Tropical Water Quality Hub

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Final Report

Assessing the human dimensions of the Great Barrier Reef: A Burnett-Mary Region focus

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JAMES COOK UNIVERSITY AUSTRALIA

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Assessing the human dimensions of the Great Barrier Reef:

A Burnett-Mary Region focus

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Cover photographs: FRONT: Commercial fishing boats in the Burnett River near Grunske's by the River.
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BACK: Lady Elliot Island © Steve Parish

This report is available for download from the NESP Tropical Water Quality Hub website:
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ACRONYMS

ABARES..... Australian Bureau of Agricultural and Resource Economics and Sciences
ABC ..... Australian Broadcasting Corporation
ABS ..... Australian Bureau of Statistics
AWPR……..Adult Workforce Participation Rate
AMSA ..... Australian Maritime Safety Authority
BITRE ..... Bureau of Infrastructure, Transport and Regional Economics
BMP..... Best Management Practice
BMRG……..Burnett Mary Regional Group
BRC…….Bundaberg Regional Council
BTRE ..... Bureau of Transport and Regional Economics
CC……Climate Change
CEO ..... Chief Executive Officer
COC..... Codes of Conduct
CSG…….Coal Seam Gas
DEHP..... Department of Environment and Heritage Protection
DIDO..... Drive-in/drive-out
EBIT..... Earnings Before Interest and Taxation
EMS ..... Environment Management System
EotR..... Eye on the Reef (program)
ERP..... Estimated Resident Population
ES……..Environmental Standard
FCRC……...Fraser Coast Regional Council
FIFO..... Fly-in/fly-out
FMP……Field Management Program
GBR..... Great Barrier Reef
GBRMPA..... Great Barrier Reef Marine Park Authority
GFC ..... Global Financial Crisis
GRC……Gympie Regional Council
GRP ..... Gross Regional Product
GSBR……..Great Sandy Biosphere Reserve
GSP ..... Gross State Product
GSS……Great Sandy Strait.
GVP ..... Gross Value of Production
HESB.....High Efficiency Sediment Basins
IMO ..... International Maritime Organization
ICHD……Indigenous Cultural Heritage Database
IPA..... Indigenous Protected Area
IPBES ..... Intergovernmental Panel on Biodiversity and Ecosystem Services
ISO..... International Organization for Standardization
JCU..... James Cook University
LGA ..... Local Government Area
LMAC..... Local Marine Advisory Committee
LNG……Liquefied Natural Gas
LOTE……. Language Other Than English
LPG..... Liquid Petroleum Gas

MOU..... Memorandum of Understanding
NESMG..... North-East Shipping Management Group
NESP ..... National Environmental Science Programme
NIEIR ..... National Institute of Economic and Industry Research
NDRAA..... Natural Disaster Relief and Recovery Arrangement
NFZ……..Net Free Zones
NQ ..... North Queensland
NRM..... Natural Resource Management
OGBR ..... Office of the Great Barrier Reef
OUV…….Outstanding Universal Value
PCCC……..Port Curtis Coral Coast
PMP ..... Property Management Plan
PoB……..Port of Bundaberg
PSSA ..... Particularly Sensitive Sea Area
QDAF..... Queensland Department of Agriculture and Fisheries
QDEHP ..... Queensland Department of Environment and Heritage Protection
QDNRM……...Queensland Department of Natural Resources and Mines
QGSO……..Queensland Government Statistician's Office
QPWS..... Queensland Parks and Wildlife Service
QSIO..... Queensland Spatial Information Office
RAC ..... Reef Advisory Committee
RIMReP ..... Reef 2050 Integrated Monitoring and Reporting Program
RO……Run-off
RRRC..... Reef and Rainforest Research Centre
SEQ ..... South East Queensland
SM ..... Spanish Mackeral
SPP..... State Planning Policy
STP……. Sewage Treatment Plants
SVA..... Social Ventures Australia
TAFE..... Technical and Further Education
TEK..... Traditional Ecological Knowledge
TIQ……Trade and Investment Queensland
TQ..... Tourism Queensland
TRA..... Tourism Research Australia
TSS……..Total Suspended Solids
TO..... Traditional Owner
TUMRA..... Traditional Use of Marine Resources Agreement
TWQ..... Tropical Water Quality
UCG…….Underground Coal Gasification
WBBEC…….. Wide Bay Burnett Environment Council
WBBENRWG.Wide Bay Burnett Environment and Natural Resources Working Group
WBBROC…. Wide Bay Burnett Regional Organisation of Councils
WH..... World Heritage
WHA ..... World Heritage Area
WQ…….. Water Quality
WQIP ..... Water Quality Improvement Plan
WWF..... World Wildlife Fund

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EXECUTIVE SUMMARY

This report focuses on the trial of a regionally-specific framework to assess and monitor the human dimensions of the Great Barrier Reef (GBR) as they relate to the Burnett-Mary Region and the adjacent GBR. To ensure GBR policy makers and managers better consider the needs of GBR-dependent and GBR-associated communities and industries, the aim of this project is to develop a participatory approach to the assessment, monitoring and bench-marking of human dimensions of relevance to the region and to the GBR. In considering the area's human dimensions, the project team has gathered evidence from peer-reviewed literature, the grey literature and other forms of knowledge such as Indigenous, historical and local knowledge. The process involves synthesising evidence from diverse sources, presenting the evidence as a series of tables, and allocating draft scores to attributes of each key human dimension theme or cluster. The tables and proposed scores are to be discussed in regional expert panel meetings using a consistent set of decision rules for scoring regional resilience based on available evidence. Key findings from the evidence gathered so far include:

Aspirations, capacities and stewardship:
In the region there many well established NRM and industry groups and individuals who are effective in addressing NRM issues. However, among the general public, there are varying perceptions about NRM & environmental issues. Managing intensive recreational pursuits that are inconsistent with conservation values is a challenge for some local councils. While there have been and continue to be substantive improvements in agricultural practice uptake, additional investment and financial incentives are required. Although urban areas are generally well managed/regulated, urban expansion in some parts of the region may have adverse impacts on GBR values. Significant progress has been made on managing the impact of tourism and the management of ports and shipping in the southern GBR. Best management practices in commercial fishing should improve with implementation of *Queensland Sustainable Fisheries Strategy 2017–2027*.

Community Vitality:
The 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 which requires good access to health and wellbeing services and appropriate housing. The South Burnett and Cherbourg LGAs are consistently below the majority of remote and regional communities across Queensland and Australia for perceptions of regional services; however Cherbourg has an active council promoting 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 residents. There are also major disparities between Aboriginal and non-Aboriginal residents with respect to wellbeing, although there are systems in place to address this gap. There growing evidence concerning the health and wellbeing benefits associated with active connection with natural resources such as the GBR, particularly for Indigenous communities.

Culture and Heritage:
Natural heritage values are exceptionally high for this region as it contains two World Heritage Areas – Fraser Island and the GBR – and the Great Sandy Biosphere Reserve (GSBR). Strong Traditional Owner use of sea country resources remains across the region, and this is beginning to be qualified and quantified. There is an increasing capacity of Indigenous land and sea institutions, but much work needs to be done to progress rights and to substantively progress country based planning, strategy development and implementation. There are major differences in the sense of cultural wellbeing between coastal LGAs and the LGAs of South Burnett and Cherbourg, perhaps suggesting much greater place attachment and pride associated with coastal and marine environments of the southern GBR and Great Sandy Strait. GBR values are deeply reflected in contemporary national culture. There is a strong historical heritage asset across the GBR coast, and historic sites within the catchment are well managed, however the *maritime* cultural heritage components generally remain poorly defined, planned and managed.

Economic Values:
The region faces many economic barriers and challenges such as high unemployment; youth retention, 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 is strategically located between SEQ and the industrial hub of Gladstone, and close to the Surat Basin. Although the Region has very few active mines, many mining and mineral activities are planned, each with its own set of potential impacts including impacts on the two World Heritage Areas and the Great Sandy Biosphere Reserve. Because of these outstanding natural assets, the region's non-market valuation is assumed to be very 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. Even so, tourism saw a decline in numbers of people employed 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 GFC in 2007-08; and more recently the sinking of the tourist vessel *Spirit of 1770* in 2016. Reef-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.

Governance:
Basic GBR-wide and bilateral strategic planning framework is in place via the Reef 2050 Plan and possible implementation strategies and institutional arrangements exist at all required scales for delivery. A strong framework for ongoing and adaptive monitoring, evaluation and review is emerging via RIMReP. There is, however, a significant ongoing likelihood of decline in GBR health, particularly in the northern sections, as a result of poor connectivity among key governance subdomains affecting GBR outcomes (e.g. greenhouse gas abatement) and the risk of implementation failure related to the catchment-based delivery of regional actions

envisaged under the Reef 2050 Plan. All required institutional actors play an important role in GBR governance, but capacities and available resources are often limited across government, industry, community and Indigenous sectors. Science capacities are generally well suited to resolve significant environmental problems facing the GBR but not social, cultural and economic considerations. Biophysical knowledges (including models and decision support tools) are generally strong across the marine and catchment space, though social, cultural and economic sciences are not developed enough to deliver truly integrated knowledge to make sound decisions.

1.0 INTRODUCTION

The GBR, one of the seven natural wonders of the world, is facing an unforgiving deadline due to climate change and other threats to its very existence (De'ath, et al 2012; GBRMPA, 2014a; DAE, 2017; Hughes et al 2016; 2017). People across the world and in its catchment love the GBR and value it to the tune of $56 Billion dollars (DAE, 2017). Its annual contribution to Australia's national economy is more than $6 Billion per annum (DAE, 2017). People such as Traditional Owners, recreational users, commercial fishers and tourism operators who use and depend on the GBR; and everyone else who values it for its social, cultural and economic benefits, are suffering in the wake of declining GBR health. Policy makers, managers and partners have long recognised that maintaining the health of the GBR both now and in the future will rely on mobilising the energy, motivation and aspirations of those who value and love the Great Barrier Reef (Great Barrier Reef Marine Park Authority, 2014).

There is growing recognition that local communities and their actions have a much more dynamic relationship with marine and coastal resources than merely causing negative impacts (Kittinger et al 2014; Cinner, David 2011; Christie et al 2003; Edgar, Russ, Babcock, 2007; Pollnac et al 2010; Ban et al 2017). In focussing solely on the human impacts on the GBR, managers may miss valuable opportunities to empower people to work in partnership with management, harnessing powerful sources of custodianship, and deepening social, cultural and economic ties to the GBR. Providing opportunities for strengthening socially-enabling factors such as equity, trust, participation and compliance can be the way forward for GBR managers to achieve their goals, and at the same time, provide tangible benefits to local, national and international communities (Christie et al 2003). In particular, to improve GBR health, policy makers and managers need to understand and monitor (a) people's relationship with the GBR including how many people directly use/visit the GBR, where they go, how they get there, what they do, and why; (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 a healthy GBR for the economic, social, or cultural values that it provides.

This report is the final in a series of six regional reports produced as part of a 12 month National Environmental Science Program (NERP) project (*NESP Project 3.2.2: Cost-effective indicators and metrics for key GBRWHA human dimensions*). The project is trialling a regionally-specific and robust framework to assess and monitor the human dimensions of the GBR and its catchment. The GBR catchment lies within six Natural Resource Management (NRM) regions and a report is being produced for each part of the GBR and catchment that falls within each region – i.e. the Wet Tropics; Eastern Cape York (part of the Cape York region); Burdekin; Mackay-Whitsunday; Fitzroy; and Burnett- Mary. These six areas are administrative regions based on sub-catchments within the larger GBR catchment. The NRM regions were established over ten years ago by the Commonwealth and Queensland governments to help deliver environment and sustainable agriculture programs (ABS 2016). They extend beyond the coastline to include part of the GBR Marine Park and are shown in Figure 1.

