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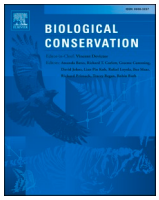

Australians support multi-pronged action to build ecosystem resilience in the Great Barrier Reef

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ABSTRACT

The scale and pace of global environmental change calls for a dramatic upscaling of ecosystem restoration and for actions that build the resilience of ecosystems to future environmental change. This research aimed to quantify public perceptions of threats to the health of the Great Barrier Reef (GBR), Australia, and their support for strategies to address those threats including large-scale restoration and resilience-building actions. We examine how these perceptions change over time and across social cohorts including people living closer to the Reef (n = 2621) and the general Australian population (n = 5825). Respondents were concerned about both the current state and future of the GBR. They identified climate change as the largest threat to the GBR with the strength of this perception increasing between 2018 and 2022. Respondents were ambivalent about existing management and overwhelmingly of the view that more should be done to save the GBR. Strong support was expressed for a range of responses including preventing threats, local restoration, measures to increase the resilience of the GBR to future threats, providing more research funding, and large-scale restoration. Trust in science to develop solutions for Reef protection and repair was high and strongly correlated with support for action. The results suggest that ongoing scientifically-informed action – underpinned by deep engagement with impacted communities and stakeholders and the full, prior and informed consent of rights-holders including First Nations – is needed to build public confidence in Reef management and the deployment of technological interventions.

1. Introduction

The United Nations Decade on Ecosystem Restoration (2021−2030) seeks to catalyse a global movement to prevent, halt, and reverse the degradation of ecosystems (Ren and Coffman, 2023). The 15th Conference of the Parties to the Convention on Biological Diversity (2022), similarly, commits signatories to initiating or completing restoration over at least 30 % of degraded terrestrial, freshwater and marine ecosystems worldwide by 2030. However, while responding to global environmental change requires a substantial upscaling of ecosystem protection and restoration it also requires consideration of how these and other activities might build the resilience of ecosystems to continuing processes of environmental change (Ren and Coffman, 2023). This requires cognizance of shifting climate and ecological baselines, increasing frequency of disturbance, complex interactions between multiple dimensions of environmental change, uncertainty regarding the timing, magnitude and nature of those changes, and the adaptative capacities of species and ecosystems (Falk, 2017; Ren and Coffman, 2023). According to Lam et al. (2017, p. 2), resilience-based approaches shift the focus of management effort from attempting to maintain systems in a steady-state to understanding and preserving the "fundamental ecosystem functions, structure, identity and feedbacks … that govern system dynamics." This may require the intentional reorganization or realignment of biotic communities through, for example,

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assisted species migration or adaptation, alongside more conventional conservation and restoration measures (Falk, 2017).

Among the many things required to upscale and reorient ecosystem protection and restoration is effective public engagement (McLeod et al., 2022). Acknowledging the importance of social and cultural values (Bliska et al., 2023), the contributions Indigenous and other communities make to ecosystem care (Dutra et al., 2021; Ren and Coffman, 2023), the knowledge they bring to that enterprise (Lyver et al., 2016), and the need to build consensus regarding the goals of ecosystem management (Kenny et al., 2023), is critical to building trust in restoration methods (Boström-Einarsson et al., 2020) and governance arrangements (Edwards et al., 2021; McLeod et al., 2022). Public engagement is most effective, Vella et al. (2021) argue, when informed by detailed understanding of the values, beliefs and resources communities bring to ecosystem resilience conversations.

There is an extensive literature on public perceptions of environmental change and policy responses at both local and global scales (Capstick et al., 2015; Drews and van den Bergh, 2016; Weber, 2016). There is comparatively little, however, on perceptions of resilience-based management or on the scaling up of restoration and other innovations in order to build ecosystem resilience in the face of global environmental change. Among those studies that are available, Ng et al. (2023) report almost universal support among Singaporean residents for restoration to stem coral reef decline. Respondents also believed restoration efforts should prioritise coral resilience over the provision of habitat for other species or the relative abundance of various coral taxa in Singapore. The majority also believed scientists had not done enough to communicate reef restoration and ecology efforts to the general public and disagreed with the proposition that restoration should be left to scientists. Low awareness of restoration options emerged in Ware and Callaway's (2019) study of coastal habitats in the United Kingdom despite extremely high levels of public concern about their loss. Research among Florida Everglades residents demonstrates high levels of concern about the sustainability of the ecosystem and correspondingly high levels of support for restoration and restriction programs (Sikder and Mozumder, 2020). Support levels were significantly associated with age, education, recreational profile, and residential location. Relatively high levels of support for the restoration of marine ecosystems were found in Europe, with conflicting evidence regarding whether people prefer local restoration rather than large-scale restoration (O'Connor et al., 2021).

The limited knowledge we have about public perceptions of restorative and resilience-building action is a potential bottleneck for existing and emerging environmental management and restoration programs. Our aim in this paper is to build on the nascent literature through examination of Australian residents' perceptions of threats to the World Heritage-listed Great Barrier Reef (GBR) and their perceptions of strategies to address those threats including large-scale restoration and resilience-building actions. Moreover, we examine how these perceptions change over time and across social cohorts including people living in close proximity to the Reef and the general Australian population. More specifically, first, we evaluate whether the public is concerned about the current condition and future existence of the GBR. Without public acknowledgement of threats to ecosystems it may be difficult to gain support for action to prevent, halt, and reverse their degradation. In our first research question, we also explore whether specific threats to the ecosystem, including impacts from climate change, are associated with environmental concerns. Perceived threats or understanding and interpretation of threats can create issue salience (Yang, 2016) and may increase the likelihood of responding to those threats.

Second, we evaluate perceptions of the adequacy of existing ecosystem management, and whether respondents believed more action is needed to support the health of the GBR. Here we test the relationship between the perceived state of the Reef and the personal, social and economic consequences of ecosystem degradation. It does not follow from perceptions of poor ecosystem condition that people are necessarily willing to endorse action to reverse degradation. People may, for example, accept ecosystem decline depending on how much they value its existence and practical use (Petursdottir et al., 2013). People might also have doubts about the effectiveness of environmental management to counter ecosystem decline (Shindler et al., 2011).

Third, we evaluate whether there are differences in the type of management responses the public would be willing to support to help improve the condition of the GBR – that is, management responses focused on local restoration, large-scale restoration, threat prevention, and building the resilience of reefs to threats. Support for management responses might differ depending on where the type of intervention fits on the active-passive continuum (Atkinson and Bonser, 2020; Chazdon et al., 2021; Holl and Aide, 2011). We also evaluate whether public support for management responses is associated with perceptions of existing management and trust in science to provide solutions (Brewer and Ley, 2013; Gray et al., 2012; Ulibarri, 2018).

1.1. Study area

World Heritage listing of the GBR recognises its outstanding universal value as a site of extraordinary scale, beauty, evolutionary significance, and biodiversity. Comprising 2500 reefs spread over 348,000 km^2 of ocean it is home to around 400 coral species, 1500 fish species and 4000 species of mollusc (UNESCO, 1981). The GBR is also a cultural landscape, stewardship of which has been provided by Aboriginal and Torres Strait Islander peoples over millennia (Watkin Lui et al., 2016). The GBR is a significant social, cultural and economic asset that supports major industries such as fishing and tourism. Its "economic, social and icon asset value" has been calculated at AUS$56 billion, inclusive of 64,000 jobs and an annual contribution of AUS$6.4 billion to the Australian economy (Deloitte Access Economics, 2017).

Coral reef ecosystems are vulnerable both to climate change and to a range of more localized stressors including water pollution and overfishing. Increased ocean temperatures, changing ocean chemistry, sea level rise and the increased frequency of tropical storms have a significant impact on the GBR (GBRMPA, 2019). Since 2016, the GBR has been exposed to four mass coral bleaching events, the last occurring during La Nina conditions associated with historically cooler summer conditions because of increased rainfall and high cloud cover. According to the GBR Marine Park Authority (2019), climate change is the primary driver of coral degradation in the region and a threat to the abundance of multiple other species.

Seventy seven percent of respondents to a national survey of Australian residents conducted in 2013 expressed concern about the impacts of climate change on the GBR and 89 % identified climate change as a threat (Goldberg et al., 2016). By contrast, only 53 % of respondents believed the GBR is well managed and 54 % were optimistic about its future. Drawing on visitor surveys conducted in 2013 and 2017, Curnock et al. (2019) report increasing awareness of the threat posed by climate change to the GBR among tourists. Similarly, surveys of commercial fishers, tourism operators, and coastal residents in those same years showed a convergence of opinion among stakeholders that climate change represents the most serious threat to the GBR (Thiault et al., 2021).

Le et al. (2022) evaluated acceptance by Australian residents of 'traditional' small-scale restoration practices, such as coral gardening, in the GBR. Their identification of trust in restoration scientists and managers as the most important correlate of acceptance raises the question as to the importance of trust in acceptance of larger scale restoration and resilience-building reef interventions. Mankad et al. (2021) surveyed Australian residents about support for the hypothetical development of coral genetically engineered to improve its climate resilience, reporting moderate to high support for the development of engineered corals and moderate to high levels of willingness to visit reefs on which those corals had been deployed. The most important correlates of support identified by Mankad et al. (2021) were the perceived efficacy of genetically

engineered corals and perceived benefits over other management responses. Other correlates of support included the perceived severity of threats and the vulnerability of the GBR to those threats. Perceived risks associated with genetic engineering were negatively correlated with support. Importantly, respondents also expressed concern about the need to interfere with nature and qualified their support with statements about the need for further research and effective regulation (Hobman et al., 2022).

