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The role of shark ecotourism in conservation behaviour: Evidence from Hawaii

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ABSTRACT

Policies to conserve sharks have generally struggled to gain broad public support. Ecotourism programs have been suggested as a way to promote support for conservation by increasing participants' knowledge of ecology, fostering positive environmental attitudes, and driving increases in conservation behaviour. Yet the evidence is mixed, and some argue that its effectiveness is constrained by the "ceiling effect", i.e., people attracted to ecotourism programs are already environmentally minded, thus their participation does not result in meaningful conservation gains. Surveys of 547 tour participants in a cage free shark diving ecotourism program and 488 members of the general public were conducted in Hawaii to test whether the program resulted in conservation benefits or whether it was constrained by the ceiling effect. The results show evidence of the ceiling effect, suggesting that the program is attracting more environmentally minded participants. Despite this, tour participants reported a significant increase in knowledge regarding the ecological role of sharks and improved attitudes towards sharks after the tour compared to before. Critically, once responses from tour participants and the general public were pooled and previous engagement in conservation was controlled for, participation in the tour still had a significant positive effect on intentions to engage in shark conservation in the future, suggesting that the program does result in meaningful conservation gains. The usefulness of the information provided on the tour in addition to participants' age, gender, and satisfaction with the tour all played a role in determining its effectiveness as a conservation strategy.

1. Introduction

Akin to many other large predators, many species of shark are facing declines all across the globe [1–3]. Though exact estimates are difficult to obtain, existing reports suggest that millions of sharks are killed each year through directed fisheries, many of which support the shark fin soup industry [4], and as fisheries bycatch [5]. Dramatic reduction in shark populations worldwide is already impacting marine ecosystems through trophic cascades [6], and the need for effective shark conservation policies has been widely recognized [7]. Yet large predators such as sharks tend to suffer from image problems associated with fear and concern for public safety [8]. Indeed, in some areas, marine policies include mandates for actively culling sharks in the name of protecting beachgoers due to public outcry [8,9]. Strategies to conserve sharks can therefore struggle to gain broad public support and engagement, which is needed to exert pressure on policymakers to act and legislate against mismanagement, illegal fishing, and other threats to sharks [10,11]. Improving the public perception of sharks is therefore critical to gaining support for their conservation, getting people engaged in shark conservation efforts, and driving changes to shark policy [12]. Immersive, nature-based tourism experiences, often referred to as 'ecotourism', is one potential method for achieving this goal.

Exact definitions vary, but ecotourism is generally agreed to consist of responsible travel experiences to natural areas that support environmental conservation through sustainable practices and the provision of environmental education [13,14]. Ecotourism has many confirmed benefits, though these vary across different kinds of ecotourism experiences. Beyond utilizing more environmentally friendly operational practices, it can make significant contributions to local economies, and profits are often used to support conservation policies and projects [15–19]. The substantial economic value of the ecotourism industry can also create an incentive for initiating or increasing conservation efforts [20]. Critically, it is widely believed that ecotourism also provides additional conservation gains by informing participants of

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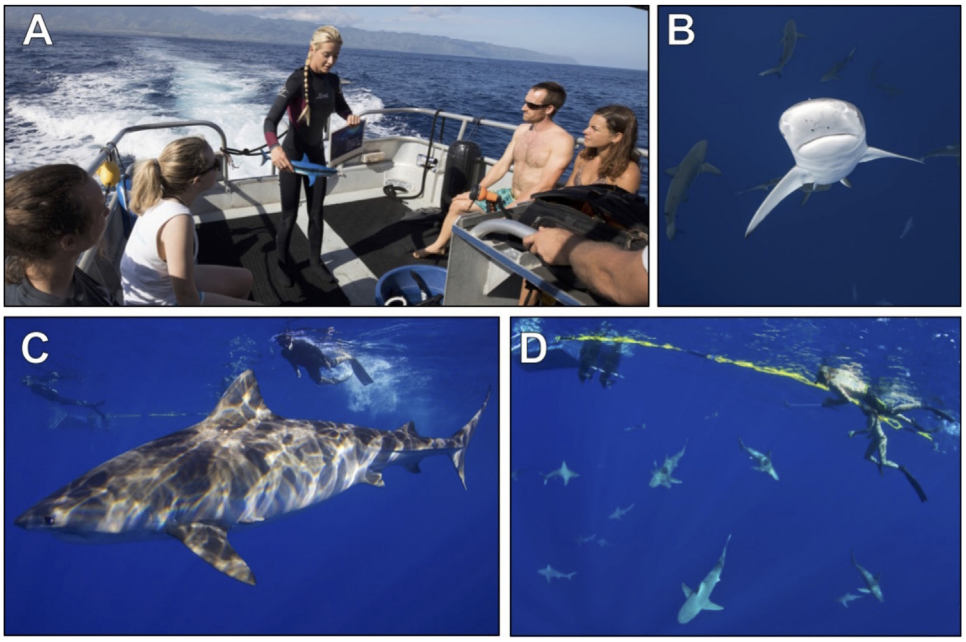

