

CONSERVATION BENEFITS OF WHALE WATCHING IN JUNEAU, ALASKA

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An increasing number of visitors to Juneau, AK, alongside a predictable population of humpback whales (*Megaptera novaeangliae*), has supported the substantial growth of its whale-watching industry. The industry provides benefits to the community through economic gains, while the experience can foster environmental awareness and support for protection of whales and the environment. However, the sustainability of the industry could be jeopardized if increasing whale-watching vessel pressure affects the health of its resource, the whales. This study investigates whether participation in whale-watching tours in Juneau, AK can support conservation of whales and the environment. Participant knowledge, attitudes, intentions, and behaviors were obtained from 2,331 respondents in surveys before, after, and 6 months after a whale-watching tour during the 2016 and 2017 seasons. Following a whale watch, the percentage of participants that indicated whale watching as a knowledge source increased ($p = 0.022$), awareness of guidelines and regulations doubled ($p < 0.001$), and strong support for regulations increased ($p = 0.016$). Six months later, these responses remained significantly higher than before the whale watch. Despite knowledge of distance threshold increasing after a whale watch ($p = 0.003$) and 6 months after ($p = 0.021$), getting close to whales remained an important factor in a participant's whale watch. Participants had a higher likelihood of strongly supporting guidelines and regulations if they indicated that boats can have a negative impact on whales or were aware of guidelines and regulations. Lastly, participants that acknowledged negative effects on whales from boats had higher overall proenvironmental attitudes. This study indicates that incorporating messages that facilitate participant awareness of guidelines/regulations and the purpose of those measures can support conservation and protection of local whale populations through managing participant expectations and ultimately encouraging operator compliance.

Key words: Whale watching; Conservation; Proenvironmental attitudes; Tourism management; Regulation

Introduction

Over the last century, the way that people value and interact with whales and dolphins has fundamentally changed. Once extracted and used as an economic commodity, the global moratorium on whaling by the International Whaling Commission in 1986 sought to save the great whales from extinction (International Whaling Commission, 2018). Meanwhile, the demand for seeing whales in the wild has expanded globally since the beginning of whale watching in the 1950s (O'Connor, Campbell, Cortez, & Knowles, 2009). The global annual economic value for whale watching in 2008 was estimated to be \$2.1 billion, with over 13 million whale watchers in 119 countries (O'Connor et al., 2009). In the US alone, revenue was estimated to be \$1 billion, consisting of 5 million whale watchers (O'Connor et al., 2009). Whale watching is often regarded as ecotourism and can benefit communities by stimulating the local economy, providing employment opportunities, and supporting the protection of natural areas and wildlife (Higginbottom, Northrope, & Green, 2001).

Whale watching can support the protection of whales by providing opportunities for tourists to learn about whales and their environment while experiencing natural areas. Participants often expect to be educated on whale-watching tours, and enjoy learning about whales and the marine environment (Filby, Stockin, & Scarpaci, 2015; Lück, 2003; Russell & Hodson, 2002). Following a whale-watching tour, participants have demonstrated greater knowledge about cetaceans (Filby et al., 2015; Mayes & Richins, 2009), awareness of threats to cetaceans (Filby et al., 2015; Finkler & Higham, 2004), greater proenvironmental attitudes (Christensen, Rowe, & Needham, 2007), and increased support for conservation of whales and marine environments (Christensen, Needham, & Rowe, 2009). In the long term, previous studies have indicated that the experience and knowledge obtained from the whale-watching tour can contribute towards lasting proenvironmental attitudes and behaviors (Orams, 1997; Zeppel & Muloin, 2008).

By contrast, others argue that ecotourism can lack conservation gain and harm the natural resources upon which the industry depends (Steele, 1993). Education programs can be ineffective because

environmental knowledge alone is not enough to influence environmental attitudes and behaviors (Beaumont, 2001; Gralton, Sinclair, & Purnell, 2004). Also, Stamation, Croft, Shaughnessy, Waples, and Briggs (2007) determined that while participants indicated knowledge and proenvironmental intentions following their whale-watching tour, they were unlikely to remember what they learned during their whale watch experience and did not change the rate at which they carried out proenvironmental behaviors 6–8 months later. The presence of the whale-watching vessels themselves may also negatively impact the whales (Parsons, 2012). Whales have demonstrated changes in direction, higher speeds, and higher breath rates in the presence of whale-watching vessels (Schuler, et al., 2019). These short-term changes can accumulate to long-term fitness consequences for whales if more time and energy is spent avoiding vessels than performing behaviors such as foraging and resting that are essential for body maintenance (Lusseau & Bejder, 2007; Parsons, 2012). Disturbances from vessel presence may also result in whales altering their distribution and habitat use (Bejder et al., 2006; Cartwright et al., 2012).