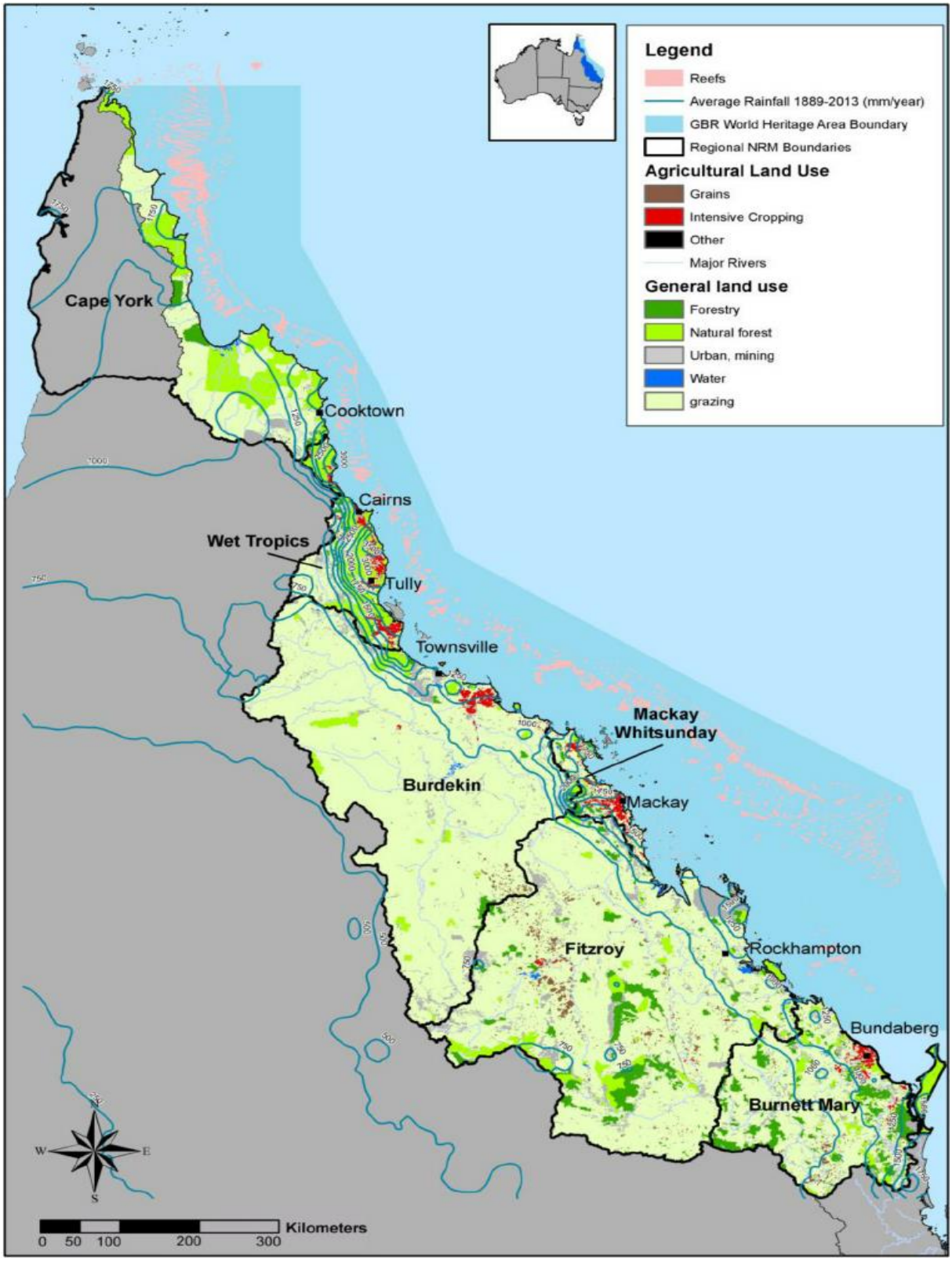

Figure 1: NRM Regions in the Great Barrier Reef catchment (Source: Thorburn, Wilkinson, and Silburn, 2013, p. 5).

The human dimensions of the GBR are the social, cultural, institutional and economic factors that shape people's relationship with the GBR. Managers realise that these relationships are diverse and wide-ranging and include collective actions by industries, communities and

governments, each influencing GBR resilience[1]. In turn, the resilience of the GBR influences the resilience of these communities. To be effective, GBR managers need to know more about these relationships. At the most basic level, managers are interested in how many people directly use or visit the GBR; who these people are, where they go, what they do and why. Marshall et al (in review) identified eight cultural benefits derived from the GBR, and these are used throughout this document to illustrate the richness of people's relationship with it.

Table 1: Eight cultural benefits associated with the GBR – Marshall et al (In review)

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 have changed considerably over time, and will no doubt change again in future. It confirmed that attitudes and perceptions are shaped by culture, societal norms, context and circumstances, including personal experiences, word-of-mouth, and print media. Indigenous Traditional Owners have had the longest association with the GBR, and their attitudes and perceptions have been relatively constant over millennia as custodians and sustainable exploiters of the GBR and its resources. By contrast, non-Indigenous attitudes and perceptions are varied and can change relatively quickly, especially for those new to the GBR and its catchment. The literature has already highlighted factors likely to affect attitudes/perceptions relating to the GBR including:

[1] This description of the human dimensions of the Great Barrier Reef and catchment was developed through discussions with managers and researchers, and will be developed further to inform the up-dated Great Barrier Reef Water Quality synthesis statement.

- 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; and
- Levels of confidence and trust in GBR management (Gooch, 2016).

The GBR's human dimensions include residents in GBR catchment towns and cities (including Traditional Owners) as well as national and international people who either have an interest in the GBR or who influence (directly or indirectly) the condition of the GBR. This also includes those in government agencies (e.g. local, State and Commonwealth governments). They also include people in the following GBR maritime and catchment industries:

- Cane
- Grazing
- Dairy
- Horticulture
- Grains
- Aquaculture
- Research
- Mining/extractive industries
- Urban development and construction
- Ports and shipping
- Forestry
- Marine and coastal recreation
- Commercial fishers
- Marine and coastal tourism

People are also 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; fishing – recreational as well as illegal fishing (i.e. intentional targeting of protected zones).

The Great Barrier Reef Marine Park Authority (GBRMPA) works with a specific set of human dimension values used for assessment, monitoring and management of activities within its jurisdiction. 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;
- Intra and inter-generational equity associated with the GBR;
- Empowerment derived from the GBR; and
- Employment and income derived from GBR-dependent industries (GBRMPA, 2017a). *See Attachment A for detailed descriptions of each value.*

Traditional Owners in particular still maintain connection to, and responsibility for caring for their particular country, through membership in a descent group or clan. There are more than 70 Traditional Owner groups along the GBR (GBRMPA 2016a). 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, songlines, 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 holistically (DAE, 2017; GBRMPA 2005; 2016a). 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 maritime 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; 2017b; 2017c).

The Approach

A human dimensions indicator framework was constructed based on five themes or clusters describing different aspects of human dimensions. Each cluster is further described by a set of attributes as listed in Table 2. The clusters were modified from the work by Vella et al (2012) who defined four main groupings of indicators 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), to describe the human dimensions of communities in north Queensland. These four groupings formed the basis of a framework for evaluating social resilience in the Wet Tropics Region of the GBR catchment (Dale et al 2016a, 2016c). To construct the framework we also reviewed the work of the Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES), which recognises that healthy human systems depend (either directly or indirectly) on a healthy ecosystem (Diaz et al., 2015). We then aligned the IPBES and Dale et al (2016c) frameworks with values articulated in the Great Barrier Reef Strategic Assessment (GBRMPA 2014a), the Great Barrier Reef Outlook Report (GMRMPA 2014b) and published regional report cards for the GBR (Healthy Rivers to Reef Partnership: Mackay Whitsundays, 2016; Fitzroy Partnership for River Health, 2015; and the Gladstone Healthy Harbour Partnership, 2016). We added a fifth cluster, culture and heritage, based on the cultural significance of the GBR, and its world heritage status Table 2.

Table 2: The five GBR human dimension clusters and their alignment with Reef 2050 Plan themes

Reef 2050 Plan Theme	The five human dimensions cluster and their attributes
All seven themes – i.e., economic benefits, community benefits, heritage, governance, water quality, biodiversity and ecosystem health.	**Aspirations, capacity and stewardship** Cohesive vision and aspirations for the future of the GBR together with awareness, skills, knowledge and capacities to turn aspirations into action. Personal and collective (including industry) efforts to: (a) minimise impacts on the GBR and catchment; (b) restore degraded marine, coastal and catchment ecosystems; (c) apply Ecologically Sustainable Development (ESD) principles; and (d) be actively involved in GBR and catchment management. ACS1 Levels of community awareness & education about the GBR ACS2 Community capacity for stewardship ACS3 Adoption of responsible/ best practice – GBR recreational users ACS4 Adoption of responsible/ best practice – Agricultural & land sector. ACS5 Adoption of responsible/ best practice – Industry & urban sector. ACS6 Adoption of responsible/ best practice – Marine industries.
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	**Community Vitality** is characterised by demographic stability, security, happiness and well-being. Community vitality associated with the GBR includes how & 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. CV1 Demographic stability across the catchment CV2 Security in the catchment including housing, safety & risk management. CV3 Wellbeing/ happiness within the general community. CV4 Community health/ wellbeing/ satisfaction associated with the GBR. CV5 Regional services & service infrastructure supporting the interface between the community & GBR.
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	**Culture and Heritage** 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 strong 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 Traditional Owner 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. Contemporary culture is how the GBR is experienced by people today. CH1 World Heritage – underpinned by ecosystem health, biodiversity & water quality CH2 Indigenous (Traditional Owner) heritage CH3 Contemporary culture CH4 Historic maritime heritage (since European settlement).
Economic Benefits Economic activities within the Great Barrier Reef World Heritage Area and its catchments sustain the GBR's Outstanding Universal Value (OUV)	**Economic values** This includes the monetary advantages that people derive directly or indirectly from a healthy and well-managed GBR. Fundamental is the premise that economic activities within the Great Barrier Reef World Heritage Area (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 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. EV1 Size and diversity of regional economic growth EV2 Economic viability of GBR-associated industries EV3 Economic viability of GBR-dependent industries EV4 Inclusiveness & economic fairness/ equity

	EV5 Workforce participation & employment EV6 Economic confidence within the region.
Governance The OUV of the Reef is maintained & enhanced each successive decade through effective governance arrangements & coordinated management activities**.**	**Governance** refers to 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. G1 Strategic focus of governance system G2 Connectivity within & between key decision making institutions & sectors G3 Adaptive governance capacity of key decision making institutions & sectors G4 Adaptive use & management of integrated knowledge sets.

