Whale Watching in the Salish Sea: A Case Study of On-board Interpretation and Willingness to Protect the Marine Environment

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Abstract

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This study presents findings on the information provided in the interpretation on whale watching tours in the Salish Sea, on the western coast of the United States, and examines its influence on tour passengers' willingness to act to protect the marine environment. Participant observation was conducted to observe the interpretation and a pen-and-paper questionnaire was administered to passengers at the end of the tour. The core variables considered by this study to influence passengers' willingness to act are knowledge of issues, knowledge of action strategies, and concern. In modeling outcomes of behavior/lifestyle change, using indicators from Orams' (1999), these core variables were shown to influence willingness to act. Observations determined that more interpretation pertaining to knowledge of threats and existing regulations is needed. Similarly, suggestions of action strategies were rarely included in interpretation. Therefore, it is recommended that interpretation programs incorporate explicit messaging about issues facing the marine environment and offer action strategies in tandem with it. In this way, passengers will leave whale watching tours with useful knowledge for engaging in environmentally responsible behavior.

Key words: whale watching; environmental education; interpretation; marine conservation; environmental protection; nature-based tourism

Introduction

Environmental campaigns and movements in the United States for the conservation of whales gained traction in the 1970s and have continued to the present day. With public pressure, the practices of commercial whale harvesting and collection for aquarium displays ended, but the affection for whales remained. The enactment of the Marine Mammal Protection Act and the listing of several whale species under the Endangered Species Act enabled the populations off the west coast of the country to rebound after major declines. Whale watching has become an increasingly sought-after activity to encounter these species.

Whale watching is a form of nature-based tourism, defined herein as "any type of tourism that relies mainly on attractions directly related to the natural environment" (Weaver, 2008, p.18). It is extremely popular in the Salish Sea, the inland waters off the west coast of the United States and Canada, generating over $216 million in associated revenue annually (Van Deren et al., 2019). This area is frequented by a variety of whale species, making it one of the top whale watching destinations in the world (Giles & Koski, 2012). Humpback whales, western north pacific gray whales, minke whales, and orcas have been regularly spotted in the Salish Sea from February to November.

Recently, southern resident killer whales (SRKWs) have gained particular attention in the news. In March of 2018, governor Jay Inslee of Washington State issued Executive Order 18-02, which established a task force of nearly 50 members to develop a long-term plan for the recovery of the SRKW population (State of Washington Office of the Governor, 2018). Then, in the summer of 2018, a female SRKW named J-35, commonly known as Tahlequah, spent an unprecedented 17 days carrying her dead calf through the waters of the Salish Sea (Dwyer, 2018). Lastly, SRKW

J-50, a.k.a. Scarlet, passed away after a period of malnourishment and illness. News spread across the United States, which raised awareness, questions, and concerns among the public.

SRKWs are critically endangered, with only 75 individuals remaining in the wild today (Center for Whale Research, 2019). The population was listed under the Endangered Species Act in 2005 and remains listed today. Recovery is difficult as there are few females of reproductive age remaining in the population today and they reproduce slowly, only birthing one offspring every 3-5 years (Wasser et al., 2017). Female fecundity is understood to be impacted by low food availability (Wasser et al., 2017), and Chinook populations in the Salish Sea are declining due to a combination of factors such as habitat degradation from dams, continued fishing efforts, and natural predation pressures. When orca calves are born, chances of survival are low due to persistent organic pollutants (POPs) present in the marine environment and trophic webs, which bioaccumulate in the mother whales' body fat and are subsequently transferred through breast milk to the young (Krahn et al. 2009).

With more whale watching boats on the water, there is some concern that the activity may disturb SRKWs and other marine wildlife. There is evidence to support that noise from vessel traffic may be affecting foraging and transiting behavior of SRKWs (Houghton et al., 2015) and humpback whales (Duffus & Dearden, 1993). These interactions may stress the whales, which could drive them away from their integral habitat (Lusseau et al. 2009). While this may cause some to argue for a reduction of whale watching activity, others argue that the benefits beyond revenue produced by the activity, such as pro-environment attitudes, awareness of environmental and conservation issues, and encouraging environmentally responsible behavior should not be discounted (Lück, 2015; Zeppel & Muloin 2008; Stamation et al., 2007; Duffus & Dearden 1993; Mayes & Richins, 2009).

