

Assessing the knowledge, social values and
stewardship of white shark cage-diving participants
within the Sanctuary Zone of the Neptune Island
group (Ron and Valerie Taylor) Marine Park.



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Photo: North Neptune Islands (K. Apps)

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1. Acknowledgements

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2. Executive Summary

The purpose of this report was to explore white shark cage-dive participant's knowledge, social value, and stewardship of the Neptune Island group (Ron and Valerie Taylor) Marine Park (MP) and Sanctuary Zone (SZ). Data was collected onboard the three shark cage dive operator vessels at the North Neptune Islands between September 2014 and April 2016. Interviews were conducted with 28 cage-dive participants prior to the establishment of the SZ (1st October, 2014), while surveys were completed by 675 participants post-SZ establishment. Both the interviews and the surveys were guided by two questions: (1) Are cage-diving participants aware of the marine park/sanctuary zone; and (2) How do participants value the North Neptune Islands? Following the cage-diving experience a sub-sample of participants (n= 144) responded to an invitation to participate in an online follow-up survey focused on participants post cage-dive interest in the MP and SZ.

- Cage-dive participants are predominantly male (58%), aged 18–30 years (53%). While just over half of the participants were Australian (58%), the second largest group were from England (15%) followed by other nationalities including Ireland, Canada, USA, France, Sweden, Denmark, Germany, and New Zealand.

- Observing white sharks was the motivating factor for 67% of respondents to visit South Australia and 96% of respondents for visiting Port Lincoln.
- Since returning home, 98% of participants have recommended cage-diving at the Neptune Islands.

Knowledge

Participant knowledge (before coming on-tour) suggests:

- Following the establishment of the SZ, there was a significant increase in the number of participants who were *aware the site is a SZ* (pre-SZ 7%; post-SZ 22%), and a significant increase in the number of participants who know *what a SZ is* (pre-SZ 14%; post-SZ 45%). However, there was a significant decrease in the number of participants *aware of the MP* following the establishment of the SZ (pre-SZ 36%; post-SZ 19%). The pre-SZ sample may not be an accurate evaluation of participant's knowledge due to the small sample size. However, prior to coming on-tour the majority of participants (pre and post SZ) were unaware of the MP or SZ.
- Participants with the least knowledge of the *site being a SZ*, or *what a SZ is* are those aged 18–30.

Participant knowledge (gained on-tour) suggests:

- Knowledge of the SZ (pre-tour 22%; post-tour 49%) and MP (pre-tour 19%; post-tour 63%) significantly increased while on tour. However, the findings from this study reveal that at least half of the participants were not aware of the SZ before the tour, and did not learn about it while on tour.
- While knowledge of the MP and SZ significantly increased during the tour, participant responses support demand for additional on-tour education.

Social Values

- Pre-SZ the most frequently mentioned values of the North Neptune Islands were *learning*, *biological diversity*, and *intrinsic* values. Following the establishment of the SZ the most frequently chosen values were *biological diversity*, *future* and *learning* values.

- *Recreation* values were valued higher by males, while *learning* values were valued higher by females. The *life sustaining* value was valued higher for the 18–30 age group than by >45 years age group. *Future* values were valued higher by domestic participants and *life sustaining* values were valued higher by international participants.

Stewardship

- A sense of personal connection to the Neptune Islands and white sharks was demonstrated in qualitative responses.
- Participants desire for more information suggests a missed opportunity to further generate a sense of stewardship amongst individuals.
- Since their return home, over half of the participants (in the follow up survey sample) demonstrated interest in the Neptune Islands MPA and SZ by sourcing further information and/or talking with others. Discussions and sourcing of information, relevant to marine parks and sanctuary zones *in general*, have also occurred.

While knowledge, values, and stewardship regarding the Neptune Islands have been identified amongst cage-dive participants, there is demand for further information and education regarding the site. An education and interpretation program may further facilitate and support the development of knowledge, enhance the social values of the site, and engender a sense of stewardship amongst participants. We suggest that well-designed quality interpretation programs be implemented to make good use of this opportunity to encourage development of knowledge and stewardship amongst cage-diving participants.

3. Introduction

3.1 Background

Marine protected areas (MPAs) have been established globally, and are an important mechanism by which to conserve marine biodiversity and socio-economic assets such as marine recreation and tourism (Eagles & McCool 2002; Harmon 2004; Lloyd et al. 2011). Effective management of such large and complex areas requires balancing reasonable human use with the maintenance of the areas natural and cultural integrity. A range of management tools, including zoning plans, are often applied to regulate access and to control and mitigate impacts associated with human use (Day 2002). The concept of zoning within a MPA is often referred to as an ecosystem and wildlife conservation tool to manage recreational and commercial anthropogenic activities by separating conflicting user groups and/or to keep sensitive, ecologically valuable or recovering areas free from use (Day 2002, Howes et al. 2012).

According to the *Marine Parks Act 2007* South Australian marine parks have been zoned for multiple uses stipulating variable levels of conservation, recreational, and commercial use. Zoning provides the basis for management of marine parks and includes, general managed use zones, habitat protection zones, sanctuary zones, restricted access zones, and special purpose areas. This report focuses on the Neptune Island group (Ron and Valerie Taylor) Marine Park Sanctuary Zone 1 (SZ) which was established on the 1st of October 2014. Defined by the *Marine Parks Act 2007* a sanctuary zone is a zone “primarily established so that an area may be managed to provide protection and conservation for habitats and biodiversity within a marine park, especially by prohibiting the removal or harm of plants, animals or marine products” (*Marine Parks Act 2007* p.6)

The range of management tools applied in MPA’s and SZ’s require not only scientific monitoring of the biophysical and cultural elements contained within them, but also a solid understanding of their functions and roles within society (Duffus & Dearden 1993; Orams 2000; Ballantyne et al. 2011; Luksenburg & Parsons 2014). While a large body of literature focuses on environmental and economic benefits, the

social values of marine protected areas has largely been overlooked (Harmon & Putney 2003, Pike et al. 2010). However, over the past decade, research on the social dimensions of marine environments has intensified. This includes studies on the perception of boat users toward marine conservation zones (McAuliffe et al. 2014), on community and stakeholder perceptions of the marine environment to determine the best approaches to MPA management (Abecasis et al. 2013), and on methods of social assessment in MPA planning (Voyer et al. 2012). These studies have shown that an improved understanding of public perceptions combined with knowledge of the attitudes and social values in management policy and planning, may assist in ensuring a sustainable use of the marine resource, and reduce the costs associated with compliance.

