pilot report card, there had been no water quality monitoring in the estuaries in the region. The data presented in the 2014 pilot and 2015 report cards represents the first year of sampling (2014-15). This was repeated to ensure that all water quality data presented in this and subsequent report cards are from the same reporting periods.

The condition of the indicators DIN and FRP and the nutrients indicator category score in estuaries for the 2015 report card are presented in Table 19. The annual median concentration of both DIN and FRP in the Gregory and the O'Connell estuaries met the guidelines and in the Gregory 80% of the monthly means met the guidelines. The distribution of monthly median concentrations of DIN and FRP can be found in Appendix A.

Table 19. Results for DIN and FRP indicators and nutrient indicator category in estuaries in the 2015 report card (2013-14 data repeated from the previous year's 2014 pilot report card).

Estuary	2015 report card (repeat of revised pilot)		
	DIN	FRP	Nutrients^
Gregory	100	100	**100**
O'Connell	100	100	**100**
St Helens/Murray	83	100	**92**
Vines	66	100	**83**
Sandy	33	100	**67**
Plane	96	100	**98**
Rocky Dam	71	100	**85**
Carmila	97	100	**99**

***DIN and FRP**: ■ = very good (≥ 80% met GV, assigned 100), ■ = good (≥ 50-80% met GV, assigned 100), ■ = moderate (66.7 – <100), ■ = poor (33.4 – 66. 7), ■ = very poor (0 – 33.3);*
***^Standardised scoring range:** ■ = very good (assigned 100), ■ = good (assigned 100), ■ = moderate (66.7 – <100), ■ = poor (33.4 – 66. 7), ■ = very poor (0 – 33.3)*

The condition of the indicators Dissolved Oxygen (DO) and Turbidity and the indicator category score 'phys-chem' in estuaries for the 2015 report card are presented in Table 20. The annual median guideline concentration of DO was met in all estuaries. The O'Connell was the only estuary that did not meet guidelines for turbidity. The distribution of monthly median concentrations of DIN and FRP can be found in Appendix A.

Table 20. Results for measured dissolved oxygen (DO) and turbidity indicators and the phys-chem indicator category score in estuaries for the 2015 report card (2013-14 data repeated from the previous year's 2014 pilot report card).

Estuary	2015 report card (repeat of revised pilot)			
	DO lower	Turbidity	DO upper	Phys-chem^
Gregory	100	100	100	**100**
O'Connell	100	61	100	**80**
St Helens/Murray	100	100	100	**100**
Vines	100	100	100	**100**
Sandy	100	100	100	**100**
Plane	100	100	100	**100**
Rocky Dam	100	100	100	**100**
Carmila	100	100	100	**100**

***DO and Turbidity**: ■ = very good (≥ 80% met GV, assigned 100), ■ = good (≥ 50-80% met GV, assigned 100), ■ = moderate (66.7 – <100), ■ = poor (33.4 – 66. 7), ■ = very poor (0 – 33.3)*
***^Standardised scoring range**: ■ = very good (assigned 100), ■ = good (assigned 100), ■ = moderate (66.7 – <100), ■ = poor (33.4 – 66. 7), ■ = very poor (0 – 33.3)*

The results for contaminants (ms-PAF area under the curve method for the five priority PSII pesticides) in the 2015 report card for the estuaries are shown in Table 21. This is the same data that was used for the pilot report card, except for the O'Connell estuary which is based on the freshwater basin score (so 2013-14 data in the 2014 pilot report card and now 2014-15 data in the 2015 report

card). The Vines and Carmila estuaries both scored 'Good' for contaminants in contrast to Rocky Dam and Sandy Creek estuaries, which scored 'Very Poor'.

Annual median chlorophyll-a (chl-a) guideline concentration in all monitored estuaries were met (Table 21). The distribution of monthly median concentrations of chlorophyll-a can be found in Appendix A.

Table 21. Results for ms-PAF indicator and chl-a indicator in estuaries for the 2015 report card (2013-14 data repeated from the previous year's 2014 pilot report card). *Contaminants in the O'Connell estuary are taken from the basin score (thus in the 2014 pilot report card this was 2013-14 data).

Estuary	2015 report card (repeat of revised pilot)	
	ms-PAF (% species affected)	Chl-a
Gregory	16	100
O'Connell	7*	
St Helens/Murray	10	100
Vines	1	100
Sandy	28	100
Plane	7	100
Rocky Dam	24	100
Carmila	5	100

***ms-PAF (% species affected)**: ■ = very good (1.0%), ■ = good (1.01 – 5.0%), ■ = moderate (5.01 – 10.0%), ■ = poor (10.01 – 20.0%), ■ = very poor (≥ 20.0%)*
***Chl-a:** ■ = very good (≥ 80% met GV, assigned 100), ■ = good (≥ 50-80% met GV, assigned 100), ■ = moderate (66.7 – <100), ■ = poor (33.4 – 66. 7), ■ = very poor (0 – 33.3)*

The results highlighted that, like in the freshwater basins, contaminants are a key concern in the region's estuarine waters, particularly for the Sandy Creek and Rocky Dam Creek estuaries. This reflects the substantial proportion of land under sugarcane production (Sandy Creek 50% and Rocky Dam Creek 24%; Folkers et al. 2014) in both of the sub-catchments where these estuaries are located.

After aggregating the water quality indicators, the final water quality index for estuaries for the 2015 report card all achieved scores of 'Moderate' (Table 22). Again, below average rainfall in the region is likely linked to the overall scores, particularly the good scores achieved in the phys-chem category.

Table 22. Results for water quality indicator categories and index in estuaries for the 2015 report card (2013-14 data repeated from the previous year's 2014 pilot report card). *Contaminants in the O'Connell was taken from the 2013-14 basin score, so is not a repeat from the pilot; this means there is a difference in the overall score for water quality for the pilot (presented in parenthesis).

Estuary	2015 report card (repeat of revised pilot)				
	Phys-chem	Nutrients	Contaminants	Chl-a	Water quality
Gregory	100	100	45	100	**86**
O'Connell	80	100	81*		**87 (*93)**
St Helens/Murray	100	92	69	100	**90**
Vines	100	83	100	100	**96**
Sandy	100	67	30	100	**74**
Plane	100	98	88	100	**96**
Rocky Dam	100	85	32	100	**79**
Carmila	100	99	100	100	**99**

***Standardised scoring range**: ■ = very good (assigned 100), ■ = good (assigned 100), ■ = moderate (66.7 – <100), ■ = poor (33.4 – 66. 7), ■ = very poor (0 – 33.3)*

Until there have been a number of report cards produced, there is no ability to demonstrate trends in results, thus caution should be used when interpreting the cause of results and/or cause and direction of changes in results.

Consideration should also be given to confidence in the results (Table 23). Confidence in representativeness is higher in the estuaries compared to freshwater because while temporal sampling is consistent, there are multiple sampling sites (2 – 5 sites) per estuary (except for the O'Connell estuary, where sampling only occurs at one site, resulting in lower confidence), which improves spatial representativeness. Confidence in the contaminants results was given a rank of two for all estuaries, with confidence expected to improve as the methodology and analysis of ms-PAF calculations expected to progress in subsequent years.

Table 23. Confidence associated with the water quality indicators in the 2015 report card. For some indicators, the confidence of the result for the O'Connell estuary (in parenthesis) was different to the other seven estuaries. Unless indicated confidence in results is the same across all other estuaries.

Water quality category	Maturity of methodology	Validation	Represent ativeness	Directness	Measured error	Final	Rank out of 5
Phys-chem	1.5	3	2(1)	3	1	10.5 (9.5)	**4 (3)**
Nutrients	1.5	3	2(1)	3	1	10.5 (9.5)	**4 (3)**
Chl-a	1.5	3	2(1)	3	1	10.5 (9.5)	**4 (3)**
Contaminants	0.5	2	1	2	1	6.5	**2**

3.2. Habitat and hydrology

Fish barrier density was 'Very Poor' in the Rocky Dam estuary, indicating that, on average, there could be a barrier every 2 km of stream. In comparison, fish barrier density in the Gregory estuary was 'Very Good' with a barrier on average every 34 kms of stream (Table 24). With no barriers in the estuary, Carmila estuary scored 'Very Good' condition for all fish barrier indicators. The condition of

the Gregory, O'Connell and Vines estuaries was 'Good' when considering the proportion of stream to the first barrier, with ≥85% of the total stream length in the estuary connected above the estuary mouth (Table 24).

When considering the proportion of stream to the first low passability barrier, many estuaries scored 'Very Good' because they had no low passability barriers in the estuary. Only Plane Creek estuary scored 'Poor' for this indicator (Table 24). For the full report on fish barriers in the Mackay-Whitsunday region see Moore 2016.

Table 24. Results for fish barrier indicators in estuaries for the 2015 report card (2014-16 data with no assessment in the pilot for comparison). Indicators assessed on Stream Order (SO) ≥3 or ≥4 where relevant, as indicated.

Estuary	2015 report card		
	Barrier density (km per barrier on SO ≥3)	% stream to the 1st barrier (SO ≥3)	% Stream to the 1st low passability barrier (SO ≥4)
Gregory	35	96	97
O'Connell	5	85	no low pass barriers
St Helens/Murray	4	65	83
Vines	13	96	no low pass barriers
Sandy	3	44	90
Plane	2	48	76
Rocky Dam	5	74	no low pass barriers
Carmila	no barriers	no barriers	no low pass barriers

Barrier density (km): ■ *= very good (≥ 16.1),* ■ *= good (8.1 – 16),* ■ *= moderate (4.1 – 8),* ■ *= poor (2.1 – 4),* ■ *= very poor (≥0 – 2)*
Stream to 1st barrier (%): ■ *= very good (100),* ■ *= good (80 – 99.9),* ■ *= moderate (60 – 79),* ■ *= poor (40 – 59.9),* ■ *= very poor (0 – 39.9)*
Stream to 1st low passability barrier (%): ■ *= very good (100),* ■ *= good (90.1 – 99.9),* ■ *= moderate (80.1 – 90),* ■ *= poor (60.1 – 80),* ■ *= very poor (0 – 60)*

The results for the riparian extent and 'mangrove and saltmarsh extent' are presented in Table 25. These results are the same as that presented in the 2014 pilot report card because they are derived from the same 2013-14 data. This is because the reporting frequency for both indicators is only once every four years; reflecting the gradual nature of change associated with the indicators. These indicators will be reported on again with new data in the 2017 report card (for the 2016/17 year, released in 2018). The O'Connell and Sandy Creek estuaries remained of greatest concern when considering riparian loss. Vines Creek was the only estuary that scored poorly for mangrove and saltmarsh loss, however this likely reflects its urbanised location in the city of Mackay.

Table 25. Results for riparian extent and mangrove and saltmarsh extent in estuaries for the 2015 report card (2013-14 data repeated from the previous year's 2014 pilot report card).

Estuary	2015 report card (repeat of revised pilot)	
	Riparian extent (% loss)	Mangrove & saltmarsh extent (% loss)
Gregory	4	3
O'Connell	62	3
St Helens/Murray	26	1
Vines	18	12
Sandy	39	6
Plane	17	2
Rocky Dam	4	5
Carmila	0	3

Riparian extent (% loss): ■ = *very good (<5%),* ■ = *good (*5.0 – 15.0%*),* ■ = *moderate (*15.01 – 25.0%*),* ■ = *poor (*25.01 – 35.0%*),* ■ = *very poor (>* 35%*)*
Mangrove and saltmarsh extent (% loss): ■ = *very good (<2%),* ■ = *good (*2.0 – 5.0%*),* ■ = *moderate (*5.01 – 10.0%*),* ■ = *poor (*10.01 – 20.0%*),* ■ = *very poor (>* 20%*)*

The final habitat and hydrology index scores for estuaries highlighted that the Gregory, Carmila and Rocky Dam estuaries were in the best condition in 2015, while Sandy Creek estuary was in the worst condition (Table 26). The fish barrier indicator scores are the cause for any differences between the 2015 and pilot report card scores as this was the only data that is not a repeat from the pilot report card. In future report cards the inclusion of the flow indicator should increase our understanding of habitat and hydrology in estuaries throughout the region.

Table 26. Results for habitat and hydrology indicator categories and index in estuaries for the 2015 report card (2014-15 data) in comparison to scores reported in the previous year's 2014 pilot report card (2013-14 data). *Riparian extent and mangrove extent data are repeat 2013-14 pilot data.

Estuary	2015 report card					Pilot report card (revised)
	Riparian extent*	Mangrove & Saltmarsh extent*	Flow	Fish barriers	Habitat and hydrology	Habitat and hydrology
Gregory	100	100		100	**100**	**100**
O'Connell	20	100		100	**73**	**60**
St Helens/Murray	65	100		67	**77**	**82**
Vines	90	60		100	**83**	**75**
Sandy	31	94		67	**64**	**63**
Plane	93	100		33	**75**	**97**
Rocky Dam	100	100		100	**100**	**100**
Carmila	100	100		100	**100**	**100**

Standardised scoring range: ■ = *very good (assigned 100),* ■ = *good (assigned 100),* ■ = *moderate (66.7 – <100),* ■ = *poor (33.4 – 66. 7),* ■ = *very poor (0 – 33.3)*

The confidence in the results of the three habitat and hydrology indicators in the reported estuaries for the 2015 report card are presented in Table 27. The fish barrier methodology is a relatively new methodology which lowers the confidence score in the 'maturity of methodology' category. Continued refinement and review of the methodology undertaken to obtain the fish barrier results, as well as increased ground-truthing improves overall confidence in the results.

Table 27. Confidence associated with habitat and hydrology indicator results in the 2015 report card. Confidence in results is the same across all estuaries.

Habitat and hydrology indicators	Maturity of methodology	Validation	Representativeness	Directness	Measured error	Score	Rank out of 5
Fish barriers	0.5	2	3	2	1	8.5	**3**
Riparian extent	1	2	2	1	2	8	**2**
Mangrove & saltmarsh extent	1	2	2	1	2	8	**2**

4. Marine ecosystem condition

The final marine scores, aggregated from the indices, 'water quality' and 'coral' and 'seagrass' (where relevant) are provided in Table 28. The Whitsunday and Central zones each scored a 'C'. This appears as an improvement in both zones that scored a 'D' in the 2014 pilot report card. While it is well understood that rainfall is strongly linked to water quality, drawing conclusions on the cause and direction of trends in the inshore marine zone datasets as a whole should be treated with caution. In subsequent years more data may assist in demonstrating trends in the results, which can facilitate a better understanding of the cause and direction of trends in the datasets. Increased representativeness in sampling also improves confidence.

Table 28. Results for indices and overall scores in marine zones reported in the 2015 report card (2014-15 data) in comparison to indicators and index scores reported in the previous year's pilot report card (2013-14 data). Black cells indicate this index does not contribute to reporting in that zone.

	2015 report card						Pilot report card (revised)					
Zone	Water quality	Coral	Seagrass	Fish	Final score		Water quality	Coral	Seagrass	Fish	Final score	
Northern			21		21	D	40				40	D
Whitsunday	73	58	16		49	C	37	56	24		39	D
Central	54		49		52	C			26		26	D
Southern												
Offshore	94	49			71	B	95	39			67	B

***Standardised scoring range**: ■ = very good (81 – 100), ■ = good (61 – 80), ■ = moderate (41 – 60), ■ = poor (21 – 40), ■ = very poor (0 – 20)*

4.1. Water quality

The condition of the water quality in the inshore marine zones for the 2015 report card are presented in Table 29. The indicator category score is calculated from annual means at the site level and indicators are aggregated per site to produce indicator category scores. Nutrients scores are calculated by aggregating NOx, PP and PN; 'Water clarity' scores are calculated by aggregating Secchi depth and TSS (turbidity was not included as it is not measured across all zones). The Whitsunday zone was 'Good' across all indicators, compared to the previous year which scored 'Poor' to 'Very Poor' for the same indicators. However, caution should be used when interpreting these scores due to low temporal representativeness; confidence is discussed further below.

The Central zone had 'Poor' water clarity and 'Moderate' nutrients and Chl-a scores (Table 29). This is the first time the full suite of water quality indicators have been reported for this zone in the Mackay-Whitsunday report card.

The offshore zone retained a 'Very Good' score (Table 29). However this score is based on remote sensing data from the GBR report card, the methodology of which is currently under review.

Annual indicator averages at a site level and corresponding indicator scores can be seen in Appendix A. The distribution of this data can be found in Appendix A.

Table 29. Results for water quality indicator categories in marine zones reported in the 2015 report card (2014-15 data) compared to the previous year's pilot report card results (2013-14 data). Presented as scaled scores; black cells indicate the indicator does not contribute to reporting in that zone. *Offshore sediment is TSS.

	2015 report card			Pilot report card (revised)		
Water quality	**Nutrients**	**Chl-a**	**Water clarity**	**Nutrients**	**Chl-a**	**Water clarity**
Northern				3	3	**55**
Whitsunday	71	66	**63**	25	24	**9**
Central	57	55	**36**			
Southern						
Offshore		96	**92***		97	**92***

***Standardised scoring range**: ■ = very good (81 – 100), ■ = good (61 – 80), ■ = moderate (41 – 60), ■ = poor (21 – 40), ■ = very poor (0 – 20)*

Based on passive sampler data (collected as part of the Marine Monitoring Program (MMP), see Development of Methods for the Mackay-Whitsunday Report Card 2015: Environmental Indicators document[1]), condition of contaminants in the Central zone were 'Good', the same as in the previous year. Grab sample data (collected as part of the Ports program, see Development of Methods for the Mackay-Whitsunday Report Card 2015: Environmental Indicators document) validated this assessment. Based on passive sampler data only, condition of contaminants in the Whitsunday zone scored 'Very Good' for the second year in a row (Table 30). The distribution of data for passive and grab samples can be found in Appendix A.

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

Table 30. Results for contaminants indicators in inshore marine zones reported in the 2015 report card (2014-15 data) compared to the previous year's pilot report card results (2013-14 data).

Contaminants sampling approach					2015 report card				Pilot report card (revised)
Zone	**Sample**	**Program**	**Site/s**	**Value obtained**	**PSII-HEq**	**PSII-HEq reported**	**Index score**	**Standardised score^**	**PSII-HEq reported**
Northern	Grab	Ports	14 sites (3 wet season samples)	Median					**0.19**
Whitsunday	Passive	MMP	Outer Whitsunday	max	**3.90**	4	5	**93**	**4.9**
Central	Passive	MMP	Sarina	max	36	36	4	**68**	**34**
	Passive	MMP	Repulse Bay	max	34				
	Passive	MMP	Round Flat	max	2.2				
	Passive	MMP	Sandy Creek	max	70				
	Grab	Ports	12 sites (1 wet season sample)	median	1.79	Used for validation only			
				max	11.8	Used for validation only			
Southern									

PSII-HEq scoring range: ■ = *very good* (≤ 10), ■ = *good* (< 10 to ≤ 50), ■ = *moderate* (< 50 to ≤ 250), ■ = *poor* (< 250 to ≤ 900), ■ = *very poor (>900)*

^Standardised scoring range: ■ = *very good (81 – 100)*, ■ = *good (61 – 80)*, ■ = *moderate (41 – 60)*, ■ = *poor (21 – 40)*, ■ = *very poor (0 – 20)*

The final water quality index for inshore marine zones, based on aggregated indicator scores for the 2015 report card, are in Table 31. The Whitsunday zone water quality index scored 'Good' compared to 'Poor' in the previous year's report card. The low rainfall year and the low temporal representativeness are both likely linked to this change in score.

Table 31. Results for water quality index in inshore and offshore marine zones reported in the 2015 report card (2014-15 data) compared to the previous year's pilot report card results (2013-14 data). *Offshore sediment is TSS.

	2015 report card					Pilot report card (revised)				
Water quality	**Nutrients**	**Chl-a**	**Water clarity**	**Contaminants**	**Water quality**	**Nutrients**	**Chl-a**	**Water clarity**	**Contaminants**	**Water quality**
Northern						3	3	55	100	**40**
Whitsunday	71	66	63	93	**73**	25	24	9	91	**37**
Central	57	55	36	68	**54**				69	
Southern										
Offshore	**NA**	96	92*		**94**	**NA**	97	92*		**95**

Standardised scoring range: ■ = *very good (81 – 100)*, ■ = *good (61 – 80)*, ■ = *moderate (41 – 60)*, ■ = *poor (21 – 40)*, ■ = *very poor (0 – 20)*

Confidence scores for the water quality indicator are presented in (Table 32). Confidence in Offshore marine water quality indicators was lower than in the inshore zones due to the use of remote sensing methodology, which remains under review.

Confidence in inshore marine water quality indicator results differed between the Whitsunday and Central marine inshore zones for the 2015 report card. Whilst the methodology used to determine water quality (grab samples for water clarity, chl-*a* and nutrients indicator categories) is accepted by

the scientific community and is directly linked to the reported indicator, caution is warranted due to low confidence in how spatially and temporally representative the sample is.

For the Whitsunday zone, the data was derived from grab samples taken at four sites at just two points in time over the 2015 report card reporting period (2014-15). In comparison, confidence is higher in the Central inshore marine zone because data comes from 12 sites sampled at three points in time over the same period. Thus, the higher number of samples increases confidence that the rest of the reporting zone or time period is represented by the samples.

Adding to this, water quality data for the marine inshore zones comes from two programs: the Marine Monitoring Program in the Whitsunday inshore marine zone and the Port of Mackay and Hay Point ambient marine water quality monitoring program in the Central inshore marine zone. There are many challenges in combining data from different programs; different program aims mean methodologies for data collection do not always match. As a result, the data set used to report on water quality must be constrained to the data that is directly comparable between programs. Thus, only grab sample data could be used to assess water quality as this was the only consistent data between programs. A review is anticipated for the 2016-17 period to examine how to use more of the available data from these monitoring programs, which would improve confidence in the results.

Following the decision rule for when confidence in indicator results differs between two reporting zones, the final confidence score assigned for the indictor was the minimum score between the two (Whitsunday zone).

Table 32. Confidence associated with the water quality indicators in the inshore and offshore marine zones for the 2015 report card. Inshore and offshore confidence were assessed separately due to different methods used to determine condition. Inshore water quality confidence scores differed between the Whitsunday and Central zones with the score for the Central zone in parentheses.

