

# EVALUATING THE USEFULNESS OF CITIZEN SCIENCE FOR NATURAL RESOURCE MANAGEMENT IN MARINE ENVIRONMENTS

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## CERTIFICATE OF ORIGINAL` AUTHORSHIP

*I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.*

*I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.*

*Signature of Student:*

*Date:*

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# TABLE OF CONTENTS

CERTIFICATE OF ORIGINAL` AUTHORSHIP .....	iii
Acknowledgements.....	iv
Table of Figures.....	viii
Abstract .....	xiii
Chapter 1: Introduction .....	1
Chapter 2: Issues and Opportunities For Citizen Science In Natural Resource Management in Australia .....	5
2.1 Environmental Management Models.....	6
2.2 Models of Community Participation in Natural Resource Management.....	7
2.3 Citizen Science in Context.....	9
2.4 Outcomes of Citizen Science.....	11
2.4.1 Outcomes for Science .....	16
2.4.1.1 Factors influencing Science Outcomes.....	17
2.4.2 Outcomes for Individuals .....	19
2.4.3 Outcomes for Society .....	21
2.5 Conclusions.....	22
Chapter 3 Assessing the quality of data collected by citizen scientist SCUBA divers for monitoring seagrass condition .....	25
Abstract.....	25
3.1 Introduction.....	26
3.2 Methods.....	29
3.2.1 Study Site .....	29
3.2.2 Participants.....	30
3.2.3 Field experiment: hypotheses and sampling design.....	30
3.2.4 Lab experiment: hypotheses and sampling design .....	31
3.2.5 Influence of photo quality.....	32

3.2.6	Volunteers' attitudes and perceptions .....	32
3.2.9	Statistical analyses .....	33
3.3	Results .....	34
3.3.1	Field experiment .....	34
3.3.2	Lab experiment .....	36
3.3.3	Photo quality .....	41
3.3.4	Volunteer attitudes .....	42
3.4	Discussion .....	43
3.5	Conclusion .....	46
	Acknowledgements .....	47
	Supplementary Table S3.1 .....	48
	Supplementary Table S3.2 .....	60
	References .....	63
Chapter 4	.....	67
	Who Cares about Citizen Science? A Survey on the Utility of marine citizen science in Australia .....	67
	Summary .....	68
4.1	Introduction .....	69
4.2	Methods .....	71
4.3	Results .....	72
4.3.1	General respondent information .....	72
4.3.2	Characteristics of Citizen Scientists .....	74
4.3.3	Characteristics of Data User Organisations .....	78
4.3.4	Uses of Citizen Science Data .....	81
4.4	Discussion .....	83
4.5	Conclusions .....	85
	Acknowledgements .....	87

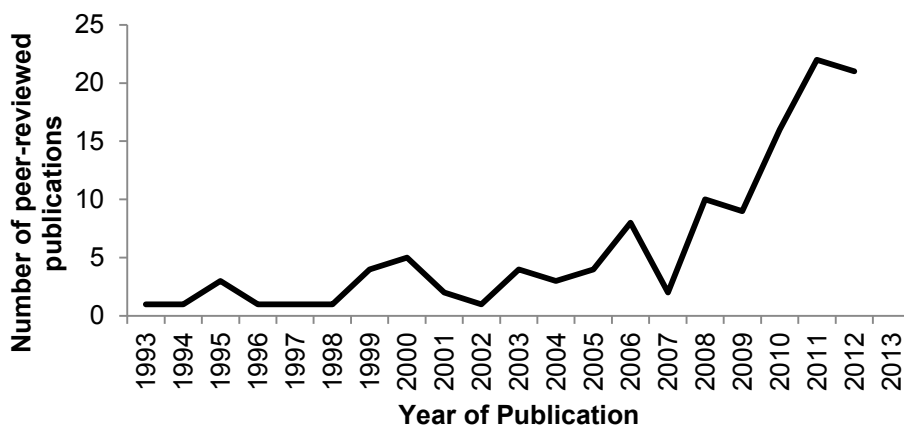
Appendix S4.1 Questionnaire.....	88
Appendix S4.2: Citizen Science Publications based on Australian Citizen Science Activities.....	96
References.....	104
Chapter 5: General Discussion and Conclusion.....	108
5.1 Introduction.....	108
5.2 Benefits of Citizen Science.....	108
5.3 Challenges to the Field of Citizen Science.....	109
5.3.1 Data Issues.....	109
5.3.2 Funding and support for Citizen Science.....	111
5.4 Citizen Science and Natural resource Management.....	113
5.5 Practical solutions for integrated citizen science.....	114
Appendix 1: Glossary.....	117
References.....	119

## TABLE OF FIGURES

Figure 2.1. The number of peer-reviewed publications with the key word “citizen science” using web of science database. n=347 publications 1900-2013..... 11