2. Methodology

Data reported in this manuscript were collected through a larger study and survey of community attitudes toward existing and prospective management interventions in the GBR as part of Australia's Reef Restoration and Adaptation Program (RRAP). RRAP, funded through a partnership between the Australian Government's Reef Trust and the Great Barrier Reef Foundation, aims to provide Reef managers with a suite of scientifically proven, ecologically effective, socially acceptable, technically feasible and economically viable options to intervene at scale on the Reef, to enhance its resilience and adaptation to climate change. Surveys were conducted in 2018 and 2022 with over 8000 Australian residents in total to explore support both for current management practices, and the potential introduction of novel management practices designed to accelerate coral adaptation to climate change and/or recovery from disturbance. This manuscript draws on sections of the survey related to respondents' perceptions of threats to the GBR, concerns about its existing condition and future existence, the quality of existing management, and perceived societal responsibility to respond to reef threats through different types of action. Surveys also requested information on demographic and contextual information associated with the respondent. Our survey questions are reproducible using the information provided in Table 1 and Table 2. Questions were randomised to reduce priming effects. This randomisation was managed by the survey platform, ensuring each participant received a unique question sequence.

2.1. Sampling

A stratified sampling strategy was used targeting two primary groups:

1. Australian residents across all states and territories (national sample).
2. Residents located within 50 km of the GBR coastline (resident sample).

Although the GBR is important nationally and internationally, marine conservation challenges are more likely to directly impact residents closest to the GBR. In both years, online surveys were distributed via a market research company using online panels. The final survey in 2018 was launched on 7 August 2018 and remained open until 14 September 2018. The final survey in 2022 was launched on 14 February 2022 and remained open until 28 February 2022.

Representativeness was maintained by using Australian census data quotas (based on gender, age, and location, with a mix of urban and rural respondents) for the national sample and soft quotas for Queensland as a guide for the resident sample. Data were cleaned by removing surveys that were either not completed in full or that were completed in a time not considered feasible to maintain quality (i.e. by "speeders"). For the 2018 survey, a total of 1978 surveys (1135 from national survey and 843 from resident sample) were removed and for the 2022 survey, a total of 2113 surveys (1664 from national survey and 449 from resident sample) were removed. The 2018 survey amounted to a total of 4036 *useable* surveys (2743 from the national sample and 1293 from the resident sample). The 2022 survey amounted to a total of 4410 *usable* surveys (3082 from the national sample and 1328 from the resident sample).

Table 1
Outcomes of interest based on research questions. All variables were measured on a 7-scale Likert: (1) strongly disagree; (2) disagree; (3) slightly disagree; (4) neither agree or disagree; (5) slightly agree; (6) agree; and (7) strongly agree.

Category	Variables
Threats to environmental health	Respondent's level of agreement with the statement that […] is negatively affecting the health of the Great Barrier Reef: - Agriculture - Climate change - Mining industry - Environmental pests - Mining industry - Shipping - Tourism industry
Concern about environmental condition	Respondent's level of agreement with the statement: I am concerned about the environmental condition of the Great Barrier Reef.
Worry about future existence	Respondent's level of agreement with the statement: I am worried that the Great Barrier Reef will cease to exist for future generations.
Socioeconomic impacts of ecosystem decline	Respondent's level of agreement with the statement that: - The loss of the Great Barrier Reef would devastate the national economy. - The declining health of the Great Barrier Reef will negatively impact me.
Quality of existing management	Respondent's level of agreement with the statement that: - I feel confident that the Great Barrier Reef is well managed. - Considering the potential values of and threats to the Great Barrier Reef, more should be done to save it.
Trust in scientific solutions	Respondent's level of agreement with the statement that: - Scientific research can provide solutions to help prevent damage to the Great Barrier Reef. - Scientific research can provide solutions to help repair the damage to the Great Barrier Reef.
Responsibility to act	Respondent's level of agreement with the statement that: *Society should […]*: - Try and prevent threats to the reef in order to slow the rate of damage/degradation. - Try and provide more research funding to examine solutions to help the Great Barrier Reef. - Try and repair the most degraded parts of the Great Barrier Reef through local restoration projects. - Try and repair all of the Great Barrier Reef through large scale restoration projects. - Try to increase the resilience of the Great Barrier Reef to future threats.[a]

[a] In the 2022 survey, specific examples were given when describing this type of responsibility to act: Try to increase the resilience of the Great Barrier Reef to future threats (e.g., using the adaptation interventions or technologies). The change in the description of this survey question should be considered when evaluating our results. In our statistical models, we included the year of the survey as a predictor variable to evaluate whether the passage of time or minor changes to the survey instrument (in this case) influenced our results.

sample).

2.2. Outcomes of interest based on research questions

To address our three research questions, we collected information on several aspects of the GBR ecosystem as perceived by the public (Table 1). Respondents were asked about perceived threats to the GBR, their perception of the environmental condition and future existence of

Table 2
Covariates used in our models studying public perceptions of environmental change in ecosystems.

Variable	Description	Unit of measurement
Year	Year in which the survey was conducted	(0) 2018 (1) 2022
Reef proximity	Distance of participant's residence from the GBR.	(0) >50 km from GBR (1) <50 km from the GBR
Gender	Gender of participant.	(0) Female (1) Male
Age Group	Participant's age group; initially measured using six levels.	(0) <50 years (1) >50 years
First Nations peoples	Participant identified as Aboriginal and/or Torres Strait Islander.	(0) No (1) Yes
Education	Participant had an undergraduate and/or postgraduate degree; initially measured using five levels.	(0) No (1) Yes
Employment	Participant had a full-time employment status at the time of the survey.	(0) No (1) Yes
Visitation	Participant had ever visited the GBR.	(0) No (1) Yes
Knowledge (GBR)	Participant's self-rated knowledge about the GBR.	From 1 'know very little' to 10 'know a lot'.

the GBR, and on the effect of a decline of the GBR. We also examined attitudes toward the management of the GBR, regarding the prospects of scientific research to help repair and restore it, and the need for further scientific research. Lastly, we measured attitudes toward future reef management and restoration options. Intercorrelations between our survey variables of interest is provided as Supplementary Material. Regarding our Likert-scale variables (Table 1), we employed a forced-choice approach with a neutral midpoint, which allows respondents to express indifference or neutrality—an option that is often more informative than a "don't know" response that might signal disengagement or a lack of knowledge (Nadler et al., 2015). This approach is particularly effective when combined with questions in the survey designed to assess the level of reef intervention literacy, including measures of knowledge (Table 2) and confidence (Table 1). These literacy assessments help interpret the forced-choice responses by providing context about the respondents' understanding of the subject matter, ensuring that the data is both meaningful and representative (Raaijmakers, 2000).

2.3. Covariates

Covariates included in the analysis to profile respondents and examine differences in responses for both years (2018 and 2022) included background information such as respondents' age, gender, employment, education, location (living $> <$ 50 km from the GBR) and whether respondents identify as Aboriginal or Torres Strait Islander (Table 2). To understand reef dependence and place attachment, past experience with the GBR in terms of past visitation levels were also assessed (Marshall et al., 2017). Lastly respondents were asked a question concerning their self-rated level of knowledge of the GBR.

2.4. Analysis

We started our analyses by providing descriptive results on the distribution of answers in our surveys regarding all our outcomes of interest (Table 1). We then ran multiple regression models to explore relationships between our outcomes and to understand the effect of demographic and contextual covariates (Table 1) on different outcomes. Models were fit using R modelling software (R Core Team, 2013), version 4.2.2. Because all our outcome variables were measured on a 7-point Likert scale, we used ordinal logistic regression models which were implemented using the MASS package in R (Ripley et al., 2013). Using a Brant Test (Brant, 1990; Schlegel and Steenbergen, 2020), we found the proportional odds assumption did not hold for multiple predictors at a 95 % confidence level. Visualization of the data indicated that the violation of the proportional odds assumption was mainly caused by lower density of responses in the lower ordinal outcome levels. Because the data visualization did not indicate any nonlinear relationship between the non-proportional predictors and our outcome of interest, we decided to proceed with the ordinal logistic regression models. For the non-proportional predictors, the effect size represents an average (rather than a proportional) effect size over the different ordinal levels, and this could be more realistic as compared to transforming the ordinal outcome levels into an artificial binary variable (Harrell, 2020).

In our models for the support for different management responses (Research Question 3), we used only one of the *trust in scientific solutions* variables as predictor, depending on the type of management response. We used trust in scientific solutions to *prevent* damage for the prevent threats and increase resilience models, and we used trust in scientific solutions to *repair* damage to the fund research, local restoration, and large-scale restoration models.

All non-binary predictors in the models were scaled using z-scores to reduce multicollinearity and to make effect sizes directly comparable (Abelson, 1995). We tested for multicollinearity through variance inflation factors using the performance package in R (Lüdecke et al., 2021). All predictors in the models had a variance inflation factor below 5, indicating low collinearity. We reported pseudo-R-squared values that were derived by using the DescTools package, specifically the Nagelkerke (Cragg and Uhler) value, which represents the proportion of the total variability in the outcome variable that is accounted for by the model.