Koehn et al. (2013) suggests that development and implementation of social data monitoring programs, in conjunction with existing ecological monitoring can benefit ocean planning and policy processes by providing information to guide the development of management plan strategies. The work of Petrosillio and others (2007) within an Italian MPA identified tourist perceptions as useful as the conventional monitoring of environmental quality to assist management of recreational activity. Hockings et al. (2006) suggest the success of a protected area as a conservation tool relies on the assumption that they are managed to protect the values that they contain. Therefore, the understanding and monitoring of the social-value of a site is critical to assess the likely acceptance and implementation of policies and regulations, and to encourage support for resource management and conservation measures.

3.2 Social values and Tourism

The social value of natural areas and the corresponding wildlife is comprised of intangible values (also referred to as non-material values). This includes the intrinsic value of nature as well as values that enrich the intellectual, psychological, emotional, spiritual, cultural, and/or creative aspects of human existence and well-being (Harmon & Putney 2003). Such values are fundamental to the acknowledgment and protection of places with natural, historic, and cultural importance by many

cultures for millennia (Chape et al. 2008). They reflect the complex, individual responses people experience and often determine why one area or species is valued over another (Pike et al. 2010). As a result, a wide range of social value types have been proposed and used to identify public perception and value of natural areas. The social values typology used in the present study (Table 1) has been used in a variety of studies to identify social values of natural areas (Rolston & Coufal 1991; Brown & Reed 2000; Raymond & Brown 2006; Clement & Cheng 2011; Sherrouse et al. 2014)

Tourism can play an important role in raising visitors' awareness, appreciation and actions towards wildlife and natural resources (Higginbottom & Tribe 2004; Ballantyne et al. 2011; Catlin et al. 2013). Since the latter part of the twentieth century, increased demand for nature-related tourism, such as visiting national parks and protected areas and wildlife tourism, has diversified in both tourism products and destinations (Eagles et al. 2002). Nature-related tourism is considered the fastest growing sector of the tourism industry, bringing in billions of dollars around the world. Such tourism plays a critical role in the conservation and management of protected areas to the extent that protected areas where "sufficient numbers of people visit them, appreciate them and take political action to ensure their survival" generally achieve enhanced protection and recognition (Eagles et al. 2002). Determining tourist's values and knowledge of an area is an important factor in creating an interdisciplinary link between the ecological system and the perceptions and significance of a MPA to the tourist.

The Neptune Island group supports one of the largest aggregation of pinnipeds in Australia leading these islands to be a Conservation Park in 1967 (Baker, 2004; Shaughnessy et al 2015), which was later extended to two nautical miles from the low water mark under the *National Parks and Wildlife Act 1972 (SA)*. Commercial white shark cage-diving activities started in the early 1980s and have been restricted to the Neptune Island Conservation Park since 2002. At present, there are three operators licensed to conduct white shark cage-diving activities within the marine park. The wide range of flora and fauna including many species of conservation importance, such as the white shark, led the Neptune Island Conservation Park to be proclaimed a Marine Park (Neptune Island Group (Ron and Valerie Taylor) Marine

Park) on 29 November 2012 (DEWNR 2012b). This Marine Park included a Sanctuary Zone (SZ) around the North Neptune Island Group, which took effect on the 1st of October 2014. Considering the importance of white sharks to the Neptune Islands Group Marine Park and that it hosts the only white shark cage-diving industry in Australia, which contributed to the area becoming a SZ, it is important to assess the social value of cage-diving participants and whether the establishment of the SZ affected such value.

3.3 Stewardship, Education, and Knowledge

Environmental stewardship has wide ranging definitions referring to a socio-ecological dynamic, which promotes responsible use and protection of the natural environment, through conservation and sustainable practices (Wolf et al. 2013). Key components of fostering marine stewardship are education and personal connection to the marine environment (Fletcher & Potts 2007; McKinley & Fletcher 2010; Wolf et al. 2013; Friedrich et al. 2014). McKinley & Fletcher (2010) and Friedrich et al. (2014) suggest an increase in marine information availability and education would stimulate higher levels of concern about the marine environment to ultimately inspire a sense of marine stewardship within the public.

Marine tourism can provide opportunities for people to develop connectivity to the ocean, gaining education and knowledge about marine conservation issues, thus fostering an attitude of marine stewardship. White shark cage-diving tourism at the Neptune Islands is one of the few places in the world and the only place in Australia where tourists can predictably view white sharks in their natural habitat (DEWNR 2012a; 2012b). As the popularity of shark diving continues to increase (Cisneros-Montemayor et al. 2013), this industry has considerable potential to enhance appreciation of sharks and the marine environment (Topelko & Dearden 2005). This increased understanding and appreciation may lead to off-site benefits including greater environmental awareness, philanthropic support for nature conservation, political lobbying for wider protection, and contributions towards scientific research (Tisdell & Wilson 2001; Mayes et al. 2004; Moscardo 2008; Powell & Ham 2008; Zeppel & Muloin 2008; Packer & Ballantyne 2012).

The potential benefits from marine stewardship are wide ranging and go beyond enhancing public support and understanding of the marine environment. Stewardship may also encourage opportunities to improve public responsibility for behaviour towards the marine environment and improve public acceptance of marine governance strategies (McKinley & Fletcher 2010).

