

Trialling an Assessment and Monitoring Program for the Human Dimensions of the Reef 2050 Integrated Monitoring and Reporting Program

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Final Report: Trialling an Assessment and Monitoring Program for the Human Dimensions of the Reef 2050 Integrated Monitoring and Reporting Program

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Australian Government



Supported by the Australian Government's
National Environmental Science Program

Project 3.2.2: The IMS 2050 Human Dimensions Project: Cost-effective Indicators and Metrics for key GBRWHA human dimensions linked to Reef 2050 Plan objectives and target

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National Library of Australia Cataloguing-in-Publication entry:
978-1-925514-16-2

This report should be cited as:

Gooch, M., Marshall, N., Dale, A., & Vella, K. (2018). *NESP Project 3.2.2 Final Report: Trialling an Assessment and Monitoring Program for the Human Dimensions of the Reef 2050 Integrated Monitoring and Reporting Program* Report to the National Environmental Science Programme. Reef and Rainforest Research Centre Limited, Cairns (97pp).

Published by the Reef and Rainforest Research Centre on behalf of the Australian Government's National Environmental Science Programme (NESP) Tropical Water Quality (TWQ) Hub.

The Tropical Water Quality Hub is part of the Australian Government's National Environmental Science Programme and is administered by the Reef and Rainforest Research Centre Limited (RRRC). The NESP TWQ Hub addresses water quality and coastal management in the World Heritage listed Great Barrier Reef, its catchments and other tropical waters, through the generation and transfer of world-class research and shared knowledge.

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ACRONYMS

ABARES	Australian Bureau of Agricultural and Resource Economics and Sciences
ABS	Australian Bureau of Statistics
ACS	Aspirations, Capacity and Stewardship
AIMS	Australian Institute of Marine Science
AMSA	Australian Maritime Safety Authority
BMP	Best Management Practice
CEO	Chief Executive Officer
CH	Culture and Heritage
CQU	Central Queensland University
CV	Community Vitality
DAE	Deloitte Access Economics
DEHP	Department of Environment and Heritage Protection
DIDO	Drive-in, Drive-out
DPSIR	Drivers-Pressures-State-Impact-Response
EMC	Environment Management Charge
EV	Economic Values
FTE	Full Time Employees
FIFO	Fly-in Fly-out
GBR	Great Barrier Reef
GBRMP	Great Barrier Reef Marine Park
GBRMPA	Great Barrier Reef Marine Park Authority
GBRWHA	Great Barrier Reef World Heritage Area
GRP	Gross Regional Product
GU	Griffith University
HDEG	Human Dimensions Expert Group
HESBs	High Efficiency Sediment Basins
IPBES	Intergovernmental Panel on Biodiversity and Ecosystem Services
LGA	Local Government Area
LNG	Liquefied Natural Gas
MPA	Marine Protected Area
MSQ	Maritime Safety Queensland
MTSRF	Marine and Tropical Science Research Facility
NESP	National Environmental Science Programme
NRM	Natural Resource Management
NPSR	Department of National Parks, Sport and Racing
OUV	Outstanding Universal Value
PAM	Protected Areas Management
POM	Plan of Management
QDAF	Queensland Department of Agriculture and Fisheries
QDEHP	Queensland Department of Environment and Heritage Protection
QDES	Queensland Department of Environment and Science
QCSSI	Queensland Centre for Social Science Innovation
QGSO	Queensland Government Statistician's Office
QoL	Quality of Life
QPWS	Queensland Parks and Wildlife Service

Reef 2050 Plan	.... The Great Barrier Reef 2050 Long-Term Sustainability Plan
RIMReP	..... Reef Integrated Monitoring and Reporting Program
RRRC	..... Reef and Rainforest Research Centre
SELTMP	..... Social and Economic Long-Term Monitoring Program
SPP	..... State Planning Policy
TEK	..... Traditional Ecological Knowledge
TMR	..... Department of Transport and Main Roads
TO	..... Traditional Owner
TRA	..... Tourism Research Australia
TSS	..... Total Suspended Solids
UC	..... University of Canberra
UNSW	..... University of New South Wales
WH	..... World Heritage
WQ	..... Water Quality

ACKNOWLEDGEMENTS

Funding was provided by the Australian Government's National Environmental Science Program (NESP) Tropical Water Quality (TWQ) Hub and supplemented through investment secured through the Australian Institute of Marine Science (AIMS) to progress conceptual thinking about monitoring of the human dimensions of the GBR (as part of the wider Reef Integrated Monitoring and Reporting Program (RIMReP) process). The NESP TWQ Project team would like to extend our sincere thanks or the contributions made by the RIMReP's Human Dimensions Expert Group: Bruce Taylor, David Souter, Col McKenzie, Diane Tarte, Charlie Morgan, John Rolfe, Liz Wren, Paul Doyle, Duane Fraser, Diane Jarvis, Ro Hill, Sean Pascoe, Dorean Erhart, Kirstin Kenyon, Matthew Curnock, Fergus Molloy, Dylan Horne, Billie Gordon, Kirstin Kenyon, Chrissy Grant, James Udy, James Webley, Susanne Becken, Pete Illidge and Matt Kealley. We would also like to thank Katrina Keith, for her fine editing skills, Jennifer McHugh for her positive and cherry support for the project and Gena Williams for her detective skills in tracking down relevant secondary data sets. We would also like to thank our participating actors/experts in the regional panels, who made valuable contributions and adjustments to our evidence tables. Finally, we would sincerely like to acknowledge the detailed review of the draft report by Gay Crowley.

EXECUTIVE SUMMARY

The Great Barrier Reef (GBR) is recognised as one of Australia's and the world's great natural treasures. It also provides many social, cultural, institutional and economic benefits that contribute to human wellbeing. In turn, each person's relationship with the GBR is also influenced by a range of social, cultural, institutional and economic factors. Understanding these interactions is critical if we are to manage the GBR in a way that not only protects its natural values, but preserves and enhances its social values and the communities that have a relationship with it. These interactions (of the GBR and of people on the GBR) should inform the design of GBR-related governance and management systems at different scales. At the whole of GBR scale, managers need to understand wider societal interests in the GBR and socio-economic trends that influence whole of GBR outcomes. As a more local level example, managers are interested in how many people directly use or visit particular sites within the GBR; who these people are, where they go, what they do and why. The GBR's human dimensions also have regional, GBR-wide, national and international aspects.

National Environmental Science Program (NESP) Tropical Water Quality (TWQ) Hub Project 3.2.2 provides a methodology for assessing and monitoring the GBR's human dimensions as a key mechanism to support governance and management of the GBR. It uses a conceptual framework to identify appropriate sets of indicators for characterising the desired state of the GBR's human dimensions at the whole-of-GBR and regional scales. Some 25 indicator attributes that describe people's relationship with the GBR can be grouped into five key attribute clusters. These include: (i) human aspirations, capacities and stewardship associated with the GBR; (ii) community vitality related to GBR outcomes; (iii) economic values related to GBR outcomes; (iv) culture and heritage related to the GBR; and (v) the health of governance systems affecting GBR outcomes. The framework is presented in full in Table 1 which also highlights major data gaps needed to inform this approach. Ongoing collection (regular and funded) of data related to these gaps is needed to fulfil the Reef 2050 Plan reporting of the GBR's human dimensions.

By populating the framework with available evidence (mostly secondary data sets) and regional discussions, we were able to demonstrate that all of the six natural resource management (NRM) regions within the GBR catchment scored moderately to well against all human dimension clusters, with conditions tending to decline with distance away from Brisbane for all clusters. Through the application of this framework, the project has already highlighted several significant and emerging implications for the Reef 2050 Plan review including:

- 1) The Australian and Queensland governments need to continue building **partnerships with agricultural, tourism, fishing and recreational user communities and progress effective stewardship approaches.**
- 2) Government agencies/researchers need to implement a **stronger free, prior and informed consent-based approach in working with GBR Traditional Owners.**
- 3) Government agencies and research institutions need to increase efforts to understand **human use patterns across the GBR** – how many people visit the GBR, where do people they go, how do they get there, why do they go.

- 4) Government agencies, in partnership with stakeholders, should progress **system-wide approaches for continuous improvement within the wider system of governance affecting GBR outcomes**. Efforts are needed to align policy and programs across a range of major policy areas that affect GBR outcomes, and significantly enhancing long term delivery systems. Improved connectivity is needed between environment, economic/regional development policy and social resilience programs of the Australian and Queensland governments and local governments. Effort needs to be better aligned across portfolios and levels of decision-making to address social and economic wellbeing and ecological health in the GBR.
- 5) A significant **social license to operate needs to be built across the international and Australian community levels** if government policies are to seek more urgent approaches to GBR protection and restoration in the face of climate change.
- 6) Government agencies and research institutions significantly need to increase efforts to protect **historical maritime heritage** in the GBR.
- 7) To assist implementing the Reef 2050 Plan, the Australian and Queensland governments could more **actively explore policies that increase the economic diversity and adaptive capacity of GBR-dependent regions - particularly north of Gladstone**.

This NESP-funded work was undertaken with collaboration and input from a GBR-wide (RIMReP) Human Dimensions Expert Group and six Regional Discussion Panels in the GBR catchment. As a result of this work, alignment of the human dimensions framework with Reef 2050 Plan targets, objectives and outcomes has revealed several gaps in the structure and implementation of the Reef 2050 Plan. It has also identified some human dimension attributes that are under-represented or overlooked in the Reef 2050 Plan. The consultation and expert-advisory processes used, and an associated literature review, also helped to shape the human dimensions framework.

Table 1: Framework for bench-marking: GBR human dimension clusters, attributes and key indicators and their alignment with Reef 2050 Plan themes

Attributes and indicators for which data collection is missing, or inadequate, and/or funding is non-ongoing are highlighted in red.

Reef 2050 Plan Theme	Human Dimension Clusters	Human Dimension Attributes	Key Indicator sets
All seven themes (i.e., economic benefits, community benefits, heritage, governance, water quality, biodiversity & ecosystem health).	Aspirations, capacity & stewardship (ACS). Cohesive vision & aspirations for the future of the GBR together with awareness, skills, knowledge & capacities to turn aspirations into action. Personal & collective (including industry) efforts to: (a) minimise impacts on the GBR & catchment; (b) restore degraded marine, coastal & catchment ecosystems; (c) apply ESD principles; & (d) be actively involved in GBR & catchment management.	ACS1 Levels of community awareness & education about the GBR	ACS1.1 Regional education/skills levels ACS1.2 Levels of awareness of NRM issues ACS1.3 Levels of awareness of GBR & waterway condition & threats ACS1.4 Number/type of GBR learning opportunities
		ACS2 Community capacity for stewardship	ACS2.1 Sense of responsibility towards the environment ACS2.2 Sense of responsibility towards the GBR & coastal waterways ACS2.3 Regional Reef-based stewardship activities ACS2.4 Numbers & types of Traditional Owner (TO) involvement in on-ground Water Quality (WQ) improvement & monitoring
		ACS3 Adoption of responsible/ best practice – GBR recreational users	ACS3.1 Extent & type of stewardship practices of GBR recreational users ACS3.2 Number of people visiting the GBR ACS3.3 Why people visit the GBR ACS3.4 Where people visit the GBR ACS3.5 What people do in the GBR ACS3.6 How people get to the GBR
		ACS4 Adoption of responsible/ best practice – Agricultural & land sector	ACS4.1 Extent & type of stewardship practices of agricultural industries
		ACS5 Adoption of responsible/ best practice – Industry & urban sector	ACS5.1 Extent & type of stewardship practices of urban councils & industries

Reef 2050 Plan Theme	Human Dimension Clusters	Human Dimension Attributes	Key Indicator sets
		<p>ACS6 Adoption of responsible/ best practice – Marine industries</p>	<p>ACS6.1 Extent & type of stewardship practices of GBR-associated industries (e.g., ports & shipping)</p> <p>ACS6.2 Arrangements to ensure GBR shipping is safe</p> <p>ACS6.3 Number of shipping accidents</p> <p>ACS6.4 Extent to which ports & shipping apply 'best practice' principles</p> <p>ACS6.5 Extent & type of stewardship practices of GBR-based tourism</p> <p>ACS6.6 Extent & type of stewardship practices of GBR-dependent commercial fishing</p>
<p>Community benefits An informed community that plays a role in protecting the Reef for the benefits a healthy Reef provides for current & future generations.</p>	<p>Community Vitality (CV). Characterised by demographic stability, security, happiness & well-being. Community vitality associated with the GBR includes how & why people access, use & value the GBR; services & infrastructure supporting the interface between the community & GBR; & the social health derived from the GBR, e.g., nature appreciation, relaxation, recreation, physical health benefits, & other lifestyle benefits derived from the GBR. A healthy GBR community derives high levels of appreciation & enjoyment from the GBR & is highly satisfied</p>	<p>CV1 Demographic stability across the catchment</p> <hr/> <p>CV2 Security in the catchment including housing, safety & risk management</p> <hr/> <p>CV3 Wellbeing/ happiness within the general community</p>	<p>CV1.1 Basic demographic characteristics (e.g., population, age structure, migration & growth rates)</p> <p>CV1.2 Migration intentions over the next 12 months</p> <hr/> <p>CV2.1 Financial distress: (i) delay or cancel non-essential purchases; (ii) could not pay bills on time; (iii) went without meals, or unable to heat or cool home; (iv) asked for financial help from friends or family</p> <p>CV2.2 Crime rates</p> <p>CV2.3 Perceptions of safety</p> <p>CV2.4 Housing including availability & affordability</p> <hr/> <p>CV3.1 Community wellbeing (1-7): (i) place to live, (ii) coping with challenges, (iii) pride, (iv) optimism, (v) community spirit</p> <p>CV3.2 Decreasing community liveability: (i) liveability; (ii) friendliness; (iii) local economy; (iv) local landscape</p> <p>CV3.3 Personal Wellbeing (0-100). Satisfaction with: (i) standard of living; (ii) health; (iii) achievements; (iv) relationships; (v) safety; (vi) feeling part of community; (vii) future security</p> <p>CV3.4 Levels of physical health</p> <p>CV3.5 Levels of mental health</p>

Reef 2050 Plan Theme	Human Dimension Clusters	Human Dimension Attributes	Key Indicator sets
	with the GBR & its management.	<p>CV4 Community health/ wellbeing/ satisfaction associated with the GBR</p> <hr/> <p>CV5 Regional services & service infrastructure supporting the interface between the community & GBR</p>	<p>CV4.1 GBR contributions to quality of life & wellbeing GBR contribution to: (i) Quality of Life (QoL); (ii) desirable way of life & ecosystem services, e.g., fresh seafood; (iii) optimism about the future; (iv) satisfaction with GBR experiences; (v) GBR experiences (negative & positive); (vi) physical &/or mental health</p> <p>CV4.2 Stress associated with decline in GBR health</p> <p>CV4.3 Indigenous health associated with the GBR</p> <p>CV4.4 Commercial fishers' wellbeing</p> <p>CV4.5 Tourism operators' wellbeing</p> <hr/> <p>CV5.1 Energy/water security</p> <p>CV5.2 Quality of infrastructure</p> <p>CV5.3 Impacts on infrastructure</p> <p>CV5.4 Perceptions of access to health, education, aged care & child care</p> <p>CV5.5 Perceptions of access to roads & public transport</p>
<p>Heritage</p> <p>Indigenous & non-Indigenous heritage values are identified, protected, conserved & managed such that the heritage values maintain their significance for current & future generations.</p>	<p>Culture and Heritage (CH).</p> <p>Status of integrated & diverse culture & heritage associated with the GBR catchment. Cultural & heritage connections promote a sense of place associated with GBR coastal communities, & there is a strong sense of place attachment & identity associated with the community, because of its association with the GBR. This cluster also includes values of significance in accordance with TO practices, observances, customs, traditions, beliefs or</p>	<p>CH1 World Heritage – underpinned by ecosystem health, biodiversity & water quality</p> <hr/> <p>CH2 Indigenous (TO) heritage</p>	<p>CH1.1 State of regional natural assets</p> <p>CH1.2 Perceptions of GBR aesthetic beauty & other world heritage attributes</p> <p>CH1.3 Impacts on GBR-Wide World Heritage values</p> <hr/> <p>CH2.1 ID, state & trend of Indigenous heritage values</p> <p>CH2.2 TO management of GBR resources including number & strength of: (a) TO connections with GBR resources incl. identification, protection & management of Indigenous cultural heritage in sea country; (b) TO benefits derived from the GBR; (c) partnerships, institutional arrangements & agreements between TOs & all GBR stakeholders; (d) TO-driven frameworks & participatory monitoring methods</p> <p>CH2.3 Levels of TO satisfaction with: (a) identification, documentation & storage of cultural information; (b) TO led methodologies; (c) participation in GBR management; (d) extent to which Traditional Ecological Knowledge (TEK) is identified, maintained & transferred</p> <p>CH2.4 Levels of TO use & dependency on the GBR</p> <p>CH2.5 Impacts on Indigenous heritage</p>

Reef 2050 Plan Theme	Human Dimension Clusters	Human Dimension Attributes	Key Indicator sets
	<p>history. Historic heritage is specifically concerned with the occupation & use of an area since the arrival of European & other migrants. There are 4 major attributes associated with this cluster: natural heritage; Indigenous heritage; contemporary culture; historic cultural heritage.</p>	<p>CH3 Contemporary culture</p> <hr/> <p>CH4 Historic maritime heritage</p>	<p>CH3.1 Place attachment, identity CH3.2 GBR as culture – levels of pride, inspiration & personal connection to the GBR CH3.3 National connections to the GBR CH3.4 Impacts on contemporary culture</p> <hr/> <p>CH4.1 Identification, protection & management of GBR historic maritime heritage CH4.2 Cultural significance of historic maritime heritage values for the GBR CH4.3 Impacts on historic maritime heritage values</p>
<p>Economic Benefits Economic activities within the Great Barrier Reef World Heritage Area & its catchments sustain the GBR's Outstanding Universal Value.</p>	<p>Economic values (EV). Monetary & non-monetary advantages that people derive directly or indirectly from a healthy & well-managed GBR. Fundamental is the premise that economic activities within the Great Barrier Reef World Heritage Area (GBRWHA) & its catchments are ecologically sustainable. GBR-dependent industries rely on a healthy GBR & include GBR-based commercial fishing, tourism, recreation, research & TO use. GBR-associated industries include industries that may impact on the GBR, but are not economically dependent on GBR health, e.g., shipping, catchment industries such as agriculture, urban development, port development.</p>	<p>EV1 Size & diversity of regional economic growth</p> <hr/> <p>EV2 Economic viability of GBR-associated industries</p> <hr/> <p>EV3 Economic viability of GBR-dependent industries</p> <hr/> <p>EV4 Inclusiveness & economic fairness/ equity</p> <hr/> <p>EV5 Workforce participation & employment</p> <hr/> <p>EV6. Economic confidence within the region</p>	<p>EV1.1 Gross Regional Product (GRP) EV1.2 Core industries – size & type</p> <hr/> <p>EV2.1 Economic viability of Mining & minerals EV2.2 Economic viability of Ports & shipping EV2.3 Economic viability of Agriculture EV2.4 Economic viability of Urban industries</p> <hr/> <p>EV3.1 Vulnerability of GBR-dependent industries EV3.2 Adaptive capacity of GBR-dependent industries EV3.3 Economic viability of GBR-tourism EV3.4 Economic viability of GBR-commercial fishing</p> <hr/> <p>EV4.1 Income – personal & household EV4.2 Opportunities for GBR TOs EV4.3 Equity between & within industries/ activities.</p> <hr/> <p>EV5.1 Regional employment participation rates & trends EV5.2 GBR- related employment EV5.2.1 No. employment opportunities for TOs in GBR sea-country management EV5.2.2 No. employment opportunities for TOs in GBR-based industries</p> <hr/> <p>EV6.1 Regional economic confidence EV6.2 Confidence in GBR industries</p>

Reef 2050 Plan Theme	Human Dimension Clusters	Human Dimension Attributes	Key Indicator sets
<p>Governance The Outstanding Universal Value of the Reef is maintained & enhanced each successive decade through effective governance arrangements & coordinated management activities.</p>	<p>Governance (G). The health of GBR-based decision-making systems (from local to international scales), including levels of connectivity between different parts of the governance system, effective use of diverse knowledge sets & system capacity for effective action. Also includes viability of institutional arrangements; community participation in GBR management; & use of strong principles in planning & management.</p>	<p>G1 Strategic focus of governance system</p>	<p>G1.1 No./ type of opportunities for improved Reef 2050 Plan governance G1.2 No./severity of system-wide problems for delivery of key Reef 2050 Plan targets</p>
		<p>G2 Connectivity within & between key decision making institutions & sectors in the system</p>	<p>G2.1 No./ type governance subdomains (or policy areas) that counteract Reef 2050 Plan targets/action G2.2 Status of partnerships, inter-governmental arrangements G2.3 Levels of transparency, ownership, accountability, responsiveness G2.4 Inter-generational equity in GBR-related decision-making G2.5 Intra-generational equity in GBR-related decision-making</p>
		<p>G3 Adaptive governance capacity of key decision making institutions & sectors in the system</p>	<p>G3.1 Levels of integrated strategy development & delivery design G3.2 Support for management G3.3 Confidence in management G3.4 Sectoral/community contributions to decision-making</p>
		<p>G4 Adaptive use & management of integrated knowledge sets in the system.</p>	<p>G4.1 Availability of integrated knowledge sets G4.2 Use of integrated knowledge sets in decision-making G4.3 Management of integrated knowledge sets</p>

1.0 INTRODUCTION

1.1 Managing the GBR's human dimensions

The Great Barrier Reef (GBR) is recognised as one of Australia's and the worlds' great natural treasures. To date, management has focussed on maintaining and restoring its natural values, including by minimising the adverse impacts of human activities. The GBR provides many social, cultural, institutional and economic benefits that contribute to human wellbeing. In turn, each person's relationship with the GBR is also influenced by a range of social, cultural, institutional and economic factors. Understanding these interactions is critical if we are to manage the GBR in a way that not only protects its natural values, but preserves and enhances its social values as well. In focussing solely on negative human impacts affecting the GBR, current protection programs miss valuable opportunities to empower people to work in partnership for management. Human dimensions should inform the design of GBR-related governance and management systems at different scales.

There is growing recognition that communities and various sectors within the wider community have a much more dynamic relationship with marine and coastal resources than merely causing negative impacts, and that these operate at different scales (Ban et al., 2017; Christie et al., 2003; Cinner & David, 2011; Edgar, Russ & Babcock, 2007; Kittinger et al., 2014; Pollnac et al., 2010). People whose identity, enjoyment and livelihoods depend on the GBR are a powerful source of custodianship, and deepen social, cultural and economic ties to the GBR, but their contribution to any collaborative management initiative depends on socially-enabling factors such as equity issues, trust, participation and compliance. Building such collaborative arrangements could be the way forward for GBR managers to achieve their goals and provide tangible benefits to local, national and international communities at the same time (Christie et al., 2003). To improve GBR health, policy makers and managers at different scales (from the whole of GBR to specific localities) need to understand and monitor: (a) people's relationship with the GBR, including how many people directly use/visit it, where they go, how they get there, what they do, and why; (b) behavioural and psychological forces driving actions that affect the GBR (positively or negatively); (c) the role of GBR decision-makers including users, managers, partners, communities and industry in affecting change; (d) equity and inclusion of multiple perspectives; and (e) the adaptive capacity of industries and communities who depend on a healthy GBR for the economic, social, or cultural values that it provides.

1.2 Reef 2050 Plan and the RIMReP

Activities to protect and restore the GBR's Outstanding Universal Value are undertaken under the [Reef 2050 Long-Term Sustainability Plan](#) (Reef 2050 Plan). This plan sets actions, targets, objectives and outcomes to drive and guide GBR management. Its primary focus is to reduce and mitigate human impacts associated with pollution, waste disposal, shipping, coastal development, fishing and hunting. The Great Barrier Reef Marine Park Authority (GBRMPA) established the Reef 2050 Integrated Monitoring and Reporting Program (RIMReP) to provide a coordinated and integrated monitoring, modelling and reporting framework for the GBR and its catchment, explicitly linked to the outcomes in the Reef 2050 Plan (GBRMPA, 2015). The aim of RIMReP is to allow the early detection of trends and changes in the GBR system; inform assessment of key threats and future risks; and enable timely management responses. The

RIMReP will inform annual report cards and GBRMPA’s five-yearly Outlook Report, which will be the principal guide for reviewing the Reef 2050 Plan (GBRMPA, 2015). The Outlook Report provides an assessment of GBR values and an evaluation of management effectiveness. The Reef Plan aims to restore the condition of values assessed as ‘poor’ or ‘very poor’ and to maintain and enhance where condition is assessed as ‘good’ or ‘very good’ (GBRMPA, 2014a). In the past, human dimensions of the GBR have been largely restricted to the heritage and commercial and non-commercial use categories, subdivided into economic and social benefits of use (Figure 1) and impacts of use (Figure 2). As discussed earlier in this report, this codification does not adequately reflect the full scope of human dimensions. Hence, the Program Design tasks set for RIMReP will need to enable the codification of human dimensions, establish a set of attributes and indicators for measuring the state (grade and trend in Figures 2 and 3) of each attribute (in line with the example shown in Figure 3), and to link a set of indicators to each possible outcome state.