3. Results

3.1. Sample description

We sampled a total of 8446 Australian residents (4036 in 2018 and 4410 in 2022). About a third (31 %) of our sample consisted of survey participants that lived in close proximity (<50 km) to the GBR, and we had a relatively even balance in terms of age and gender (Appendix A, Table 3). About a tenth (9 %) of our sample consisted of participants that classified themselves as Aboriginal and/or Torres Strait Islander. About two-thirds (62 %) of the participants had ever visited the GBR and the median knowledge about the GBR was 5 on a ten-point scale. While most of our outcomes of interest (Table 1) had the same median and modus values between survey years, there were a few outcomes that did change over time. In terms of environmental threats, while in 2018 most (modus) of the respondents "agreed (6)" that climate change is negatively affecting the health of the GBR, in 2022 most (modus) of the respondents "strongly agreed (7)" with that same statement. The same pattern was found for respondents' level of concern about the environmental condition of the GBR, and for the respondents' level of support for societal action to try and prevent threats to the GBR in order to slow the rate of damage/degradation. Finally, respondents' level of support for societal action to try and repair all of the GBR through large scale restoration projects increased over time, reflected in a median value that increased from "slight agreement (5)" in 2018 to "agreement (6)" in 2022.

3.2. Impacts on the health of the Great Barrier Reef

Climate change was perceived as the largest threat to the GBR. Australians showed high levels of agreement that climate change is negatively affecting the health of the GBR, with 31 % of respondents strongly agreeing, 27 % agreeing, and 17 % slightly agreeing (Fig. 1). Environmental pests were identified as the second biggest threat, with 57 % of respondents agreeing or strongly agreeing they are negatively affecting the health of the GBR. Shipping and mining were also

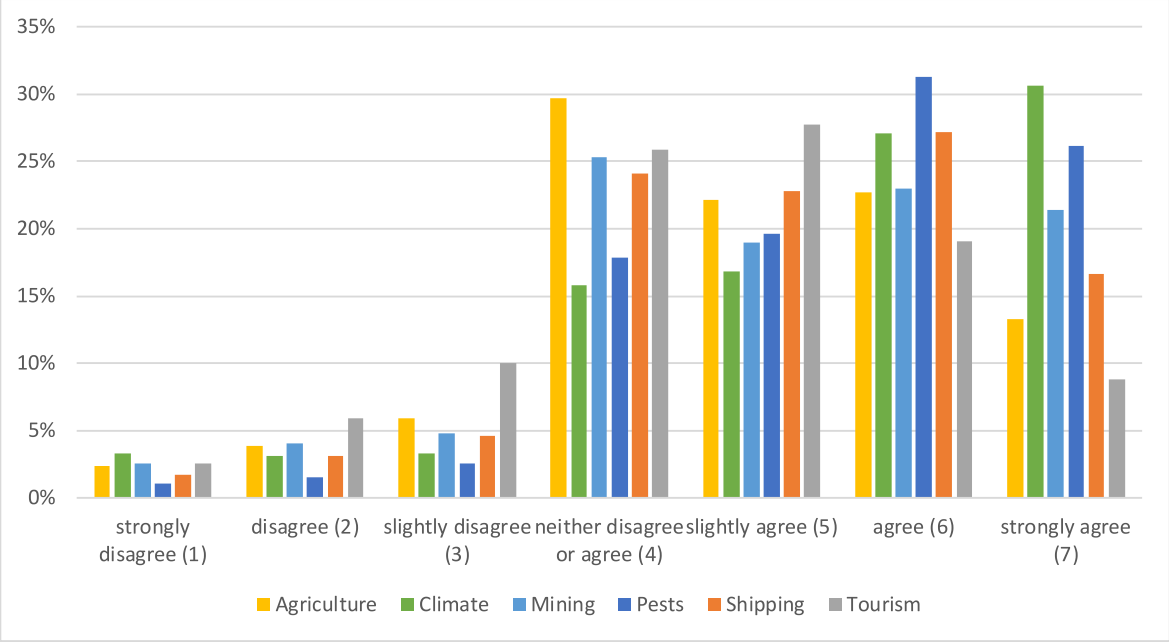

Fig. 1. Australian residents' (n = 8446) agreement with statements about whether different threats or industries are negatively affecting the health of the Great Barrier Reef. Data were collected through surveys in 2018 (n = 4036) and 2022 (n = 4410). Respective median values of 5, 6, 5, 6, 5, and 5 for threats from left to right.

perceived as negatively affecting the health of the GBR with about 44 % of respondents agreeing or strongly agreeing. Agricultural and tourism industries were perceived as relatively lesser threats.

The perceived impacts were relatively similar in both survey years 2018 and 2022 (Fig. 2), except for the perceived impact of climate change, which strongly increased between 2018 and 2022 (mean odds ratio (OR) = 1.35, $p < 0.001$). Except for threats from environmental pests, GBR residents generally perceived less threats, especially from local industries such as mining (OR = 0.71, $p < 0.001$), shipping (OR = 0.73, $p < 0.001$), and tourism (OR = 0.70, $p < 0.001$). Male and older respondents perceived significantly less threats to the GBR, although threats from environmental pests were a strong exception to that rule because older respondents were much more likely to perceive them (OR = 1.64, $p < 0.001$). Especially in terms of impacts from climate change, male (OR = 0.63, $p < 0.001$) and older (OR = 0.74, $p < 0.001$) respondents were much less worried. Aboriginal and Torres Strait Islander respondents were much more worried about GBR impacts from tourism (OR = 1.50, $p < 0.001$) and agriculture (OR = 1.31, $p < 0.001$), and

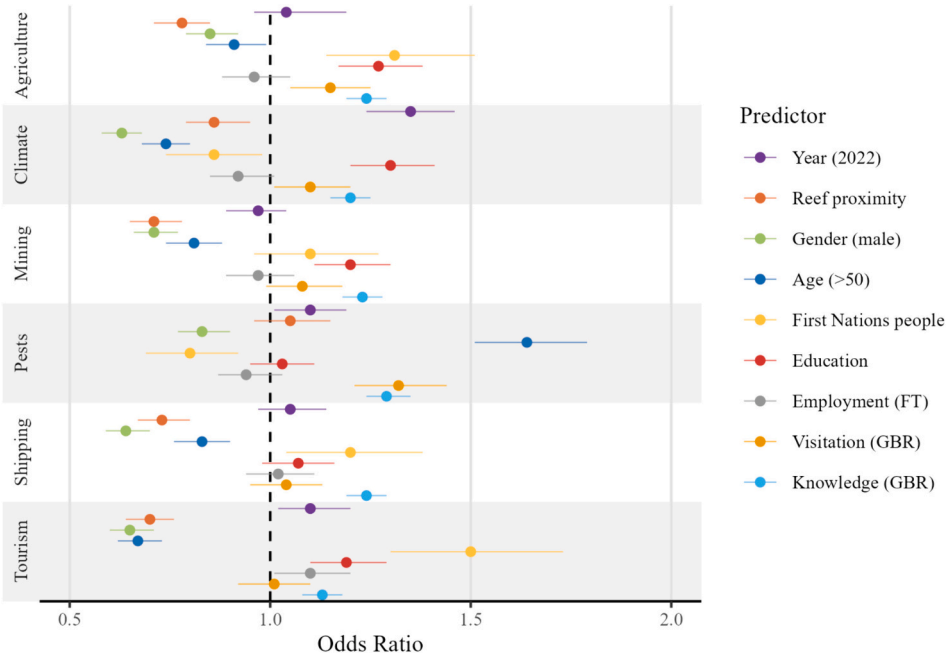

Fig. 2. Effect of temporal, spatial, demographic, and experience factors on agreement with statements about whether different threats (or industries) are negatively affecting the health of the Great Barrier Reef. Figure shows regression statistics (odds ratios at 95 % confidence intervals) for ordinal logistic regression model outcomes. Outcomes are on a 7-point Likert scale (Fig. 1). Significant predictors are those that do not cross the dotted '1' line.

somewhat less worried about environmental pests (OR = 0.80, p = 0.002) and climate change (OR = 0.86, p = 0.027). Education levels, visitation, and knowledge about the GBR generally had a positive effect on perceived threats.

3.3. Concerns about the Great Barrier Reef's environmental condition and future existence

Australians showed high levels of concern about the current condition of the GBR and its future existence, with respectively 30 % and 32 % showing strong agreement, and respectively 29 % and 27 % showing agreement (Fig. 3).

Both the level of concern about the environmental condition of the GBR and the level of worry that the GBR will cease to exist for future generations were overwhelmingly associated with the perceived impact of climate change on the health of the GBR, with respective standardized mean odds ratios of 3.20 ($p < 0.001$) and 3.10 ($p < 0.001$) (Fig. 4). Environmental pests had a stronger effect size on respondents' concern for the existing condition of the GBR rather than its future existence, with respective standardized mean odds ratios of 1.62 ($p < 0.001$) and 1.34 ($p < 0.001$). For worries about the GBR's future existence, perceived mining impacts became more important than those from environmental pests (OR = 1.54, $p < 0.001$). Concerns about the GBR's environmental condition and future existence did not differ strongly between our survey years or between GBR residents and the broader public. Male (OR = 0.73, $p < 0.001$) and Aboriginal and Torres Strait Islander (OR = 0.73, $p < 0.001$) respondents were overall much less worried about the existing condition of the GBR, and male (OR = 0.58, $p < 0.001$) and older (OR = 0.71, $p < 0.001$) respondents were much less worried about its future. Overall, our models explained respectively 59 % and 55 % of the total variance in the environmental concern and future worry levels.

3.4. Potential impacts of Great Barrier Reef decline

Respondents expressed high levels of agreement with the statement that loss of the GBR would devastate the national economy, with 30 % of respondents strongly agreeing, 28 % agreeing, and 20 % slightly agreeing (Fig. 5). There were lower levels of agreement with the statement that the declining health of the GBR would affect respondents personally, although there was more agreement than disagreement with that statement.