3.4 Need and Objectives

Regular assessment of social data, understanding the links between environmental, social and economic values, and information for guiding policy design are some of the research questions identified in ‘*Forging the Links 2013–15*’ (DEWNR 2013). These questions establish key themes for monitoring and research requirements as part of the marine parks Monitoring, Evaluation and Reporting (MER) Program. Theme two includes ‘Communities: social, cultural and economic values and assets’ and the objective of ‘assessing the social and economic impacts of the establishment and ongoing management of the park’. In addition, one of DEWNR’s science priorities in ‘*Science Directions 2010–2015 Strategic Directions in Science and Research for the South Australian Department of Environment and Natural Resources*’ is to build core capability in the social and economic disciplines, and includes research questions related to building social stewardship, understanding social perceptions, and community involvement (DENR 2010a). The Neptune Island group (Ron and Valerie Taylor) Marine Park management plan (DEWNR 2012b) also recognises community stewardship as one of the keys to the success of marine parks, acknowledging the importance of community education, involvement, and enjoyment of the park (DEWNR 2012b).

The present study provides a valuable insight into the views of the often-silent majority (tourists who are the main users of the SZ but are often silent as their participation is transient). The key findings from this study will assist in understanding social perceptions including the links between tourists and their environmental and social values of the MPA, in addition to recommendations for developing social stewardship

The aim of the present study was to address these research questions related to perception and stewardship, and to explore the social values and knowledge held by white shark cage-diving tourists related to the North Neptune Islands and compare these before and after the establishment of the SZ. Specifically, the objectives were to:

1. Identify white shark cage-diving tourism participant's knowledge of the Neptune Island group (Ron and Valerie Taylor) Marine Park and Sanctuary Zone;
2. Determine the social (intangible) values of the North Neptune Islands before and after the establishment of a sanctuary zone;
3. Establish if participating in white shark cage dive tourism at the Neptune Island group (Ron and Valerie Taylor) Marine Park, stimulates community stewardship of the marine environment; and
4. Based on the analysis of Objectives 1–3, develop recommendations to strengthen education strategies and communication with white shark cage-dive tourists to enhance the social value and knowledge of the Neptune Island group (Ron and Valerie Taylor) Marine Park.

4. Methods

4.1 Study Site

The Neptune Island group (Ron and Valerie Taylor) Marine Park (35°16.72'S; 136°5.48'E) is located approximately 60–70km south of Port Lincoln, South Australia. The management plan (DEWNR 2012b) for this area includes a SZ around the North Neptune Islands which took effect in October 2014.

4.2 Procedure

The data collection was guided by two questions: (1) Are cage-diving participants aware of the marine park/sanctuary zone; and (2) How do participants value the Neptune Islands? Data collection was conducted on-board all three licensed operator vessels with the data combined to give a sample of cage-dive tourists, as opposed to individual operators. In instances where an individual operator is

mentioned, they are referred to as *Operator One* (O1), *Operator Two* (O2), and *Operator Three* (O3) to ensure anonymity as part of research ethics stipulations. Each operator's proportion of the sample size was reflective of their share of the market based on the number of participants in 2014 provided by the cage-diving operators.

4.21 Pre-SZ establishment data collection procedure

The study was divided into two sampling period separated by the date the SZ came into effect (1st October 2014). The pre-SZ establishment data was collected between August 2014 and September 2014. Interviews and focus groups were used to collect responses from cage-diving participants ($n=28$). Participants were given the option of providing multiple responses, or a non-response if they could not think of any relevant values when answering questions (Curtis *et al.*, 2010).

Responses were recorded and later transcribed. Content analysis of responses was performed to identify social values mentioned by participants. In instances where the participant responded to questions with more than one value, all responses were included in the data. By reviewing the raw data and identifying common themes of meaning inherent to the responses, categories were developed to collapse the 26 value responses into 7 value categories based on the value typology used in the post-SZ phase (Rolston & Coufal 1991; Brown and Reed 2000; Sherrouse *et al.* 2014). The value categories were reviewed in terms of how frequently they were mentioned by participants.

4.22 Post-SZ establishment data collection procedure

In order to collect a larger sample size post-SZ establishment, data collection was completed by the use of surveys between December 2014 and April 2016. The survey response rate was high (88.6%; $n=675$), with participation voluntary and surveys conducted during the return trip to Port Lincoln. Reasons for not completing surveys included seasickness and language limitations.

The survey consisted of three sections including: (1) knowledge of the marine park and sanctuary zone; (2) allocation of a hypothetical \$100 among values included

in social-values typology (Table 1); and (3) demographic information. A convenience sampling method was used, whereby all shark cage-diving participants, over 18 years of age, were invited to participate in the study.

A range of social value types were used to ensure a comprehensive understanding of the public perception of the value of the SZ (Table 1). These values were based on value typology suggested by Rolston and Coufal (1991) and adapted by Brown and Reed (2000) and Sherrouse et al. (2014).

Survey analysis consisted of descriptive statistics, which included frequencies and mean values for the demographic and marine park values. The frequency with which a particular marine park value was allocated a hypothetical dollar amount represents the prevalence of that value in the minds of the respondents. The mean value score represents the relative importance of the value to the survey participants (Brown & Reed 2000).

To determine relationships between demographic characteristics and SZ values an analysis of variance (ANOVA) was used to test for the effects of age and operator, while a series of t-tests were used to analyse gender and nationality variables. McNemars test was used when repeated measures were tested such as pre- and post-tour knowledge, while Chi-square was used to test knowledge before and after the SZ was established. All statistical analysis was performed using IBM SPSS Statistics 22. Responses to open-ended questions were used throughout the report, as direct quotes, to illustrate participant's thoughts.

4.23 Post tour follow up survey

Following the cage-dive experience a sub-sample of participants (n= 144) responded to an invitation to participate in a follow-up survey. The online survey emailed to participants gathered data regarding recommendations of the tour, discussions with others related to the site, and the sourcing of further information about MPAs and SZs.