Marine zone	Maturity of methodology	Validation	Representativeness	Directness	Measured error	Total	Rank out of 5
Nutrients inshore	0.5 (1.5)	3	1 (2)	3	2 (3)	9.5 (12.5)	**3 (5)**
Chl-a inshore	0.5 (1.5)	3	1 (2)	3	2 (3)	9.5 (12.5)	**3 (5)**
Water clarity inshore	0.5 (1.5)	3	1 (2)	3	2 (3)	9.5 (12.5)	**3 (5)**
Contaminants inshore	1	2	1	2	1	7	**2**
Total Suspended Solids Offshore	1	1	2	1	1	6	**1**
Chl-a Offshore	1	1	2	1	1	6	**1**

4.2. Coral

The condition of the coral indicators in the inshore marine zones for the 2015 report card are presented in Table 33. The Whitsunday zone coral remained in 'Moderate' condition. Coral cover and Juvenile cover in the Central zone were also in 'Moderate' condition, however, due to the applied minimum data decision rule there was not enough information to provide an overall coral index score for the Central zone.

Coral in the offshore zone changed from 'Poor' in 2014 to 'Moderate' in 2015. This was linked to the increase in amount of juvenile corals, from 'Good' to 'Very Good' over that period.

Table 33. Results for coral indicators in inshore and offshore marine zones reported in the 2015 report card (2014-15 data) compared to the previous year's pilot report card (2013-14 data). Black cells indicate this indicator does not contribute to reporting in that zone. *Composition indicator is new for the 2015 report card and the pilot coral report has been back-calculated to include this new indicator.

Marine zone	2015 report card						Pilot report card (revised)					
	Cover	Macro algae	Juvenile	Change	Composition*	Coral index	Cover	Macro algae	Juvenile	Change	Composition*	Coral index
Northern												
Whitsunday	64	74	60	40	53	**58**	61	74	61	39	44	**56**
Central	42		39									
Southern												
Offshore	28	31	88			**49**	25	22	69			**39**

***Standardised scoring range**: ■ = very good (81 – 100), ■ = good (61 – 80), ■ = moderate (41 – 60), ■ = poor (21 – 40), ■ = very poor (0 – 20)*

Confidence scores for the coral indicator results are presented in Table 34. Confidence in coral indicators reported in the Whitsunday and Central marine inshore zones, the only inshore zones that reported coral condition for the 2015 report card, were the same despite different programs (MMP and Ports monitoring) contributing to the coral data across the two zones. For offshore coral, confidence in results differed between indicators with confidence in results for the 'juvenile' indicator lower than for 'cover' and 'macroalgae' indicator results. The approach to analysis of coral data to produce indicator scores is under review for the offshore zone and may change in subsequent years so that analysis better aligns with the inshore zones. Confidence in offshore coral results may increase after this review.

Table 34. Confidence associated with the coral indicators in the inshore and offshore marine zones for the 2015 report card. Confidence in results is the same across inshore zones where data were available (Whitsunday and Central zones).

Coral indicators	Maturity of methodology	Validation	Representativeness	Directness	Measured error	Final	Rank out of 5
Cover Inshore	1.5	3	2	3	2	11.5	**4**
Change Inshore	1.5	3	2	3	2	11.5	**4**
Juvenile Inshore	1.5	3	2	3	2	11.5	**4**
Macroalgae Inshore	1.5	3	2	3	2	11.5	**4**
Composition Inshore	1.5	3	2	3	2	11.5	**4**
Cover Offshore	1.5	3	1	3	3	11.5	**4**
Macroalgae Offshore	1.5	3	1	3	3	11.5	**4**
Juvenile Offshore	1	2	1	3	2	9.5	**3**

4.3. Seagrass

Condition of seagrass indicators measured by the MMP and QPSMP across measured sites is presented in Table 35. When condition was aggregated from overall site/meadow scores, the Whitsunday zone scored 'Very Poor' fore the 2015 report card, compared to 'Poor' in 2014; the Central zone scored 'Moderate' in 2015, instead of 'Poor' in 2014 (Table 36). These changes in scores are linked to the increase in our understanding of seagrass condition between the 2014 pilot report card and 2015 report card. The 2015 report card now includes QPSMP data in the Northern and Central inshore marine zones for the first time and also includes two more MMP sites in the Whitsunday and Central inshore marine zones that were not assessed for the 2014 pilot report card.

This year in the Whitsunday zone, the MMP assessed seagrass at Pioneer Bay, Hamilton Island and Hydeaway Bay (Table 35). Hydeaway Bay is a Seagrass-Watch location that contributes data to MMP seagrass condition reporting, however it was not sampled in the reporting period for the 2014 pilot report card. The inclusion of this location in the 2015 report card resulted in the condition of seagrass in the Whitsunday zone being scored 'Very Poor', instead of 'Poor'. Similar to other locations, monitoring undertaken by MMP demonstrated that seagrass at Hydeaway Bay declined between 2009 and 2013 as a consequence of multiple years of above average rainfall and extreme weather events; resulting in localised landslip events that can cause acute sedimentation and light attenuation (L. McKenzie pers. comm. 2016). The 'Very Poor' condition of seagrass in Hydeaway Bay is likely the result of lagged recovery due to the dominance of persistent, slower growing species which are expected to improve in condition over the next one to two years (L. McKenzie pers. comm. 2016).

At the Hamilton Island site (in the Whitsunday zone), despite seagrass abundance remaining 'Very Poor' there was an improvement in the score between 2014 and 2015 report cards. This reflects the findings of McKenzie et al. (2016) who noted an overall increase in abundance (and reproductive effort) scores for the Mackay-Whitsunday region.

Similar to the Whitsunday inshore marine zone, there was an increase in the number of sites assessed in the Central inshore marine zone: seagrass was assessed at Sarina Inlet, Midge Point and Hay Point (Table 35). In the 2014 pilot report card, the seagrass condition score was derived only from assessments in Sarina Inlet. Without the addition of Midge Point (MMP location) and Hay Point (QPSMP site), the Central zone would have scored 'Poor' for the 2015 report card (matching the 2014 pilot report card score) instead of 'Moderate'.

This means that the change in seagrass scores observed in the Whitsunday and Central inshore marine zones between the 2014 and 2015 report card are driven primarily from an increase in spatial representation across the zones, leading to an improvement in our overall understanding of the indicator.

The overall seagrass index score for the Northern zone was 'Poor' despite each of the indicators that contribute to this score achieving a 'Moderate' score (Table 36). This is because seagrass index scores are calculated from the mean of site scores, not the mean of indicator scores. The calculation

of site scores depends on the monitoring program associated with the site, such that site scores associated with the QPSMP are assigned the minimum indicator condition at the site while sites associated with the MMP are assigned a score based on the mean of indicator condition scores at the site.

Table 35. Results for seagrass indicators, based on data collected by the Marine Monitoring Program (MMP) and the Queensland Ports Seagrass Monitoring Program (QPSMP), and final seagrass index score in inshore marine zones reported in the 2015 report card (2014-15 data). Black cells indicate this indicator does not contribute to reporting in that zone.

						MMP			QPSMP				
Zone	**Habitat**	**Depth**	**Program**	**Location/Meadow**	**Meadow/ site**	**Abundance**	**Reproductive effort**	**Nutrient status**	**Biomass**	**Area**	**Species Composition**	**Overall site/meadow score^**	**Overall zone score^**
Northern	coastal subtidal	inshore	Ports	Abbot Pt.	API3	NA	NA	NA	88	57	35	35	21
					API5	NA	NA	NA	0	0	NP	0	
					ABI7	NA	NA	NA	95	75	59	59	
					ABI8	NA	NA	NA	0	0	NP	0	
					ABI9	NA	NA	NA	96	95	0	0	
		deep	Ports		ABD1	NA	NA	NA	0	NA	NP	0	
					ABD2	NA	NA	NA	53	NA	99	53	
					ABD3	NA	NA	NA	35	NA	78	35	
					ABD4	NA	NA	NA	4	NA	77	4	
Whitsunday	reef intertidal	intertidal	MMP	Hydeaway Bay	HB1	0			NA	NA	NA	0	16
					HB2	0			NA	NA	NA	0	
		intertidal	MMP	Hamilton Is.	HM1	0	0	7	NA	NA	NA	2	
					HM2	12	50	45	NA	NA	NA	36	
	coastal intertidal	intertidal	MMP	Pioneer Bay	PI2	17	25	38	NA	NA	NA	27	
					PI3	50	25	13	NA	NA	NA	29	
Central	coastal intertidal	intertidal	MMP	Midge Point	MP2	100			NA	NA	NA	100	49
					MP3	100		61	NA	NA	NA	81	
	estuarine intertidal	intertidal	MMP	Sarina Inlet	SI1	12	50	30	NA	NA	NA	31	
					SI2	12	50	31	NA	NA	NA	31	
	coastal subtidal	deep	Ports	Hay Point	HPD1	NA	NA	NA	4		100	4	
Southern													

***Standardised scoring range^ and MMP scoring range**: ■ = very good (81 – 100), ■ = good (61 – 80), ■ = moderate (41 – 60), ■ = poor (21 – 40), ■ = very poor (0 – 20)*
***QPSMP scoring range**: ■ = very good (≥85 – 100), ■ = good (≥65 – <85), ■ = moderate (≥50 – <65), ■ = poor (≥25 – <50), ■ = very poor (0 – <25)*

Table 36. Results for seagrass indicators for each zone, based on data collected by the Marine Monitoring Program (MMP) or the Queensland Ports Seagrass Monitoring Program (QPSMP), and final seagrass index score for inshore marine zones reported in the 2015 report card (2014-15 data) in comparison to indicators and index scores reported in the previous year's pilot report card (2013-14 data). Black cells indicate this indicator does not contribute to reporting in that zone.

Zone	2015 report card							Pilot report card (revised MMP)			
	Abundance	Reproductive effort	Nutrient status	Biomass	Area	Sp. Composition	Seagrass Index	Abundance	Reproductive effort	Nutrient status	Seagrass Index
Program	*MMP*			*QPSMP*				*MMP*			
Northern				41	45	58	**21**				
Whitsunday	13	25	26				**16**	17	25	27	**23**
Central	56	50	40	4		100	**49**	13	25	39	**26**
South											

***Standardised scoring range**: ■ = very good (81 – 100), ■ = good (61 – 80), ■ = moderate (41 – 60), ■ = poor (21 – 40), ■ = very poor (0 – 20)*

Confidence scores for the seagrass indicator results in the reported marine zones are presented in Table 37. Confidence in different attributes of indicator results differed between indicators. This was due to the different methods employed by the two seagrass monitoring programs. The final confidence score assigned for the indictor was the same despite these differences. The approach to integrating the data from the MMP and QPSMP is likely to be reviewed for the 2016 report card with the view of moving towards fully integrating the data, such that indicators and scoring is consistent across all zones in the future.

Table 37. Confidence associated with the seagrass indicators in the reported in the 2015 report card. Confidence is the same across inshore marine zones.

Seagrass indicator	Maturity of methodology	Validation	Representativeness	Directness	Measured error	Final	Rank out of 5
Abundance	1.5	3	2	3	2	11.5	**4**
Reproductive effort	1.5	3	2	3	2	11.5	**4**
Nutrient status	1.5	3	2	3	2	11.5	**4**
Biomass	1.5	3	1	3	2	10.5	**4**
Area	1.5	3	1	3	2	10.5	**4**
Sp. Composition	1	3	1	3	2	10	**4**

5. Stewardship

5.1. Agricultural industries

Stewardship assessments from the agricultural sectors of sugarcane, horticulture and grazing use the same data and structure for reporting as the GBR report card[1]. 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.

In subsequent years the Mackay–Whitsunday report card intends to transition towards reporting progress towards targets. Currently the Healthy Rivers to Reef Partnership have not agreed to targets for any of the environmental indicators or for stewardship. The targets currently reported in the GBR report card act as a broad guide to progress in the Mackay-Whitsunday region. According to these, there is still a long way to go to meet GBR report card targets for best management practice in the sugarcane, horticulture and grazing industries.

5.1.1. Sugarcane

The stewardship results for the sugarcane industry presented in the 2015 report card are the results from the Mackay-Whitsunday NRM region only (the Don basin is excluded). The percentage of sugarcane land under best management practice for sediment is 41%, nutrients 21%, and pesticides 41% (Table 38). These results are similar to the pilot report card results in the previous year (Figure 4). The lowest risk and moderate to low risk categories are deemed to be the "best management practice".

Table 38. Percentage of sugarcane land under best management practice for each management tactic associated with pesticides, nutrients and sediment. The weighting that each tactic contributes to the overall management for pesticides, nutrients or sediment is shown.

Management area	Tactic	Weighting	Area at Best Practice (%)	Overall (%)
Nutrients	Rate	0.6	22	21
	Timing	0.3	22	
	Placement	0.1	70	
Sediment	Trash Cover	0.3	84	41
	Fallow	0.25	13	
	Tillage	0.2	19	
	CTF	0.25	55	
Pesticides	Targeting	0.4	39	41
	Timing	0.4	10	
	Ratoons	0.2	42	

[1] http://www.reefplan.qld.gov.au/measuring-success/report-cards/2015/

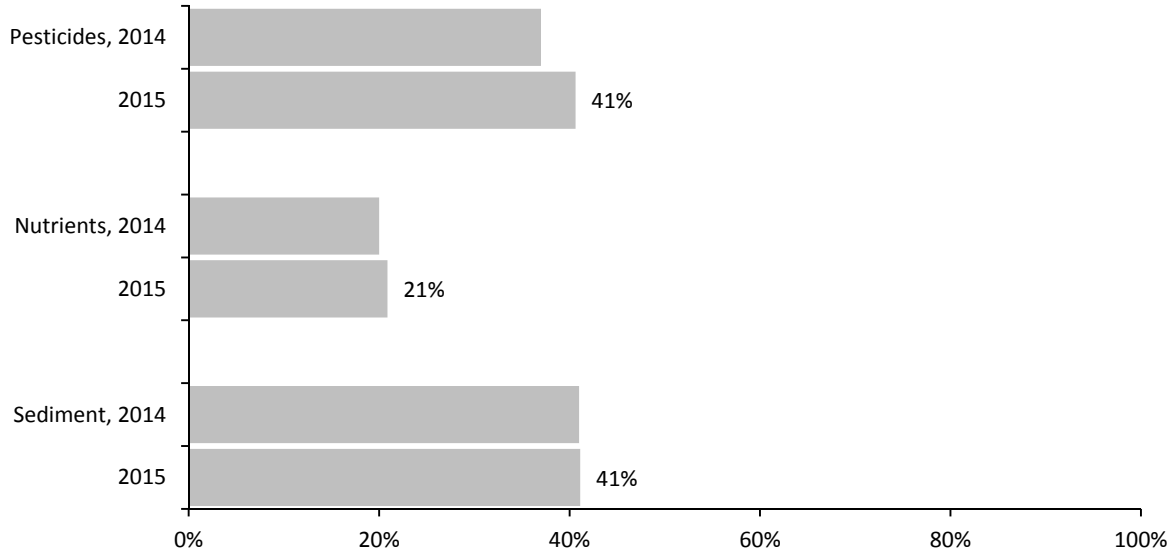

Figure 4. Land in the sugarcane industry under best practice management for the 2015 report card.

5.1.2. Horticulture

The results for horticulture presented in the 2015 report card, are the stewardship results from the horticultural growers in the Don Basin only, for the 2014-15 reporting year (Table 39 and Figure 5). 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.

The lowest risk and moderate to low risk categories are deemed to be the "best management practice". The percentage of horticultural land under best management practice for sediment is 64%, pesticides 47%, nutrients 10%, and irrigation is 8%.

Table 39. Results for horticulture management practices within the Don basin for the 2015 report card (2014-15 data) compared to the previous year's pilot report card (2013-14 data).

Management Area	2015 report card				Pilot report card (revised)			
	Lowest Risk	Moderate-Low Risk	Moderate-High Risk	High Risk	Lowest Risk	Moderate-Low Risk	Moderate-High Risk	High Risk
Sediment	9	55	36	0	9	55	36	0
Pesticides	15	33	53	0	15	33	53	0
Nutrients	2	8	81	9	2	8	81	9
Irrigation	4	4	90	2	4	4	90	2

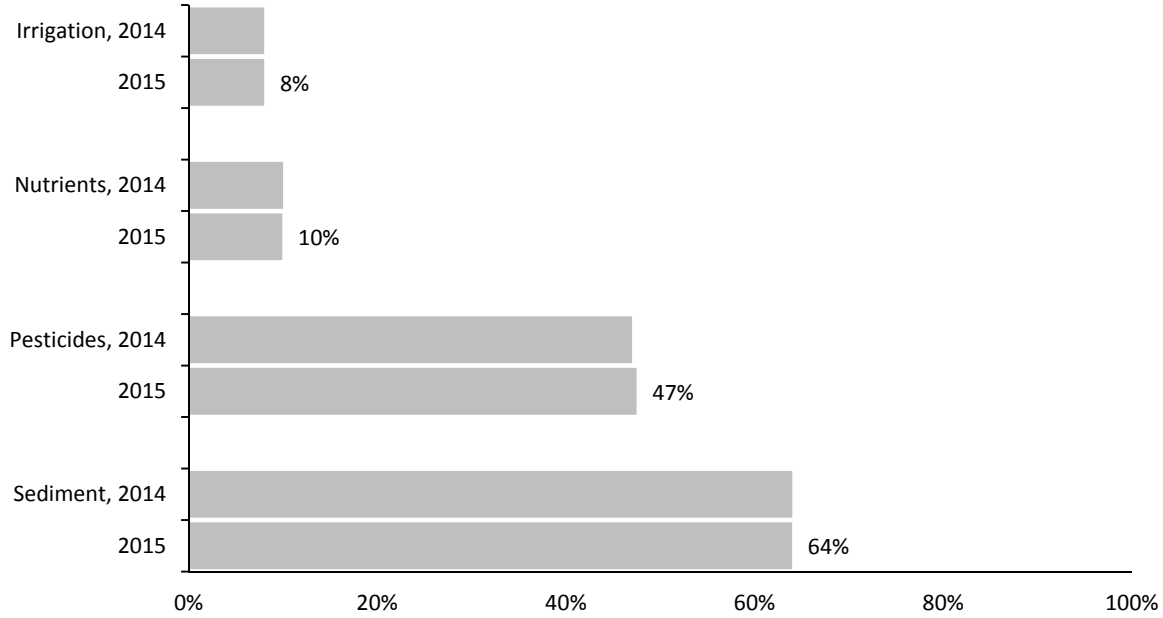

Figure 5. Land in the horticultural industry under best practice management for the2015 report card.

5.1.3. Grazing

The management practice levels within the grazing industry in terms of the percentage of grazing land under each of the four classified management practice levels for each of the three main erosion process is presented in Table 40. The percentage of land under these management practice levels is similar between the 2014 and 2015 report card results (Figure 6). The lowest risk and moderate to low risk categories are deemed to be the "best management practice". The percentage of grazing land under best management practice for erosion in pastures (hillslope erosion) is 21%, streambanks 46%, and gullies is 28%.

Table 40. Results for grazing management practices associated with three main erosion processes within Plane, Pioneer, O'Connell, Proserpine and Bowen areas for the 2015 report card (2014-15 data) compared to the previous year's pilot report card (2013-14 data).

Management Area	2015 report card				Pilot report card				
	Low Risk	Moderate Risk	Mod-High Risk	High Risk	Lowest Risk	Moderate-Low Risk	Moderate-High Risk	High Risk	N/A
Pastures/hillslope (area)	3	18	32	47	2	14	36	48	0
Streambank (km)	22	24	31	23	19	19	22	16	25
Gully (area)	0	28	37	34	0	27	37	35	0

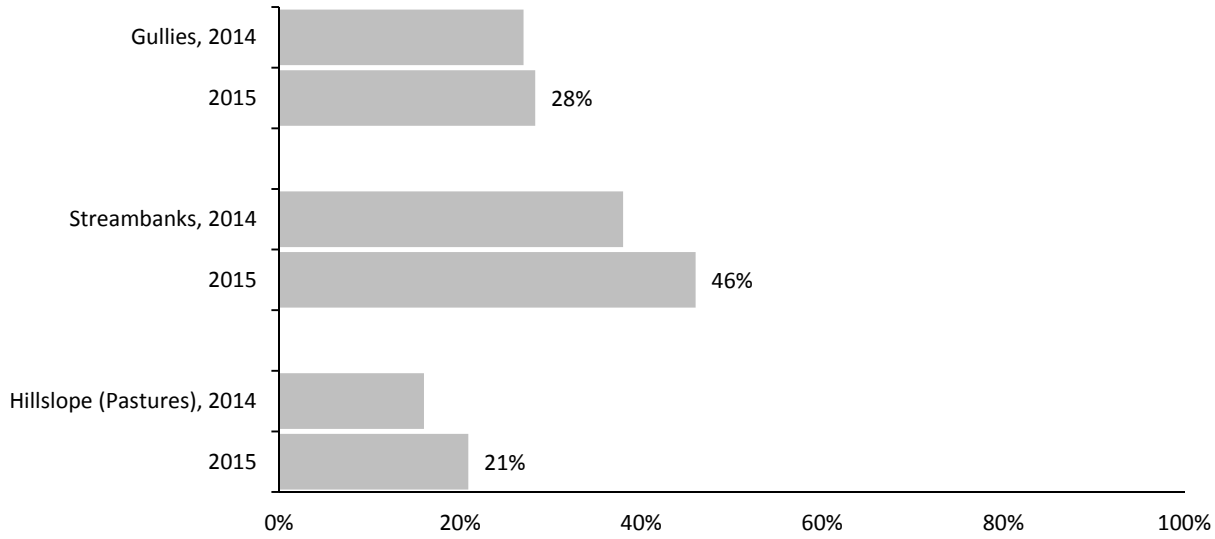

Figure 6. Land in the grazing industry under best practice management for the 2015 report card.

Confidence associated with agricultural stewardship reporting is presented in Table 41. This reflects the representativeness of the results, which only report management improvement reported through the Australian Government's Reef Programme.

Table 41. Confidence associated with agricultural stewardship reporting for the 2015 report card.

Management effectiveness	Maturity of methodology	Validation	Representativeness	Directness	Measured error	Final	Rank out of 5
Stewardship	0.5	2	2	2	1	7.5	**2**

5.2. Non-agricultural industries

The full report for the non-agricultural industries stewardship assessments in the Mackay-Whitsunday report can be found in Eco Logical Austral (2016) (see Appendix B for the full report). Below is a summary of the results provided in the Mackay-Whitsunday Stewardship Assessment – 2015-16 report. A full review of the methodologies and scoring of non-agricultural stewardship is intended prior to the release of the next report card.

5.2.1. Aquaculture

The overall result for aquaculture stewardship in the Mackay-Whitsunday region was very effective for the 2015-16 FY (Figure 7).