Table 2.1: Models of public-scientist interactions in citizen science (Shirk et al. 2012), in order (from top to bottom of table) of increasing public involvement..... 12

Table 2.2: Evaluation of the five models of citizen science against outcomes for science, individuals and society (SYNTHESIZED FROM Lunney & Matthews 2002; Ely 2008b; Danielsen et al. 2009; Conrad & Hilchey 2011; Shirk et al. 2012). Models are in order of increasing public involvement (from top to bottom) as per Table 2.1..... 13



.....28

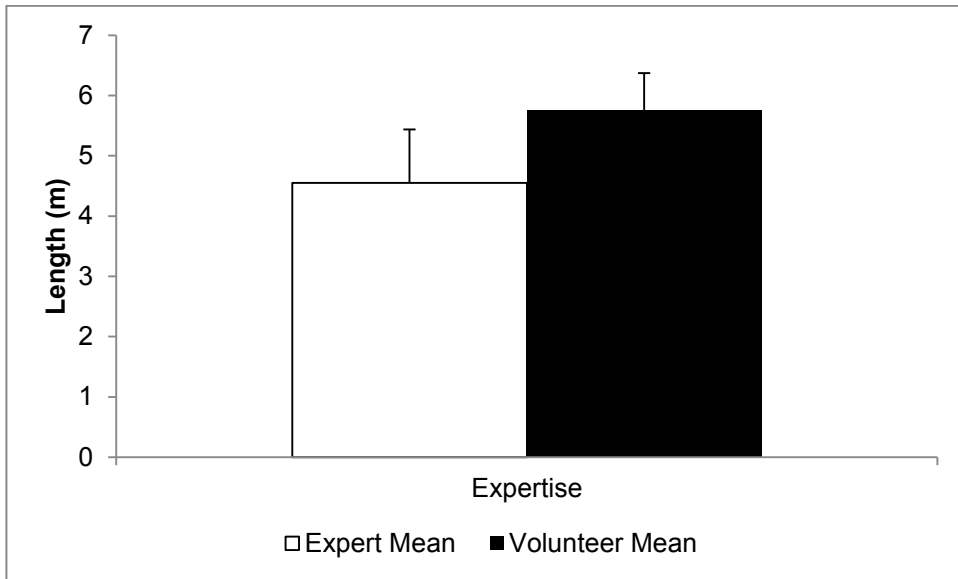
Figure 3.1. Peer-reviewed publications implying use of citizen science for marine data collection, 1993 to 2012. Compiled list of references can be found in Supplementary Table S3.1. .... 28

Table 3.1. Questions asked of volunteers after a training session to assess their level of enjoyment with the data processing (lab) experiment. n=7 ..... 33

Table 3.2. Summary of PERMANOVAs testing for differences in estimates of mean leaf length of *Zostera* and *Posidonia* and of mooring scour lengths, measured by volunteers and experts. Estimates of variance components are included. Transformations are written above each analysis. \*When Expertise x Site was non-significant ( $p > 0.25$ ), this term was pooled with the Residual to create new tests for the main factors. .... 35

Figure 3.2. Estimates of Mean (+ Standard Error) leaf length of *Zostera* and *Posidonia* seagrass measured by experts and volunteers. .... 35