Many authors have endorsed environmental education, "a process aimed at increasing biological and cultural knowledge, awareness of environmental problems, and creating motivation to act responsibly towards these environments" (Andersen & Miller, 2006, p.112), as a conservation strategy. When properly employed in nature-based tourism, it can achieve the aforementioned benefits (Forestell,1993; Orams, 1997; Lück, 2003; Andersen & Miller, 2006; Stamation et al., 2007; Zeppel & Muloin, 2008; Lopez & Pearson, 2017; García-Cegarra & Pacheco, 2016).

Interpreters, also commonly known as educators or naturalists, can deliver environmental education through tours, presentations, pamphlets and other similar methods. Throughout this article, this will be generally referred to as "interpretation". The content of these programs can span a variety of topics including local history, conservation issues, and information from the natural sciences. Seeing whales in their habitat can be very impressive and augmenting this experience with an education framework creates the potential for conservation benefits (Stamation et al., 2007).

Tourists who experience an education component in their whale watching experience are more likely to leave with a heightened awareness of threats to marine life and retain applicable knowledge such as actions to reduce human impacts on the environment (Zeppel & Muloin, 2008). Interactions with wildlife can inspire tourists to alter their behavior in favor of environmental stewardship; however, when lacking a structured interpretive program, they are unlikely to follow through with any action (Orams, 1997).

From the observations of this study, whale watching operators were aware of potential negative impacts and acted with care around the conduct of their vessels and animal encounters. With all due respect regarding the potential for impacts generated by the activity of vessel-based

whale watching, this study aims to highlight the benefits that the experience of whale watching can provide to its participants and to the short- and long-term stewardship of the marine environment. While Washington operators were the focus of this study, the conclusions and recommendations are intended to apply to any interested and applicable operators.

The primary research questions guiding this study are:

1) *What type of information is provided during whale watching tours in the Salish Sea?*

2)What interpretation information influences tour passengers' willingness to change their habits to help protect the marine environment?

To identify types of information provided during whale watching tours and to answer both research questions, a meta-analysis by Hines et al. (2010) identified specific variables to have a connection with environmentally responsible behavior: "knowledge of issues, knowledge of action strategies, locus of control, attitudes, verbal commitment, and an individual's sense of responsibility". The core variables further considered by this study are knowledge of issues, knowledge of action strategies, and attitudes (herein represented by "concern"). Furthermore, this study applies Orams' (1999) tourist outcome indicators (Table 1) to evaluate the impact that environmental education on whale watching tours in the Salish Sea could have on promoting the willingness to act to protect the marine environment among participants. The marine environment outcome indicators are not specifically addressed by this study; however, it is assumed that positive marine environment outcomes would be reflected by positive tourist outcomes.

Table 1: Outcome indicators

Outcome indicators – Tourist
• Satisfaction/enjoyment • Education/learning • Attitude/belief change • Behavior/lifestyle change
Outcome indicators – Marine Environment
• Minimize disturbance • Improve habitat protection • Contribute to the long-term health and viability of the ecosystem

Adapted from Orams (1999, p.89)

Whale watching vessels are an excellent setting to apply these indicators because there is a motivated, captive audience. Passengers are aboard for several hours at a time and they have invested their time and money into this activity. Given this, it can be presumed they have some affinity for the environment and/or wildlife they are experiencing.

Equipped with a personal emotional attachment, a special experience, and environmental education, it can be argued that the potential for promoting responsible environmental behavior is high amongst whale watch participants. Feasibly, this class of individuals is inclined to take the environmental education provided for them and put it into action.

Methods

Data Collection

Whale watchers aboard the boats were surveyed on nine whale watching tours departing from ports in Washington State, USA. All eligible passengers (over 18 years of age) were asked to participate. Of a total of 1113 passengers, 587 questionnaires were returned; an average response rate of 52.7%. 577 respondents are included in this study (some were removed due to <75% completion of the survey or the respondents were minors under the age of 18) (Table 2). The

majority of respondents were American (n = 524; 90.68%) and identify as female (n = 344; 62.4%). Ages 25-34 years old were most represented (n = 147; 25.4%) along with those who hold Bachelor's degrees (n = 213; 37.4%).