In constructing the tables for each region, the project team gathered evidence from peer-reviewed literature, grey literature and other forms of knowledge such as Indigenous and local knowledge. We drew on qualitative and quantitative data. Quantitative data sets used in the analysis include the following:

- **ABS** (Australian Bureau of Statistics) *Data by Region* http://stat.abs.gov.au/itt/r.jsp?databyregion
- **ABS** (Australian Bureau of Statistics). (2015). *Information paper: An experimental ecosystem account for the Great Barrier Reef Region, 2015* (cat. no. 4680.0.55.001). Canberra: ABS. 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** (Australian Bureau of Statistics). *ABS Census Data*. Retrieved: http://www.abs.gov.au/websitedbs/D3310114.nsf/Home/Census?opendocument&ref=topBar
- **ABS** (Australian Bureau of Statistics). 4609.0.55.003 - *Land Account: Queensland, Experimental Estimates, 2011 – 2016*. *Land Account: Queensland, Experimental Estimates, 2011-2016*,
- **ABS** (Australian Bureau of Statistics) – Community profiles http://www.abs.gov.au/websitedbs/censushome.nsf/home/communityprofiles
- **ABARES** (Australian Bureau of Agricultural and Resource Economics and Sciences) *Catchment Scale Land Use of Australia* http://www.agriculture.gov.au/abares/display?url=http://143.188.17.20/anrdl/DAFFService/display.php%3Ffid%3Dpb_luausg9abll20160616_11a.xml
- **ABARES** (Australian Bureau of Agricultural and Resource Economics and Sciences) *Data sets*. http://www.agriculture.gov.au/abares/data
- **GBR Report Card 2016 Reef Water Quality Protection Plan**. http://www.reefplan.qld.gov.au/measuring-success/report-cards/2016/assets/report-card-2016-detailed-results.pdf
- **GBRMPA** (Great Barrier Reef Marine Park Authority). *Vessel registration levels for the Great Barrier Reef catchment area.* http://www.gbrmpa.gov.au/VesselRegistrations/
- **Infofish**. https://crystal-bowl.com.au/
- **QGSO** (Queensland Government Statistician's Office). *Queensland regional profiles* http://statistics.qgso.qld.gov.au/
- **Rental Vulnerability Index** https://cityfutures.be.unsw.edu.au/cityviz/rental-vulnerability-index/
- **SELTMP** *The Social and Economic Long Term Monitoring Program for the Great Barrier Reef* http://seltmp.eatlas.org.au/seltmp
- **TRA** (Tourism Research Australia) https://www.tra.gov.au/
- **University of Canberra** (2017) *2016 Regional Wellbeing Survey: Results by RDA and LGA*. http://www.regionalwellbeing.org.au/

The process involves synthesising evidence from diverse sources, presenting the evidence as a series of tables, and allocating draft scores to attributes of each human dimension cluster.

We then invited people to review the tables through a series of expert panel meetings held in each region. Meeting participants were selected on the basis of: (a) their experience and knowledge of the Great Barrier Reef from a regional, community, industry (GBR-dependent and GBR-associated industries), or governance perspective; and/or (b) their involvement in social, economic and/or environmental initiatives which contribute to regional community wellbeing. If an invited person was unable to attend, but could offer a proxy who can represent them, then the proxy is 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; Traditional Owners; and researchers on the project team. There were usually around 10 people on each panel. Specifically, panel members were invited to appraise evidence about the GBR's human dimensions presented in the tables; add additional knowledge to fill data gaps; and record data gaps and limitations. During the meeting discussions, the multiple lines of evidence were weighed up using a set of decision rules (Table 3) then used to score attributes within each of the five human dimension clusters. The scores are used to make critical judgements on the state or condition of regional community resilience as a way of representing the human dimensions of that part of the GBR. The process helps all involved in the meetings and their interested parties to plan for the future, and to alert GBR managers, partners and stakeholders to emerging issues and risks. Reference to the *regional community* includes all levels of government, industry, Traditional Owners and local residents viewed through the regional geographic lens. A thriving, resilient community can anticipate risks and limit impacts while still retaining the same function, structure, purpose, and identity. Sometimes a regional community may get trapped in an undesirable state, unable to change over time. Being able to understand which attributes of a community need attention is an important first step to overcome stagnation or decline (CARR 2013; Walker and Salt). The *broader community* includes national and international people who either have an interest in the GBR or who influence (directly or indirectly) the condition of the GBR including industry sectors, Traditional Owners and government agencies.

Table 3: Decision rules for assessing resilience 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.

2.0 THE BURNETT-MARY REGION

For this report the Burnett-Mary Region covers 5.5 million hectares across seven local government areas - Bundaberg, Cherbourg, Fraser Coast, Gympie, North Burnett, South Burnett, and the southern part of the Gladstone Regional Council. It includes the basins of Baffle Creek, and the Burnett, Burrum, Kolan and Mary Rivers. More than 80% of the population is located in the major urban centres of Bundaberg, Maryborough, Hervey Bay, Gympie and Kingaroy. Rural settlements of various sizes are scattered throughout the region. Land is mainly used for a wide range of agriculture, although beef cattle grazing (5,257 holdings over 3 million ha) is by far the most common activity. Marine and coastal areas include the southern end of the GBR World Heritage Area, the Ramsar listed Great Sandy Strait and the UNESCO designated Great Sandy Biosphere Reserve. These ecologically outstanding areas make significant contributions to regional and national economies through tourism, recreation and fishing. Critical GBR habitats include seagrass, soft sediments, coral reefs and coastal wetlands (GBRMPA 2014a; QGSO 2017a; Bennett, Dickson, Park and Roberts 2015; ABS 2009; ABS 2017; WBBROC 2013).

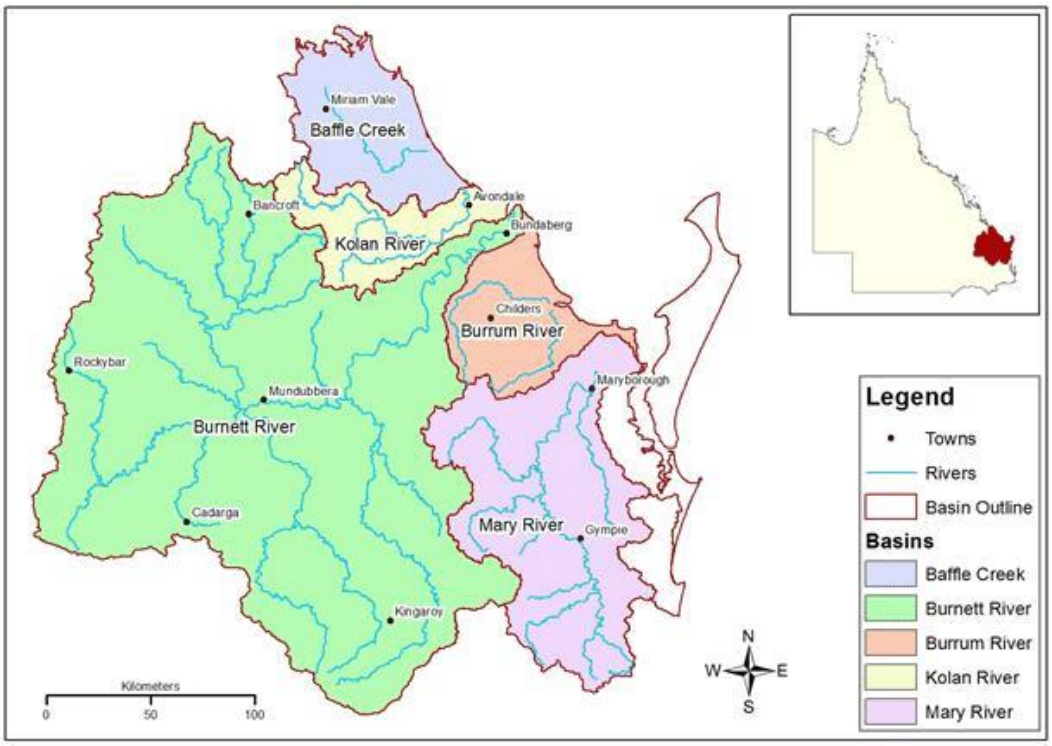

Figure 2: The Burnett-Mary Catchment

(SOURCE: Beverly Roberts and Bennett 2016)).

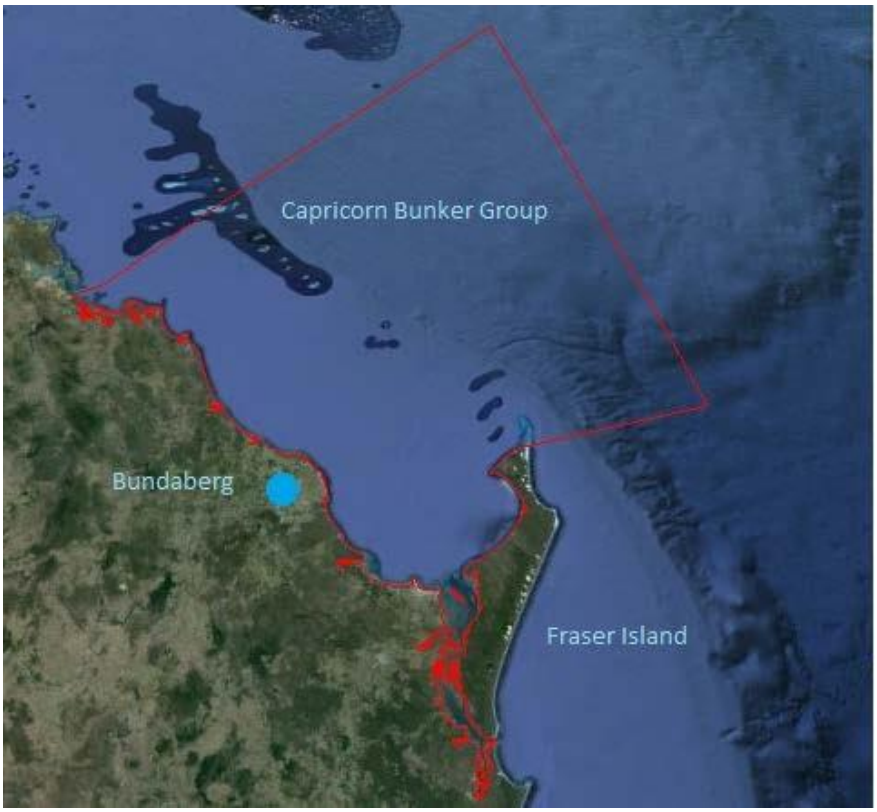

Figure 3: The marine boundary of the Burnett Mary region (SOURCE: Coppo et al 2014).

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Cluster One: Aspirations, capacities and stewardship

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

Table 4: Aspirations, capacities and stewardship

Attribute Component	Possible Pressure, State & Trend Indicators	Evidence	Conclusions	Proposed Value & Logic
ACS1 Levels of community awareness, education	• Regional education/ skills levels • Awareness of NRM issues • Awareness of GBR & waterway condition & threats • GBR learning opportunities	**Regional education/ skills levels** • In 2011, 47.4% region had a post-school qualification c.w. 54.2% across Qld (QGSO, 2017a). • Currently, Cherbourg Aboriginal Council is focused on: o Documentation, expansion & implementation of traditional land management strategies; o Training & educating younger community members in traditional knowledge & promoting environmental stewardship; o Reducing fragmentation of natural habitat & loss of biodiversity (WBBENRWG 2013). **Awareness of NRM issues** • Perception that *water quality* is a big problem: Bundaberg & Nth Burnett 34.7%; Fraser Coast & Gympie 37.0%; Sth Burnett & Cherbourg 70.0% c.w. 41.4% for rural & regional Aust & 43.7% rural & regional Qld (Uni of Canberra 2017). • Perception that *soil erosion* is a big problem: Bundaberg & Nth Burnett 44.0%; Fraser Coast & Gympie 36.4%; Sth Burnett & Cherbourg 40.5% c.w. 41% for rural & regional Aust & 39.4% % rural & regional Qld (Uni of Canberra 2017). • Perception that *environmental degradation in general* is a big problem: Bundaberg & Nth Burnett 33.2%; Fraser Coast & Gympie 29%; Sth Burnett & Cherbourg 22.7% c.w. 40.4% for rural & regional Aust & 40.7% % rural & regional Qld (Uni of Canberra 2017). **Awareness of GBR and waterway condition & threats** • 71% B-M residents agree that coral reefs in the region are in good condition; 74% agree that mangroves are in good health; 74% agree that estuarine & marine fish are in good condition; 71% are worried about the status of freshwater fish in the region;	• Regional Yr 12 completion & post-school qualification rates are below state average & within the regional general public there are varying perceptions & levels of awareness about NRM & environmental issues. • Recognition & inclusion of TEK will lead to improved natural & cultural resource management outcomes across the region (WBBENRWG 2013). • Regional awareness of NRM issues is variable, but awareness of GBR & waterway condition & threats is generally high • GBRMPA's Reef Guardian School's Program has a large influence on community capacity for stewardship • Within the whole GBR catchment, there is a broad societal awareness of the impacts of climate change & catchment-based activities on the GBR. • There are high levels of agreement among national residents & catchment residents that it is the responsibility of all Australians to care for the GBR, indicating that	**3.5** Among the general regional community, perceptions of threats to local ecosystems & the GBR are variable. More broadly, there is a high level of national & international awareness & concern about the GBR that does not always translate into cohesive policy action