Table 1: Description of the social value types included in the North Neptune Islands value surveys

Social value type	Social value description
Aesthetic	I value this site for the scenery, sights, smells, sounds, etc.
Biological diversity	I value this site because it provides a variety of fish, wildlife, etc.
Cultural	I value this site because it is a place for me to continue and pass down the wisdom and knowledge, traditions and way of life of my ancestors
Economic	I value this site for the economic benefits such as tourism
Future	I value this site because it allows for future generations to know and experience the area as it is now
Historic	I value this site because it has places and things of natural and human history that matter to me, others and/or the nation
Intrinsic	I value this site for its existence, whether people are present or not
Learning	I value this site because we can learn about the environment
Life sustaining	I value this site because it helps to produce, preserve and renew air and water
Recreation	I value this site because it provides an outdoor recreation opportunity
Spiritual	I value this site because it is sacred, religious or spiritually special to me, or because I feel reverence and respect for nature there
Subsistence	I value this site because it provides necessary food and supplies to sustain my life
Therapeutic	I value this site because it makes me feel better, physically and/or mentally

5. Results and Discussion

5.1 Participants

The demographic data for both the pre- and post-SZ establishment results were combined to give an overall description of the cage-diving participant. The majority of the participants were male (58%), aged 30 years or under (53%) with ages ranging from 18 to over 66 years of age. While just over half of the participants were Australian (58%), the second largest group was from England (15%) followed by other nationalities including Ireland, Canada, USA, France, Sweden, Denmark, Germany, and New Zealand. We acknowledge that divers with limited English skills were unable to complete the survey and are therefore not included in the sample. The response rate (88%), however, suggests that the sample results are likely to be consistent with nationality of those onboard.

Scuba-diving certification is not a requirement for cage-diving in the surface cages at the Neptune Islands, however 31% of the participants were certified with the majority holding either, “open water diver” or “advanced open water diver” certification levels. This indicates that although these divers were familiar with breathing via regulators, they are likely to have minimal diving experience. Of the sample 67% ($n=375$) stated that observing white sharks was the motivating factor for visiting South Australia and 96% of participants ($n=652$) reported that observing white sharks was the motivating factor for visiting Port Lincoln. Over half (56%) the participants stayed in Port Lincoln for two nights while a further 19% stayed an extra night. The primary motivation of participants to visit Port Lincoln based on the wildlife experience points to the regional importance of the cage-dive activity. In addition to profits generated by the shark cage-dive operators, revenue from related tourism activities (food, accommodation) can be a financial injection to the local economy which is unlikely to occur in the absence of the cage-diving industry.

5.2 Objective 1: Participant knowledge of the Neptune Island Group (Ron and Valerie Taylor) Marine Park and Sanctuary Zone

The participant knowledge data indicates the majority of participants were unaware of the MP and SZ designation of the area before they came on-tour (Table 2). However, for those who were aware ($n=130$), some participants ($n=40$) acknowledged that the *marine park influenced their decision to choose Port Lincoln*. As fifteen of these participants were international tourists to Australia, they may have chosen another country to go cage-diving if the marine park had not been established. One participant stated:

“We were looking at South Africa and South Australia. It came down to who was running the most ecological tour... So we selected four weeks in Australia based on this tour.”

Further enquiry with these participants would be needed to determine how significantly the marine park influenced their decision and if they would have chosen elsewhere if the site was not an MPA.

Table 2: Participant knowledge with regard to the Marine Park and Sanctuary Zone

Pre-tour	Pre-SZ establishment	Post-SZ establishment
Participant was aware the site is a Marine Park	35.7%	19%*
Marine park knowledge influenced their decision to choose Port Lincoln	20%	29%
Participant was aware the site is a Sanctuary Zone	7%	22%*
Participant knows what a Sanctuary Zone is	14%	45%*

* Chi-square ($P<0.001$)

The knowledge data (Table 2) reveals a significant decrease in the number of participants who were *aware the site is a MP* following the establishment of the SZ. However, there was a significant increase in the number of participants who were *aware the site is a SZ* post-establishment (22%) compared to those in the pre-SZ sample (7%). There was also a significant increase in the number of participant's who were aware of *what a SZ is*, in the post-SZ sample (45%) compared to those in the

pre-SZ sample (14%). Another 36% of the post-SZ sample (n=240) responded that they knew a little about *what a SZ is*. The results showing that, post-SZ establishment, more people know about the SZ than the MPA may reflect the focus of the education campaign following the establishment of the SZs. It is essential for information sources to mention the SZ in the context of the MPA to ensure that the general public understand the connection between the two. The information the general public receives about MPAs and SZs may come from a variety of sources and therefore may not always be accurate. The cage-diving tour offers a time and location to introduce participants to the goals and objectives of the MPA and SZ; with potential to amend any previously held inaccurate information.

The increase in SZ knowledge may imply that information with regard to marine park zoning within the Neptune Island Group (Ron and Valerie Taylor) Marine Park and perhaps information with regard to understanding marine park zonation as a whole, is reaching more members of the general public. If this is the case, this is an encouraging result, as MPAs may often be perceived by the general public as complete lock out areas. Understanding that MPAs are often managed for multiple uses, and can be zoned for a variety of activities and user groups, may result in greater public support of marine parks.

5.21 Pre-tour knowledge and demographic characteristics

Using the post-SZ sample due to the sample size pre-SZ, the frequency data for demographic characteristics and SZ knowledge suggests that participants with the least knowledge of the *site being a SZ* are 18–30 years old international, non-diver females (Table 3). Participants who do not know *what a SZ is*, are more likely to be 18–30 years old international, non-diver males. Although the differences in demographic characteristics and knowledge are slight, this information can assist in guiding where education and interpretation related to SZ should be targeted. As 53% of participants are aged 18–30 and this group has the least SZ knowledge, it would be an important age group to target with an education and interpretation program to improve the knowledge and understanding of SZ.