Table 2: Survey respondent demographics

Category	No. of responses	% of total
Age		
18-24	43	7.5%
25-34	147	25.6%
35-44	80	13.9%
45-54	119	20.7%
55-64	122	21.3%
65+	61	10.6%
Gender		
Male	206	37.3%
Female	344	62.4%
Education		
Some high school, no diploma	3	0.5%
High school graduate or equivalent	47	8.2%
Trade/technical/vocational training	33	5.8%
Some college credit, no degree	93	16.3%
Associate's degree	3	0.5%
Bachelor's degree	213	37.4%
Master's degree	115	20.2%
Professional degree	30	5.2%
Doctorate	31	5.4%
Nationality		
American	524	90.8%
Other	52	9.0%

The tours occurred from August 2018 to October 2018. Three companies are included in this study, henceforth referred to as Company A, Company B, and Company C. Seven different naturalists were observed, henceforth referred to as Naturalist 1 through 7. The vessels were all catamarans with capacities for 200-296 people, although tour groups tended to have 100-150 people.

Detailed field notes (as described by Kirk & Miller, 1986; and Spradley, 1979) were recorded throughout the tour. These notes included date, time, weather, visibility, tour departure and return, number and species of whales spotted, location of whale viewing sites, time on site

with whales, number of other vessels present, interpretation topics included, and passenger behavior.

Whales were spotted on each of the nine tours. Grey whales were spotted on two tours, humpback whales were spotted on two tours, and orcas (transient or resident) were spotted on five tours. Time spent watching whales ranged from 41-82 minutes, with an average time of 57.55 minutes.

Interpretation was delivered by a naturalist speaking into a microphone. Seven different naturalists were observed: five women and two men. There was a mix of educational backgrounds, some without formal training or education pertaining to the marine environment. Many of them learned content from each other or went through training created by the company. The information delivered in the presentations was unscripted but factually accurate, and typically related to the immediate geographic surroundings or the wildlife that passengers were seeing at the time. This was frequently complemented by images on screens in the cabin areas of the vessels, occasional physical props (a sample of whale baleen, a sperm whale tooth, an orca tooth replica), and printed booklets.

Participant observation was employed onboard the whale watching vessel to note the interpretation information offered and to distribute the questionnaires to the passengers. This method of data collection takes place with a researcher involved (passively, in this case) in the activity being studied (Yin, 2014). Additional information was not offered to passengers, but the researcher would generally answer questions when asked.

Pen-and-paper questionnaires (see Appendix A) were distributed to the passengers after all stops for wildlife viewing were complete. Verbal and written instructions were provided. The questionnaires were completed and returned before arriving at the port.

The questionnaire was inspired by several questions from a study conducted in Peru by García-Cegarra & Pacheco (2016). Questionnaires were anonymous (no names or contact information were collected or saved). It consisted of 23 statements: 19 Likert-style questions regarding motivations to engage in whale watching; concern about the environment; current knowledge about whales, conservation and related legislation; and 4 demographic questions (gender, location, level of education, and age).

Qualitative Analysis of Printed Booklets

Each whale watch company offered a printed booklet to the passengers aboard their tours. These booklets are useful for conveying consistent messaging to passengers, regardless of what is offered in the oral interpretation by the naturalist. Booklets could be the tools to equip passengers with knowledge of threats and action strategies to refer to at any time after disembarking the tour.

One company distributed them by donation (recommended $1) and proceeds were donated to salmon recovery efforts. This written material contained information about local geography, landmarks, and species; the natural and built environments; and booklets by Company A and Company C offered some action strategies.

A rudimentary qualitative analysis was performed, consisting of grouping the booklet content thematically. This was intended to capture an idea of the proportions of the booklets dedicated to providing different information to the passengers. Furthermore, it captures an idea of the framing (Nisbet & Mooney, 2007) selected by the operator with which to share information. Four major categories emerged: language framing the environment through a human/developed environment lens, natural science information, policy explanation or inference, and conservation strategies. The proportions were determined by a ratio of pages of a given theme to the total. In

the event that not one entire page was dedicated to the same theme, if the majority of sentences on a page were one theme then this was counted as one "page".