		54% DISAGREE that freshwater rivers & creeks in the region ARE NOT in good condition; 82% DISAGREE that they ARE NOT worried about climate change impacts on the GBR (Marshall & Pert 2017). • 50% B-M residents say the greatest threat to the GBR is pollution; 32% believe climate change is the greatest threat to the GBR and 32% say poor water quality is the greatest threat to the GBR (Marshall & Pert 2017). *GBR catchment residents* • In 2013, 52% GBR coastal residents believed climate change is an immediate threat to the GBR. In 2017, this increased to about 65% (SELTMP, 2013a; 2017). *National/International perspectives* • Australians consider pollution, climate change & people to be the biggest threats to the GBR c.w. shipping, & agricultural runoff mentioned by catchment respondents. Tourists listed the most serious threats as tourism (41%), climate change (40%), & commercial fishing (22%). Commercial fishers list agricultural run-off (34%) new ports & port expansions (31%), shipping (31%). Only 18% of fishers see climate change as a major GBR threat (Marshall et al., 2013a). • 81% Australians agree that all Australians should be responsible for the GBR c.w.94% GBR coastal residents. 54% Australians are optimistic about the GBR's future (Marshall et al., 2013a). • 2/3 Australian & international respondents of a recent survey were prepared to pay to protect the GBR. Of these 61% alluded to its importance to the planet; 59% felt future generations should be able to visit it; 59% cited its importance to biodiversity; 52% felt it was morally & ethically right to pay for its protection (DAE, 2017). **GBR learning opportunities** • 79% B-M residents are interested in learning "more about the condition of the GBR"; but only 49% B-M residents agree they have knowledge & skills to reduce their GBR impacts; 88% value the GBR because it provides opportunities for learning through scientific discoveries; & 74% B-M residents value the GBR because it provides a place where people can continue to pass down wisdom, traditions and a way of life (Marshall & Pert 2017). *GBR-wide Reef-education programs* • GBR-wide Reef Guardians Program - 276 schools, 120,000 students, 7,400 teachers; 16 Councils covering 300,000 km2; 17 commercial fishers (line, trawl, net, collection); 24 sugarcane,	cohesive stewardship efforts at local, regional & national scales would be a sound investment.	related to key threats.

		banana, horticulture & broad-acre farmers & 5 beef graziers (GBRMPA, 2016a).		
ACS2 Community capacity for stewardship	• Sense of responsibility towards the environment • Sense of responsibility towards the GBR & coastal waterways • Regional Reef-based stewardship activities • Numbers & types of TO involvement in on-ground WQ improvement & monitoring	**Sense of responsibility towards the environment** • 93% B-M residents agree they make every effort to use energy efficiently at home & at work; 73% DISAGREE that they RARELY CONSIDER environmental impacts of production processes for goods & services that they purchase; 83% DISAGREE that they DON'T USUALLY make any extra effort to reduce waste; 83% re-use or recycle most goods & waste; 5% are part of an environmental community-based group (Marshall & Pert 2017). **Sense of responsibility towards the GBR & coastal waterways** • 83% B-M residents agreed they would like to do more to help protect the GBR; 86% agreed they like to do more to improve water quality in local waterways (including rivers, creeks); 60% DISAGREE that they CANNOT make a difference in improving GBR health; 84% DISAGREE that it is NOT their responsibility to protect the GBR; 72% agree that they feel a social expectation to reduce impacts they may have on the GBR; 69% DISAGREE that they DO NOT HAVE time or opportunity to reduce their impacts on the GBR (Marshall & Pert 2017). • GBR coastal residents strongly agreed that they would like to do more to help protect the GBR (av. 7.3/10 in 2013 & 7.75/10 & generally agreed that they have a personal responsibility to protect the GBR (av. 6.8/10 in 2017 (Marshall & Pert 2017). **Regional Reef-based stewardship activities** • Many well-established & effective landcare & other groups involved in coastal management, conservation & catchment care. NB many individuals contribute to NRM activities but choose not to belong to a group (QWaLC 2016; WBBENRWG 2013). • BRMG fosters close partnerships with regional communities, industry, TOs & government to implement management of culturally significant sites, landcare & school activities; provides iadvice to gov't, research & regional dev. agencies to ensure NRM is part of decision-making (BMRG 2016). • $700,000 Reef Trust project engaged > 4000 people in marine debris removal across the GBR (GBRMPA, 2016a). • 2/3 Australian & international survey respondents are prepared to pay to protect the GBR. Of these 61% alluded to its importance to the planet; 59% felt future generations should be able to visit it; 59% cited its importance to biodiversity; 52% felt it	• B-M resident responses to a SELTMP survey suggest that they have relatively high aspirations and levels of capacity and stewardship around the GBR. • Stewardship levels & sense of responsibility are relatively high within the region – perhaps due to the high numbers of well-established & effective groups involved in coastal management, conservation & catchment care, coordinated mostly by BRMG.	**3.5**

		was morally & ethically right to pay for its protection (DAE, 2017). **Numbers & types of TO involvement in on-ground WQ improvement & monitoring** • Little data available		
ACS3 Adoption of responsible/ best practice – GBR recreational/ artisanal users	• Extent & type of stewardship practices • How many people visit this section of the GBR? • Where do they go? • What do they do? • How do they get there? • Why do they visit?	**Extent & type of stewardship practices** • Not enough evidence to assess **Number of GBR visitors** • 90% B-M residents visited GBR at least once in the past year (Marshall & Pert 2017). • No. of rec. vessels registered in Bundaberg Regional & North Burnett rose from 9036 in 2008 to 10103 in 2016 (GBRMPA, 2017e). • In 2015-16 the region had ~3M day trippers, 6M domestic overnight visitors & 2M international visitors (DAE, 2017). **Where recreational visitors go** • Not enough evidence to assess **Why do they visit? What do they do?** • 2% B-M residents belong to a GBR-based club or community group. Top three activities contributing to B-M residents' use & enjoyment of the GBR (ranked using mean ratings on 1-10 scale) Wildlife watching = 8.23; Sightseeing/ exploration = 7.88; Viewing coral & reef habitats = 7.58 (Marshall & Pert 2017). • 20% of the region's pop'n fish at least once each year, higher than state av. of 17% (QDAF 2015).	• Hard to get regionally specific data on use patterns & stewardship efforts of recreational/artisanal users, however managing intensive recreational pursuits that are inconsistent with conservation values is a challenge for Fraser Coast councils (WBBENRWG 2013). • Recreational fishing continues to be a very important recreational activity	**3** There is some anecdotal evidence of compliance issues in the recreation sector, but there is insufficient data to assess with confidence
ACS4 Adoption of best practice systems – Agricultural & land sector. (including Aquaculture)	• Extent & type of stewardship practices of agricultural industries.	**Reef Plan Report Card** for B-M industry: *Grazing Target: 90% grazing lands managed using BMP by 2018* • 2495 graziers farm 2.66M ha land & 14,078km streambanks. In 2016 46% grazing land was under BMP for hillslope erosion; 49% for streambank erosion & 30 % for gully erosion. Overall BMP for B-M graziers is D (CoA & QG 2016). *Sugar Target: 90% sugarcane lands managed using BMP by 2018* • 498 growers farm 86 000ha. In 2016, 50% cane land was under BMP for pesticides, 15% nutrients & 39% soil. Overall BMP for B-M cane farmers is D (CoA & QG 2016). • Smartcane engaged with 124 growers; 5 got BMP accreditation • 54 growers adopted improved practices on 7587ha through BMRG & Aust. Gov's Reef Programme: 9 improved fallow management; 5 moved to zonal tillage prior to planting; 7 adopted Six Easy Steps; 13 changed to sub-surface application of nitrogen fertiliser; 11 improved residual herbicide application;	• Current sediment, N & P load reduction targets could be achieved but more ambitious ecologically relevant targets require significant additional investment & unlikely to be achieved (Beverly, Roberts & Bennett 2016) • It will be extremely difficult to achieve practice change in the grazing industry without financial incentives to improve paddock management practices & fencing of stream banks & gullies (Bennett, Dickson, Park & Roberts 2015).	**3.5** Substantive improvements in agricultural practice uptake, but additional investment & financial incentives are required for further improvement.

		3 improved management of irrigation & rainfall RO (CoA & QG 2016). *Horticulture Target: 90% lands managed using BMP by 2018* • 280 horticulture producers farm 23 000ha land. In 2016, BMP applied in 36% horticultural land for pesticides; 33% for nutrients & 76% for soil. Overall BMP for Burdekin horticulture farmers is C (CoA & QG 2016).		
ACS5 Adoption of best practice systems – Industry & urban sector.	• Extent & type of stewardship practices of urban councils & industries.	• Hervey Bay CBD Urban Renewal Master Plan includes principles of ESD (FCRC 2015). • Bundaberg's Community Conservation Advisory Group est. 2010 to address conservation issues, coordinate conservation-based work, collaborate on projects & review Council's natural area management plans (BRC 2015). • Gympie's Planning Scheme prepared under Sust. Plann. Act 2009 (GRC 2013). • Expanding urbanisation in Fraser Coast & Gympie may put pressure on arable land & local ecosystems (WBBENRWG 2013). • SPP (DILGP, 2017) states that all exposed soil areas > 2500 m^2 must have sediment controls implemented & maintained to achieve 80% hydrologic effectiveness (50mg/L TSS or less & pH bet. 6.5–8.5). One method for achieving compliance is to implement HESBs (Turbid Water Solutions, 2017). To date NO LGAs in the GBR catchment have HESBs on working construction sites within their jurisdictions (S. Choudhury pers.comm.)	• Managing impacts of urban growth in the Fraser Coast & Gympie is challenging, as these areas prioritise protecting, restoring & enhancing the environment; maintaining biodiversity; valuing ecosystem services; & managing natural resources sustainably (WBBENRWG 2013). • Some councils have gone beyond legislative compliance to ensure best practice systems are in place, however, across the GBR catchment, traditional sediment basins are often not designed or maintained to minimum standards & thus ineffective. Local councils are calling for support from other governments in the form of an independent, dedicated compliance team that would travel the State. (S. Choudhury pers.comm.)	**3.5** Although urban areas are generally well managed & regulated, urban expansion in some parts of the region may have adverse impacts on biodiversity & conservation values.
ACS6 Adoption of best practice systems – Marine sector	• Extent & type of stewardship practices of GBR-associated industries (Ports & shipping) • Arrangements to ensure GBR shipping is safe. • No. shipping accidents	**Ports & shipping - stewardship & safety** • PoB maintains ISO 14001–2004 ES accreditation & conducts annual maintenance dredging (GPC 2016). • WWF & AMSA recognise that the NESMP provides important actions, but urgent changes are needed (e.g. compulsory pilotage for the entire GBR; use of high-standard ships in GBR waters, & improved marine biosecurity (Comm. of Aust. 2014). **GBR Fishing & Fisheries**	• Evidence suggests that ports & shipping comply with regulations. • Until recommended changes are made to NESMP, shipping accidents will continue to occur throughout the GBR.	**3.5** Significant progress has been made on tourism & ports. Best management practices in commercial