GBR residents expressed higher levels of agreement with both statements on the potential impacts of GBR decline, with respective mean odds ratios of 1.20 ($p < 0.001$) and 1.17 ($p < 0.001$) (Fig. 6). The perceived impacts of GBR loss on the national economy increased meaningfully between our survey years (OR = 1.20, $p < 0.001$). Male (OR = 0.48, $p < 0.001$), Aboriginal and Torres Strait Islander (OR = 0.68, $p < 0.001$), and more educated (OR = 0.80, $p < 0.001$) respondents perceived fewer potential impacts of GBR loss on the national economy. Visitation (OR = 1.26, $p < 0.001$) and knowledge of the GBR (standardized OR = 1.27, $p < 0.001$), on the other hand, were associated with higher perceived impacts on the national economy. Male (OR = 0.68, $p < 0.001$), but especially older (OR = 0.54, $p < 0.001$), respondents were much less likely to perceive that they would be personally affected by the declining health of the GBR. Aboriginal and Torres Strait Islander respondents were meaningfully more likely to feel personally affected by declining GBR health (OR = 1.19, p = 0.016), while visitation (OR = 1.32, $p < 0.001$) and knowledge (standardized OR = 1.46, $p < 0.001$) were also positively associated with personal impacts.

3.5. The adequacy of existing Great Barrier Reef management

Respondents expressed only tentative agreement with the statement the GBR is well-managed, with 27 % of respondents disagreeing to some extent and 28 % neutral responses (Fig. 7). However, there was strong support from Australians for the proposition that more should be done to save the GBR, with 41 % strongly agreeing, 29 % agreeing, and 15 % slightly agreeing.

Confidence levels that the GBR is well-managed were meaningfully higher in 2022 compared to 2018 (OR = 1.28, $p < 0.001$), but there was no increase in support for more action between survey years (OR = 0.98, p = 0.665) (Fig. 8). There was no meaningful difference between GBR residents and the broader public. Respondents who were more concerned about the condition of the GBR (standardized OR = 0.78, $p < 0.001$), and especially those who were more worried about its future existence (standardized OR = 0.61, $p < 0.001$), were much less confident that the GBR is well-managed. Aboriginal and Torres Strait Islander, on the other hand, were much more confident that the GBR is well-managed (OR = 1.92, $p < 0.001$). Whether respondents believed more should be done to save the GBR was overwhelmingly associated with how they concerned they were about its current condition (standardized OR = 3.32, $p < 0.001$), while worries about the GBR's future existence (standardized OR = 2.42, $p < 0.001$) and the perceived impacts of GBR loss on the national economy (standardized OR = 1.69, $p < 0.001$) also had strong effect sizes. Older respondents were much more agreeable that more should be done to save the GBR (OR = 1.58, $p < 0.001$), while the opposite effect was found for Aboriginal and Torres

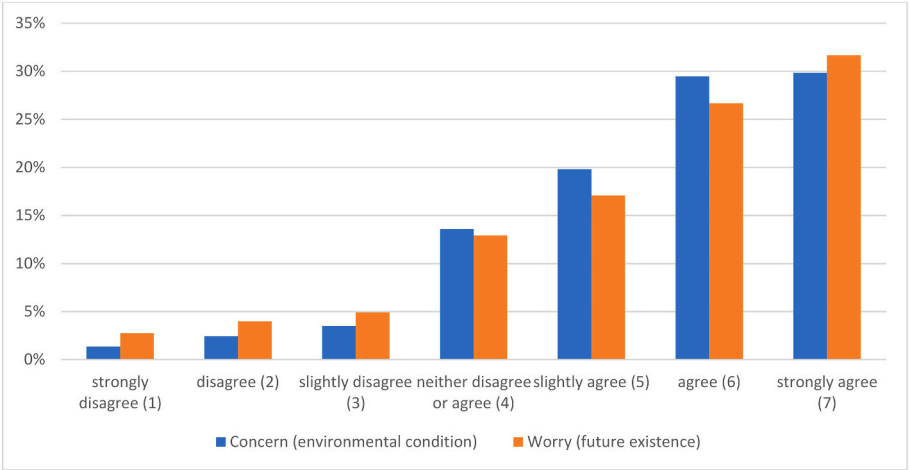

Fig. 3. Australian residents' (n = 8446) agreement with statements regarding (1) concern about the environmental condition of the Great Barrier Reef; and (2) worry that the Great Barrier Reef will cease to exist for future generations. Data was collected through surveys in the years 2018 (n = 4036) and 2022 (n = 4410). Respective median values of 6 and 6.

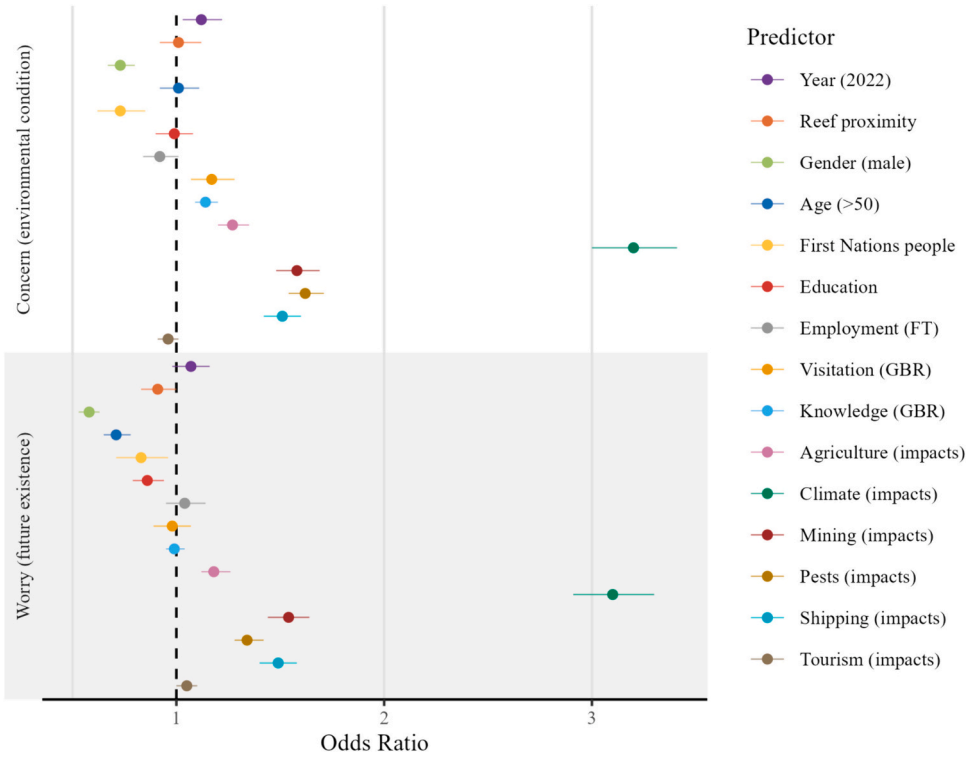

Fig. 4. Effect of temporal, spatial, demographic, experience factors, and perceptions of impacts on agreement with statements regarding (1) concern about the environmental condition of the Great Barrier Reef; and (2) worry that the Great Barrier Reef will cease to exist for future generations. Figure shows regression statistics (odds ratios at 95 % confidence intervals) for ordinal logistic regression model outcomes. Outcomes are on a 7-point Likert scale (Fig. 3). Significant predictors are those that do not cross the dotted '1' line.

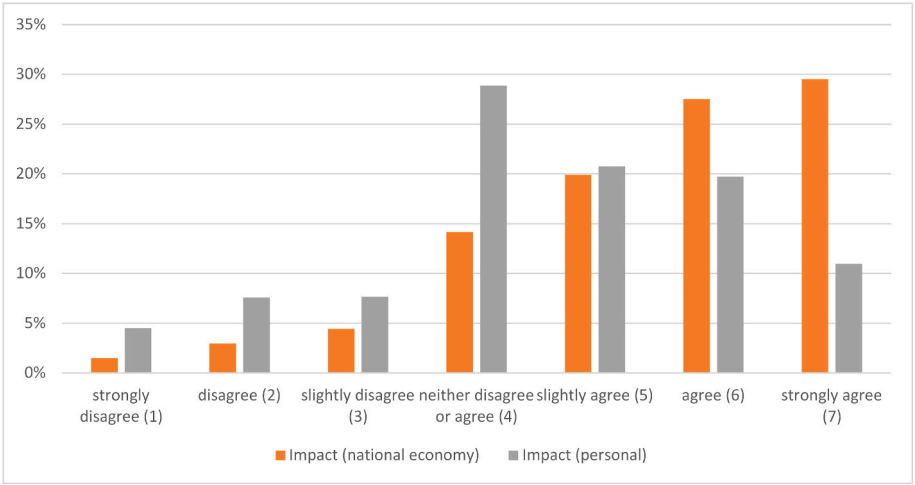

Fig. 5. Australian residents' (n = 8446) agreement with statements about whether (1) Great Barrier Reef loss would devastate the national economy; and (2) the declining health of the Great Barrier Reef would impact them personally. Data was collected through surveys in the years 2018 (n = 4036) and 2022 (n = 4410). Respective median values of 5 and 6.

Strait Islander respondents (OR = 0.52, $p < 0.001$). Overall, our model on more action for the GBR explained a large fraction of the total variance (60 %), while our model had less predictive power for perceptions of existing management (12 %).