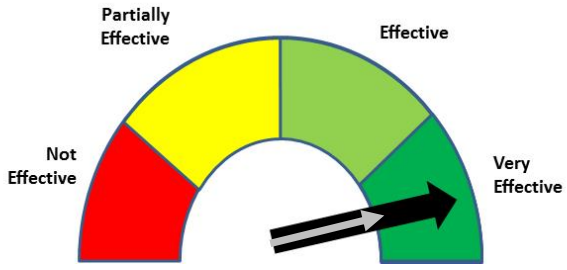

Figure 7. Result of the stewardship assessment for 2015 report card (2015-16 data) in the aquaculture industry, compared to the previous year's pilot report card aquaculture result (2014-15 data; grey arrow).

This was consistent across the administration, development and operations themes. Seven of the nine scores were in the very effective range (Table 42). Regulatory requirements for new or expanded developments involve a nil net discharge of nutrients. This requirement is above and beyond that of comparable industries (e.g. agriculture) or land uses (e.g. urban) in the region. Seven compliance inspections by DAF of aquaculture facilities in the region, to check biosecurity compliance and adherence with farm approval conditions, achieved a compliance rate of 100% (Eco Logical Australia and Adaptive Strategies, 2016).

The aquaculture industry works closely with other organisations to achieve a very effective stewardship rating. The prawn and barramundi farming industries are working closely with MBD Energy and James Cook University to develop and implement techniques for the removal of nutrients from wastewater using marine algae. A pilot water treatment facility has been in operation at a prawn farm with excellent results. The prawn farming industry has strong collaborative links with CSIRO and other research partners to develop more efficient farming practices, feed inputs and wastewater treatment. While the aquaculture industry's stewardship is already very effective, challenges in developing a robust data set on compliance with approvals under the Environmental Protection Act 1994 needs to be addressed in future years (Eco Logical Australia and Adaptive Strategies, 2016).

Table 42. Breakdown of aquaculture stewardship ratings for the 2015 report card (2015-16 data) compared to the previous year's pilot report card (2014-15 data).

Activity group	2015 report card			Pilot report card (revised)		
	Planning	Implementation	Outcome	Planning	Implementation	Outcome
Administration	3.6 (effective)	3.8 (very effective)	3.6 (effective)	3.6 (effective)	3.8 (very effective)	3.6 (effective)
Operations	3.8 (very effective)	4.0 (very effective)	4.0 (very effective)	3.8 (very effective)	4.0 (very effective)	4.0 (very effective)
Development	4.0 (very effective)	4.0 (very effective)	3.8 (very effective)	4.0 (very effective)	4.0 (very effective)	3.8 (very effective)
Grand Total	**3.8 (very effective)**	**3.9 (very effective)**	**3.8 (very effective)**	**3.8 (very effective)**	**3.9 (very effective)**	**3.8 (very effective)**

Scale: >3.75 very effective, 3.00 – 3.75 effective, 2.00 – 3.00 partially effective, <2.00 – ineffective

5.2.2. Heavy industry

The overall result for heavy industry stewardship in the Mackay-Whitsunday region was effective for the 2015 report card (Figure 8).

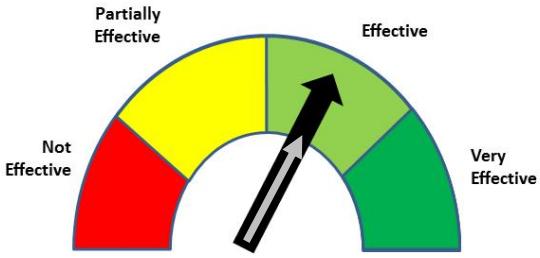

Figure 8. Result of the stewardship assessment for 2015 report card (2015-16 data) in heavy industry, compared to the previous year's pilot report card heavy industry result (2014-15 data; grey arrow).

This was consistent across the administration and operations themes, with the development theme scoring very effective (Table 43). A key element in achieving the effective rating was the extra non-regulatory activities that companies undertake to deliver positive environmental outcomes. Innovation and a commitment to reduce and reuse waste products was evident, particularly in the sugar and meat processing industries. Examples included the use of treated effluent to irrigate a turf farm, and the use of cane waste to produce electricity and ethanol for addition to fuel. Such practices demonstrate successful approaches to managing threats to the GBR from nutrients and climate change in a commercially viable manner (Eco Logical Australia and Adaptive Strategies, 2016).

Environmental management staff have a high awareness of environmental regulations and their responsibilities to implement management systems to reduce environmental impacts. Heavy industry terminal operators contribute to a range of environmental programs, working in partnership with the port authority. A compliance rate of 100% was achieved from 13 inspections of heavy industry sites by DEHP officers (Eco Logical Australia and Adaptive Strategies, 2016).

The level of participation in research and extension activities related to ecosystem health varied among companies. There was a high variability in responses from companies on community engagement activities. Some companies undertake extensive consultation programs, while others don't have any. This may reflect the high diversity of the business activities within the heavy industry category, and associated variability in the approach taken within their respective markets. While all companies had an Environmental Management System in place, only two had the system accredited to ISO14001 standards (Eco Logical Australia and Adaptive Strategies, 2016).

Table 43. Breakdown of heavy industry stewardship ratings for the 2015 report card (2015-16 data) compared to the previous year's pilot report card (2014-15 data).

Activity group	2015 report card			Pilot report card (revised)		
	Planning	Implementation	Outcome	Planning	Implementation	Outcome
Administration	3.2 (effective)	3.6 (effective)	3.2 (effective)	3.2 (effective)	3.6 (very effective)	3.3 (effective)
Operations	3.5 (effective)	4.0 (very effective)	3.8 (very effective)	3.5 (effective)	2.8 (partially effective)	3.7 (effective)
Development	4.0 (very effective)	4.0 (very effective)	4.0 (very effective)	4.0 (very effective)	4.0 (very effective)	4.0 (effective)
Grand Total	**3.5 (effective)**	**3.8 (very effective)**	**3.6 (effective)**	**3.5 (effective)**	**3.3 (effective)**	**3.5 (effective)**

Scale: >3.75 very effective, 3.00 – 3.75 effective, 2.00 – 3.00 partially effective, <2.00 – ineffective

5.2.3. Tourism

The overall result for tourism stewardship in the Mackay-Whitsunday region was effective for the 2015-16 FY (Figure 9).

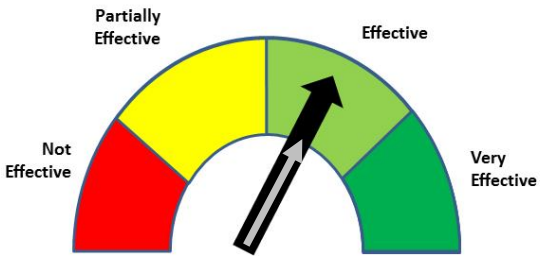

Figure 9. Result of the stewardship assessment for the 2015 report card (2015-16 data) in tourism compared to the previous year's pilot report card tourism result (2014-15 data; grey arrow).

Approximately 45 per cent of tourists visiting the Great Barrier Reef participating in activities in the Mackay-Whitsunday region. The commercial marine tourism industry of the region is comprised of a number of operations and activities, including reef cruises and boat tours, organised diving and snorkelling, boat charters, air charters and water based sports. The industry is closely regulated, primarily in relation to access and operations within the Marine Park and National Park islands. The focus for the 2015 report card was on an assessment of the industry as a whole (rather than the

averaged results of individual companies) due to a low survey response rate (Eco Logical Australia and Adaptive Strategies, 2016).

The results are based on an assessment of four of the six activity groups contained in the framework. Implementation is a notable strong point of the industry with planning and outcomes also assessed as effective (Table 44).

There is high participation in recognised environmental industry accreditation programs. In the region 32 tourist operations participate in the ECO Certification program. For certification, operators must demonstrate a strong, well-managed commitment to sustainable practice. Of certified operators, 14 hold Advanced Ecotourism certification. There is a high (>90%) participation in industry associations with codes of practice and auditing and participation in extension and research projects is moderate to high, particularly "Eye on the Reef' and crown of thorns control programs (Eco Logical Australia and Adaptive Strategies, 2016).

The system of marine park permits is comprehensive and compliance rates are very high. Few environmental incidents or serious non-compliance matters were reported in the 2015-16 period. Training programs for tourism are available through local TAFE and applied within the industry (Eco Logical Australia and Adaptive Strategies, 2016).

A close collaboration with tourism industry associations and Great Barrier Reef Marine Park Authority (GBRMPA) to obtain relevant regionally specific data would greatly enhance the rigor and application of the tourism framework. Industry associations may be able to assist in increasing the operator response rate to the survey. In future years, publically available data should be supplemented with the results of GBRMPA permit compliance data by region. Compliance reporting on tourism permits issued by GBRMPA in the previous financial year is not publicly available until early October in the following year. This creates a timing issue for data collection for assessment (Eco Logical Australia and Adaptive Strategies, 2016).

Table 44. Breakdown of tourism stewardship ratings for the 2015 report card (2015-16 data) compared to the previous year's pilot report card (2014-15 data).

Activity	2015 report card			Pilot report card (revised)		
	Planning	Implementation	Outcome	Planning	Implementation	Outcome
Operations	-	-	-	-	-	-
Infrastructure development	-	-	-	-	-	-
Compliance	Effective	Effective	Effective	Effective	Very effective	Effective
Scheme participation	Effective	Very effective	Effective	Effective	Effective	Effective
Training and awareness	Effective	Very effective	Effective	Effective	Very effective	Effective
Extension programs	Effective	Effective	Effective	Effective	Effective	Effective
Overall	**Effective**	**Effective**	**Effective**	**Effective**	**Effective**	**Effective**

5.2.4. Ports

The overall result for port stewardship in the Mackay-Whitsunday region was at the higher end of effective for the 2015-16 FY (Figure 10).

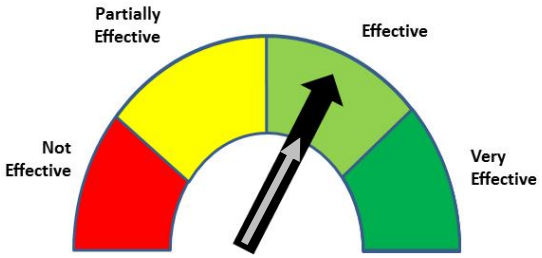

Figure 10. Result of the stewardship assessment for the 2015 report card (2015-16 data) ports result compared to the previous year's pilot report card ports result (2014-15 data; grey arrow).

This was consistent across the administration, operations and shipping themes, with the development theme scoring very effective (Table 45).The port authority employs highly qualified and experienced staff to manage ecosystem health and water quality and a comprehensive environmental management system is in place and is certified to ISO14001 standards. There is a high level of community engagement by the port authority on environmental issues, with significant contributions to the environmental initiatives of port industry representative bodies. Ambient marine monitoring programs for seagrass, water quality and inshore rocky reefs are in place for extended areas around the three ports. The results of monitoring should assist in providing a comprehensive baseline for reference during Industry Summary Report 2015-16 FY Healthy Rivers to Reef Partnership Mackay-Whitsunday future dredging programs. These programs are above and beyond what is required by regulation (Eco Logical Australia and Adaptive Strategies, 2016). There was no dredging activity during the reporting period and a compliance rate of 100% was achieved from a single inspection of port sites by officers from the Queensland Department of Environment and Heritage Protection (DEHP) (Eco Logical Australia and Adaptive Strategies, 2016).

The port authority employs highly qualified and experienced staff to manage ecosystem health and water quality and a comprehensive environmental management system is in place and is certified to ISO14001 standards. There is a high level of community engagement by the port authority on environmental issues, with significant contributions to the environmental initiatives of port industry representative bodies. Ambient marine monitoring programs for seagrass, water quality and inshore rocky reefs are in place for extended areas around the three ports. The results of monitoring should assist in providing a comprehensive baseline for reference during Industry Summary Report 2015-16 FY Healthy Rivers to Reef Partnership Mackay-Whitsunday future dredging programs. These programs are above and beyond what is required by regulation (Eco Logical Australia and Adaptive Strategies, 2016).

Table 45. Breakdown of port stewardship ratings for the 2015 report card (2015-16 data) compared to the previous year's pilot report card (2014-15 data).

Activity group	2015 report card			Pilot report card (revised)		
	Planning	Implementation	Outcome	Planning	Implementation	Outcome
Administration	3.6 (effective)	3.8 (very effective)	3.4 (effective)	3.6 (effective)	3.8 (very effective)	3.4 (effective)
Operations	4.0 (very effective)	4.0 (very effective)	3.0 (effective)	4.0 (very effective)	4.0 (very effective)	3.0 (effective)
Development	4.0 (very effective)	4.0 (very effective)	4.0 (very effective)	4.0 (very effective)	4.0 (very effective)	4.0 (very effective)
Shipping	3.8 (very effective)	3.5 (effective)	3.7 (effective)			
Grand Total	**3.8 (very effective)**	**3.8 (very effective)**	**3.5 (effective)**	**3.9 (very effective)**	**3.9 (very effective)**	**3.5 (effective)**

Scale: >3.75 very effective, 3.00 – 3.75 effective, 2.00 – 3.00 partially effective, <2.00 – ineffective

5.2.5. Urban

The overall result for urban stewardship in the Mackay-Whitsunday region was partially effective for the 2015-16 FY (Figure 11). This was not consistent across all activity groups and management themes, with the development activity group and the planning and outcome management themes assessed as effective (Table 46).

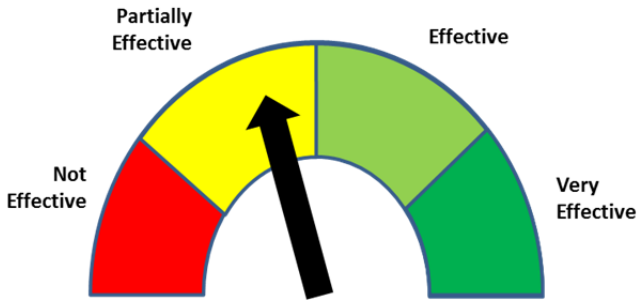

Figure 11. Result of the stewardship assessment for 2015 report card (2015-16 data) in the urban sector (this sector was not assessed in the pilot so there is no comparison to pilot results).

Urban development within the Mackay-Whitsunday region is concentrated along the coastal zone and urban land uses occur predominantly within cities such as Mackay and large regional centres. Mackay, Whitsunday and Isaac Regional Councils are long-term partners of the Reef Guardian Program, which showcases environmentally sustainable practices in the Great Barrier Reef catchment. This level of participation reflects a long-term commitment to protect and conserve the health and resilience of the Reef (Eco Logical Australia and Adaptive Strategies, 2016).

There was a high degree of awareness within companies and Councils of environmental management practices related to the improvement of water quality and Reef health. Typical

investments included the formation of a stormwater quality working group, capital investments in sewage treatment plant upgrades, creek rehabilitation projects, participation in best management practice programs for agriculture and public education about stormwater quality. There was a high degree of community engagement in environmental management practices affecting urban environments. Commitment to these programs was generally long-term and resulted in successful outcomes (Eco Logical Australia and Adaptive Strategies, 2016).

The level of commitment to and investment in environmental management practices varied significantly among stakeholders. A pattern of declining stewardship with distance inland from the coast and away from major regional centres was evident. A compliance rate of 67% was achieved from 58 inspections of urban sites by DEHP officers. This compliance rate is in the partially effective range. Non-compliances were most commonly related to a breach of approval conditions or a release to the environment (Eco Logical Australia and Adaptive Strategies, 2016).

Table 46. Breakdown of urban stewardship ratings for the 2015 report card (2015-16 data; this sector was not assessed in the pilot so there is no comparison to pilot results).

Activity group	Management theme (2015 report card)		
	Planning	Implementation	Outcome
Administration	3.0 (effective)	3.0 (effective)	2.8 (partially effective)
Operations	3.2 (effective)	2.0 (partially effective)	3.4 (effective)
Development	3.2 (effective)	3.2 (effective)	3.0 (effective)
Grand Total	**3.1 (effective)**	**2.7 (partially effective)**	**3.1 (effective)**

Scale: >3.75 very effective, 3.00 – 3.75 effective, 2.00 – 3.00 partially effective, <2.00 – ineffective

Confidence associated with stewardship in non-agricultural industries is presented in Table 47. The assessment relies heavily on self-assessment via questionnaires and is in its early stages of development. A review of the assessment process is anticipated prior to the 2016 report card, which should lead to improvements in methodology and thus confidence.

Table 47. Confidence associated with non-agricultural industry stewardship reporting for the 2015 report card.

Management effectiveness	Maturity of methodology	Validation	Representativeness	Directness	Measured error	Final	Rank out of 5
Stewardship	0.5	2	3	1	1	7.5	**2**

6. Cultural Heritage

The cultural heritage indicators assessment of the Mackay-Whitsunday region was conducted by the Traditional Owner Reference Group comprising Gia, Ngaro, Juru, Yuwibara, Koinmerburra and Barada/Wiri Traditional Owners in conjunction with Terra Rosa Consulting for the Mackay-Whitsunday Healthy Rivers to Reef Partnership. The full report for this work was produced by Terra Rosa Consulting and can be requested by contacting the Healthy Rivers to Reef Partnership. An Executive Summary is available on the Partnership's website[1]

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:

1. St Helens Beach;
2. Hook Island, Whitsunday Island and South Molle Island;
3. Cape Hillsborough including Andrews Point, Wedge island, Finlayson Point and Haliday Bay;
4. Cape Palmerston; and
5. The Mackay Region.

To arrive at an 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.

The final condition scores for the three zones assessed in 2015 report card for the indigenous cultural heritage indicator are presented in (Table 48). 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 DATSIP records which hampered the ability of the project to evaluate the areas in detail. As a result, the final report card score for the cultural heritage health of the Mackay-Whitsunday region for 2016 is: **2.48 (D)**.

Table 48. Final scores attributed to each zone as part of the 2015 report card cultural heritage health assessment of the Mackay-Whitsunday region.

Zone	Zone name	Score (1 – 5)	Grade
1	St Helens Beach	1.1	E
2	Hook Island, Whitsunday Island and South Molle Island	3.7	B
3	Cape Hillsborough	2.6	C
4	Cape Palmerston	NA	NA
5	Mackay Region	NA	NA

Cultural heritage scoring range: *■ = A (4.51 – 5), ■ = B (3.51 – 4.5), ■ = C (2.51 – 3.5), ■ = D (1.51 – 2.5), ■ = E (1 – 1.5)*

[1] http://healthyriverstoreef.org.au/wp-content/uploads/2016/09/HR2RP-Ex-sum.pdf

Further analysis in the second year of the program of areas with better preservation conditions and management may enhance this score, as would the development of further frameworks to investigate and manage the sites that exist within the region.

Confidence was lower in the Hook Island, Whitsunday and South Molle Island zone due to lower representativeness. Specifically this meant that for this zone only four sites out of a potential 69 sites were assessed in this zone. The confidence in the scoring for the cultural heritage assessments can be seen in Table 49.

Table 49. Confidence associated with the cultural heritage indicators in the three zones for the 2015 report card. Confidence scores differed between zones, with the score for the Hook Island, Whitsunday and South Molle Island zone in parentheses.

Cultural heritage indicator	Maturity of methodology	Validation	Represent-ativeness	Directness	Measured error	Final	Rank out of 5
Spiritual/social values	1	2	3 (1)	2	1	9 (7)	**3 (2)**
Scientific value of sites	1	2	3 (1)	2	1	9 (7)	**3 (2)**
Physical condition of sites	1	2	3 (1)	2	1	9 (7)	**3 (2)**
Protection of sites and zones	1	2	3 (1)	2	1	9 (7)	**3 (2)**
Land use within zones	1	2	3 (1)	2	1	9 (7)	**3 (2)**
Cultural maintenance of sites and zones	1	2	3 (1)	2	1	9 (7)	**3 (2)**

7. References

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

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Appendix A

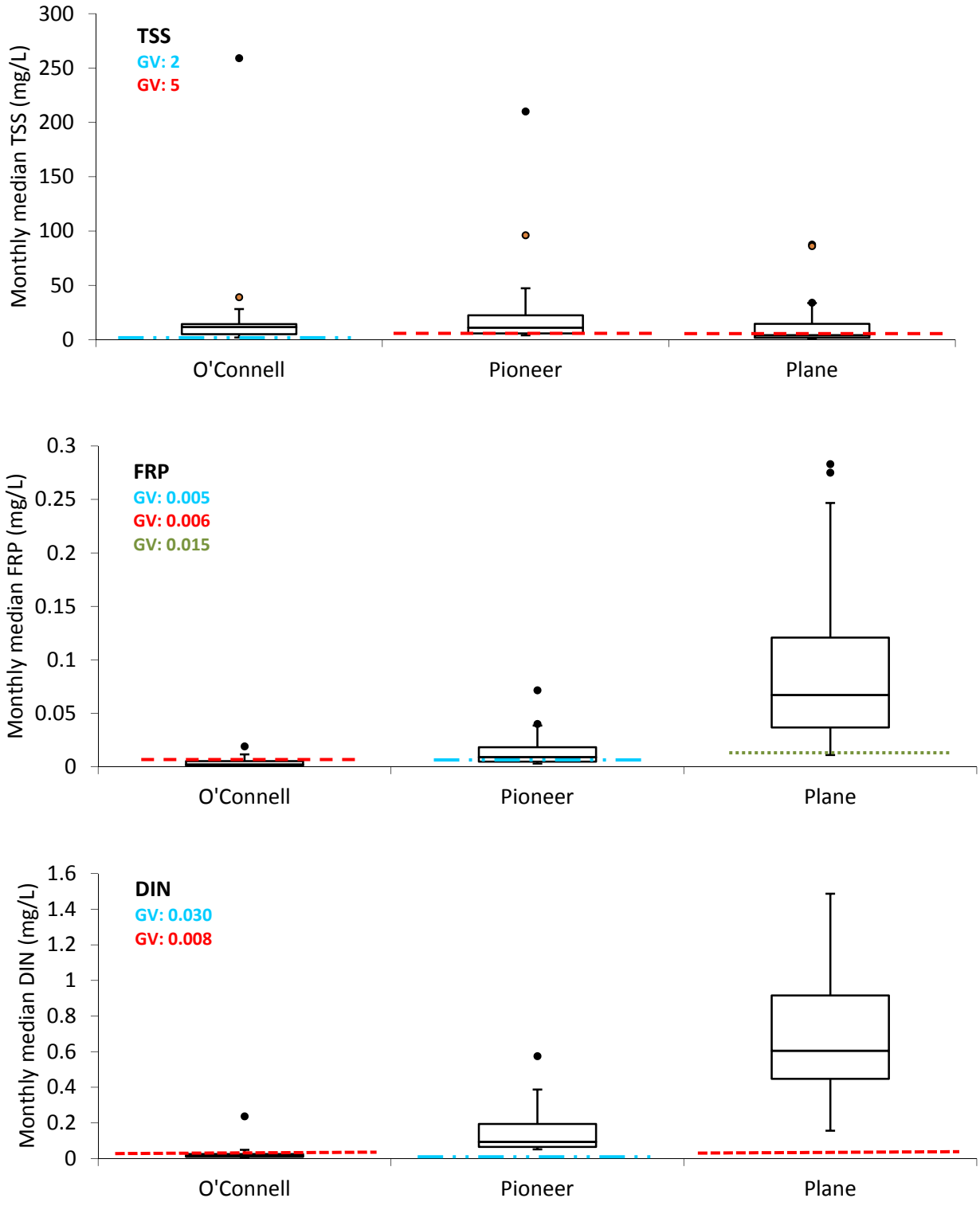

Figure A1. Box and whiskers plot of monthly median concentrations of DIN, FRP and TSS in the O'Connell, Pioneer and Plane basins, with guideline values (GV) for each basin indicated. To achieve a 'Good' or better the median must be below the GV.