Qualitative Analysis of Naturalists' Interpretation

Table 3: Observations of interpretation topics (grouped by similarity)

Category	Interpretation topic	No. of tours included	% of tours
Regulations	Distance regulations	6	66.6%
	Marine Mammal Protection Act	5	55.5%
	Endangered Species Act	2	22.2%
	"Endangered species"	6	66.6%
Geographic Area	"Critical habitat"	0	0%
	The Salish Sea	7	77.7%
	San Juan Islands	9	100%
	Southern Resident Killer Whales	9	100%
Threats	Threats to SRKWs	6	66.6%
	Chinook salmon	4	44.4%
	Climate change	0	0%
	Threats to the ocean	0	0%
Information about actions	Strategies for stewardship	1	11.1%
	A call to action	2	22.2%

The variables identified in Hines et al. (2010) meta-analysis informed the themes from the observation. The naturalists' interpretation was coded for presence or absence of the topic, represented by the number of tours in Table 3. These variables are included in the following quantitative analysis of modeling the behavior/lifestyle change outcome.

Quantitative Analysis: Modeling the Behavior/Lifestyle Change Outcome

Responses to the survey were coded on a Likert-style scale as follows:

0 - "Strongly disagree"
1 - "Disagree"
2 - "I don't know"/No opinion
3 - "Agree"
4 - "Strongly agree"

Each question was analyzed for frequencies and distribution of responses, measured by using the ratio of response to total responses and represented in percentages (Tables 4 and 5).

The model of behavior/lifestyle change outcome was designed by selecting the responses from the researcher's survey and drawing on Hines et al. (2010) variables associated with responsible environmental behavior.

Additionally, by averaging responses for highly correlated aspects of knowledge, this study created two indices to include in the model: Knowledge of threats and knowledge of regulations.

Results

Interpretation observations

Table 3 presents the observations of interpretation topics to answer the research question: *What type of information is provided during whale watching tours in the Salish Sea?* The frequency and specificity of these topics varied significantly within and across the nine tours.

In the sphere of environmental threats, interpretation was generally lacking. This may be caused by companies wanting to avoid introducing potentially controversial topics to their passengers. For example, climate change was not mentioned by any naturalist. There was little to no explicit identification of threats to the marine environment such as plastic pollution, noise pollution, or ocean acidification. While survey respondents generally agreed that humans bear some responsibility for threats to the ocean, no naturalists linked human activities to impacts on the environment.

Similarly, action strategies were rarely included in interpretation (e.g. reduce fossil fuel consumption or purchase carbon offsets, reduce personal plastic use, participate in litter clean-up projects, etc.). Naturalist 2 suggested cleaning rivers for the benefit of salmon health because food availability is threatening SRKWs; however, salmon spawning in streams was not explained and

several passengers asked the researcher if they should stop eating wild-caught salmon instead. Naturalist 5 offered information on eating sustainable seafood as a way to promote healthy whale habitat and food sources.

While the language "endangered species" was used by Naturalists 1, 3, 4, 6, and 7, only Naturalist 1 explained the Endangered Species Act (ESA). Naturalist 6 explained the endangered species list but did not relate it to the ESA. Under the ESA, the Salish Sea is designated critical habitat for SRKWs, yet no naturalists mentioned this while the tours took place in the very same area.

Every naturalist described the water bodies composing the Salish Sea and the whale species (orcas, minkes, humpbacks, gray whales) that can be found there.

Naturalists 1, 5, 6, and 7 mentioned the Marine Mammal Protection Act; however, it was only explained in detail (that it is a federal law, year it was instituted, goals of the law, outcomes to date, etc.) by Naturalist 5 and 7.

Viewing guidelines (minimum distances and maximum speeds maintained while in proximity to wildlife) set and adhered to by the whale watching companies were explained on six of the tours. These protocols are similar to those set by NOAA, but those regulations were not specifically mentioned.

Lastly, the researcher was listening for the naturalists to make a call to action; to mobilize the passengers to engage with marine conservation after leaving their tour. The one notable instance occurred from Naturalist 5 who recommended that if passengers care about whale health and the environment then they should vote for candidates in their locales with platforms seeking to address these concerns.

Printed Booklets

Company A's booklet contained 65 total pages including text, maps, and other images; 55 featured content related to this analysis. 42 of 55 (76.3%) were dedicated to natural science information, 7 of 55 (12.7%) to human dimension framing, 1 page (1.8%) featured action strategies, and policy mentions were dispersed over a few pages and have been equated to 2 pages (3.6%). The remaining pages fall within the minor categories not relevant to the research questions.

