A public opinion of Shark Exclusion Net and Shark Management on Fish Hoek Beach

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Abstract

The Fish Hoek shark exclusion net which keeps sharks and swimmers separate is in its trial phase, but a decision regarding its continuity is needed. This paper aims to understand the level of community satisfaction and support of the Fish Hoek exclusion net project and management thereof. One of the main attributes of the net is that it prevents marine life from being trapped as it uses a fine mesh which prohibits by-catch. Data from surveys of beach users collected in Fish Hoek were analysed using single factor analysis of variance tests. The results showed that the local community are satisfied with the current shark management and that those who perceived the risk of sharks to be high support the exclusion net.

Introduction

In March 2013, the shark exclusion net was put into effect in a combined effort between the City of Cape Town and the Shark Spotters organisation to minimise the risk of shark attack on Fish Hoek beach. Over the past year the net has undergone a trial phase. This paper will attempt to gauge the attitudes of the public in terms of management and whether the public would support a permanent implementation of the net.

The Fish Hoek and the False Bay area have a reputation for shark attacks. In recent years, there has been an increase in the interaction between beach users and sharks. Although the number of fatal attacks is still relatively low the public fear has increased (Nel *et al*., 2006). In 2004, the City of Cape Town launched the Shark Spotters Program in an attempt to protect the public in an environmentally friendly manner (Allen, 2013). This program has been a success; however, it is not 100% effective. Therefore there is a need for a more effective but equally discrete solution, and thus the shark exclusion net was implemented. The net aims to provide protection for swimmers while having no impact on the environment and marine life.

The net encloses a 200m section of the beach which is referred to as "The Exclusion Zone" (Allen, 2013). It is deployed in the mornings and retrieved in the evenings to prevent the loss of marine life and other bi-catch. The net is used in the summer periods, throughout the weekends, public holidays and school holidays, therefore protecting as many beach users as possible (Allen, 2013).

The aim of this paper is to analyse from a management point of view whether the users of Fish Hoek beach support the exclusion net, whether they feel safer swimming within the net, and whether they would like to see the net become a permanent feature of the beach.

Methods

Survey

The survey was designed in order to assess whether the users of Fish Hoek beach support the exclusion net. The survey consisted of 11 questions relating to shark management and perceived shark attack risk on Fish Hoek beach. Questions included sources of information surrounding shark management, possibility of animal entanglement, and impact on local trek-net fishers, organisations responsible for shark management, acceptable forms of shark mitigation, and size of exclusion net and time of deployment. It was followed by a brief questionnaire on the respondents' profile indicating where they live, their age, gender, education levels and occupation. Each respondent indicated whether they swam on that particular day and if so, if they used the exclusion net. In addition, respondents were asked to indicate their level of satisfaction with the shark management. Finally, each respondent made it explicitly clear as to whether they supported the exclusion net or not.

Survey Administration

After receiving ethics clearance from the UCT Ethics in Research Committee, the surveys were conducted on Fish Hoek beach with the support of the Shark Spotters program. The surveys were completed in 2 phases. The first phase was completed on a public holiday. The beach was relatively full and a total of 50 surveys were completely. The second phase was completed during school holidays but during the middle of the week. The weather was not conducive to high numbers of beach goers; however, a total of 21 surveys were completed. An overall total of 71 surveys were collected.

Model Specification

<u>Table 1</u>

Details of the explanatory variables used in the analysis of variance model to assess levels of satisfaction towards the management of shark attack in Cape Town

Explanatory variable	Description
Risk	Likert scale measuring perceived risk of shark attack (1 to 10)
Info	Satisfaction with amount of information available (yes, no or unsure)
InfoSource	Categorical variable indicating source of information regarding net
Entanglement	Measured concern with animal entanglement (yes, no or unsure)
Trek-net	Concern with impact on trek-net fishers income (yes, no or unsure)
Responsible	Categorical variable indicating organisation responsible for management
Solution	Categorical variable indicating solution to shark attack in Cape Town
Size	Satisfaction with size of net (yes, no or unsure)
Time	Satisfaction with time of deployment of net (yes, no or unsure)
Permanent	Should the net be a permanent feature (yes, no or maybe)

Public Profile	
Suburb	Participants indicated where they are from (local or tourist)
Age	Numeric variable indicating participant age
Education	Two factor variable indicating gender (Male or female)
SwimArea	Indicates where paticipant swam (inside net, outside net, did not swim)
Education	Participant's education (incomplete, High School, FET College, Uni)
Occupation	Categorical variable capturing participants occupation
FhvKzn	Difference between Fish Hoek shark net and KZN gill nets (yes or no)
Adults	No. of adults in participants party
Children	No. of children in participants party

From the 71 surveys, 10 explanatory variables were established from the surveyed questions. The risk perception was recorded on a scale of 1 to 10, 1 indicating that no real risk was felt and 10 being that high risk was felt. Main sources of information were collected under the following categories; internet, TV programmes, newspapers, sign boards, pamphlets, public talks, friends and family, other sources or none of the above. For simplicity reasons within the model, a variable Community Media was created which included those forms of media that were available and present within the Fish Hoek community. These included sign boards, pamphlets, public talks and friends and family. The opinion on animal entanglement was collected by a simple "yes", "no" or "unsure" question.