Many regions have created guidelines and regulations to mitigate potential disturbance to whales by whale-watching vessels (Carlson, 2013). In the US, each National Oceanic and Atmosphere Administration (NOAA) Fisheries Regional Office develops whale-watching guidelines and regulations to support protections under the Marine Mammal Protection Act (MMPA). Further efforts to manage local industries include voluntary programs, like Whale SENSE (NOAA Fisheries & Whale and Dolphin Conservation, 2018), that exist in the Atlantic and Alaska regions. This program recognizes and promotes operators that agree to follow additional viewing guidelines and complete annual staff trainings to support accurate educational messages on tours. Incorporating an explanation of guidelines and regulations has the potential to be a proactive management strategy to avoid negatively affecting whale populations where whale-watching industries exist (Andersen & Miller, 2006). Further, increasing whale watch participant knowledge and awareness has been found to encourage operator compliance to regulations (Filby et al., 2015).

The whale-watching industry in Juneau, Alaska has become increasingly lucrative alongside a growing number of cruise ship passengers that visit from May to September. As a city only accessible by boat or by plane, cruise ships contribute 93% of all visitors to Juneau, totaling over 1 million people each year (McDowell Group, 2017). Approximately one third of visitors participated in whale watching and other day cruises in 2016 (McDowell Group, 2017). The annual revenue of the whale-watching industry was estimated to be \$32 million in 2006 (Dugan, Fay, Griego, & Colt, 2009); however, the industry has likely increased in value since then. From 2006 to 2018, the number of visitors in Juneau grew by 23% and this number was projected to be 48% higher in 2019 versus 2018 (Rain Coast Data, 2018). A reliable presence of humpback whales (*Megaptera novaeangliae*) and opportunistic sightings of killer whales (*Orcinus orca*) has resulted in all dedicated whale-watching operations offering a whale sighting money back guarantee (S. Teerlink, Alaska Regional Office, NMFS, personal communication, February 18, 2019). The Juneau whale-watching industry consists of approximately 65 dedicated whale-watching vessels, in addition to opportunistic whale watching that occurs with fishing charter vessels (Di Clemente et al., 2018). Of the vessels that offered dedicated whale-watching tours in Juneau in 2018, approximately 67% participated in the Whale SENSE program (Schuler, unpublished data).

As more people participate in whale-watching tours and whale-watching vessel presence increases, it is essential to create a sustainable industry that supports conservation and protection of whales. The overall goal of this study was to determine whether whale-watching tours in Juneau can support the conservation of whales and the environment. The first objective (Objective 1) of this study was to identify differences in whale-watching participants' knowledge, intentions, behaviors, and attitudes before, after, and 6 months after a whale-watching tour. The second objective (Objective 2) of this study was to determine how awareness of whale-watching guidelines and regulations, behaviors, attitudes, and demographics influenced whale-watching participants' support of guidelines and regulations. The third objective (Objective 3) of this study was to evaluate whether whale-watching

participants' behaviors, attitudes towards whale watching, and survey group related to proenvironmental attitudes.

Method

Paper-and-pencil multiple answer choice surveys were administered by a researcher (A.S.) to participants before (PRE) (surveys are available upon request) or after (POST) a whale-watching tour to measure knowledge, intentions, behaviors, and attitudes in addition to demographic information. Six months later (POST6M), participants who provided their email address received a survey on the Survey Monkey website. The majority of whale-watching tours depart from Auke Bay, approximately 12 miles from downtown Juneau. Since most tourists to Juneau arrive by cruise ship, companies arrange for shuttle buses to pick up and drop off participants at the cruise ship terminal. Participants in this study completed the 5-min survey on the shuttle bus to or from the whale-watching tour. Participants were informed about the goals of the project and notified of the requirements for participating. Survey participation was voluntary, and all survey participants met inclusion criteria of being 18 years or older and able to read and understand spoken and written English. Inclusion criteria were verified by questioning each person individually. Upon completion of the survey, participants were encouraged to include their email address to be entered to win a \$50 Amazon gift card. Of the approximately 16 whale-watching companies in Juneau, three whale-watching companies participated in implementing the surveys. Two companies were selected opportunistically and one was a participant in previous research (Lopez & Pearson, 2017). To be included in the study, a 75% completion rate was required for each survey. All research was carried out under approval of the University of Alaska Southeast Institutional Review Board (#16-13).