Company B's booklet consisted of 26 total pages, with 15 pages featuring related content. 12 (80.0%) were dedicated to natural science, 3 (20.0%) to human dimension framing, and 0 to action strategies for environmental stewardship. There were three sentences with implicit references to policy (mentions of endangered species and international ban on commercial whaling); too few to be considered one page.

Company C's booklet consisted of 30 pages, and 18 pages contained related content. 9 of 18 (50.0%) were majority natural science, 6 (33.3%) human dimension framing, 1 (5.5%) featured action strategies, and policy mentions equate to 1 page (5.5%). The remaining page falls into the minor categories.

Survey Responses

Tables 4 and 5 present the responses to the survey questions. Table 4 reports respondents' experience and expectations. Most of the respondents agreed or strongly agreed (90.8%) that their expectations were met on the tour. The majority strongly agreed that the interpretation added to their experience (62.9%). Most agreed or strongly agreed (83.1%) that they would share what they learned with others. Furthermore, the majority would recommend a whale watching tour to their friends or family (64.3%). The majority believed all applicable laws were followed (89.3%) and

proximity to whales was not a driving factor of tour satisfaction because most respondents would not have preferred to be closer while viewing (39.8%).

Table 5 reports respondents' knowledge, concern, and willingness to act. Overwhelmingly, respondents agreed or strongly agreed that they were concerned about the state of the marine environment today (87.5%). Additionally, the majority strongly agreed with the statement that humans are responsible for the threats to the marine environment (69.5%). Lastly, the majority responded that they would be willing to change their habits if it helps steward the marine environment (90.4%). However, one in five respondents were not certain of actions that could be taken to participate in marine conservation efforts (20.1%).

Responses regarding familiarity with the Marine Mammal Protection Act were normally distributed, with most answering they did not hold an opinion (34.1%). Conversely, most respondents agreed that they were familiar with the Endangered Species Act (48.5%). Responses of familiarity with whale watching distance regulations were also normally distributed, with most agreeing (31.3%).

Table 4: Passengers' expectations and experience

Statement	No. of responses	% of total
Seeing whales was primary motivation to go whale watching		
Strongly agree	437	75.6%
Agree	123	21.3%
No opinion	4	0.7%
Disagree	13	2.2%
Strongly disagree	0	0%
Naturalist interpretation added to the experience		
Strongly agree	363	62.9%
Agree	198	34.3%
No opinion	8	1.3%
Disagree	8	1.3%
Strongly disagree	0	0%
Will tell others what they learned		
Strongly agree	231	40.0%
Agree	249	43.1%
No opinion	72	12.4%
Disagree	19	3.3%
Strongly disagree	4	0.7%

Would recommend a whale watch tour to friends & family		
Strongly agree	371	64.3%
Agree	166	28.7%
No opinion	26	4.5%
Disagree	8	1.3%
Strongly disagree	4	0.7%
Would have preferred to be closer to whales during the tour		
Strongly agree	55	9.7%
Agree	167	29.5%
No opinion	60	10.6%
Disagree	225	39.8%
Strongly disagree	57	10.1%
Believe all applicable laws were followed throughout the tour		
Strongly agree	296	52.2%
Agree	210	37.1%
No opinion	53	9.3%
Disagree	4	0.7%
Strongly disagree	2	0.3%
Going whale watching helps marine conservation		
Strongly agree	99	17.1%
Agree	218	37.7%
No opinion	182	31.5%
Disagree	64	11.1%
Strongly disagree	10	1.7%
Expectations were met		
Strongly agree	257	44.8%
Agree	264	46.0%
No opinion	22	3.8%
Disagree	26	4.5%
Strongly disagree	3	0.5%

Table 5: Passengers' concern, knowledge of threats and actions strategies, and willingness to act