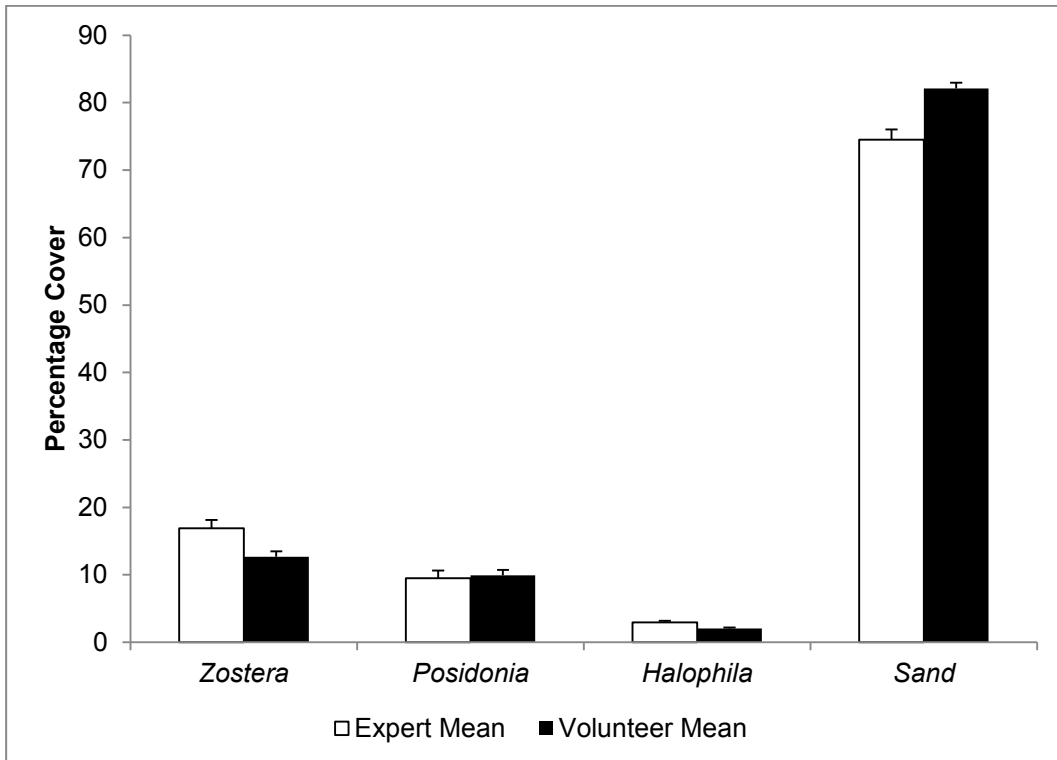




..... 36

Figure 3.3. Estimates of mean (+standard error) length of mooring scours from experts and volunteers. .... 36

Table 3.3. Summary of PERMANOVA results testing for differences between experts and volunteers in estimates of mean % cover of seagrass (*Zostera*, *Posidonia*, *Halophila*) and sand from photoquadrats. Estimates of variance components are included. Transformations are written above each analysis. \*Adjusted Significance level of  $p=0.01$  used because variances were heterogenous and could not be eliminated by transformations. .... 37



...38

Figure 3.4. Estimates of mean (+ standard error) of % cover of *Zostera*, *Posidonia*, *Halophila* and sand recorded by experts and volunteers. ....38

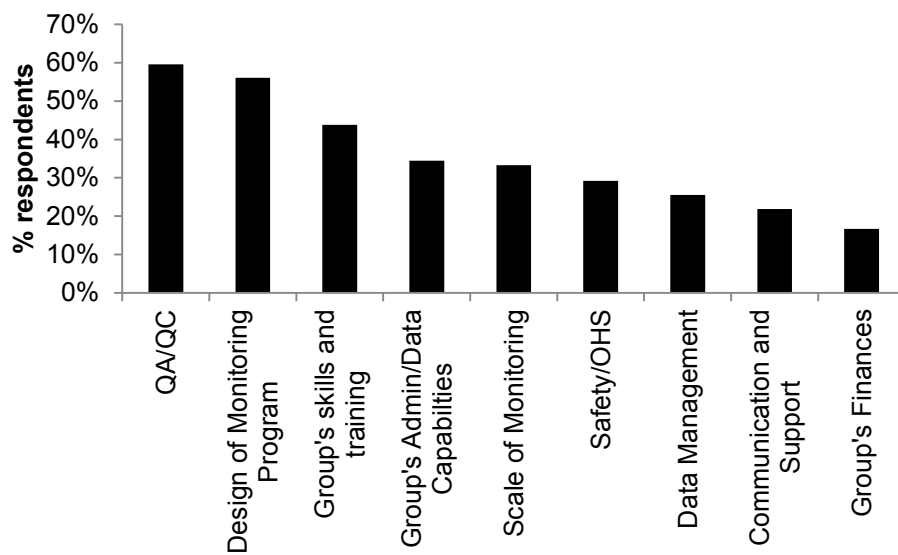
Table 3.4. Results of pair-wise tests comparing Expert and Volunteer data for each site. \*Adjusted significance level of  $p=0.01$  used for *Posidonia* and *Halophila* because variances were heterogeneous and could not be eliminated by transformations. Significant  $p$ -values are in bold. .... 38

Figure 3.5: Estimates of mean % cover of seagrass (*Zostera*, *Posidonia*, *Halophila*) and sand recorded by each person at each site. Person 1-9 = volunteers, 10-13 = experts. Sites 1-4 are seagrass friendly moorings, Sites 5-8 are swing moorings, and Sites 9-12 are controls (i.e. no moorings)..... 39

Table 3.5. Summary of PERMANOVA results testing for differences between experts and volunteers in estimates of mean % occurrence of seagrasses and sand from video transects Transformations are written above each analysis. Variance components are included. \*Adjusted significance level of  $p=0.01$  used because variances were heterogeneous and could not be eliminated by transformations. ....40