2009 Grade	Current summary and assessment components	Assessment grade and trend				Confidence	
	Economic and social benefits of use: Use of the Great Barrier Reef continues to contribute to local communities and the national economy. Its economic value has increased over the past five years as has the number of jobs it supports. The number of recreational visits appears to be increasing and declines in tourism visitor numbers until 2011 are now beginning to be reversed. Traditional use helps maintain Traditional Owner connections to their sea country. Some users financially contribute to management.						
		Very good	Good	Poor	Very poor	Grade	Trend
	Commercial marine tourism: Tourism continues to make a significant contribution to the presentation, management and economic value of the Great Barrier Reef.					●	●
	Defence activities: Activities in the Great Barrier Reef continue to directly contribute to the training and operations of Australia’s defence services.					●	●
	Fishing: Commercial fishing and aquaculture in and adjacent to the Region generate about \$160 million per year. Recreational fishing continues to be one of the most popular pastimes in the Region.					●	●
Not assessed	Ports: Ports adjacent to the Region support trade for Queensland industries and communities. Their economic contribution is increasing.					●	
	Recreation (not including fishing): The opportunity to enjoy the Region’s environment continues to be of social value to Queensland residents, other Australians and international visitors.					◐	◐
	Research and educational activities: A range of academic institutions and government agencies undertake research about the Great Barrier Reef, providing income and employment in regional communities.					●	●
Not assessed	Shipping: Shipping through the Region provides a range of social and economic benefits to catchment communities and the nation.					●	
	Traditional use of marine resources: Traditional use of marine resources continues to provide environmental, social, economic and cultural benefits to Traditional Owners and their sea country.					○	○
Grading statements		Trend since 2009				Confidence	
 Very good Use of the Region provides significant economic and social benefit, in ways that sustain the fundamental value of the natural resource. The Region is strongly recognised, valued and enjoyed by catchment residents, the nation and the world community.	 Good Use of the Region provides valuable economic and social benefit. The Region is valued by catchment residents, the nation and the world community.	 Poor There are few and declining economic and social benefits derived from use of the Region. Many do not recognise the value of the Region and do not enjoy their visit to the Region.	 Very poor Use of the Region contributes little or no economic and social benefit. The Region holds little value for catchment residents, the nation or the world community.	↑ Improved ↔ Stable ↓ Deteriorated — No consistent trend	● Adequate high-quality evidence and high level of consensus ◐ Limited evidence or limited consensus ○ Inferred, very limited evidence		

Figure 1: Assessment of economic and social benefits of use of the Great Barrier Reef from the 2014 GBR outlook report. (SOURCE: GBRMPA, 2014a)

2009 Grade	Current summary and assessment components	Assessment grade and trend				Confidence	
		Very low impact	Low impact	High impact	Very high impact	Grade	Trend
	Impacts of use: The impacts of different uses of the Great Barrier Reef overlap and are concentrated inshore, particularly next to developed areas. Some uses have only minor and localised effects, for example defence activities, research and educational activities, and traditional use. Cumulative effects of tourism and recreation activities are localised around popular locations. Port activities and their flow-on impacts are generally in areas that are already under pressure from an accumulation of impacts. There are concerns about overfishing of some fish stocks, and the effects of fishing on some species of conservation concern. The survival of non-retained species is not monitored or well understood.						
	Commercial marine tourism: Marine tourism extends throughout the Great Barrier Reef; its impacts are localised, mainly in a few intensively managed areas.						
	Defence activities: Most defence activities occur within a limited area. The level of planning and resourcing for defence activities means incidents are rare.						
	Fishing: Fishing occurs in many parts of the Region, extracting mostly predators and particle feeders. It can result in the entanglement and death of species of conservation concern, reductions of targeted species with implications on the food chain, and impact on Indigenous heritage values. The status of most targeted species and estimates of discarded catch are not well known. Fisheries management continues to improve; more can be done. Illegal fishing remains a concern.						
Not assessed	Ports: Port activities have local adverse impacts, including from dredging and dredge material disposal. Understanding of the effects of dredging and disposal is improving; the cumulative effects are not well understood.						
	Recreation (not including fishing): The impacts of recreation are mainly localised in inshore areas, particularly close to regional centres.						
	Research and educational activities: Research and educational activities are concentrated around research stations; minor, localised effects are likely.						
Not assessed	Shipping: Despite an increase in shipping activity, impacts are relatively stable. Proactive management is addressing emerging risks. Ship grounding sites can take decades to recover.						
	Traditional use of marine resources: Traditional hunting, fishing and collecting involves a range of marine species (some of conservation concern) but levels of take are considered sustainable. Poaching is being addressed.						

Grading statements				Trend since 2009	
Very low impact Any impacts attributable to use of the Region are minor and localised, with no observable effects on overall ecosystem function or heritage values.	Low impact The impacts of use are observable in some locations or on some values, but only to the extent that limited additional intervention would be required for the use to be sustainable.	High impact The impacts of use are obvious in many locations or to many values to the extent that significant additional intervention would be required for the use to be sustainable.	Very high impact The impacts of use are widespread, to the extent that ecosystem function and heritage values are severely compromised.		Increased
					Stable
					Decreased
					No consistent trend
				Confidence	
					Adequate high-quality evidence and high level of consensus
					Limited evidence or limited consensus
					Inferred, very limited evidence

Figure 2: Assessment of impacts of use on Great Barrier Reef values from the 2014 GBR outlook report (SOURCE: GBRMPA, 2014a)

Functional group of values	Condition grading statement			
	Very good	Good	Poor	Very poor
Economic and social benefits of use	Use of the Region provides significant economic and social benefit, in ways that sustain the fundamental value of the natural resource. The Region is strongly recognised, valued and enjoyed by catchment residents, the nation and the world community.	Use of the Region provides valuable economic and social benefit. The Region is valued by catchment residents, the nation and the world community.	There are few and declining economic and social benefits derived from the use of the Region. Many do not recognise the value of the Region and do not enjoy their visit to the Region.	Use of the Region contributes little or no economic and social benefit. The Region holds little value for catchment residents, the nation or the world community.

Figure 3: Example of condition grading used in earlier versions of the GBR outlook reports
(SOURCE: GBRMPA, 2014a)

1.3 GBR management information needs

The RIMReP will provide information to GBR managers who are required to make sound decisions for different management needs, which may be categorised as:

- Tactical (e.g., responding to an event; vessel grounding, flood, cyclone, bleaching)
- Operational (e.g., permits, prioritise compliance effort and infrastructure)
- Strategic planning (e.g., revisions to Reef Plan and Reef 2050, zoning and policy)
- Quantifying effectiveness of management actions (outcomes achieved with funding)
- Reporting to community and stakeholders (e.g., report cards, Outlook reports). (Udy, 2017).

Udy (2017) identified three ways that information can be provided to managers, based on interviews with 45 GBR managers¹:

- Maps showing the spatial distribution of various attributes
- Temporal mapping of condition and value and changes over time
- Process understanding of causal factors that informs decision support tools, to predict the outcomes of management actions.

Table 2 provides some examples of how human dimensions data may be used for different management purposes. Incorporating human dimensions into GBR management, assessment and monitoring, particularly to meet Reef 2050 Plan reporting requirements will require socio-economic information across all scales and categories.

¹ In this document, GBR managers refers to policy officers and field staff of GBRMPA, Queensland state departments and the Commonwealth Department of Environment and Energy, but excludes industry bodies, traditional owners and other community members with an acknowledged role in GBR management.

Table 2: Examples of how social data can be used for different management purposes

	Category of management use				
	Tactical	Operational	Strategic planning	Quantifying effectiveness	Reporting
	Event/ incident response, e.g., <ul style="list-style-type: none"> • Cyclone • Oil spill • Coral bleaching 	<ul style="list-style-type: none"> • Permit assessment • Prioritise compliance effort 	<ul style="list-style-type: none"> • Revisions to Reef 2050 Plan • Policy development • Plans of Management (POMs), Zoning 	<ul style="list-style-type: none"> • Results of resource investment, policy implementation 	<ul style="list-style-type: none"> • Report cards • Outlook
Hierarchical monitoring	Application of human dimensions data - some examples				
Spatial extent: <ul style="list-style-type: none"> • Map socially culturally & economically significant places 	Maps identify areas that require additional management actions to protect/restore benefits	Maps improve ability to balance conflicting uses & manage for economic benefits	Use of maps by planners & managers ensures future planning considers socially culturally & economically significant places	Maps improve assessment of actions by identifying places of high social, economic & cultural significance	Maps are a clear visual tool to illustrate & communicate the numerous benefits provided by the GBR
Temporal trend: <ul style="list-style-type: none"> • Compare condition & values over time & map to Drivers-Pressures-State-Impact-Response (DPSIR) 	Understand if impact has degraded an attribute (over time) beyond its resilience threshold – is intervention required?	Provide guidance on choice of management tool(s) for achieving desired outcome(s)	Focus use of planning tools on regions that are not improving	Compare effectiveness of different actions in reaching objectives across regions	Track progress & report on quantifiable attributes – assess if attributes are above or below objectives
Process understanding <ul style="list-style-type: none"> • Cause-effect • Problem-solution (DPSIR) 	Identify possible recovery paths & the role management can have on assisting resilience	Consider social, cultural & economic impacts of each permit & use to build knowledge of cumulative impacts	Predict the likely pathway for recovery & use planning tools to enhance resilience, e.g., the impact of poor decisions due to weak governance arrangements	Understand multiple impacts of interventions & monitor to ensure actions achieve intended outcomes	Report on actions completed & outcomes achieved, supporting cause & effect understanding

1.4 GBR communities

Communities with a relationship with the GBR range from residents in GBR catchment towns and cities, including Traditional Owners, to people across the nation or globe, and either have an interest in the GBR or influence (directly or indirectly) the condition of the GBR. This also includes government agencies (i.e., local government, state and Commonwealth governments). They also include people in the GBR maritime and catchment industries (Table 3).

Table 3: Great Barrier GBR industry stakeholders

Coastal/Marine Primary Industries	Catchment-based Primary Industries	Services Industries	Extraction and development
Commercial fishing	Cane	Marine and coastal tourism	Ports and shipping
Aquaculture	Grazing	Marine and coastal recreation	Urban development and construction
	Dairy	Research	Mining/extractive industries
	Horticulture		
	Grains		
	Forestry		

There are also people involved in a vast range of non-commercial activities related to the GBR, including: Traditional Owner use of marine and coastal resources; non-commercial recreational activities such as boating, diving, snorkelling; defence activities in designated areas; and fishing both recreational and illegal fishing (i.e., intentional targeting of protected zones).

1.5 What are the GBR's human dimensions?

The human dimensions of the GBR are the social, cultural, institutional and economic factors that shape people's relationship with the Great Barrier Reef. Managers realise that these relationships are diverse and wide-ranging and include collective actions by industries, communities and governments, each influencing GBR resilience². For effective management, GBR managers need to know more about these relationships. Management of individual sites within the GBR needs to be informed by the number of people who directly use or visit the GBR; who these people are, where they go, what they do and why. Marshall et al. (in review), for example, identified eight cultural benefits derived from the GBR, and these are used frequently throughout this document to illustrate the richness of people's relationship with the GBR (see Table 4).

² This description of the human dimensions of the Great Barrier Reef and catchment was developed through discussions with GBR managers and researchers.

Table 4: Eight cultural benefits associated with the Great Barrier Reef

Cultural benefits	Description
Identity	The feeling of belonging to a place or social group with its own distinct culture and common social values and beliefs.
Pride in resource status	Refers to a satisfied sense of attachment towards a place or its status such as World Heritage Area status. It can be linked to a signal of high social status.
Place importance/ Attachment to place	The emotional and physical bond between person and place which is influenced by experiences, emotions, memories and interpretations. It often provides a reason for people to live where they live.
Aesthetic appreciation	Describes the aesthetic value that an individual attributes to aspects of an ecosystem. Aesthetic responses are linked to both the characteristics of an environment and culturally or personally derived preferences.
Appreciation of biodiversity	Describes how people are emotionally inspired by biodiversity and other measures of ecosystem integrity at a particular place.
Lifestyle	The expression of 'visible' culture that has evolved around a natural resource or ecosystem; describes the extent to which people lead their lives around a natural resource and how people interact with it for recreation.
Scientific value	The value that people associate with learning opportunities in the past, present and future. The legacy and appreciation of ecosystems and natural resources that have been inherited from the past and their sense of continuity across time.
Wellbeing maintenance	The extent to which individuals are concerned for their own wellbeing if the health of the natural resource were to decline.

Reviewed literature reveals that people's relationship with the GBR is also influenced by attitudes towards, and perceptions of, the GBR and its management. These attitudes and perceptions have changed considerably over time, and will no doubt change again in future, and are shaped by culture, societal norms, context and circumstances, including personal experiences, word-of-mouth, and print media. Gooch (2016) has already identified factors that are very likely to affect attitudes and perceptions relating to the GBR including:

- Familiarity with the GBR and its management
- Occupation
- Proximity to the GBR
- Access to the GBR and its resources
- Identity with and/or affinity for the GBR
- Dependency on the GBR's resources for income or other benefits
- Where people go and what they do in the GBR
- What people value about the GBR
- Motivations for visiting the GBR
- Sense of optimism about the future of the GBR
- Understanding of factors that threaten GBR health
- Knowledge of the current condition of the GBR
- Levels of satisfaction with GBR-based experiences
- Levels of confidence and trust in GBR management.

Indigenous Traditional Owners have had the longest association with the GBR, as custodians and sustainable exploiters of the GBR and its resources, the continuity of their relationship with

the GBR having a stabilising influence on their attitudes and perceptions over many millennia. They still maintain connection to and responsibility for caring for particular country through membership of descent groups, families or clans. More than 70 Traditional Owner groups are custodians of the GBR (GBRMPA, 2016). Traditional Owner heritage values include all customs, lore and places that are part of Aboriginal and Torres Strait Islander peoples' spiritual links to land or sea country and which tell the story of Indigenous peoples from time immemorial to the present. Traditional Owner values comprise tangible and non-tangible attributes, which often overlap—including sacred sites, sites of particular significance and places important for cultural tradition; Indigenous structures, technology, tools and archaeology; stories, song-lines, totems and languages; and cultural practices, observances, customs and lore. Traditional Owner heritage values are connected to and inter-related with other GBR values and should be considered in this context (Deloitte Access Economics [DAE], 2017; GBRMPA, 2005, 2016).

By contrast, non-Indigenous attitudes and perceptions are varied and can change relatively quickly, especially for those new to the GBR and its catchment. Non-Indigenous cultural heritage includes buildings, monuments, gardens, industrial sites, landscapes, cultural landscapes, archaeological sites, groups of buildings and precincts, or places which embody a specific cultural or historic value. Historic heritage relates to the occupation and use of an area since the arrival of European and other migrants and describes the way in which the many cultures of Australian people have modified, shaped and created the cultural environment. GBRMPA recognises four historic heritage values of the GBR Marine Park - World War II features and sites; historic voyages and shipwrecks; lighthouses; and other places of historic significance (GBRMPA, 2005, 2017a, 2017b).

1.6 Aim and scope of this report

This report:

- Explains the rationale for including human dimensions in GBR monitoring and reporting
- Describes the institutional arrangements for developing a human dimensions monitoring and reporting scheme, including the steps to be taken
- Describes the process undertaken, including:
 - Framework development
 - Identification of indicators
 - Identification of data to populate indicators
 - Gap analysis, including proposals for filling monitoring gaps.
- Applies the human dimensions monitoring and reporting scheme to GBR across the six GBR natural resource management (NRM) regions to establish a baseline from which conditions and trends can be mapped against Reef 2050 objectives and targets
- Identifies emerging priorities and some implications for future GBR human dimensions monitoring.

2.0 PROJECT MANAGEMENT

2.1 Allocation of roles and responsibilities

The GBR Ministerial Forum oversees the implementation of the Reef 2050 Plan and RIMReP. Implementation of the RIMReP is managed through a RIMReP Steering Group co-chaired by the GBRMPA Chairman and the Director-General of the Queensland Government’s Department of Environment and Science (GBRMPA, 2015). There are also three working groups (data management; synthesis and reporting; and program design). Within the Program Design component are several expert groups. The RIMReP Human Dimensions Expert Group (HDEG) was formed to oversee the development and application of the GBR human dimensions monitoring, assessment and reporting, and to identify significant issues and data gaps that would affect its application (Figure 4). Specific tasks assigned to the HDEG are listed in Table 5 and were largely completed through the NESP 3.2.2 Project Team.

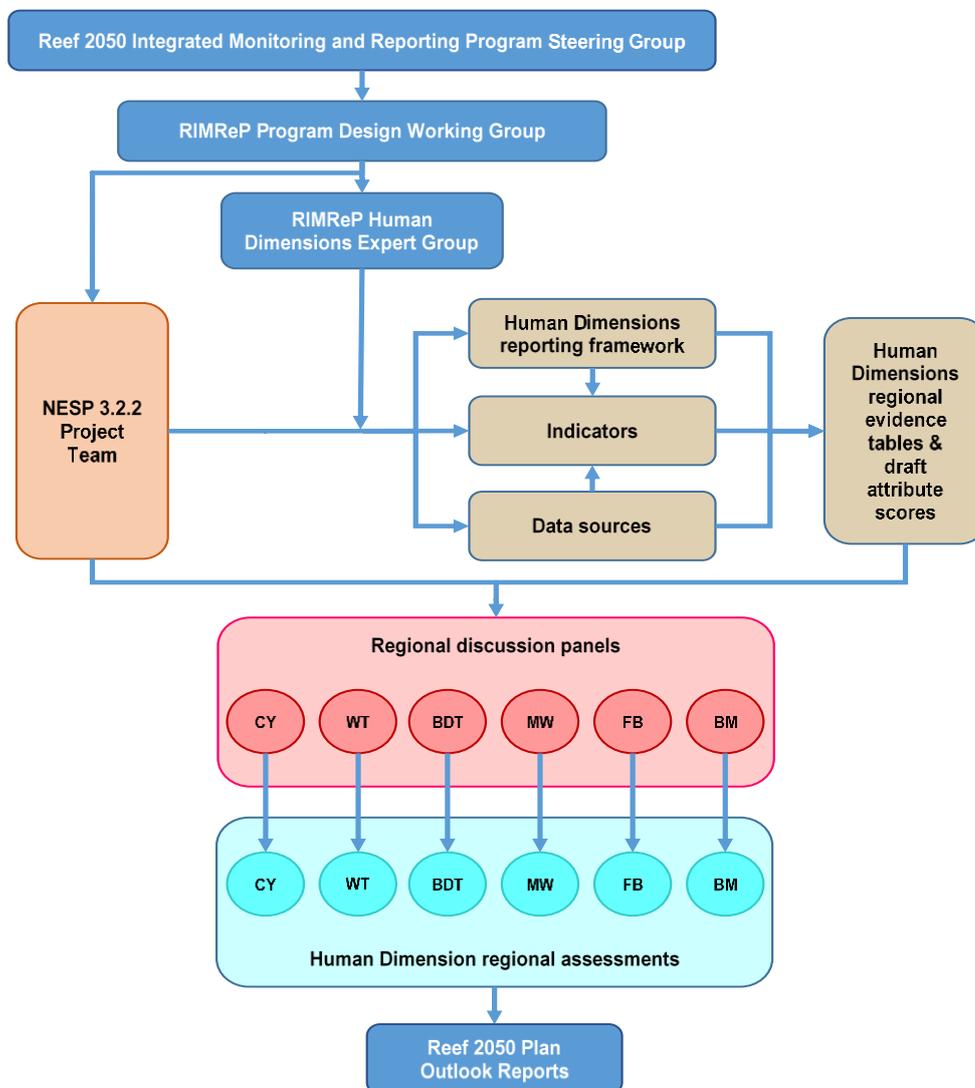


Figure 4: Process for developing and incorporating human dimensions into Reef 2050 Plan

Region codes: CY, Cape York; WT, Wet Tropics; BDT; Burdekin Dry Tropics; MW, Mackay Whitsundays; FB, Fitzroy Basin; BM, Burnett Mary

Table 5: RIMReP Program Design tasks

Task	
RIMReP Task 1	Identify the critical human dimension values that require monitoring within the overall context of people and their relationship with the Great Barrier Reef.
RIMReP Task 2	Identify the objectives and targets in the Reef 2050 Plan and provide a corresponding list of potential indicators and metrics for key GBRWHA human dimension values based on expert knowledge and a review of the literature.
RIMReP Task 3	Establish a framework for long-term benchmarking, monitoring and reporting systems to inform the coming (and regular) review and reporting of the Reef 2050 Plan, 5 yearly Outlook reporting cycle, and other reporting requirements.
RIMReP Task 4	Provide guidelines for grading indicator scores.
RIMReP Task 5	Where appropriate, determine associated social-economic thresholds in relation to indicators and their relationship to associated environmental thresholds.
RIMReP Task 6	Undertake a gap analysis of data requirements.
RIMReP Task 7	Identify how gaps may be addressed and by whom.
RIMReP Task 8	Evaluate the adequacy/suitability of existing data sets to achieve the objectives and requirements of the RIMReP, including information requirements for the Outlook Report, Reef 2050 Plan, Regional Report Cards and other mandatory reporting requirements and other information requirements of GBR users.
RIMReP Task 9	Evaluate the adequacy of the spatial and temporal resolution of existing data.
RIMReP Task 10	Work with experts from other RIMReP Program Design groups to integrate monitoring and reporting across disciplines.

The NESP 3.2.2 Project Team’s responsibilities included refining the task list to align with social science methodologies; designing the framework and indicator clusters; identifying the type of data required and available sources; undertaking data gaps, including the extent to which data would be available into the future; and applying the framework across the six GBR Natural Resource Management (NRM) regions. The completion status of all tasks is provided in Appendix 1 (Table 17) and the process for completing them is described in detail in the section called *Framework development*.

2.2 RIMReP Human Dimensions Expert Group (HDEG)

The RIMReP HDEG (chaired by Professor Allan Dale) provided advice on approaches and data sources to the project team. A key goal of the RIMReP HDEG was to address major knowledge gaps pertaining to the human dimensions of the GBR, and to facilitate and communicate information pertinent to research, assessment and monitoring of the GBR’s human dimensions. HDEG members were selected based on their experience and knowledge of the GBR from a community, industry (GBR-dependent and GBR-associated industries), or governance perspective; and/or (b) their involvement in social, economic and/or other research of relevance to the human dimensions of the GBR. Input was mostly via email. In total three HDEG meetings were held in Brisbane, as most members are based in Brisbane. Further, there were several email exchanges and updates circulated by the NESP project team throughout the life of the NESP project. The meetings and email exchanges facilitated the successful completion of several RIMReP Program Design tasks.

2.3 Regional discussion panels

To test the framework at the regional level, six discussion panels were established, each representing one of the six major NRM regions (Figure 4). Panels comprised between 8 and 15 members, each recognised as having: (a) experience and knowledge of the GBR from a regional, community, industry (GBR-dependent and GBR-associated industries), or governance perspective; and/or (b) involvement in social, economic and/or environmental initiatives which contribute to regional community wellbeing. Panel discussions were facilitated by a project team member. If a panel member was unable to attend, but could offer a proxy to represent them, then the proxy was accepted. Panel members comprised chairs of GBRMPA's Local Marine Advisory Committees; Chairs and/or CEOs of NRM bodies; local government; Regional Development Australia; tourism organisations; commercial fishers; regional healthy waterways partnership members; and Traditional Owners.

At the panel meetings, members were invited to propose attribute scores based on the evidence presented for each attribute and their first-hand experience, following the process outlines in Section 3 (3. Framework development). They also helped to further refine data gaps and limitations.

3.0 FRAMEWORK DEVELOPMENT

3.1 Assessment and monitoring of the GBR's human dimensions

The approach taken to the assessment and monitoring of the GBR's human dimensions in this document is consistent with, and aligned to, the Drivers-Pressures-State-Impact-Response (DPSIR) framework, which has been adopted by the RIMReP Program Design Group (Figure 5). The DPSIR framework enables managers to see the GBR as a linked social-ecological system that requires management across both natural and human dimensions. Cause-and-effect relationships can be traced through the DPSIR framework, illustrating links between human actions and ecosystem health. The framework shows how people can have a more dynamic relationship with the GBR and catchment than merely causing negative impacts.