Statement	No. of responses	% of total
Concerned about the state of the marine environment today		
Strongly agree	288	49.9%
Agree	217	37.6%
No opinion	46	7.9%
Disagree	22	3.8%
Strongly disagree	1	0.1%
There are actions to take to be part of marine conservation efforts		
Strongly agree	180	31.9%
Agree	270	46.8%
No opinion	116	20.1%
Disagree	7	1.2%
Strongly disagree	0	0%
Humans are responsible for threats to the marine environment		
Strongly agree	401	69.5%
Agree	160	27.7%
No opinion	11	1.9%
Disagree	2	0.3%
Strongly disagree	1	0.1%
Plastic can affect whales		
Strongly agree	427	74.0%
Agree	127	22.0%
No opinion	19	3.3%
Disagree	2	0.3%
Strongly disagree	0	0%
Noise can affect whales		
Strongly agree	270	46.7%
Agree	173	29.9%
No opinion	128	22.1%
Disagree	4	0.6%
Strongly disagree	2	0.3%
Willing to change habits if it helps to care for the marine environment		
Strongly agree	245	42.4%
Agree	277	48.0%
No opinion	43	7.4%
Disagree	8	1.3%
Strongly disagree	0	0%
Familiar with Marine Mammal Protection Act		
Strongly agree	65	11.2%
Agree	149	25.8%
No opinion	197	34.1%
Disagree	141	24.4%
Strongly disagree	24	4.1%

Familiar with Endangered Species Act		
Strongly agree	144	24.9%
Agree	280	48.5%
No opinion	82	14.2%
Disagree	65	11.2%
Strongly disagree	6	1.0%
Familiar with whale watching distance regulations		
Strongly agree	77	13.4%
Agree	179	31.3%
No opinion	149	26.1%
Disagree	126	22.0%
Strongly disagree	40	7.0%

Modeling the factors influencing the belief/lifestyle change outcome

The regression function below is used to estimate the relationships between respondents' willingness to change their behavior and a set of independent variables capturing concern, knowledge of issues, and knowledge of action strategies.

$$willingness\ to\ act = \beta_0 + \beta_1 Knowledge\ of\ threats + \beta_2 Knowledge\ of\ actions + \beta_3 Concern + \beta_4\ Knowledge\ of\ regulations + \beta_5 Interpretation\ threats + \beta_6 Interpretation\ Call\ to\ action + \beta_{n*ivn}$$

where
n = different demographic control variables listed in second section of Table 6

Table 6 displays the results of the regression analysis. The core variables are separated into the first section of the table. Results with statistical significance (gender, age, and "Interpretation: Threats" i.e. a variable representing naturalists' interpretation that included mention of threats) are not substantive and, thus, not considered further. The remaining variables were not statistically significant nor substantive, which include: the knowledge of regulations index, gender, American nationality, Washington state residence, proximity to the coast, level of education, and if the naturalist made a call to action in their interpretation on a tour.

Table 6: Results of OLS regression analysis

Variable	Regression Coefficient	p-value
Knowledge of threats	0.3290	0.00
Knowledge of actions	0.2591	0.00
Concern	0.2243	0.00
Knowledge of regulations	0.0037	0.89
Interpretation: Threats	-0.0628	0.01
Interpretation: Call to action	-0.0425	0.44
Gender	0.1121	0.01
USA resident	-0.0445	0.63
WA State resident	-0.0838	0.13
Coastal resident	-0.0065	0.90
Resident w/in 3hr journey to coast	-0.0018	0.97
Education	0.0150	0.20
Age	0.0457	0.00

As Table 6 indicates, core variables capturing environmental education components such as knowledge of threats and knowledge of actions are associated with willingness to act. These results cohere with the literature reviewed in this study and they hold while controlling for socioeconomic variables that literature suggests are important explanatory variables.

Discussion

The results of this study suggest the findings that there is specific information that may influence an individual's willingness to change their habits to care for the marine environment. The responses to the surveys indicate that environmental education is a successful strategy to shift tourists from passive consumption of nature-based tourism for enjoyment to active engagement with a lifestyle change to protect the marine environment. In employing Orams (1999) outcome indicators to the aspects of this study, the naturalists' interpretation aboard whale watching vessels is the mechanism that produces the behavior/lifestyle change.