Fig. 1. The pelagic shark program. (A) A marine biologist conducts a safety briefing and educational talk in route to the site where participants snorkel or skin-dive with different species of shark, including (B) galapagos sharks, (C) tiger sharks, and (D) sandbar sharks. A safety diver oversees all in-water activity. Photos by Juan Oliphant.

the need to protect the environment or particular species, thereby altering their attitudes towards environmental issues and increasing pro-conservation behaviours [13,15,21]. This suggests that ecotourism may be especially beneficial for shark conservation, which has generally struggled to garner the broad public support needed to affect change due to strong negative perceptions of sharks held among much of the general public [12]. Indeed, counteracting misconceptions about sharks and increasing knowledge of their ecological role in the environment have been identified as key for overcoming this barrier [12,22].

There is existing empirical evidence that ecotourism does increase participant's knowledge of conservation issues, their self-reported interest in stewardship action, and their intention to engage in pro-environment behaviour in the future [13,15,17,23–26]. However, some studies show no changes in attitudes or knowledge [27], while others have shown a lack of intention to engage in conservation after participation in ecotourism programs despite knowledge gain [14,28–30]. One of the leading hypotheses for the potential ineffectiveness of ecotourism programs in achieving knowledge and behavioural change is what's known as the *ceiling effect*, or “preaching to the choir” [28]. The ceiling effect describes the idea that tourists willingly paying to engage in programs advertised as pro-conservation or educational in nature tend to already be well informed and hold positive attitudes towards the environment and/or the target species. Consequently, the educational information presented on the tour does not add to their pre-existing knowledge; subsequently, they do not report changes in knowledge, attitudes, or intended conservation behaviour [15,28,31]. Despite this conflicting evidence, to the authors' knowledge no study has conducted a baseline survey to see if participants of ecotourism programs show significantly different pre-tour knowledge or attitudes to non-nature based tourists or the general population. Such a comparison is needed to determine the existence and magnitude of the ceiling effect, and to establish if such an effect is limiting the effectiveness of ecotourism programs in encouraging conservation behaviour.

This paper examines the role of shark ecotourism in conservation behaviour and whether its effectiveness as a conservation strategy is limited by the ceiling effect. It was hypothesized that although shark ecotourism programs may help to improve knowledge and attitudes about sharks, their value in affecting conservation behaviour is likely to be limited by the ceiling effect. To test this hypothesis, a shark ecotourism program in Hawaii was studied to determine its impact on participants' knowledge of sharks, attitude towards sharks, and intentions to engage in shark conservation. Members of the general public were surveyed to identify whether a ceiling effect was present, and if so, to determine whether this pre-existing bias explained any differences in reported intentions to engage in shark conservation between the general public and shark tour participants. Interestingly, the results indicate that the role of shark ecotourism programs on conservation behaviour is not limited by the ceiling effect, suggesting they can have a meaningful effect on shark conservation policies and actions. As a post-hoc analysis, the factors playing an important role in determining the effectiveness of shark ecotourism as a conservation strategy were examined. These results can help to shape shark and other marine ecotourism programs to have a greater impact on conservation policies and actions.

2. Methods

2.1. Data collection

Two structured surveys were implemented: one targeted toward shark tour participants and one targeted toward the general public. The first was distributed to participants of a pelagic shark ecotourism program based in Hawaii from April to August 2016 on completion of their tour (n = 547). The tour is marketed as an education program and an opportunity to engage in conservation research. The program takes small groups (up to six) to known shark aggregation sites off the northern coast of Oahu, Hawaii, outside of State waters, to snorkel or skin-dive with sharks, while a marine biologist conducts surveys of the sharks present to support ongoing research. On the boat trip out to the aggregation sites a marine biologist gives a safety briefing and educational talk on shark ecology and behaviour (Fig. 1). While at the site tour participants rotate in and out of the water, where they are supervised by a safety diver. Shark species commonly observed include tiger sharks, sandbar sharks, galapagos sharks, and scalloped hammerheads (Fig. 1). While at the site and on the return trip back to the harbor, tour staff talk with participants about their ongoing research efforts, the conservation status of sharks, and how participants can contribute to shark conservation policies and actions.

The survey for shark tour participants included questions regarding previous interactions with sharks, previous engagement with environmental conservation generally, and previous participation in shark-specific conservation actions. Participants were also asked to identify