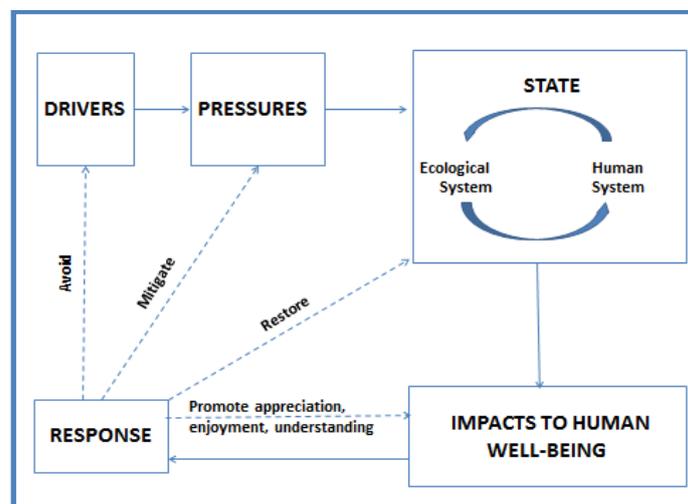


Figure 5: Drivers, Pressures, State, Impact Response framework adopted by RIMReP

Assessment and monitoring of the GBR's human dimensions requires a replicable, collaborative approach that is rolled out at local scales using a methodology that allows comparisons across vast, socially and geographically diverse areas. This project takes such an approach through the development of a conceptual framework that links indicator sets to the desired state of the GBR's human dimensions; and collaboration and input from regional discussion panels within the GBR catchment.

3.2 Constructing and populating the human dimension indicator framework

Previous efforts to classify human dimensions for socio-economic assessments were examined for their applicability to Reef 2050 Plan reporting. A framework used by Vella et al., (2012) to describe the human dimensions of communities in north Queensland identified four main indicator groups that had been derived from Social Impact Assessment literature (e.g., Vanclay, 1999); social-ecological resilience literature (e.g., Berkes & Folke, 1998); and the Millennium Ecosystem Assessment (MEA, 2005). This framework had also been applied to an evaluation of social resilience in the Wet Tropics region of the GBR catchment (Dale, George, Hill & Fraser, 2016a). Neither application of the classification included *culture and heritage*,

which is an important aspect of how humans value the GBR, including through its World Heritage status and long-standing Indigenous connections to country.

A revised indicator framework which included five distinct clusters of indicators was developed based on values articulated in the Great Barrier Reef Strategic Assessment (GBRMPA, 2014b); the Great Barrier Reef Outlook Report (GMRMPA, 2014a); THE Reef Blueprint (2017f) and published regional report cards for the GBR (Fitzroy Partnership for River Health, 2015; Gladstone Healthy Harbour Partnership, 2016; and the Healthy Rivers to Reef Partnership: Mackay Whitsundays, 2016). This was then compared with the framework developed by the Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES) to characterise human-ecosystem interactions (Diaz et al., 2015). This alignment confirmed the utility of our revised framework with four human dimension clusters mapping directly to four individual themes of the Reef 2050 Plan, and one cluster (aspirations, capacities and stewardship) contributing to all seven themes (see Figure 6).

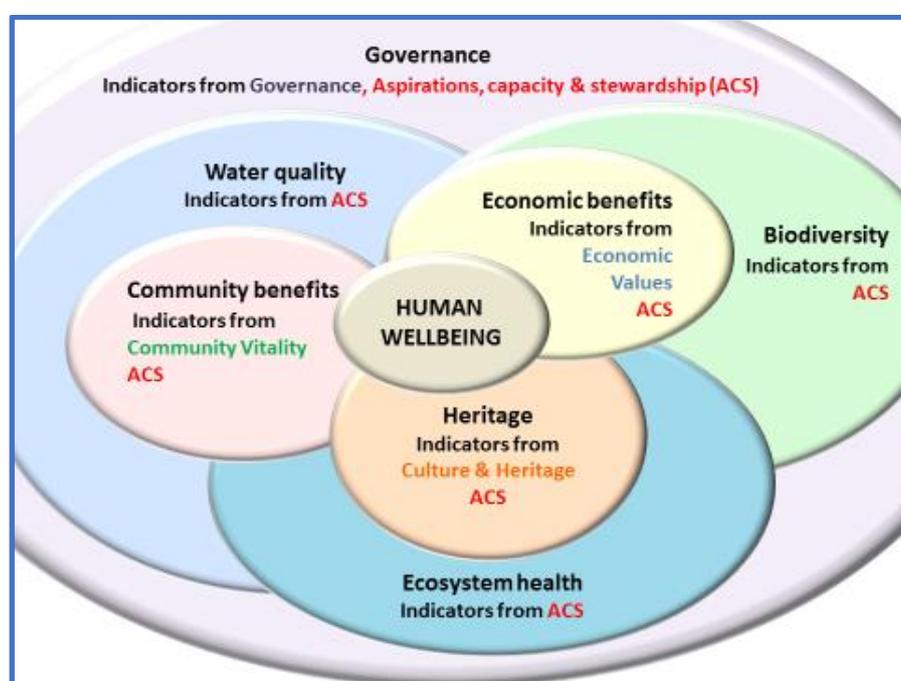


Figure 6: Human Dimension clusters aligned with Reef 2050 themed outcomes

SOURCE: Gooch et al., 2017, p. 14

In developing the framework, the project team fully incorporated the same set of human dimension values³ used by GBRMPA for assessment, monitoring and management of activities within the Great Barrier Reef Marine Park. These are:

- Access to GBR resources
- GBR aesthetics
- Appreciation, understanding and enjoyment of the GBR
- Human health associated with the GBR
- Personal connection to the GBR

³ RIMReP task 1

- Intra and inter-generational equity associated with the GBR
- Empowerment derived from the GBR
- Employment and income derived from GBR-dependent industries
- Heritage (GBRMPA, 2017a). (Refer to Appendix 2 for details).

Alignment of Reef 2050 Plan objectives and targets with the human dimensions indicator framework is shown in Appendix 3 (Table 18). The human dimensions clusters, attributes and key indicators, and their alignment with Reef 2050 Plan themes are presented for each cluster in the **Regional assessments** and displayed in full in Executive Summary Table 1⁴. The framework was used to complete several RIMReP HDEG tasks including: (a) evaluate the adequacy/suitability of existing data sets⁵; (b) undertake a gap analysis⁶; (c) identify how gaps may be addressed and by whom⁷; (d) evaluate the adequacy/suitability of existing data sets to achieve the objectives and requirements of the RIMReP, including information requirements for the Outlook Report, Reef 2050 Plan, Regional Report Cards and other mandatory reporting requirements and other information requirements of GBR users⁸; and (e) evaluate the adequacy of the spatial and temporal resolution of existing data⁹. Integration of the framework into Reef 2050 Plan monitoring and reporting across disciplines, in collaboration with the RIMReP Human Dimensions Expert Group and other RIMReP Program Design groups to integrate and will be completed in 2018¹⁰.

3.3 Using the indicator framework to construct evidence tables

Data sources that could be used for assessing each of the indicators and attributes in the framework were compiled from peer-reviewed literature, grey literature and other forms of knowledge such as Indigenous and local knowledge. The following datasets were used extensively in the 2017 human dimensions regional benchmarking reports:

- **Australian Bureau of Statistics [ABS].** (2017b). *Data by region*. Retrieved from <http://stat.abs.gov.au/itt/r.jsp?databyregion>
- **ABS.** (2015a). *Information paper: An experimental ecosystem account for the Great Barrier Reef Region, 2015* (cat. no. 4680.0.55.001). Retrieved from <http://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/4680.0.55.001Main%20Features202015?opendocument&tabname=Summary&prodno=4680.0.55.001&issue=2015&num=&view=>
- **ABS.** (2017a). *Census*. Retrieved from <http://www.abs.gov.au/websitedbs/D3310114.nsf/Home/Census?opendocument&ref=topBar>
- **ABS.** (2017d). *Land account: Queensland, experimental estimates, 2011 - 2016* (cat. no. 4609.0.55.003). Retrieved from <http://www.abs.gov.au/Ausstats/abs@.nsf/0/C513A7FD834B39C2CA25813F00120EFE?OpenDocument>

⁴ RIMReP Task 2 and RIMReP Task 3

⁵ RIMReP Task 4 and RIMReP Task 5

⁶ RIMReP Task 6

⁷ RIMReP Task 7

⁸ RIMReP Task 8

⁹ RIMReP Task 9

¹⁰ RIMReP Task 10

- **ABS.** (2016). *Community profiles*. Retrieved from <http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles>
- **Australian Bureau of Agricultural and Resource Economics and Sciences [ABARES].** (2017b). *Land use and management information for Australia*. Retrieved from <http://www.agriculture.gov.au/abares/aclump>
- **ABARES.** (2017a). *Data sets*. Retrieved from <http://www.agriculture.gov.au/abares/data>
- **Australian Maritime Safety Authority [AMSA].** (2017). *List of registered ships*. Retrieved from <https://www.amsa.gov.au/vessels-operators/ship-registration/list-registered-ships>
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- **Troy, L., & Martin, C. (2017).** *Queensland rental vulnerability index: Final report*. Sydney: University of NSW. Retrieved from <https://cityfutures.be.unsw.edu.au/research/projects/queensland-rental-vulnerability-index/>
- **Marshall, N., Bohensky, E., Curnock, M., Goldberg, J., Gooch, M., Nicotra, B., . . . Tobin, R. (2014).** *Measuring the human dimension of the Great Barrier Reef: Social and Economic Long-Term Monitoring Program*. Townsville: CSIRO Publishing. Retrieved from <http://seltmp.eatlas.org.au/node/1285>
- **Tourism Research Australia.** (2016). Retrieved from <https://www.tra.gov.au/>
- **University of Canberra.** (2017). *2016 regional wellbeing survey: Results by RDA and LGA*. Retrieved from <http://www.regionalwellbeing.org.au/>

The project team identified several other data sets, and reviewed the adequacy/suitability of each to achieve the objectives and requirements of the RIMReP, including information requirements for the Outlook Report, Reef 2050 Plan, Regional Report Cards and other mandatory reporting requirements and other information requirements of GBR users.

3.4 Developing decision rules

Assessment of each attribute for each region was based on the data and expert opinion captured in the evidence tables (Appendix). As much of the evidence was comprised of a mix of both quantitative and qualitative data, clear decision rules were required to ensure consistency in assessments (See Table 6).

Table 6: Decision rules for assessing human dimensions of regional communities that will influence social, economic and environmental outcomes of relevance to the GBR

Index Rating	Decision Rule
5	The regional community will easily manage the GBR sustainably, maintaining or improving their economic and social wellbeing and the health of the GBR over time.
4	The regional community will make reasonable progress on managing the GBR sustainably, at least maintaining but also improving their economic and social wellbeing and the health of the GBR over time.
3	The regional community will suffer some shocks associated with managing the GBR sustainably, taking considerable time and investment to secure their economic and social wellbeing and the health of the GBR over time.
2	The regional community will struggle to manage the GBR sustainably, resulting in declining social and economic wellbeing and ongoing decline in the health of the GBR over time.
1	The regional community will be unable to manage the Reef sustainably, and their social and economic wellbeing and the health of the GBR will be unlikely to recover over time.

3.5 Gap analysis

Gap analysis was undertaken in the course of compiling the evidence tables, which identified when there was insufficient information to score an attribute. This process revealed several readily available data sets for assessment, but also a number of critical data gaps. Appendix 4 provides a table showing adequacy of existing data sets. Through the gap analysis we also identified some attributes of human dimensions which are under-represented in the Reef 2050 Plan. For example, there is no specific reference in the Plan to the adoption of responsible practices by recreational/ artisanal users of the GBR, yet we estimate that around 4 million people visit/use the GBR each year (DAE, 2017), and that GBR visitors are willing to adopt new practices to protect the GBR (Marshall et al., 2014). Similarly, there is no consideration of major strategies to improve the economic resilience of communities seriously affected by the impacts of coral bleaching and extreme weather events likely caused by climate change, even though such events can be financially damaging, especially for GBR-dependent industries (Marshall et al. 2013; Prideaux, Carmody & Pabel, 2017). The gap analysis revealed a number of barriers affecting the information needs identified by GBR managers, and discussion panel members. These include a lack of targeted, on-going (i.e., fully funded and regular) monitoring of the following:

Aspirations, Capacity & Stewardship

- ACS2.2 Sense of responsibility towards the GBR & coastal waterways
- ACS2.3 Regional GBR-based stewardship activities

- ACS2.4 Numbers & types of TO involvement in on-ground WQ improvement & monitoring
- ACS3.1 Extent & type of stewardship practices of GBR recreational users
- ACS3.2 Number of people visiting the GBR
- ACS3.3 Why people visit the GBR
- ACS3.4 Where people visit the GBR
- ACS3.5 What people do in the GBR
- ACS3.6 How people get to the GBR
- ACS4.1 Extent & type of stewardship practices of agricultural industries
- ACS5.1 Extent & type of stewardship practices of urban councils & industries
- ACS6.1 Extent & type of stewardship practices of GBR-associated industries
- ACS6.2 Arrangements to ensure GBR shipping is safe
- ACS6.3 Number of shipping accidents
- ACS6.4 Extent to which ports & shipping apply 'best practice' principles
- ACS6.5 Extent & type of stewardship practices of GBR-based tourism
- ACS6.6 Extent & type of stewardship practices of GBR-dependent commercial fishing

Community Vitality

- CV4.1 GBR contributions to quality of life & wellbeing
- CV4.2 Stress associated with decline in GBR health
- CV4.3 Indigenous health associated with the GBR
- CV4.4 Commercial fishers' wellbeing
- CV4.5 Tourism Operators' wellbeing

Culture & Heritage

- CH1.2 Perceptions of GBR aesthetic beauty & other world heritage attributes
- CH1.3 Impacts on GBR-Wide World Heritage values
- CH2 Indigenous (Traditional Owner) heritage
- CH2.1 ID, state & trend of Indigenous heritage values
- CH2.2 TO management of GBR resources
- CH2.3 Levels of Traditional Owner satisfaction with: (a) Identification, documentation & storage of cultural information; (b) Traditional Owner led methodologies; (c) participation in GBR management; (d) extent to which TEK is identified, maintained & transferred
- CH2.4 Levels of TO use & dependency on the GBR
- CH2.5 Impacts on Indigenous heritage
- CH3.1 Place attachment, identity
- CH3.2 GBR as culture – levels of pride, inspiration & personal connection to the GBR
- CH3.4 Impacts on contemporary culture
- CH4.1 Identification, protection & management of GBR historic maritime heritage
- CH4.2 Cultural significance of historic maritime heritage values for the GBR
- CH4.3 Impacts on historic maritime heritage values

Economic Values

- EV4.2 Opportunities for GBR Traditional Owners
- EV4.3 Equity between & within industries/ activities

- EV5.2 GBR- related employment
- EV5.2.1 No. employment opportunities for Traditional Owners in GBR sea-country management
- EV5.2.2 No. employment opportunities for Traditional Owners in GBR-based industries

Governance

- G1.1 No./ type of opportunities for improved Reef 2050 Plan Governance
- G1.2 No. /severity of system-wide problems for delivery of key Reef 2050 Plan targets
- G2.1 No./type governance subdomains that counteract Reef 2050 Plan targets/action
- G2.3 Levels of transparency, ownership, accountability, responsiveness
- G2.4 Inter-generational equity in GBR-related decision-making
- G2.5 Intra-generational equity in GBR-related decision-making
- G3.2 Support for management
- G3.3 Confidence in management

Though the gap analysis, we identified a number of programs/activities which are **critical** for the successful assessment and monitoring of the GBR's human dimensions, and which need to be fully funded into the future. Use of free and readily available data sets together with a combination of the following monitoring programs/ activities are seen as core to meeting human dimensions targets, objectives and outcomes articulated in the Reef 2050 Plan, and for addressing significant gaps.

- SELTMP – surveys to be undertaken every two years across the GBR catchment (e.g., Marshall et al., 2013a; Marshall & Pert, 2017)
- Economic dependency on the GBR – commercial fishing and marine tourism (e.g., ABS, 2017d; Marshall et al., 2013; Marshall & Pert, 2017; Pascoe et al., 2016; Prideaux, Carmody & Pabel, 2017)
- Use and visitation patterns - social media analysis & big data analytics (e.g., Becken, Connolly & Stantic, 2017c; Becken, Stantic, Chen, Alaei & Connolly, 2017d)
- Recreational index (a measure of non-market valuation) (e.g., Windle Rolfe & Pascoe, 2017)
- Site-specific recreational fishing surveys (e.g., Department of Agriculture and Fisheries, 2015; Infofish 2017a, 2017b)
- Site-specific aesthetics monitoring (e.g., D. Marshall, 2017; Becken, Connolly, Scott & Stantic, 2017b; Becken, Connolly, Scott & Stantic, 2017a)
- Traditional – Owner led indicators (partly described in Dale, George, Hill & Fraser, 2016a)
- Indigenous cultural heritage places (e.g., Rowland, Ulm & Roe, 2014)
- Historic maritime heritage (e.g., GBRMPA, 2017d)
- Media tracking & analysis (e.g., Lankester, Bohensky & Newlands, 2015; Lloyd, Newlands & Petray, 2017)
- Stewardship & behaviour change – supported by Queensland Department of Environment and Science (QDES); regional partnerships; GBRMPA's Reef guardians; one-on-one extension (e.g., Coutts et al., 2017; Eco Logical Australia & Adaptive Strategies, 2016; Eagle, Hamann & Low, 2016; Eagle, 2016; Smartcane BMP, 2017; Coutts et al., 2017; N. Marshall, 2017).
- Human Dimensions benchmarking (e.g., Gooch et al., 2017)

- Governance benchmarking (e.g., Dale et al., 2016b).

Data sources/ programs/activities listed in Table 7 either do not yet exist, or are ad hoc or site-specific and are not undertaken for the whole GBR (i.e., new or partially new initiatives). Data sources/ programs/activities listed in Table 8 are not systematically undertaken for the whole GBR. The tables also identify known institutions, organisations, programs and activities that have the potential to fill data gaps¹¹.

The gap analysis enabled the project team to classify data sources/programs/activities which are desirable and have readily available data sets for successful assessment and monitoring of the GBR’s human dimensions. Desirable programs/data sources/activities listed in Table 9 have specific relevant data sets which need to be extracted for GBR human dimensions monitoring and assessment. Extra on-going funding is required for this task. Data sources/programs/activities listed in Table 10 are those which routinely produce freely available, relevant data sets, and are expected to do so into the future. No extra funding is required.

Adequacy of the spatial and temporal (periodicity) scales of available data sets¹² is displayed in Attachment C, and rated as High (H), Medium (M) or Low (L). Attachment C also identifies the host organisation, data type (numeric, spatial, rich text); and data format (excel, PDF, raster).

Table 7: Critical programs/data sources/activities that are not yet undertaken for the whole GBR

Source of potential &/or existing data	Indicator clusters					Institution(s) that could potentially fill data gap
	ACS	CV	CH	EV	G	
Indigenous-led indicators	x	x	x	x	x	RIMReP process
Site specific aesthetics monitoring	x	x	x	x	x	GU & CSIRO (NESP projects)
Recreation Index	x	x	x	x	x	Uni – Central Queensland University (CQU) (currently Gladstone Harbour only)
Human use patterns – where, when, how people access the GBR	x	x	x	x	x	Uni- Griffith University (GU) (Big Data analytics)

¹¹ RIMReP Task 7

¹² RIMReP Task 9

Table 8: Critical programs/data sources/activities that are not yet systematically undertaken

Source of potential &/or existing data	Indicator clusters						
	ACS	CV	CH	EV	G	Institution	Website ¹³
Stewardship	x	x		x	x	QDEHP; GBRMPA; CSIRO	http://healthyriverstoreef.org.au/wp-content/uploads/2016/05/Stewards-hip-Scoring-Methods-and-Results-Pilot-Report-Card.pdf ; http://seltmp.eatlas.org.au/seltmp:Reef-Guardian-Councils-Highlight-Report-2015-2016
Wellbeing	x	x	x	x		CSIRO (SELTMP)	http://seltmp.eatlas.org.au/seltmp
GBR - use & dependency	x	x	x	x	x	CSIRO (SELTMP)	http://seltmp.eatlas.org.au/seltmp
Perceptions of GBR & its management	x	x	x		x	CSIRO (SELTMP)	http://seltmp.eatlas.org.au/seltmp
Bench marking – HD & Gov	x	x	x	x	x	NESP 3.2.2; RIMReP	N/A
Historic heritage	x	x	x		x	QDEHP	N/A
Indigenous Heritage	x	x	x	x	x	Qld Govt	https://data.qld.gov.au/dataset/cultural-heritage-aboriginal-and-torres-strait-islander-parties-list/resource/cd186b4f-b4bc-4c84-81fd-13b5d4698a0e

¹³ Not an exhaustive list

Table 9: Desirable programs/data sources/activities with readily available data sets, but data need to be extracted for GBR human dimensions monitoring and assessment

Source of potential &/or existing data	Indicator clusters						Institution/s	Website -not exhaustive
	ACS	CV	CH	EV	G			
Analysis coast guard data	X	X	X				Regional coast guard organisations	N/A
Analysis of Queensland Parks and Wildlife Service (QPWS) camping data	X	X	X				QPWS	https://data.qld.gov.au/dataset/camping-and-vehicle-permits/resource/c1d1ff63-ebe4-49e7-8dd5-41be0dbf6948
Media tracking & analysis	X	X	X	X	X		GBRMPA; state govt dept offices; CSIRO (SELTMP)	http://seltmp.eatlas.org.au/seltmp
Commercial fisheries data	X	X	X	X	X		QDAF; Fisheries Research and Development Corporation (FRDC); CSIRO (SELTMP)	http://seltmp.eatlas.org.au/seltmp ; http://www.frdc.com.au/
Compliance – land & sea	X	X					GBRMPA/ Queensland Department of Environment and Heritage Protection (QEHP)	N/A
Vessel registration - commercial		X		X	X		AMSA	??
Tourism Trends – GBR		X	X	X			CQU (Cairns); GBRMPA Environment Management Charge (EMC) data; CSIRO (SELTMP)	http://seltmp.eatlas.org.au/seltmp
MIPs – social surveys	X					X	State govt; NRMs	N/A

Source of potential &/or existing data	Indicator clusters						Institution/s	Website -not exhaustive
	ACS	CV	CH	EV	G			
Stewardship - understanding behaviour change	X						NESP 2.1.3; CSIRO (SELTMP)	http://seltmp.eatlas.org.au/seltmp
Recreational fishing data	X	X	X	X	X		QDAF; Infofish (Bill Sawynock); rec fishing clubs; FRDC	https://www.daf.qld.gov.au/fisheries/monitoring-our-fisheries/recreational-fisheries/statewide-and-regional-recreational-fishing-survey ; http://infofishaustralia.com.au/ http://www.frdc.com.au/ ; https://data.qld.gov.au/dataset/recreational-survey-by-fishing-region-comparison-of-2000-and-2010-surveys ; https://data.qld.gov.au/dataset/recreational-survey-2010-catch-release-retained-all-species/resource/0c0ea940-d6d2-4a58-a3f5-935d4c0bba12

Table 10: Desirable programs/data sources/activities with readily available data sets

Source of potential &/or existing data	Indicator clusters						Institution	Website ¹⁴
	ACS	CV	CH	EV	G			
GBR experimental ecosystem account	x	X		x			ABS	http://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/4680.0.55.001Main%20Features202015?opendocument&tabname=Summary&prodno=4680.0.55.001&issue=2015&num=&view=
Census Data	x	X		x			ABS	http://www.abs.gov.au/websitedbs/D3310114.nsf/Home/Census?opendocument&ref=topBar
Qld. Land Account	x	X	x			x	ABS	http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4609.0.55.0032011%20-%202016?OpenDocument

¹⁴ Not an exhaustive list

Source of potential &/or existing data	Indicator clusters					Institution	Website ¹⁴
	ACS	CV	CH	EV	G		
Regional community profiles	x	x		x		ABS; QGSO; UNSW (Rental Vulnerability Index)	http://stat.abs.gov.au/itt/r.jsp?databyregion http://statistics.qgso.qld.gov.au/ https://cityfutures.be.unsw.edu.au/cityviz/rental-vulnerability-index/
Regional wellbeing Surveys	x	x	x	x		Uni of Canberra;	http://www.regionalwellbeing.org.au/
Catchment Scale Land Use	x			x	x	QSpatial; ABARES	http://qldspatial.information.qld.gov.au; http://www.agriculture.gov.au/abares/display?url=http://143.188.17.20/anrd/DAFFService/display.php%3Ffid%3Dpb_luAusg9abl20160616_11a.xml
Agricultural datasets	x			x	x	ABARES	http://www.agriculture.gov.au/abares/data
Tourism trends – Australia				x		TRA (Tourism Research Aust.)	https://www.tra.gov.au/
Tourism Trends - Queensland				x		Tourism Queensland	https://teq.queensland.com/research-and-insights/domestic-research/regional-tourism-satellite-accounts
Vessel registration – recreational					x	GBRMPA; QDT&MR	http://www.gbrmpa.gov.au/VesselRegistrations/
Regional economic surveys				x		Regional Chambers of commerce; LGAs	Various CoC & LGA websites
Fishery monitoring data	x	x			x	QDAF	https://data.qld.gov.au/dataset/fishery-monitoring-data/resource/743681ed-53a0-41ef-9392-9cc5cd2cdcfb
Queensland Aquaculture Production from 1995 to 2015				x		QDAF	https://data.qld.gov.au/dataset/queensland-aquaculture-production-1995-2015/resource/0629abbc-ee4f-4e41-87c7-62f0591ae5bc

Source of potential &/or existing data	Indicator clusters						Institution	Website ¹⁴
	ACS	CV	CH	EV	G			
Queensland Commercial Fishery data	x	x		x	x		QDAF	https://data.qld.gov.au/dataset/queensland-commercial-fishery-observer-data/resource/2e6d2c6e-4ea1-4b00-aaaa-5c4480e1ea2a ; https://data.qld.gov.au/dataset/queensland-commercial-fishery-catch-and-effort-annual-totals-line/resource/5290c7a1-506a-4c04-9c65-d74baa6cafb0 ; https://data.qld.gov.au/dataset/queensland-commercial-fishery-catch-and-effort-annual-totals-trawl-beam-otter/resource/6918e93a-c65e-40b0-bffa-74b22d05f930 ; https://data.qld.gov.au/dataset/queensland-commercial-fishery-catch-and-effort-annual-totals-trawl-beam-otter/resource/1c45a387-0eaf-4f2a-a8b1-5b043585806f ; https://data.qld.gov.au/dataset/queensland-commercial-fishery-catch-and-effort-annual-totals-pot/resource/025472a0-1a46-4392-837c-33e3f05ff014 ; https://data.qld.gov.au/dataset/queensland-commercial-fishery-catch-and-effort-annual-totals-net ; https://data.qld.gov.au/dataset/queensland-commercial-fishery-catch-and-effort-annual-totals-charter/resource/1db4e748-5574-4b28-827a-49e7686849b8
Monitoring of sewage	x	x			x		QSpatial	https://data.qld.gov.au/dataset/soe2015-volume-and-load-of-sewage-treatment-plants/resource/indicator-3-2-0-4 ; http://qldspatial.information.qld.gov.au
Marine pollution— 2002 to 2016	x	x	x		x		Qld Gov	https://data.qld.gov.au/dataset/marine-oil-spills-data/resource/280b7e6e-61b5-4502-b365-96bafea2950a
Maritime Safety Queensland series	x	x			x		Qspatial	https://data.qld.gov.au/dataset/maritime-safety-queensland-series

4.0 HUMAN DIMENSION ASSESSMENT FINDINGS

4.1 Overview

All regions scored moderately to well against all human dimension clusters (Table 11), with conditions tending to decline with distance away from Brisbane for all clusters. Scores are based on the Decision Matrix presented in Table 6. Scores are converted to percentages for easy comparison. Details of each regional assessment are available in separate reports. Detailed profiles for each cluster are presented in the following sections.

