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Changes among coastal residents of the Great Barrier Reef region from 2013 to 2017

a report from the Social and Economic Long-Term Monitoring Program (SELTMP)

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Report prepared for the ***Great Barrier Reef Marine Park Authority***, May 2019

ISBN: 978-1-4863-1243-6

Citation

Marshall, N.A. and Curnock, M.I. (2019). Changes among coastal residents of the Great Barrier Reef region from 2013 to 2017: a report from the Social and Economic Long-Term Monitoring Program (SELTMP). Report prepared for the Great Barrier Reef Marine Park Authority. CSIRO Land and Water, Townsville [online].

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Important disclaimer

This project has been jointly funded by CSIRO, and the Australian and Queensland governments as part of the Reef 2050 Integrated Monitoring and Reporting Program. We also thank Jeremy Goldberg, Petina Pert, Lauric Thiault, Lucy Callan, Genevieve Williams, our team of survey staff & volunteers, our CSIRO and GBRMPA reviewers, and staff from the Great Barrier Reef Marine Park Authority for their advice and support.

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Executive summary

The Social and Economic Long Term Monitoring Program (SELTMP) forms an integral part of the Reef 2050 Integrated Monitoring and Reporting Program (RIMReP), providing primary data for a range of human dimension indicators that are necessary to evaluate progress towards the objectives of four themes within the *Reef 2050 Long Term Sustainability Plan* (Commonwealth of Australia 2015; 2018). The purpose of this report is to present the differences in the responses of local residents of the Great Barrier Reef (GBR) coastal region (defined as the GBR catchment, bounded by Bundaberg in the south, Cape York in the north and the Great Dividing Range in the west) to survey questions presented to them in 2013 and 2017.

The report forms part of a series, describing and comparing the state of key characteristics of GBR-dependent industries and communities within the Great Barrier Reef region, including local residents, commercial fishers, tourists, and marine tourism operators.

In this report, only a limited number of survey questions are directly compared between sampling periods, due to 2017 survey questions being refined to address future reporting needs of the *Reef 2050 Long Term Sustainability Plan*. It is anticipated that more comparisons and longitudinal insights will be possible in the next reporting period. The complete results (mean scores ± standard error for all survey questions, including both 2013 and 2017 surveys) are summarised in tabular form in Appendix A, and these indicators will form the basis for future longitudinal trend analyses.

Results in this report (and the report series) should be considered in the context of key events (environmental, social and economic) that occurred over the 2013-2017 period. Notably, between these sampling points, unprecedented coral bleaching events over the summers of both 2016 and 2017 affected much of the northern half of the GBR Marine Park (Great Barrier Reef Marine Park Authority 2017a; 2018). In addition, in March 2017, Severe Tropical Cyclone Debbie impacted built infrastructure, islands and coral reef habitats in the Whitsundays region (Great Barrier Reef Marine Park Authority 2018). Media reports associated with these events was sensationalised and extensive (Eagle et al., 2018), and combined with the personal experiences of local communities, will undoubtedly have had some influence on the responses of SELMTP survey participants.

In early 2018, the RIMReP Human Dimensions Expert Group, proposed that indicators for monitoring the human dimension of the region be organised into five clusters: Aspirations, Capacity and Stewardship, Community Vitality, Culture and Heritage, Economic Values and Governance (Gooch et al., 2018). Within this framework, key findings from this report include:

- **Aspirations, capacity and stewardship**. The results below show a significant increase in residents' ratings for indicators of stewardship sentiment (i.e. willingness to act to protect the GBR), and a corresponding decline in ratings for indicators of self-efficacy (i.e. perceptions of one's ability to succeed in protecting the GBR). These results are consistent with those reported for tourists in the GBR region (cf. Curnock & Marshall 2019), and when considered in combination with significant increases in residents' ratings for place values associated with the GBR, indicate a widespread expression of public sentiment for the Reef

in response to the major biophysical disturbances reported over 2016 and 2017. Perceptions of the major threats to the GBR also changed substantially from 2013 to 2017; in which *pollution* and *climate change* became the most frequently cited threats. An increased proportion of residents indicated the belief that "climate change is an immediate threat requiring action" (up from 53% of respondents in 2013 to 68% in 2017).

- **Community vitality**. Indicators of community vitality associated with the GBR included some mixed results, with small but statistically significant increases in ratings for *GBR pride*, *GBR identity* and *wellbeing* derived from the GBR. Concomitantly, there were declines in ratings for aesthetic perceptions of the GBR, and for optimism for the Reef's future.
- **Culture and heritage**. Since 2013, stated cultural values associated with the GBR increased significantly among residents, including ratings of the GBR's economic value, biodiversity, and international icon value; however, stated values associated with lifestyle and food provisioning (i.e. fresh seafood) decreased.
- **Governance**. Indicators relevant to governance and management effectiveness received significantly lower ratings in 2017 than in 2013. Local residents of the GBR coastal region indicated lower levels of confidence that the GBR is well managed; lower levels of support for rules and regulations that affect access and use of the GBR, and perceptions of less fair access to the GBR compared to other user groups. Ratings of trust in different institutions (for information about the GBR) varied slightly from 2013, with the most notable difference being a decline in trust in the news media.

These results, including the complete summary of all SELTMP survey questions presented in Appendix A, provide important insights for understanding the state and trends in values, perceptions, attitudes and resource dependency of local residents of the GBR coastal region. Future iterations of data collection will become increasingly valuable for Reef managers and decision makers, as coastal communities respond and adapt to environmental and societal change.

Introduction

The need to incorporate social, cultural and economic data into environmental management is increasingly recognised as critical for achieving conservation and sustainable human use goals (Adger 2000; Gooch et al., 2017). This is particularly pertinent where natural resources are degrading and the role of natural resource managers is broadening to include managing for human wellbeing. The Great Barrier Reef (GBR) is one such example; it is heavily depended upon by people for a range of benefits, yet it is experiencing concerning ecological declines (Great Barrier Reef Marine Park Authority 2009; 2014a). Since the last decade the GBR is threatened most significantly by climate change, poor water quality from land-based runoff, coastal development, and some remaining impacts from fishing (Great Barrier Reef Marine Park Authority 2009; 2014a). Over the summers of 2016 and 2017, the GBR experienced sequential mass coral bleaching events at an unprecedented scale, leaving a substantial impact on coral communities across the northern half of the Marine Park (Great Barrier Reef Marine Park Authority 2017a; 2018). In addition, in March 2017, Severe Tropical Cyclone Debbie impacted built infrastructure, islands and coral reef habitats in the Whitsundays region (Great Barrier Reef Marine Park Authority 2018). Despite these impacts, the GBR remains one of best managed, most intact and resilient coral reef ecosystems on the planet (Great Barrier Reef Marine Park Authority 2017b). Understanding the responses of local residents to these events, and more broadly understanding the dynamic relationship that local residents have with the Great Barrier Reef is critical if coral reef managers are to ensure that the GBR continues to deliver essential ecosystem and cultural services.

The recent development of the Reef 2050 Integrated Monitoring and Reporting Program (RIMReP) provides the unprecedented opportunity to integrate human dimensions with other monitoring in the GBR, to enhance our system understanding and guide tactical and strategic management decisions in an era of rapid environmental and societal change. The Social and Economic Long Term Monitoring Program (SELTMP) for the GBR describes some of the conditions and trends of the human dimension of the GBR social-ecological system. Designed for long-term monitoring of key indicators relevant to the *Reef 2050 Long-Term Sustainability Plan* (Commonwealth of Australia 2015; 2018), SELTMP provides valuable insights to assist day-to-day management of the GBR, as well as planning for the future of GBR-dependent and GBR-associated industries and communities in the face of environmental and societal challenges and drivers of change. These drivers, which include climate change; population growth; economic growth; technological development; societal attitudes; and governance, have direct and indirect effects on human activities and pressures exerted on the GBR (Great Barrier Reef Marine Park Authority 2014b). The state of the GBR, in turn, directly and indirectly affects the wellbeing of people and communities who depend on it, or are associated with it, and/or value it (Marshall et al., 2016; 2017).