While certified divers were the most knowledgeable about the site and definition of a SZ, they only make up 31% of the sample. The majority of participants may have minimal marine experience and therefore may have not been previously exposed to multiple-use MPAs and their management. As non-divers are given instructions on how to use onboard breathing apparatus, this time may offer an opportunity to deliver additional information about the SZ specifically to this group.

The pre-tour knowledge and demographic characteristics data show that many people are unaware of the MP and SZ. Current education initiatives might not reach a large proportion of the general public, especially those aged 18–30 years. Opportunities, therefore, exist to introduce participants to the MP and SZ: (1) improve education initiatives to inform participants before they venture on-tour; and (2) ensure on-tour education includes MP and SZ information to guarantee participants have the opportunity to learn while on-tour.

Table 3: Sanctuary Zone knowledge in relation to participant demographics

Demographic characteristic		Participant is NOT <i>aware site is a Sanctuary Zone</i>	Participant does NOT <i>know what a Sanctuary Zone is</i>
Nationality	International	81.8%	19.6%
	Domestic	73.4%	16.5%
Gender	Male	76.2%	14.8%
	Female	79.6%	23.0%
Age	18–30	82.4%	21.8%
	31–45	70.1%	14.1%
	45+	74.0%	11.0%
Dive certified	Diver	67.1%	9.7%
	Non- diver	81.3%	21.5%

Post-SZ data ($n = 675$)

5.22 On-tour Marine Park and Sanctuary Zone education

As part of the post-SZ establishment survey, we investigated on-tour education about the MP and SZ. The results indicated that tourist knowledge of the SZ and MP significantly increased while on-tour (Table 4). Participant comments included:

“It was unfortunate that we didn’t see any sharks but it was still enjoyable and I learnt about the sanctuary which was great”

The information participants received on tour was predominantly disseminated by staff members, and less frequently from other passengers.

“A staff member introduced us to the sanctuary zone and explained briefly”

The experience and the site also acted as a tool for education with one participant commenting:

“When I first heard about the marine park I was against it as I thought that people would lose their jobs. After seeing the area, I think it is quite special. It has changed my mind.”

Table 4: On-tour education of the Marine Park and Sanctuary Zone

Participant knowledge of	Pre-tour	Post-tour
Marine park	19%	63%*
Sanctuary zone	22%	49%*

*McNemar’s test (P<0.001).

While knowledge of the MP and SZ significantly increased while on tour, participant responses support demand for more on-tour education:

“I could use more information about Neptune Islands and Sanctuary zone”

“Time enough to explain something about the park and the sanctuary”

“I could use more information about Neptune Islands and Sanctuary zone”

“Great experience, but would have loved more of an educational aspect to the trip to gain knowledge about the sharks, and sanctuary zones, and how we can do our part to maintain it”

“I want to learn how the sanctuary encompassing the Neptune islands is being preserved”

“Is the Neptune Island a sanctuary zone only because of the sharks or for other reasons?”

Regardless of the significant increase from pre-tour to post-tour, the findings from this study reveal that at least half of the sample were not aware of the SZ before the tour, and did not learn about it while on tour. Nearly 60% of 18–30 years old participants had not heard or learnt anything about the SZ while on-tour (vs., 43.6% in 31–45 years old and 41.1% in 45+), suggesting that information related to the SZ is not reaching this age group. Therefore, an opportunity lies with the cage-diving operators to deliver SZ information specifically targeted to this demographic.

5.3 Objective 2: The social values of the North Neptune Islands before and after the establishment of the Sanctuary Zone

Social values are often referred to as intangible and can be difficult to describe. This was the case during interviews whereby participants often found it hard to put into words the value of the area. As a result, the methodology of the post-SZ phase survey included a social value typology (Rolston & Coufal 1991; Brown & Reed 2000; Sherrouse et al. 2014) to assist participants identifying social values.

5.31 Pre-establishment of the Sanctuary Zone

During interviews participants were asked how they valued the North Neptune islands site. Participants did not have the list of values used in the post-SZ surveys and as a result, less value types were identified compared to post-SZ surveys. Value categories were developed by identifying responses with similar meaning and using the value typology type and description used in the post-SZ phase as a guide to

category labels. The most frequently mentioned value was *learning* (n=13). This was followed by *biological diversity* (n=4), *intrinsic* (n=3) (Figure 1), *economic* (n=2), *cultural* (n=2), *historic* (n=1) and *recreational* (n=1) values.