Table 11: Comparison of regional scores against each of the five human dimension clusters

	Aspirations, Capacity & Stewardship	Community Vitality	Culture and Heritage	Economic Values	Governance
Eastern Cape York	57% (17/30)	60% (15/25)	55% (11./20)	45% (13.5/30)	52% (10.5./20)
Wet Tropics	67% (20/30)	68% (17/25)	57% (11.5/20)	58% (17.5/30)	57% (11.5./20)
Burdekin	67% (20/30)	64% (16/25)	57% (11.5/20)	58% (17.5/30)	57% (11.5./20)
Mackay-Whitsunday	70% (21/30)	66% (16.5/25)	60% (12/20)	63% (19/30)	57% (11.5./20)
Fitzroy	67% (20/30)	66% (16.5/25)	62% (12.5/20)	62% (18.5/30)	57% (11.5./20)
Burnett-Mary	70% (21/30)	72% (18/25)	72% (14.5/20)	68% (20.5/30)	67% (13.5/20)

0-20%	20-40%	40-60%	60-80%	80-100%
Unable to manage Will not recover over time	Struggle to manage Declining social/economic wellbeing & ecological health	Suffer some shocks Considerable time/investment to improve social/economic wellbeing & ecological health	Make reasonable progress Improving economic & social well-being and ecological health	Easily manage Maintains/improves social/economic wellbeing & ecological health

4.2 Regional assessments

4.2.1 Aspirations, Capacities and Stewardship (ACS)

Cluster description: Cohesive vision & aspirations for the future of the GBR together with awareness, skills, knowledge & capacities to turn aspirations into action. Personal & collective (including industry) efforts to: (a) minimise impacts on the GBR & catchment; (b) restore degraded marine, coastal & catchment ecosystems; (c) apply ESD principles; & (d) be actively involved in GBR & catchment management.

Reef 2050 Plan Theme: **All seven themes** (i.e., economic benefits, community benefits, heritage, governance, water quality, biodiversity & ecosystem health).

Reporting framework: The reporting framework for the Aspirations, Capacities and Stewardship human dimension cluster is shown in Table 12, along with significant information

gaps that will impede comprehensive reporting. **Attributes and indicators for which data collection is missing or inadequate, and/or funding is non-ongoing at present**, are highlighted in red.

Table 12: Human dimension attributes and key indicators for the Aspirations, Capacities and Stewardship human dimension cluster

Human Dimension Attributes	Key Indicator sets
ACS1 Levels of community awareness & education about the GBR	ACS1.1 Regional education/skills levels ACS1.2 Levels of awareness of NRM issues ACS1.3 Levels of awareness of GBR & waterway condition & threats ACS1.4 Number/type of GBR learning opportunities
ACS2 Community capacity for stewardship	ACS2.1 Sense of responsibility towards the environment ACS2.2 Sense of responsibility towards the GBR & coastal waterways ACS2.3 Regional GBR-based stewardship activities ACS2.4 Numbers & types of TO involvement in on-ground water quality (WQ) improvement & monitoring
ACS3 Adoption of responsible/best practice – GBR recreational users	ACS3.1 Extent & type of stewardship practices of GBR recreational users ACS3.2 Number of people visiting the GBR ACS3.3 Why people visit the GBR ACS3.4 Where people visit the GBR ACS3.5 What people do in the GBR ACS3.6 How people get to the GBR
ACS4 Adoption of responsible/best practice – Agricultural & land sector	ACS4.1 Extent & type of stewardship practices of agricultural industries
ACS5 Adoption of responsible/best practice – Industry & urban sector	ACS5.1 Extent & type of stewardship practices of urban councils & industries
ACS6 Adoption of responsible/best practice – Marine industries	ACS6.1 Extent & type of stewardship practices of GBR-associated industries (e.g., ports & shipping) ACS6.2.1 Arrangements to ensure GBR shipping is safe ACS6.2.2 Number of shipping accidents ACS6.3 Extent to which ports & shipping apply 'best practice' principles ACS6.4.1 Extent & type of stewardship practices of GBR-based tourism ACS6.4.2 Extent & type of stewardship practices of GBR-dependent commercial fishing

Condition and trend:

Eastern Cape York	Wet Tropics	Burdekin	Mackay-Whitsunday	Fitzroy	Burnett-Mary
57% (17/30)	67% (20/30)	67% (20/30)	70% (21/30)	67% (20/30)	70% (21/30)
0-20% Unable to manage Will not recover over time	20-40% Struggle to manage Declining social/economic wellbeing & ecological health	40-60% Suffer some shocks Considerable time/investment to improve social/economic wellbeing & ecological health	60-80% Make reasonable progress Improving economic & social well-being and ecological health	80-100% Easily manage Maintains/improves social/economic wellbeing & ecological health	

Across the catchment there has been significant growth in GBR stewardship-related education programs, especially since the implementation of GBRMPA's Reef Guardian program and the establishment of major GBR water quality programs. Further, several of the GBR regions enjoy reasonably high formal education levels, suggesting a high level of capacity to ensure high quality stewardship of the GBR and associated catchments. Reef Guardian councils together with regional NRM agencies show leadership in sustainability initiatives and community-based environmental education. In urban areas, industries with point source pollution are generally well regulated under the *Queensland Environmental Protection Act 1994*, however some urban areas are still sources of water pollution, and urban expansion may have adverse impacts on GBR values. State Planning Policy (SPP) (Department of Infrastructure, Local Government and Planning, 2017) states that all exposed soil areas >2500 m² must have sediment controls implemented and maintained to achieve 80% hydrologic effectiveness (50mg/L Total Suspended Solids (TSS) or less & pH bet. 6.5–8.5). One method for achieving compliance is to implement High Efficiency Sediment Basins (HESBs) (Turbid Water Solutions, 2017). To date no Local Government Areas in the GBR catchment have HESBs on working construction sites within their jurisdictions (S. Choudhury, personal communication). Nevertheless, significant progress has been made on sewage treatment and energy efficiency practices, and more effort is emerging in regard to urban storm water practices. Managing intensive recreational pursuits that are inconsistent with conservation values is a challenge for some local councils. Several knowledge gaps are evident around the management practices of ports and shipping, although these industries generally comply with regulations. Most commercial fishers are compliant with Great Barrier Reef Marine Park (GBRMP) regulations, but are generally slow to embrace eco-efficient practices. This is expected to improve with the implementation of Queensland Sustainable Fisheries Strategy 2017–2027. In contrast, there is good progress towards the uptake of environmentally-friendly practices and eco-certification in the GBR tourism sector.

Among catchment residents there are varying perceptions about NRM and environmental issues and anecdotal evidence suggests that recreational fishing requires increased compliance and stewardship effort. Despite this, there are high levels of agreement among catchment residents that it is the responsibility of all Australians to care for the GBR, indicating that cohesive stewardship efforts at local, regional and national scales would remain a sound investment. Major barriers to strengthening uptake of stewardship activities exist throughout the catchment including educational inequalities within all regions especially affecting poorer, rural and Indigenous people. This is most obvious in Eastern Cape York. Further, there is a growing gap between community aspirations and the resources allocated to deliver and showcase improved environmental sustainability across the catchment. Another major barrier is a lack of on-going targeted workforce strategies to enhance stewardships skills over time. In some places across the catchment, graziers lack financial capacity and/or change management skills needed to improve their stewardship practices. In general, a mix of mechanisms that includes both financial incentives with direct extension to support change is required to improve agricultural Best Management Practice (BMP).

Some Emerging Policy Implications

Assessment of the available information has raised issues with significant and emerging implications for the Reef 2050 Plan Review, including the need to continue to build the foundational co-management approaches to regulation and deeper partnerships required with agricultural, tourism, fishing and recreational user communities in progressing effective

stewardship approaches. Comprehensive reporting of this cluster is hampered by several data gaps, as indicated in Table 12.

4.2.2 Community Vitality (CV)

Cluster description: Characterised by demographic stability, security, happiness and well-being. Community vitality associated with the GBR includes how and why people access, use and value the GBR; services and infrastructure supporting the interface between the community and GBR; and the social health derived from the GBR, e.g., nature appreciation, relaxation, recreation, physical health benefits, and other lifestyle benefits derived from the GBR. A healthy GBR community derives high levels of appreciation and enjoyment from the GBR and is highly satisfied with the GBR and its management.

Reef 2050 Plan Theme: Community benefits: An informed community that plays a role in protecting the Reef for the benefits a healthy Reef provides for current and future generations.

Reporting framework: The reporting framework for Community Vitality human dimension cluster is shown in Table 13, along with significant information gaps that will impede comprehensive reporting.

Table 13: Human dimension attributes and key indicators for the Community Vitality human dimension cluster

Human Dimension Attributes	Key Indicator sets
CV1 Demographic stability across the catchment	CV1.1 Basic demographic characteristics (e.g., population, age structure, migration & growth rates) CV1.2 Migration intentions over the next 12 months
CV 2 Security in the catchment including housing, safety & risk management	CV2.1 Financial distress: (i) delay or cancel non-essential purchases; (ii) could not pay bills on time; (iii) went without meals, or unable to heat or cool home; (iv) asked for financial help from friends or family CV2.2 Crime rates CV2.3 Perceptions of safety CV2.4 Housing including availability & affordability
CV3 Wellbeing/ happiness within the general community	CV3.1 Community Wellbeing (1-7): (i) place to live, (ii) coping with challenges, (iii) pride, (iv) optimism, (v) community spirit CV3.2 Decreasing community liveability: (i) liveability; (ii) friendliness; (iii) local economy; (iv) local landscape CV3.3 Personal Wellbeing (0-100). Satisfaction with: (i) standard of living; (ii) health; (iii) achievements; (iv) relationships; (v) safety; (vi) feeling part of community; (vii) future security CV3.4 Levels of physical health CV3.5 Levels of mental health
CV4 Community health/ wellbeing/ satisfaction associated with the GBR	CV4.1 GBR contributions to quality of life & wellbeing GBR contribution to: (i) QoL; (ii) desirable way of life & ecosystem services, e.g., fresh seafood; (iii) optimism about the future; (iv) satisfaction with GBR experiences; (v) GBR experiences (negative & positive); (vi) physical &/or mental health CV4.2 Stress associated with decline in GBR health CV4.3 Indigenous health associated with the GBR CV4.4 Commercial fishers' wellbeing CV4.5 Tourism Operators' wellbeing

CV5 Regional services & service infrastructure supporting the interface between the community & GBR	CV5.1 Energy/water security CV5.2 Quality of infrastructure CV5.3 Impacts on infrastructure CV5.4 Perceptions of access to health, education, aged care & child care CV5.5 Perceptions of access to roads & public transport
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Condition and trend

	Eastern Cape York	Wet Tropics	Burdekin	Mackay-Whitsunday	Fitzroy	Burnett-Mary
Community Vitality	60% (15/25)	68% (17/25)	64% (16/25)	66% (16.5/25)	66% (16.5/25)	72% (18/25)
	0-20% Unable to manage Will not recover over time	20-40% Struggle to manage Declining social/economic wellbeing & ecological health	40-60% Suffer some shocks Considerable time/investment to improve social/economic wellbeing & ecological health	60-80% Make reasonable progress Improving economic & social well-being and ecological health		80-100% Easily manage Maintains/improves social/economic wellbeing & ecological health

Condition and trend of community vitality varies significantly within the GBR catchment. However, there were some consistent patterns, including high levels of Indigenous disadvantage, high youth unemployment, and higher crime rates across the GBR catchment than other parts of rural and regional Australia. The biggest issues affecting Eastern Cape York’s community vitality are inadequate road infrastructure; job shortages; lack of economic diversity contributing to reduced community vitality and a lack of communications infrastructure; limited housing choice and affordability; potential impact of flooding and coastal hazards; land tenure limiting options for growth; and high infrastructure costs (Cook Shire Council, 2017). Few residents in any Cape York Indigenous town owns their own home, largely because of the lack of enabling tenure and local land administration systems. People living in remote Indigenous communities are most vulnerable in terms of disaster response. Despite these issues, Cape York residents, along with the rest of Australia’s citizens report high levels of wellbeing related to the GBR. These benefits are no obtained through the strong cultural and personal connections to the GBR of the local TOs and commercial fishers.

There is a generally high level of health and wellbeing within the Wet Tropics region, but this is tempered by significant disadvantage, particularly within Indigenous populations and poorly employed younger populations. There is significant Indigenous mobility across the Wet Tropics region and declines in populations in some smaller regional communities—particularly in the Hinchinbrook Shire and the Cassowary Coast, since Cyclones Larry (2005) and Yasi (2011). The region’s generally high levels of housing and personal security are slightly offset by decreasing levels of insurance affordability. Solid infrastructure and service arrangements in the region enhance the linkages between the region, tourists and the GBR.

The Burdekin region’s population is concentrated in the centres of Townsville, Ayr, Bowen and Charters Towers. Many inland centres are very small, and service large, scattered pastoral properties or mines. These isolated communities face declining numbers and ageing populations. The Burdekin Region has a high proportion of Aboriginal and Torres Strait Islander people; rural and remote persons often living in situations of social isolation; and mining communities with large numbers of fly-in/fly-out and drive-in/drive-out (FIFO/DIDO)

workers. The region's infrastructure can be severely damaged in cyclones and floods, leading to adverse impacts on communities and industries. Despite these drawbacks, the GBR makes an important contribution to the health and wellbeing of coastal residents and visitors to the region.

Community vitality in the Mackay-Whitsunday Region has recently been affected by Severe Tropical Cyclone Debbie, which caused widespread damage and increased community feelings of isolation, loss and anxiety. In general, however, Mackay-Whitsunday residents are very satisfied with region's enviable lifestyle including recreational opportunities and proximity to the GBR. Traditional Owners in this region deeply value the GBR as a place of social enjoyment, gatherings and ceremonies during times of mourning. This region's residents also value the favourable climate, productive agricultural land, the people, sense of community, small town sizes, and access to reasonably good services (e.g., health, school infrastructure). An ageing population poses challenges to Mackay's healthcare facilities and services, although the region enjoys excellent transport infrastructure and accessibility to local and regional markets, via a combination of road, rail (passenger and freight), port connectivity and air links.

The Fitzroy Region's population is generally stable, with fluctuations in some areas resulting from fluctuating activity in the mining and minerals sectors. The regional Indigenous population is distinctly younger than the overall regional population. Larger urban centres have good services and infrastructure for residents, however facilities in smaller centres are under pressure from influx of FIFO/DIDO workers. In general, the health/ wellbeing and happiness of people living in this region appears to lag behind that of other Australians. Key wellbeing issues include high levels of alcohol consumption; limited access to mental health services; and youth risk-taking behaviour (high levels of teen pregnancy compared with the Queensland average). As well, smoking remains the single largest cause of premature mortality and ill health but will soon be overtaken by obesity and poor nutrition. As obesity rates rise, diabetes prevalence is expected to worsen. There are high rates of hospitalisation particularly for Indigenous residents and major health disparities between Aboriginal and non-Aboriginal people. Rockhampton's crime rates are significantly higher than those of the rest of the state, and could have implications for resident's feelings of personal safety and security. On the other hand, the crime rates for the Livingstone & Banana Local Government Areas (LGAs) were much lower than the state average. Housing affordability is affected by high insurance premiums compared with non-cyclone areas. People living adjacent to Gladstone Harbour are enjoying the harbour more than previous years. The GBR plays an important role in the health and wellbeing of residents, TOs and visitors. Most GBR users (with the exception of commercial fishers) are satisfied with management, support rules and believe they have fair access to resources.

The Burnett-Mary Region has one of Australia's fastest urban growth rates. It is reasonably well-serviced by schools, hospitals, road, rail, airports, water, gas and electricity. However, there are some capacity issues and variation in community vitality across the region. The ageing coastal population, loss of youth further inland, mobility of the Indigenous population and rapid expansion of some urban centres reflects a fluctuating population that requires good access to health and wellbeing services and appropriate housing. The South Burnett and Cherbourg LGAs have a consistently lower level of satisfaction with service delivery than experienced by the majority of remote and regional communities across Queensland and Australia for perceptions of regional services. This is despite Cherbourg council's active

promotion of services and infrastructure projects for the community. Regional crime rates are below the state average, with the exception of Cherbourg and South Burnett LGAs, reflecting major disparities between Aboriginal and non-Aboriginal communities. These disparities extend to wellbeing, despite the systems in place to address this gap. Benefits associated with active connection with natural resources, such as the GBR, are increasingly evident, particularly for Indigenous communities.

Some Emerging Policy Implications

Bench-marking Community Vitality is important for maintaining and strengthening partnerships and positive relationships between GBR managers and all sectors within local, regional, national and international communities. Assessment of the available information has raised issues with major emerging implications for the Reef 2050 Plan Review. For example, GBR managers need to build a significant social license across international and Australian communities if policies are required to implement more urgent approaches to GBR protection and restoration in the face of climate change.

4.2.3 Culture and Heritage (CH)

Cluster description: Status of integrated and diverse culture and heritage associated with the GBR catchment. Cultural and heritage connections promote a sense of place associated with GBR coastal communities, and there is a strong sense of place attachment and identity associated with the community, because of its association with the GBR. This cluster also includes values of significance in accordance with TO practices, observances, customs, traditions, beliefs or history. Historic heritage is specifically concerned with the occupation and use of an area since the arrival of European and other migrants. There are four major attributes associated with this cluster: natural heritage; Indigenous heritage; contemporary culture; historic cultural heritage.

Reef 2050 Plan Theme: **Heritage** Indigenous and non-Indigenous heritage values are identified, protected, conserved and managed such that the heritage values maintain their significance for current and future generations.

Reporting framework: The reporting framework for the Cultural and Heritage human dimension cluster is shown in Table 14, along with significant information gaps that will impede comprehensive reporting. **Attributes and indicators for which data collection is missing or inadequate, and/or funding is non-ongoing at present,** are highlighted in red.

Table 14: Human dimension attributes and key indicators for the Cultural Heritage human dimension cluster

Human Dimension Attributes	Key Indicator sets
CH1 World Heritage – underpinned by ecosystem health, biodiversity & water quality	CH1.1 State of regional natural assets CH1.2 Perceptions of GBR aesthetic beauty & other world heritage attributes CH1.3 Impacts on GBR-Wide World Heritage values
CH2 Indigenous (Traditional Owner) heritage	CH2.1 ID, state & trend of Indigenous heritage values CH2.2 TO management of GBR resources including number & strength of: (a) TO connections with GBR resources incl. identification, protection & management of Indigenous cultural heritage in sea country; (b) TO benefits derived from the GBR; (c) partnerships, institutional arrangements & agreements between TOs & all GBR stakeholders; (d) TO-driven frameworks & participatory monitoring methods CH2.3 Levels of TO satisfaction with: (a) identification, documentation & storage of cultural information; (b) TO led methodologies; (c) participation in GBR management; (d) extent to which TEK is identified, maintained & transferred CH2.4 Levels of TO use & dependency on the GBR CH2.5 Impacts on Indigenous heritage
CH3 Contemporary culture	CH3.1 Place attachment, identity CH3.2 GBR as culture – levels of pride, inspiration & personal connection to the GBR CH3.3 National connections to the GBR CH3.4 Impacts on contemporary culture
CH4 Historic maritime heritage	CH4.1 Identification, protection & management of historic heritage in GBR environments CH4.2 Cultural significance of historic heritage values for the GBR CH4.3 Impacts on historic maritime heritage values

Condition and trend

	Eastern Cape York	Wet Tropics	Burdekin	Mackay-Whitsunday	Fitzroy	Burnett-Mary
Cultural Heritage	55% (11./20)	57% (11./20)	57% (11./20)	60% (12/20)	62% (12.5/20)	72% (14.5/20)
						
	0-20% Unable to manage Will not recover over time	20-40% Struggle to manage Declining social/economic wellbeing & ecological health	40-60% Suffer some shocks Considerable time/investment to improve social/economic wellbeing & ecological health	60-80% Make reasonable progress Improving economic & social well-being and ecological health	60-80% Make reasonable progress Improving economic & social well-being and ecological health	80-100% Easily manage Maintains/improves social/economic wellbeing & ecological health

The entire region’s heritage values have been internationally recognised through the listing of the GBR under four out ten World Heritage (WH) criteria: Natural phenomena or beauty; Major stages of Earth’s history; Ecological and biological processes; and Natural habitat for biodiversity. The Wet Tropical rainforests in the northern GBR catchments are recognised for the same suite of WH values and Fraser Island in the south for the first three. Though Indigenous cultural values are of deep and enduring significance, they have not been

adequately captured in any framework. Attempts to obtain international recognition of cultural values of the World Heritage Area have not yet borne fruit.

Throughout the GBR and catchment cultural and heritage values may be compromised by extraction, development, pollution and/or climate change. Recent extreme weather events and two consecutive summers of mass coral bleaching caused by higher than average water temperatures have significantly degraded the heritage values of Eastern Cape York, Wet Tropics, Burdekin and Mackay-Whitsundays Regions. The entire GBR is also adversely affected by marine debris and coastal development, and associated visual and noise impacts, dredging and transient shipping. Until the recent bleaching events of 2016 and 2017, the natural heritage values for the Eastern Cape York section of the GBR were exceptionally high. GBR values are deeply reflected in contemporary regional and national culture. Throughout the catchment there is a strong overall cultural understanding of the importance of the GBR and many regional sub-cultures are respectful of GBR values. In every region, TOs continue to have strong cultural connections to land and sea areas and retain custodial responsibilities to ensure their protection (Grant, 2012). Indigenous heritage values pertaining to the GBR are unique, dynamic, diverse and living. They includes language and place names, songlines, storylines, intimate traditional ecological knowledge, social enjoyment, historic travel and trade routes, access and use of coastal fishing places, fish traps, middens, quarries, hunting grounds and traditional estates. Traditional Owners have long expressed an interest in taking a more prominent NRM role in managing regional land and sea country and formal agreements for managing use have improved dramatically over the past decade. Even so, significant work still remains in securing sea country rights and financially viable (Indigenous led) land and sea management capacities in sea country estates. Across the GBR there is a lack of knowledge about the location of historic maritime heritage sites and the condition of historic shipwrecks is poorly understood.

Some Emerging Policy Implications

Assessment of the available information has raised issues with major implications for the Reef 2050 Plan Review, including the need to:

- Progress development of indicators for assessment and monitoring of aesthetics within the GBRWHA context
- Shift towards a stronger free, prior and informed consent-based approach in working with Traditional Owners of the GBR, and particularly in Cape York Peninsula
- Significantly increase attention to protecting historical maritime heritage in the GBR.

Comprehensive reporting of this cluster is hampered by several data gaps as indicated in Table 14.

4.2.4 Economic Values (EV)

Cluster description: Monetary and non-monetary advantages that people derive directly or indirectly from a healthy and well-managed GBR. Fundamental is the premise that economic activities within the GBRWHA and its catchments are ecologically sustainable. GBR-dependent industries rely on a healthy GBR and include GBR-based commercial fishing, tourism, recreation, research and Traditional Owner use. GBR-associated industries include industries that may impact on the GBR, but are not economically dependent on GBR health e.g. shipping, catchment industries such as agriculture, urban development, port development.