This report forms part of series that builds on the baseline of SELTMP reports over 2011-2014, available at https://seltmp.eatlas.org.au/seltmp, which provided the first quantitative snapshots describing how people interact with the GBR, how they value it, perceive it and are likely to respond to environmental and social changes. Following an extensive consultative process to identify knowledge gaps and prioritise human dimension monitoring needs (outlined in Marshall et al., 2014) the first iteration of SELTMP primary data collection commenced in 2013. The large-

scale surveys were conducted at 14 coastal centres along the GBR coast, from Cooktown to Bundaberg, and involved more than 6,300 participants, including commercial fishers, tourism operators, tourists and local residents of the GBR coastal region. In addition 2,000 Australian residents were surveyed online as part of a geographically and demographically representative sample of the Australian population. Our second sampling period occurred in mid-2017, involving more than 3,900 participants across the GBR region representing the same groups.

Recommendations from the RIMReP Human Dimensions Expert Group included biennial SELTMP sampling (Gooch et al., 2018), which would enable correlations and potentially predictive modelling of human-environment responses to significant environmental and/or societal events (e.g. major disturbances like a mass coral bleaching event) through detailed analyses and synthesis in alternate years.

A number of peer-reviewed scientific papers using SELTMP data are currently available, which validate SELTMP's conceptual design (e.g. Marshall et al., 2016; Marshall et al., 2018b; Gooch et al., 2017) and reveal new insights into people's values and attachment to the GBR (e.g. Goldberg et al., 2016; Gurney et al., 2017, Marshall et al. 2018b), their perceptions of its management and institutional trust (e.g. Turner et al., 2016; MacKeracher et al., 2018), their vulnerability and dependence on the GBR (e.g. Marshall et al., 2017), and responses to climate change (e.g. Goldberg et al., 2018; Marshall et al., 2019; Curnock et al., in review). As longer-term data and knowledge are accumulated over time, the value of SELTMP to GBR managers and the Australian public will grow.

Survey data from SELTMP are made publicly available online via https://doi.org/10.25919/5c74c7a7965dc and can be analysed for myriad purposes. SELTMP 2017 data can also be interrogated through several PowerBI™ online dashboards (https://research.csiro.au/seltmp/).

Methods

Surveys involved face-to-face interviews with local residents of the GBR coastal region (defined as the GBR World Heritage Area and Marine Park, together with the GBR catchment, bounded by Bundaberg in the south, Cape York in the north and the Great Dividing Range in the west) between June and August in both 2013 and 2017. The surveys were conducted at regional population centres including Cairns, Mission Beach, Ingham, Townsville, Airlie Beach, Mackay, Yeppoon, Gladstone and Bundaberg, in locations such as public beaches, boat ramps, jetties, parks, shopping centres, caravan parks, markets, and on a limited number of GBR tourism vessels. Responses to interview questions were entered in situ into an iPad, using the iSurvey application.

Survey questions are provided in Appendix A, and a detailed description of the survey design (as well as data collection methods) is reported in the SELTMP 2017 Final Report to GBRMPA (Marshall et al., 2018a), as well as in the SELTMP 2014 report on coastal residents in the GBR (Bohensky et al., 2013). We adopted the same method for data collection in 2017 as employed in 2013. Temporal and financial resources available to conduct surveys in 2017 were slightly less than those in 2013; however, sufficient sample sizes were achieved, enabling robust statistical analyses to be conducted.

In 2013 a total of 3181 people completed the survey, and in 2017 a sample of 1934 respondents was achieved. A description of the GBR region coastal resident samples (comparing 2013 and 2017) is provided in Table 1.

Analysis and presentation of results

Numeric data were analysed using MS Excel and SPSS statistics software. Most of the results below show comparisons of mean ratings from scaled response questions (i.e. respondents were asked to give a rating from 1 to 10 indicating their level of disagreement/agreement with a statement). Statistical tests comparing mean rating scores between years included non-parametric Mann-Whitney U Tests, and Spearman's Rho tests were used to identify the strength and significance of correlations between particular questions. Responses to the open-ended question "what do you think are the three (3) most serious threats to the Great Barrier Reef" were coded thematically via qualitative content analysis, to produce frequencies of different major threat themes as they occurred (e.g. climate change, pollution, fishing, and tourism).

Results are presented according to the Gooch et al. (2018) framework and survey questions (indicators) are categorised as: (i) aspirations, capacities and stewardship, (ii) community vitality, (iii) culture and heritage, and (iv) governance. In Appendix A, a table is provided summarising the mean rating scores for all survey questions in both 2013 and 2017. This table indicates significant differences (where applicable) from 2013, the direction of change (higher or lower), and the relevance of each question to the RIMReP human dimension indicator clusters and attributes proposed by Gooch et al. (2018).

To compare general sentiment associated with the GBR among commercial fishers, we analysed text responses to the open-ended question: “what are the first words that come to mind when you think of the Great Barrier Reef?” Using the word-sentiment analysis plugin (EmoLex^{TM}) in R software, we compared of the relative frequency of emotionally valenced words (positive or negative) between 2013 and 2017, and displayed the results in colour-coded words clouds (see Figure 5).

Results

Sample description

Sample sizes and some basic demographic descriptors for respondents in 2013 and 2017 are shown below (Table 1). While sampling protocols remained unchanged between years, we note that the mean age of respondents in 2017 (38 years) was slightly lower than that for the 2013 sample (43.8 years). The proportion of female respondents was also slightly higher in 2017 (55% cf. 50% in 2013). The proportion of respondents who had visited the GBR in the previous 12 months was also slightly lower in 2017 (91%) than in 2013 (95%). The 2017 sample also had a slightly higher proportion of respondents who self-identified as Indigenous Australians (4.8% cf. 3.3% in 2013). Despite these minor differences, and due to the overall large sample sizes, comparisons of indicators between years are considered to be statistically robust, and the samples representative of the GBR coastal region local resident population.

Table 1 Description and comparison of GBR coastal region local resident samples in 2013 and 2017

	2013 local GBR region coastal residents (n=3181)	2017 local GBR region coastal residents (n=1934)
Mean age (±SE; range)	43.8 (±0.298; 14-91)	38.0 (±0.37; 17-91)
Gender (F:M; %)	50:50	55:45
Years living in GBR region (±SE; range)	20.70 (.323; (0-85 yrs)	17.2 (±0.38; 1mth – 90yrs)
Visited the GBR in previous 12 months?	95%	91%
Median household income (category)	$60,001–$100,000	$60,001–$100,000
Indigenous Australian respondents (% of sample)	3.3%	4.8%

Aspirations, capacity and stewardship

Coastal residents' stewardship sentiments and empowerment to take action to reduce impacts and/or protect the GBR were assessed via ratings of agreement with the following statements: (a) "It is NOT my responsibility to protect the GBR" (sense of personal responsibility), (b) "I CANNOT make a personal difference in improving the health of the GBR" (sense of agency), (c) "I would like to do more to help protect the GBR" (willingness to act), (d) "I would like to learn more about the condition of the GBR" (willingness to learn), (e) "I have the necessary knowledge and skills to reduce any impact that I might have on the GBR" (capacity to act), and (f) "I DO NOT have the time or opportunity required to reduce any impact that I might have on the GBR" (opportunity to act). Note that in the results below, responses to the negatively worded questions (a, b, f) are inverted for ease of interpretation (Figure 1).