In the context of whale watching participants aboard the nine observed tours in the Salish Sea, Orams' outcome indicators of satisfaction/enjoyment (Indicator 1), education/learning

(Indicator 2), and attitude/belief change (Indicator 3) are already met and occur simultaneously. The majority of responses agreed that their expectations were met to see a whale in its natural habitat, which implies that Indicator 1 is reached. Similarly, the majority agreed that they learned about whale behaviors and that they would recommend a whale watching tour, which meets Indicator 2. Indicator 3 is met by the majority of respondents agreeing that they are concerned about the state of the marine environment today. This supports the presumption that the individuals that elect to take whale watching tours are highly motivated and, thus, prime candidates for becoming environmental stewards.

The study can only speak to Indicator 4 in the *intent* to engage in a behavior/lifestyle change, the willingness to act to help care for the marine environment, because there is no assurance that respondents will act. The model predicts that the most influential factors to prompt intent to engage in environmentally responsible behavior are knowledge of threats facing cetaceans and/or the marine environment, knowledge of actions to take to help, and concern for the state of the environment. This suggests that messaging delivered by naturalists should place some focus on these topics to have an impact in promoting environmental stewardship.

This aligns with the expectations established by the literature review. Similar findings have been determined in other locations: New South Wales, Australia (Stamation et al., 2007); Los Organos, Peru (García-Cegarra & Pacheco, 2016); and Long Beach, California (Jordan, 2015). Consistent across these settings and in the Salish Sea, there is the missing link of building an interpretation curriculum with responsible environmental behavior as its goal.

Limitations of the study and possible sources of error

The results of this study are based largely upon the responses received from the survey. Given that this survey was a self-reporting anonymous survey, there is the assumption that the information provided is accurate to the best of the respondent's abilities. However, there is no guarantee the answers are honest or without bias.

Responses were not randomly selected as they opted in to the survey aboard the boats. Additionally, companies that were included in the study were not randomly selected; they were a convenience sample that depended upon their agreement to partner with the researcher. It is not reasonable to extrapolate these results to be representative of all whale watch tours in the region or the country.

Lastly, the survey instructions (written and verbal) were only given in English. It is possible there may have been respondents who did not fully understand the instructions or questions yet still returned surveys. There may have been other misunderstandings or distractions when reading and answering the questions aboard the boat. The researcher was not present with each survey respondent to supervise.

Recommendations for interpretation content

Interpretation training could incorporate explicit messaging regarding issues and threats facing the marine environment and wildlife. It is possible that interpretation does not currently include this information because of hesitation with respect to the tourist experience. Companies may not wish to create a narrative around responsibility for what may be considered as negative impacts on the wildlife they are viewing with their passengers. This concern is valid. It is not recommended that the entire message of the interpretation shift to a sense of urgency to address environmental issues, but striking a balance could be a more effective messaging delivery than in

its current form. There is no evidence from this study that would suggest that this new lens would be rejected by the passengers.

Additionally, there is an opportunity for whale watching companies to demonstrate support for the federal legislation that protects the wildlife they rely upon for the existence of their business. As taxpayers, each American aboard the tours contributes financially to the implementation of the Marine Mammal Protection Act and the Endangered Species Act. Much of the success of rebounding whale populations can be attributed to the protections offered by the MMPA and, without it, the passengers may not be seeing this exceptional wildlife today. However, most survey respondents indicated they were not familiar with the MMPA. Filling this information gap could link whale watch participants with an important form of conservation they already engage in and encourage them to do more.

When only given the information about threats, passengers are still unlikely to forge the connection on how to appropriately act on that information. Therefore, it is imperative that action items are offered in tandem with information about environmental issues. For example, one observed tour had a naturalist who described that some southern resident killer whales were experiencing malnutrition because their food source had declined, then they did not elaborate further. This prompted passengers to ask each other and the researcher (very few, and sometimes none, of the passengers approached the naturalist with questions) if they should refrain from eating any salmon. However, if they are eating wild-caught Alaskan salmon or perhaps farmed salmon, this has no bearing on whether the orcas have enough Chinook salmon in the Salish Sea. Had the naturalist offered reasons why local Chinook populations have declined (poor stream habitat for spawning, extensive damming of rivers on the west coast of the United States, overfishing, etc.)

and how to respond, then those passengers could have returned home with strategies and objectives to help improve the status of their local salmon stocks.

Further research

In the future, further research could be done by following up with participants of whale watching tours in Washington waters through email surveys to learn if they remember what they learned on their whale watch, if they have integrated strategies for environmental stewardship into their daily lives, or if there are other effects they experienced from participating in the tour. Similar studies have been done elsewhere in the world, but not a recent study focusing on the Salish Sea.