Reef 2050 Plan Theme **Economic Benefits** Economic activities within the Great Barrier Reef World Heritage Area and its catchments sustain the GBR’s Outstanding Universal Value.

Reporting framework: The reporting framework for the Economic Values human dimension cluster is shown in Table 15, along with significant information gaps that will impede comprehensive reporting. **Attributes and indicators for which data collection is missing or inadequate, and/or funding is non-ongoing at present**, are highlighted in red.

Table 15: Human dimension attributes and key indicators for the Economic Values human dimension cluster

Human Dimension Attributes	Key Indicator sets
EV1 Size & diversity of regional economic growth	EV1.1 Gross Regional Product (GRP) EV1.2 Core industries – size & type
EV2 Economic viability of GBR-dependent & GBR-associated industries	EV2.4 Economic viability of Mining & minerals EV2.5 Economic viability of Ports & shipping EV2.6 Economic viability of Agriculture EV2.7 Economic viability of Urban industries
EV3 Economic viability of GBR-dependent industries	EV3.1 Vulnerability of GBR-dependent industries EV3.2 Adaptive capacity of GBR-dependent industries EV3.3 Economic viability of GBR-tourism EV3.4 Economic viability of GBR-commercial fishing
EV4 Inclusiveness & economic fairness/ equity	EV4.1 Income – personal & household EV4.2 Opportunities for GBR TOs EV4.3 Equity between & within industries/ activities
EV5 Workforce participation & employment	EV5.1 Regional employment participation rates & trends EV5.2 GBR- related employment EV5.2.1 No. employment opportunities for TOs in GBR sea-country management EV5.2.2 No. employment opportunities for TOs in GBR-based industries
EV6. Economic confidence within the region	EV6.1 Regional economic confidence EV6.2 Confidence in GBR industries

Condition and trend

	Eastern Cape York	Wet Tropics	Burdekin	Mackay-Whitsunday	Fitzroy	Burnett-Mary
Economic Values	45% (13.5/30)	58% (17.5/30)	58% (17.5/30)	63% (19/30)	62% (18.5/30)	68% (20.5/30)
0-20% Unable to manage Will not recover over time	20-40% Struggle to manage Declining social/economic wellbeing & ecological health	40-60% Suffer some shocks Considerable time/ investment to improve social/economic wellbeing & ecological health	60-80% Make reasonable progress Improving economic & social well-being and ecological health	80-100% Easily manage Maintains/improves social/economic wellbeing & ecological health		

The economic values of communities and regions across the GBR catchment varies considerably from north to south, and within regions from east to west. The most northern section of the catchment, Eastern Cape York is the most economically vulnerable. Residents here are highly welfare-dependent and have very limited employment opportunities. Enabling the long term social and economic viability of Eastern Cape York requires expanding and diversifying the region's economic base, and reducing reliance on government support. As well, investment is needed in programs that support mobility for work and employment. Unfortunately, however, planning, tenure and land use conflicts reduce investor confidence in economic opportunities. Commercial fisheries are progressing towards industry sustainability but competition with conservation/ recreation may decrease profitability. While agricultural production continues to grow, water availability and storage proposals are expensive and may have viability limits.

Immediately to the south is the Wet Tropics Region which has a sound economic infrastructure for the GBR-related economy. However, ongoing resource decline and regional-capital city inequities could drive declining equity and promote economic fragility. GBR-dependent industries (mainly commercial fishing and marine tourism) rely on a healthy GBR system. Repeated bleaching and extreme weather events mean that many corals do not have time to recover and even pristine reefs are not immune. Past cyclone and recent bleaching events have reduced natural resource resilience to future shocks in significant areas. GBR-dependent industries generally have levels of financial equity that are comparable to those of other industries; although fishing enterprises receive lower levels of compensation for extreme weather events than are paid to terrestrially-based agricultural enterprises. Further, some commercial fishing operators claim their viability is compromised by recreational and illegal fishing activities. Commercial fisheries are progressing towards environmental sustainability, but competition with conservation/ recreation may compromise financial sustainability. There is potential to increase economic diversity through investment in industries linked to GBR-related lifestyle values. The Wet Tropics regional economy has a very strong workforce exposure to volatility in the tourism industry, with a high dependence on backpackers. Further, significant economic disadvantage exists for Indigenous communities and younger people, particularly in relation to employment. Unemployment levels between 8% and 10% population wide are also higher than the rest of Australia (with the exception of Townsville). Despite the region's economic vulnerabilities, increasing confidence in the tourism sector and the growth of the services economy has delivered new business confidence.

The Burdekin Region's economy relies on a solid primary industries base which, in common with most of Queensland, is vulnerable to extreme weather events such as floods, droughts and cyclones. Unemployment in Townsville (the region's economic hub) is among the highest in Australia and the city's economic confidence is generally low, although expected to increase substantially with the implementation of the Townsville City Deal. Townsville is north Queensland's focus for warehousing, retail, manufacturing, health care, education, research and defence. It has strong linkages to the region's resource industries, including mining and minerals; coal and gas; grazing; sugar cane; horticulture; and GBR fisheries. Proposed new coal mines in the Galilee Basin are driving expansion proposals for several GBR ports. Burdekin Shire and Ingham together produce 26% of Australia's raw sugar. Challenges for GBR-dependent industries (recreation, tourism and fishing) include predicted climate change impacts, decline in water quality, lack of fish passage connectivity, and degradation of intertidal nursery habitats and marine ecosystems. Challenges for mineral resources industries include:

declining coal price and markets; high carbon emissions; potential environmental impacts on surrounding environment and GBR; risk to surface and groundwater; and high financial leakage from the region due to FIFO/DIDO workforce.

The Mackay-Whitsundays Region supports a diverse agricultural sector (grazing, sugarcane, sorghum, horticulture); substantial commercial fishing; high quality nature-based tourism; and services to the mining sector. It contributes \$16B-\$17B per annum to the national economy. In the Whitsundays, tourism is the largest sector, with an emphasis on lifestyle and high-quality food production. There are two ports in the region: Hay Point which had a throughput of 1,133 bulk carriers in 2015-16, up from 1,087 in 2014-15; and Mackay Port which had 164 ships in 2015-16—down from 173 in 2014-15. Mackay's population will likely continue to grow, but several smaller regional towns are experiencing population declines, leading to decreased demand for services and facilities, and resulting in a smaller workforce in these areas. Severe Tropical Cyclone Debbie caused substantial damage to the cane industry (\$250M) and to horticulture (\$100M); severely disrupted tourism operations; caused widespread property damage; and disrupted power and telecommunications to small businesses, affecting economic confidence in the region in the short-term. Despite these set-backs, the region has shown economic resilience as it transitions from the mining boom and recovers from Severe Tropical Cyclone Debbie.

In the Fitzroy Region, economic growth is strongest in the public sector and mining-related construction. While regional GBR-associated industries are highly profitable, GBR-dependent industries are steady (tourism) or in decline (commercial fishing). In general, the region has a prosperous economy driven by its central location along major north, south and west transport and freight infrastructure routes, and proximity to major mines and mineral processing plants. There are, however, some disparities between high income earners in mining and minerals sectors and families who are dependent on welfare. Regional unemployment is above the Queensland average, and welfare dependency is high despite strong adult, female and Indigenous workforce participation. There is below average Year 12 completion and a tendency for young adults to bypass post-school education and training for unskilled jobs. High unemployment; poorly skilled workforce; economy dominated by public sectors; below average and slowing economic activity per resident prevents Rockhampton's economic potential being realised. Rockhampton lacks a large, dynamic and entrepreneurial business community, and there are the numbers of local businesses and new businesses forming are below average in comparison with the rest of Queensland. Gladstone LGA is a major industrial hub that includes the state's largest port and Liquefied Natural Gas (LNG) plants. The Gladstone housing market is extremely volatile, perhaps reflecting changes in types of residents in recent years. Increased prices in units are offset by declining house values. Agricultural and mining and minerals sectors remain vulnerable to global market forces and extreme weather events which are expected to influence future performance. Nevertheless, global demands for beef, fruit and vegetables are driving expansion of grazing and crop production in the catchment and this may have adverse impacts on GBR water quality. Urban expansion along the Capricorn Coast may also have adverse impacts on GBR water quality.

The Burnett-Mary Region faces many economic barriers and challenges, including high unemployment; high levels of youth migration away from the area; ageing population; and low workforce participation rates. Regional personal income is below the state average, particularly in the Aboriginal community of Cherbourg. Regional and youth unemployment is higher than

the state average. Increasingly ageing populations in coastal centres are more likely to be retired or heading towards retirement. Even so, the housing market in coastal areas is slowly recovering from a sharp decline after the 2011 floods, although many rural areas are static or in decline. Regional economic confidence is generally subdued (with the exception of the agricultural sector which is very profitable). However the region's strategic location between South-East Queensland and the industrial hub of Gladstone, and close to the Surat Basin has access benefits. Although the Region has very few active mines, many mining and mineral activities are planned, each with of the potential to improve economic viability of communities in the region. The region's non-market valuation, bolstered two World Heritage Areas (the GBRWHA and Fraser Island) and the Great Sandy Biosphere Reserve, is assumed to be high. In recent years this most southern section of the GBR has had an increase in hard coral cover and fish abundance and steady reversal of seagrass declines. The value of commercial fishing has increased since 2012, and the number of people employed in GBR fishing in this region more than doubled from 33 in 2011-12 to 78 in 2015-16. This goes against the trend for other GBR sections. This rise is dwarfed by the decline in tourism-related employment over the same period (from 3,563 to 2,192). The value of regional tourism has fluctuated since 2008-2009—perhaps reflecting floods and other extreme weather events; the impact of the Global Financial Crisis in 2007-08; and, more recently, the sinking of the tourist vessel *Spirit of 1770* in 2016. GBR-dependent industries of commercial fishing and tourism are optimistic about the future of the GBR, but this does not always extend to confidence in the viability of their own businesses.

Some Emerging Policy Implications

An issue with major implication for the Reef 2050 Plan Review raised by assessment of the available information is the need for Australian and Queensland governments to actively pursue policies to increase economic diversity and adaptive capacity of GBR-dependent regions (particularly north of Gladstone) so that GBR communities can avoid the worst impacts of climate change.

Comprehensive reporting of this cluster is hampered by several data gaps as indicated in Table 15.

4.2.5 Governance (G)

Cluster description: The health of GBR-based decision-making systems (from local to international scales), including levels of connectivity between different parts of the governance system, effective use of diverse knowledge sets and system capacity for effective action. Also includes viability of institutional arrangements; community participation in GBR management; and use of ESD principles in planning and management.

Reef 2050 Plan Theme: Governance. The Outstanding Universal Value of the Reef is maintained & enhanced each successive decade through effective governance arrangements & coordinated management activities.

Reporting framework: The reporting framework for the Community Vitality human dimension cluster is shown in Table 16, along with significant information gaps that will impede comprehensive reporting. **Attributes and indicators for which data collection is missing or inadequate, and/or funding is non-ongoing at present,** are highlighted in red.

Table 16: Human dimension attributes and key indicators for the Governance human dimension cluster

Human Dimension Attributes	Key Indicator sets
G1 Strategic focus of governance system	G1.1 No./ type of opportunities for improved Reef 2050 Plan Governance G1.2 No. / severity of system-wide problems for delivery of key Reef 2050 Plan targets
G2 Connectivity within & between key decision making institutions & sectors	G2.1 No./ type governance subdomains (or policy areas) that counteract Reef 2050 Plan targets/action G2.2 Status of partnerships, inter-governmental arrangements G2.3 Levels of transparency, ownership, accountability, responsiveness G2.4 Inter-generational equity in GBR-related decision-making G2.5 Intra-generational equity in GBR-related decision-making
G3 Adaptive governance capacity of key decision making institutions & sectors	G3.1 Levels of integrated strategy development & delivery design G3.2 Support for management G3.3 Confidence in management G3.4 Sectoral/community contributions to decision-making
G4 Adaptive use & management of integrated knowledge sets	G4.1 Availability of integrated knowledge sets G4.2 Use of integrated knowledge sets in decision-making G4.3 Management of integrated knowledge sets

Condition and trend

	Eastern Cape York	Wet Tropics	Burdekin	Mackay-Whitsunday	Fitzroy	Burnett-Mary
Governance	52% (10.5./20)	57% (11.5./20)	57% (11.5./20)	57% (11.5./20)	57% (11.5./20)	67% (13.5/20)
						
	0-20% Unable to manage Will not recover over time	20-40% Struggle to manage Declining social/economic wellbeing & ecological health	40-60% Suffer some shocks Considerable time/investment to improve social/economic wellbeing & ecological health	60-80% Make reasonable progress Improving economic & social well-being and ecological health	80-100% Easily manage Maintains/improves social/economic wellbeing & ecological health	80-100% Easily manage Maintains/improves social/economic wellbeing & ecological health

The wider system of governance affecting GBR outcomes fails to adequately address human dimensions concern across the GBR catchment. In most regions, governance arrangements require considerable investment to improve social and economic well-being and ecological health. The exception is the Burnett Mary Region, where governance arrangements have made more reasonable progress in addressing GBR community wellbeing and the wider ecological health of the GBR.

The evaluation confirmed that Reef 2050 Plan provides a basic GBR-wide and a bilaterally agreed strategic planning framework. Implementation strategies and institutional arrangements exist at all scales required for delivery. There is a strong framework for ongoing and adaptive monitoring, evaluation and review of the over-arching system of governance affecting outcomes in the GBR emerging through RIMReP. All required institutional organisations across the GBR are well engaged in GBR governance, but there are varying capacities across different sectors. Further, there is the ongoing possibility of further decline in social and economic wellbeing of GBR communities and GBR ecological health as a result of poor connectivity among key governance subdomains affecting GBR outcomes. This is particularly pertinent to Eastern Cape York where historically poor linkages have existed within and between the strategic governance roles of government agencies, TOs and councils. In the

southern section of the GBR, proximity to South-East Queensland results in stronger connectivity between regional and state-wide decision-makers. Biophysical knowledges (including models and decision support tools) are generally strong across the marine and catchment space, (with the exception of Cape York) though social and economic sciences are not developed enough to deliver truly integrated decisions.

Some Emerging Policy Implications

Major emerging implications for the Reef 2050 Plan Review include the need to:

- Progress system-wide approaches to effect continuous improvement in the wider system of governance affecting GBR outcomes, particularly through greater effort alignment across major policy areas affecting GBR outcomes, and significantly enhancing long term delivery systems
- Improve the connectivity between environment, economic/regional development policy and social resilience programs of the Australian and Queensland governments and local governments. There is also a need to align efforts across portfolios and levels of decision-making to address social and economic wellbeing and ecological health in the GBR.

With a significant whole of system benchmarking system now in place, there is a clear framework for long term monitoring of the GBR governance system. Implementation of this framework, however, is not resourced on an ongoing or long term basis.

5.0 SUMMARY AND CONCLUSIONS

Since the release of the Reef 2050 Plan there has been a significant growth in international understanding of the concept of considering the human dimensions of Marine Protected Areas (MPAs). In short, intellectual thinking about people in protected areas has shifted from old models that simply saw the actions of humans as threats or impediments to core MPA values. This view has progressed towards a mixed approach, recognising human dimensions, but still thinking about them as potential threats to MPA values that need to be managed. Across the globe, new thinking around these issues is based on recognition that MPAs are socio-ecological systems, and that managers need to identify and manage both biophysical and human values that are desired by society and hence these need to be managed interchangeably. Consider, for example, that a community that is experiencing extreme poverty is less likely to be able to adapt and progressively improve stewardships practices to improve GBR health. This change of thinking sees MPA managers increasingly turning their attention to recognising important human dimensions (e.g., community or economic wellbeing), and setting goals, targets and actions to improve these dimensions. This means MPA managers are explicitly moving toward managing a more complex socio-ecological system, rather than just seeking to fend off negative human influences.

While explicit inclusion of four key aspects of the human dimension of the GBR are now recognised within the Reef 2050 Plan, the goals set can be predominantly seen to revert back to concern for the biophysical asset, rather than for innate concern for the human component of the system. The two key goals related to community and economic benefits, for example, are:

- A community that plays a role in protecting the Reef for the benefits a healthy Reef provides for current and future generations
- Economic activities within the GBR World Heritage Area and its catchments sustain the Reef's Outstanding Universal Value (Australian Government, 2015).

Both goals can be seen to consider the human dimension largely from the viewpoint of the health of the GBR, rather than from the viewpoint that human well-being is an inherently important part of the socio-ecological system. In the past, this has led MPA and World Heritage management agencies to be almost exclusively regulatory in their approach, and management institutions predominantly populated by people embedded in the biophysical sciences. This has “disciplinary bias” or rationalistic approach to problem solving, routinely resulting in significant tensions between the business of sustainable management and the economic and community wellbeing of (both directly related and associated) communities. To address this problem, there has been a practical and financial commitment to the development of a Human Dimensions Expert Group and a benchmarking/monitoring product within the wider RIMReP approach to monitoring the health of the GBR.

Emerging Implications for Reef 2050 Plan and Opportunities to Improve

The emerging Reef 2050 Plan human dimension indicator framework, comprised of indicator clusters and potential indicators for attributes within these clusters, is based on work by:

- (a) the Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES)

- (b) previously funded research (Marine and Tropical Science Research Facility (MTSRF) and Queensland Centre for Social Science Innovation (QCSSI)) on measuring community resilience in the wet Tropics region of the GBR catchment
- (c) the synthesis of other monitoring efforts and needs for the Reef 2050 Plan implementation
- (d) the NESP-funded Social and Economic Long Term Monitoring Program (SELTMP)
- (e) regional reporting in the catchment by GBR-based partnership groups (Stewardship).
- (f) Reef Blueprint (GBRMPA 2017f).

The intention of this new assessment and monitoring approach is to review and refine the indicator framework for understanding the human dimensions of the GBR as a basis for strategy development for improve the health of these dimensions. This can be done through discussions and meetings with the program design expert panels and other similar groups of researchers, stakeholders, managers and partners. These meetings aim to stimulate discussions, compile relevant data sets against indicators, and refine specific components of the framework. The framework can be used to:

- gather evidence regarding the state and trend of the human dimensions related to the GBR (published and unpublished sources of data, social surveys and other lines of evidence)
- create narratives as they pertain to different components of the DPSIR framework
- develop a set of cohesive decision rules for creating an index from the lines of evidence used to inform benchmarking (scoring) of indicator clusters and sub-cluster attributes
- guide decision-making by discussion panels
- deliver results to RIMReP Program Design working group, the Reef 2050 Plan Mid-Term Review and Outlook reporting.

The inclusion of human dimensions considerations in future planning, assessment and monitoring of the GBR is a new concept, even though GBR policy makers, managers and partners have long recognised that maintaining the health of the GBR, both now and into the future, will rely on mobilising the energy, motivation and aspirations of key individuals and sectors of society (particularly within GBR catchments) (GBRMPA, 2017f). In particular, to improve GBR's health, policy makers and managers need to understand and monitor:(a) people's relationship with the GBR; (b) psychological forces driving behaviours that affect the GBR (positively or negatively); (c) the role of GBR decision-makers including users, managers, partners, communities and industry in affecting change; (d) equity and inclusion of multiple perspectives, and (e) the adaptive capacity of industries and communities who depend on the GBR for the economic, social, or cultural values it provides.

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APPENDIX 1: TASK COMPLETION STATUS

Table 17: RIMReP Program Design tasks and progress to date

Task		Progress
RIMReP Task 1.	Identify the critical human dimension values that require monitoring within the overall context of people & their relationship with the Great Barrier Reef.	Completed
RIMReP Task 2.	Identify the objectives and targets in the Reef 2050 Plan & provide a corresponding list of potential indicators & metrics for key GBRWHA human dimension values on the basis of expert knowledge & the literature.	Completed where possible
RIMReP Task 3.	Establish a framework for long-term benchmarking, monitoring & reporting systems to inform the coming (& regular) review & reporting of the Reef 2050 Plan, 5 yearly Outlook reporting cycle, & other reporting requirements.	Completed as far as possible
RIMReP Task 4.	Provide guidelines for grading indicator scores.	Completed
RIMReP Task 5.	Where appropriate, determine associated social-economic thresholds in relation to indicators & their relationship to associated environmental thresholds.	Completed where possible
RIMReP Task 6.	Undertake a gap analysis of data requirements.	Completed where possible
RIMReP Task 7.	Identify how gaps may be addressed & by whom.	Completed where possible
RIMReP Task 8.	Evaluate the adequacy/suitability of existing data sets to achieve the objectives & requirements of the RIMReP, including information requirements for the Outlook Report, Reef 2050 Plan, Regional Report Cards & other mandatory reporting requirements & other information requirements of Reef users.	Completed where possible
RIMReP Task 9.	Evaluate the adequacy of the spatial & temporal resolution of existing data.	Completed where possible
RIMReP Task 10.	Work with experts from other RIMReP Program Design groups to integrate monitoring & reporting across disciplines.	Not yet completed – waiting on RIMReP integration meetings

APPENDIX 2: HUMAN DIMENSION VALUES ADOPTED BY THE GBRMPA

Access refers to people's ability to enter and use the Marine Park and its resources. Millions of people visit the Marine Park each year. It provides a wide range of recreational opportunities such as boating, snorkelling, diving, fishing and nature appreciation. There are also opportunities for commercial fishing, marine tourism and education. In some key locations, management arrangements such as Plans of Management separate or limit certain use to avoid conflicts. Access also refers to the potential for people to visit and use the Marine Park in the future.

Aesthetic values are associated with healthy intact ecosystems. They are connected to both environmental attributes (such as bays, beaches, continental islands, coral cays, mangroves, marine animals, water, as well as seagrass meadows) and experiential attributes (presented by beauty, discovery, naturalness, remoteness, sense of inspiration, as well as tranquillity and solitude).³ The aesthetics values of the Great Barrier Reef are experienced and described from a variety of perspectives:

- panoramic – above in the air or high lookout points. This perspective displays patterns of waters, reefs, cays and islands, and as a vast landscape.
- at water or land level – the Great Barrier Reef at eye level, as sky, water, and land emerging from water and with a sense of world beneath the water.
- below the water – the Great Barrier Reef is an underwater landscape. The three-dimensional qualities of the underwater landscape.

Aesthetics refers to people's perceptions of the beauty of a site or object. While aesthetics are strongly influenced by visual appearance, all the senses play a role—sight, sound, smell, touch and taste. Aesthetics influence the way in which people value and enjoy the Great Barrier Reef. Aesthetics is highly personal—one person may seek solitude and quiet, while another seeks social interactions. The same person often values different elements at different times. Places that are easy to access are less likely to provide opportunities for enjoying solitude or tranquillity, but may enhance opportunities for socialising and personal comfort. Perceptions of the beauty and desirability of natural areas are influenced by people's personal experiences and cultural backgrounds. Psychological, social or cultural dimensions of aesthetics include a sense of history, a sense of place, inspiration, spiritual connections; and opportunities for learning, relaxation, recreation and escapism. Indigenous perspective on aesthetic values may include cultural expressions such as storytelling, mythology, spirituality, literature, music/art, symbols of power, wealth.³ Aesthetics are recognised under criterion (vii) of the World Heritage Convention: for attributes which 'contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.' Aesthetics are closely linked to the condition of natural, cultural and historic heritage values within the Marine Park. The natural beauty of most of the Marine Park remains intact, especially for offshore coral reefs and aerial vistas, as well as for neighbouring islands (many of which are Queensland national parks). Significant loss of coral cover has reduced underwater aesthetic value at many inshore reefs, particularly since the Year 2000 due to severe weather, crown-of-thorns starfish and increased sea surface temperature increases. Aesthetics is linked to wellbeing are also closely linked to social values such as access, understanding, appreciation and personal connection.

Understanding, appreciation and enjoyment

Understanding refers to people's knowledge of the Marine Park, its values and the interconnected systems that support life on the Great Barrier Reef.

Understanding comes from learning, either in-person or remotely. The levels of understanding held by coastal residents and GBR visitors is an important factor in how they may respond to potential impacts on GBR health. Personal experiences, together with scientific knowledge and cultural knowledge gained from stories passed from one generation to the next (including intergenerational aspects of learning for wise decision-making), provide a context for understanding the Marine Park and its values. Understanding allows reflection on what the Great Barrier Reef may have been like in the past; how it contributed to human wellbeing; and how it has responded to human activities.

Appreciation refers to realising and feeling grateful for the uniqueness of the Great Barrier Reef. Appreciation often grows with understanding.