3.6. Trust in scientific solutions

Respondents were overwhelmingly supportive of scientific research and the contribution it can make to help prevent and repair damage to the GBR, with respectively 83 % and 82 % of respondents at least slightly agreeing (Fig. 9).

Respondents were much more confident in 2022 than they were in 2018 that scientific research can provide solutions to help prevent and repair damage to the GBR, with respective mean odds ratios of 1.60 ($p < 0.001$) and 1.61 ($p < 0.001$) (Fig. 10). GBR proximity, age, education, visitation, and knowledge were all positively associated with trust in scientific solutions, while male and Aboriginal and Torres Strait Islander respondents had less trust in scientific solutions for the GBR.

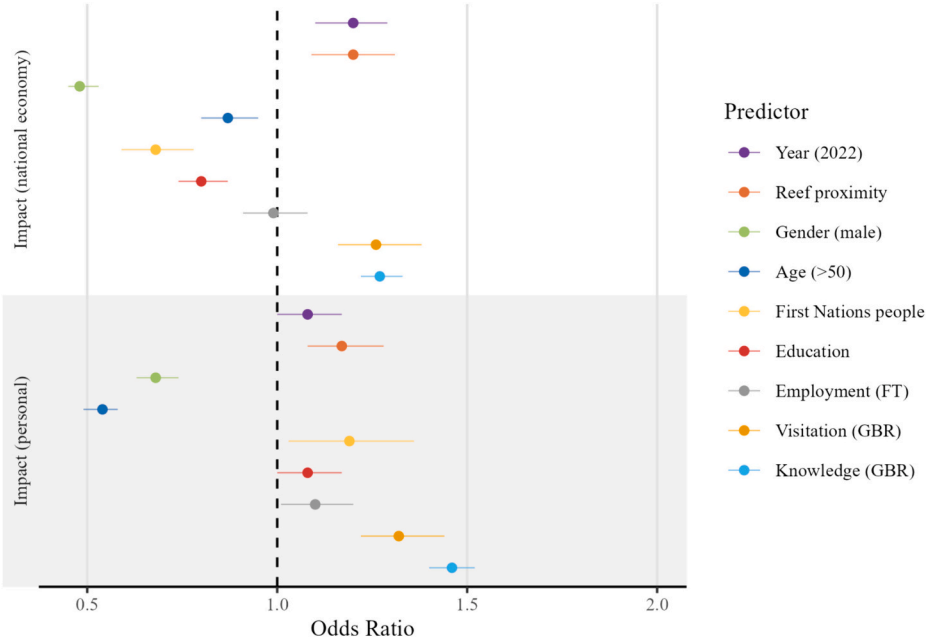

Fig. 6. Effect of temporal, spatial, demographic, and experience factors on agreement with statements about whether (1) Great Barrier Reef loss would devastate the national economy; and (2) the declining health of the Great Barrier Reef would impact them personally. Figure shows regression statistics (odds ratios at 95 % confidence intervals) for ordinal logistic regression model outcomes. Outcomes are on a 7-point Likert scale (Fig. 5). Significant predictors are those that do not cross the dotted '1' line.

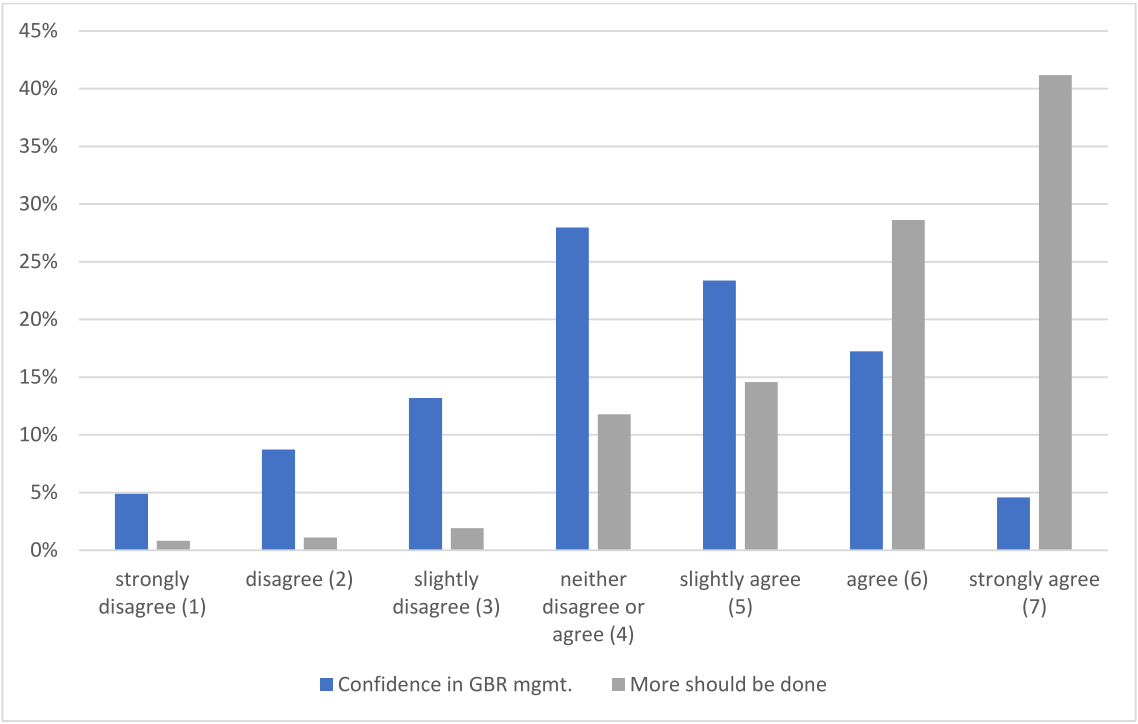

Fig. 7. Australian residents' (n = 8446) agreement with statements about whether (1) they feel confident that the Great Barrier Reef is well-managed; (2) more should be done to save the Great Barrier Reef considering potential values and threats. Data was collected through surveys in 2018 (n = 4036) and 2022 (n = 4410). Respective median values of 4 and 6.

3.7. Support for management responses

Respondents expressed strong to very strong support for all of the potential management responses included in our survey. As Fig. 11 shows, they were most supportive of preventing threats (86 % at least slightly agreed) with slightly lower levels of support for local restoration (82 %), measures to increase the resilience of the GBR to future threats (79 %), providing more research funding (77 %), and large-scale restoration (73 %). A significant minority (11–18 %) neither agreed nor disagreed while a maximum of 9 % (for large-scale restoration) opposed any of the responses.

Belief in the need for more action to save the GBR and trust in science

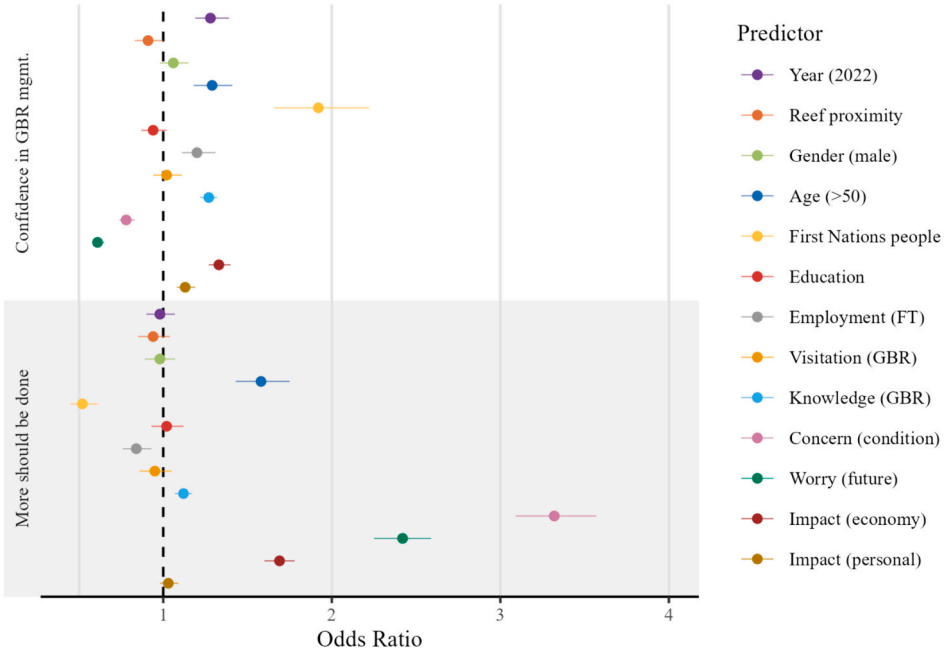

Fig. 8. Effect of temporal, spatial, demographic, experience factors, environmental and economic concerns on agreement with statements about whether (1) they feel confident that the Great Barrier Reef is well-managed; (2) they think enough is being done to effectively manage the Great Barrier Reef; and (3) more should be done to save the Great Barrier Reef considering potential values and threats. Figure shows regression statistics (odds ratios at 95 % confidence intervals) for ordinal logistic regression model outcomes. Outcomes are on a 7-point Likert scale (Fig. 7). Significant predictors are those that do not cross the dotted '1' line.