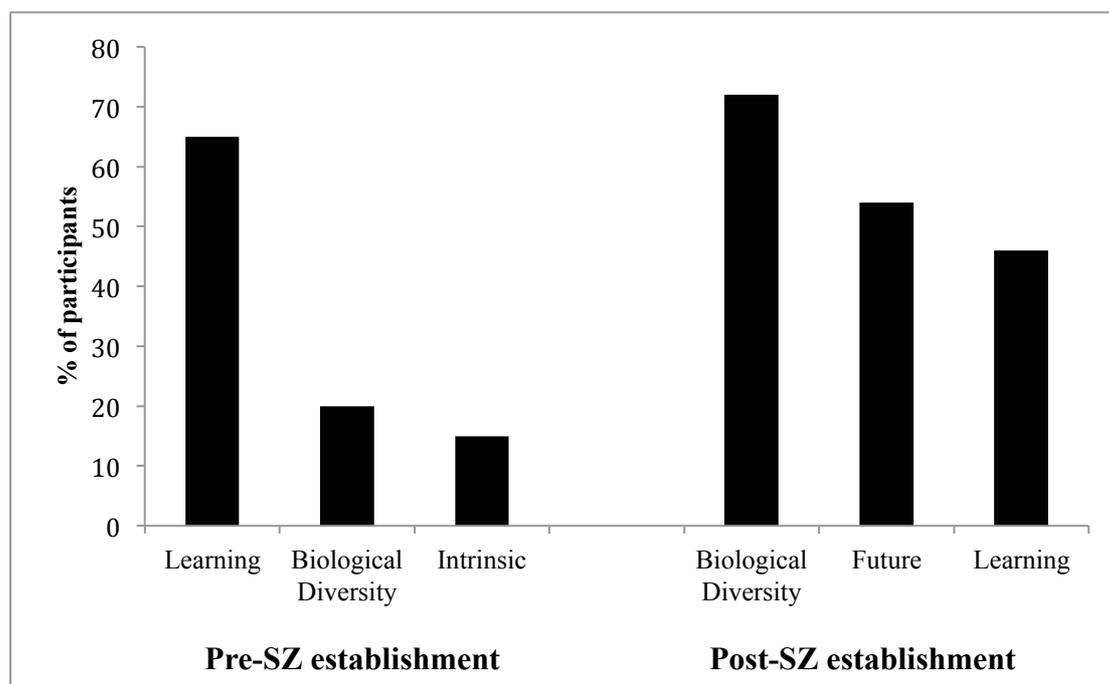


Figure 1: The three most frequently mentioned values for the North Neptune Islands pre- and post-establishment of the Sanctuary Zone

5.3.2 Post-establishment of the Sanctuary Zone

Using the social value typology (Rolston & Coufal 1991; Brown & Reed 2000; Sherrouse et al. 2014) in the post-SZ phase allowed the participants to distinguish between 13 different values. The most frequently mentioned were *biological diversity*, *future*, *learning* (Figure 1), *recreation*, and *aesthetic* values, while the least mentioned values were *subsistence*, *spiritual*, and *cultural* values (Table 5).

Consideration of the rank frequency and mean scores reveals slight differences in responses. *Recreation* and *learning* values which ranked fourth and third in frequency of response ranked third and fourth in mean scores respectively. These rank discrepancies suggest that while learning was a value held by more respondents (frequency), the recreation value was held with more importance (mean dollar allocation). Nonetheless, the top four most frequently selected values (*biological*

diversity, future, learning and recreation) were also selected as the most important. For the remaining value typologies, there was general agreement among participants between the frequency of selected values (rank frequency) and the value importance (rank mean score).

Table 5: Post-SZ Frequency and mean scores for the 13 North Neptune Islands values

Value	Frequency	Rank	Rank mean		
	Frequency	Mean (\$)	score	SD	
Biological diversity	479	1	25.81	1	24.25
Future	358	2	14.66	2	19.27
Learning	306	3	9.73	4	13.51
Recreation	293	4	10.99	3	17.98
Aesthetic	275	5	9.02	5	14.57
Economic	247	6	7.87	6	14.04
Intrinsic	195	7	6.49	7	14.08
Life sustaining	188	8	5.60	8	11.06
Historic	112	9	2.98	9	8.84
Therapeutic	96	10	2.47	10	8.67
Cultural	76	11	1.72	11	6.18
Spiritual	71	12	1.58	12	6.09
Subsistence	52	13	.79	13	3.65

($n=664$)

The following statistically significant relationships were found between value and demographic data: (1) Gender - *recreation* values were valued higher by males than females ($p = 0.003$, two-tailed), while *learning* values were valued higher by females than males ($p = 0.016$, two-tailed); (2) Age - the *life sustaining* value was valued higher for the 18–30 age group than by the over 45 years age group (ANOVA, $P < 0.5$); (3) Nationality - *life sustaining* values were valued higher by international participants ($p = 0.013$, two-tailed), whilst *future* values were valued higher by domestic participants ($p = 0.017$, two-tailed).

While all the values were selected by the post-SZ sample, the non-commodity values such as *biological diversity* and *future* were deemed most important in terms of both frequency selected and mean sum (see Table 5). These results are similar to research by Sherrouse and others (2014) who found general agreement across three forests regarding the most highly rated value types (*aesthetic, recreation, biodiversity* and *future*). Brown and Reed (2000) found *aesthetic, recreation, life sustaining* and

biological diversity to be the most frequently acknowledged values held by residents of local communities with regard to the Chugach National Forest. Relationships found by Brown and Reed (2000) concerning gender and values correspond with the present study, as they too found *recreation* values to be valued higher by men and *learning* values to be valued higher by women.

5.33 Social values pre- and post-SZ

While not all values were mentioned by both the pre- and post-SZ sample, 70% of participants stated *biological diversity* as an intangible value of the site. Following the theory of reasoned action (Ajzen and Fishbein 1980), the first 2–3 beliefs of individuals are primary determinants of his/her attitudes. As *biological diversity* was the most common response overall, it may determine participant's attitude toward supporting conservation issues and the establishment of the SZ.

Although the pre-SZ sample size was small, the frequency of responses including the *biological diversity* value increased after the establishment of the SZ (Fig 1). This increase may be the result of participants acquiring information about the SZ as participant knowledge significantly increased in the post-SZ sample (Table 1). Therefore, increasing cage-diving participant knowledge about the SZ could potentially result in more participants' valuing the North Neptune Islands for its *biological diversity* value.

5.4 Objective 3: White shark cage-dive tourism and community stewardship of the marine environment

The final section of the survey and interview process allowed for participants to make any further comments about their experience. Content analysis was performed to categorise responses into key components integral for fostering marine stewardship. These categories include a personal connection to the marine environment and marine education as suggested by Fletcher and Potts (2007), McKinley and Fletcher (2010), Wolf et al. (2013), and Friedrich et al. (2014).

5.41 Personal Connection

A key factor in generating stewardship amongst individuals is a sense of personal attachment or connection to the marine environment or target species (Gosling et al 2010; McKinley & Fletcher 2010; Wolf et al 2013). This is presumed to involve a process whereby positive experiences at sites or with wildlife lead to a heightened emotional affinity, which in turn leads to a desire to take action or protect the area and/or wildlife (Falk et al. 2007; Sneddon et al. 2016). Place attachment indicates the strength of one's link to a place, involving the emotional bond between people and the environment. This can include place identity such as feelings about specific settings and how these settings can provide purpose and meaning to life (Brown and Raymond 2007).