Alternatively, a follow-up observation study and passenger survey could be performed within a couple of years with the same companies to see if any recommendations have been implemented and how this influences survey responses.

Conclusion

The results of this study and its explorative analysis suggest that the information about threats to the environment and actions to take to help have the most influence on an individual's willingness to change their habits and engage in environmental stewardship. This study and its recommendations do not serve the purpose of offering negative opinions of the whale watching industry in Washington's waters. On the contrary, the researcher observed consistently responsible operations, scientifically accurate interpretation, high participant satisfaction, and a general sense of appreciation for the natural environment. The companies are already committed to conservation and adhere to best practices on every tour for this reason. These suggestions are simply asking

that, if this aligns with the company's goals, to stretch a little more and integrate some changes to, hopefully, produce a positive impact among their participants and within the environment itself.

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Appendix A

Survey Questions

1. **Seeing whales in the wild was my primary motivation to go on this tour:**
   Strongly agree Agree I don't know Disagree Strongly disagree

2. **The interpretation (naturalist's presentation) during this tour added to my experience:**
   Strongly agree Agree I don't know Disagree Strongly disagree

3. **I learned about where we were in the ocean on our boat tour today:**
   Strongly agree Agree I don't know Disagree Strongly disagree

4. **I learned about whale behaviors (for example: feeding or breeding) during this trip:**
   Strongly agree Agree I don't know Disagree Strongly disagree

5. **When I return home, I will tell others about the things I learned:**
   Very likely Likely Neutral Unlikely Very unlikely

6. **I would recommend a whale watching tour to my friends and family:**
   Very likely Likely Neutral Unlikely Very unlikely

7. **I am concerned about the state of the marine environment today:**
   Strongly agree Agree I don't know Disagree Strongly disagree

8. **There are actions that I can take to be part of marine conservation efforts:**
   Strongly agree Agree I don't know Disagree Strongly disagree

9. **I am willing to change my habits if it helps to care for the marine environment:**
   Strongly agree Agree I don't know Disagree Strongly disagree

10. **I believe that by taking this whale watching tour I help in marine conservation:**
    Strongly agree Agree I don't know Disagree Strongly disagree

11. **I believe humans are responsible for some threats to the marine environment:**
    Strongly agree Agree I don't know Disagree Strongly disagree

12. **I think that plastic in the oceans can affect whales:**
    Strongly agree Agree I don't know Disagree Strongly disagree

13. **I think that loud noise in the oceans can affect whales:**
    Strongly agree Agree I don't know Disagree Strongly disagree

14. **I am familiar with the Marine Mammal Protection Act:**
    Strongly agree Agree I don't know Disagree Strongly disagree

15. **I am familiar with the Endangered Species Act:**
Strongly agree Agree I don't know Disagree Strongly disagree

16. **I am familiar with Be Whale Wise or distance regulations:**
Strongly agree Agree I don't know Disagree Strongly disagree

17. **I believe that any applicable laws were followed during this whale watching tour:**
Strongly agree Agree I don't know Disagree Strongly disagree

18. **I would have preferred it if our boat had been closer to the whales today:**
Strongly agree Agree I don't know Disagree Strongly disagree

19. **My experience on this whale watching tour met my expectations about seeing a whale in its natural environment:**
Strongly agree Agree I don't know Disagree Strongly disagree

20. **My gender identity is (indicate one with a check mark √):**
☐ Female ☐ Male ☐ Non-binary ☐ Other ☐ Prefer not to answer

21. **I come from (please write in):**
City_____
State_____
Country_____

22. **The highest degree or level of school I have completed (indicate one with a check mark √):**
(*If currently enrolled, select highest degree received)*

☐ Some high school, no diploma
☐ High school graduate, diploma or equivalent (for example: GED)
☐ Trade/technical/vocational training
☐ Some college credit, no degree
☐ Bachelor's degree ☐ Master's degree
☐ Professional degree ☐ Doctorate degree

23. **My age range is (indicate one with a check mark √):**

☐ Under 18 years old ☐ 35-44 years old
☐ 18-24 years old ☐ 45-54 years old ☐ Over 65 years old
☐ 25-34 years old ☐ 55-64 years old