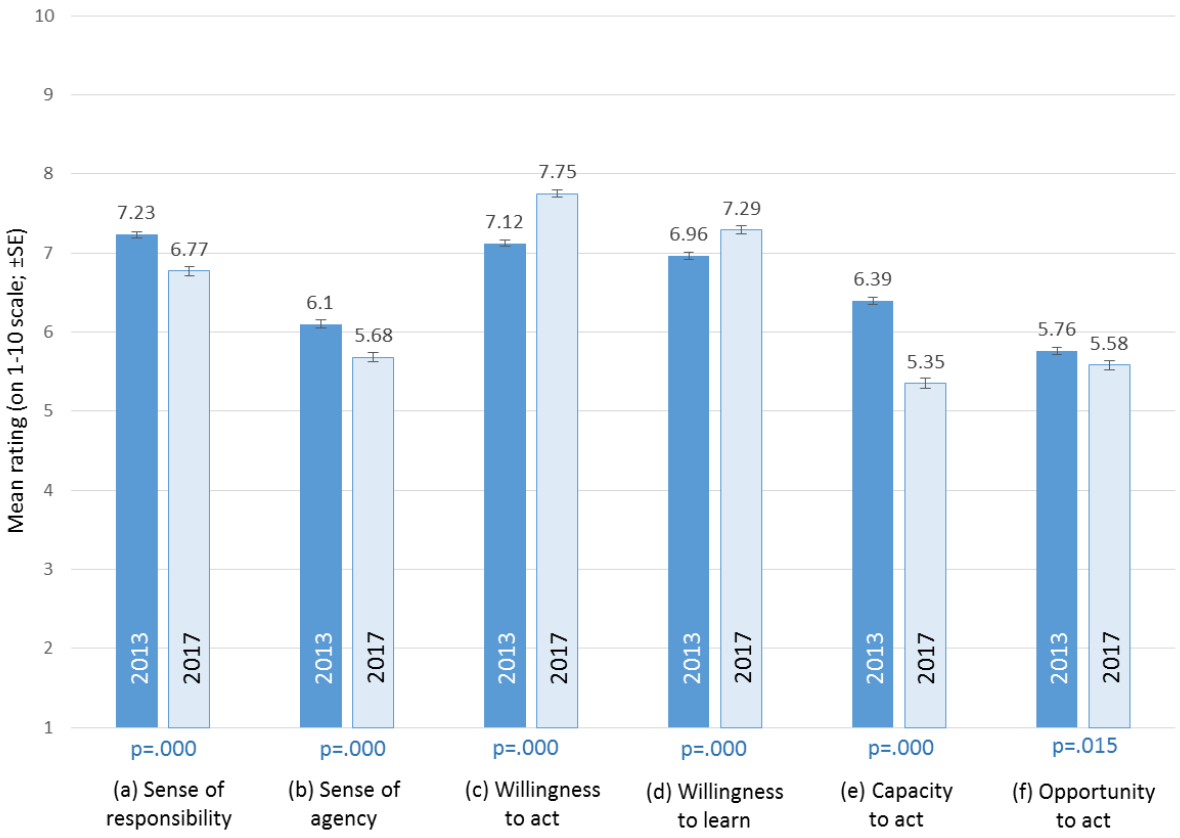

Figure 1 Comparison of mean ratings (1-10 scale; 2013 and 2017; ±SE) and statistical test results (p value) for local residents of the GBR coastal region, comparing ratings of (a) their sense of personal responsibility for protecting the GBR, (b) sense of agency, (c) willingness to act, (d) willingness to learn, (e) capacity to act, and (f) opportunity to act

NB. Ratings of agreement for negatively worded statements (a, b, f) are inverted

A comparison of 2013 and 2017 responses to the above questions revealed changes of varying magnitude in rating scores for all variables, all of which were statistically significant (Figure 1). There was an increase in ratings for indicators representing stewardship sentiment, including *willingness to act* (increase of 0.63 points on the ten-point scale), and *willingness to learn* (increase of 0.33 points). However, there were slight declines (between 0.18 and 0.46 points on the ten-point scale) in ratings of *sense of personal responsibility*, *sense of agency*, and *opportunity to act*. A more substantial decline (1.04 points) was observed in respondents self-assessed *capacity to act*. These findings are consistent with those observed for tourists (Curnock & Marshall 2019), and a further analysis of this change (increased stewardship sentiment and concurrent decreased self-efficacy) and potential drivers are discussed in a separate paper by Curnock et al. (in review).

Climate change attitudes

We evaluated coastal residents' attitudes about climate change by asking respondents to select one statement from five options, which best reflected their beliefs. The five statements were: (i) "climate change is an immediate threat requiring action", (ii) "climate change is a serious threat, but the impacts are too distant for immediate concern", (iii) "I need more evidence to be

convinced of the problem", (iv) "I believe that climate change is not a threat at all", and (v) "I do not have a view on climate change". Residents' risk awareness of climate change also increased significantly (Figure 2). In 2013, 53% of residents indicated the belief that climate change was an immediate threat requiring action, and this proportion increased to 68% in 2017. The proportion of respondents who indicated climate scepticism ("I need more evidence to be convinced of the problem") and climate change denial ("I believe that climate change is not a threat at all") decreased substantially (combined; from 27% in 2013 to 15% in 2017).

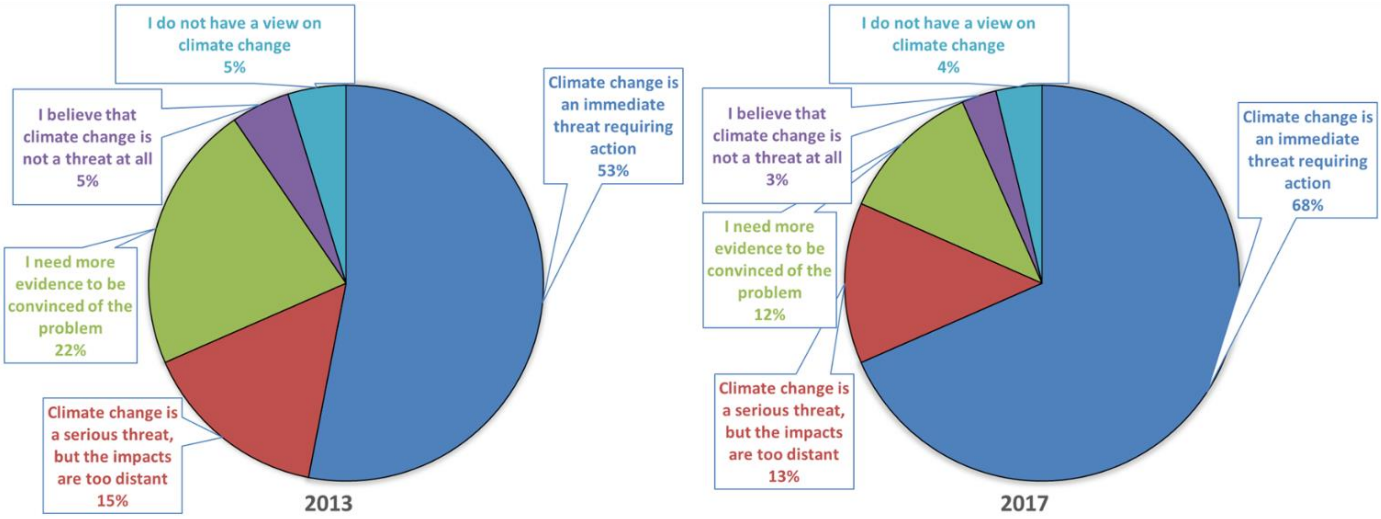

Figure 2 Comparison of the proportion of local residents of the GBR coastal region (2013 and 2017) in categories representing their climate change beliefs, indicated by agreement with one of five statements

Perceived threats to the GBR

Respondents were asked to list what they thought were the "three most serious threats to the Great Barrier Reef" in an open-ended format. In 2013, the most frequently identified threat was *shipping* (cited by 34% of respondents), which was subsequently cited by only 13 per cent of respondents in 2017, ranking eighth (Figure 3). *Pollution* became the highest ranked category in 2017 (cited by 29% of respondents in 2013, rising to 46% in 2017), encompassing a range of responses including 'marine debris', 'plastics', and 'litter'. *Climate change* increased from fifth-ranked in 2013 (28%) to second in 2017 (41%). *Water quality* fell from second-ranked in 2013 to fourth in 2017 (cited by 29% of respondents in 2013 and 19% in 2017). Other threat categories that were identified with increasing frequency in 2017 included *coral bleaching* (from 7% in 2013 to 17% in 2017), and *humanity* (encompassing responses such as 'overpopulation', 'too many people', and 'human causes'; from 6% in 2013 to 15% in 2017).