Cage-dive participants responded with a number of comments illustrating their personal connection to the experience.

"For me, it is just being out in nature experiencing something. A beautiful area, it makes me appreciate it and respect it more. Just seeing it first hand you can really relate and respect it"

"It was a once in a lifetime experience. I have a phobia of sharks since I was little (not feeling good when I have to enter the water, even freshwater and swimming pool when I am there alone, even the bathroom when I close my eyes). This was a completely new view of these beautiful creatures. Helped me a lot to face my phobia. It was the reason for me to come"

"Life changing experience, a whole new appreciation for great whites"

For many participants, cage-diving is something they have wanted to experience for some time, adding to the significance of the experience

"I completed my 15 year old dream to dive with great whites"

"Being so close to something that large and powerful. Fulfilled life long dream"

“I wasn’t interested in seeing the “crash and bash” my main motivation was to realise a long time goal of being able to see a great white in the wild and with the least interference on their lifestyle as possible”

“I travelled 7600 miles to fulfil one of my life long dreams since I started reading sharks books from when I was 8 years old”

Many participants believe it to be a once in a lifetime experience:

“An incredible day. The day was run very smoothly and professionally. I enjoyed every minute of it. Thanks for a once in a lifetime fantastic experience”

“Meeting new people is always enjoyable and joining in the camaraderie. Staff are always helpful and it is great getaway from the real world for a day. Not forgetting an experience of a lifetime”

“Great trip. Worth traveling from the UK to do it. Once in a lifetime experience”

“Once in a lifetime experience, beautiful creatures, beautiful country”

Some participants described the experience as memorable, adding meaning to the experience into the future:

“I will always remember this experience and would love to do it again in the future”

“Great day! One of the best experiences I've had -one off the bucket list. Will recommend to all my friends and family. Thanks for an amazing/memorable experience”

“A highly memorable and enriching experience”

“A truly memorable enjoyable life changing experience”

“An unbelievable experience I will remember for all of my (hopefully) long life”

Participant's comments demonstrate a connectedness to the cage-dive experience with potential for this to result in an attachment to the Neptune Islands. These feelings of attachment and connectedness could result in greater support for protecting the site and its corresponding wildlife. Whether these personal bonds are associated with actual pro-environmental behaviour remains unclear, however, connectedness to nature is a source of hope in the endeavor to generate environmental stewardship amongst the public.

5.42 Marine education

One mechanism to encourage marine stewardship is through environmental education techniques whereby an increase in marine environmental education and information availability would engender higher levels of awareness and concern about the marine environment (Fletcher & Potts 2007). Powell and Ham (2008) recommend that a well-designed interpretation program can have a significant impact on pro-environmental attitudes of visitors in addition to longer-term intentions to support and participate in conservation efforts.

Apps et al. (2016) identified the most frequent response, with regard to the advantages of white shark cage-diving, was the opportunity it allowed for learning about sharks. Participants, by coming on tour, already have an attraction to, interest in, and/or an expected enjoyment of the activity. These factors can lead to increased attention, greater concentration and an increased willingness to learn (Balantyne & Packer 2006). Tour operators are therefore in a unique position to facilitate support for marine conservation by designing relevant interpretative programs which include a conservation ethic.

Participant responses included a variety of comments suggesting they had found the tour to be a learning experience. Comments include:

"Its educational. Unlike other wildlife tours this is really educational and you are in their territory"

"Wonderful, educational experience that makes people reconsider the negative portrayal and misinformation great whites experience, especially throughout the

media. Seeing the other animals and sites added to the experience, and service was fantastic”

“It’s been amazing to see the sharks up close. I feel like it has de-mystified them a little”

“This experience changed my perspective on sharks. I originally saw them as a necessity, a valuable part of the ecosystem, but not very likable. Very eye opening”

“Beautiful example of Australia’s ecosystem/environment”

Lück (2003; 2015) suggests that marine wildlife tourists are inclined to expect a certain depth in interpretative communication and desire more information about the species and the marine environment in general. In order to generate stewardship amongst participants Topelko and Dearden (2005) suggest that shark based tours need to facilitate and support the development of knowledge and pro conservation attitudes among their tourists’ by offering opportunities for participants to learn about conservation.

While open comment responses suggest participant satisfaction with tour, many participants desired further information. Comments include:

“The experience was a great life experience/thrill and staff were very informed, but I don’t feel I learned much about the life of sharks or the Neptune islands and their other ecological systems/animals etc.”

“Give more information about the sharks so we can learn about them and better understand them. Also give some information about the location. The more information you got the more you will like the experience”

“It truly was an amazing experience in terms of seeing the sharks and being so close to these beautiful creatures. (Name removed) was a wealth of information but felt

there could have been more group education on sharks for everyone to hear. Overall loved it”

Moscardo and Saltzer (2004) suggest that wildlife based experiences need to be associated with structured, quality interpretation programs to be able to facilitate and support the development of knowledge amongst participants. Conservation benefits are more likely to be gained when the learning benefits from information, reinforce the emotional benefits of directly experiencing marine species in their natural habitat (Zeppel & Muloin 2008). The linkages between tour characteristics and positive changes in tourists’ environmental knowledge, attitudes and behaviours remain largely untested. The potential for white shark tourism to influence visitor’s attitudes towards marine stewardship via education, awareness, and experience is an area that warrants further academic investigation (Dobson, 2008).

While the proponents of nature-based tourism suggest the delivery of education is major element to the conservation of the species, there are limitations to the provision of an interpretative program. Operators are challenged to engage participants and deliver effective messages while managing visitors desire for close interactions with wildlife (Zeppel & Muloin 2008). Most marine wildlife tours provide only a brief window of communication opportunity. Therefore, programs must be well structured with trained guides who establish credibility quickly to maintain interest and attention of participants (Forestell 1993; Hrycik and Forestell 2012). The beliefs and attitudes of participants prior to the tour and the experiential elements of the activity will vary from person to person, therefore it may be unrealistic to expect interpretative encounters to result in strong and enduring attitude impacts during this brief encounter (Ham 2007). While the cage-dive experience may engender a willingness to support the protection of the site and its corresponding wildlife amongst some participants, further understanding of participants’ behaviour post-experience is necessary before the link between the cage-diving activity and stewardship can be established.