	• Extent & type of stewardship practices of GBR-dependent industries (Fishing & Tourism)	• 8% commercial fishers have fuel efficient vessels; 81% participate in industry best practice; 13% use an emissions calculator (Marshall et al. 2013a). • Several MOUs & Codes of Conduct (COCs) for comm. fishers, but formal information is lacking (Tobin et al., 2014). • *Queensland Sustainable Fisheries Strategy 2017–2027* should improve management practices in the commercial fishing sector (QDAF 2017a). **GBR-Wide Tourism** • Lady Elliot Island – winner of multiple awards for sustainability & ecotourism (LEI 2017) • 67 GBR tourism operators have ECO Certification through Ecotourism Australia & carry 69% GBR tourists (GBRMPA, 2016a). 52% tourists prefer those with 'green' credentials; 63% tourism operators said they "regularly get involved in GBR research &/or management"; 98% agreed they "try to encourage other people to reduce their GBR impacts"; 90% agreed that their operation "provides interpretation for tourists that promotes conservation or sustainable use of the GBR"; 88% use fuel efficient engines; 84% separate waste for recycling; 83% participate in industry best practices (e.g. codes of practice, MOUs); 45% participate in GBRMPA's Eye on the Reef monitoring program; 43% use green energy (e.g. solar); 28% use emissions calculator; 19% use carbon offsets; 8% use alternative fuels (Marshall et al., 2013a).	• Relatively low up-take of eco-efficient practices by commercial fishers, compared with marine tourism operators.	fishing should improve with implementation of *Queensland Sustainable Fisheries Strategy 2017–2027*
Rating				**20.5**
Maximum for this Attribute				**30**

Cluster Two: Community vitality

Community vitality is characterised by demographic stability, security, happiness and well-being. Community vitality associated with the GBR include services and infrastructure supporting the interface between the community and GBR as well as 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

Table 5: Community vitality

Attribute Component	Possible Pressure, State & Trend Indicators	Evidence	Conclusions	Proposed Value & Logic
CV1 Demographic stability across the Burnett-Mary Region	• Basic demographic characteristics (e.g. population, age structure, migration & growth rates). • Migration intentions over the next 12 months	**Basic demographic characteristics** • 2016 Regional ERP is 292,364 persons as at 30 June 2016 c.w. 991,978 for GBR catchment, & 4,778,854 for Qld (QGSO, 2017a; 2017b) • Av. regional growth rate is 0.9% over 5 yrs & 1.4% over 10 (QGSO, 2017a). In 2016, 12% regional residents were born overseas, c.w. 21.6% across Qld; 4.7 % were Indigenous c.w. 4% for Qld; 3.7% speak a LOTE (QGSO, 2017a). • Ageing population - 21.8% > 65 yrs in 2014 cw 14% for QLD (WBBROC 2016). • Region is projected to accommodate a slightly higher age profile than state in the age groups 55–59 through to 85 & over, & a lower proportion of residents in the 15–19 through to 50–54 age groups (Uni of Canberra 2017). • Social trends of skill & youth migration away from regional areas to larger metropolitan locations prevail (WBBROC 2016). **Migration intentions in the next 12 months** • 9.4% Bundaberg & Nth Burnett residents were likely to move in the next 12 months; Fraser Coast & Gympie residents = 11.1%; Sth Burnett & Cherbourg residents = 21.3%; c.w. 10.8% for rural & regional Aust & 12.6% rural & regional Qld (Uni of Canberra 2017).	• The Region has one of Australia's fastest urban growth rates matching or exceeding state & national population figures (WBBENRWG 2013). • The region has experienced a significant shift in its population centres, as coastal communities attract 'sea changers' while many inland regional towns experience decline as young people leave for further education, employment & lifestyle opportunities (WBBENRWG 2013). • The trend of expanding ageing coastal populations puts pressure on health & community services & other resources. . • Sth Burnett & Cherbourg residents are almost twice as likely to move in the next 12 months compared with most state or national populations.	**3.5** Ageing coastal population, loss of youth further inland, mobility of Indigenous population & rapid expansion of some urban centres reflects a fluctuating population which requires good access to health & wellbeing services.

CV2 Security in the catchment including housing, safety & risk management.	• 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 • Crime rates • Perceptions of safety • Housing including availability & affordability	**% residents with high financial distress (2, 3 or 4 factors)** • Bundaberg & Nth Burnett 38.7%; Fraser Coast & Gympie 28.8%; Sth Burnett & Cherbourg 26.5% c.w. 20.9% rural & reg. Aust & 22.3% rural & reg. Qld (Uni of Canberra 2017). **Regional Crime Rates & domestic safety** • Regional crime rate 9,431 per 100,000 < Qld Av of 9,856/100,000 persons; offences against a person 717/100,000 c.w. 634/100,000 for Qld (QGSO 2017a). • Cherbourg had highest no. offences against a person 8,901/100 000 & 13,313 per 100 000 against property (QGSO 2017a). • Cherbourg, is part of the Integrated Service Response Trial to ensure people affected by domestic & family violence are supported (State of Qld 2010–2017). **Perceptions of safety** • 88.5% Bundaberg & Nth Burnett residents agreed with the statement: This is a safe place to live c.w.Fraser Coast & Gympie residents (82.2%); Sth Burnett & Cherbourg residents (63.6)% & . rural & reg. Aust (80.7%) & 83.3% rural & reg. Qld residents (Uni of Canberra 2017). **Housing availability & affordability** • Challenges for availability of a suitable range of housing for ageing population in coastal centre (Uni of Canberra 2017). • In 2001, Qld's rental vulnerability was highest around Bundaberg, Fraser Coast & Gympie, meaning that the median rents in these areas are higher than 30% of household income (Troy & Martin 2017). • When low-income households have to spend more than 30% income on housing, they start to go without other things – e.g. meals, health care & outings. For this reason, low-income households in unaffordable housing are said to be in "housing stress" or "rental stress" (Troy & Martin 2017).	• Crime rates are below the state average, with the exception of Cherbourg & Sth Burnett • People who live in Cherbourg & Sth Burnett feel much less safe within their communities compared with other communities in the region. • Some urban areas are experiencing housing challenges associated with accommodating ageing populations. • Residents in Bundaberg & Nth Burnett experience much higher levels of financial & rental stress than other parts of rural & regional Australia.	**3** Crime rate is below state average, with the exception of Cherbourg & South Burnett. Major disparities between Aboriginal & non-Aboriginal residents with respect to crime rates & feelings of personal safety. Major disparities between different LGAs with respect to financial stress & rental vulnerability.
CV3 Wellbeing/ happiness within the general community.	• **Community Wellbeing** (1-7) (i) great place to live, (ii) Coping with challenges, (iii) Pride, (iv)	**Community wellbeing** • Bundaberg & Nth Burnett residents rate community wellbeing as 5.3/7; Fraser Coast & Gympie 5.2; Sth	• Parts of the region are below state & national average for perceptions of personal health & wellbeing, &	**3.5**

	Optimism, (v) Community spirit. • **Decreasing community liveability** (i) liveability (ii) friendliness (iii) local economy (iv) local landscape • **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. • **Health** • **Mental illness**	Burnett & Cherbourg 4.7 c.w. 5.5 rural & regional Aust; 5.5 rural & regional Qld (Uni of Canberra 2017). **Perceptions of decreasing community liveability** • 19% Bundaberg & Nth Burnett residents perceive decreasing community liveability; 29.3% Fraser Cst & Gympie residents & 45.0% Sth Burnett & Cherbourg residents perceive decreasing community liveability c.w. 20.2% rural & reg. Aust. residents; & 25.5% rural & reg. Qld residents (Uni of Canberra 2017). **Perceptions of personal wellbeing** • Bundaberg & Nth Burnett residents rated their personal wellbeing as 63.0/100; Fraser Coast & Gympie 71.8; Sth Burnett & Cherbourg 68.8 c.w. 73.7 rural & regional Aust; 73 rural & regional Qld (Uni of Canberra 2017). **Health** • 9.4% Bundaberg & Nth Burnett residents; 4.3% Fraser Coast & Gympie; & 5.6% Sth Burnett & Cherbourg residents report poor health c.w. 5.2% rural & reg. Aust; 5.1% rural & reg. Qld (Uni of Canberra 2017). **Mental illness** • 22.5% Bundaberg & Nth Burnett residents; 9.5% Fraser Coast & Gympie residents;& 11.4% Sth Burnett & Cherbourg residents are likely to suffer from a serious mental illness c.w. 9.6% rural & reg. Aust; 10.8% rural & reg. Qld (Uni of Canberra 2017).	community wellbeing & liveability; while other parts are above. • South Burnett & Cherbourg (high Indigenous population) are consistently below the most remote & regional centres across Qld & Australia for all perceptions about health & wellbeing. • However, Cherbourg's strong cultural links to other locations & access to educational resources & strong local leaders ensures residents are well-placed to influence natural & cultural resource management beyond their boundaries through TEK (WBBENRWG 2013).	Major disparities between Aboriginal & non-Aboriginal residents with respect to wellbeing, although there are systems in place to address this gap.
CV4 Community health/ wellbeing/ satisfaction associated with the GBR.	• Stress associated with decline in GBR health • **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 • **Indigenous health associated with the GBR**	**Stress associated with decline in GBR health** • 83% B-M residents DISAGREE that they would NOT be personally affected if GBR health declined; 72% admitted that thinking about coral bleaching makes them feel depressed (Marshall & Pert 2017). • 54% of Australians would be personally affected if GBR health declined c.w. 81% GBR coastal residents (Marshall et al., 2013a). **GBR contributions to quality of life & wellbeing** • 79% B-M residents agree that the GBR contributes to their quality of life & wellbeing; 91% value the GBR because it supports a desirable & active way of life; 55% value the GBR because it inspires artistic or thoughtful ways; 75% value the GBR for the fresh seafood it provides; only 48% feel optimistic about the future of the GBR; 79% value the GBR because it makes them feel better physically and/or mentally (Marshall & Pert 2017).	• The GBR plays an important role in the health & wellbeing of residents, Traditional Owners & visitors. Most are very satisfied with GBR experiences. • Strong & growing levels of evidence exists concerning the health & wellbeing benefits of culturally strong & active connection & use to natural resources, particularly within Indigenous communities. • These benefits are mainly limited by the degree to which communities & people are able to	**4** High levels of wellbeing related to the GBR are reported in both regional & Australian populations.