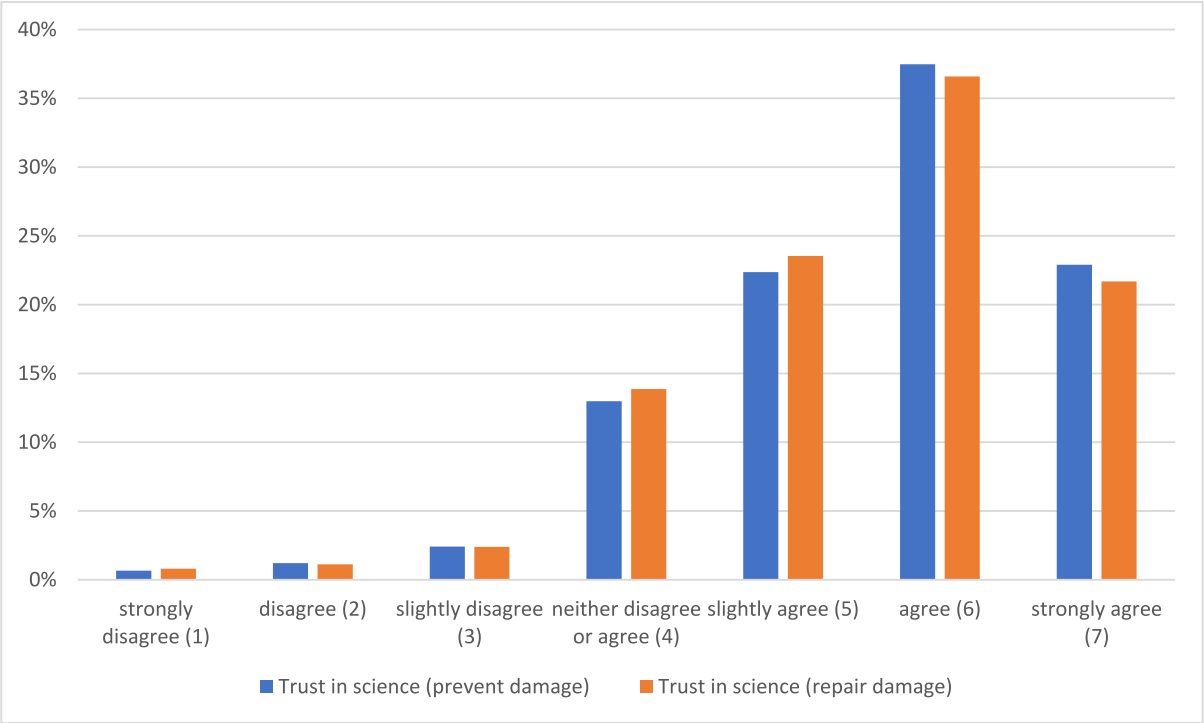

Fig. 9. Australian residents' (n = 8446) agreement with statements about whether (1) scientific research can provide solutions to help prevent damage to the Great Barrier Reef; and (2) scientific research can provide solutions to help repair the damage to the Great Barrier Reef. Data was collected through surveys in 2018 (n = 4036) and 2022 (n = 4410). Respective median values of 6 and 6.

to deliver solutions both had major effects on support for all management responses, with standardized mean effect sizes in the range of 1.79 to 3.41 (Fig. 12). Respondents who supported more action to save the GBR were more likely to support all types of action, but especially more research funding to examine solutions to help the GBR (standardized OR = 3.41, $p < 0.001$), action to prevent threats to the GBR (standardized OR = 3.35, $p < 0.001$), and local restoration (standardized OR = 2.88, $p < 0.001$). Trust in scientific solutions to help prevent or repair damage to the GBR had a strong effect size on support for all types of management responses but especially so on the provision of more funding for

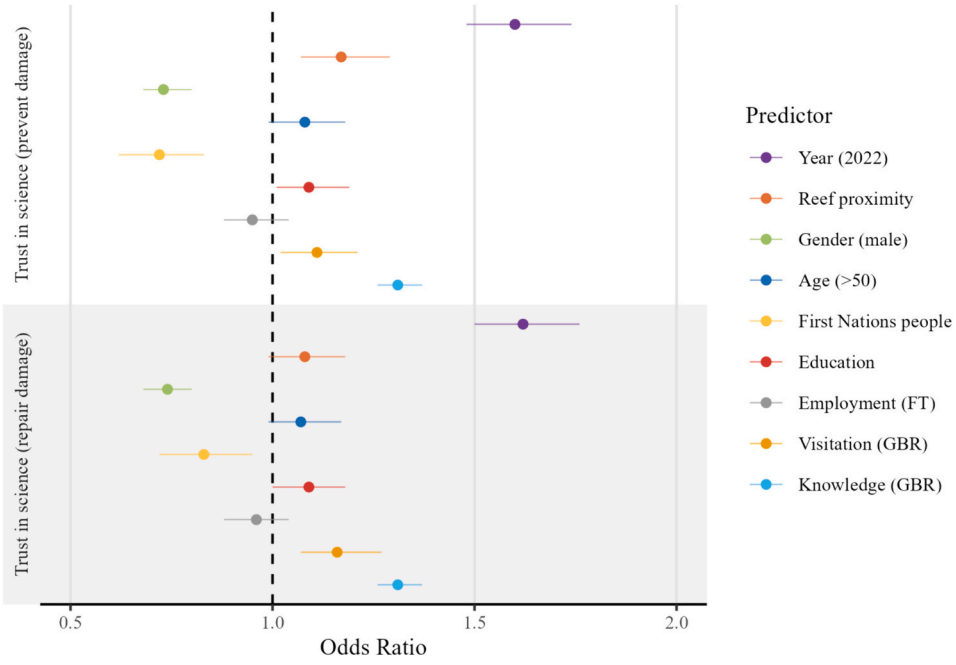

Fig. 10. Effect of temporal, spatial, demographic, and experience factors on agreement with statements about whether (1) scientific research can provide solutions to help prevent damage to the Great Barrier Reef; and (2) scientific research can provide solutions to help repair the damage to the Great Barrier Reef. Figure shows regression statistics (odds ratios at 95 % confidence intervals) for ordinal logistic regression model outcomes. Outcomes are on a 7-point Likert scale (Fig. 11). Significant predictors are those that do not cross the dotted '1' line.

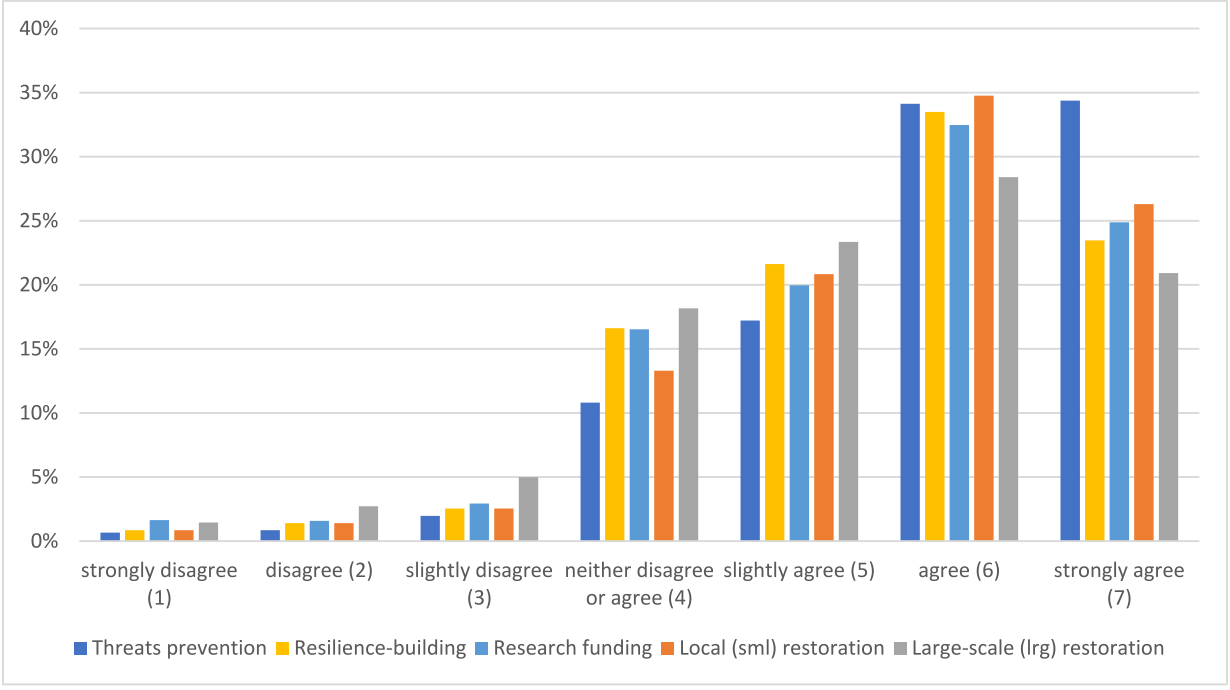

Fig. 11. Australian residents' (n = 8446) agreement with statements about whether (1) society should try and prevent threats to the reef in order to slow the rate of damage/degradation; (2) society should try to increase the resilience (e.g., using adaptation interventions or technologies) of the Great Barrier Reef to future threats; (3) society should try and provide more research funding to examine solutions to help the Great Barrier Reef; (4) society should try and repair the most degraded parts of the Great Barrier Reef through local restoration projects; and (5) society should try and repair all of the Great Barrier Reef through large scale restoration projects. Data was collected through surveys in 2018 (n = 4036) and 2022 (n = 4410). Respective median values of 6, 6, 6, 6, and 5.

research (standardized OR = 3.11, $p < 0.001$).