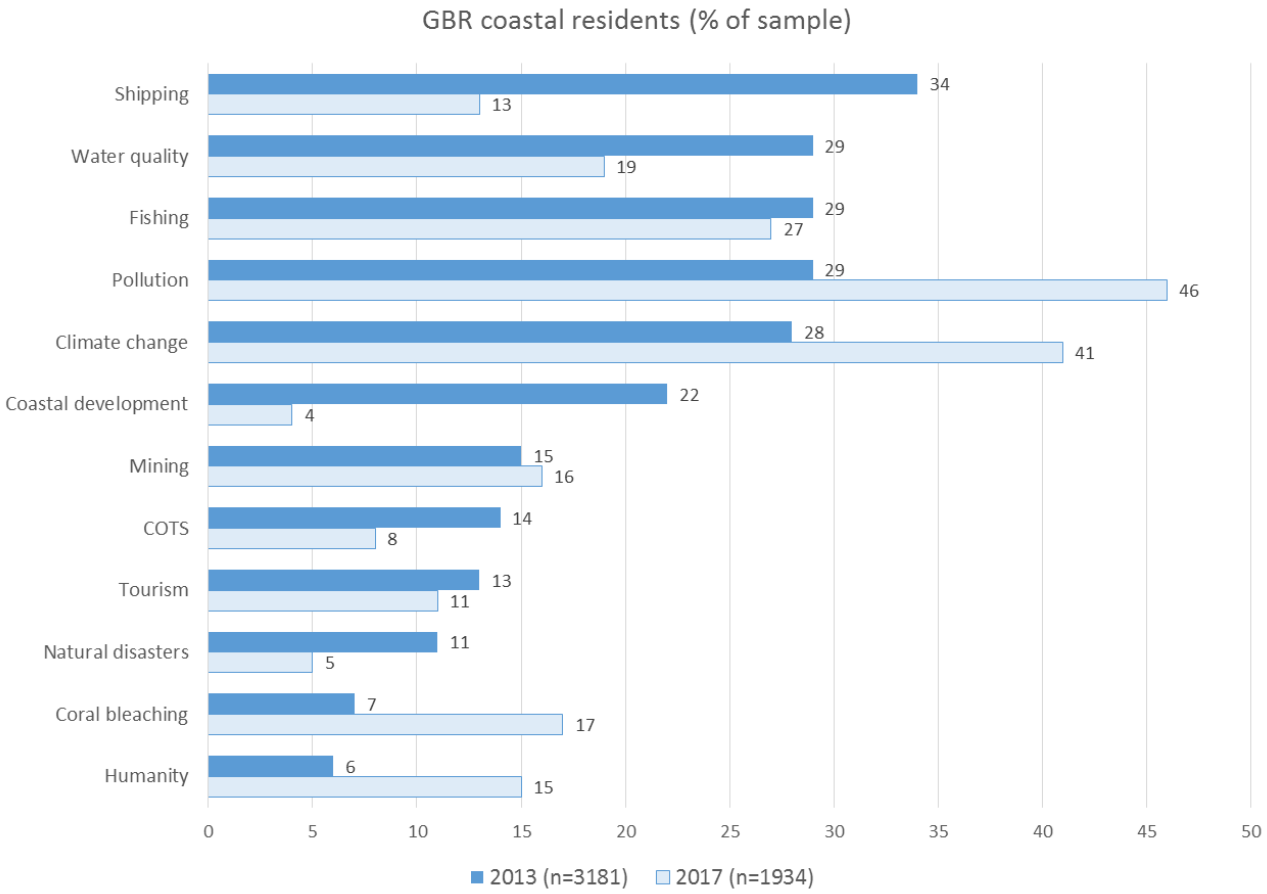

Figure 3 Comparison of the proportion of local residents of the GBR coastal region (2013 and 2017) who identified specific threats among their perceived 'three most serious threats to the Great Barrier Reef'

NB. Top ten response themes shown and ranked based on 2013 responses

Community vitality

Residents indicated characteristics of their personal relationship with the GBR, identity and derived wellbeing, through ratings of agreement with the statements: (a) "I feel proud that the GBR is a World Heritage Area" (GBR pride), (b) "The aesthetic beauty of the GBR is outstanding" (aesthetic perception), (c) "The GBR is part of my identity" (GBR identity), (d) "I would NOT be personally affected if the health of the GBR declined" (affective vulnerability; NB. agreement ratings inverted due to negative framing of statement), (e) "I am optimistic about the future of the GBR" (GBR optimism), and (f) "The GBR contributes to my quality of life and wellbeing" (wellbeing from GBR) (Figure 4).

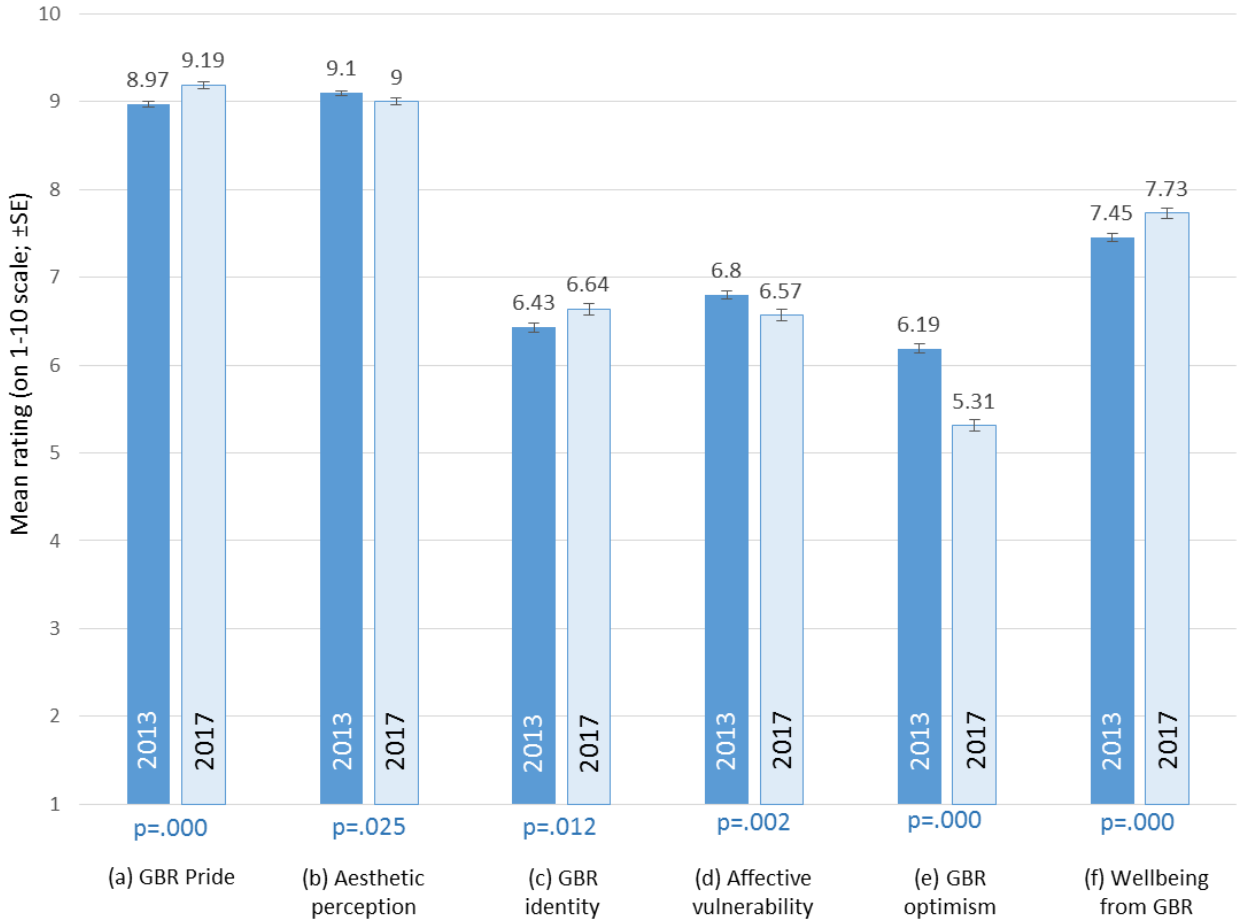

Figure 4 Comparison of mean ratings (1-10 scale; 2013 and 2017; ±SE) and statistical test results (p value) for local residents of the GBR coastal region, comparing ratings of (a) GBR pride, (b) aesthetic perception, (c) GBR identity, (d) affective vulnerability, (e) GBR optimism, and (f) wellbeing derived from the GBR