	• **Commercial fishers' wellbeing** • **Tourism Operators' wellbeing**	**Indigenous wellbeing** • Physical & cultural values of land & sea country are essential to TO wellbeing (WBBENRWG 2013). • Indigenous health & wellbeing is affected by a significant collection of chronic health conditions which can & are being minimized by access to & use of GBR resources (Hill & Lyons, 2014). **Coastal residents' wellbeing** • In 2013, 75% GBR coastal residents were very satisfied with GBR experiences (i.e. rating > 8/10). Greatest +ive influences were visual quality, weather, hospitality/company, habitat quality, & fish number. Greatest -ive influences were number of fish, habitat quality & weather. 80% GBR tourists were very satisfied with GBR experiences (8/10) Highest scores for sightseeing & photography (8.6), GBR seafood (8.5), wildlife watching (8.5), scuba diving (8.4), camping & hiking (8.3) & snorkelling (8.2). **Tourists' wellbeing** • Greatest positive influence on tourists' GBR experience were aesthetics, weather, GBR health, hospitality & wildlife; absence of crowding. Greatest negatives were bad weather & issues associated with tourism operators (e.g. service, cleanliness, cost). • In 2013, 74% intern'l & 57% domestic tourists came to the catchment because of the GBR, & rated overall satisfaction with GBR experiences as 8.4/10. (Marshall et al., 2013a). **Commercial fishers' wellbeing** • In 2013, the GBR contributed to quality of life & wellbeing of 90% Burnett-Mary Region fishers (Tobin et al., 2014). **Tourism Operators' wellbeing** • In 2013, 76% GBR tourism operators lived in the catchment because of the GBR (Marshall et al., 2013a).	access & enjoy the use of these resources. • Evidence suggests that the GBR plays an important role in the health & wellbeing of residents & visitors.	
CV5 Regional services & service infrastructure supporting the interface between the	• Energy/water security • Quality of infrastructure • Impacts on infrastructure • Perceptions of access to health, education, aged care & child care • Perceptions of access to roads & public transport	**Energy security** • Av. electricity bill for Qld residents will rise by 3.3% pa; & 4.1% for Qld small businesses (QCA 2017). **Quality of Infrastructure** • Limited capacity for infrastructure & services to meet current/future demand; quality of institutions could be improved; provision of reliable mobile, internet & digital comms varies across region (WBBROC 2016).	• Regional generally well serviced with human and physical infrastructure. • Region has many small centres & communities which can be difficult for infrastructure planning (WBBROC 2016).	**3.5** Region is reasonably well serviced by schools,

community & GBR		• Cherbourg's community has its own TAFE campus, community gardens, radio station, hospital, aged care facility & craft centre (WBBENRWG 2013) • Bundaberg, Maryborough, Hervey Bay, Gympie, Gayndah & Kingaroy have capacity to accommodate further growth using future planned infrastructure & existing networks. Projected growth can be mostly accommodated on land already zoned for urban & residential purposes (DLGP 2011). • Opportunities & challenges for infrastructure & service delivery in some coastal locations due to ageing population (Uni of Canberra 2017). **Impacts on infrastructure** • More extreme events with flooding will make communities more isolated & thus vulnerable based on current transportation infrastructure (State of Qld 2011). • After the 2011 floods infrastructure damage impacted commercial fishers' ability to get fish to market, & tourism operators were affected by damaged infrastructure – e.g. jetties, resorts, roads, rail & airports (Gooch et al 2013). • Cyclones & flooding impact unpredictably on fisheries & tourism. More extreme events with flooding will make communities more isolated & thus vulnerable based on current transportation infrastructure (State of Qld 2011). **Perceptions of good access to health, education, aged care & child care** • Bundaberg & Nth Burnett 57.6%; Fraser Coast & Gympie 67.8%; Sth Burnett & Cherbourg 37.7% c.w. 75% for both rural & regional Aust & rural & regional Qld (Uni of Canberra 2017). **Perceptions of good access to roads & public transport** • Bundaberg & Nth Burnett 37.4%; Fraser Coast & Gympie 50.1%; Sth Burnett & Cherbourg 25.3% c.w. 50.3% for rural & regional Aust & 53.9% rural & regional Qld (Uni of Canberra 2017).	• Sth Burnett & Cherbourg are consistently below the majority of remote & regional communities across Qld & Australia for perceptions of regional services; however Cherbourg has an active council promoting services & infrastructure projects for the community (WBBENRWG 2013). • Future challenges associated with urban expansion & ageing populations in some coastal communities require good planning & balancing trade-offs between expanding urban areas & public infrastructure needs with the sustainability of natural resources (WBBENRWG 2013). • All physical & social infrastructure can be severely damaged in extreme weather, leading to adverse impacts on GBR-dependent communities & industries	hospitals, road, rail, airports, water, gas, electricity, however there are some capacity issues & variation across the region in terms of quality. Challenges remain due to the number of small scattered communities across the region & expanding urban areas along the Fraser Coast & Gympie (WBBROC 2016).
Rating				**18**
Maximum for this Cluster				**25**

Cluster Three: Culture and heritage

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 Traditional Owner 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 4 major attributes associated with this cluster: World Heritage; Indigenous heritage; Contemporary culture; Historic maritime heritage.

Table 6: Culture and heritage

Attribute Component	Possible Pressure, State & Trend Indicators	Evidence	Conclusions	Proposed Value & Logic
CH1 World Heritage – underpinned by ecosystem health, biodiversity & water quality	• Regional natural assets • Perceptions of the GBR's natural beauty & other world heritage attributes • Impacts on GBR-Wide World Heritage values	**Regional natural assets** • Burnett-Mary Region's marine & coastal habitats contain globally significant natural heritage – 2 WHAs (Fraser Is & GBR); & the GSBR - which include turtle & seabird nesting & roost sites; coral spawning, migrating whales, fish spawning aggregations; superlative natural beauty above & below the water; & provides some of the most spectacular scenery on earth. (e.g. Fraser Coast & Fraser Is; Cap Bunkers; Swains Reefs) (Context, 2013; BMRG 2016). **Perceptions of natural beauty & other World Heritage attributes** • 95% value the GBR because it attracts people from all over the world & 93% value the GBR simply because it exists, even if they don't use or benefit from it (Marshall & Pert 2017). • 98% regional residents agree that the GBR's aesthetic beauty is outstanding & 93% value the GBR because it supports a variety of life, such as fish and corals; 95% B-M residents like the colour/clarity of water along the beaches in their region, however 75% feel there is too much rubbish on these beaches (Marshall & Pert 2017). **Impacts on GBR-Wide World Heritage values** • Hard coral cover increased from 32% in 2016 to 51.3% in 2017; trend in decline of seagrass meadows is reversing; & fish abundance is increasing (ABS 2017); so although inshore seagrass meadows and coral reefs continue to recover from previous losses due to major run-off events and	• Assessment & monitoring of OUV & aesthetics is a new field, & methods are being trialled now for application in the future. A staggering 98% of B-M residents are proud that the GBR is a WHA & believe it has outstanding aesthetic beauty Increase in hard coral cover & fish abundance & steady reversal of seagrass declines suggests this section of the GBR is recovering from previous flood & cyclone events. Nevertheless, climate change is predicted to increase the intensity of extreme weather events, which are significant in driving impacts to coastal and marine ecosystems (Waterhouse et al, 2017).	**4.5** Exceptionally high based on OUV of two WHAs & the GSBR. Regional has not been subject to significant bleaching, COTS and cyclonic events. Potentially threatened by coastal development & extreme weather events.

		cyclones, they remain in moderate to poor condition due to poor marine water quality associated with pollutant run-off from the adjacent catchments, especially during major floods (Waterhouse et al, 2017); (Coppo et al 2014). • Mid-shelf & outer shelf reefs in the southern GBR can rapidly recover from previous disturbances; however, a severe mass thermal coral bleaching event in 2016 resulted in significant coral mortality, especially north of Port Douglas (Waterhouse et al, 2017).		
CH2 Indigenous (Traditional Owner) heritage	• ID, state & trend of Indigenous heritage values. • TO management of GBR resources including number & strength of (i) TO connections with GBR resources incl. identification, protection & management of Indigenous cultural heritage in sea country; (ii) Partnerships, institutional arrangements & agreements between TOs & all GBR stakeholders; (iii) TO-driven frameworks & participatory monitoring methods • Levels of Traditional Owner satisfaction with: (i) Identification, documentation & storage of cultural information; (ii) Traditional Owner led methodologies; (iii) participation in GBR management; (iv) extent to which TEK is	**ID, state & trend of Indigenous heritage values** • 52% B-M residents agree that the GBR is important for Traditional or Cultural practices; & 74% value the GBR because of its rich Traditional Owner heritage (Marshall & Pert 2017). • Traditional Owners have observed impacts on Indigenous cultural integrity & heritage values from rising sea levels (e.g. fish traps in Girringun country are being affected (GBRMPA, 2014a). • GBRMPA is developing an Indigenous Heritage Strategy to improve understanding & protection of GBR Indigenous heritage values (GBRMPA, 2016a). • GBRMPA's FMP manages cultural & Indig. heritage on island national parks & Comm. Islands, including developing heritage management plans to protect significant sites & active maintenance & restoration at some locations (GBRMPA & QG, 2016). **TO management of GBR resources** *(i) TO connections* • TO aspirations for securing rights & managing GBR cultural value have been well defined over the past 20 years since Sea Forum (Dale et al., 2016b). *(ii) Partnerships, arrangements & agreements* • PCCC has a TUMRA Agreement with GBRMPA & MOU with QPWS. It is the largest TUMRA, lying across both GBR (20 000 km2) & GSS (6 000 km2). TUMRA has strengthened partnerships with government, community & industry & enabled several management initiatives to be completed (Gidarjil Development Corporation 2016). • About 8 TUMRAs cover 24.6% of the GBR – i.e. 45,200 km2 - & involve 16 Traditional Owner groups to address issues such as the sustainable take of culturally significant species, & supporting cultural practice in GBR	• Strong Traditional Owner use of sea country resources remains across the region, & this is beginning to be qualified & quantified. • There is an increasing capacity of Indigenous land & sea institutions, but much work needs to be done to progress rights & to substantively progress country based planning, strategy development & implementation. • Better supporting Indigenous peoples to document & share TEK is a first step to the bigger challenge of engaging with Indigenous processes of knowing about environmental change (Hill & Lyons, 2014).	**3** Strong Traditional Owner use of land & sea country resources remains across the region Capacities of land & sea institutions & formal agreements for managing use have improved dramatically over the past decade but generally continue to have capacity concerns.

	identified, maintained & transferred. • Levels of TO use & dependency on the GBR	conservation & management. The agreements incorporate traditional & contemporary scientific knowledge for GBR management (GBRMPA, 2016a). • GBRMPA is developing cultural protocols to guide management of Indigenous heritage & is partnering with Traditional Owners to determine how to store, handle & manage Indigenous knowledge appropriately (GBRMPA, 2016a). • GBRMPA has prepared draft guidelines for Traditional Owner heritage impact assessment in the permission system (GBRMPA, 2016a). *(iii) TO-driven frameworks & participatory monitoring methods* • PCCC TUMRA has a training Centre to help TOs build a science knowledge base to complement TEK & better understand impacts on Sea Country & how they can be slowed or stopped into the future (Gidarjil Development Corporation 2016). **Traditional Owner satisfaction with GBR management** • Insufficient data currently exists. **TO use & dependency on the GBR** • Insufficient data currently exists.		
CH3 Contemporary culture associated with the GBR	• Place attachment, identity, • GBR as culture – levels of pride, inspiration & personal connection to the GBR • National connections to the GBR	**General regional place attachment** *% **disagreement** with: 'I like the environment & surrounds I live in':* • Bundaberg & Nth Burnett 1.2%; Fraser Coast & Gympie 2.7%; Sth Burnett & Cherbourg 13.6% c.w. 4.2% for rural & regional Aust & 5.3% rural & regional Qld (Uni of Canberra 2017). **GBR as 'culture'** • 60% B-M residents see the GBR as an important part of their culture; 80% love living beside the GBR; 98% B-M residents are proud the GBR is a World Heritage Area; 73% agree that the GBR is part of their identity;& 55% value the GBR because it is spiritually important to them (Marshall & Pert 2017). • On average, GBR catchment residents had lived in the catchment for 20.7 years. 66% indicated there are "not many other places better than the GBR for recreation activities they enjoy". 94% "feel proud that the GBR is a WHA". 64% believe "the GBR is part of my identity". 41% live in the catchment because of the GBR. Strongest GBR values for	• Major differences between coastal LGAs & the inland LGAs of South Burnett & Cherbourg, suggesting much greater place attachment & pride associated with coastal & marine environments of the southern GBR & Great Sandy Strait. • GBR values are deeply reflected in contemporary national culture.	**4** There is a high level of contemporary cultural integrity in relation to the GBR.