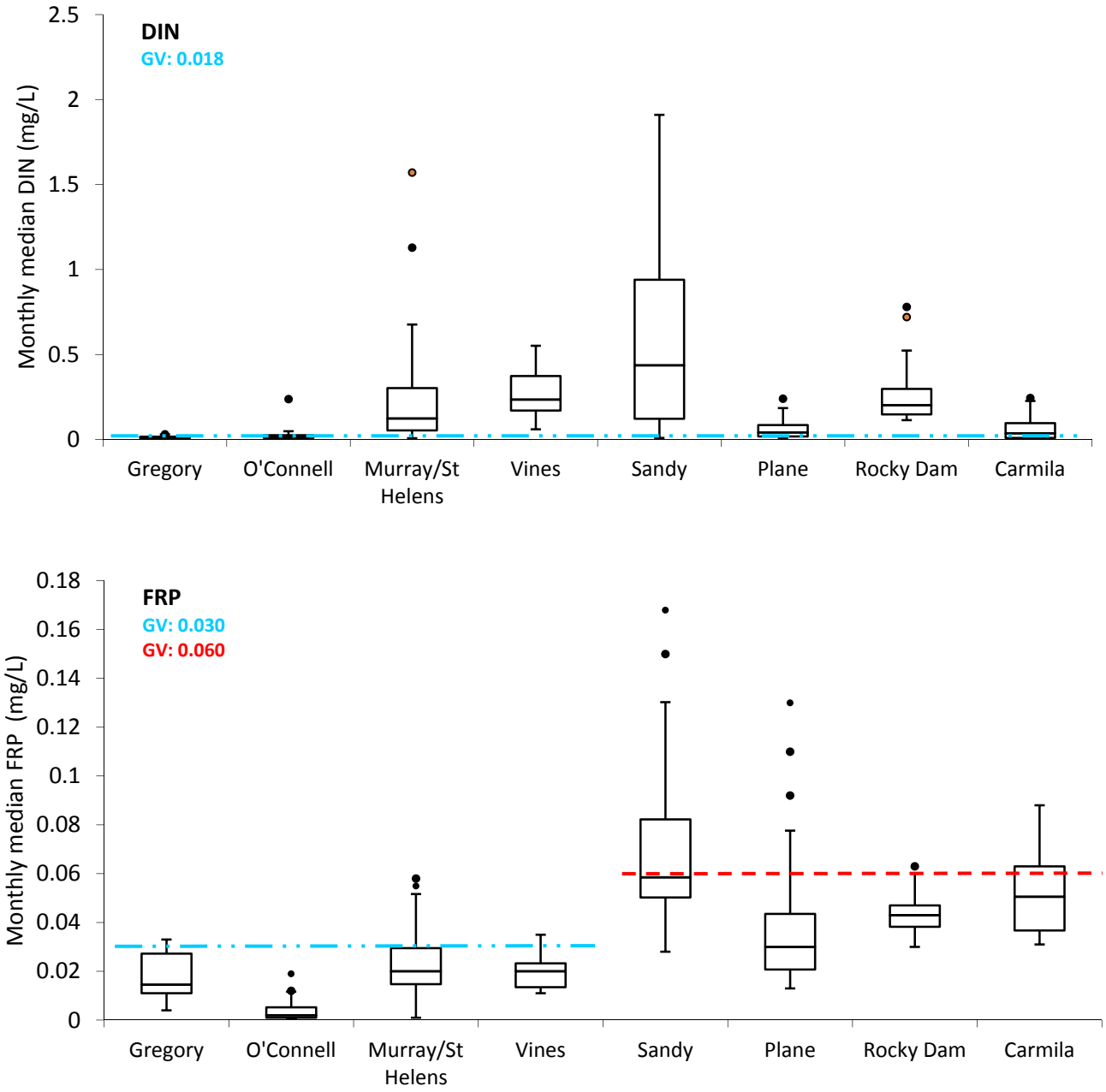

Figure A2. Box and whiskers plot of monthly median concentrations of DIN and FRP in the eight estuaries, with guideline values (GV) for each estuary indicated. To achieve a 'Good' or better the median must be below the GV.

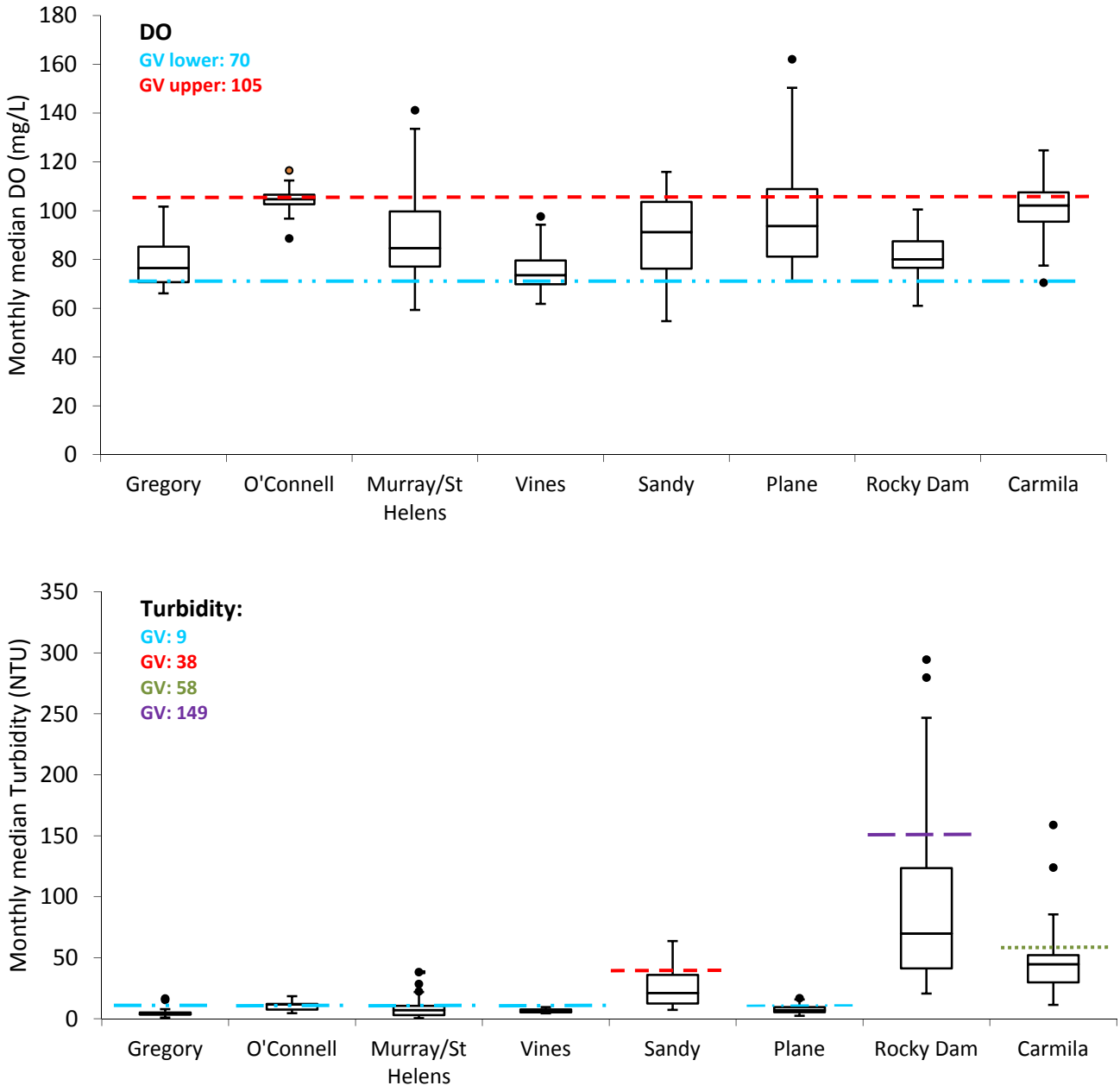

Figure A3. Box and whiskers plot of monthly median concentrations of DO and Turbidity in the eight estuaries, with guideline values (GV) for each estuary indicated. To achieve a 'Good' or better the median must be below the GV.

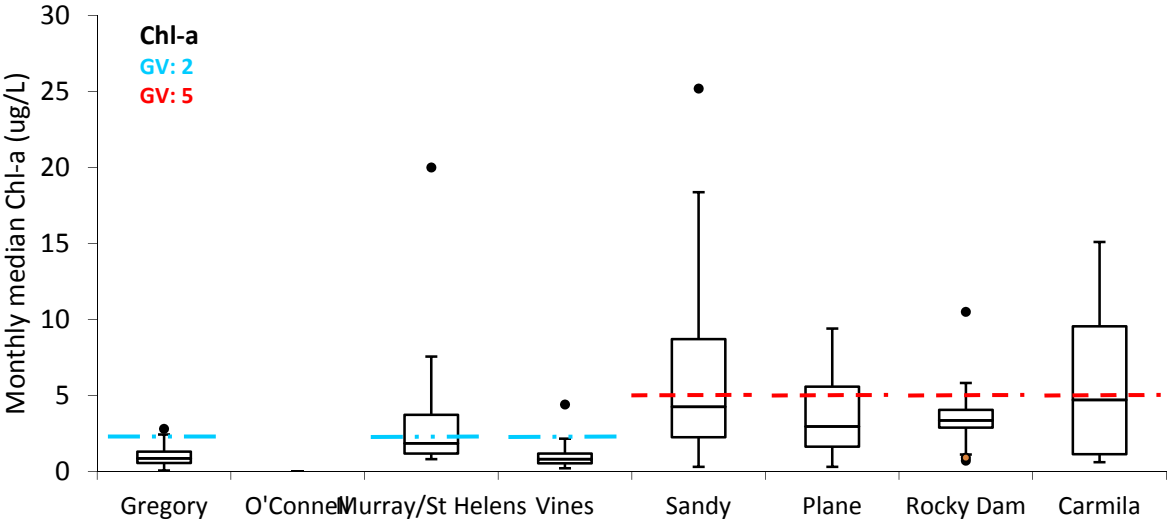

Figure A4. Box and whiskers plot of monthly median concentrations of Chl-a in the eight estuaries, with guideline values (GV) for each estuary indicated. To achieve a 'Good' or better the median must be below the GV.

Table A1. Average of measurements taken in 2014-15 for inshore marine indicators for each site in the inshore marine zones (before the formula for scoring is applied).

Row Labels	Zone	Average TSS (mg/l)	Average Secchi depth (m)	Average Chl-a (ug/l)	Average PP (ug/l)	Average PN (ug/l)	Average NOx (ug/l)	Average Turbidity (NTU)
Daydream/West Molle Island	Whitsunday	1.41	7.25	0.43	2.34	19.51	1.56	
Double Cone Island	Whitsunday	0.67	7.25	0.29	3.01	21.45	1.78	
Pine Island	Whitsunday	1.07	6.25	0.47	2.34	32.45	2.04	
Seaforth Island	Whitsunday	1.30	5.00	0.50	1.94	13.66	3.11	
Repulse Islands dive mooring	Central	9.72	1.50	1.20	3.64	34.10	2.08	
Site 1	Central	4.30	3.70	0.89	3.33	35.00	6.33	39.60
Site2	Central	2.40	13.33	0.47	3.00	17.00	6.67	5.17
Site 3	Central	2.73	6.80	0.22	1.00	10.33	4.00	2.37
Site 4	Central	2.43	10.00	0.37	3.00	28.33	3.67	0.07
Site 5	Central	1.70	6.87	0.41	1.33	17.33	4.67	10.23
Site 6	Central	3.10	14.33	0.48	1.33	27.67	4.00	1.00
Site 7	Central	2.20	16.00	0.76	2.33	32.67	6.33	0.00
Site 8	Central	1.53	6.50	0.09	1.00	7.33	6.00	3.00
Site 9	Central	1.83	4.90	0.26	0.67	15.67	3.33	7.57
Site 10	Central	2.50	4.07	1.12	1.67	30.67	4.00	53.97
Site 11	Central	3.20	6.18	1.55	2.33	38.00	9.67	47.73
Site 12	Central	8.90	3.64	0.36	1.67	19.67	3.33	52.17

Table A2. Scores for inshore marine indicators measured in 2014-15 at each site (based on annual site averages).

Row Labels	Zone	Score for TSS	Score for Secchi depth	Score for Chl-a	Score for PP	Score for PN	Score for NOx	Score for Turbidity
Daydream/West Molle Island	Whitsunday	0.51	-0.46	0.06	0.26	0.04	0.95	
Double Cone Island	Whitsunday	1.00	-0.46	0.64	-0.11	-0.10	0.76	
Pine Island	Whitsunday	0.91	-0.68	-0.06	0.26	-0.70	0.56	
Seaforth Island	Whitsunday	0.63	-1.00	-0.15	0.53	0.55	-0.05	
Repulse Islands dive mooring	Central	-1.00	-1.00	-1.00	-0.38	-0.77	0.53	
Site 1	Central	-1.00	-1.00	-0.99	-0.25	-0.81	-1.00	-1.00
Site2	Central	-0.26	0.42	-0.05	-0.10	0.23	-1.00	-1.00
Site 3	Central	-0.45	-0.56	1.00	1.00	0.95	-0.42	-1.00
Site 4	Central	-0.28	0.00	0.27	-0.10	-0.50	-0.29	1.00
Site 5	Central	0.23	-0.54	0.12	1.00	0.21	-0.64	-1.00
Site 6	Central	-0.63	0.52	-0.09	1.00	-0.47	-0.42	0.00
Site 7	Central	-0.14	0.68	-0.76	0.26	-0.71	-1.00	1.00
Site 8	Central	0.38	-0.62	1.00	1.00	1.00	-1.00	-1.00
Site 9	Central	0.13	-1.00	0.79	1.00	0.35	-0.15	-1.00
Site 10	Central	-0.32	-1.00	-1.00	0.75	-0.62	-0.42	-1.00
Site 11	Central	-0.68	-0.69	-1.00	0.26	-0.93	-1.00	-1.00
Site 12	Central	-1.00	-1.00	0.31	0.75	0.02	-0.15	-1.00

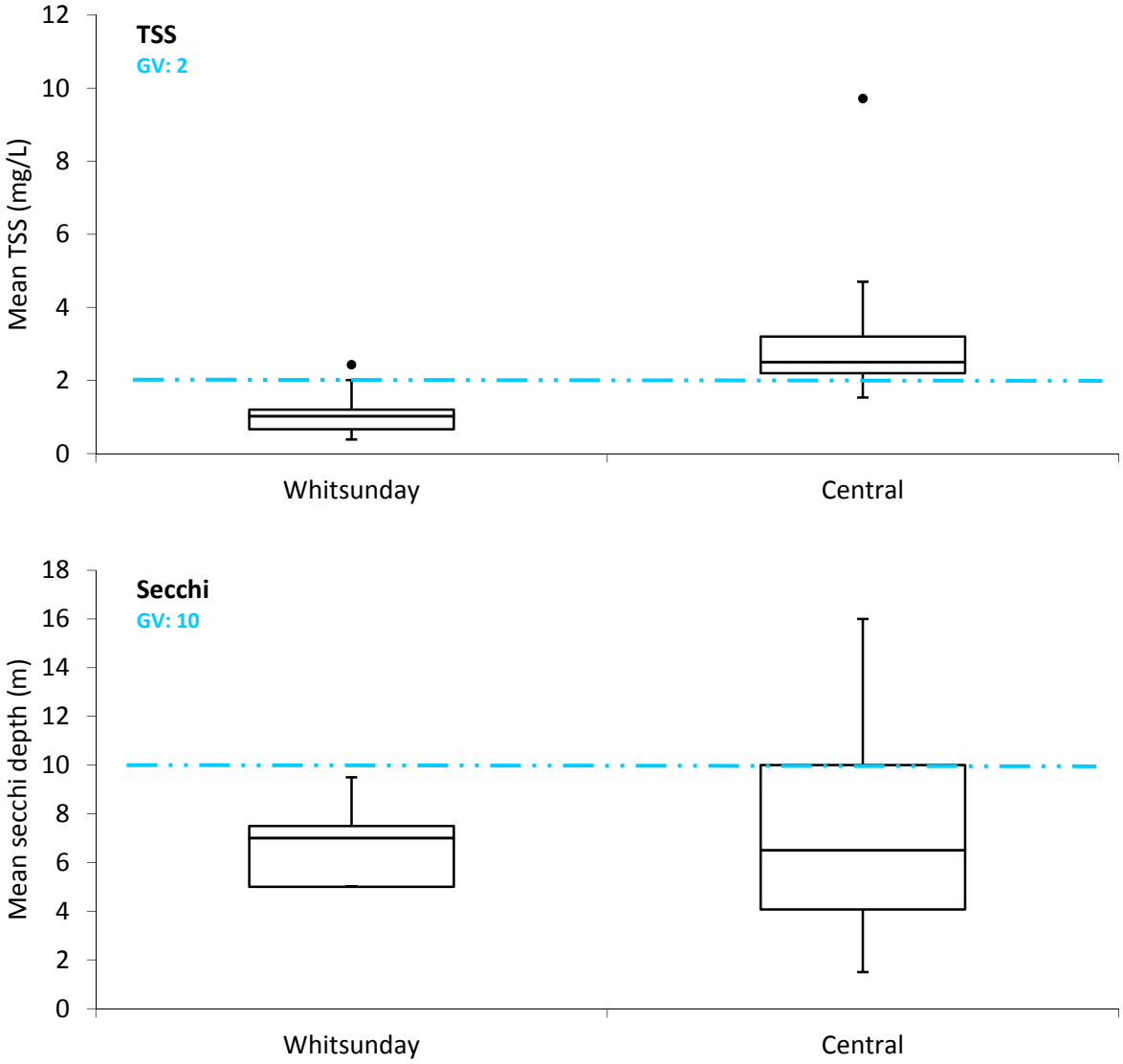

Figure A5. Box and whiskers plot of annual site means of TSS and secchi depth in the Whitsunday and Central inshore marine zones, with guideline values (GV) indicated. For TSS, to achieve a 'Good' or better the median must be below the GV. For secchi depth, to achieve a 'Good' or better the median must be above the GV.

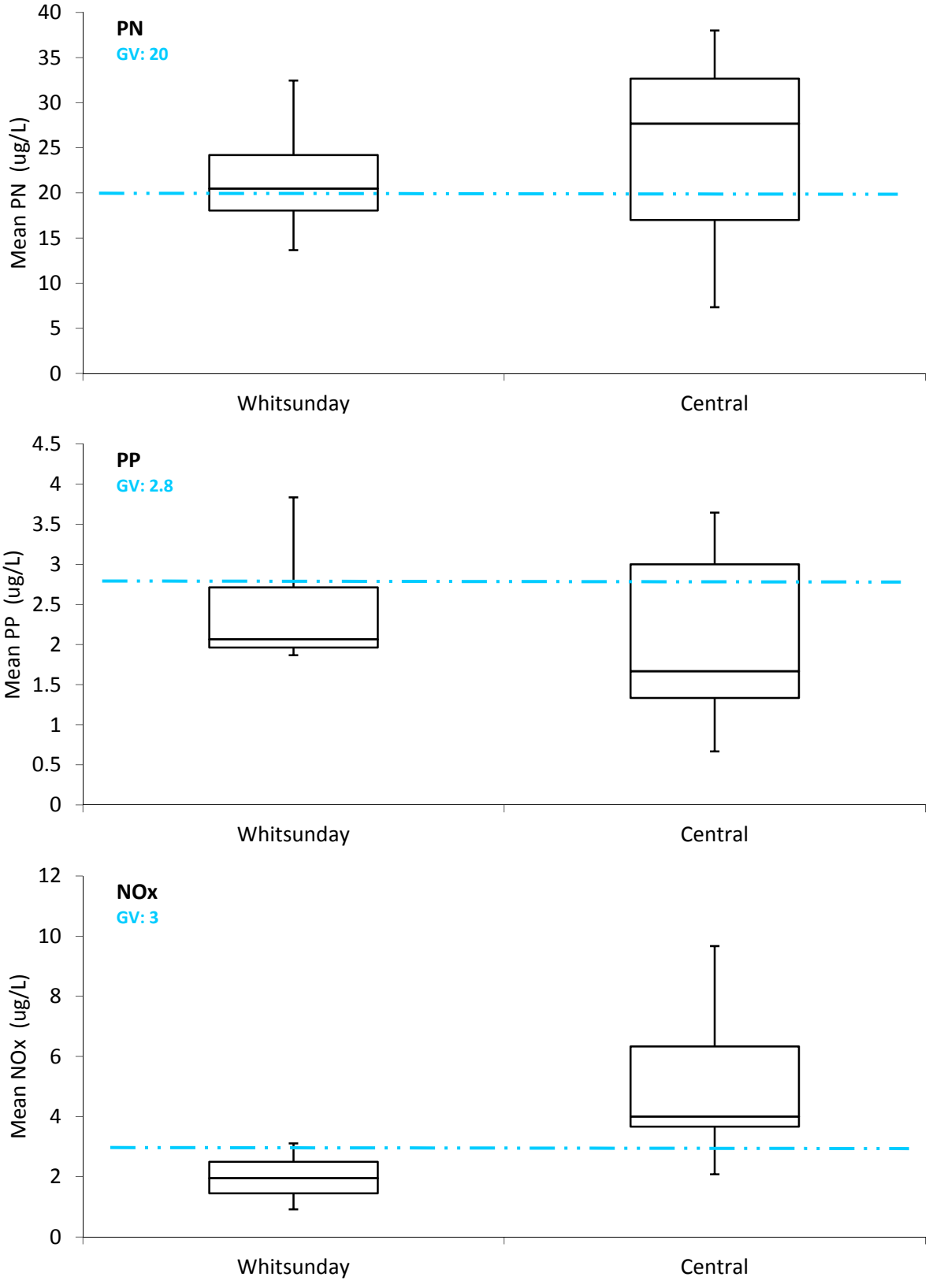

Figure A6. Box and whiskers plot of annual site means of PN, PP and NOx in the Whitsunday and Central inshore marine zones, with guideline values (GV) indicated. To achieve a 'Good' or better the median must be below the GV.