Enjoyment refers to the positive emotions people experience when they visit or see the Marine Park. Most people in the world will never visit the Marine Park in person, but many still enjoy the Marine Park through photographs, videos or stories. The Marine Park's biophysical and heritage values are the primary reasons why people visit the Reef either as part of a commercial tourist program or in a recreational capacity. There are many opportunities for coastal residents and visitors to learn about and help protect the Great Barrier Reef. A key component of many tourism programs is presenting and interpreting the Marine Park to their guests. Close to 70% of visitors to the Marine Park travel with certified high standard tourism operators. These operators are committed to a high standard of presentation and interpretation as part of their daily operation. Through GBRMPA's [Reef Guardian](#) stewardship program, local stakeholders are encouraged to take hands-on actions to care for the Great Barrier Reef. The program includes schools, local councils, farmers, graziers and commercial fishers. Participants are encouraged to go beyond what is required by law in their day-to-day activities and to become active stewards. This includes sharing information about their actions. Other stewardship initiatives such as the [Eye on the Reef](#) program contribute vital information about Marine Park values from people who are in the Marine Park daily, such as tourism operators, researchers, students, as well as Queensland Parks and Wildlife Service officers. Participants contribute substantially to understanding trends in the condition of values through time and at many locations throughout the Marine Park.

Human health refers to the physical and mental health benefits that residents and visitors derive from the Marine Park. People benefit from relaxation and stress reduction through recreational activities and access to natural settings; healthy inputs to diets from freshly caught local seafood; and exercise from snorkelling, boating and fishing. Conversely, people may be negatively affected if Reef health declines—depression and anxiety have been associated with environmental decline.¹⁵ The health benefits people derive from the Marine Park are diminished by those impacts that make the Marine Park a less attractive and fulfilling place to

¹⁵ Louv, R. (2008). *Last child in the woods: Saving our children from nature-deficit disorder*. Chapel Hill, NC: Algonquin Books; Speldewindea, P., Cook, A., Davies, P., & Weinstein, P. (2009). A relationship between environmental degradation and mental health in rural Western Australia. *Health & Place*, 15(3), 880–887. doi:10.1016/j.healthplace.2009.02.011

visit, and by those that reduce the quality and availability of its food resources, clean air, water or sediment.

Personal connection refers to people's aspirations, spiritual connections, cultural ties, employment, stewardship activities, places of residence and recreational activities that are associated with the Marine Park. It links each individual stakeholder, visitor, local resident and Traditional Owner to the Marine Park. The Great Barrier Reef is a key part of the identity of adjacent coastal communities. It is a major source of pride and distinction for these communities. More than 95% of nearby residents have visited the Great Barrier Reef at least once in their lives. Many coastal residents report that they chose where they live so as to be close to the Great Barrier Reef and that there are 'not many other places better than the Great Barrier Reef for the recreation activities they enjoy' (Marshall et al 2014). Commercial fishers and tourism operators identify very strongly with their occupations and the places where they live and work. This is highlighted by the fact that few, if any, who were directly affected by Severe Tropical Cyclone Yasi or the central Queensland floods in 2011 changed their jobs or moved elsewhere, despite economic imperatives to find alternative income. Traditional Owners continue to maintain connection to their sea country, for example, through stories and songlines, sites of cultural significance and important saltwater ceremonies. Australians in general also identify strongly with the Great Barrier Reef as a national icon. A 2013 survey conducted as part of the Social and Economic Long Term Monitoring Program found that 80% of Australians see the Great Barrier Reef as vital to their identity (Marshall et al 2014). Across the world, people of many nations feel a strong personal connection to the Great Barrier Reef, even if they have never visited in person.

Equity relates to fairness in the distribution of benefits and impacts across the community and depends on sustainable use that meets the needs of the current generations without compromising the ability of future generations to meet their own needs¹⁶. Impacts to equity may result in changes to the current and future generations' access, enjoyment, appreciation and use of the Great Barrier Reef. Equity may also be compromised if there are impacts to human health through the decline of ecosystem health and/or contamination of air, water or sediments.

Empowerment is the process that enables citizens, groups, communities, stakeholders, and organisations to undertake actions and participate meaningfully in the protection and management of the Great Barrier Reef. Factors that enhance human wellbeing of Reef-dependent people may contribute to empowerment.

Employment and income

Employment refers to jobs created or maintained as a result of sustainable activities conducted in the Marine Park. Income refers to money that people receive as a result of activities conducted in the Marine Park. The benefits that businesses, individuals and communities derive from the Marine Park are founded on its biodiversity, species distribution and abundance, geomorphological features, and the range of social, Indigenous and historic heritage values. Employment and income are therefore affected by impacts that diminish the

¹⁶ Brundtland, G. H., & World Commission on Environment and Development. (1987). *Our common future: Report of the World Commission on Environment and Development*. Retrieved from <http://www.un-documents.net/wced-ocf.htm>

condition of these foundational values. Activities in the Marine Park generate income and employment for tens of thousands of people both within and outside the Marine Park, as the flow-on benefits reach far beyond the boundaries of the Marine Park. The Marine Park supports significant commercial uses linked to recreation, tourism and commercial fishing. These industries play an important role in regional Queensland and rely on a healthy Reef ecosystem for long-term economic stability. The economic contribution generated by tourism, recreation, commercial fishing and scientific research in the Great Barrier Reef catchment and the World Heritage Area in 2015-16 was estimated to be \$6.4 billion and generated around 64 000 jobs. This has been relatively stable over the past five years (DAE 2017). It is important to note, the economic estimates are likely to be only a portion of the total economic value of the Great Barrier Reef, as most ecosystem services that are not traded in markets have not yet been calculated (DAE 2017). For example, the non-market economic value of a healthy coral reef system in providing a physical barrier from wave and tsunamis impacting coastal areas, or mangrove habitats that also provide a buffer between land and sea and filter sediment and nutrients.

Heritage

A place's natural and cultural environment having aesthetic, historic, scientific or social significance, or other significance, for current and future generations of Australians.

Historic heritage includes places associated with the non-Indigenous cultural heritage of Australia encompassed in the country's history. It can include historic shipwrecks, World War II features and sites, light stations, places of scientific significance, e.g., research stations, expedition sites; places of social significance, e.g., iconic sites such as Ninney Rise (Mission Beach), buildings, monuments, gardens, industrial sites, landscapes, cultural landscapes, archaeological sites, groups of buildings and precincts, or places which embody a specific cultural or historic value. Historic places tell us about national and social developments in Australia over the past few centuries, technical and creative achievements, and provide a tangible link to past events, processes and people.

Indigenous heritage includes all places that are part of Aboriginal and Torres Strait Islander peoples' spiritual links to the land or which tell the story of Indigenous peoples from time immemorial to the present. It can include cultural practices, observances, customs and lore, sacred sites, sites of particular significance, places important for cultural tradition; stories, songlines, totems and languages; Indigenous structures, technology, tools and archaeology; ceremonial sites like bora rings and rock art, fish traps, burials, middens, scarred trees, camp sites and semi/permanent settlements.

World Heritage – sites of natural beauty and outstanding natural phenomena.

APPENDIX 3: ALIGNMENT OF REEF 2050 PLAN OBJECTIVES AND TARGETS WITH THE HUMAN DIMENSIONS INDICATOR FRAMEWORK

Table 18: Alignment of Reef 2050 Plan objectives and targets with the human dimensions indicator framework

Reef 2050 Plan Theme	Reef 2050 Plan Objective	Reef 2050 Plan Target	Proposed rating for target (based on Burnett Mary only)	Attributes (metrics)	Human Dimension Indicators	Value
Community benefits Access Aesthetics Understanding, appreciation & enjoyment Human health Personal connection Equity Empowerment Employment & income	CBO1 The rights of TOs to derive benefits from the conservation & cultural use of biological resources are recognised	CBT1 - increase in TO benefit sharing initiatives	Not enough evidence to rate with confidence	CV4 Community health/ wellbeing/ satisfaction associated with the GBR	CV4.3 Indigenous health associated with the GBR	Access Human Health Human health
	CBO2 A healthy Reef that supports sustainable lifestyles & livelihoods, & provides coastal communities with protection from extreme weather events. NB: 'supports sustainable lifestyles is consistent with economic targets	Suggest including targets to be more in line with CV.4 & CV.4.1	Not enough evidence to rate with confidence	CV4 Community health/ wellbeing/ satisfaction associated with the GBR	CV4.1 GBR contributions to quality of life & wellbeing GBR contribution to: (i) QoL; (ii) desirable way of life & ecosystem services, e.g., fresh seafood; (iii) optimism about the future; (iv) satisfaction with GBR experiences; (v) GBR experiences (negative & positive); (vi) physical &/or mental health CV4.2 Stress associated with decline in GBR health CV4.3 Indigenous health associated with GBR CV4.4 Commercial fishers' wellbeing CV4.5 Tourism Operators' wellbeing	Access Employment & income Human health
	CBO3. Community benefits provided by the Reef including its superlative natural beauty & the sense of place, are	CBT2 CB values identified & considered in decision-making NB: Need to develop specific target for CV1	3.5	CV1 Demographic stability across the catchment	CV1.1 Basic demographic characteristics CV1.2 Migration intentions over the next 12 months	Access

Reef 2050 Plan Theme	Reef 2050 Plan Objective	Reef 2050 Plan Target	Proposed rating for target (based on Burnett Mary only)	Attributes (metrics)	Human Dimension Indicators	Value
	<p>maintained for current & future generations</p> <p>NB: suggest re-wording to avoid confusion with attributes of World Heritage, i.e., aesthetics</p>	NB: Need to develop specific target for CV2	3.5	CV 2 Security in the catchment including housing, safety & risk management	<p>CV2.1 Financial distress: (i) delay or cancel non-essential purchases; (ii) could not pay bills on time; (iii) went without meals, or unable to heat or cool home; (iv) asked for financial help from friends or family</p> <p>CV2.2 Housing security</p> <p>CV2.3 Crime rates</p> <p>CV2.4 Spatially identified flood, cyclone, drought & other natural risk ratios</p>	Human Health Employment & income Equity
<p>Community benefits</p> <p>Access</p> <p>Aesthetics</p> <p>Understanding, appreciation & enjoyment</p> <p>Human health</p> <p>Personal connection</p> <p>Equity</p> <p>Empowerment</p>	<p>CBO3. Community benefits provided by the Reef including its superlative natural beauty & the sense of place, are maintained for current & future generations</p> <p>NB: suggest re-wording to avoid confusion with attributes of World Heritage, i.e., aesthetics</p>	NB: Need to develop specific target for CV3	3.5	CV3 Wellbeing/ happiness within the general community	<p>CV3.1 Community Wellbeing (1-7): (i) place to live, (ii) coping with challenges, (iii) pride, (iv) optimism, (v) community spirit</p> <p>CV3.2 Decreasing community liveability: (i) liveability; (ii) friendliness; (iii) local economy; (iv) local landscape</p> <p>CV3.3 Personal Wellbeing (0-100). Satisfaction with: (i) standard of living; (ii) health; (iii) achievements; (iv) relationships; (v) safety; (vi) feeling part of community; (vii) future security</p> <p>CV3.4 Levels of physical health</p> <p>CV3.5 Levels of Mental illness</p>	Human Health Aesthetics Equity Employment & income

Reef 2050 Plan Theme	Reef 2050 Plan Objective	Reef 2050 Plan Target	Proposed rating for target (based on Burnett Mary only)	Attributes (metrics)	Human Dimension Indicators	Value
Employment & income		NB: Need to develop specific target for CV4	4	CV4 Community health/ wellbeing/ satisfaction associated with the GBR	CV4.1 GBR contributions to QoL & wellbeing GBR contribution to: (i) QoL; (ii) desirable way of life & ecosystem services, e.g., fresh seafood; (iii) optimism about the future; (iv) satisfaction with GBR experiences; (v) GBR experiences (negative & positive); (vi) physical &/or mental health CV4.2 Stress associated with decline in GBR health CV4.3 Indigenous health associated with GBR. CV4.4 Commercial fishers' wellbeing CV4.5 Tourism Operators' wellbeing	Access Understanding, appreciation & enjoyment Human health Personal connection Aesthetics Equity
		NB: Need to develop specific target for CV5	3.5	CV5 Regional services & service infrastructure supporting the interface between the community & GBR	CV5.1 Energy/water security CV5.2 Quality of infrastructure CV5.3 Impacts on infrastructure CV5.4 Perceptions of access to health, education, aged care & child care CV5.5 Perceptions of access to roads & public transport	Access
		NB: Need to develop specific target for ACS1	3.5	ACS1 Levels of community awareness & education about the GBR	ACS1.3 Levels of awareness of GBR & waterway condition & threats ACS1.4 Number/type of GBR learning opportunities	Understanding, appreciation & enjoyment

Reef 2050 Plan Theme	Reef 2050 Plan Objective	Reef 2050 Plan Target	Proposed rating for target (based on Burnett Mary only)	Attributes (metrics)	Human Dimension Indicators	Value
Community benefits Access Aesthetics Understanding, appreciation & enjoyment Human health Personal connection Equity Empowerment Employment & income	CBO4: Local, regional & Reef-wide community benefits are understood & the community is actively engaged in managing Reef activities	CBT3: Community participation in stewardship actions to improve Reef health & resilience continues to grow	3.5	ACS2 Levels of community capacity for stewardship		Understanding, appreciation & enjoyment Personal connection Empowerment
		CBT4 Community benefit values for the GBR coastal ecosystems are being monitored & show a positive trend	Not enough evidence to rate with confidence	All of the above	ACS2.1 Sense of responsibility towards the environment ACS2.2 Sense of responsibility towards the GBR & coastal waterways ACS2.3 Regional Reef-based stewardship activities ACS2.4 Numbers & types of TO involvement in on-ground WQ improvement & monitoring	Access Aesthetics Understanding, appreciation & enjoyment Human health Personal connection Equity Empowerment Employment & income
Heritage Indigenous & non-Indigenous heritage values are identified, protected, conserved & managed such that the heritage values maintain their	HO1: TOs heritage rights & responsibilities are incorporated in all facets of management	HT1: New & effective cooperative management practices are developed for protection & conservation of GBR Indigenous & non-Indigenous heritage	Not enough evidence to rate with confidence	CH2 Indigenous (TO) heritage	CH2.2 (a) Number & strength of TO connections with GBR resources including identification, protection & management of Indigenous cultural heritage in sea country CH2.3 Levels of TO satisfaction with: (a) identification, documentation & storage of cultural information; (b) T led methodologies; (c) participation in GBR management; (d) extent to which TEK is identified, maintained & transferred	Access Understanding, appreciation & enjoyment Personal connection Equity Empowerment

Reef 2050 Plan Theme	Reef 2050 Plan Objective	Reef 2050 Plan Target	Proposed rating for target (based on Burnett Mary only)	Attributes (metrics)	Human Dimension Indicators	Value
significance for current & future generations		HT2: Indigenous & non- Indigenous heritage values are defined, documented & protected in decision-making & planning processes	3	CH2 Indigenous (TO) heritage	CH2.1 ID, state & trend of Indigenous heritage values CH2.2 TO management of GBR resources including number & strength of: (b) TO benefits/values derived from the GBR; (d) TO-driven frameworks & participatory monitoring methods CH2.5 Impacts on Indigenous heritage	Access Understanding, appreciation & enjoyment Personal connection Equity Empowerment
			3	CH4 Historic maritime heritage	CH4.1 Identification, protection & management of GBR historic maritime heritage CH4.2 Cultural significance of historic heritage CH4.3 Impacts on historic maritime heritage values	Access Aesthetics Understanding, appreciation & enjoyment Personal connection
		HO2 Indigenous & non- Indigenous heritage including natural, aesthetic, historic, scientific, & social values are identified, conserved & managed in partnership with the community. Needs to be replaced with more specific objectives & targets for world heritage, historic	HT3: Partnerships between TO & all stakeholders are increased to ensure key Reef heritage values are identified, documented & monitored	Not enough evidence to rate with confidence	CH2 Indigenous (TO) heritage	CH2.2 TO management of GBR resources including number & strength of: (c) partnerships, institutional arrangements & agreements between TOs & all GBR stakeholders	Equity Empowerment
			Not enough evidence to rate with confidence	CH1 World Heritage – underpinned by ecosystem health, biodiversity & water quality	CH1.1 State of regional natural assets CH1.2 Perceptions of GBR aesthetic beauty & other world heritage attributes. CH1.3 Impacts on GBR-Wide World Heritage values	Aesthetics Understanding, appreciation & enjoyment

Reef 2050 Plan Theme	Reef 2050 Plan Objective	Reef 2050 Plan Target	Proposed rating for target (based on Burnett Mary only)	Attributes (metrics)	Human Dimension Indicators	Value
	maritime heritage & contemporary cultural heritage		Not enough evidence to rate with confidence	CH2 Indigenous (TO) heritage	CH2.1 ID, state & trend of Indigenous heritage values CH2.2 TO management of GBR resources including number & strength of: (a) TO connections with GBR resources incl. identification, protection & management of Indigenous cultural heritage in sea country; (b) TO benefits derived from the GBR; (c) partnerships, institutional arrangements & agreements between TOs & all GBR stakeholders; (d) TO-driven frameworks & participatory monitoring methods	Access Understanding, appreciation & enjoyment Human health Personal connection Equity Empowerment
4		CH3 Contemporary culture		CH3.1 Place attachment CH3.2 Identity CH3.3 Pride CH3.4 Personal connection to the GBR CH3.5 Impacts on contemporary culture	Access Aesthetics Understanding, appreciation & enjoyment Personal connection	
3		CH4 Historic maritime heritage		CH4.1 Identification, protection & management of historic heritage in GBR environments CH4.2 Cultural significance of GBR historic heritage values CH4.3 Impacts on historic maritime heritage values	Personal connection	

Reef 2050 Plan Theme	Reef 2050 Plan Objective	Reef 2050 Plan Target	Proposed rating for target (based on Burnett Mary only)	Attributes (metrics)	Human Dimension Indicators	Value
Biodiversity The Reef maintains its diversity of species & ecological habitats in at least a good condition with a stable to improving trend	BO1 TOs are engaged & participate in & manage the conservation & sustainable use of cultural keystone species & biocultural resources	BT1 Customary use of biological resources in accordance with traditional cultural practices that are compatible with conservation or cultural use requirements are formally recognised & adopted in management arrangements	3	CH2 Indigenous (TO) heritage	CH2.3 Levels of TO satisfaction with: (a) identification, documentation & storage of cultural information; (b) TO led methodologies; (c) participation in GBR management; (d) extent to which TEK is identified, maintained & transferred	Access Understanding, appreciation & enjoyment Equity Empowerment
Ecosystem Health The status & ecological functions of ecosystems within the GBRWHA are in at least good condition with a stable to improving trend	EHO1 The knowledge, innovations & practices of TOs relevant for conservation & cultural use of biocultural diversity are preserved & maintained	EHT1 TOs have TEK management systems for collecting, handling & sharing culturally sensitive information, & integration in decision-making	3	CH2 Indigenous (TO) heritage	CH2.1 ID, state & trend of Indigenous heritage values CH2.2 (a) Number & strength of TO connections with GBR resources incl. identification, protection & management of Indigenous cultural heritage in sea country	Access Aesthetics Understanding, appreciation & enjoyment Personal connection Equity Empowerment
		EHT2 Number of agreements with TOs addressing management of ecosystems within their traditional estates is increased	3	CH2 Indigenous (TO) heritage	CH2.2(c) Number & strength of partnerships, institutional arrangements & agreements between TOs & all GBR stakeholders	Equity Empowerment

Reef 2050 Plan Theme	Reef 2050 Plan Objective	Reef 2050 Plan Target	Proposed rating for target (based on Burnett Mary only)	Attributes (metrics)	Human Dimension Indicators	Value
Ecosystem Health The status & ecological functions of ecosystems within the GBRWHA are in at least good condition with a stable to improving trend	Need a specific objective	EHT4 Key direct human-related activities are managed to reduce cumulative impacts & achieve a net benefit for the Reef		G2 Connectivity within & between key decision making institutions & sectors	G2.3 Levels of involvement of TOs industry, researchers & the community	Equity Empowerment
			Not enough evidence to rate with confidence	EV3 Economic viability of GBR-dependent industries	EV3.1 Vulnerability of GBR-dependent industries EV3.2 Adaptive capacity of GBR-dependent industries	Access Aesthetics Understanding, appreciation & enjoyment
			3.5	ACS2 Community capacity for stewardship	ACS2.2 Numbers of individuals & groups participating in Reef-based stewardship activities ACS2.3 Numbers & types of TO, industries & communities engaged in on-ground WQ improvement & monitoring ACS2.5 Numbers of community actions to minimise environmental impacts & conserve resources	Access Understanding, appreciation & enjoyment Personal connection Empowerment
			Not enough evidence to rate with confidence	ACS3 Adoption of responsible/ best practice – GBR recreational/ artisanal users	ACS3.1 Extent & type of stewardship practices of GBR recreational users ACS3.2 Number of people visiting the GBR ACS3.3 Why people visit ACS3.4 Where they go ACS3.5 What they do ACS3.6 How they get to the GBR	Access Aesthetics Understanding, appreciation & enjoyment Human health Personal connection Empowerment

Reef 2050 Plan Theme	Reef 2050 Plan Objective	Reef 2050 Plan Target	Proposed rating for target (based on Burnett Mary only)	Attributes (metrics)	Human Dimension Indicators	Value
Ecosystem Health The status & ecological functions of ecosystems within the GBRWHA are in at least good condition with a stable to improving trend			3.5	ACS4 Adoption of responsible/ best practice – Agric & land sector	ACS4.1 Extent & type of stewardship practices of agricultural industries	Access Aesthetics Understanding, appreciation & enjoyment Human health Personal connection Empowerment
			3.5	ACS5 Adoption of responsible/ best practice – Industry & urban sector.	ACS5.1 Extent & type of stewardship practices of urban councils & industries.	Access Aesthetics Understanding, appreciation & enjoyment Human health Personal connection Empowerment

Reef 2050 Plan Theme	Reef 2050 Plan Objective	Reef 2050 Plan Target	Proposed rating for target (based on Burnett Mary only)	Attributes (metrics)	Human Dimension Indicators	Value
			3.5	ACS6 Adoption of responsible/ best practice – Marine industries	<p>ACS6.1 Extent & type of stewardship practices of GBR-associated industries (e.g., ports & shipping)</p> <p>ACS6.2 Arrangements to ensure GBR shipping is safe</p> <p>ACS6.3 Number of shipping accidents</p> <p>ACS6.4 Extent to which ports & shipping apply 'best practice' principles</p> <p>ACS6.5 Extent & type of stewardship practices of GBR-based tourism</p> <p>ACS6.6 Extent & type of stewardship practices of GBR-dependent commercial fishing</p>	<p>Access</p> <p>Aesthetics</p> <p>Understanding, appreciation & enjoyment</p> <p>Human health</p> <p>Personal connection</p> <p>Equity</p> <p>Empowerment</p>
<p>Governance</p> <p>The OUV of the Reef is maintained & enhanced each successive decade through effective governance arrangements & coordinated</p>	GO1 Governance arrangements support effective implementation review & maintenance of this Plan	GT1 Implementation, reporting & review of this Plan are based on the principles of transparency, ownership, accountability, responsiveness & the strong involvement of TOs industry, researchers & the community	Not enough evidence to rate with confidence	G2 Connectivity within & between key decision making institutions & sectors	<p>G2.1 Strength/status of institutional partnerships</p> <p>G2.2 Levels of transparency, ownership, accountability, responsiveness</p> <p>G2.3 Levels of involvement of TOs industry, researchers & the community</p>	<p>Equity</p> <p>Empowerment</p>

Reef 2050 Plan Theme	Reef 2050 Plan Objective	Reef 2050 Plan Target	Proposed rating for target (based on Burnett Mary only)	Attributes (metrics)	Human Dimension Indicators	Value
management activities		GT2 The visions, outcomes objectives & targets in this Plan are taken into account in relevant regulation, documents, policies & strategies of all levels of government	Not enough evidence to rate with confidence	G1 Strategic focus of governance system	G1.1 Number/ type of opportunities for improved Reef 2050 Plan Governance	Equity Empowerment
	GO2 This Plan guides decisions about the Reef made by governments industry & the community	GT3 Actions under this Plan are prioritised & tailored to reflect local or regional differences in threats to the values of the Reef	Not enough evidence to rate with confidence		G1.2 Number/ type of governance subdomains (or policy areas) that have the potential to counteract the targets & actions identified in the Reef 2050 Plan	Equity Empowerment
	GO2 This Plan guides decisions about the Reef made by governments industry & the community	GT4 Investment in actions is prioritised using evidence-based risk assessment to maximise benefits for Reef health & resilience.	Not enough evidence to rate with confidence		G1.3 Number & severity of system-wide problems associated with the implementation or delivery of key targets established under the Reef 2050 Plan	Equity Empowerment
	GO3 Strong partnerships with TOs, industry, researchers & community support protection & management of the Reef.		Not enough evidence to rate with confidence	G2 Connectivity within & between key decision making institutions & sectors	G2.1.1 Strength of partnerships with TOs, industry researchers & the community support Reef protection & management	Equity Empowerment
	GO4 An adaptive management approach underpins implementation	GT5 A comprehensive Integrated Monitoring & Reporting Program	Not enough evidence to rate with confidence	G3 Adaptive governance capacity of key	Partly covered in CH2.3 G3.1 Satisfaction with comm. fisheries management	Equity Empowerment