Other variables with significant associations with management responses in the regression models had relatively minor effect sizes. In the 2022 surveys, we found slightly higher support for action to prevent threats to the GBR (standardized OR = 1.16, $p = 0.001$) and local restoration (standardized OR = 1.15, $p = 0.001$). We found marginally lower support for measures to increase GBR resilience (standardized OR = 0.85, $p < 0.001$), which may be an artifact of a small difference in the

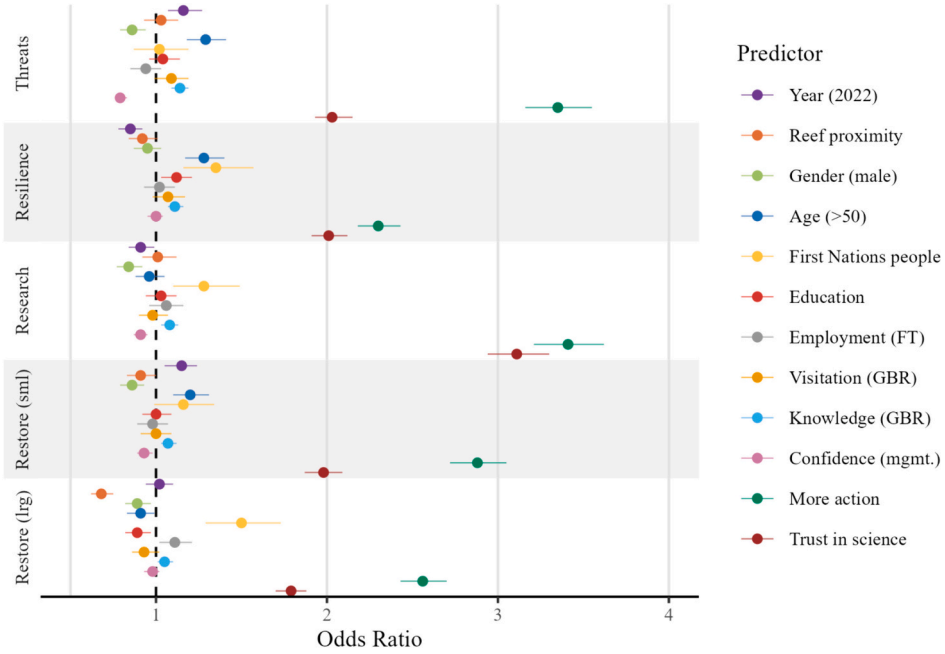

Fig. 12. Effect of temporal, spatial, demographic, experience factors, management perceptions, and trust in science on expressed levels of agreement with statements about whether (1) society should try and prevent threats to the reef in order to slow the rate of damage/degradation; (2) society should try to increase the resilience (e.g., using adaptation interventions or technologies) of the Great Barrier Reef to future threats; (3) society should try and provide more research funding to examine solutions to help the Great Barrier Reef; (4) society should try and repair the most degraded parts of the Great Barrier Reef through local restoration projects; and (5) society should try and repair all of the Great Barrier Reef through large scale restoration projects. Figure shows regression statistics (odds ratios at 95 % confidence intervals) for ordinal logistic regression model outcomes. Outcomes are on a 7-point Likert scale (Fig. 11). Significant predictors are those that do not cross the dotted '1' line.

survey question between survey years (Table 1). GBR residents indicated meaningfully lower levels of support for large-scale restoration (OR = 0.68, $p < 0.001$), while the opposite was found for Aboriginal and Torres Strait Islander respondents (OR = 1.50, $p < 0.001$), who also showed much stronger support for measures to increase GBR resilience (OR = 1.35, $p < 0.001$) and to provide more research funding to examine solutions to help the GBR (standardized OR = 1.28, $p = 0.002$). Male respondents were overall slightly less supportive of the various management responses, while older respondents were generally more supportive. Overall, our models explained about 30 to 40 % of the total variance (48 % for preventing threats, 36 % for resilience-building, 38 % for research funding, 42 % for local restoration, and 35 % for large-scale restoration).

4. Discussion

Consistent with prior research (Goldberg et al., 2016), the vast majority of Australians surveyed through this study were concerned about the environmental condition of the GBR and worry it will cease to exist for future generations (Fig. 3). Also consistent with prior research (Curnock et al., 2019; Goldberg et al., 2016; Thiault et al., 2021), perceived threats to the GBR including climate change were the strongest correlates of concern for its condition and future. Interestingly, while Australians acknowledged several threats to the GBR (Fig. 1), the levels of concern about the existing and future condition of the reef were overwhelming associated with the perceived impact of climate change on GBR condition while other threats had relatively minor effects (Fig. 4). Notably, the perceived impact of climate change increased strongly between our survey years 2018 and 2022 (Fig. 2). This finding may be regarded as counter-intuitive given the first survey in 2018 followed back-to-back mass coral bleaching events in 2016 and 2017 (AIMS, 2018; GBRMPA, 2017a) while the second, in 2022, followed a period both of recovery in coral cover across the GBR (AIMS, 2022) and of social disruption associated with the COVID-19 pandemic. In a global study, Hornsey et al. (2022) note time lag affects between global warming and a decline in climate change scepticism, which may explain these findings. Neumann et al. (2022) also provide evidence to support an increase in concern for climate change. Their study tracked changes in Australian's perceptions of climate change noting a significant increase between 2011 and 2020. Our findings suggest, similarly, that climate change is becoming more entrenched in the minds of Australians and threats to the GBR are increasingly linked to climate change and global warming.

Strong action to mitigate climate change stands out as a clear prerequisite for ongoing public support of GBR protection programs. The vast majority of respondents believed more should be done to save the GBR and actions to prevent threats – of which climate change was perceived as the most serious – received the highest levels of support. At the same time, a significant minority questioned the effectiveness of current GBR management or were neutral suggesting a lack of information or understanding (see also Goldberg et al., 2016). We also found high to very high support was expressed for additional actions including the scaling up of restoration, building resilience to future threats, and developing new solutions. Combined with high levels of trust in science to help deliver those solutions, this suggests the majority of respondents support a comprehensive and multi-pronged approach to ensuring the future of the GBR. While this should not be interpreted as endorsement of specific research and development initiatives, it does suggest that proactive measures to both mitigate, and adapt to, climate change are important to the maintenance of public support. It may also suggest that even with any potential advances in scalable restoration technologies, there is public recognition that there is no single or quick technological fix.

Importantly, this observed posture among public respondents – of supporting a comprehensive set of management actions addressing threats, building knowledge, resilience and actively restoring at local and larger scales – corresponds with the stated positions of marine park management authorities, stakeholders and researchers working in the

field (GBRMPA, 2017b). This presents a significant opportunity for broad communicative alignment between publics, managers and the science community on the overall rationale and means of intervention. If indeed there is the prospect of some consensus, and novel scalable restoration technologies can be seen as additive rather than replacing existing management or preventative efforts, this then focuses attention on the organisational and institutional capabilities of managers, scientists, and stakeholders to undertake diverse and interrelated actions at multiple scales. We believe this question of the collective capacity to act and govern such a set of responses is an emerging and critical question for investigation. Moreover, it points to the need to consider how the procedural and distributive outcomes of such a program of action are anticipated and equitably and appropriately managed in future implementation planning (Vella et al., 2021).

That scientists and scientific institutions are more trusted than others as sources of information about environmental condition and degradation is well established (Brewer and Ley, 2013). The focus here though on trust in scientific research to provide solutions to help prevent and repair damage to the GBR is novel and bears drawing out. Trust in science to provide solutions roughly doubled the likelihood of respondents expressing support for any action to protect and repair reefs (Le et al., 2022; Mankad et al., 2021) while trust in science itself increased dramatically between the two surveys. While the relationship between trust and support makes intuitive sense, there is nothing in our conceptual model that explains the increase in trust between 2018 and 2022. We believe it possible that increased communication regarding Australia's Reef Restoration and Adaptation Program (RRAP) and other programs related to reef restoration could have contributed to increased trust in scientific solutions for the GBR. The COVID-19 pandemic and the role of scientists in understanding transmission, communicating public health messages, and developing vaccines and treatments could also have been influential (Bromme et al., 2022; Goldfinch et al., 2021).

Strong perceptions of climate change impact and trust in science to provide solutions stand in stark contrast to the prominence of scepticism toward science in public debate over the reality, causes, and implications of anthropogenic climate change (Lockie, 2023). Promoting confusion and distrust, are political and industry alliances that seek to exploit uncertainty, economic dependence, and nationalism to advance their own interests (Bell et al., 2019; Bowden, 2018; Liu, 2015; Stoddart et al., 2017). The results presented here lend credence to arguments that polarisation of the political and media spheres amplifies these voices of denial despite what is, in fact, widespread confidence in scientists and scientific institutions to act on real and pressing problems (Lockie, 2020).

Given the significant representation of Aboriginal and Torres Strait Islanders ($n = 746$, see our sample description in Appendix A), our survey findings provide a unique insight into First Nation people's perceptions of the GBR and its management. We found that Aboriginal and Torres Strait Islander respondents expressed significantly (when considering other model effects) lower levels of trust in science to deliver solutions. Aboriginal and Torres Strait Islander respondents were also significantly less concerned about the condition of the GBR (Fig. 4), much more confident the GBR is well-managed (Fig. 8), and much less supportive of more action to save it (Fig. 8). Aboriginal and Torres Strait Islander respondents showed higher levels of support, however, than non-Indigenous respondents for research funding for reef solutions, large-scale restoration, and reef resilience responses (Fig. 12). Given Indigenous peoples' troubled relationship with the idea of wilderness conservation (Fletcher et al., 2021), it is not necessarily surprising that Aboriginal and Torres Strait Islander respondents were less concerned about the GBR's environmental condition and more open to novel interventions. These results may suggest that Aboriginal and Torres Strait Islander respondents are more likely to conceive of the GBR as a managed system in which people and ecologies have co-evolved since time immemorial than as a pristine system needing protection from humans (Ford et al., 2020; Sheremata, 2018).