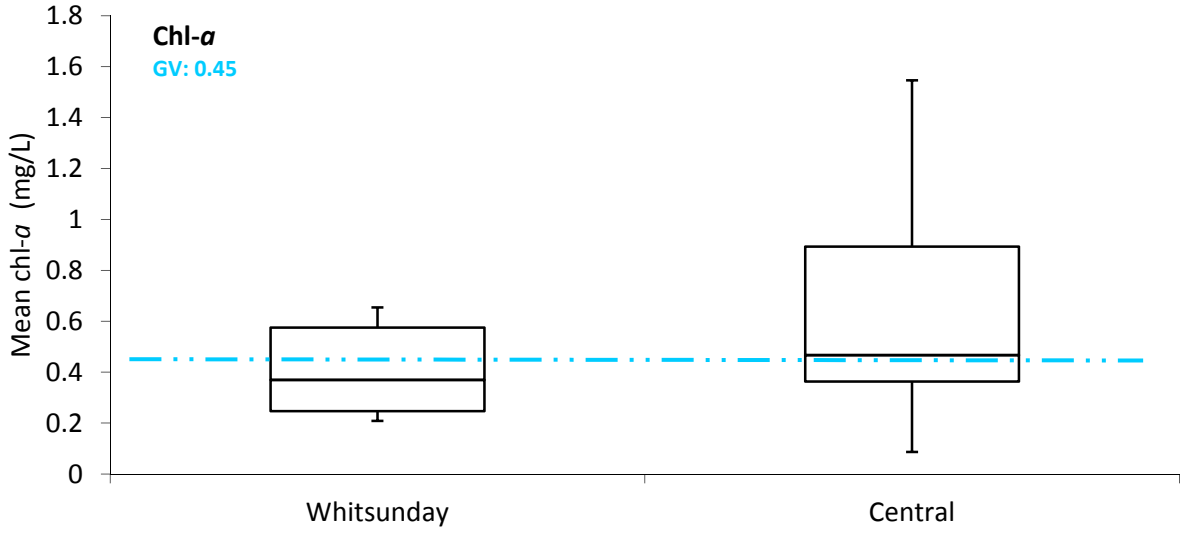

Figure A7. Box and whiskers plot of annual site means of chloropyll-*a* in the Whitsunday and Central inshore marine zones, with guideline values (GV). To achieve a 'Good' or better the median must be below the GV.

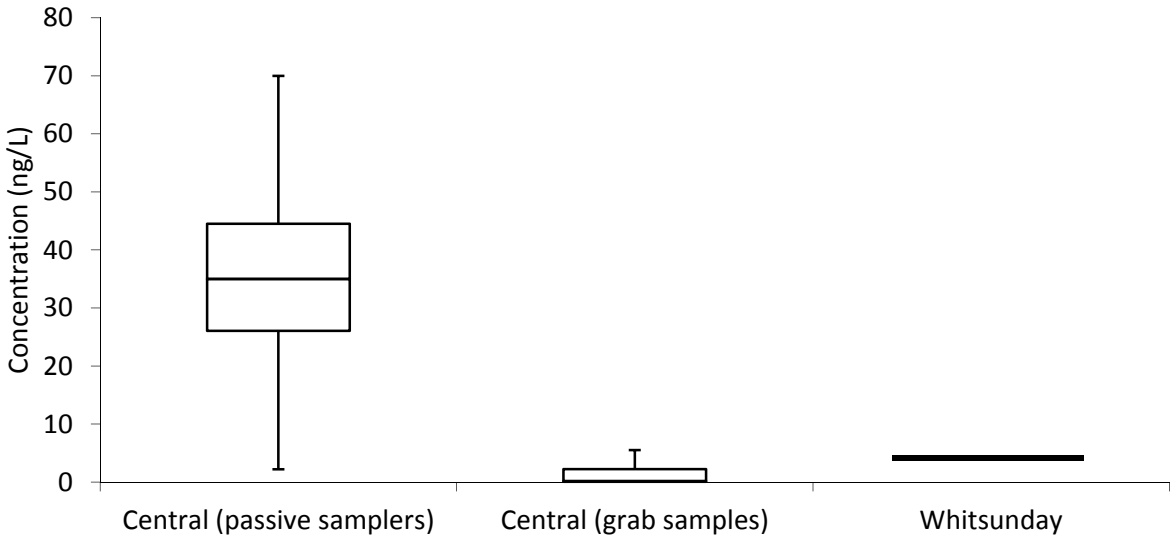

Figure A8. Box and whiskers plot of PSII-HEq concentration from passive samplers and grab samples across sites in the Central inshore marine zone and PSII-HEq concentration from single passive sampler in the Whitsunday inshore marine zone.

Appendix B

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

Mackay-Whitsunday Stewardship Assessment

2015-16

Prepared for
Mackay-Whitsunday Healthy Rivers to Reef Partnership

5 December 2016

DOCUMENT TRACKING

Item	Detail
Project Name	Mackay-Whitsunday Stewardship Assessment
Project Number	4526
Project Manager	Miles Yeates (07) 3503 7197 GPO Box 2040, Brisbane Q 4001
Prepared by	Miles Yeates, Tom Kaveney and Lee Archinal
Reviewed by	Ailsa Kerswell
Approved by	Ailsa Kerswell
Status	Final
Version Number	1
Cover photo	The Whitsundays (Ailsa Kerswell)

This report should be cited as 'Eco Logical Australia and Adaptive Strategies 2016. *Mackay-Whitsunday Stewardship Assessment – 2015-16*. Prepared for the Mackay-Whitsunday Healthy Rivers to Reef Partnership.'

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Contents

Abbreviations

Abbreviation	Description
DAF	Department of Agriculture and Fisheries
DEHP	Department of Environment and Heritage Protection
ELA	Eco Logical Australia

1 Introduction

Eco Logical Australia Pty Ltd (ELA) was commissioned by the Mackay-Whitsunday Healthy Rivers to Reef Partnership (the Partnership) to assess environmental stewardship within the Mackay-Whitsunday region for the 2015-16 financial year. The results have informed the preparation of an annual waterway health report card for the Mackay-Whitsunday region, which is published by the Partnership each year[1]. The purpose of this report is to provide a concise summary of the findings of the stewardship assessment.

The scope of the stewardship assessment for 2015-16 included the following industries:

- Port – port authorities, and terminal operators that completed dredging and shipping activities
- Heavy Industry – large industrial facilities such as coal terminals, sugar mills, meat processing facilities and mineral processing and storage facilities
- Urban – local governments, airports, tourism resorts, urban developers and master-planned communities
- Aquaculture – prawn farms, barramundi farms and red claw farms
- Tourism – diving, fishing, reef and island tours and water sports

Stewardship assessments were completed in accordance with methods developed by ELA and Adaptive Strategies (2015), which are based on the nation-wide State of the Environment Report management effectiveness framework. The stewardship assessment method and associated frameworks for each industry were first applied to the Mackay-Whitsunday region in 2015.

Stewardship has been defined as 'responsible planning and management actions' and is intended for this purpose to capture information on management efforts by industries, port operators and local governments to maintain or improve water quality and ecosystem health.

[1] Report card is available at http://healthyriverstoreef.org.au/report-card/report-card-results/

2 Methods

The assessment of stewardship was conducted in accordance with the detailed methods described in ELA and Adaptive Strategies (2015) for Port, Heavy Industry, Tourism, Fishing and Aquaculture, and ELA and Adaptive Strategies (2016) for Urban. Reports are available from the Partnership upon request.

In summary, the following keys steps were implemented to assess environmental stewardship:

- An implementation plan was developed with the Partnership which identified key stakeholders within the industries being assessed
- Relevant contacts (e.g. Environmental Manager) at each company, industry representative body or organisation were contacted and invited to participate in the stewardship assessment, through the completion of a confidential survey on their environmental management practices and the provision of supporting information
- The responses provided in completed surveys were assessed and scored in accordance with stewardship frameworks developed for each industry.
- Information in the public domain was also assessed and considered where relevant to the assessment of environmental stewardship (e.g. annual reports of companies or regulatory agencies).
- 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.

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 industry.

Summary reports were prepared for each industry, providing information on the stewardship rating and associated scoring, highlights for the industry and areas requiring improvement. The results of individual companies or organisations were not reported and remain confidential.

3 Results and Discussion

Sector-specific summary reports and frameworks for the Port, Heavy Industry, Aquaculture, Tourism and Urban sectors are provided in Appendix A. A summary of the stewardship assessment results is provided below.

Industry	Stewardship Rating
Port	Effective
Heavy Industry	Effective
Aquaculture	Very Effective
Tourism	Effective
Urban	Partially Effective

Results of the Mackay-Whitsunday stewardship assessment in 2015-16 were similar to those obtained in 2014-2015 for Port, Heavy Industry, Aquaculture and Tourism. There is a high degree of environmental regulation within these industries, and Effective to Very Effective environmental management strategies are in place.

Companies often work together in partnerships to pool their resources and implement programs that are of mutual benefit to participants and the environment. Examples include the formation of industry working groups (e.g. Ports, Heavy Industry and Aquaculture) and participation in coordinated programs such as the Reef Guardian Councils Program of the Great Barrier Reef Marine Park Authority (Urban). Compliance rates in the Port, Heavy Industry and Aquaculture sectors were 100%, with no non-compliances detected by officers of DEHP or DAF during multiple inspections.

The Urban sector was assessed for the first time in 2015-16. A stewardship rating of Partially Effective indicates that there is room for improving the environmental management of urban environments. Examples highlighted by the assessment include the need for improved development and implementation of environmental management plans and improving the low rate of compliance (67%) with environmental legislation and approval conditions.

References

ELA and Adaptive Strategies (2015). Mackay-Whitsunday Healthy Rivers to Reef Partnership Stewardship Reporting. Eco Logical Australia and Adaptive Strategies.

ELA and Adaptive Strategies (2016). Urban Stewardship Framework. Report prepared by the Great Barrier Reef Regional Report Card Partnerships. Eco Logical Australia and Adaptive Strategies.

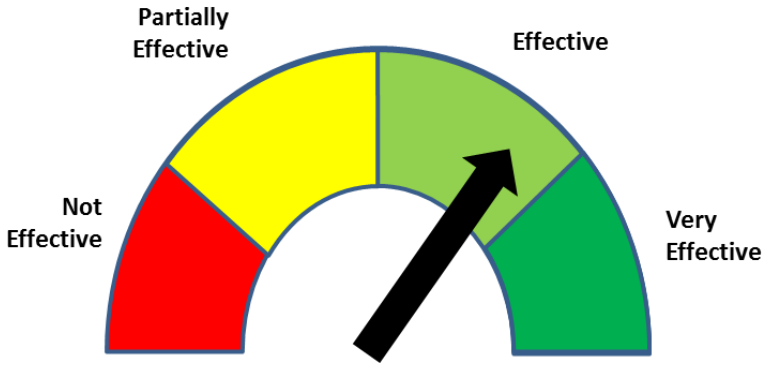
Appendix A Sector-Specific Summary Reports and Frameworks

Industry Summary Report 2015-16 FY

Port

One port authority (North Queensland Bulk Ports Corporation; NQBP) operates the Ports of Abbot Point, Mackay and Hay Point within the Mackay-Whitsunday region. The region's ports account for approximately 50 per cent of Queensland's total export sea trade. There is a high level of community engagement on environmental issues with significant contributions towards environmental initiatives from port bodies. A response rate of 100% was achieved from the companies and agencies invited to provide information to inform the assessment.

Key findings



The overall result for port stewardship in the Mackay-Whitsunday region was at the higher end of effective for the 2015-16 FY. This was consistent across the administration, operations and shipping themes, with the development activity group scoring very effective. Planning and implementation were assessed as very effective.

Breakdown of port stewardship ratings

Activity group	Management theme		
	Planning	Implementation	Outcome
Administration	3.6 (effective)	3.8 (very effective)	3.4 (effective)
Operations	4.0 (very effective)	4.0 (very effective)	3.0 (effective)
Development	4.0 (very effective)	4.0 (very effective)	4.0 (very effective)
Shipping	3.8 (very effective)	3.5 (effective)	3.7 (effective)
Grand Total	**3.8 (very effective)**	**3.8 (very effective)**	**3.5 (effective)**

Scale: >3.75 very effective, 3.00 – 3.75 effective, 2.00 – 2.99 partially effective, <2.00 – ineffective

There was no capital or maintenance dredging activity during the reporting period.

Background on the framework and evaluation methodology is provided below.

Strengths and innovation

- The port authority employs highly qualified and experienced staff to manage ecosystem health and water quality.
- A comprehensive environmental management system is in place and is certified to ISO14001 standards.
- There is a high level of community engagement by the port authority on environmental issues, with significant contributions to the environmental initiatives of port industry representative bodies.

- Ambient marine monitoring programs for seagrass, water quality and inshore rocky reefs are in place for extended areas around the three ports. The results of monitoring will assist in providing a comprehensive baseline for reference during future dredging programs. These programs are above and beyond what is required by regulation. The results are provided to the Partnership as an in-kind contribution, with the results informing the development of the annual report card.
- A compliance rate of 100% was achieved from a single inspection of port sites by officers from the Queensland Department of Environment and Heritage Protection (DEHP).

Areas needing improvement

- The stewardship framework relies heavily (although not entirely) on compliance with the existing regulatory framework. This assumes that the legislation and regulatory processes themselves are adequate to provide good environmental outcomes i.e. that the regulatory framework is 'effective'. There is currently, however, no regulatory stewardship framework.

The stewardship reporting framework

Stewardship is defined as 'responsible planning and management actions'. The framework describes and evaluates environmental management efforts within the Mackay-Whitsunday region. It captures information on management efforts to maintain or improve ecosystem health of the Great Barrier Reef. It is based on the nation-wide State of the Environment Report management effectiveness framework.

Stewardship is rated on a scale from 'very effective' through to 'ineffective' based on a range of criteria covering administrative, operational and development activities during various management phases (planning, implementation and outcome).

Evaluation

A list of key activities undertaken by ports 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 management effectiveness (i.e. stewardship) could be evaluated.

Several companies are port tenants and may undertake activities that could be classified as 'port related', ie dredging and shipping. Therefore, all dredging and shipping activities (undertaken by any company) were included.

Evaluation used data collected via self-reporting (survey) and compliance data from DEHP. Each survey answer was translated into a numerical value to facilitate averaging of scores across activity groupings and management themes. Scores were then combined to produce scores (and corresponding ratings) for each company. The scores for the individual themes of planning, implementation and outcome were averaged and then assigned a stewardship rating of:

- >3.75 very effective,
- 3.00 – 3.75 effective,
- 2.00 – 2.99 partially effective,
- <2.00 – ineffective.

The overall stewardship rating awarded to the industry was derived from the lowest (i.e., the least effective) of the planning, implementation and outcome results.

The full report on scoring methods for stewardship can be accessed at
http://healthyriverstoreef.org.au/report-card/technical-reports-for-pilot-report-card/

Port Stewardship Framework

Activity	Criteria	Criteria Descriptions – minimum standards apply. Overall score for each activity cannot be higher than the minimum score for Implementation or outcome		
		Planning	**Implementation**	**Outcome**
Administration				
Extension and Research Projects: Note these cover water quality and ecosystem health related issues only.	Very Effective	There is planned involvement in several extension (community or industry) activities/programs that are focussed on research, monitoring or managing ecosystem health.	There is active involvement or support for extension programs relevant to ecosystem health, with long term commitments.	Highly successful outcomes of extension programs (e.g. support for the program, programs maintained in long-term or environmental goals achieved).
	Effective	There is planned involvement in more than one extension (community or industry) activities/programs that are focussed on focussed on research, monitoring or managing ecosystem health.	There is active involvement or support for extension programs relevant to ecosystem health, with annual commitments.	Successful outcomes of extension programs (e.g. support for the program, programs maintained in long-term or environmental goals achieved).
	Partially Effective	There is planned involvement in at least one extension (community or industry) activities/programs that are focussed on focussed on research, monitoring or managing ecosystem health.	There is sporadic active involvement or support for extension programs relevant to ecosystem health.	Some successful outcomes of extension programs (e.g. support for the program, programs maintained in long-term or environmental goals achieved).
	Not Effective	There is no planned involvement in extension (community or industry) activities/programs that are focussed on focussed on research, monitoring or managing ecosystem health.	There is limited or no involvement or support for extension programs relevant to ecosystem health with long term commitments.	Few successful outcomes of extension programs (e.g. support for the program, programs maintained in long-term or environmental goals achieved).
Compliance approach: Note that these apply to water quality and ecosystem health related authorities only	Very Effective	NA	Requirements of all authorities are implemented, monitored and reported on, with regular voluntary/industry led engagement with regulators.	The results/learnings from incidents and near misses always feed into further development and update of management systems and operations.
	Effective	All site operational procedures/protocols are developed to fully comply with all aspects of environmental approvals (e.g. EAs, permits)	Requirements of all authorities are implemented, monitored and reported on, with some voluntary/industry led engagement with regulators.	The results/learnings from incidents and near misses mostly feed into further development and update of management systems and operations
	Partially Effective	NA	Requirements of all authorities are implemented, monitored and reported on, with regulator-instigated engagement only.	The results/learnings from incidents and near misses sometimes feed into further development and update of management systems and operations
	Not Effective	Not all site operational procedures/protocols developed to fully comply with all aspects of environmental approvals (e.g. EAs, permits)	Requirements of the few authorities are implemented, monitored and reported on and lack of engagement.	The results/learnings from incidents and near misses rarely feed into further development and update of management systems and operations
EMS	Very Effective	EMS developed and certified to ISO 14001 standard. EMS addresses relevant major pressures and risks to water quality and ecosystem health.	EMS fully implemented, monitored and reviewed.	EMS certification maintained, frequently reviewed and updated.
	Effective	EMS developed to ISO 14001 standard, though no certification. EMS addresses relevant major pressures and risks to water quality and ecosystem health.	EMS implemented, monitored and reviewed.	EMS maintained, regularly reviewed and updated.
	Partially Effective	EMS developed, though not certified or to ISO 14001 standard. EMS addresses relevant major pressures and risks to water quality and ecosystem health.	Most but not all elements of EMS implemented, monitored and reviewed.	EMS maintained, review and updating of EMS.
	Not Effective	EMS not developed.	Few elements of EMS implemented, monitored and reviewed.	EMS not maintained or reviewed.

Training, Knowledge and Awareness	Very Effective	Relevant staff are adequately qualified and highly experienced in environmental management. Further training or education around ecosystem health forms part of the professional development goals of key staff.	Environmental management training is provided to all staff, with more specific internal and external environmental training made available for environmental management staff.	All training development goals met.
	Effective	Relevant staff are adequately qualified and/or highly experienced in environmental management.	Environmental management training is provided to all staff, with more specific internal environmental training made available for environmental management staff.	Most training development goals met.
	Partially Effective	Relevant staff are not adequately qualified, though have adequate experience in environmental management.	Environmental management training is provided to key staff.	Some training development goals met
	Not Effective	Relevant staff are not adequately qualified or experienced.	Environmental management is not provided, or is out of date and/or missing important information.	No training development goals met.
Community Engagement: Note these cover water quality health related issues only.	Very Effective	There is planned involvement to engage with the community on all aspects of operational activities and future development activities that relate to managing ecosystem health, as part of a broader strategy of environmental management or stakeholder engagement.	There is active involvement and support for community engagement programs relevant to ecosystem health, with a long term commitment.	There is a high participation rate and strong positive feedback from the community on the level of engagement provided.
	Effective	There is planned involvement to engage with the community on some aspects of operational activities and/or future development activities that relate to managing ecosystem health, as part of a broader strategy of environmental management or stakeholder engagement.	There is active involvement and support for community engagement programs relevant to ecosystem health, with annual commitments.	There is a high participation rate with generally positive feedback from the community on the level of engagement provided.
	Partially Effective	There is planned involvement to engage with the community on aspects of operational activities and/or future development activities, but without a broader strategy of environmental management or stakeholder engagement.	There is active involvement and support for community engagement programs relevant to ecosystem health on an ad hoc or as needs basis.	There is a moderate participation rate with mixed feedback from the community on the level of engagement provided.
	Not Effective	There is no planned involvement to engage with the community on aspects of operational activities and/or future development activities.	There is limited or no involvement for community engagement programs relevant to ecosystem health.	There is a low participation rate and negative (or an absence of) feedback from the community on the level of engagement provided.
Tenancy management	Very Effective	Lease contains specific and clear environmental management conditions for all relevant environmental aspects. These measures cover commencement, operation and termination of the lease. Environmental Standards for all tenants in place.	Regular inspections of tenant operations are undertaken and issues appropriately addressed in a timely manner. Joint initiatives established where demonstrated to be beneficial, feasible and practical.	Tenants fully comply with lease requirements and Environmental Standards (where they exist). Majority of tenants participate in joint initiatives where established.
	Effective	Lease contains few and high level environmental management conditions for key environmental aspects. These measures cover commencement, operation and termination of the lease. Environmental Standards exist but may not yet be fully applied.	Occasional inspections of tenant operations are undertaken and issues appropriately addressed in a timely manner.	Tenants mostly comply with lease requirements and Environmental Standards (where they exist). Some tenants participate in joint initiatives where established.
	Partially Effective	Lease contains unclear or very few environmental management conditions for only a few of the relevant environmental aspects. These measures cover commencement, operation and termination of the lease. No Environmental Standards.	Few inspections of tenant operations are undertaken and issues appropriately addressed at some point.	Tenants partially comply with lease requirements and Environmental Standards (where they exist). Few tenants participate in joint initiatives where established.
	Not Effective	Lease contains no environmental management conditions and there are no Environmental Standards	Inspections of tenant operations are not undertaken.	Tenants regularly do not comply with lease requirements and Environmental Standards (where they exist). Tenants do not participate in joint initiatives where established.
Shipping				