Reef 2050 Plan Theme	Reef 2050 Plan Objective	Reef 2050 Plan Target	Proposed rating for target (based on Burnett Mary only)	Attributes (metrics)	Human Dimension Indicators	Value
	of this Plan & results in governance arrangements & processes	is established & operational & the reporting informs the review & updating of this Plan		decision making institutions & sectors G4 Adaptive use & management of integrated knowledge	G3.2 Satisfaction with MP management G3.3 Satisfaction with rec fisheries management G3.4 Satisfaction with marine tourism management	
Economic Benefits Economic activities within the Great Barrier Reef World Heritage Area & its catchments sustain the GBR's Outstanding Universal Value	EBO1 TOs derive economic benefits from conservation & sustainable use of biological resources	EBT1 There is an increase in the number of TO service providers & viable businesses	Not enough evidence to rate with confidence	EV4 Inclusiveness & economic fairness/ equity	EV4.2 Opportunities for GBR TOs EV5.2.1 No. employment opportunities for TOs in GBR sea-country management EV5.2.2 No. employment opportunities for TOs in GBR-based industries	Equity
		EBT2 No. employ. ops for TOs in sea country management & Reef-based industries is increased.	Not enough evidence to rate with confidence	EV5 Workforce participation & employment	EV5.2.1 No. employment opportunities for TOs in GBR sea-country management EV5.2.2 No. employment opportunities for TOs in GBR-based industries	Equity Employment & income
	EBO2 Protecting Reef's OUV is embedded within decision making, with impacts first avoided, then mitigated & then as a final consideration, any residual impacts are offset to achieve a net env. benefit	EBT3 Cumulative impacts on the Reef from human activities are understood, & measures to ensure a net environmental benefit approach for the Reef are in place	Not enough evidence to rate with confidence	Same as for EHT4 Key direct human-related activities are managed to reduce cumulative impacts & achieve a net benefit for the Reef		Understanding, appreciation & enjoyment Equity

Reef 2050 Plan Theme	Reef 2050 Plan Objective	Reef 2050 Plan Target	Proposed rating for target (based on Burnett Mary only)	Attributes (metrics)	Human Dimension Indicators	Value
	EBO3 Reef-associated industries are planned & managed in such a way as to protect the Reef's OUV & are sustainable, productive & profitable	EBT4 Shipping in the Reef is safe, risks are minimised & incidents are reduced to as close to zero as possible	3.5	EV2 Economic viability of Reef-associated industries	ACS6.1 Extent & type of stewardship practices of GBR-associated industries (e.g., ports & shipping) ACS6.2 Arrangements to ensure GBR shipping is safe ACS6.3 Number of shipping accidents ACS6.4 Extent to which ports & shipping apply 'best practice' principles	Access Aesthetics Equity
		NB: Need to develop specific target		EV2 Economic viability of GBR-associated industries	EV2.1 Economic viability of mining & minerals	Access Aesthetics Equity
Economic Benefits Economic activities within the Great Barrier Reef World Heritage Area & its catchments sustain the GBR's OUV	EBO3 Reef-associated industries are planned & managed in such a way as to protect the Reef's OUV & are sustainable, productive & profitable	NB: Need to develop specific target	3.5	ACS4 Adoption of responsible/ best practice – Agricultural & land sector	ACS4.1 Extent & type of stewardship practices of agricultural industries	Access Aesthetics Understanding, appreciation & enjoyment Human health Personal connection Empowerment
		NB: Need to develop specific target	3.5	ACS5 Adoption of responsible/ best practice – Industry & urban sector	ACS5.1 Extent & type of stewardship practices of urban councils & industries	Access Aesthetics Understanding, appreciation & enjoyment Human health Personal connection

Reef 2050 Plan Theme	Reef 2050 Plan Objective	Reef 2050 Plan Target	Proposed rating for target (based on Burnett Mary only)	Attributes (metrics)	Human Dimension Indicators	Value
		NB: Need to develop specific target	3.5	ACS6 Adoption of responsible/ best practice – Marine industries	ACS6.1 Extent & type of stewardship practices of GBR-associated industries (e.g., ports & shipping) ACS6.2 Arrangements to ensure GBR shipping is safe. ACS6.3 Extent to which ports & shipping apply 'best practice' principles	Empowerment Access Aesthetics Understanding, appreciation & enjoyment Human health Personal connection Empowerment
	EBO4 Reef-dependent industries are productive & profitable based on a healthy Reef & are ecologically sustainable	EBT5 The relationship between Reef health & the viability of Reef-dependent industries (e.g., tourism & fishing) is understood & considered in planning & development decisions. Target could be broken down	Not enough evidence to rate with confidence	EV3 Economic viability of Reef-dependent industries	EV3.1 Vulnerability of GBR-dependent industries EV3.2 Adaptive capacity of GBR-dependent industries EV3.3 Economic viability of GBR-tourism EV3.4 Economic viability of GBR-commercial fishing	Access Aesthetics Understanding, appreciation & enjoyment Human health Personal connection Empowerment
		EBT5 Levels of understanding & consideration in planning	Not enough evidence to rate with confidence	ACS6 Adoption of responsible/ best practice – Marine industries	ACS6.5 Extent & type of stewardship practices of GBR-based tourism ACS6.6 Extent & type of stewardship practices of GBR-dependent commercial fishing	Understanding, appreciation & enjoyment Equity Empowerment

Reef 2050 Plan Theme	Reef 2050 Plan Objective	Reef 2050 Plan Target	Proposed rating for target (based on Burnett Mary only)	Attributes (metrics)	Human Dimension Indicators	Value
	Need an economic Objective to reflect attributes EV.1, EV.4, EV.5, EV.6 & their associated indicators	EBT6: Economic indicators are included in the RIMReP		EV1, EV2, EV3, EV4, EV5, EV6		All values
Water Quality Reef water quality retains the OUV, builds resilience & improves ecosystem health over each successive decade	WQ 2	WQT5 TOs industry & community are engaged in on-ground water quality improvement & monitoring	Not enough evidence to rate with confidence	ACS2 Community capacity for stewardship	ACS2.4 Numbers & types of TO involvement in on-ground WQ improvement & monitoring	Understanding, appreciation & enjoyment Empowerment

APPENDIX 4: ADEQUACY OF THE SPATIAL AND TEMPORAL SCALES OF AVAILABLE DATA SETS

Adequacy of the spatial and temporal (periodicity) scales of available data sets is rated as High (H), Medium (M) or Low (L), and shown in the table below. The table also identifies the host organisation, data type (numeric, spatial, rich text); and data format (excel, PDF, raster).

Table 19: Adequacy of the spatial and temporal (periodicity) scales of available data sets

Dataset name	Host organisation	Location (URL if available)	Data type	Data format	Periodicity	Scale	Adequacy of scale & periodicity (H,M L)
Tourist visits to the entire marine park (aggregated for whole reef)	Aust. Gov.-GBRMPA	http://www.gbrmpa.gov.au/visit-the-reef/visitor-contributions/gbr_visitation/numbers/tourist-visits-to-the-entire-marine-park	Numeric	Excel	Monthly	GBR aggregated	H
NPSR issued Penalty Infringement Notices(Nature Conservation PAM Regulation)—2015	QLD Gov.-NPSR	https://data.qld.gov.au/dataset/npsr-issued-penalty-infringement-notices-nature-conservation-pam-regulation-2015	Numeric/ Rich Text	Excel	Monthly	Qld	H
NPSR issued Penalty Infringement Notices(Marine Parks Act)—2015	QLD Gov.-NPSR	https://data.qld.gov.au/dataset/npsr-issued-penalty-infringement-notices-marine-parks-act-2015/resource/465efade-9bb0-410f-9f8c-4212b90080ad	Numeric/ Rich Text	Excel	Monthly	Qld	H
Vessel Registration Levels for the Great Barrier Reef Catchment Area	Aust. Gov.-GBRMPA	http://www.gbrmpa.gov.au/VesselRegistrations/	Numeric	Interactive Web Page	Quarterly	GBR	H
Vessel Registration Levels for the Great Barrier Reef	Aust. Gov.-GBRMPA	http://www.gbrmpa.gov.au/VesselRegistrations/data.aspx	Numeric	Interactive Web Page	Quarterly	GBR	H
Labour Force, Australia, Detailed, Quarterly, May 2017	Aust. Gov.-ABS	http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/62	Numeric	Excel	Quarterly	National	H

Dataset name	Host organisation	Location (URL if available)	Data type	Data format	Periodicity	Scale	Adequacy of scale & periodicity (H,M L)
		91.0.55.003/May%202017?OpenDocument					
Regional Wellbeing by LGA	UC	http://www.canberra.edu.au/research/faculty-research-centres/ceraph/regional-wellbeing/survey-results/2016-survey-results/2016-results-by-rda-and-lga	Numeric	Excel	Annual	LGA	H
Regional Wellbeing by NRM	UC	http://www.canberra.edu.au/research/faculty-research-centres/ceraph/regional-wellbeing/survey-results/2016-survey-results/2016-results-by-nrm-and-ils	Numeric	Excel	Annual	NRM	H
Reef-Guardian-Councils-Highlight-Report-2015-2016	Aust. Gov.-GBRMPA	http://elibrary.gbrmpa.gov.au/jspui/bitstream/11017/3161/1/Reef-Guardian-Councils-Highlight-Report-2015-2016.pdf	Rich Text	PDF	Annual	GBR	H
2015-16-Land-and-Sea-Country-Partnerships-Annual-Report-summary	Aust. Gov.-GBRMPA	http://elibrary.gbrmpa.gov.au/jspui/bitstream/11017/3032/2/2015-16-Land-and-Sea-Country-Partnerships-Annual-Report-summary.pdf	Numeric/ Rich Text	PDF Report	Annual	GBR	H
Regional Wellbeing by NRM	UC	http://www.canberra.edu.au/research/faculty-research-centres/ceraph/regional-wellbeing/survey-results/2016-survey-results/2016-results-by-nrm-and-ils	Numeric	Excel	Annual	LGA	H
Tourist Accommodation, Small Area Data, Queensland	Aust. Gov.-ABS	http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/8635.3.55.001Main+Features1Jun%202013?OpenDocument	Numeric	Excel	Annual	NRM	M
Australian Industry	Aust. Gov.-ABS	http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8155.02015-16?OpenDocument	Numeric	Excel	Annual - financial year	NRM	H-M

Dataset name	Host organisation	Location (URL if available)	Data type	Data format	Periodicity	Scale	Adequacy of scale & periodicity (H,M L)
Trade Statistics for Queensland Ports—30 June 2015	Qld Gov.-TMR	https://www.tmr.qld.gov.au/business-industry/Transport-sectors/Ports/Trade-statistics-for-Queensland-ports	Numeric/ Rich Text	PDF Statistical Report	Annual	Qld	
Queensland regional profiles	QGSO	http://statistics.qgso.qld.gov.au/	Numeric	Excel	Annual	Qld	H
Population estimates by Indigenous status, LGAs	Qld Gov.	https://data.qld.gov.au/dataset/pop-est-indigenous-status/resource/6e4b863c-ceb4-4191-929e-adb74f5b64e3	Numeric	Excel	Annual	Qld	H
GBR Tourists	CSIRO-SELTMP	http://seltmp.eatlas.org.au/seltmp/survey-data			Not yet specified	GBR NRM	H
Australian Residents	CSIRO-SELTMP	http://seltmp.eatlas.org.au/seltmp/survey-data			Not yet specified	GBR NRM	H
GBR Tourism Operators	CSIRO-SELTMP	http://seltmp.eatlas.org.au/seltmp/survey-data	Numeric	Excel	Not yet specified	GBR NRM	H
GBR Coastal Residents	CSIRO-SELTMP	http://seltmp.eatlas.org.au/seltmp/survey-data	Numeric	Excel	Not yet specified	GBR NRM	H
GBR Commercial Fishers	CSIRO-SELTMP	http://seltmp.eatlas.org.au/seltmp/survey-data	Numeric	Excel	Not yet specified	GBR NRM	H
Value of Agricultural Commodities Produced, Australia, 2015-16	Aust. Gov.-ABS	http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/7503.02015-16?OpenDocument	Numeric	Excel	Annual	GBR NRM	H-M
Australian Industry	Aust. Gov.-ABS	http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/8155.02015-16?OpenDocument	Numeric	Excel	Annual - financial year	NRM	H-M
Reef plan - cane management practice adoption - basin level	Qld Gov.-QSpatial	http://qldspatial.information.qld.gov.au/catalogue/custom/search.page?q=%22Reef%20plan%20-%20cane%20management%20practice%20adoption%20-%20basin%20level%22	Spatial	Shape File	Not specified	Qld	H-M?
Australian Demographic Statistics	Aust. Gov.-ABS	http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/31	Numeric	Excel	Quarterly	National	M

Dataset name	Host organisation	Location (URL if available)	Data type	Data format	Periodicity	Scale	Adequacy of scale & periodicity (H,M L)
		01.0Dec%202016?OpenDocument					
International Visitors in Australia	Aust. Gov.-TRA	https://www.tra.gov.au/ArticleDocuments/185/International_Visitors_in_Australia_September_2012.pdf.aspx?Embed=Y	Numeric/ Rich Text	PDF Report	Quarterly	National	M
Region data - Selected physical and financial characteristics by state - Australian sugarcane farm businesses: Financial performance, 2013-14	Aust. Gov.- ABARES	http://www.agriculture.gov.au/abares/publications/display?url=http://143.188.17.20/anrd/DAFFService/display.php%3Ffid%3Dpb_asffpd9absf20151218.xml	Numeric	Excel	Annual	Qld	M
Rate of return data - Selected physical and financial characteristics by state - Australian sugarcane farm businesses: Financial performance, 2013-14	Aust. Gov.- ABARES	http://www.agriculture.gov.au/abares/publications/display?url=http://143.188.17.20/anrd/DAFFService/display.php%3Ffid%3Dpb_asffpd9absf20151218.xml	Numeric	Excel	Annual	Qld	M
State Tourism Satellite Accounts 2016-16	Aust. Gov.-TRA	https://www.tra.gov.au/ArticleDocuments/254/Appendix_State_Tourism_Satellite_Accounts_2015-16.xlsx.aspx	Numeric	Excel	Annual	Qld	M
Tourism businesses in Australian states and territories by employment	Aust. Gov.-TRA	https://www.tra.gov.au/ArticleDocuments/185/Appendix_A_Tourism_businesses_in_Australian_states_and_territories_by_employment.xlsx.aspx	Numeric	Excel	Annual	Qld	M
Tourism businesses by employment size in Queensland tourism regions	Aust. Gov.-TRA	https://www.tra.gov.au/ArticleDocuments/185/Appendix_B_Tourism_businesses_by_employment_size_in_tourism_regions(1).xls.aspx	Numeric	Excel	Annual	Qld	M
State and territory tourism forecast 2017	Aust. Gov.-TRA	https://www.tra.gov.au/ArticleDocuments/257/State_and_Territory_Forecast_Tables_2017.xml.aspx	Numeric	Excel	Annual	Qld	M

Dataset name	Host organisation	Location (URL if available)	Data type	Data format	Periodicity	Scale	Adequacy of scale & periodicity (H,M L)
Tourism Investment Monitor 2016	Aust. Gov.-TRA	https://www.tra.gov.au/ArticleDocuments/185/Tourism_Investment_Monitor_2016_Excel_Tables.xlsx.aspx	Numeric	Excel	Annual	Qld	M
Current volume and load, and change over time of discharge from sewage treatment plants into waterways	Qld Gov.	https://data.qld.gov.au/dataset/soe2015-volume-and-load-of-sewage-treatment-plants/resource/indicator-3-2-0-4-1	Numeric	Excel	Annual	Qld	M
Fishery monitoring data	Qld Gov.-DAF	https://data.qld.gov.au/dataset/fishery-monitoring-data/resource/743681ed-53a0-41ef-9392-9cc5cd2cdcfc	Numeric	Excel	Annual	Qld	M
The commercial catch and effort data for the Beam trawl fishery for all years from 1990.	Qld Gov.-Qfish	http://qfish.fisheries.qld.gov.au/query/commercial-beam-trawl-catch-and-effort/table	Numeric	Excel	Annual	Qld	M
Commercial Harvest Fisheries	Qld Gov.-Qfish	http://qfish.fisheries.qld.gov.au/query/commercial-harvest-fisheries/table	Numeric	Excel	Annual	Qld	M
The commercial catch and effort data for the Line fishery for all years from 1990.	Qld Gov.-Qfish	http://qfish.fisheries.qld.gov.au/query/commercial-line-catch-and-effort/table	Numeric	Excel	Annual	Qld	M
The commercial catch and effort data for the Net fishery for all years from 1990.	Qld Gov.-Qfish	http://qfish.fisheries.qld.gov.au/query/commercial-net-catch-and-effort/table	Numeric	Excel	Annual	Qld	M
The commercial catch and effort data for the Otter trawl fishery for all years from 1990.	Qld Gov.-Qfish	http://qfish.fisheries.qld.gov.au/query/commercial-otter-trawl-catch-and-effort/table	Numeric	Excel	Annual	Qld	M
The commercial catch and effort data for the Pot fishery for all years from 1990.	Qld Gov.-Qfish	http://qfish.fisheries.qld.gov.au/query/commercial-pot-catch-and-effort/table	Numeric	Excel	Annual	Qld	M
Domestic tourism: (a)(b) Day visitors by	Qld Gov.-QGSO	http://www.qgso.qld.gov.au/products/tables/domestic-	Numeric	Excel	Annual	Qld	M

Dataset name	Host organisation	Location (URL if available)	Data type	Data format	Periodicity	Scale	Adequacy of scale & periodicity (H,M L)
Queensland tourism region visited, 2005–06 to 2015–16		tourism-day-visitors-qld/index.php					
Domestic tourism: (a)(b) Overnight visitor trips by Queensland tourism region, 2005–06 to 2015–16	Qld Gov.-QGSO	http://www.qgso.qld.gov.au/products/tables/domestic-visitors-qld-tourism-region/index.php	Numeric	Excel	Annual	Qld	M
International visitors (a)(b) by Queensland Tourism region, 2005–06 to 2015–16	Qld Gov.-QGSO	http://www.qgso.qld.gov.au/products/tables/internat-visitors-qld-tourism-region/index.php	Numeric	Excel	Annual	Qld	M
Queensland Commercial Fishery Catch and Effort Annual Totals from 2006 - Trawl (Beam)	Qld Gov.-DAF	https://data.qld.gov.au/dataset/queensland-commercial-fishery-catch-and-effort-annual-totals-trawl-beam-otter/resource/6918e93a-c65e-40b0-bffa-74b22d05f930	Numeric	Excel	Annual	Qld	M
Queensland Commercial Fishery Catch and Effort Annual Totals from 2006 - Trawl (Otter)	Qld Gov.-DAF	https://data.qld.gov.au/dataset/queensland-commercial-fishery-catch-and-effort-annual-totals-trawl-beam-otter/resource/1c45a387-0eaf-4f2a-a8b1-5b043585806f	Numeric	Excel	Annual	Qld	M
Queensland Commercial Fishery Catch and Effort Annual Totals from 2006 - Pot	Qld Gov.-DAF	https://data.qld.gov.au/dataset/queensland-commercial-fishery-catch-and-effort-annual-totals-pot/resource/025472a0-1a46-4392-837c-33e3f05ff014	Numeric	Excel	Annual	Qld	M
Queensland Commercial Fishery Catch and Effort Annual Totals from 2006 - Net	Qld Gov.-DAF	https://data.qld.gov.au/dataset/queensland-commercial-fishery-catch-and-effort-annual-totals-net	Numeric	Excel	Annual	Qld	M
Queensland Aquaculture Production from 1995 to 2015	Qld Gov.-DAF	https://data.qld.gov.au/dataset/queensland-aquaculture-production-1995-	Numeric	Excel	Annual	Qld	M

Dataset name	Host organisation	Location (URL if available)	Data type	Data format	Periodicity	Scale	Adequacy of scale & periodicity (H,M L)
		2015/resource/0629abbc-ee4f-4e41-87c7-62f0591ae5bc					
Queensland Commercial Fishery Observer data	Qld Gov.-DAF	https://data.qld.gov.au/dataset/queensland-commercial-fishery-observer-data/resource/2e6d2c6e-4ea1-4b00-aaaa-5c4480e1ea2a	Numeric	Excel	Annual	Qld	M
Queensland Commercial Fishery Catch and Effort Annual Totals from 2006 - Line	Qld Gov.-DAF	https://data.qld.gov.au/dataset/queensland-commercial-fishery-catch-and-effort-annual-totals-line/resource/5290c7a1-506a-4c04-9c65-d74baa6cafb0	Numeric	Excel	Annual	Qld	M
Queensland Commercial Charter Fishery Catch and Effort from 2006 - Charter	Qld Gov.-Qfish	https://data.qld.gov.au/dataset/queensland-commercial-fishery-catch-and-effort-annual-totals-charter/resource/1db4e748-5574-4b28-827a-49e7686849b8	Numeric	Excel	Annual	Qld	M
Registered Queensland regulated ships as at 31 July 2017	Qld Gov.-Qfish	https://www.msq.qld.gov.au/About-us/Maritime-statistics-and-reports-library	Numeric	PDF	Annual	Qld	M
Tourism Region Summaries	Qld Gov.-Qfish	https://www.tra.gov.au/ArticleDocuments/185/Tourism_Region_Summaries_Final.xlsx.aspx	Numeric	Excel	Annual	Qld	M
State Tourism Satellite Accounts 2015-16	Qld Gov.-QGSO	https://www.tra.gov.au/research/view-all-publications/all-publications/economic-reports/state-tourism-satellite-accounts-2015-16	Numeric/ Rich Text	Excel	Annual	Qld	M
Travel by Australians: Results of the National Visitor Survey for year ending March 2017	Qld Gov.-QGSO	https://www.tra.gov.au/research/view-all-publications/all-publications/national-visitor-survey-results/nvs-march-2017	Numeric	Excel	Annual	Qld	M

Dataset name	Host organisation	Location (URL if available)	Data type	Data format	Periodicity	Scale	Adequacy of scale & periodicity (H,M L)
Results of the International Visitor Survey: Year Ending March 2017	Qld Gov.-QGSO	https://www.tra.gov.au/research/view-all-publications/all-publications/international-visitor-survey-results/ivs-march-2017	Numeric/ Rich Text	Excel	Annual	Qld	M
State of the Industry	Qld Gov.-DAF	https://www.tra.gov.au/research/view-all-publications/all-publications/state-of-the-industry/state-of-the-industry-2016	Numeric/ Rich Text	Report	Annual	Qld	M
December 2016 Quarterly Results of the International Visitor Survey	Aust. Gov.-TRA	https://www.tra.gov.au/research/view-all-publications/all-publications/international-visitor-survey-results/international-visitors-in-australia-december-2016	Numeric/Rich Text	Excel	Annual	National	M
State of the Industry 2016	Aust. Gov.-TRA	https://www.tra.gov.au/tra/2016/soi/tra.gov.au/reports/soi2016/state_of_the_industry_2016.pdf	Numeric/ Rich Text	PDF Report	Annual	National	M
Tourism Forecast 2017	Aust. Gov.-TRA	https://www.tra.gov.au/ArticleDocuments/257/Tourism%20Forecasts.pdf.aspx?Embed=Y	Numeric/ Rich Text	PDF Report	Annual	National	M
National Aboriginal and Torres Strait Islander Social Survey	Aust. Gov.-ABS	http://www.abs.gov.au/AUSSTATS/abs@.nsf/mf/4714.0	Numeric	Excel	4 years	National	M
Land Account: Great Barrier Reef Region, Experimental Estimates	Aust. Gov.-ABS	http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4609.0.55.001Main+Features12014?OpenDocument	Numeric	Excel	Not specified	GBR NRM	M
Land Management Practices in the Great Barrier Reef Catchments	Aust. Gov.-ABS	http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4619.0.55.0012008-09?OpenDocument	Numeric	Excel	Not specified	GBR NRM	M
Tourism Investment Opportunities	Qld Gov.	https://data.qld.gov.au/dataset/tourism-investment-opportunities-	Rich Text	Excel	Not specified	Qld	M

Dataset name	Host organisation	Location (URL if available)	Data type	Data format	Periodicity	Scale	Adequacy of scale & periodicity (H,M L)
		2013/resource/f3f8572b-3f75-4f3f-8d38-2cf4245116d9					
Marine pollution—2002 to 2016	Qld Gov.	https://data.qld.gov.au/dataset/marine-oil-spills-data/resource/280b7e6e-61b5-4502-b365-96bafea2950a	Numeric/ Rich Text	Excel	Not specified	Qld	M
Coal industry review statistical tables	Qld Gov.	https://data.qld.gov.au/dataset/coal-industry-review-statistical-tables	Numeric	Excel	Not specified	Qld	M
Number of heritage places and areas identified in local planning schemes and/or on local heritage registers	Qld Gov.	https://data.qld.gov.au/dataset/soe2015-local-heritage-places-and-areas/resource/indicator-2-2-0-2-1	Numeric/ Rich Text	Excel	Not specified	Qld	M
Rate of change in extent of remnant native vegetation	Qld Gov.	https://data.qld.gov.au/dataset/soe2015-extent-and-rate-of-change-of-remnant-native-vegetation/resource/indicator-1-1-0-1-2	Numeric/ Rich Text	Excel	Not specified	Qld	M
Pressures affecting Queensland's aquatic ecosystems	Qld Gov.	https://data.qld.gov.au/dataset/soe2015-pressures-affecting-queenslands-aquatic-ecosystems/resource/indicator-3-2-0-3-1	Numeric/ Rich Text	Excel	Not specified	Qld	M
Stationary energy sector greenhouse gas emissions	Qld Gov.	https://data.qld.gov.au/dataset/soe2015-stationary-energy-sector-greenhouse-gas-emissions/resource/indicator-3-4-0-2-1	Numeric	Excel	Not specified	Qld	M
Recreational Survey by Fishing Region- Comparison of 2000 and 2010 surveys-by retained	Qld Gov.-DAF	https://data.qld.gov.au/dataset/recreational-survey-by-fishing-region-comparison-of-2000-and-2010-surveys	Numeric	Excel	Not specified	Qld	M
Recreational Survey 2010 Caught, Released	Qld Gov.-DAF	https://data.qld.gov.au/dataset/recreational-survey-2010-catch-release-retained-all	Numeric	Excel	Not specified	Qld	M