		residents were: aesthetic beauty (9.1/10); biodiversity 9.1; WH status, 9.0; economic values 8.9; scientific & education 8.5; & lifestyle 8.5 (Marshall et al., 2013a). **National Connections to the GBR** • In 2013, 93% Australians described the GBR as inspiring, 46% believed it is the most inspiring natural icon in Australia; 82% had positive associations with the GBR; 84% were proud the GBR is a WHA; 64% saw the GBR as part of their identity (Marshall et al., 2013a).		
CH4 Historic maritime heritage (since European settlement)	Identification, protection & management of historic heritage in GBR environments • Cultural significance of historic heritage values for the GBR.	• 2014 *National Trust of Qld Heritage Award* for FCRC & Converge Heritage & community's conservation & management of 8 heritage sites across Maryborough (Converge Heritage 2014). • Across the GBR > 800 historic shipwrecks, but only ~ 40 located & ~ 20 positively identified; conservation management plans exist for 6 under the Historic Shipwreck Act 1976 (GBRMPA, 2017c; P. Illidge, pers. comm). • Historic sites are under pressure from natural threats (cyclones, sediment erosion), vessel anchoring, & pilfering (GBRMPA, 2017c; P. Illidge, pers. comm). • Obligations under Reef 2050 Plan e.g. Action HA 11 not being met (P. Illidge, pers. comm). • GBRMPA is developing a Heritage Strategy to better understand & protect GBR Indigenous & historic heritage values (GBRMPA, 2016a). • GBRMPA has prepared draft guidelines for Historic heritage impact assessment in the permission system (GBRMPA, 2017d, 2017e) • Lady Elliot Island light station is monitored annually & has an historic heritage management plan (DSDIP 2013). • When sea level was much lower, Indigenous people walked across the land (now the GBR) leaving evidence of their passing. Many archaeological sites exist, both under sea & on islands, but knowledge is scattered & not well documented (P. Illidge, pers. com.)	• Many historical sites within the Maryborough district are well managed & maintained • Key historical maritime heritage assets tend to be considered & managed by a disparate range of institutions & agencies (e.g. historical societies, QPWS, Indigenous Land & Sea Institutions, etc.). • Very fragmented knowledge of maritime historical heritage, but there is an important set of values & assets.	**3** While there is a strong historical heritage asset across the GBR coast, & sites within the catchment are well managed, the *maritime* components remain poorly defined, planned & managed. This value is higher than other GBR catchment regions due to work of FCRC & others in managing historic assets.
Rating				**14.5**
Maximum for this Attribute				**20**

Cluster Four: Economic values

This includes the monetary advantages that people derive directly or indirectly from a healthy and well-managed Great Barrier Reef. Fundamental to this cluster is the premise that economic activities within the Great Barrier Reef World Heritage Area 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. These industries generate income and employment for thousands of people in coastal communities near the Great Barrier Reef, and beyond. The GBR tourism industry generates and collects the Environmental Management Charge which directly benefits GBR Marine Park management, which has flow on benefits to the broader community and society. 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 and port development.

Table 7: Economic values

Attribute Component	Possible Pressure, State & Trend Indicators	Evidence	Conclusions	Proposed Value & Logic
EV1 Size & diversity of regional economic growth	• Regional Product (GRP) • Core industries	**Gross Regional Product** • Core Industries include horticulture, livestock, sugar cane, timber, tourism, transport & equipment prod'n, food & beverages, health care & social assistance, aviation & marine; mineral & extractive resource industries (WBBROC 2013; DSD 2015; RDA 2016). • In 2015-16 regional GRP was $11.96B, growing 0.1% since 2014-15 (3% State's GSP) (RDA 2016). • In 2015–16, GVP for regional agric. was $1.4B = 11% total GVP for Qld ($13.2B) & an increase from $1.056B in 2010-11 (ABARES 2017; RDA 2016). • Most important ag commodities based on GVP were cattle & calves ($396M), sugarcane ($137M) mandarins ($114M). • Beef cattle (2,348 farms) comprise 58% of all farms in the region & 19% of all Qld beef farms (ABARES 2017). • 378 cane farms comprise 9.4% all farms in the region & 12.7% of all Qld cane farms (ABARES 2017). • In 2015–16 the region produced 100% ($500,000) of Qld's lentils (ABARES 2017). • There are several regional limestone & nickel mines, quarries & sand extraction (Waterhouse, Flint & Johnson, 2016; WBBROC 2016).	• The region's GVP for agriculture is based on a diverse & profitable agricultural sector, which is increasing steadily. • Mining & minerals play a much smaller role in this region compared with others in the GBR catchment	**4** Regional economics not so subject to commodity and tourism market changes, compared with other regions in the catchment.

EV2 Economic viability of *Reef-associated industries* [2]	• Mining & minerals • Ports & shipping • Agriculture • Urban	• Significant GRP contributor with potential for growth in intensive livestock production & horticulture – both with positive demand trends (WBBROC 2016). • Ag. land is in demand; value rising by 10.3% around Bundaberg; 8.9% Nth Burnett, Gympie 6.4% (Goetze 2017). • A significant threat to the region's ability to produce food & fibre is the irreversible loss of ag. land for other purposes (e.g. urban expansion) (WBBENRWG 2013). • Mineral & coal exploration & interest in UCG, CSG & geothermal energy increasing (WBBROC 2016).	• Ag land is increasing in value • Intensification of agriculture will likely place pressure on marine & coastal areas through changes in water availability & water quality associated with increased chemical use. • The Region has very few active mines, however, many mining & mineral activities planned, each with its own set of potential impacts including impacts on waterways that flow to the sea (WBBEC 2017).	**3.5** Significant current contribution by the agricultural and urban development sectors. Service sector industries could continue to grow.
EV3 Economic viability of *Reef-dependent industries*[3]	• Vulnerability of GBR-dependent industries • Adaptive capacity of GBR-dependent industries • Economic viability of GBR-tourism • Economic viability of GBR-commercial fishing	**Vulnerability & adaptive capacity of GBR dependent industries** • 98% regional residents feel the GBR is a valuable asset for the B-M regional economy (Marshall & Pert 2017).however, GBR tourism, recreation & fishing industries remain specifically vulnerable to the impacts of the Global Financial Crisis (GFC) & repeated large weather events (Marshall et al., 2013a; 2013b). In particular, fishers & tourism operators are sensitive to changes in GBR condition (Marshall et al., 2013a; 2013b). • GBR tourism operators & commercial fishers with comparatively smaller businesses, higher levels of occupational identity, place attachment, formal networks, & strategic approaches have higher levels of adaptive capacity (i.e. sensitivity to change may be offset by adaptive capacity & improved skills levels) (Marshall et al., 2013a). • Need to re-skill & provide assistance to develop business plans to help the commercial fishing industry cope with change & be resilient (Sutton, Lédée, Tobin, & De Freitas, 2010) **Economic viability** *Tourism*	• Value of regional tourism has fluctuated since 2008- 2009 – perhaps reflecting floods & other extreme weather events; impact of the GFC in 2007-08; & more recently the sinking of the tourist vessel *Spirit of 1770* in 2016. • Value of GBR fisheries has increased between 2013 & 2016.	**3.5** This section of the GBR is in better condition that other sections, recovering from previous flood & cyclone events. Value of commercial fishing has increased in recent years, against the trend for other GBR sections.

[2] *Reef-associated industries* are those which do not depend on the health of the GBR but which may have an impact on GBR health (e.g. urban industries in catchment cities & towns; agricultural industries in GBR catchments; ports & shipping).
[3] *Reef-dependent industries/activities* are those which depend on healthy GBR ecosystems for their prosperity– e.g commercial fishing, marine tourism, recreation, GBR-related research Traditional Owner use of GBR resources.

		• In 2015-16 the Burnett-Mary Region generated some $ 911M in tourism revenue & $11M in recreation (DAE 2017). • Tourism expenditure has fluctuated from $1,066.6M in 2007-08 up to $1,338.1M in 2011-12; then down to $1,128.7 in 2013-14; $1,288.1 in 2014-15 & $1,245.0 in 2015-16 (ABS, 2017). • In May 2016, the *Spirit of 1770* – tourist vessel - caught fire & sank while returning from a trip to Lady Musgrave Is (LMI). No fatalities or major injuries, but since it sank, resorts & hotels in 1770 have had a massive drop in tourist numbers & length of visit. A much smaller boat still goes to LMI, but the town needs a replacement for the *Spirit of 1770* (Cansdale, 2017). *Fishing* • 107/1060 GBR regional commercial fishing licences; 82 active; 97% owner-operators; 33% travel > 100km from port. Household financial dependency on fishing is high. It is an aging industry. Most operate in one fishery type only (Tobin, 2014). • Value of GBR commercial fishing in the Region increased from $5.7M in 2011-12 to $15M in 2015-16 (DAE 2013; 2017) • Between 2001 & 2016 fishing decreased in value across the whole GBR by 46% (i.e. from $190M to $104M). Physical production dropped 46% (15,341 tonnes to 8,259 tonnes). Licence numbers & fishing effort also decreased, by 52% & 45% respectively (ABS, 2017).		
EV4 Inclusive-ness & economic fairness/ equity	• Income – personal & household • Opportunities for GBR Traditional Owners • Equity between Reef-dependent industries/activities	**Regional Income** • In 2016, 55.3% of Burnett-Mary Region residents were in the most disadvantaged quintile; median personal income was $24,897p.a., (Cherbourg had $16,380 p.a.) c.w. $34,320 p.a. for Qld; 35% people earned < $20,800pa;(28.4% State-wide); 3.1% earned > $104,000 c.w. 7.1% for Qld. (QGSO, 2017a). **Opportunities for GBR Traditional Owners** • Aboriginal participation in GBR tourism is very low, as measured by ads in local tourism trade literature (DAE, 2017). **Equity between Reef-dependent industries/activities** • Only 57% commercial fishers in the Region believe they have fair access to GBR resources (Tobin et al, 2014). • Commercial fishers feel under increased pressure for GBR access from recreational fishers, conservation based	• Regional personal income is below the State average, particularly in the Aboriginal community of Cherbourg. • Some evidence reflecting inequities between commercial fishers & other GBR users	**3** Could be improved through higher education/ training opportunities for youth & 'closing the gap' strategies for Aboriginal residents.