Men, similar to Aboriginal and Torres Strait Island respondents, had lower trust in scientific solutions and they were far less concerned than women about the condition of the GBR or its future (Fig. 4). This did not, however, translate into meaningfully different levels of support for actions to protect and repair the GBR (Fig. 12). Conflicting evidence was found for older respondents, in that they were less concerned about the GBR's future (Fig. 4) but, at the same time, they were more supportive of action to save the GBR compared to younger respondents (Fig. 8). It should be noted that these demographic comparisons should be interpreted with care, given that (1) they are based on a sample of the total population; and (2) they are based on marginal regression effects, where other predictive factors are considered. More comprehensive research on demographic differences, for example using latent class analysis, could be the focus of future research.

In sum, these results suggest that communications targeting Aboriginal and Torres Strait Islander Australians, men, and older Australians, should focus on the implementation of solutions or direct action rather than on trying to convince them the GBR is under threat. Targeted communication is required using examples and images of current approaches. As Neumann et al. (2022) argue, the same message is likely to be responded differently depending on who delivers it. A more targeted approach based on segments is also suggested (Neumann et al., 2022). For instance, those that are disengaged or cautious may rely on peripheral routes or heuristics, such as level of trust in the message and images, while those that are engaged in the issue may require more detailed information and facts about scientific research and possible solutions (Petty et al., 1983). Designing effective messages are crucial to increase knowledge, trust and support for direct interventions in the GBR.

This research has demonstrated strong relationships between the perceived impact of climate change on the GBR, concern about its condition and future, and support for actions both to mitigate climate change and to adapt to its impacts (see also Mankad et al., 2021). Although our modelling treats this as evidence beliefs about climate change are driving perceptions of ecosystem condition and appropriate management responses it is likely the relationships are multidirectional (Anthony et al., 2020). Research into the effects of exposure to extreme weather on climate beliefs, for example, provides evidence that observation or experience of local environmental change can increase the perceived impact of global environmental change (Cutler et al., 2020). Increased attention among Australian residents to cycles of coral bleaching and recovery over recent decades may thus have elevated the perceived role of global climate change and the importance of addressing it. Our findings contribute to calls for better understanding of the complex feedback loops between changes in ecosystem condition, public perceptions of local and global causes, and social impacts and responses (Bartelet et al., 2022; Dajka et al., 2020; Sterman, 2012).

5. Conclusion

The vast majority of Australian residents believe anthropogenic climate change is negatively affecting the health of the GBR and they support multi-pronged action for protection and repair. Strong support was expressed through this research both for actions that work to mitigate threats such as climate change and for actions that promote adaptation. Small- and large-scale restoration and actions to build reef resilience all received strong support. Confidence in science to develop solutions for reef protection and repair was similarly high and strongly correlated with support for restorative and resilience-building action. Confidence in existing reef management, however, was found to be one of the few questions in our survey to which respondents showed lesser agreement levels, with 55 % of the respondents either disagreeing or providing neutral responses (Fig. 7). Thus, our results suggest that urgent, comprehensive, and scientifically informed action against threats from climate change is needed to build public confidence in GBR management.

At the same time, more research is needed to understand whether support for small- and large-scale restoration and other resilience-building actions in the GBR is reflected in support for specific technology and/or management options and, further, whether this support is reflected in reef and non-reef ecosystems elsewhere. Based on the limitations and scope of this research we provide some specific and more general calls for research. First, at an individual level, understanding the predictors of trust in scientific solutions should be examined more fully. The competence and trust of scientific solutions or scientists themselves could be explored. Other factors such as political affiliation and issue involvement may also influence trust and support for action (Neumann et al., 2022) and could be included in future studies. Due to a significant number of neutral or negative responses to the current management of the GBR, designing and testing effective communication mechanisms could increase knowledge, trust and support not just for the overall management of the GBR and but also for more novel technologies. These could be targeted to groups using our research findings.

Second, at a general or broader level, given the immense cultural, spiritual, social, and economic significance of reefs and other ecosystems it is also important to note the importance of understanding the implications for people of any change in ecosystem management before it is made. Further research is needed on effective ways to engage stakeholder in the design and deployment of interventions. Understanding the type and spread of benefits is also crucial. Action research and longitudinal studies may be appropriate research designs to use in this context. What is undeniable is that the development of novel restoration and adaptation measures without deep engagement with impacted communities and stakeholders and the full, prior and informed consent of rights-holders including First Nations risks loss of public support.

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Research ethics

This research adheres to the National Statement on Ethical Conduct in Human Research. Human ethics approval was granted prior to data collection by the University of Queensland Human Research Ethics Committee (ref: 2018/HE001183 and 2021/HE002586). Reciprocal approval was granted by the James Cook University Human Research Ethics Committee (ref: H9172).

CRediT authorship contribution statement

Stewart Lockie: Writing – original draft, Supervision, Methodology, Funding acquisition, Conceptualization. **Henry A. Bartelet:** Writing – original draft, Methodology, Formal analysis. **Brent W. Ritchie:** Writing – review & editing, Supervision, Methodology, Funding acquisition, Conceptualization. **Csilla Demeter:** Writing – original draft, Methodology, Investigation, Conceptualization. **Bruce Taylor:** Writing – original draft, Supervision, Methodology, Funding acquisition, Conceptualization. **Lintje Sie:** Writing – review & editing, Project administration, Investigation, Data curation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that has been used is confidential.

Acknowledgements

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Appendix A. Sample description

Table 3
Sample description.

Indicator	Level	Frequency (fraction)		
		2018	2022	Combined
Surveys	#	4036 (48 %)	4410 (52 %)	8446 (100 %)
Reef proximity	>50 km from the GBR	2743	3082	5825 (69 %)
	<50 km from the GBR	1293	1328	2621 (31 %)
Gender	Female	2172 (54 %)	2350 (53 %)	4522 (54 %)
	Male	1858 (46 %)	2057 (47 %)	3915 (46 %)
Age group	<50 years	2299 (57 %)	2383 (54 %)	4682 (55 %)
	>50 years	1737 (43 %)	2027 (46 %)	3764 (45 %)
First Nations peoples	No	3432 (86 %)	4245 (96 %)	7677 (91 %)
	Yes	581 (14 %)	165 (4 %)	746 (9 %)
Education (graduate degree)	No	2485 (62 %)	2388 (54 %)	4873 (58 %)
	Yes	1528 (38 %)	2022 (46 %)	3550 (42 %)
Employment (full-time)	No	2498 (62 %)	2503 (57 %)	5001 (59 %)
	Yes	1515 (38 %)	1907 (43 %)	3422 (41 %)
Reef visitation	No	1526 (38 %)	1702 (39 %)	3228 (38 %)
	Yes	2510 (62 %)	2708 (61 %)	5218 (62 %)

(*continued on next page*)

Table 3 (*continued*)

Indicator	Level	Frequency (fraction)		
		2018	2022	Combined
Knowledge (GBR)	Median (10-scale Likert)	6	5	5
	Modus (10-scale Likert)	5	5	5
Perceived threat (agriculture)	Median (7-scale Likert)	5	5	5
	Modus (7-scale Likert)	4	4	4
Perceived threat (climate change)	Median (7-scale Likert)	6	6	6
	Modus (7-scale Likert)	6	7	7
Perceived threat (environmental pests)	Median (7-scale Likert)	6	6	6
	Modus (7-scale Likert)	6	6	6
Perceived threat (mining industry)	Median (10-scale Likert)	5	5	5
	Modus (10-scale Likert)	4	4	4
Perceived threat (shipping)	Median (7-scale Likert)	5	5	5
	Modus (7-scale Likert)	6	6	6
Perceived threat (tourism industry)	Median (7-scale Likert)	5	5	5
	Modus (7-scale Likert)	5	5	5
GBR condition (concern)	Median (7-scale Likert)	6	6	6
	Modus (7-scale Likert)	6	7	7
Future existence (worry)	Median (7-scale Likert)	6	6	6
	Modus (7-scale Likert)	7	7	7
GBR loss (impact on national economy)	Median (7-scale Likert)	6	6	6
	Modus (7-scale Likert)	7	7	7
GBR declining health (personal impact)	Median (7-scale Likert)	5	5	5
	Modus (7-scale Likert)	4	4	4
GBR well-managed (confidence)	Median (7-scale Likert)	4	4	4
	Modus (7-scale Likert)	4	4	4
More should be done to save GBR	Median (7-scale Likert)	6	6	6
	Modus (7-scale Likert)	7	7	7
Trust in science (prevent damage)	Median (7-scale Likert)	6	6	6
	Modus (7-scale Likert)	6	6	6
Trust in science	Median (7-scale Likert)	6	6	6
(repair damage)	Modus (7-scale Likert)	6	6	6
Prevent threats to the reef (support)	Median (7-scale Likert)	6	6	6
	Modus (7-scale Likert)	6	7	7
Increase resilience to future threats (support)	Median (7-scale Likert)	6	6	6
	Modus (7-scale Likert)	6	6	6
Research to examine solutions (support)	Median (7-scale Likert)	6	6	6
	Modus (7-scale Likert)	6	6	6
Local restoration projects (support)	Median (7-scale Likert)	6	6	6
	Modus (7-scale Likert)	6	6	6
Large-scale restoration projects (support)	Median (7-scale Likert)	5	6	5
	Modus (7-scale Likert)	6	6	6

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