Respondents were asked whether they would still support the exclusion net if it resulted in decreased income for trek-net fishers. It was again answered in a "yes", "no" or "unsure" manner. A variable that captured where respondents lived was recorded and subsequently divided into a local and foreign variable. Those who lived in Fish Hoek and False Bay area were considered local while those living elsewhere, including the Cape Town city bowl, were considered foreigners. Within the profile section of the questionnaire, gender was also recorded. Finally, a variable was created which represented techniques that had the least impact on the environment. This was created by collaborating certain management techniques, namely "shark spotter", "exclusion nets" and "do nothing" into a "least impact" variable. These explanatory variables were used in the results and will be discussed further.

The perception of shark management was dealt with using several different single factor analysis of variance tests. The satisfaction with shark management (ranking from "satisfied", "unsatisfied" and "unsure") was used as the dependent variable. The explanatory variables were computed against the independent (explanatory) variables; male, local media, satisfaction with information provided, local dummy, concern with animal entanglement, cost to trek net fishers, perceived risk and least impact techniques. In order to capture a general opinion towards the net, a multiple linear regression analysis was run using the perceived risk factor as a dependent variable, and the size, time and permanent variables as treatment variables in order to assess the opinion of the net in terms of levels of risk. Finally, a one way regression analysis was used to determine the influence of information on the public's view of the exclusion net.

Results

<u>Table 2</u>

One way analysis of variance using all explanatory variables against the satisfaction towards management variable

	Satisfaction towards management			
	0	1	2	
	Unsatisfied	**Satisfied**	**Unsure**	**F-value**
	n=14	n=42	n=15	
Perceived risk	6.60	6.20	7.30	0.91
Deployment times	0.50	0.74	0.60	1.49
Permanent structure	0.71	0.67	0.73	0.13
Age	47.70	43.90	45.00	0.28
Gender: Male Dummy Var	0.57	0.50	0.27	1.61*
Swimming: Dummy	0.50	0.40	0.33	0.41
Years of Education	14.40	14.50	14.30	0.09
Participant from local area	1.00	0.64	0.40	6.79***
Child	0.50	0.52	0.53	0.02
Shark Spotters	0.43	0.47	0.40	0.14
Exclusion as a solution	0.50	0.64	0.80	1.43
Enough Info	0.14	0.83	0.60	4.88**
Trek-net	0.64	0.81	0.87	1.21
Entanglement	0.64	0.74	1.07	2.19*
Reliant on community media	0.57	0.36	0.20	2.21*
Nature of the dissatisfaction				
% Male	57%	50%	27%	1.61*
% Relies on local media	57%	36%	20%	2.21*
% Satisfied with info provided	14%	83%	60%	4.88**
% Local dummy	100%	64%	40%	6.79***
% Concerned with entanglement	36%	64%	67%	2.03*
% Cost on Trek-net fishers	64%	81%	87%	1.21
Perceived risk	6.60	6.20	7.30	0.91
Techniques of least impact	14%	31%	7%	2.25*
Lethal control variable	21%	5%	13%	1.78*

Perceptions of shark management

59% of the respondents were satisfied with the manner in which sharks were being managed on Fish Hoek beach. An analysis of variance was conducted, and it was found that a relationship existed between the local variable (this taking into account those in the Fish Hoek area) and the satisfaction with management was highly significant ($F = 6.79***$). This indicates that the local community are satisfied with current shark management on their local beach. In addition to its statistical significance, this is of particular relevance as it is represents the local beach users' opinion towards shark management and, as they are the main users of the beach, their opinion holds weight. The relationship between shark management and amount of information available also gave a highly significant result ($F = 4.88**$). This indicates that people who are receiving sufficient amounts of information about shark management are satisfied with shark management. It was found that out of the 42 respondents who were satisfied with shark management, 35 of those respondents felt there is enough information available about the shark exclusion net and other mitigation measures. In addition to sufficient information being available, a significant p-value was found with regards to community media being the source of information ($F = 2.21*$). Once again, this indicates that the community is gaining sufficient information from local sources, which adds to their perception of shark management and, ultimately, the exclusion net. It is interesting to note that there is a significant level between the male satisfaction and level of management ($F = 1.61*$). 57% of the respondents who were unsatisfied were in fact male. This indicates that the male population is more concerned with shark management than females.