5.43 Post-experience interest in the Marine Park and Sanctuary Zone

Following the cage-diving experience a sub-sample of participants (n= 144; 33% response rate) responded to an invitation to participate in an online follow-up survey. The survey emailed to participants gathered data regarding their post cage-diving experience interest in the MP and SZ.

Since returning home,

- 98% of participants had recommended cage-diving at the Neptune Islands.
- 82% had talked with others about the Neptune Islands Marine Park.
- 62% had talked with others about the Neptune Islands Sanctuary Zone.
- 49% had sourced information about the Neptune Islands.
- 66% had talked with others about marine parks or sanctuary zones in general
- 45% had sourced information about marine parks or sanctuary zones in general

These results suggest that approximately half of the sample have demonstrated interest in the Neptune Islands by sourcing further information and/or talking with others about the MPA and SZ since their return home. While participants were interested in talking about, and obtaining further information about the Neptune Islands, discussions and sourcing information relevant to marine parks and sanctuary zones in general also occurred. These results are encouraging in light of the recurring theme for more information amongst the onboard survey participant comments, suggesting participant's interest and desire to learn more about the site extended beyond the onboard tour.

Customer loyalty has minimal relevance for the purpose of repeat patronage on cage-diving tours since repeat patronage for 'a once in a lifetime' experience in such a remote area is likely to be low. However, marine wildlife tours, such as shark diving, are reliant on positive word-of-mouth recommendations to generate new customers (Catlin et al. 2010). The results indicating that 98% of participants have recommended cage-diving at the Neptune Islands is an extremely valuable form of advertising for the industry and promotion of the SZ and MP.

5.5 Objective 4: Management implications and Recommendations

The aim of the present study was to investigate the social values and knowledge held by white shark cage-diving tourists related to the North Neptune Islands before and after the establishment of the SZ. On the basis of the above findings the following recommendations and conclusions are made:

1. The majority of the sample stated that the cage-diving tour was the motivating factor for visiting South Australia (67%) and Port Lincoln (98%). This visitation is a financial injection into the local community and Marine Park that would not have occurred without the cage-dive industry. While the majority of participant's were unaware of the MP (64%) or SZ (93%), for those that were, 30% stated that the marine park influenced their decision to choose Port Lincoln. It is therefore suggested, that if future participants were informed of the MP and SZ (perhaps via operator websites), this may influence their decision to choose Port Lincoln (and Australia) as their cage-diving destination.
2. Although participant knowledge of the MP and SZ significantly increased during cage-diving trips, half the participants were not aware of the SZ before the tour, and did not learn about it while on tour. Participant responses support demand for further on-tour education about white sharks, the Neptune Islands, and the SZ. This demonstrates the potential for operators to contribute to participant knowledge (and potentially participant support of the SZ) through education and interpretation while on-tour.
3. While operators have a unique opportunity to raise awareness and inform participants about the MP, SZ, and marine conservation issues, tourist's needs are potentially difficult to address in program design due to the diverse characteristics of participants (language, previous marine knowledge, and tourist 'type') (Orams 1999). Understanding participants' characteristics and motivations can assist the provision of interpretative material (Garrod 2008). Participants aged 18–30 had the least knowledge of the SZ and comprised 53% of cage-diving tours participants. We suggest that this would be a

suitable age group to target with an education and interpretation program focused on the goals and objectives of the MP and SZ. Interpretative communication would need to be site relevant with material offered for those who are interested without reducing the experiential satisfaction of others wishing to ‘ignore it’.

4. The results indicate that respondents are capable of recognising and stating preferences among intangible values for a marine resource. The most important values of the SZ were the *biological diversity*, *future*, and *learning* values. These values reflect individual’s experience of the site and may be fundamental to their support for the protection of the Neptune Islands. These values could, therefore, be used to promote the North Neptune Islands to achieve further support for the SZ and the protection of the Neptune Islands.
5. Key components of fostering marine stewardship are education and personal connection to the marine environment. While a sense of personal connection to the Neptune Islands and the white sharks was demonstrated in qualitative responses, participants desire for more education suggests a missed opportunity to further generate a sense of stewardship amongst individuals. We suggest that the white shark cage-diving experience needs to be associated with well-designed quality interpretation programs to be able to facilitate and support the development of stewardship amongst participants.
6. The follow up survey results indicated that approximately half of the sample demonstrated interest in the Neptune Islands by sourcing further information and/or talking with others about the MPA and SZ since their return home. While on-tour education may reduce the need for participants to source further information, it is important for information sources such as webpages include information regarding the SZ. We suggest that the DEWNR webpage (<http://www.environment.sa.gov.au/marineparks/find-a-park/eyre-peninsula/neptune-islands>) promote this site as the ‘Neptune Islands Group (Ron and Valerie Taylor) Marine Park Sanctuary Zone’. By adding SZ to this title gives the public a clear indication of the environmental significance of

this site and may enhance public appreciation, understanding, and stewardship of the site.

6.0 Conclusion

This study provided a valuable insight into the views of white shark cage-dive tourists and highlighted the demand for further education opportunities amongst cage-dive participants. Quality education and interpretation programs may not only facilitate and support the development of knowledge about the Neptune Islands, the MPA and the SZ, they may also enhance the social values of the site and engender a sense of stewardship amongst participants.

While the findings may not be extrapolated beyond the study sample, the gap in knowledge related to the SZ and the frequency of values mentioned may be common amongst other stakeholders and the general public. An understanding of public knowledge and value of the MP and SZ may assist in encouraging public acceptance and support of marine governance strategies and the facilitation of marine stewardship amongst the public.

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