Figures 3.6, 3.7, 3.8 (L-R). Photos demonstrating contribution of orientation and clarity to photo quality score. Quadrat is centred, square and clear (figure 3.6); figure 3.7

shows photo that is not square and taken at acute angle; 10% of quadrat missing from dull photo (figure 3.8).....	41
Table 3.6. Quality scores of photos taken by volunteers. Letter denotes photographer. Site is denoted as Seagrass-Friendly Mooring (SFM), Swing (S) or Control (C). Shading indicates those moorings where significant differences were detected in % cover measured by experts and volunteers for <i>Zostera</i> (z), <i>Posidonia</i> (p) or sand (s).	41
Figure 3.9. Comparison of confidence in 8 volunteers in completing the computer-based activities, at the conclusion of the training workshop and after completing the task.....	43
Table 4.1. Questionnaire Themes.....	71
Table 4.2. Characteristics of respondents by organisation type, based on n=185 partially/fully completed surveys (percentages rounded to nearest whole number). ....	73
Table 4.3. Monitoring activities according to biotic, physical and social categories. Data are percentages of 73 ‘citizen scientist’ respondents. Percentages are rounded to nearest whole number. ....	75
Figure 4.1. Comparison of funding sources for citizen scientist respondents, showing (upper panel) proportion of respondents reporting all sources of funding (respondents could select more than one response so percentages may total >100); (middle panel) proportion of respondents reporting a funding source that made up more than 50% of their total operational budget; and (lower panel) proportion of respondents reporting a funding source that made up more than 90% of their total operational budget. N=60..	76
Figure 4.2: Key factors that affect citizen scientists’ ability to provide data to organisations. Responses displayed for % respondents selecting top answer (‘1’). ‘Volunteers’ describes the number of volunteers in the group and their technical skills, ‘funding’ refers to the financial support and partnerships the group maintains, ‘admin’ includes the capacity of the group to enter and store data, ‘communication’ is the amount of feedback the group receives from researchers or other project proponents, ‘QA/QC’ describes data quality and assurance protocols, and ‘safety/OHS’ relates to insurances and protocols for group monitoring activities. ....	77
Figure 4.3. Frequency distribution of time data users had engaged with citizen science (based on n=101 responses). ....	79



.....80

Figure 4.4. Factors which contribute to a data user's decision to use citizen science data. Responses displayed are proportion of respondents selecting factor as top answer ('1' rank), n=90. 'QA/QC' describes data quality and assurance protocols employed by the group, 'Group's admin' includes the capacity of the group to enter and store data, 'Safety/OHS' relates to insurances and protocols for group monitoring activities, and 'Communication' is the amount of feedback the user provides to the citizen science groups.....80

Table 4.4. Perceived and known uses of citizen science data reported by citizen scientists and data users. Responses displayed are ranked, where 1 = top answer. (94 citizen science respondents, 97 data user respondents; 1=highest/most used rank, 9=lowest/least used) ..... 81

Table 4.5. Outputs of citizen science programs, compiled from all respondents ((n=185)) as a measure of usefulness of citizen science data. ....82

## ABSTRACT

Management of marine natural resources and ecosystems is relying increasingly on the engagement of members of the public to collect environmental monitoring data for application in research and marine decision-making processes. Despite an accumulating body of work which discusses the potential benefits of engaging members of the public in marine environmental monitoring for better decision-making, there is no published analysis of whether, in fact the data collected by the public are used. The aim of this research was to assess the utility of citizen science data for marine natural resource management in Australia. This was accomplished by an investigation into the development of the field of 'citizen science' and its potential place within community participation frameworks for sustainability and environmental management. It also reviewed the perceived benefits and challenges to the use of citizen science in the natural sciences and discussed its potential uses and influence on environmental policy and management.

A validation study was undertaken to evaluate seagrass condition data collected by volunteers using field and computer-based sampling methods. Citizen scientists (volunteer SCUBA divers) did not differ from experts (professional marine scientists) in their estimates of % occurrence of seagrasses and sand (from video transects), however, they differed in a more complex task of estimating % cover of seagrass and other habitat features (from photoquadrats). Experts differed in their estimates of % cover from photoquadrats, indicating methods require review and may have contributed to volunteer results. Citizen scientists found the computer-based activities helpful in expanding their knowledge on scientific processes and essential for evaluating and modifying techniques used in their monitoring protocol. This evidence further supports the inclusion of volunteer SCUBA divers in scientific research (including seagrass condition monitoring) and highlights the importance of also validating professionals prior to training volunteers.

Results of a questionnaire distributed to researchers, managers, community support organisations and community members across Australia demonstrated that citizen science is being used for decision-making in Australia, as well as for high-quality research. More than 70% of respondents (n=185) reported having used citizen science-collected data for natural resource management decisions or research, with 53

programs producing 72 peer-reviewed publications and 110 technical reports. Where scientists and the public are working together, citizen science is a powerful research tool that has an added benefit of expanding the individual well-being of the participants involved. This study has also been able to demonstrate that citizen science is achieving its purported use of data for decision-making, and additional documented cases are likely to arise as the field gains trust.