NB. Ratings of agreement for negatively worded statement (d) are inverted

While statistically significant changes were observed in ratings for all the above indicators (Figure 4), the magnitude of these changes was relatively small for most. The largest change observed was for *GBR optimism*, which fell by 0.88 points in 2017. The increase in ratings for GBR pride, GBR identity and wellbeing from GBR are consistent with those responses by Australian and international tourists (Curnock & Marshall 2019), and are hypothesised to be a response to the 2016-2017 mass coral bleaching event (discussed further in Marshall et al., 2019 and Curnock et al. in review).

In responses to the open-ended question: "what are the first words that come to mind when you think of the Great Barrier Reef?" we found no significant change in the relative occurrence of positively valenced words (e.g. beautiful, wonder, amazing, spectacular) or negatively valenced words (e.g. endangered, polluted, dying, threat) provided in responses from 2013 to 2017; however the occurrence of some specific words did change (e.g. bleaching; Figure 5).

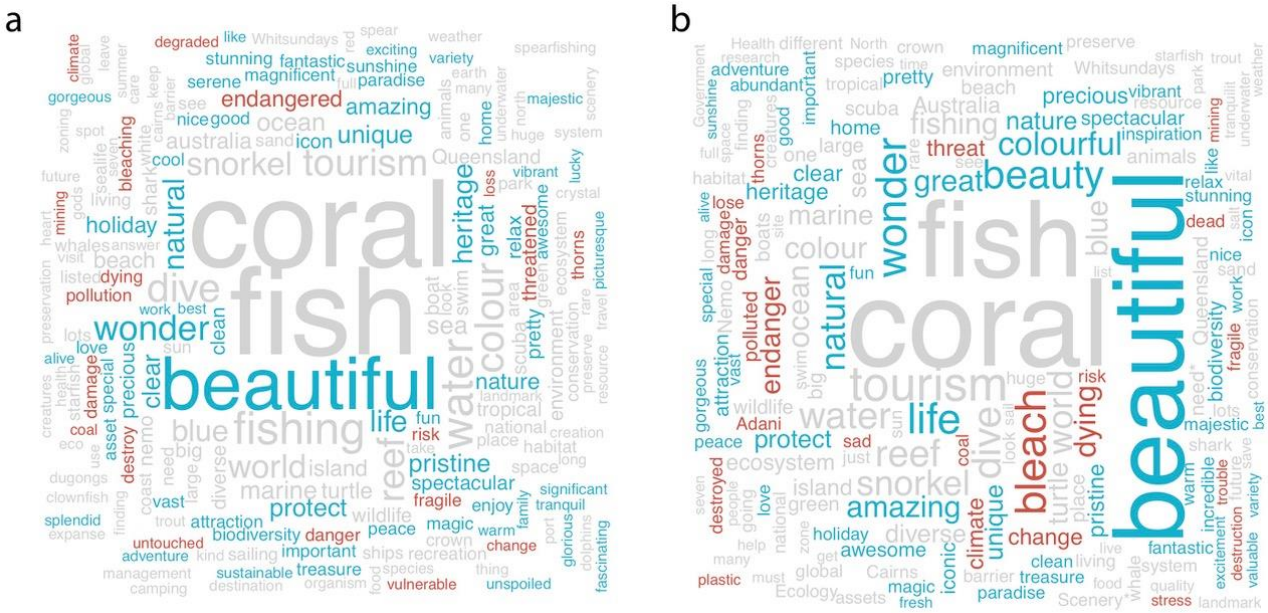

Figure 5 Word clouds comparing the relative frequency of emotionally valenced words associated with the GBR provided by local residents of the GBR coastal region, when asked: "what are the first words that come to mind when you think of the GBR", in (a) 2013 (n=3181), and (b) 2017 (n=1934). Words with positive and negative valence are coloured in blue and red, respectively. The size of words represents the relative frequency of responses. Words occurring fewer than three times are omitted

Culture and heritage

The relative strength of different values attributed to the GBR were elicited from respondents through ratings of agreement (1=very strongly disagree; 10=very strongly agree) with a range of statements, including: (a) "I value the GBR because it supports a variety of life, such as fish and corals" (biodiversity value), (b) "The GBR is a great asset for the economy of this region" (economic value), (c) "I value the GBR because we can learn about the environment through scientific discoveries" (scientific heritage value), (d) "I value the GBR because it supports a desirable and active way of life" (lifestyle value), (e) "I value the GBR because it attracts people from all over the world" (international icon value), and (f) "I value the GBR for the fresh seafood it provides" (food provisioning value). Significant increases were observed in 2017 ratings for the GBR's *biodiversity value*, its *economic value*, and *international icon value*, while significant decreases were observed for the GBR's *lifestyle value* and *food provisioning value* (Figure 6). Nonetheless, mean ratings for most place values associated with the GBR remained high (i.e. above 8 out of 10), with the exception of *food provisioning value*.