Participants

Survey group was defined by the period of time in which participants completed the survey (PRE, POST, POST6M). Demographic information was included as a series of open-response questions for nationality and sex. Preselected options were

presented for age (18–24, 25–40, 41–60, 60+). For regression analysis, nationality was recoded to “USA” versus “Other.” Experience was determined by the total number of whale-watching tours the participant had partaken in prior to Juneau. For comparisons between survey groups, experience was further divided into “First time” whale watchers and “Experienced” (0 and 1, respectively).

Knowledge

Participants were asked to choose a single response to “How have you gained most of your knowledge about whales?” from preselected options (e.g., TV/movies, internet, whale watch). Participants also responded to “Are you aware of any whale watch guidelines/regulations?” by selecting “Yes” or “No” to determine perceived awareness of NOAA humpback whale approach guidelines and regulations. For those who selected “Yes,” knowledge of guidelines and regulations was indicated if they correctly selected all listed guidelines and regulations. In 2016, the Alaska Humpback Whale Approach Regulations required that operators: 1) not approach within 100 yards of a humpback whale, 2) not place the vessel in the path of oncoming humpback whales causing them to surface within 100 yards of the vessel, and 3) operate at a slow, safe speed when near humpback whales (National Oceanic and Atmospheric Administration, 2016). In 2017, the regulation “Not disrupt the normal behavior or prior activity of a whale” was added by NOAA. The General Marine Mammal Viewing Code of Conduct (NOAA Fisheries, 2019) and Whale SENSE guidelines also suggest limiting time observing individuals to 30 min.

Behaviors and Intentions

Preselected options for environmental behaviors (e.g., recycling, composting, and energy usage) were listed for participants to “Check all that apply” to “Which of the following environmental activities do you do?” Selected behaviors were recoded as a “Yes” response, while unselected behaviors were recoded as “No.” Intention after their whale watch in Juneau was determined

by the likelihood of participants to engage in conservation behaviors (i.e., “Go on another whale watch or marine ecotourism trip,” “Join or donate to an environmental or conservation organization,” and “Tell your friends and family about what you learned”). Responses were on a 3-point Likert-type scale including *Not likely*, *Somewhat likely*, and *Very likely*. Six months later, participants were asked if they had fulfilled those intentions since their whale watch in Juneau by selecting “Yes” or “No.”

Attitudes

Participant attitudes towards whale watching were evaluated by importance factors and responses regarding the effects of viewing whales from boats. In response to “Which of the following is/was the *single most important* factor in determining the quality of your whale watch experience?” participants selected one of preselected options (i.e., “getting close to whales,” “boat size and number of passengers on board,” “seeing the whales do interesting behaviors like feed or leap,” “being with the whales for a long time,” “being the only boat with the whales,” “being respectful to the whales”). In response to “How important is it *to you personally* to be able to see humpback whales in the wild?” a 3-point Likert-type scale included *Not important*, *Somewhat important*, and *Very important*. Participants indicated their agreement or disagreement towards effects of whale watching (i.e., “Observing whales from boats can have negative impacts on whales,” “Observing whales from boats can have positive impacts on people,” “Following whale watch guidelines and regulations is important for the protection of whales”) on a 5-point Likert-type scale including *Strongly disagree*, *Disagree*, *Neither agree nor disagree*, *Agree*, and *Strongly agree*. In regression analyses, when used as independent variables, statements regarding the effects of whale watching were recoded to a 3-point Likert-type scale (*Disagree*, *Neutral*, *Agree*).

Environmental attitudes were assessed using the modified New Environmental Paradigm (NEP) scale by Luzar, Diagne, Gan, and Henning (1995). The NEP uses six 5-item Likert-type scale statements concerning human conflicts with nature, limits to growth, and the role of humans in nature

to measure overall participant pro-environmental attitudes. NEP responses have a value from 1 to 5, with responses reflecting positive environmental attitudes ranking higher. The maximum total score for the modified NEP scale is 30.

Social Desirability

The 5-item Socially Desirable Response Set (SDRS) was included to control for socially desirable response tendencies (Hays, Hayashi, & Stewart, 1989). Social desirability is an individual's tendency to portray a positive self-image at the expense of presenting factual information (Hays et al., 1989). By measuring social desirability, the study controlled for socially desirable responses concerning prosocial behaviors such as environmental and conservation actions (Pearson, Dawson, & Radecki Breitkopf, 2012). SDRS was included as a covariate in all multivariate models.