		closures, & coastal development that impact where vessels may operate (Pascoe et al., 2016). • QDAF's 2014 harvest strategy allows coral trout stock recovery, but reduces annual commercial catch. Catch taken by recreational fishers may be hindering stock recovery (Tobin et al., 2016).		
EV5 Workforce participation & employment	• Regional employment participation rates & trends • GBR- related employment	• In 2011, 14.0% employed persons were in health care & social assistance; 12.3% in retail trade; highest specialisation ratio of 3.06 in ag. forestry, fishing (QGSO, 2017a). • Region has 5% total Qld employment; 20% in ag, forestry & fishing (ABARES 2017). • Health care & social assistance is largest employment sector, followed by retail trade. Ag, forestry & fishing is 3rd largest sector. Other important employment sectors were accommodation & food services, education & training, & construction (ABARES 2017). • Unemployment in Burnett-Mary was 9.5% c.w. 6.2% across Qld. Cherbourg had the highest unemployment rate of 12.7%; North Burnett had lowest of 5.1% (QGSO, 2017a). • Regional workforce participation 48.2% 2014-15 c.w 65.5% for Qld; youth unemployment rate has increased in recent years to be 20.6% in 2016 > State av. of 13.2% (WBBROC 2016). **GBR- Related Employment** • In 2015-16 there were 78 people directly employed in GBR commercial fishing (c.w 33 in 2011-12) & 2,192 employed in tourism in the Burnett-Mary Region (c.w 3,563 in 2011-12) (DAE 2013, 2017).	• Regional & youth unemployment is > Qld average & ageing populations in coastal centres are more likely to be retired or heading towards retirement. • Number of people employed in GBR commercial fishing more than doubled from 33 in 2011-12 to 78 in 2015-16. • This trend is reversed for GBR tourism which saw a decline in numbers of people employed over the same period (from 3,563 to 2,192); but the value of tourism has remained steady over the same period.	**3** Unemployment is higher than the State average for most sectors/ groups, however numbers employed in the fishing industry has increased in recent years – from 33 to 78 (very small numbers)
EV6 Economic confidence in the Region	• Regional economic confidence • Confidence in GBR industries	**Regional Economic Confidence** • According to TIQ this region had the highest number of client registrations & success results across Qld. This reinforces an increasing level of business confidence in the region (WBBROC 2016). • An emerging mining industry & more effective utilisation of PoB have been tipped as key economic opportunities (DSD 2015). • Industrial, retail & other commercial activity is largely subdued (QDNRM 2016) • However value of ag. land has soared in recent months (Goetze 2017). • Coastal house values remain mostly static while hinterland areas are static to falling, due to local economies (QDNRM 2016).	• Housing market in coastal areas is slowly recovering from a sharp decline after the 2011 floods (WBBROC 2016); however many rural areas are static or in decline (QDNRM 2016). • Regional economic confidence is generally subdued, although agricultural land is increasing in value • Region faces many economic barriers & challenges such as high unemployment; youth retention,	**3.5** Consumer confidence is generally subdued, however the agricultural sector is thriving & the region is strategically located

		• Bundaberg median house price went from ~ $261,000 in 2010 (pre-2011 floods) to ~ $235,000 in 2016; climbing steadily to pre-flood levels (REA Group Ltd 2017a), • Gympie median house price went from $235,000 to $245,000 bet. 2011-16. • Maryborough median house price went from $225,000 to $194,000 bet. 2011-16. • South Burnett house prices continue to weaken since 2015. Median value in Kingaroy is $65 000 & $34 500 in Murgon (QDNRM 2016). • Farming & rural residential values largely unchanged around major centres, but minor falls in some western & southern areas. Sth Burnett farm values are steady; but rural homesite values fell in parts of Wondai & Nanango (QDNRM 2016). **Barriers to confidence** • Access to skilled workforce & mentoring support; access to finance; reduced ability to attract investors; ability for infrastructure & services to meet current/future demand; quality of institutions in the region (e.g. gov. agencies, universities); Readiness of business to take up new technology (WEBBROC 2016). **Confidence in GBR-Tourism** • 26% GBR tourism operators think "the GBR areas that my operation uses are not in great condition"; 24% are not optimistic about the future of their business in the GBR; 43% are "confident things will turn out well for them, regardless of future events; 39% are "uncertain how to plan for changes in the GBR" but 59% have planned for their financial security (Marshall et al., 2013a). **Confidence in GBR-Fisheries** • 71% Burnett-Mary Region GBR comm. fishers are optimistic about the GBR's future, but only 41% are optimistic about the future of their business in the GBR (Tobin, 2014). • Across the whole marine park, 71% commercial fishers are optimistic about the GBR's future, but only 52% are optimistic about the future of their business in the GBR. They scored 5.4/10 in their belief that things will turn out well for them in future. 6.2/10 are uncertain of how to plan for change. They are more likely to adapt than other coastal residents (7.4) & many plan for their financial security (6.7). Many are keen to learn how to better prepare for change (6.7) (Marshall et al., 2013a).	ageing population & low workforce participation rates (WEBBROC 2016) • Reef-dependent industries are optimistic about the future of the GBR, but this does not always extend to confidence in the viability of their own businesses.	between SEQ & industrial hub of Gladstone & close to the Surat Basin (WBBROC 2016).

Rating	**20.5**
Maximum for this Cluster	**30**

Cluster Five: Governance

Governance refers to 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.

Table 8: Governance

Attribute Component	Possible Pressure, State & Trend Indicators	Evidence	Conclusions	Proposed Value & Logic
G1 Strategic focus of governance system.	• No./ type of opportunities for improved Reef 2050 Plan Governance • No./ severity of system-wide problems for delivery of key Reef 2050 Plan targets.	**No./ type of opportunities for improved Reef 2050 Plan** • The Reef 2050 Plan represents the one fully integrated, bilaterally agreed strategy concerning the future health of the GBR. The Reef 2050 Plan exists in a first phase development form with clear (but not yet highly robust) targets but also with more limited strategy development (Commonwealth of Australia, 2015). • This Plan includes ongoing management of the GBR World Heritage Values & the strategic improvement of water quality flowing into the Reef lagoon. **No./ severity of system-wide problems for delivery of key Reef 2050 Plan targets** • Basic core delivery mechanisms, particularly at catchment scale are operational & in place across most GBR catchments (e.g. Regional NRM, WQIPs, Land Use Plans, PMPs/BMPs etc). (Dale et al, 2016c) • Strong foundations exist (via the RIMReP framework) & are developing for monitoring GBR health & water quality. Human dimension monitoring arrangements are just emerging. Outlook reporting presents a five year formalised opportunity for review (Gooch et al 2017; Dale et al, 2016c).	• Clear strategic planning & coordination frameworks for planning & action in relation to management of the Marine Park & water quality improvement are emerging at GBR, regional level, catchment & property scales. • Frameworks for monitoring, evaluation & review are emerging in the RIMReP & outlook context. These arrangements are increasingly looking towards inclusion of the human dimensions of the GBR asset. There is a lack, however, of a clear future strategic land use framework (& associated focus on management actions. • There is no cohesive framework for managing future land use & associated management actions in the Burnett-Mary context.	**3.5** Basic GBR-wide & bilateral strategic planning framework is in place via the *Reef 2050 Plan* & possible implementation strategies & institutional arrangements exist at all required scales for delivery.
G2 Connectivity within & between key decision making	• No./ type governance subdomains (or policy areas) that counteract Reef 2050 Plan targets/action	**No./ type governance subdomains (or policy areas) that counteract Reef 2050 Plan targets/actions** • At least 5 non-GBR governance subdomains have been identified as negatively impacting of GBR health (in broader social, economic & environmental terms) (Dale et al, 2016c) **Status of partnerships, inter-governmental arrangements**	There is a significant ongoing likelihood of decline in GBR health as a result of poor connectivity among key governance subdomains affecting GBR outcomes (e.g.	**3.5**

institutions & sectors.	• Status of partnerships, inter-governmental arrangements • Levels of transparency, ownership, accountability, responsiveness • Sectoral/community contributions to decision-making • Inter-generational equity in Reef-related decision-making • Intra-generational equity in Reef-related decision-making	- Refer back to CH2 • The commissioning of new coal mines such as that planned for the Galilee Basin, & the pursuit of polluting & expensive "clean coal" projects & new gas plants, is completely at odds with protecting the GBR & other reefs globally (Hughes et al., 2017). • Commercial fishers are under increased pressure for GBR access from recreational fishers, conservation based closures, & onshore activities (e.g. coastal development) that impact where vessels may operate (Pascoe et al., 2016). **Levels of transparency, ownership, accountability, responsiveness** • Connectivity between the Reef 2050 Plan governance subdomain & other key subdomains negatively influencing GBR outcomes is poor (most notably the climate change & greenhouse gas abatement subdomain (Dale et al., 2016c). **Inter-generational equity in Reef-related decision-making** • Only 33% B-M residents feel that future generations have been adequately considered in GBR management (Marshall & Pert 2017) **Intra-generational equity in Reef-related decision-making** • Only 51% regional residents agree that they have fair access to the GBR compared to other user groups (Marshall & Pert 2017); while 57% B-M commercial fishers believe they have fair access to GBR resources (Tobin et al., 2014).	greenhouse gas abatement) & the risk of implementation failure related to the catchment-based delivery of Burnett-Mary Region actions envisaged under the *Reef 2050 Plan*. However proximity to SEQ results in stronger connectivity between regional and State-wide decision-makers.	
G3 Adaptive governance capacity of key decision making institutions & sectors.	• Levels of integrated strategy development & delivery design • Support for management • Confidence in management • Sectoral/community contributions to decision-making	**Levels of integrated strategy development & delivery design** • Within the context of the Reef 2050 Plan, capacity in integrated strategy development & delivery design in both federal & state policy building institutions is currently limited. • Required catchment scale institutions to improve water quality & reef protection & management action exist but face unstable statutory recognition with respect to these role & lack stable resourcing (Dale et al 2016c). **Support for management** • 71% regional residents support current rules and regulations that affect GBR access & use; 83% support rules & regulations that affect access & use of local freshwater areas (Marshall & Pert 2017). **Confidence in management** • Only 24% B-M residents think enough is being done to effectively manage the GBR & 55% are confident that the GBR is well managed; 45% are confident that local freshwater areas are well managed (Marshall & Pert 2017). **Sectoral/community contributions to decision-making** • Traditional Owners are routinely marginalised in development of policy & delivery systems (Dale et al, 2016a).	• Policy making capacities limited in regard to designing effective delivery systems, risking implementation failure. • Local residents are not confident that the GBR is well managed, and do not believe enough is being done to effectively manage the asset. More than half, however believe they can contribute to management.	**2.5** All required institutional actors play an important role in GBR governance, but capacities are limited across government, industry, community & Indigenous sectors.

		• 57% regional residents feel like they can contribute to GBR management (Marshall & Pert 2017).		
G4 Adaptive use & management of integrated knowledge sets.	• Availability of integrated knowledge sets • Use of integrated knowledge sets in decision-making • Management of integrated knowledge sets.	• Despite some progress, recognition of Traditional Knowledge, as opposed to working within a western scientific framework needs to be embedded in GBR management agencies (Grant, 2012). • Core biophysical knowledges concerning marine & catchment science are strong. • Across the GBR, traditional & historical knowledge sets remain strong but in decline. • Decision support models & prioritisation tools are relatively advanced in the GBR. • Funding through Reef & Rainforest Research Centre (RRRC) has returned to regional design & implementation but remains poorly linked to state-based scientific investment & effort (Dale et al, 2016c).	• Strong biophysical science capacity & decision support tools exist in both the marine & catchment space. • Limited social & economic knowledge is levered within GBR decision making systems. • Declining health in historical & traditional knowledge sets, in part because of resource limitations facing Traditional Owner land & sea institutions.	**3.5** Biophysical knowledges are generally strong across the marine & catchment space, though social & economic sciences are not developed enough to deliver truly integrated knowledge to make sound decisions.
Rating				**13**
Maximum for this Attribute				**20**

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ATTACHMENT A

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.[1,2,3]

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.[3]

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.[3] 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)[1], 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.[4] The health benefits people derive from the Marine Park are diminished

[4] 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.* Vol 15, Issue 3, pp 880–887. https://doi.org/10.1016/j.healthplace.2009.02.011

by those impacts that make the Marine Park a less attractive and fulfilling place to 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'.[4] 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.[5] 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 2014 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.[4] 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 needs[5]. 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 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

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[5] GH, Brundtland, and World Commission on Environment and Development. (1987). *Our Common Future: Report of the World Commission on Environment and Development*. Oxford University,

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 2012 was estimated to be $5.6 billion. This has been relatively stable over the past five years.[6] Commercial marine tourism is a major use of the Marine Park, both in terms of economic value and employment. It is estimated that, in 2011–12, Great Barrier Reef-based tourism contributed approximately $5.2 billion to the Australian economy and supported employment equivalent to about 69,000 full-time positions.[6] 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. 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 nutrient.

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, lightstations, 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

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