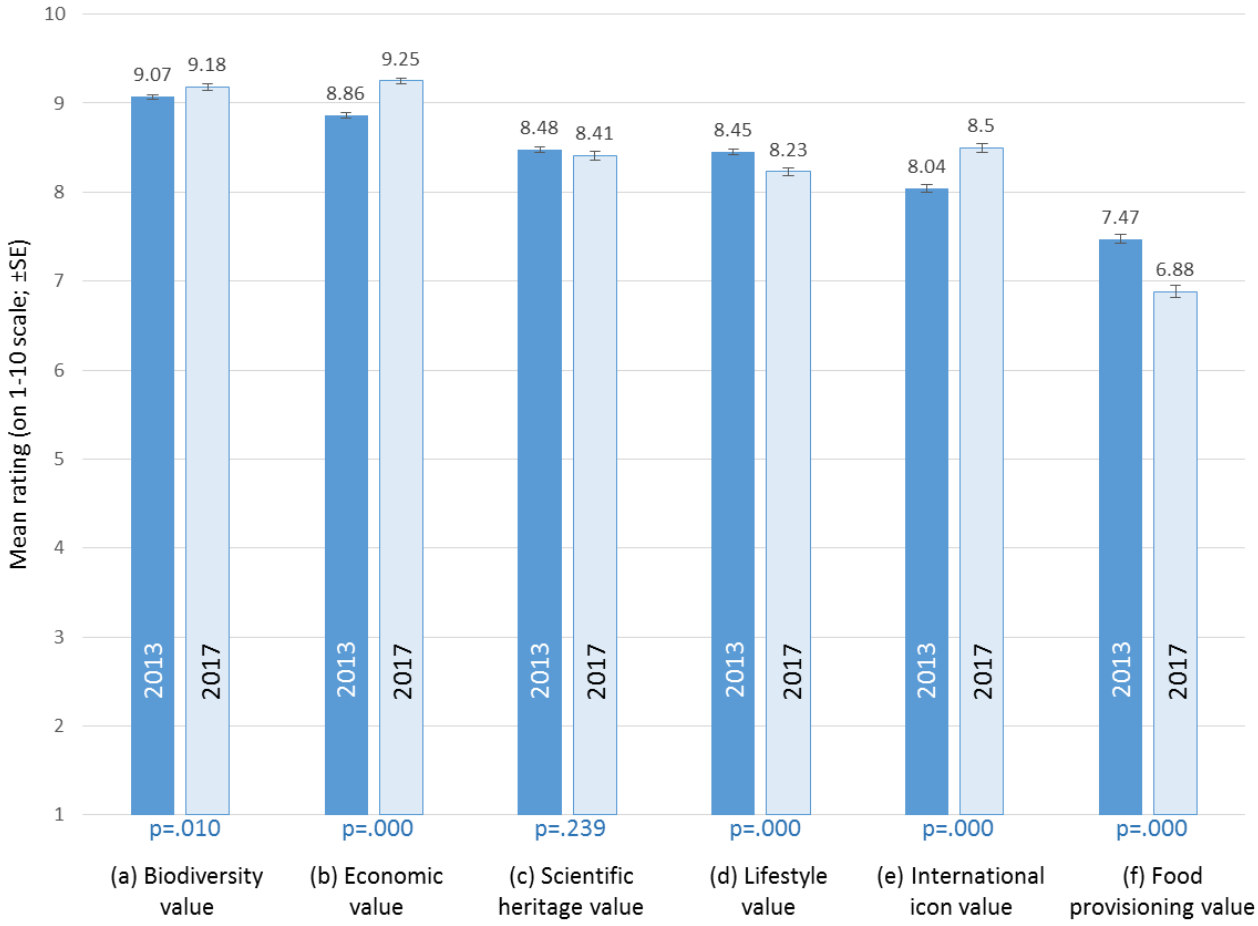

Figure 6 Comparison of mean ratings (1-10 scale; 2013 and 2017; ±SE) and statistical test results (p value) for local residents of the GBR coastal region, comparing ratings of (a) GBR biodiversity value, (b) GBR economic value, (c) GBR scientific heritage value, (d) GBR lifestyle value, (e) GBR international icon value, and (f) GBR food provisioning value

Governance

Three indicators relevant to governance (i.e. perceptions of management effectiveness) were comparable in the survey responses between years. Residents indicated their level of agreement with the following statements: (a) "I feel confident that the GBR is well managed" (confidence in management), (b) "I DO NOT have fair access to the GBR compared to other user groups" (perceived equity among GBR users; NB. agreement ratings were inverted due to the negative framing of this statement), and (c) "I support the rules and regulations that affect access and use of the GBR" (regulatory support). Ratings for all three indicators were significantly lower in 2017, with the largest decline shown for *confidence in GBR management* (decrease of 0.58 points; Figure 7).

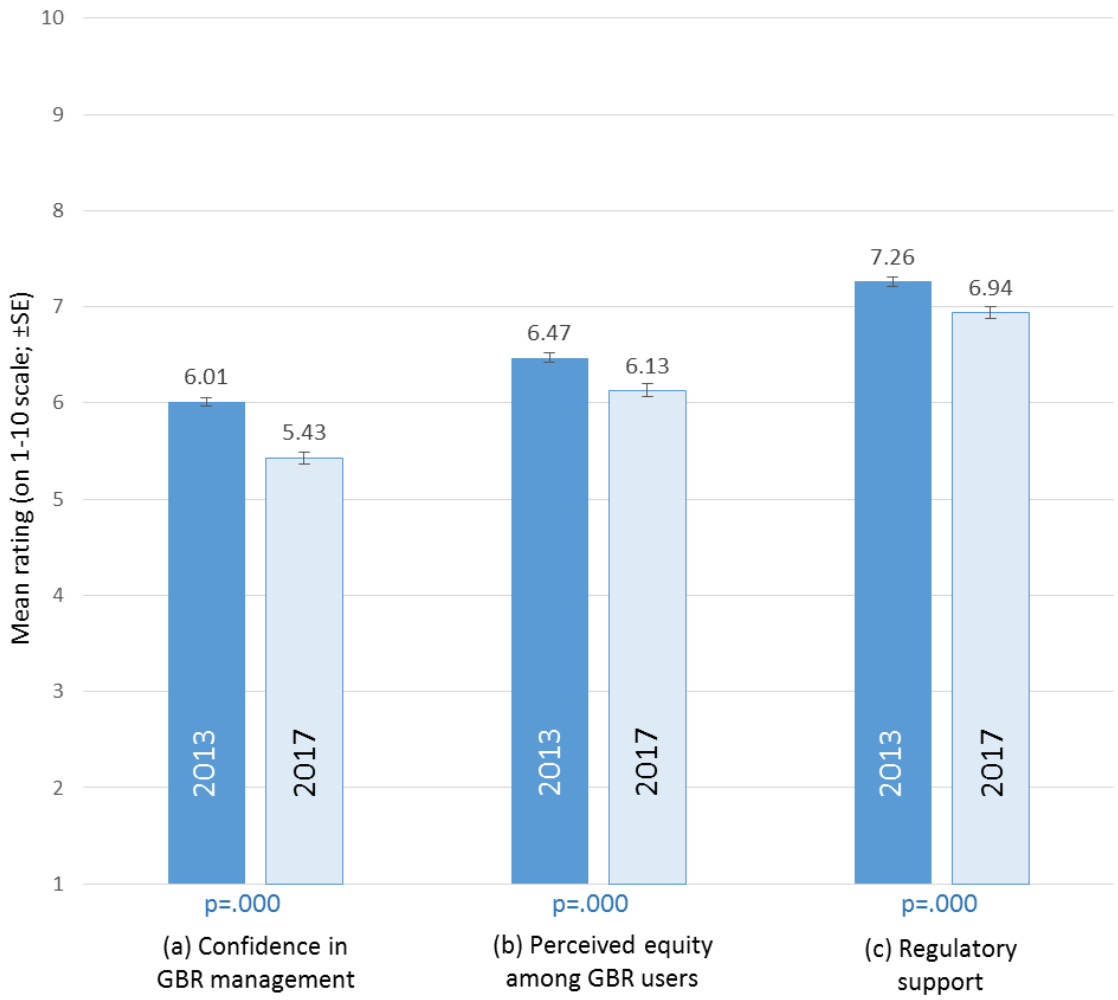

Figure 7 Comparison of mean ratings (1-10 scale; 2013 and 2017; ±SE) and statistical test results (p value) for local residents of the GBR coastal region, comparing ratings of (a) confidence in GBR management, (b) perceived equity among GBR users, and (c) regulatory support

NB. Ratings of agreement for negatively worded statement (b) are inverted

Trust in GBR information from different sources

Respondents indicated their level of trust (1-10 scale; 1=do not trust at all, 10=trust very strongly) in the information they received about the GBR from different groups/sources, including (a) scientists from research institutions, (b) friends, family and/or work colleagues, (c) industry groups (e.g. from tourism, fisheries), (d) news media journalists, and (e) social media commentators/bloggers (Figure 8). Minor increases in trust ratings were observed in ratings for *scientists*, and *family, friends and colleagues* (the latter being statistically significant), while significant declines were observed in ratings for *industry groups* (0.22 points; p=.001) and the *news media* (0.48 points; p=.000; Figure 8).