<u>Movement:</u> Vessels entering port limits and moving to and from berths. Issues include routes, speeds	Very Effective	REEF VTS and local vessels monitoring systems (incl. Harbour Master) are in place and integrated into all relevant operational plans.	REEF VTS and local vessels monitoring systems are fully operational and have secure long term funding.	No shipping incidents or near misses.
	Effective	REEF VTS and local vessels monitoring systems (incl. Harbour Master) are in place and integrated into most relevant operational plans.	REEF VTS and local vessels monitoring systems are fully operational and have secure medium term funding.	No shipping incidents. Few near misses.
	Partially Effective	REEF VTS and/or local vessels monitoring systems (incl. Harbour Master) not fully in place.	REEF VTS and local vessels monitoring systems are partially operational and/or lack funding security.	No shipping incidents. Many near misses.
	Not Effective	REEF VTS and/or local vessels monitoring systems (incl. Harbour Master) not in place.	REEF VTS and local vessels monitoring systems are not operational.	One or more shipping incidents. Many near misses.
<u>Anchorage:</u> Anchoring offshore (not portside)	Very Effective	Designated anchorage areas are charted, with location informed primarily by environmental constraints.	Anchoring always occurs within designated areas.	No harm caused to environmentally sensitive receptors from anchoring.
	Effective	Designated anchorage areas are charted, with location partially informed by environmental constraints.	Anchoring occurs designated area, except in exceptional circumstances.	Minimal and reversible harm to environmentally sensitive receptors from anchoring.
	Partially Effective	Some identification and charting of designated anchorage area, but not comprehensive.	Anchoring mostly occurs within designated areas.	Moderate and long-term harm to environmentally sensitive receptors from anchoring.
	Not Effective	Designated anchorage areas not identified.	Anchoring often occurs outside designated areas.	Significant harm to environmentally sensitive receptors from anchoring.
<u>Discharges:</u> bilge/ballast, shipping waste, antifoul	Very Effective	MARPOL and local regulatory requirements well understood by all users.	Discharge practices exceed international and local requirements.	No pollution incidents.
	Effective	MARPOL and local regulatory requirements well understood by management staff.	Discharge practices meet international and local requirements.	Few, minor pollutions incidents.
	Partially Effective	MARPOL and local regulatory requirements partially understood by management staff.	Discharge practices partially meet international and local requirements.	Regular, minor pollution incidents.
	Not Effective	MARPOL and local regulatory requirements not understood by management staff.	Discharge practices do not meet international and local requirements.	Continual, minor pollution incidents and/or one (or more) major pollution incident.
<u>Biosecurity:</u> Introduced Marine Pests (IMPs)	Very Effective	Biosecurity plans and protocols are well established by relevant agencies.	IMP monitoring is undertaken as part of a long-term program. IMPs are detected soon after invasion and eradication/management measures implemented immediately post-detection.	Any existing IMP populations significantly reducing. No new IMP establishments.
	Effective	Biosecurity plans and protocols are established by relevant agencies.	IMP monitoring is undertaken. IMPs are detected and eradication/management measures implemented post-detection.	Any existing IMP populations stable. No new IMP establishments.
	Partially Effective	Biosecurity plans and protocols are partially established by relevant agencies.	Limited IMP monitoring is undertaken. IMPs are detected and ad hoc measures implemented post-detection.	Any existing IMP populations increasing. No new IMP establishments.
	Not Effective	Biosecurity plans and protocols are not established .	No IMP monitoring is undertaken. IMPs are detected/ known to occur though there are no measures implemented to manage the issue post-detection.	Any existing IMP populations increasing. One or more new IMP establishments.

Port operations				
<u>Operational and Ancillary activities:</u> Includes all operational elements that may affect ecosystem health, such as: landside waste, hazardous substance storage, refuelling vehicles, quarries, loading and unloading, spill management	Very Effective	All regulatory requirements (e.g. permits, EAs, Management Plans/procedures) are in place, plus innovation is shown	Activities are undertaken with very high levels of compliance with regulatory requirements (>90%).	Very few environmental incidents.
	Effective	All regulatory requirements (e.g. permits, EAs, Management Plans/procedures) are in place	Activities are undertaken with high levels of compliance with regulatory requirements (80-90%).	Few, minor environmental incidents.
	Partially Effective	NA	Activities are undertaken with moderate levels of compliance with regulatory requirements (60-80%).	Regular, minor environmental incidents.
	Not Effective	Not all regulatory requirements (e.g. permits, EAs, Management Plans/procedures) are in place.	Activities are undertaken with poor levels of compliance with regulatory requirements (<60%).	Continual, minor environmental incidents and/or one (or more) major environmental incident.
<u>Maintenance dredging</u>	Very Effective	All regulatory requirements (e.g. permits, EAs, Dredging Management Plan) are in place. A long-term maintenance dredging strategy has been developed to minimise dredge volumes and frequencies.	Activities are always undertaken in line with regulatory requirements.	No harm caused to environmentally sensitive receptors from dredging.
	Effective	All regulatory requirements (e.g. permits, EAs, Dredging Management Plan) are in place. A long-term maintenance dredging strategy has not been developed to minimise dredge volumes and frequencies	Activities are undertaken in line with regulatory requirements, except in exceptional circumstances.	Minimal and reversible harm to environmentally sensitive receptors from dredging.
	Partially Effective	NA	Activities are mostly undertaken in line with regulatory requirements.	Moderate and long-term harm to environmentally sensitive receptors from dredging.
	Not Effective	Not all regulatory requirements (e.g. permits, EAs) are in place.	Activities are not undertaken in line with regulatory requirements.	Significant harm to environmentally sensitive receptors from dredging.
Port Development				
<u>Capital dredging:</u> Dredging and disposal	Very Effective	NA	Activities are always undertaken in line with regulatory requirements.	No harm caused to environmentally sensitive receptors from dredging.
	Effective	All regulatory requirements (e.g. permits, EAs, Dredging Management Plan) are in place, and meet regulatory requirements.	Activities are undertaken in line with regulatory requirements, except in exceptional circumstances.	Minimal and reversible harm to environmentally sensitive receptors from dredging.
	Partially Effective	NA	Activities are mostly undertaken in line with regulatory requirements.	Moderate and long-term harm to environmentally sensitive receptors from dredging.
	Not Effective	Not all regulatory requirements (e.g. permits, EAs, Dredging Management Plan) are in place.	Activities are not undertaken in line with regulatory requirements.	Significant harm to environmentally sensitive receptors from dredging.
<u>New port</u>	Very Effective	All regulatory requirements (e.g. permits, EAs, approvals) are in	Activities are always undertaken in line with regulatory requirements.	No harm caused to environmentally sensitive receptors from

<u>development or significant upgrades:</u> New / significant upgrades to infrastructure (jetties, channels etc.), services, facilities, operators		place. Port development is fully informed and undertaken in line with legislated land use plans and/or port master plans, which have been developed taking all environmental values into account.		development.
	Effective	All regulatory requirements (e.g. permits, EAs, approvals) are in place, Port development is mostly informed and undertaken in line with legislated land use plans and/or port master plans, which have been developed taking major environmental values into account.	Activities are undertaken in line with regulatory requirements, except in exceptional circumstances.	Minimal and reversible harm to environmentally sensitive receptors from development.
	Partially Effective	All regulatory requirements (e.g. permits, EAs, approvals) are in place. Port development is not guided by land use plans and/or port master plans.	Activities are mostly undertaken in line with regulatory requirements.	Moderate and long-term harm to environmentally sensitive receptors from development.
	Not Effective	Not all regulatory requirements (e.g. permits, EAs, approvals) are in place.	Activities are not undertaken in line with regulatory requirements.	Significant harm to environmentally sensitive receptors from development.

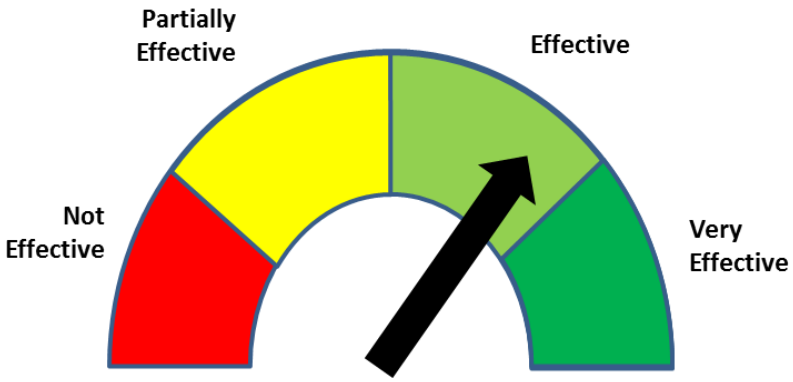
Industry Summary Report 2015-16 FY

Industry (heavy)

The Mackay-Whitsunday region has a large diversity of heavy industry activities, including coal export terminals, sugar mills, meat processing facilities and storage areas for commodities such as mineral sands, petroleum products and grain. These industries are highly regulated and have effective environmental practices in place to protect ecosystem health and water quality.

The stewardship results were generated from six companies across the sugar milling, meat processing, coal handling and mineral sands industries. Compliance data from the Queensland Department of Environment and Heritage Protection (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.

Key findings



The overall result for heavy industry stewardship in the Mackay-Whitsunday region was effective for the 2015-16 FY. The development and operations activity groups and the implementation management theme scored in the very effective range.

Breakdown of heavy industry stewardship ratings

Activity group	Management theme		
	Planning	Implementation	Outcome
Administration	3.2 (effective)	3.6 (effective)	3.2 (effective)
Operations	3.5 (effective)	4.0 (very effective)	3.8 (very effective)
Development	4.0 (very effective)	4.0 (very effective)	4.0 (very effective)
Grand Total	**3.5 (effective)**	**3.8 (very effective)**	**3.6 (effective)**

Scale: >3.75 very effective, 3.00 – 3.75 effective, 2.00 – 2.99 partially effective, <2.00 – ineffective

Background on the framework and evaluation methodology is provided below.

Strengths and innovation

- A key element in achieving the effective rating was the extra non-regulatory activities that companies undertake to deliver positive environmental outcomes.
- Environmental management staff have a high awareness of environmental regulations and their responsibilities to implement management systems to reduce environmental impacts.
- Innovation and a commitment to reduce and reuse waste products are evident, particularly in the sugar and meat processing industries. Examples included the

use of treated effluent to irrigate a turf farm, and the use of cane waste to produce electricity and ethanol for addition to fuel. Such practices demonstrate successful approaches to managing threats to the GBR from nutrients and climate change in a commercially viable manner.

- Heavy industry terminal operators contribute to a range of environmental programs, working in partnership with the port authority.
- A compliance rate of 100% was achieved from 13 inspections of heavy industry sites by DEHP officers.

Areas needing improvement

- The level of participation in research and extension activities related to ecosystem health varied among companies.
- There was a high variability in responses from companies on community engagement activities. Some companies undertake extensive consultation programs, while others don't have any. This may reflect the high diversity of the business activities within the heavy industry category, and associated variability in the approach taken within their respective markets.
- While all companies had an Environmental Management System in place, only two had the system accredited to ISO14001 standards.

The stewardship reporting framework

Stewardship is defined as 'responsible planning and management actions'. The framework describes and evaluates environmental management efforts within the Mackay-Whitsunday region. It captures information on management efforts to maintain or improve ecosystem health of the Great Barrier Reef. It is based on the nation-wide State of the Environment Report management effectiveness framework.

Stewardship is rated on a scale from 'very effective' through to 'ineffective' based on a range of criteria covering administrative, operational and development activities during various management phases (planning, implementation and outcome).

Evaluation

A list of key activities undertaken by heavy industry 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 could be evaluated.

Evaluation used company data collected via self-reporting (survey) and compliance data from DEHP. Each survey answer was translated into a numerical value to facilitate averaging of scores across activity groupings and management themes. Scores were then combined to produce scores (and corresponding ratings) for each company. The scores for the individual themes of planning, implementation and outcome were averaged and then assigned a stewardship rating of:

- >3.75 very effective,
- 3.00 – 3.75 effective,
- 2.00 – 2.99 partially effective,
- <2.00 – ineffective.

The overall stewardship rating awarded to the industry was derived from the lowest (i.e., the least effective) of the planning, implementation and outcome results.

The full report on scoring methods for stewardship can be accessed at http://healthyriverstoreef.org.au/report-card/technical-reports-for-pilot-report-card/

Heavy Industry Stewardship Framework

Activity	Criteria	Criteria Descriptions – minimum standards apply. Overall score for each activity cannot be higher than the minimum score for Implementation or outcome		
		Planning	**Implementation**	**Achievement**
Administration				
Extension and Research Projects: Note these cover water quality and ecosystem health related issues only.	Very Effective	There is planned involvement in several extension (community or industry) activities/programs that are focussed on research, monitoring or managing ecosystem health.	There is active involvement or support for extension programs relevant to ecosystem health, with long term commitments.	Highly successful outcomes of extension programs (e.g. support for the program, programs maintained in long-term or environmental goals achieved).
	Effective	There is planned involvement in more than one extension (community or industry) activities/programs that are focussed on focussed on research, monitoring or managing ecosystem health.	There is active involvement or support for extension programs relevant to ecosystem health, with annual commitments.	Successful outcomes of extension programs (e.g. support for the program, programs maintained in long-term or environmental goals achieved).
	Partially Effective	There is planned involvement in at least one extension (community or industry) activities/programs that are focussed on focussed on research, monitoring or managing ecosystem health.	There is sporadic active involvement or support for extension programs relevant to ecosystem health.	Some successful outcomes of extension programs (e.g. support for the program, programs maintained in long-term or environmental goals achieved).
	Not Effective	There is no planned involvement in extension (community or industry) activities/programs that are focussed on focussed on research, monitoring or managing ecosystem health.	There is limited or no involvement or support for extension programs relevant to ecosystem health, with long term commitments.	Few successful outcomes of extension programs (e.g. support for the program, programs maintained in long-term or environmental goals achieved).
Compliance approach: Note that these apply to water quality and ecosystem health related authorities only	Very Effective	NA	Requirements of all authorities are implemented, monitored and reported on, with regular voluntary/industry led engagement with regulators.	The results/learnings from incidents and near misses always feed into further development and update of management systems and operations.
	Effective	All site operational procedures/protocols are developed to fully comply with all aspects of environmental approvals (e.g. EAs, permits)	Requirements of all authorities are implemented, monitored and reported on, with some voluntary/industry led engagement with regulators.	The results/learnings from incidents and near misses mostly feed into further development and update of management systems and operations
	Partially Effective	NA	Requirements of all authorities are implemented, monitored and reported on, with regulator-instigated engagement only.	The results/learnings from incidents and near misses sometimes feed into further development and update of management systems and operations
	Not Effective	Not all site operational procedures/protocols developed to fully comply with all aspects of environmental approvals (e.g. EAs, permits)	Requirements of the few authorities are implemented, monitored and reported on and lack of engagement.	The results/learnings from incidents and near misses rarely feed into further development and update of management systems and operations
EMS	Very Effective	EMS developed and certified to ISO 14001 standard. EMS addresses relevant major pressures and risks to water quality and ecosystem health.	EMS fully implemented, monitored and reviewed.	EMS certification maintained, frequently reviewed and updated.
	Effective	EMS developed to ISO 14001 standard, though no certification. EMS addresses relevant major pressures and risks to water quality and ecosystem health.	EMS implemented, monitored and reviewed.	EMS maintained, regularly reviewed and updated.
	Partially Effective	EMS developed, though not certified or to ISO 14001 standard. EMS addresses relevant major pressures and risks to water quality and ecosystem health.	Most but not all elements of EMS implemented, monitored and reviewed.	EMS maintained, review and updating of EMS.
	Not Effective	EMS not developed.	Few elements of EMS implemented, monitored and reviewed.	EMS not maintained or reviewed.

Training, Knowledge and Awareness	Very Effective	Relevant staff are adequately qualified and highly experienced in environmental management. Further training or education around ecosystem health forms part of the professional development goals of key staff.	Environmental management training is provided to all staff, with more specific internal and external environmental training made available for environmental management staff.	All training development goals met.
	Effective	Relevant staff are adequately qualified and/or highly experienced in environmental management.	Environmental management training is provided to all staff, with more specific internal environmental training made available for environmental management staff.	Most training development goals met.
	Partially Effective	Relevant staff are not adequately qualified, though have adequate experience in environmental management.	Environmental management training is provided to key staff.	Some training development goals met
	Not Effective	Relevant staff are not adequately qualified or experienced.	Environmental management is not provided, or is out of date and/or missing important information.	No training development goals met.
Community Engagement: Note these cover water quality and ecosystem health related issues only.	Very Effective	There is planned involvement to engage with the community on all aspects of operational activities and future development activities that relate to managing ecosystem health, as part of a broader strategy of environmental management or stakeholder engagement.	There is active involvement and support for community engagement programs relevant to ecosystem health, with a long term commitment.	There is a high participation rate and strong positive feedback from the community on the level of engagement provided.
	Effective	There is planned involvement to engage with the community on some aspects of operational activities and/or future development activities that relate to managing ecosystem health, as part of a broader strategy of environmental management or stakeholder engagement.	There is active involvement and support for community engagement programs relevant to ecosystem health, with annual commitments.	There is a high participation rate with generally positive feedback from the community on the level of engagement provided.
	Partially Effective	There is planned involvement to engage with the community on aspects of operational activities and/or future development activities, but without a broader strategy of environmental management or stakeholder engagement.	There is active involvement and support for community engagement programs relevant to ecosystem health on an ad hoc or as needs basis.	There is a moderate participation rate with mixed feedback from the community on the level of engagement provided.
	Not Effective	There is no planned involvement to engage with the community on aspects of operational activities and/or future development activities.	There is limited or no involvement for community engagement programs relevant to ecosystem health.	There is a low participation rate and negative (or an absence of) feedback from the community on the level of engagement provided.
Industry operations				
Operational and Ancillary activities: Includes all operational elements that may affect ecosystem health, such as: stormwater management, discharges, landside waste, stockpile management, hazardous substance storage, refuelling vehicles, spill management	Very Effective	All regulatory requirements (e.g. permits, EAs, Management Plans/procedures) are in place, plus innovation is shown	Activities are undertaken with very high levels of compliance with regulatory requirements (>90%).	Very environmental incidents.
	Effective	All regulatory requirements (e.g. permits, EAs, Management Plans/procedures) are in place	Activities are undertaken with high levels of compliance with regulatory requirements (80-90%).	Few, minor environmental incidents.
	Partially Effective	NA	Activities are undertaken with moderate levels of compliance with regulatory requirements (60-80%).	Regular, minor environmental incidents.
	Not Effective	Not all regulatory requirements (e.g. permits, EAs, Management Plans/procedures) are in place.	Activities are undertaken with poor levels of compliance with regulatory requirements (<60%).	Continual, minor environmental incidents and/or one (or more) major environmental incident.

Site/facility Development				
<u>Site development or significant upgrades:</u> New / significant upgrades or expansion (site expansion, new buildings, services, facilities).	Very Effective	All regulatory requirements (e.g. permits, EAs, approvals) are in place. Development is fully informed and undertaken in line with legislated land use plans and/or site master plans, which have been developed taking all environmental values into account.	Activities are always undertaken in line with regulatory requirements.	No harm caused to environmentally sensitive receptors from development.
	Effective	All regulatory requirements (e.g. permits, EAs, approvals) are in place. Development is mostly informed and undertaken in line with legislated land use plans and/or site master plans, which have been developed taking major environmental values into account.	Activities are undertaken in line with regulatory requirements, except in exceptional circumstances.	Minimal and reversible harm to environmentally sensitive receptors from development.
	Partially Effective	All regulatory requirements (e.g. permits, EAs, approvals) are in place. Development is not guided by land use plans and/or site master plans.	Activities are mostly undertaken in line with regulatory requirements.	Moderate and long-term harm to environmentally sensitive receptors from development.
	Not Effective	Not all regulatory requirements (e.g. permits, EAs, approvals) are in place.	Activities are not undertaken in line with regulatory requirements.	Significant harm to environmentally sensitive receptors from development.

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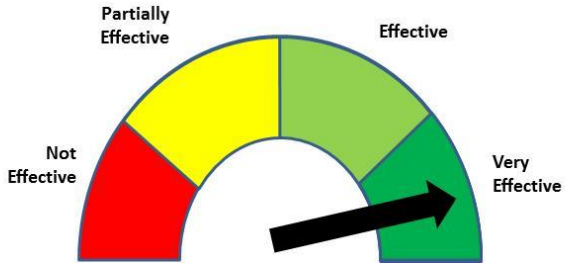
Aquaculture

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. The stewardship results 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 Queensland Department of Agriculture and Fisheries (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.

Key findings



The overall result for aquaculture stewardship in the Mackay-Whitsunday region was very effective for the 2015-16 FY. This was consistent across the administration, development and operations activity groups. Seven of the nine scores were in the very effective range. The stewardship activities of the aquaculture industry were assessed to be above and beyond those of comparable industries where discharges to the environment occur.

Breakdown of aquaculture stewardship ratings

Activity group	Management theme		
	Planning	Implementation	Outcome
Administration	3.6 (effective)	3.8 (very effective)	3.6 (effective)
Operations	3.8 (very effective)	4.0 (very effective)	4.0 (very effective)
Development	4.0 (very effective)	4.0 (very effective)	3.8 (very effective)
Grand Total	**3.8 (very effective)**	**3.9 (very effective)**	**3.8 (very effective)**

Scale: >3.75 very effective, 3.00 – 3.75 effective, 2.00 – 2.99 partially effective, <2.00 – ineffective

Background on the framework and evaluation methodology is provided below.

Strengths and innovation

- The prawn and barramundi farming industries are working closely with MBD Energy and James Cook University to develop and implement techniques for the removal of nutrients from wastewater using marine algae. A pilot water treatment facility has been in operation at a prawn farm with excellent results.
- The prawn farming industry has strong collaborative links with CSIRO and other research partners to develop more efficient farming practices, feed inputs and wastewater treatment.

- Seven compliance inspections by DAF of aquaculture facilities in the region, to check biosecurity compliance and adherence with farm approval conditions, achieved a compliance rate of 100%.
- Regulatory requirements for new or expanded developments involve a nil net discharge of nutrients. This requirement is above and beyond that of comparable industries (e.g. agriculture) or land uses (e.g. urban) in the region.

Areas needing improvement

- The aquaculture industry's stewardship is already very effective. However challenges in developing a robust data set on compliance with approvals under the *Environmental Protection Act 1994* needs to be addressed in future years.
- The stewardship framework relies heavily (although not entirely) on compliance with the existing regulatory framework. This assumes that the legislation and regulatory processes themselves are adequate to provide good environmental outcomes i.e. that the regulatory framework is 'effective'. There is currently, however, no regulatory stewardship framework.