Dataset name	Host organisation	Location (URL if available)	Data type	Data format	Periodicity	Scale	Adequacy of scale & periodicity (H,M L)
& Retained for All Species		species/resource/0c0ea940-d6d2-4a58-a3f5-935d4c0bba12					
The Queensland heritage register	Qld Gov.-DEHP	http://www.ehp.qld.gov.au/data-sets/heritage-register.xml	Rich Text	Html	Not specified	Qld	M
Register of World War II historic places	Qld Gov.-DEHP	https://data.qld.gov.au/dataset/world-war-ii-historic-places-in-queensland/resource/cbd1aa53-38f3-414d-9ed2-29623047ac23	Rich Text	Excel	Not specified	Qld	M
Heritage register boundaries - Queensland	Qld Gov.-DEHP	http://qldspatial.information.qld.gov.au/catalogue/custom/search.page?q=%22Heritage%20register%20boundaries%20-%20Queensland%22	Spatial	Shape File	Not specified	Qld	M
Cultural Heritage Aboriginal and Torres Strait Islander parties list	Qld Gov.-DEHP	https://data.qld.gov.au/dataset/cultural-heritage-aboriginal-and-torres-strait-islander-parties-list/resource/cd186b4f-b4bc-4c84-81fd-13b5d4698a0e	Rich Text	Excel	Not specified	Qld	M
Queensland commercial fishery 30 minute reporting grid	Qld Gov.-QSpatial	http://qldspatial.information.qld.gov.au/catalogue/custom/search.page?q=%22Queensland%20commercial%20fishery%2030%20minute%20reporting%20grid%22	Spatial	Shape File	Not specified	Qld	M
Cadastral data - Queensland - by area of interest	Qld Gov.-QSpatial	http://qldspatial.information.qld.gov.au/catalogue/custom/detail.page?fid={A07975CC-FE78-408F-959F-B0CDEC1C6EDA}	Spatial	Shape File	Not specified	Qld	M
Rental Vulnerability Index	UNSW	https://cityfutures.be.unsw.edu.au/cityviz/rental-vulnerability-index/		Webpage	Not specified	Qld	M
Trade Statistics for Queensland Ports—30 June 2015	Qld Gov.-TMR	https://www.tmr.qld.gov.au/business-industry/Transport-sectors/Ports/Trade-statistics-for-Queensland-ports	Numeric/ Rich Text	PDF Statistical Report	Annual	Qld	

Dataset name	Host organisation	Location (URL if available)	Data type	Data format	Periodicity	Scale	Adequacy of scale & periodicity (H,M L)
Stationary energy sector greenhouse gas emissions	Qld Gov.	https://data.qld.gov.au/dataset/soe2015-stationary-energy-sector-greenhouse-gas-emissions/resource/indicator-3-4-0-2-1	Numeric	Excel	Not specified	Qld	M
Agricultural commodities: June quarter 2017	Aust. Gov.- ABARES	http://www.agriculture.gov.au/abares/publications/display?url=http://143.188.17.20/anrd/DAFFService/display.php%3Ffid%3Dpb_agcomd9abcc20170620_2had.xml	Numeric/ Rich Text	PDF Report & Excel	Quarterly	National	L
Fishing region catch by survey (recreational)	Qld Gov.-Qfish	http://qfish.fisheries.qld.gov.au/query/fishing-region-catch-by-survey/table	Numeric	Excel	Annual	Qld	L
Fishing region released catch by survey (recreational)	Qld Gov.-Qfish	http://qfish.fisheries.qld.gov.au/query/fishing-region-released-catch-by-survey/table	Numeric	Excel	Annual	Qld	L
Recreational survey participation by region	Qld Gov.-Qfish	http://qfish.fisheries.qld.gov.au/query/recreational-participation-by-region/table	Numeric	Excel	Annual	NRM	L
Charter fishery catch and effort data by method for all years from 1990.	Qld Gov.-Qfish	http://qfish.fisheries.qld.gov.au/query/charter-catch-and-effort/table	Numeric	Excel	Annual	Qld	L
Navy visits	Ports Australia	http://portsaustralia.com.au/au-s-ports-industry/trade-statistics/?id=8&period=15	Numeric	Excel	Annual	National	L
Commercial vessel calls	Ports Australia	http://portsaustralia.com.au/au-s-ports-industry/trade-statistics/?id=60&period=15	Numeric	Excel	Annual	National	L
Australian Coastal Shipping: Number of vessel visits	Ports Australia	http://portsaustralia.com.au/au-s-ports-industry/trade-statistics/?id=103&period=15	Numeric	Excel	Annual	National	L
Number of Full Time Employees (FTE) Employed - Direct (Port Authority)	Ports Australia	http://portsaustralia.com.au/au-s-ports-industry/trade-statistics/?id=320&period=15	Numeric	Excel	Annual	National	L

Dataset name	Host organisation	Location (URL if available)	Data type	Data format	Periodicity	Scale	Adequacy of scale & periodicity (H,M L)
Sugar Exports (mass tonnes)	Ports Australia	http://portsaustralia.com.au/au-s-ports-industry/trade-statistics/?id=13&period=15	Numeric	Excel	Annual	National	L
Coal Exports (mass tonnes)	Ports Australia	http://portsaustralia.com.au/au-s-ports-industry/trade-statistics/?id=9&period=15	Numeric	Excel	Annual	National	L
Gas Exports (mass tonnes)	Ports Australia	http://portsaustralia.com.au/au-s-ports-industry/trade-statistics/?id=24&period=15	Numeric	Excel	Annual	National	L
Trade statistics	Ports Australia	http://portsaustralia.com.au/au-s-ports-industry/trade-statistics/	Numeric	Excel	Annual	National	L
Total Throughput (mass tonnes) for 2014/2015	Ports Australia	http://portsaustralia.com.au/au-s-ports-industry/trade-statistics/?id=1&period=15	Numeric	Excel	Annual	National	L
Cruise vessel visits	Ports Australia	http://portsaustralia.com.au/au-s-ports-industry/trade-statistics/?id=7&period=15	Numeric	Excel	Annual	National	L
QPWS Permits - April 2016 to June 2016	Qld Gov.-QPWS	https://data.qld.gov.au/dataset/camping-and-vehicle-permits/resource/c1d1ff63-ebe4-49e7-8dd5-41be0dbf6948	Numeric/ Rich Text	Excel	Not specified	Qld	L

APPENDIX 5: PRIORITY INDICATORS FOR ASSESSMENT AND MONITORING OF THE GBR'S HUMAN DIMENSIONS

Table 20: Priority indicators, data collection method, scale and frequency of data collection

Priority Indicator	Survey/data collection method	Spatial scale	Specific locations to focus on, if known	Survey Frequency (Temporal)	Other information
Assessment of each human dimensions indicator	Collaborative assessment of each indicator using expert discussion panels and drawing on multiple lines of evidence derived from primary & secondary data	NRM region – can be scaled up or down	NRM regional centres; Super sites/hot spots – when identified	Annual	Not yet funded; Trialed through NESP Project 3.2.2
ACS1.3 Levels of awareness of threats to GBR & catchment	SELTMP face-to-face	NRM region, whole GBR catchment; national		Every 2 years	Ad hoc funding at present
	Traditional Owner-led monitoring – may include face-to-face interviews; group discussions	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	New Initiative Not yet funded
	Media tracking & analysis	NRM region; whole GBR catchment; national		Annual	Not yet funded
	Big data analytics	NRM region, whole GBR catchment; national, international		Near real-time	New Initiative Not yet funded
ACS2.2 Sense of responsibility towards the GBR & coastal waterways	SELTMP face-to-face	NRM region, whole GBR catchment;		Every 2 years	Ad hoc funding at present
ACS2.3 Regional Reef-based stewardship activities	Traditional Owner-led monitoring – may include face-to-face interviews; group discussions	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	New Initiative Not yet funded

Priority Indicator	Survey/data collection method	Spatial scale	Specific locations to focus on, if known	Survey Frequency (Temporal)	Other information
	Monitor and evaluate practice change through the Paddock to Reef program.	NRM region, whole GBR catchment;		??	??
ACS2.3 Numbers & types of TO, industries & communities engaged in on-ground WQ improvement & monitoring	Traditional Owner-led monitoring – may include face-to-face interviews; group discussions	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	New Initiative Not yet funded
	Monitor and evaluate practice change through the Paddock to Reef program & other projects e.g. Balkanu CYDC& JCU water quality monitoring project in Cape York	NRM region, whole GBR catchment;		??	??
	Traditional Owner-led monitoring – may include face-to-face interviews; group discussions	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	New Initiative Not yet funded
ACS3.1 Extent & type of stewardship practices of GBRMP recreational users	InfoFish surveys	Across the whole GBRMP		Every 2 years	Site-specific data requires extra resources
	QDAF Rec Fishing survey	whole GBRMP & catchment		Every 3 years	Site-specific data requires extra resources
	Recreational club surveys	whole GBRMP		Every 2 years	New Initiative Not yet funded
	Extend the Paddock to Reef program to include monitoring of gross pollutants in the GBRMP & waterways	NRM region, whole GBR catchment; whole GBRMP		??	New initiative Not yet funded
	Ongoing evaluation of extension and education approaches				New initiative Not yet funded
ACS3.2 Number of people visiting the GBRMP	Big Data analytics	whole GBRMP		Near real-time	New Initiative Not yet funded

Priority Indicator	Survey/data collection method	Spatial scale	Specific locations to focus on, if known	Survey Frequency (Temporal)	Other information
ACS3.3 Why people visit the GBRMP	SELTMP face-to-face	whole GBRMP		Every 2 years	Ad hoc funding at present
	GU Big Data analytics	whole GBRMP		Near real-time	New Initiative Not yet funded
	QDAF Rec Fishing survey	whole GBRMP		Every 3 years	Site-specific data requires extra resources
ACS3.4 Where people go in the GBRMP	SELTMP face-to-face	whole GBRMP		Every 2 years	Ad hoc funding at present
	GU Big Data analytics	whole GBRMP		Near real-time	New Initiative Not yet funded
ACS3.5 What people do in the GBRMP	SELTMP face-to-face	whole GBRMP		Every 2 years	Ad hoc funding at present
	GU Big Data analytics	whole GBRMP		Near real-time	New Initiative Not yet funded
	Infofish	whole GBRMP		??	Site-specific data requires extra resources
	Rec Fishing surveys – QDAF	whole GBRMP		Every 3 years	Site-specific data requires extra resources
	CQU Recreation Index	whole GBRMP			New Initiative Not yet funded
ACS3.6 How people get to the GBRMP	SELTMP face-to-face	whole GBRMP		Every 2 years	Ad hoc funding at present
	GU Big Data analytics	whole GBRMP		Near real-time	New Initiative Not yet funded
	CQU Recreation Index	whole GBRMP		Every 2 years	New Initiative Not yet funded
ACS4.1 Extent & type of stewardship practices of agricultural industries.	Monitor and evaluate practice change through the Paddock to Reef program.	NRM region, whole GBR catchment			Funding needs to be institutionalised

Priority Indicator	Survey/data collection method	Spatial scale	Specific locations to focus on, if known	Survey Frequency (Temporal)	Other information
	Monitor compliance rates & best management practice adoption rates				New Initiative Not yet funded
	Application of a consistent urban stewardship framework across the GBR catchment	Urban areas, whole GBR catchment; whole GBRMP			New Initiative Not yet funded
	Ongoing evaluation of extension and education approaches and adaptive management where Required				
ACS5.1 Extent & type of stewardship practices of urban councils & industries	Extend programs to include monitoring of gross pollutants in the GBRMP & waterways	NRM region, whole GBR catchment; whole GBRMP		??	New Initiative Not yet funded
ACS6.1 Extent & type of stewardship practices of GBR-associated industries (e.g. ports & shipping)	Monitor compliance rates & best management practice adoption rates	NRM region, whole GBR catchment; whole GBRMP			New Initiative Not yet funded
	Extend programs to include monitoring of marine debris in the GBRMP & waterways	NRM region, whole GBR catchment; whole GBRMP		??	New Initiative Not yet funded
	Monitor compliance rates & best management practice adoption rates				New Initiative Not yet funded
ACS6.2 Arrangements to ensure GBR shipping is safe. ACS6.3 Number of shipping accidents	Monitor compliance rates & best management practice adoption rates	NRM region, whole GBR catchment; whole GBRMP			??
ACS6.4 Extent to which ports & shipping apply 'best practice' principles.	Monitor compliance rates & best management practice adoption rates	NRM region, whole GBR catchment; whole GBRMP			??
	Extend programs to include monitoring of gross pollutants in the GBRMP & waterways	NRM region, whole GBR catchment; whole GBRMP		??	New Initiative Not yet funded
Priority Indicator	Survey/data collection method	Spatial scale	Specific locations to focus on, if known	Survey Frequency (Temporal)	Other information
ACS6.5 Extent & type of stewardship practices of GBR-based tourism	SELTMP telephone surveys	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	Ad hoc funding at present

	Extend programs to include monitoring of gross pollutants in the GBRMP & waterways	NRM region, whole GBR catchment; whole GBRMP	??	New Initiative Not yet funded	
	Monitor compliance rates & best management practice adoption rates				
ACS6.6 Extent & type of stewardship practices of GBR-dependent commercial fishing	SELTMP telephone surveys	NRM region, whole GBRMP	Every 2 years	Ad hoc funding at present	
	Monitor compliance rates & best management practice adoption rates			New Initiative Not yet funded	
CV4.1 GBR contribution to: (i) QoL; (ii) desirable way of life & ecosystem services, e.g., fresh seafood; (iii) optimism about the future; (iv) satisfaction with GBR experiences; (v) GBR experiences (negative & positive); (vi) physical &/or mental health	SELTMP face-to-face	NRM region, whole GBR catchment; whole GBRMP	Every 2 years	Ad hoc funding at present	
	Media tracking & analysis	NRM region, whole GBR catchment; whole GBRMP	Annual	Not yet funded	
	Big Data analytics	NRM region, whole GBR catchment; whole GBRMP	Near real-time	New Initiative Not yet funded	
	CQU Recreation Index	NRM region, whole GBR catchment; whole GBRMP	Every 2 years	New Initiative Not yet funded	
	InfoFish	NRM region, whole GBR catchment; whole GBRMP		Site-specific data requires extra resources	
	QDAF rec fishing surveys	NRM region, whole GBR catchment; whole GBRMP	Every 3 years	Site-specific data requires extra resources	
Priority Indicator	Survey/data collection method	Spatial scale	Specific locations to focus on, if known	Survey Frequency (Temporal)	Other information
CH1.2 Perceptions of GBR aesthetic beauty & other world heritage attributes.	Big Data analytics	NRM region, whole GBRMP		Near real-time	Link to AIMS LTSP; GBRMPA's EotR; New Initiative Not yet funded
	SELTMP face-to-face	NRM region, whole GBRMP		Every 2 years	Ad hoc funding at present

CH1.3 Impacts on marine and coastal aesthetic qualities	SELTMP face-to-face	NRM region, whole GBRMP	Every 2 years	Ad hoc funding at present
	Big Data analytics	NRM region, whole GBRMP	Near real-time	New Initiative Not yet funded
	Traditional Owner-led monitoring – personal & group discussions	NRM region, whole GBR catchment; whole GBRMP	Every 2 years	New Initiative Not yet funded
CH2.2 Number & strength of (a) TO connections with GBR resources incl. Identification, protection & management of Indigenous cultural heritage in sea country	Traditional Owner-led monitoring – personal & group discussions; may be modelled on work by Prof Ulm (JCU) ¹⁷	NRM region, whole GBR catchment; whole GBRMP	Every 2 years	New initiative Not yet funded
CH2.2 Number & strength of (b) TO benefits derived from the GBR	Traditional Owner-led monitoring – may include face-to-face interviews; group discussions;	NRM region, whole GBR catchment; whole GBRMP	Every 2 years	New initiative Not yet funded
CH2.2 Number & strength of (c) partnerships, institutional arrangements & agreements between TOs & all GBR stakeholders	Traditional Owner-led monitoring – personal & group discussions;	NRM region, whole GBR catchment; whole GBRMP	Every 2 years	New initiative Not yet funded

¹⁷ Rowland, M., Ulm, S. & Roe, M. (2014) Approaches to Monitoring and Managing Indigenous Australian Coastal Cultural Heritage Places. Queensland Archaeological Research 17: 37-48

Priority Indicator	Survey/data collection method	Spatial scale	Specific locations to focus on, if known	Survey Frequency (Temporal)	Other information
CH2.2 Number & strength of (d) TO-driven frameworks & methods	TO-led monitoring – personal & group discussions;	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	New initiative Not yet funded
CH2.3 Levels of TO satisfaction with: (a) ID, documentation & storage of cultural information; (b) Traditional Owner led methodologies; (c) participation in GBR management; (d) extent to which TEK is identified, maintained & transferred	Traditional Owner-led monitoring – may include face-to-face interviews; group discussions	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	New initiative Not yet funded
CH3.1 GBR Place attachment & ID	SELTMP face-to-face;	NRM region, whole GBRMP		Every 2 years	Ad hoc funding
	Traditional Owner-led monitoring – may include face-to-face interviews; group discussions;	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	New initiative Not yet funded
CH3.2 GBR as culture – levels of pride, inspiration & personal connection to the GBR	SELTMP face-to-face;	NRM region, whole GBRMP		Every 2 years	Ad hoc funding at present
	Traditional Owner-led monitoring – may include face-to-face interviews; group discussions;	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	New initiative Not yet funded
	Media tracking & analysis	NRM region, whole GBRMP		Annual	Not yet funded
	Big data analytics	NRM region, whole GBRMP		Near real-time	New Initiative Not yet funded

Priority Indicator	Survey/data collection method	Spatial scale	Specific locations to focus on, if known	Survey Frequency (Temporal)	Other information
CH4.1 Identification, protection & management of historic maritime heritage in GBR environments	May be modelled on work developed by GBRMPA ¹⁸	whole GBRMP			New initiative Not yet funded
EV3.1 & EV3.2 Vulnerability of GBR-dependent industries; Adaptive capacity of GBR-dependent industries	SELTMP telephone surveys;	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	Ad hoc funding at present
	ABS – Env Accounts for the GBR	NRM region, whole GBR catchment; whole GBRMP			Link to AIMS LTSP; other programs which monitor GBR health; Ad hoc at present
EV3.3 & EV3.4 Economic viability of GBR-dependent industries to national & regional economies	ABS – Env Accounts for the GBR	NRM region, whole GBR catchment; whole GBRMP		Annual	Ad hoc at present – needs to be institutionalised
EV5.2.1 No. employment opportunities for Traditional Owners in GBR sea-country management	Traditional Owner-led monitoring – may include face-to-face interviews; group discussions;	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	New initiative Not yet funded
	ABS – Env Accounts for the GBR	NRM region, whole GBR catchment; whole GBRMP			Ad hoc at present
EV5.2.2 No. employment opportunities for Traditional Owners in Reef-based industries.	Traditional Owner-led monitoring – may include face-to-face interviews; group discussions;	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	New initiative Not yet funded
	ABS – Env Accounts for the GBR	NRM region, whole GBR catchment; whole GBRMP		Annual	Ad hoc at present

¹⁸ GBRMPA considers that carrying out ‘cultural heritage monitoring’ is characterised by: a. Monitoring and recording the condition of the site over time through photography and other observations. b. The identification of areas that may be prone to damage through natural causes and the monitoring of those features. c. Submission of data to GBRMPA to assist with site management. GBRMPA (2017) Historic Heritage Assessment – Maritime Cultural Heritage Protection Special Management Area. Retrieved from: <http://elibrary.gbrmpa.gov.au/jspui/bitstream/11017/3235/1/Historic-heritage-assessment-Maritime-Cultural-Heritage-Guideline.pdf>

Priority Indicator	Survey/data collection method	Spatial scale	Specific locations to focus on, if known	Survey Frequency (Temporal)	Other information
EV5.2 GBR- related employment	SELTMP face-to-face	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	Ad hoc funding at present
	ABS – Env Accounts for the GBR	NRM region, whole GBR catchment; whole GBRMP		Annual	Ad hoc at present
G1.1 No./ type of opportunities for improved Reef 2050 Plan Governance	SELTMP face-to-face	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	Ad hoc funding at present
	JCU-led governance assessment & monitoring	whole GBR catchment; whole GBRMP		Every 2 years	Ad hoc funding at present
G1.2 No./ severity of system-wide problems for delivery of key Reef 2050 Plan targets.	Traditional Owner-led monitoring – may include face-to-face interviews; group discussions;	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	New initiative Not yet funded
	ABS – Env Accounts for the GBR	NRM region, whole GBR catchment; whole GBRMP		Annual	Ad hoc at present
	JCU-led governance assessment & monitoring	whole GBR catchment; whole GBRMP		Every 2 years	Ad hoc funding at present
G2.1 No./ type governance subdomains (or policy areas) that counteract Reef 2050 Plan targets/action	Traditional Owner-led monitoring – may include face-to-face interviews; group discussions;	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	New initiative Not yet funded
	JCU-led governance assessment & monitoring	whole GBR catchment; whole GBRMP		Every 2 years	Ad hoc funding at present
G2.2 Status of partnerships, inter-governmental arrangements	Traditional Owner-led monitoring – may include face-to-face interviews; group discussions;	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	New initiative Not yet funded
	JCU-led governance assessment & monitoring	whole GBR catchment; whole GBRMP		Every 2 years	Ad hoc funding at present
G3.1 Support for management	SELTMP face-to-face	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	Ad hoc funding at present

Priority Indicator	Survey/data collection method	Spatial scale	Specific locations to focus on, if known	Survey Frequency (Temporal)	Other information
	Traditional Owner-led monitoring – may include face-to-face interviews; group discussions;	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	New initiative Not yet funded
	JCU-led governance assessment & monitoring	whole GBR catchment; whole GBRMP		Every 2 years	Ad hoc funding at present
G3.2 Community confidence in management	SELTMP face-to-face	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	Ad hoc funding at present
	Traditional Owner-led monitoring – may include face-to-face interviews; group discussions;	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	New initiative Not yet funded
	JCU-led governance assessment & monitoring	whole GBR catchment; whole GBRMP		Every 2 years	Ad hoc funding at present
	SELTMP face-to-face; telephone surveys	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	Ad hoc funding at present
G3.3 Sectoral/community contributions to decision-making	Traditional Owner-led monitoring – may include face-to-face interviews; group discussions;	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	New initiative Not yet funded
	JCU-led governance assessment & monitoring	whole GBR catchment; whole GBRMP		Every 2 years	Ad hoc funding at present
	SELTMP face-to-face; telephone surveys	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	Ad hoc funding at present
G4.1 Availability of integrated knowledge sets to decision-makers	Traditional Owner-led monitoring – may include face-to-face interviews; group discussions;	NRM region, whole GBR catchment; whole GBRMP		Every 2 years	New initiative Not yet funded
	SELTMP face-to-face; telephone surveys	NRM region, whole GBR catchment; whole GBRMP			Ad hoc funding at present New questions to be added
	JCU-led governance assessment & monitoring	whole GBR catchment; whole GBRMP		Every 2 years	Ad hoc funding at present
Priority Indicator	Survey/data collection method	Spatial scale	Specific locations to focus on, if known	Survey Frequency (Temporal)	Other information

G4.2 Extent to which integrated knowledge sets are used in decision-making	Traditional Owner-led monitoring – may include face-to-face interviews; group discussions;	NRM region, whole GBR catchment; whole GBRMP	Every 2 years	New initiative Not yet funded
	SELTMP face-to-face; telephone surveys	NRM region, whole GBR catchment; whole GBRMP		Ad hoc funding at present New questions to be added
	JCU-led governance assessment & monitoring	whole GBR catchment; whole GBRMP	Every 2 years	Ad hoc funding at present
G4.3 Management of integrated knowledge sets	Traditional Owner-led monitoring – may include face-to-face interviews; group discussions;	NRM region, whole GBR catchment; whole GBRMP	Every 2 years	New initiative Not yet funded
	JCU-led governance assessment & monitoring	whole GBR catchment; whole GBRMP	Every 2 years	Ad hoc funding at present