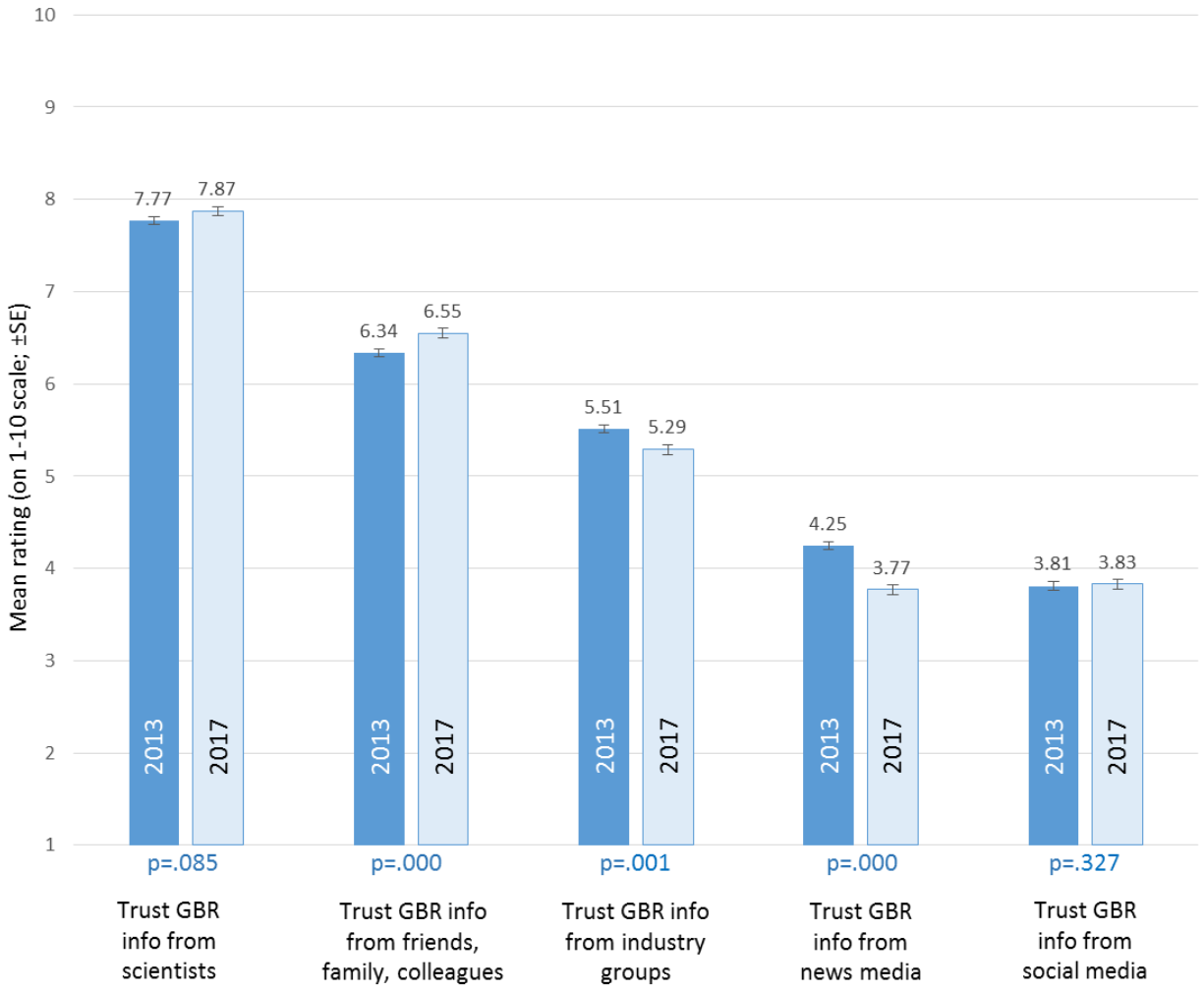

Figure 8 Comparison of mean ratings (1-10 scale; 2013 and 2017; ±SE) and statistical test results (p value) for GBR region local residents' rated trust in different sources of information about the GBR

Summary of key findings

This report outlines some of changes that have occurred in perceptions, values and attitudes associated with the GBR among local residents of the GBR coastal region (surveyed in coastal towns and cities between Cooktown and Bundaberg), between 2013 and 2017. Key findings include:

- Consistent with findings for tourists in the GBR region (Curnock & Marshall 2019), this report shows a significant increase in residents' ratings for indicators of stewardship sentiment (e.g. *willingness to act*, *willingness to learn*; Fig.1) and a corresponding decline in ratings for indicators of self-efficacy (e.g. *capacity to act*, *sense of agency*, *sense of personal responsibility*; Fig.1). When considered in combination with the observed significant increases in residents' ratings for place values associated with the GBR (e.g. *biodiversity value*, *economic value*, *international icon value*; Fig. 6), and in the context of major Reef impacts in 2016 and 2017, these results are indicative of wider public sentiment for the Reef in response to this major biophysical disturbance (i.e. grief and empathy, reported in Marshall et al. 2019; Curnock et al., in review).

- Perceived threats to the GBR have changed significantly since 2013. In 2013, the most frequently identified threats by local residents of the GBR coastal region were *shipping*, *water quality* and *fishing*. In 2017 the most frequently identified threats were *pollution*, *climate change*, and *fishing* (Fig.3). The proportion of respondents who indicated belief that "*climate change is an immediate threat requiring action*" increased from 53 per cent in 2013 to 68 per cent in 2018 (Fig.2).

- Indicators of community vitality associated with the GBR included some mixed results, with small but statistically significant increases in ratings for *GBR pride*, *GBR identity* and *wellbeing* derived from the GBR (Fig. 4). Concomitantly, there were declines in ratings for aesthetic perceptions of the GBR, and for optimism for the Reef's future (Fig. 4).

- Ratings indicating perceptions of management effectiveness of the GBR were significantly lower in 2017, including those for *confidence in GBR management*, *perceived equity among GBR users*, and *support for regulations* (Fig. 7). Ratings of trust in different institutions (for information about the GBR) varied slightly from 2013, with the most notable (significant) difference being a decline in trust in the news media (Fig. 8).

While only a limited set of longitudinal indicators are presented in this report, representing comparable SELTMP survey questions between 2013 and 2017, it is expected that future reporting will include more in-depth and time-series analyses, drawing on the full complement of indicators identified in Appendix A.

Conclusion

Results presented in this report series can assist GBR managers in multiple ways, including in their assessment of management effectiveness, in their spatial planning for different activities and user types within in the Marine Park, and in their development of engagement strategies that aim to improve GBR stewardship among different community and industry groups. More immediately, these results provide valuable information on the current state of the human dimension of the GBR, and indicators that feed into the 2019 Outlook Report and Reef 2050 reporting processes, assisting with evaluation of targets identified in the Reef 2050 Plan.

Longitudinal, up-to-date and comparable social and economic datasets of key stakeholders remain scarce, but provide vital information to improve our understanding of the drivers, pressures, state, impacts and responses within the complex social-ecological GBR system. It is expected that the value of SELTMP will increase with each iterative sampling event. As additional data points become available, the synthesis and integration of these data in an integrated monitoring and reporting program (i.e. RIMReP) will provide improved system understanding, and will underpin decisions that provide more effective management for the GBR. In the meanwhile, the SELTMP 2017 snapshots of GBR stakeholders and communities, including local residents of the GBR coastal region, provide the best, up-to-date depictions of the relationship between people and the GBR.

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Appendix A SELTMP 2013 and 2017 local residents of the GBR coastal region survey questions and results in human dimension indicator framework for Reef 2050 benchmarking

Table A: SELTMP local resident survey questions as human dimension indicators for Reef 2050 integrated monitoring under RIMReP. Human dimension clusters and attributes organised according to Gooch et al.'s (2018) framework for human dimension benchmarking for targets and objectives of the Reef 2050 Plan.