The stewardship reporting framework

Stewardship is defined as 'responsible planning and management actions'. The framework describes and evaluates environmental management efforts within the Mackay-Whitsunday region. It captures information on management efforts to maintain or improve ecosystem health of the Great Barrier Reef. It is based on the nation-wide State of the Environment Report management effectiveness framework.

Stewardship is rated on a scale from 'very effective' through to 'ineffective' based on a range of criteria covering administrative, operational and development activities during various management phases (planning, implementation and outcome).

Evaluation

A list of key activities undertaken by aquaculture 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 are a basis for the development of criteria against which the management effectiveness (i.e. stewardship) of companies could be evaluated.

Evaluation used company data collected via self-reporting (survey) and compliance data from DAF. Each survey answer was translated into a numerical value to facilitate averaging of scores across activity groupings and management themes. Scores were then combined to produce scores (and corresponding ratings) for each company. The scores for the individual themes of planning, implementation and outcome were averaged and then assigned a stewardship rating of:

- >3.75 very effective,
- 3.00 – 3.75 effective,
- 2.00 – 2.99 partially effective,
- <2.00 – ineffective.

The overall stewardship rating awarded to the industry was derived from the lowest (ie the least effective) of the planning, implementation and outcome results.

The full report on scoring methods for stewardship can be accessed at http://healthyriverstoreef.org.au/report-card/technical-reports-for-pilot-report-card/

Appendix C Aquaculture Stewardship Framework

Activity	Criteria	Criteria Descriptions – minimum standards apply. Overall score for each activity cannot be higher than the minimum score for Implementation or outcome		
		Planning	**Implementation**	**Achievement**
Administration				
Extension and Research Projects: Note these cover water quality and ecosystem health related issues only.	Very Effective	There is planned involvement in several extension (community or industry) activities/programs that are focussed on research, monitoring or managing ecosystem health.	There is active involvement or support for extension programs relevant to ecosystem health, with long term commitments.	Highly successful outcomes of extension programs (e.g. support for the program, programs maintained in long-term or environmental goals achieved).
	Effective	There is planned involvement in more than one extension (community or industry) activities/programs that are focussed on focussed on research, monitoring or managing ecosystem health.	There is active involvement or support for extension programs relevant to ecosystem health, with annual commitments.	Successful outcomes of extension programs (e.g. support for the program, programs maintained in long-term or environmental goals achieved).
	Partially Effective	There is planned involvement in at least one extension (community or industry) activities/programs that are focussed on research, monitoring or managing ecosystem health.	There is sporadic active involvement or support for extension programs relevant to ecosystem health.	Some successful outcomes of extension programs (e.g. support for the program, programs maintained in long-term or environmental goals achieved).
	Not Effective	There is no planned involvement in extension (community or industry) activities/programs that are focussed on focussed on research, monitoring or managing ecosystem health.	There is limited or no involvement or support for extension programs relevant to ecosystem health, with long term commitments.	Few successful outcomes of extension programs (e.g. support for the program, programs maintained in long-term or environmental goals achieved).
Compliance approach: Note that these apply to water quality related authorities only	Very Effective	NA	Requirements of all authorities are implemented, monitored and reported on, with regular voluntary/industry led engagement with regulators.	The results/learnings from incidents and near misses always feed into further development and update of management systems and operations.
	Effective	All site operational procedures/protocols are developed to fully comply with all aspects of environmental approvals (e.g. EAs, permits)	Requirements of all authorities are implemented, monitored and reported on, with some voluntary/industry led engagement with regulators.	The results/learnings from incidents and near misses mostly feed into further development and update of management systems and operations
	Partially Effective	NA	Requirements of all authorities are implemented, monitored and reported on, with regulator-instigated engagement only.	The results/learnings from incidents and near misses sometimes feed into further development and update of management systems and operations
	Not Effective	Not all site operational procedures/protocols developed to fully comply with all aspects of environmental approvals (e.g. EAs, permits)	Requirements of the few authorities are implemented, monitored and reported on and lack of engagement.	The results/learnings from incidents and near misses rarely feed into further development and update of management systems and operations
EMS	Very Effective	Detailed EMS developed. EMS addresses relevant major pressures and risks to water quality and ecosystem health.	EMS fully implemented, monitored and reviewed.	EMS certification maintained, frequently reviewed and updated.
	Effective	EMS developed. EMS addresses relevant major pressures and risks to water quality and ecosystem health.	EMS implemented, monitored and reviewed.	EMS maintained, regularly reviewed and updated.
	Partially Effective	EMS developed, though only to a basic level. EMS addresses relevant major pressures and risks to water quality and ecosystem health.	Most but not all elements of EMS implemented, monitored and reviewed.	EMS maintained, review and updating of EMS.
	Not Effective	EMS not developed.	Few elements of EMS implemented, monitored and reviewed.	EMS not maintained or reviewed.
Training,	Very Effective	Relevant staff are adequately qualified and highly experienced in	Environmental management training is provided to all staff, with	All training development goals met.

Knowledge and Awareness		environmental management. Further training or education around ecosystem health forms part of the professional development goals of key staff.	more specific internal and external environmental training made available for environmental management staff.	
	Effective	Relevant staff are adequately qualified and/or highly experienced in environmental management.	Environmental management training is provided to all staff, with more specific internal environmental training made available for environmental management staff.	Most training development goals met.
	Partially Effective	Relevant staff are not adequately qualified, though have adequate experience in environmental management.	Environmental management training is provided to key staff.	Some training development goals met
	Not Effective	Relevant staff are not adequately qualified or experienced.	Environmental management is not provided, or is out of date and/or missing important information.	No training development goals met.
Community Engagement: Note these cover water quality and ecosystem health related issues only.	Very Effective	There is planned involvement to engage with the community on all aspects of operational activities and future development activities that relate to managing ecosystem health, as part of a broader strategy of environmental management or stakeholder engagement.	There is active involvement and support for community engagement programs relevant to ecosystem health, with a long term commitment.	There is a high participation rate and strong positive feedback from the community on the level of engagement provided.
	Effective	There is planned involvement to engage with the community on some aspects of operational activities and/or future development activities that relate to managing ecosystem health, as part of a broader strategy of environmental management or stakeholder engagement.	There is active involvement and support for community engagement programs relevant to ecosystem health, with annual commitments.	There is a high participation rate with generally positive feedback from the community on the level of engagement provided.
	Partially Effective	There is planned involvement to engage with the community on aspects of operational activities and/or future development activities, but without a broader strategy of environmental management or stakeholder engagement.	There is active involvement and support for community engagement programs relevant to ecosystem health on an ad hoc or as needs basis.	There is a moderate participation rate with mixed feedback from the community on the level of engagement provided.
	Not Effective	There is no planned involvement to engage with the community on aspects of operational activities and/or future development activities.	There is limited or no involvement for community engagement programs relevant to ecosystem health.	There is a low participation rate and negative (or an absence of) feedback from the community on the level of engagement provided.
Aquaculture operations				
Operational and Ancillary activities: Includes all operational elements that may affect ecosystem health, such as: stormwater management, discharges, landside waste, stockpile management, hazardous substance storage, refuelling vehicles, spill management	Very Effective	Operations exceed regulatory requirements by applying the results of innovative research	Activities are undertaken with very high levels of compliance with regulatory requirements (>90%).	Very few environmental incidents.
	Effective	All regulatory requirements (e.g. permits, EAs, Management Plans/procedures) are in place	Activities are undertaken with high levels of compliance with regulatory requirements (80-90%).	Few, minor environmental incidents.
	Partially Effective	NA	Activities are undertaken with moderate levels of compliance with regulatory requirements (60-80%).	Regular, minor environmental incidents.
	Not Effective	Not all regulatory requirements (e.g. permits, EAs, Management Plans/procedures) are in place.	Activities are undertaken with poor levels of compliance with regulatory requirements (<60%).	Continual, minor environmental incidents and/or one (or more) major environmental incident.
Aquaculture Development				

<u>Site development or significant upgrades:</u> New / significant upgrades or expansion (site expansion, new buildings, services, facilities).	Very Effective	All regulatory requirements (e.g. permits, EAs, approvals) are in place. Development is fully informed and undertaken in line with legislated land use plans and/or site master plans, which have been developed taking all environmental values into account.	Activities are always undertaken in line with regulatory requirements.	No harm caused to environmentally sensitive receptors from development.
	Effective	All regulatory requirements (e.g. permits, EAs, approvals) are in place. Development is mostly informed and undertaken in line with legislated land use plans and/or site master plans, which have been developed taking major environmental values into account.	Activities are undertaken in line with regulatory requirements, except in exceptional circumstances.	Minimal and reversible harm to environmentally sensitive receptors from development.
	Partially Effective	All regulatory requirements (e.g. permits, EAs, approvals) are in place. Development is not guided by land use plans and/or site master plans.	Activities are mostly undertaken in line with regulatory requirements.	Moderate and long-term harm to environmentally sensitive receptors from development.
	Not Effective	Not all regulatory requirements (e.g. permits, EAs, approvals) are in place.	Activities are not undertaken in line with regulatory requirements.	Significant harm to environmentally sensitive receptors from development.

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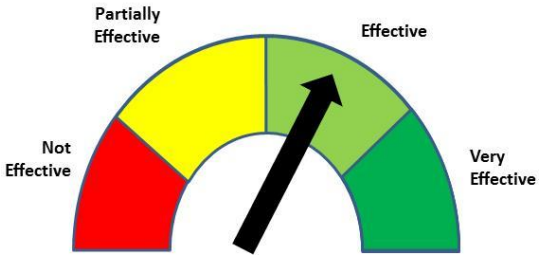
Tourism

The Mackay-Whitsunday region is a hub for tourism operations, with approximately 45 per cent of tourists visiting the Great Barrier Reef participating in activities in the region. The commercial marine tourism industry of the region is comprised of a number of operations and activities, including reef cruises and boat tours, organised diving and snorkelling, boat charters, air charters and water based sports. The industry is closely regulated, primarily in relation to access and operations within the Marine Park and National Park islands.

The focus for 2015-16 was on an assessment of the industry as a whole (rather than the averaged results of individual companies) due to a low survey response rate (~10%).

Key findings



The overall result for tourism stewardship in the Mackay-Whitsunday region was effective for the 2015-16 FY. The results are based on an assessment of four of the six activity groups contained in the framework. Implementation is a notable strong point of the industry with planning and outcomes also assessed as effective.

Breakdown of tourism stewardship ratings

Activity	Management theme		
	Planning	Implementation	Outcome
Operations	-	-	-
Infrastructure development	-	-	-
Compliance	Effective	Effective	Effective
Scheme participation	Effective	Very effective	Effective
Training and awareness	Effective	Very effective	Effective
Extension programs	Effective	Effective	Effective
Overall	**Effective**	**Effective**	**Effective**

Background on the framework and evaluation methodology is provided below.

Strengths and innovation

- There is high participation in recognised environmental industry accreditation programs:
  - In the region 32 tourist operations participate in the ECO Certification program. For certification, operators must demonstrate a strong, well-managed commitment to sustainable practice. Of certified operators, 14 hold Advanced Ecotourism certification.

  - There is a high (>90%) participation in industry associations with codes of practice and auditing.

- Participation in extension and research projects is moderate to high, particularly “Eye on the Reef’ and crown of thorns control programs. These programs are associated with reporting the condition of ecosystem values on the GBR and taking voluntary actions to improve environmental outcomes, beyond what is required by regulation.
- The system of marine park permits is comprehensive and compliance rates are very high. Few environmental incidents or serious non-compliance matters were reported in the 2015-16 period.
- Training programs for tourism are available through local TAFE and applied within the industry.

Areas needing improvement

- A close collaboration with tourism industry associations and GBRMPA to obtain relevant regionally specific data will greatly enhance the rigor and application of the framework. Industry associations may be able to assist in increasing the operator response rate to the survey.
- In future years, publically available data should be supplemented with the results of GBRMPA permit compliance data by region. Compliance reporting on tourism permits issued by GBRMPA in the previous financial year is not publicly available until early October in the following year. This creates a timing issue for data collection for assessment.

The stewardship reporting framework

Stewardship is defined as ‘responsible planning and management actions’. The framework describes and evaluates environmental management efforts within the Mackay-Whitsunday region. It captures information on management efforts to maintain or improve ecosystem health of the Great Barrier Reef. It is based on the nation-wide State of the Environment Report management effectiveness framework.

Stewardship is rated on a scale from ‘very effective’ through to ‘ineffective’ based on a range of criteria covering administrative, operational and development activities during various management phases (planning, implementation and outcome).

Evaluation

Stewardship assessment of the tourism industry was focused on management efforts to maintain or improve the ecosystem health of marine and coastal waters. The framework was similar to those for port, heavy industry and aquaculture so that comparisons could be made. It had a greater focus on certification and training and participation rates, however, given that systems for the industry are well established and there were a much larger number of operators than for other industries.

Data collection for the 2015-16 was based primarily on publically available data. The response rate to the survey of tourism operators was low.

The full report on scoring methods and results for stewardship can be accessed at http://healthyriverstoreef.org.au/report-card/technical-reports-for-pilot-report-card/

Tourism Stewardship Framework – Mackay Whitsunday

Activity		Criteria		
		Planning	**Implementation**	**Achievement**
Operational and management standards				
Operational activity (includes all operational elements that may affect ecosystem health, such as: vessel movements, emissions, sewage discharge etc)	Very Effective	All regulatory requirements (e.g. permits, authorities, management plans/procedures) are in place. Business planning and operational procedures incorporate the full range of Responsible Reef Practices.	Activities are undertaken with very high levels of compliance with regulatory requirements (>90%).	Very few, to no, environmental incidents.
	Effective	All regulatory requirements (e.g. permits, authorities, management plans/procedures) are in place. Business planning and operational procedure incorporates some Responsible Reef Practices.	Activities are undertaken with high levels of compliance with regulatory requirements (80-90%).	Few, minor environmental incidents.
	Partially Effective	All regulatory requirements (e.g. permits, authorities, management plans/procedures) are in place. No documented business planning.	Activities are undertaken with moderate levels of compliance with regulatory requirements (60-80%).	Regular, minor environmental incidents.
	Not Effective	Not all regulatory requirements (e.g. permits, authorities, management plans/procedures) are in place.	Activities are undertaken with poor levels of compliance with regulatory requirements (<60%).	Continual, minor environmental incidents and/or one (or more) major environmental incident.
Tourism infrastructure development (New/significant upgrades or expansion eg private moorings, diving pontoons, marinas/berths etc)	Very Effective	Planning for new or upgrades to infrastructure include environmental impact assessment and a process to avoid, mitigate or offset environmental risks.	Activities are always undertaken in line with regulatory approval requirements and leading practice risk management practices.	No significant harm caused to environmentally sensitive receptors from development.
	Effective	Planning for new or upgrades to infrastructure include environmental impact assessment and a process to avoid, mitigate or offset environmental risks.	Activities are undertaken in line with regulatory requirements, except in exceptional circumstances.	Minimal and reversible harm to environmentally sensitive receptors from development.
	Partially Effective	Planning for new or upgrades to infrastructure is undertaken in accordance with standard permit approval process.	Activities are mostly undertaken in line with regulatory requirements.	Moderate permanent impact to environmentally sensitive receptors from development.
	Not Effective	Not all regulatory requirements (e.g. permits, approvals) are in place.	Activities are not undertaken in line with regulatory requirements.	Significant harm to environmentally sensitive receptors from development.

Activity		Criteria		
		Planning	Implementation	Achievement
Accreditation and compliance				
Compliance	Very Effective	All operational procedures/protocols of the business are developed to fully comply with all aspects of environmental approvals.	Requirements of all authorities are implemented, monitored and reported on, with regular voluntary/industry led engagement with regulators.	The results/learnings from incidents and near misses always feed into further development and update of management systems and operations.
	Effective	All operational procedures/protocols of the business are developed to fully comply with all aspects of environmental approvals.	Requirements of all authorities are implemented, monitored and reported on, with regulator-instigated engagement only.	The results/learnings from incidents and near misses mostly feed into further development and update of management systems and operations.
	Partially Effective	Minimum planning and procedures in place to meet regulatory requirements.	Requirements of all authorities are implemented, monitored and reported.	The results/learnings from incidents and near misses sometimes feed into further development and update of management systems and operations.
	Not Effective	Not all procedures/protocols of the business are developed to fully comply with all aspects of environmental approvals.	Very few requirements of authorities are implemented, monitored and reported on, and there is lack of engagement with regulators.	The results/learnings from incidents and near misses rarely feed into further development and update of management systems and operations.
Participation in recognised scheme (currently only the Ecotourism certification scheme)	Very Effective	Environmental strategy or plan developed and certified to recognised scheme standard. Strategy or plan addresses relevant major pressures and risks to water quality and ecosystem health.	Strategy or plan fully implemented, monitored and reviewed. There is >90% industry participation in recognized scheme.	Participation in industry lead audit process. Certification under recognised scheme maintained, frequently reviewed and updated.
	Effective	Environmental strategy or plan developed to recognised scheme standard but not certified. Strategy or plan addresses relevant major pressures and risks to water quality and ecosystem health.	Strategy or plan implemented, monitored and reviewed. There is 80-90% industry participation in recognised scheme.	Environmental strategy or plan maintained, regularly reviewed and updated.
	Partially Effective	Environmental strategy or plan developed though not certified or to recognised scheme standard. Strategy or plan addresses relevant major pressures and risks to water quality and ecosystem health.	Most but not all elements of strategy or plan implemented, monitored and reviewed. There is 60-80% industry participation in recognized scheme.	Environmental strategy or plan infrequently maintained, reviewed and updated.
	Not Effective	Environmental strategy or plan not developed.	Few elements of strategy or plan implemented, monitored and reviewed. There is <60% industry participation in recognized scheme.	Environmental strategy or plan not maintained or reviewed.

Activity		Criteria		
		Planning	Implementation	Achievement
Staff training and operational engagement				
Training, knowledge and awareness	Very Effective	Relevant staff are adequately qualified and highly experienced in ecotourism operations and interpretation (including all responsible reef practices). Further training or education forms part of the professional development goals of key staff.	Ecotourism and interpretation (including all responsible reef practices) training is provided to all staff, with more specific internal and external environmental training made available for key staff.	All training development goals met.
	Effective	Relevant staff are adequately qualified and/or highly experienced in ecotourism operations and interpretation (including all responsible reef practices).	Ecotourism and interpretation (including all responsible reef practices) training is provided to all staff.	Most training development goals met.
	Partially Effective	Relevant staff are not adequately qualified, although have adequate experience in ecotourism operations and interpretation (including all responsible reef practices).	Ecotourism and interpretation (including all responsible reef practices) training is made available and provided to some staff.	Some training development goals met
	Not Effective	Relevant staff are not adequately qualified or experienced.	Ecotourism and interpretation (including all responsible reef practices) training is not provided, or is out of date and/or missing important information.	No training development goals met.
Extension and research activity (Note these cover water quality and ecosystem health related issues only.)	Very Effective	There is planned involvement in several extension activities/programs that are focused on research, monitoring or managing ecosystem health.	There is active involvement or support for extension programs relevant to ecosystem health, with long term commitments.	Highly successful outcomes of extension programs (e.g. support for the program, programs maintained in long-term or environmental goals achieved).
	Effective	There is planned involvement in more than one extension activities/programs that are focused on focused on research, monitoring or managing ecosystem health.	There is active involvement or support for extension programs relevant to ecosystem health, with annual commitments.	Successful outcomes of extension programs (e.g. support for the program, programs maintained in long-term or environmental goals achieved).
	Partially Effective	There is planned involvement in at least one extension activities/programs that are focused on focused on research, monitoring or managing ecosystem health.	There is sporadic active involvement or support for extension programs relevant to ecosystem health.	Some successful outcomes of extension programs (e.g. support for the program, programs maintained in long-term or environmental goals achieved).
	Not Effective	There is no planned involvement in extension activities/programs that are focused on focused on research, monitoring or managing ecosystem health.	There is limited or no involvement or support for extension programs relevant to ecosystem health, with long term commitments.	Few successful outcomes of extension programs (e.g. support for the program, programs maintained in long-term or environmental goals achieved).

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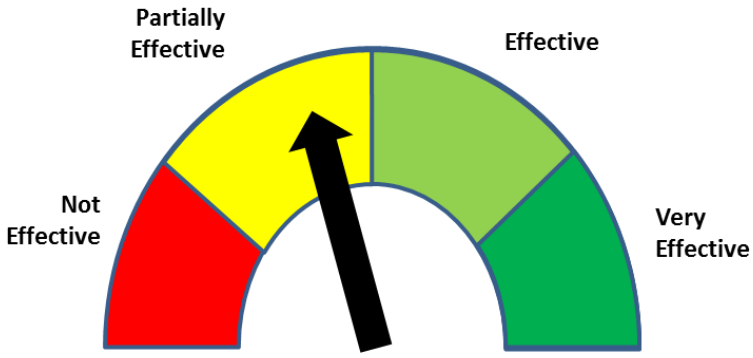
Urban

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 from a range of information sources, including surveys completed by companies involved in urban development, commercial airport facilities, local governments, compliance data from the Queensland Department of Environment and Heritage Protection (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.

Key findings



The overall result for urban stewardship in the Mackay-Whitsunday region was partially effective for the 2015-16 FY. This was consistent across the administration and operations activity groups and the implementation management theme. The development activity group and the planning and outcome management themes were assessed as effective.

Breakdown of urban stewardship ratings

Activity group	Management theme		
	Planning	Implementation	Outcome
Administration	3.0 (effective)	3.0 (effective)	2.8 (partially effective)
Operations	3.2 (effective)	2.0 (partially effective)	3.4 (effective)
Development	3.2 (effective)	3.2 (effective)	3.0 (effective)
Grand Total	**3.1 (effective)**	**2.7 (partially effective)**	**3.1 (effective)**

Scale: >3.75 very effective, 3.00 – 3.75 effective, 2.00 – 2.99 partially effective, <2.00 – ineffective

Background on the framework and evaluation methodology is provided below.

Strengths and innovation

- Mackay, Whitsunday and Isaac Regional Councils are long-term partners of the Reef Guardian Program, which showcases environmentally sustainable practices in the Great Barrier Reef catchment. This level of participation reflects a long-term commitment to protect and conserve the health and resilience of the Reef.
- There was a high degree of awareness within companies and Councils of environmental management practices related to the improvement of water quality

and Reef health. Typical investments included the formation of a stormwater quality working group, capital investments in sewage treatment plant upgrades, creek rehabilitation projects, participation in best management practice programs for agriculture and public education about stormwater quality.