There is little significance between satisfaction of management and whether respondents want the exclusion net to become a permanent feature ($F=0.13$). One cannot draw a direct conclusion that the current shark management is influencing the public's opinion of the exclusion net. It was also found that there is little significance between satisfaction levels of management and education levels ($F = 0.09$) as well as little significance with regards to age ($F = 0.28$). Therefore, we can conclude that the age of the respondent and the education levels have little effect on their satisfaction of shark management in Fish Hoek.

Sources of information

Through the analysis of the data it was found that the relationship between levels of information available to the public and their want for the permanent implementation of the exclusion net was insignificant ($F = 0.12$). There is no direct link between the two variables, suggesting that an increase in the amount of information available will not influence the public's opinion on the exclusion net.

Response to exclusion net and risk perception

The response to the exclusion net was interpreted in terms of risk perception and its size, the time of deployment and potential permanency. The size test statistic is not significant in the model and the p-value is far from any rejection cut-off. The "time" of deployment and "permanent" variables are, however, significant (T = -3.74** and T =15.18*** respectively). This indicates that those who perceive the risk of shark attack to be high are satisfied with the time of deployment and would like to see the exclusion become a permanent feature of Fish Hoek beach. This is an encouraging result for the shark exclusion nets as it suggests those who are fearful of sharks feel that the net is deployed at times that enhance their safety. In addition, they feel it should be implemented permanently. This regression model does however; suggest a size adaption would be welcomed by the public. Those who fell into the high-risk bracket (rated between 7 and 10 on the risk scale) made up 53% of the survey sample.

In addition to the support of the exclusion net, it was found that there was a significant relationship between least invasive techniques and shark management. A level of significance was found which indicates that respondents are in support of environmentally friendly mitigation measures (F = 2.25*). This further emphasises the support for the shark exclusion net and its minimal effect on marine life.

Concerns about exclusion net

Although the net received positive feedback, there are concerns surrounding the program. There is a significant relationship between the shark management variable and the possibility of animal entanglement (F =2.19*). This suggests that respondents are concerned that the exclusion net, despite its efficiency in shark management could cause environmental harm. The possibility of animal entanglement is a serious issue particularly in KwaZulu-Natal. KwaZulu-Natal has in place a gill net system that is essentially a catchment net, aiming at trapping sharks rather than the more environmentally friendly method used in the exclusion net (Cliff *et al.*, 2011). Large numbers of marine life get caught in these gill nets causing animal entanglement and harm (Cliff *et al.*, 2011). It is interesting to note that those who are concerned with animal entanglement are aware of the difference between the KwaZulu-Natal gill nets and the Fish Hoek exclusion net in this regard (T = 1.71, p < 0.1). There is a low level of significance between management and the possibility of decreased income for the trek-net fishers. This indicates that the public is not concerned with the impact the net will have on trek net fishers.

Conclusion

Through the analysis of the results, it is clear that the shark exclusion net is supported and that the current shark management is satisfactory. The majority of the respondents felt that the manner in which the risk of sharks is dealt with is sufficient. This suggests that the Shark Spotters Programme, along with the trial exclusion net, is well received. A significant relationship between local beach users and the risk management was found. This reiterates that the local community is pleased with the level of shark mitigation. There was also found to be a significant relationship between shark management and quantity of information available. The availability of information, particularly that of community media, has contributed to the satisfaction of current shark management. This shows that the public are well informed with regards to the shark management, and thus their opinion is based on sufficient information. However, there was no relationship between an increase in the amount of information available to the public and the percentage of people wanting the net to be a permanent feature.

It is evident that the shark exclusion net is supported. 69% of the respondents supported the permanency of the exclusion net. Respondents who felt the risk of sharks were high were satisfied with the time the net is deployed and supported the trial exclusion net. This was seen by a significant t-stat associated with the explanatory variables time and permanency respectively. These results indicate that those who are most fearful of sharks are most supportive of the net. However, the relationship between risk perception and the size of the exclusion zone is not clear and further research should be conducted to determine this. In addition to this, respondents were concerned about the possibility of animal entanglement. The relationship between this variable and satisfaction with management is significant, indicating that participants are satisfied with the approach to entanglement taking by management. The Fish Hoek exclusion net has not experienced a single entanglement since its debut in 2006 (Allen, 2013).

Through the collection of data in the form of surveys and statistical analyses, this paper has established that the Fish Hoek exclusion net is supported by the local community. It has shown that the community is happy with the way in which sharks are being managed and the information available to them and, most importantly, they think the exclusion net should become a permanent feature of Fish Hoek beach.

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