Human Dimension Cluster	Concepts	Survey questions	Mean (±SE) 2013	Mean (±SE) 2017	Direction of change and significance
Aspirations, capacity and stewardship	Aspirations (ACS1)	I would like to do more to help protect the GBR	7.12 (.040)	7.75 (.050)	.000 ▼
		I would like to do more to improve water quality in the waterways in my region	NA	7.77 (.051)	NA
		I would like to learn more about the condition of the GBR	6.96 (.043)	7.29 (.054)	.000 ▲
	Capacity and education (ASC2)	I have the necessary knowledge and skills to reduce any impact that I have on the GBR	6.39 (.048)	5.35 (.061)	.000 ▼
		I feel like I can contribute to GBR management	NA	5.99 (.061)	NA
		I am not worried about climate change impacts on the GBR	NA	3.30 (.068)	NA
		Climate change is an immediate threat requiring urgent attention	Figure 2	Figure 2	NA
		What do you think are the three (3) most serious threats to the Great Barrier Reef?	Figure 3.	Figure 3.	NA
		Do you have university of TAFE education?	NA	NA	NA
		I cannot make a personal difference in improving the health of the GBR	3.90 (.048)	4.32 (.062)	.000 ▲
		I do not have the time or opportunity required to reduce any impact that I might have on the GBR	4.24 (.047)	4.42 (.058)	.015 ▲
	Stewardship (ACS3)	I make every effort to use energy efficiently in my home and workplace	NA	7.75 (.047)	NA
		I re-use or recycle most goods and waste (2013 = how often do you recycle?)	NA	7.43 (.055)	NA
		I rarely consider the environmental impact of the production process for goods and services that I purchase	NA	3.83 (.058)	NA
		I don't usually make any extra effort to reduce the waste that I generate	NA	3.35 (.054)	NA
		It is not my responsibility to protect the GBR	2.77 (.041)	3.23 (.059)	.000 ▲
		I feel a social expectation to reduce any impact that I might have on the GBR	NA	6.79 (.060)	NA
		Are you part of a GBR based club or community group such as a spear- fishing club in your region? (1=yes, 2=no)	NA	1.93 (.006)	NA
		a. Are you part of an environmental community based group? Name	NA	1.89 (.007)	NA
Community vitality	Community health (CV3)	I value the GBR because it makes me feel better physically and/or mentally	NA	7.50 (.056)	NA

		I would not be personally affected if the health of the GBR declined	3.20 (.046)	3.43 (.063)	.002 ▲
		Thinking about coral bleaching makes me feel depressed	NA	7.16 (.064)	NA
	Satisfaction (CV4)	The coral reefs in my region are in good condition (2013; The place that I most recently visited in the GBR is NOT in good condition)	4.45 (.051)	4.94 (.057)	NA
		I am worried about the status of freshwater fish in region	NA	6.83 (.060)	NA
		The mangroves in my region are in good health	NA	6.02 (.051)	NA
		The estuarine and marine fish in my region are in good condition	NA	5.83 (.051)	NA
		I like the colour clarity of water along the beaches in my region.	NA	5.82 (.065)	NA
		There is too much rubbish (plastics and bottles) on the beaches in my region	NA	7.72 (.059)	NA
		The freshwater areas (e.g. rivers, creeks) in my region are not in good condition	NA	5.49 (.055)	NA
	Wellbeing (CV3)	The GBR contributes to my quality of life and wellbeing	7.45 (.044)	7.73 (.057)	.000 ▲
		I feel optimistic about the future of the GBR	6.19 (.047)	5.31 (.065)	.000 ▼
		I love that I live beside the GBR (2013; I live here because of the GBR)	4.82 (.054)	8.85 (.045)	NA
	GBR Relationship (CV4)	What are the first words that come to mind when you think of the Great Barrier Reef?	NA	NA	NA
Culture and Heritage	Values (CH1) (CH3) (CH4)	I feel proud that the GBR is a World Heritage Area	8.97 (.032)	9.19 (.037)	.000 ▲
		The GBR is an important part of my culture	NA	5.92 (.070)	NA
		The GBR is a great asset for the economy of the region	8.86 (.030)	9.25 (.035)	.000 ▲
		The GBR is part of my identity	6.43 (.050)	6.64 (.065)	.012 ▲
		I value the GBR because it supports a variety of life, such as fish and corals	9.07 (.027)	9.18 (.035)	.010 ▲
		The aesthetic beauty of the GBR is outstanding	9.10 (.026)	9.00 (.037)	.025 ▼
		The GBR supports a desirable and active way of life	8.45 (.033)	8.23 (.045)	.000 ▼
		I value the GBR for the fresh seafood it provides	7.47 (.049)	6.88 (.067)	.000 ▼
		I value the GBR because it attracts people from all over the world	8.04 (.041)	8.50 (.048)	.000 ▲
		The GBR contributes to my quality of life and wellbeing	7.45 (.044)	7.73 (.057)	.000 ▲
		I value the GBR because of its rich traditional owner heritage	NA	6.70 (.069)	NA
		I value the GBR because it provides a place where people can continue to pass down wisdom, traditions and a way of life	NA	7.01(.066)	NA
		I value the GBR because we can learn about the environment through scientific discoveries	8.48 (.034)	8.41 (.046)	.239
		The GBR inspires me in artistic or thoughtful ways	NA	6.47 (.068)	NA
		I value the GBR because it is spiritually important to me	NA	5.72 (.072)	NA
		I value the GBR because it exists, even if I don't benefit from it	NA	8.46 (.048)	NA
Governance		Enough is being done to effectively manage the GBR	NA	3.85 (.058)	NA

	Confidence in management (G3)	I feel confident that the GBR is well managed	6.01 (.041)	5.43 (.061)	.000 ▼
		I feel confident that the freshwater areas in my region are well managed	NA	5.58 (.058)	NA
		I can contribute to GBR management	NA	5.99 (.061)	NA
	Equity issues (EV4)	I do not have fair access to the GBR compared to other user groups	3.53 (.047)	3.87 (.066)	.000 ▲
		Future generations have been adequately considered in the management of the GBR	NA	4.55 (.063)	NA
	Support for management (G3)	I support the rules and regulations that affect access and use of the GBR	7.26 (.044)	6.94 (.063)	.000 ▼
		I support the current rules and regulations that affect access and use of freshwater areas (rivers and creeks in my region	NA	6.95 (.060)	NA
	Traditional vs. progressive (G2)	“Progressive” rather than, “traditional” on a ten point scale with traditional at one end, and progressive at the other.	NA	6.81 (.054)	NA
	Trust in networks (G4)	On a scale of 1-10, how much do you trust the information you receive about the GBR from the following groups? (11 listed) The Australian Government	NA	4.64 (.057)	NA
		The Queensland government	NA	4.84 (.057)	NA
		Friends, family and/or work colleagues	6.34 (.041)	6.55 (.050)	.000 ▲
		GBRMPA	5.83 (.147)	7.14 (.050)	.000 ▲
		Scientists	7.77 (.037)	7.87 (.048)	.085 ▲
		Industry Groups	5.51 (.044)	5.29 (.054)	.001 ▼
		Australian based NGOs	NA	6.42 (.054)	NA
		International NGOs	NA	6.35 (.059)	NA
		New media journalists	4.25 (.042)	3.77 (.051)	.000 ▼
		Social media bloggers	3.81 (.045)	3.83 (.051)	.327
		Lobby groups	NA	4.57 (.059)	NA
	Sources of Information (G4)	On a scale of 1-10, how much do you rely on each of the following for news about your region and the world? (16 listed) Local newspaper	NA	4.43 (.065)	NA
		State papers	NA	4.07 (.064)	NA
		Magazines	NA	3.04 (.053)	NA
		TV	NA	4.96 (.069)	NA
		Pay tv	NA	3.06 (.060)	NA
		Digital streamlining	NA	3.89 (.065)	NA
		Local radio	NA	5.06 (.066)	NA
		National radio	NA	4.86 (.067)	NA
		Online forums	NA	3.61 (.062)	NA
		Facebook	NA	4.39 (.068)	NA
		Twitter	NA	2.39 (.053)	NA
		Instagram	NA	2.77 (.060)	NA
		Snapchat	NA	2.30 (.053)	NA
		Youtube	NA	3.42 (.066)	NA
		News media websites	NA	4.80 (.071)	NA
		Word of mouth	NA	5.57 (.064)	NA
		Mean age	43.75	38	.000 ▼
		What is your current home postcode?	NA	NA	NA

	Demographic Information (CV1)				
		For how many years have you lived in the GBR region?	20.70	19.78	.650
		Do you identify as an Aboriginal Australian (1=yes, 2=no)	3.3%	4.8%	NA
		Do you identify as a TS Islander?	1.1%	1.95%	NA
		Do you identify as FIFO	5.2%	3.6%	NA

NB. A p value of .05 or smaller indicates a statistically significant difference in rating score between years (95% confidence interval).

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