- There was a high degree of community engagement in environmental management practices affecting urban environments. Commitment to these programs was generally long-term and resulted in successful outcomes.

Areas needing improvement

- The level of commitment to and investment in environmental management practices varied significantly among stakeholders.
- A pattern of declining stewardship with distance inland from the coast and away from major regional centres was evident.
- A compliance rate of 67% was achieved from 58 inspections of urban sites by DEHP officers. This compliance rate is in the partially effective range. Non-compliances were most commonly related to a breach of approval conditions or a release to the environment.

The stewardship reporting framework

Stewardship is defined as ‘responsible planning and management actions’. The framework describes and evaluates environmental management efforts within the Mackay-Whitsunday region. It captures information on management efforts to maintain or improve ecosystem health of the Great Barrier Reef. It is based on the nation-wide State of the Environment Report management effectiveness framework.

Stewardship is rated on a scale from ‘very effective’ through to ‘ineffective’ based on a range of criteria covering administrative, operational and development activities during various management phases (planning, implementation and outcome).

Evaluation

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.

Evaluation used data collected via self-reporting (survey) and compliance data from DEHP. Each survey answer was translated into a numerical value to facilitate averaging of scores across activity groupings and management themes. Scores were then combined to produce scores (and corresponding ratings) for each company or organisation.

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).

The scores for the individual themes of planning, implementation and outcome were averaged and then assigned a stewardship rating of:

- >3.75 very effective,
- 3.00 – 3.75 effective,
- 2.00 – 2.99 partially effective,
- <2.00 – ineffective.

The overall stewardship rating awarded to the urban sector was derived from the lowest (i.e., the least effective) of the planning, implementation and outcome results.

The full report on scoring methods for stewardship can be accessed at http://healthyriverstoreef.org.au/report-card/technical-reports-for-pilot-report-card/

Urban Stewardship Framework

Activity	Criteria	Criteria Descriptions – minimum standards apply. Overall score for each activity cannot be higher than the minimum score for Implementation or outcome		
		Planning	**Implementation**	**Achievement**
Administration				
Extension and Research Projects: Note these cover urban water quality and ecosystem health related issues only.	Very Effective	There is planned involvement in several extension (community or industry) activities/programs that are focussed on research, monitoring or managing urban ecosystem health.	There is active involvement or support for extension programs relevant to urban ecosystem health, with long term commitments.	Highly successful outcomes of extension programs (e.g. support for the program, programs maintained in long-term or environmental goals achieved).
	Effective	There is planned involvement in more than one extension (community or industry) activities/programs that are focussed on focussed on research, monitoring or managing urban ecosystem health.	There is active involvement or support for extension programs relevant to ecosystem health, with annual commitments.	Successful outcomes of extension programs (e.g. support for the program, programs maintained in long-term or environmental goals achieved).
	Partially Effective	There is planned involvement in at least one extension (community or industry) activities/programs that are focussed on focussed on research, monitoring or managing urban ecosystem health.	There is sporadic active involvement or support for extension programs relevant to ecosystem health.	Some successful outcomes of extension programs (e.g. support for the program, programs maintained in long-term or environmental goals achieved).
	Not Effective	There is no planned involvement in extension (community or industry) activities/programs that are focussed on research, monitoring or managing urban ecosystem health.	There is limited or no involvement or support for extension programs relevant to ecosystem health, with long term commitments.	Few successful outcomes of extension programs (e.g. support for the program, programs maintained in long-term or environmental goals achieved).
EMS	Very Effective	EMS developed and certified to ISO 14001 standard. EMS addresses relevant major pressures and risks to urban water quality and ecosystem health.	EMS fully implemented, monitored and reviewed.	EMS certification maintained, frequently reviewed and updated.
	Effective	EMS developed to ISO 14001 standard, though no certification. EMS addresses relevant major pressures and risks to urban water quality and ecosystem health.	EMS implemented, monitored and reviewed.	EMS maintained, regularly reviewed and updated.
	Partially Effective	EMS developed, though not certified or to ISO 14001 standard. EMS addresses relevant major pressures and risks to urban water quality and ecosystem health.	Most but not all elements of EMS implemented, monitored and reviewed.	EMS maintained; review and updating of EMS occurs on an ad hoc basis.
	Not Effective	EMS not developed.	Few elements of EMS implemented, monitored and reviewed.	EMS not maintained or reviewed.
Systems for Development Assessment and Management	Very Effective	Where relevant, a system of development assessment and development management/regulation is in place that covers issues pertinent to urban environmental stewardship. The system fully integrates and often exceeds State requirements (e.g. *State Planning Policy 2014* requirements), considers a comprehensive suite of urban stewardship issues, provides detailed and innovative guidelines/specifications/design requirements to proponents, and is set up to apply during the planning or development assessment phase of projects. E.g. relevant sub-policies and procedures are in place that regulate urban development's impact on the environment.	The system is fully implemented, monitored and reviewed. The system enables council and the development industry to work together to come up with innovative design solutions that exceed regulatory requirements.	Systems maintained, frequently reviewed and updated. Development approval (DA) conditions are regularly innovative and conditions exceed state requirements.
	Effective	Where relevant, a system of development assessment and development management/regulation is in place that covers issues pertinent to urban environmental stewardship. The system fully integrates State requirements (e.g. *State Planning Policy 2014* requirements), considers urban stewardship issues, references guidelines/specifications/design requirements, and is set up to apply during the planning or development assessment phase of projects.	System implemented, monitored and reviewed. The system seeks to enable council and the development industry to work together to come up with design solutions to meet regulatory requirements.	System maintained, regularly reviewed and updated. DA conditions meet state requirements.

Activity	Criteria	Criteria Descriptions – minimum standards apply. Overall score for each activity cannot be higher than the minimum score for Implementation or outcome		
		Planning	**Implementation**	**Achievement**
	Partially Effective	A development assessment system makes mention of urban environmental issues though requirements for development assessment and management (such as guidelines/specifications/design requirements) lack detail and do not fully integrates State requirements (e.g. *State Planning Policy 2014* requirements).	Most but not all elements of the system are implemented, monitored and reviewed. The system seeks to enable council and the development industry to work together to come up with design solutions; however solutions often only partially meet regulatory requirements.	System maintained; review and updating of system occurs on an ad hoc basis. DA conditions partially meet state requirements.
	Not Effective	The development assessment system in place does not consider urban environmental issues or their management.	Few elements of system implemented, monitored and reviewed. The system does not enable council and the development industry to work together to come up with design solutions; however solutions rarely meet regulatory requirements.	System not maintained or reviewed. DA conditions do not meet industry or community expectations and are not accepted as best practice.
<u>Compliance approach:</u> Note that these apply to water quality and ecosystem health related authorities only	Very Effective	NA	Requirements of all authorities are implemented, monitored and reported on, with regular voluntary led engagement with regulators.	The results/learnings from incidents and near misses always feed into further development and update of management systems and operations.
	Effective	All site operational procedures/protocols are developed to fully comply with all aspects of environmental approvals (e.g. EAs, permits)	Requirements of all authorities are implemented, monitored and reported on, with some voluntary led engagement with regulators.	The results/learnings from incidents and near misses mostly feed into further development and update of management systems and operations
	Partially Effective	NA	Requirements of all authorities are implemented, monitored and reported on, with regulator-instigated engagement only.	The results/learnings from incidents and near misses sometimes feed into further development and update of management systems and operations
	Not Effective	Not all site operational procedures/protocols developed to fully comply with all aspects of environmental approvals (e.g. EAs, permits)	Few requirements of authorities are implemented, monitored and reported on, and there is a lack of engagement.	The results/learnings from incidents and near misses rarely feed into further development and update of management systems and operations
<u>Compliance Auditing and Enforcement</u>		N/A	For developments that had urban environmental management issues, all projects were adequately monitored (e.g. via site inspection or review of monitoring reports etc.) as part of the development assessment system (i.e. compliance assessment) during the last year.	There is full compliance with DA conditions.
		System of compliance monitoring has been developed, which prioritises compliance monitoring according to project risk, and includes both desktop assessment and site inspection.	For developments that had urban environmental management issues, a majority of projects were adequately monitored (e.g. via site inspection or review of monitoring reports etc.) as part of the development assessment system (i.e. compliance assessment) during the last year.	Non-compliance with DA conditions is infrequent and when it does occur, is reversible and does not cause significant harm to the environment.
		Compliance monitoring is formally planned; it occurs on ad hoc basis.	For developments that had urban environmental management issues, a majority of key projects were adequately monitored (e.g. via site inspection or review of monitoring reports etc.) as part of the development assessment system (i.e. compliance assessment) during the last year.	Non-compliance with DA conditions is infrequent and then only minor.
		No compliance monitoring system or plan is in place.	For developments that had urban environmental management issues, very few projects were adequately monitored (e.g. via site inspection or review of monitoring reports etc.) as part of the development assessment system (i.e. compliance assessment) during the last year.	Non-compliance with DA conditions is common.
<u>Strategic Assessment</u>	Very Effective	Strategic urban planning has been undertaken. It includes planning for land use change and intensification, catchment management and coastal / flood plain development and considers a broad suite of associated environmental issues in depth. Planning documents	Strategic planning frameworks are in place. Their influence clearly (explicitly) flows through the planning framework to guide development. Monitoring and reporting occur.	Development has proceeded in a way that is consistent with strategic planning and has exceeded requirements of environmental goals that underpin the strategic planning framework.

Activity	Criteria	Criteria Descriptions – minimum standards apply. Overall score for each activity cannot be higher than the minimum score for Implementation or outcome		
		Planning	**Implementation**	**Achievement**
		clearly show how regional environmental issues have influenced strategic planning arrangements.		
	Effective	Strategic urban planning has been undertaken It includes planning for land use change and intensification, catchment management and coastal/floodplain development. There is evidence that associated environmental issues have been considered.	Strategic planning frameworks are in place. Their influence flows through the planning framework to guide development. Monitoring and reporting occur.	Development has proceeded in a way that is consistent with strategic planning and meets requirements of environmental goals that underpin the strategic planning framework.
	Partially Effective	It includes planning for land use change and intensification, catchment management and coastal/floodplain development, though there is little evidence of how associated environmental issues have been considered.	Strategic planning frameworks are in place. Their influence flows through the planning framework to guide development, though there is no formal mechanism for this.	Development has proceeded in a way that is partially consistent with strategic planning and partially meets requirements of environmental goals that underpin the strategic planning framework.
	Not Effective	Urban environmental issues have not informed strategic planning exercises, or, no strategic planning has occurred.	Strategic planning frameworks are not in place or do not formally guide development.	Most development has proceeded in a way that contradicts strategic planning and the requirements of environmental goals underpinning a strategic planning framework.
<u>Urban Storm Water Management and Planning</u> This may include Urban Stormwater Quality Management Plans, Catchment or waterway management plans, Water Quality Improvement Plans, Healthy Waters Management Plans, and Natural Resource Management Plans.	Very Effective	Where relevant, an Urban Stormwater Management Plan (or similar) is in place. It considers legislative requirements (e.g. *State Planning Policy 2014*, *Environmental Protection [Water] Policy 2009*), community expectations, water quality goals and objectives that exceed regulatory requirements, baseline environmental conditions, the relevant threatening processes, methods to manage urban water quality, monitoring, maintenance/upgrade, clear and definitive actions, and funding. The plan can cover a regional, local or project scale and is supported at all relevant levels of governance. There are clear and explicit links to policy and/or procedures that assist in implementing the plan. The plan also incorporates existing strategic plans, programs and projects, including Water Quality Improvement Plans (WQIPs), Total Water Cycle Management Plans (TWCIPs), Healthy Waters Management Plans (HWMPs) and their operational components, where relevant.	Plan fully implemented, funded, monitored and reviewed. Supporting policies or procedures make reference to the plan.	All actions realised as per plan, or all actions on track to be fully realised on time. The plan facilitates innovative and locally appropriate solutions for urban stormwater management that achieve the relevant urban stormwater management design objectives.
	Effective	Where relevant, an Urban Water Quality Management Plan (or similar) is in place. It considers legislative requirements, community expectations, water quality goals and objectives, baseline environmental conditions, the relevant threatening processes, methods to manage urban water quality, monitoring, maintenance, high level actions and funding. The plan can cover a regional, local or project scale. There are links to supporting policy and/or procedures that assist in implementing the plan.	Plan mostly implemented, funded, monitored and reviewed.	Most actions realised as per plan, or most key actions on track to be fully realised on time. The plan facilitates locally appropriate solutions for urban stormwater management that achieve the relevant urban stormwater management design objectives.
	Partially Effective	No central Urban Water Quality Management Plan (or similar) exists, however, urban water quality is governed through a variety of formal methods that are centrally coordinated.	Plan partially implemented, funded, monitored and reviewed. Some barriers to full implementation are apparent.	Some actions realised as per plan, or some key actions on track to be fully realised on time. The plan facilitates locally appropriate solutions for urban stormwater management that partially achieve the relevant urban stormwater management design objectives.
	Not Effective	An Urban Water Quality Management Plan (or similar) is not in place and urban water quality management is not centrally coordinated, occurs in an ad hoc way and on a project by project basis.	A majority of the plan is not implemented, funded or monitored and there is no evidence of plan review. Significant barriers to implementation are apparent.	Very few (or no) actions realised as per plan, or very few key actions on track to be fully realised on time. The plan does not facilitate locally appropriate solutions for urban stormwater management and/or does not achieve the relevant urban stormwater management design objectives.
<u>Training, Knowledge and Staff Awareness</u>	Very Effective	Relevant staff are adequately qualified and highly experienced in environmental management. Further training or education around ecosystem health forms part of the professional development goals of key staff.	Environmental awareness or management training is provided to all staff, with more specific internal and external environmental training made available for environmental management staff.	All training development goals met.

Activity	Criteria	Criteria Descriptions – minimum standards apply. Overall score for each activity cannot be higher than the minimum score for Implementation or outcome		
		Planning	**Implementation**	**Achievement**
	Effective	Relevant staff are adequately qualified and/or highly experienced in urban environmental management.	Environmental awareness or management training is provided to all staff, with more specific internal environmental training made available for environmental management staff.	Most training development goals met.
	Partially Effective	Relevant staff are not adequately qualified, though have adequate experience in environmental management.	Environmental awareness or management training is provided to key staff.	Some training development goals met.
	Not Effective	Relevant staff are not present, adequately qualified and/or experienced.	Environmental awareness or management is not provided, or is out of date and/or missing important information.	No training development goals met.
Proactive Approaches to Seeking Knowledge	Very Effective	Regardless of the perceived need, expertise and third party accreditation is sought or provided (internally or externally) from adequately qualified and highly experienced people (e.g. WSUD, ESC, water treatment). Proactive involvement in networks (e.g. Reef Urban Stormwater Management Improvement Group, Reef Catchments, Healthy Waterways, other Natural Resource Groups).	NA	The proactive approach to seeking information has led to leading or innovative solutions.
	Effective	When required, expertise and third party accreditation is sought (internally or externally) in a timely manner from adequately qualified and experienced people/groups.	Advice is fully implemented.	The approach to seeking information has led to effective solutions.
	Partially Effective	Expertise is sought (internally or externally) from adequately qualified people/groups. The advice may be sought reactively or late.	Advice is partially implemented. Barriers unrelated to the quality of advice prevent some aspects of implementation.	The approach to seeking information has led to effective solutions, though achievement could have been improved with earlier or more proactive approaches.
	Not Effective	When required, expertise was not sought (internally or externally) from qualified or experienced people/groups.	Advice is not implemented. Barriers unrelated to the quality of advice prevent implementation.	It is likely that information deficiencies have led to environmental impacts that could have been avoided by seeking relevant information.
Information Availability and Dissemination Note these cover urban water quality and ecosystem health issues only. 'Information' relates to environmental science information, water quality management, design standards, information on legal frameworks, Geographic Information Systems, etc.	Very Effective	Although detailed, information is non-technical and easy to understand. Information comes in multiple media forms (including workshops and training, establishing pilot/research projects, seminars and information booklets, reports, design guidelines etc.) The information may be free (or very low cost), open source and able to be adapted and reproduced.	Information that enables stakeholders in the region to manage urban issues is very evidently and publically available. Active advertisement of the information occurs.	There is active uptake, involvement or support for information that is disseminated. Information is wide reaching. The target audience finds the information very useful. Highly successful stewardship outcomes due to information dissemination.
	Effective	Detailed information is available through may require technical backgrounds in the subject matter for understanding. Information comes in a few media forms. The information is not cost prohibitive to stakeholders.	Information that enables stakeholders in the region to manage urban issues is easy to access and actively advertised.	There is uptake, involvement or support for information that is disseminated. The target audience finds the information mostly useful. Successful stewardship outcomes due to information dissemination.
	Partially Effective	Information may be technical or cost prohibitive. Some stakeholders may be excluded from the information due to this.	Information that enables stakeholders in the region to manage urban issues is available and disseminated within closed or specialist groups, though is generally not actively advertised. It is slightly challenging to find and access the information.	There is a low level of stakeholder awareness for what information is available. The information has played some role in successful stewardship outcomes.
	Not Effective	Information is not available or lacking detail, or comes in a limited number of forms, is very technical, cost prohibitive to many stakeholders, and is held tightly in private by commercial enterprise.	Information is not actively disseminated or is hard to find or access.	No awareness or limited awareness of available information. There is little evidence that the information has a role in successful stewardship outcomes.
Community Engagement:	Very Effective	There is planned involvement to engage with the community on all aspects of planning (where relevant), operational activities and future development activities that relate to managing ecosystem	There is active involvement and support for community engagement programs relevant to ecosystem health, with a long term commitment.	There is a high participation rate and strong positive feedback from the community on the level of engagement provided.

Activity	Criteria	Criteria Descriptions – minimum standards apply. Overall score for each activity cannot be higher than the minimum score for Implementation or outcome		
		Planning	**Implementation**	**Achievement**
Note these cover water quality and ecosystem health related issues only.		health, as part of a broader strategy of environmental management or stakeholder engagement. Specialised NRM groups exist within the Mackay Whitsunday Region that cover urban stewardship issues.	NRM groups are highly active and organised around urban stewardships issues.	NRM groups run urban stewardship programs that are highly successful and innovative.
	Effective	There is planned involvement to engage with the community on some aspects of planning (where relevant), operational activities and/or future development activities that relate to managing ecosystem health, as part of a broader strategy of environmental management or stakeholder engagement. NRM groups exist within the Mackay Whitsunday Region that cover urban stewardship issues.	There is active involvement and support for community engagement programs relevant to ecosystem health, with annual commitments. NRM groups are active and organised around urban stewardships issues.	There is a high participation rate with generally positive feedback from the community on the level of engagement provided. NRM groups run urban stewardship programs that are successful.
	Partially Effective	There is some planned involvement to engage with the community on aspects of planning (where relevant), operational activities and/or future development activities, but without a broader strategy of environmental management or stakeholder engagement. NRM groups exist within the Mackay Whitsunday Region that partially cover urban stewardship issues.	There is active involvement and support for community engagement programs relevant to ecosystem health on an ad hoc or as needs basis. NRM groups are active and organised around urban stewardships issues, though often these are not priority issues.	There is a moderate participation rate with mixed feedback from the community on the level of engagement provided. NRM groups run urban stewardship programs that are partially successful.
	Not Effective	There is no planned involvement to engage with the community on aspects of planning (where relevant), operational activities and/or future development activities. NRM groups do not exist within the Mackay Whitsunday Region that cover urban stewardship issues.	There is limited or no involvement for community engagement programs relevant to ecosystem health. NRM groups are not active or organised around urban stewardships issues.	There is a low participation rate and negative (or an absence of) feedback from the community on the level of engagement provided. NRM groups run urban stewardship programs that have very limited benefit.
Operations				
<u>Operational and Ancillary activities:</u> Includes all urban operational elements that may affect ecosystem health, such as: implementation and maintenance of WSUD systems, ESC, stormwater management, ground water management, discharges, landside waste, stockpile management, hazardous substance storage, refuelling vehicles, spill management	Very Effective	All regulatory requirements (e.g. permits, EAs, Management Plans/procedures, and design requirements) are in place, plus innovation is shown.	Activities are undertaken with very high levels of compliance with regulatory requirements (>90%).	Very environmental incidents.
	Effective	All regulatory requirements ((e.g. permits, EAs, Management Plans/procedures, and design requirements) are in place.	Activities are undertaken with high levels of compliance with regulatory requirements (80-90%).	Few, minor environmental incidents.
	Partially Effective	NA	Activities are undertaken with moderate levels of compliance with regulatory requirements (60-80%).	Regular, minor environmental incidents.
	Not Effective	Not all regulatory requirements ((e.g. permits, EAs, Management Plans/procedures, and design requirements) are in place.	Activities are undertaken with poor levels of compliance with regulatory requirements (<60%).	Continual, minor environmental incidents and/or one (or more) major environmental incident.
Site Development				
<u>Site development or</u>	Very Effective	All regulatory requirements (e.g. permits, EAs, approvals) are in place.	Activities are always undertaken in line with regulatory requirements.	The project is designed to benefit environmentally sensitive receptors (e.g. a project that retrofits Water Sensitive Urban Design over a wide

Activity	Criteria	Criteria Descriptions – minimum standards apply. Overall score for each activity cannot be higher than the minimum score for Implementation or outcome		
		Planning	**Implementation**	**Achievement**
<u>significant upgrades:</u> New / significant upgrades or expansion (site expansion, new buildings, services, facilities). The criteria apply to both planning and construction phases.		Planned development is consistent with legislated land use plans and/or site master plans, which have been developed taking all environmental values into account.		scale or a constructed wetland), or cause no harm to environmentally sensitive receptors from development. Development is undertaken in line with legislated land use plans and/or site master plans, which have been developed taking all environmental values into account.
	Effective	All regulatory requirements (e.g. permits, EAs, approvals) are in place. Planned development is mostly consistent with legislated land use plans and/or site master plans, which have been developed taking major environmental values into account.	Activities are undertaken in line with regulatory requirements, except in exceptional circumstances.	Minimal and reversible harm to environmentally sensitive receptors from development.
	Partially Effective	All regulatory requirements (e.g. permits, EAs, approvals) are in place. Planned development is not guided by land use plans and/or site master plans.	Activities are mostly undertaken in line with regulatory requirements.	Moderate and long-term harm to environmentally sensitive receptors from development.
	Not Effective	Not all regulatory requirements (e.g. permits, EAs, approvals) are in place.	Activities are not undertaken in line with regulatory requirements.	Significant harm to environmentally sensitive receptors from development.

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