Statistical Methods

All analyses were performed using the free, open-source software R v.3.4.3 (<https://www.R-project.org/>). For analysis of Objective 1, participant responses regarding knowledge, intentions, behaviors, and attitudes were compared across all survey groups (PRE, POST, and POST6M) using Pearson chi-square tests. Intentions and previous whale-watching experience were also compared within survey groups using Pearson chi-square tests. Likert-type scale questions on attitudes towards whale watching for each survey group were compared using Wilcoxon rank sum tests.

Post hoc analysis for Objective 2 indicated that responses to "Following whale watch guidelines and regulations is important for the protection of whales" lacked variability and would have caused analytic problems, with the majority of responses being *Agree* (26%) or *Strongly agree* (64%). This may be due to the highly socially desirable nature of an agreeable response. Therefore, after Radecki Breitkopf and Pearson (2009), responses to the dependent variable "Following whale watch guidelines and regulations is important for the protection of whales" were recoded as *Strongly agree* versus "Other" responses (*Strongly disagree*, *Disagree*, *Neutral*, *Agree*).

To further analyze Objective 2, Pearson chi-square tests were used to determine significant differences in *Strongly agree* versus "Other" responses to "Following whale watch guidelines and regulations is important for the protection of whales" in relation to each explanatory variable. Explanatory variables included awareness about whale-watching guidelines and regulations, behaviors (i.e., "belong to an environmental or conservation organization"), importance factors, attitudes regarding whale watching, NEP, and demographics (i.e., nationality, sex, and age). Significant variables at the bivariate level were then entered into a multivariate model. Binomial logistic regression was used to predict the probability of a participant choosing *Strongly agree* versus "Other" responses, while controlling for SDRS and survey group. A likelihood ratio test was used to determine the best fit model. The probability of choosing *Strongly agree*, the odds ratio (probability of choosing *Strongly agree* divided by the probability of choosing "Other") and a 95% confidence interval for the odds ratio were estimated.

In support of Objective 3, analysis of variance (ANOVA) and pairwise *t* tests were used to determine which explanatory variables affected participant NEP score. Explanatory variables tested included behaviors (recycling at home, membership to an environmental or conservation organization), importance factors, attitudes regarding whale watching, and survey group. Significant variables were then included in the linear regression model while controlling for SDRS and demographics (i.e., nationality, age, and sex).

Results

Participants

Of the 2,385 surveys completed, 2% ($n = 54$) were removed due to <75% completion rate, resulting in a total of 2,331 surveys used in analyses (PRE: $n = 971$, POST: $n = 1,167$, POST6M: $n = 193$). Of the number of participants invited to take the survey in 2017, the response rate for the PRE and POST was 60% (this information was not collected in 2016). Participants were primarily from the US (81%), with the rest from other countries ("Other") (17%) (Table 1). The majority of participants were female and over the age of 40.

Table 1
 Passenger Responses to the Demographic Questions on the Multiple Choice Survey (PRE and POST, $N = 2,138$)

Survey Item	% (n)
Age	
18–25	6.3% (135)
26–40	18.0% (384)
41–60	42.1% (901)
60+	30.1% (643)
Sex	
Female	54.6% (1,168)
Male	35.0% (748)
Nationality	
USA	80.8% (1727)
Other	16.7% (358)
Europe	4.3% (94)
Australia/New Zealand	4.2% (89)
Canada	3.4% (72)
Asia	2.1% (46)

Note. Totals that do not equal 100% or $N = 2,138$ reflect missing data.

There were no significant differences in demographic distributions between the PRE, POST, or POST6M survey groups. For the majority of participants, their whale watch in Juneau was their first whale watch (PRE: 54%, POST: 64%, POST6M: 55%).

Objective 1

PRE participants attained knowledge about whales primarily through TV and movies (Fig. 1). There was a significant decrease in the proportion of participants that selected TV and movies between the PRE versus POST ($p = 0.022$) and PRE versus POST6M ($p < 0.001$). Instead, the majority of the POST and POST6M participants indicated that their whale watch in Juneau was their primary source of whale information.

The percentage of participants who indicated awareness about guidelines and regulations was double in POST compared to PRE ($p < 0.001$, Table 2). Of those who indicated that they were aware of NOAA whale watch guidelines, there was an increase in the percentage of participants who knew “Maintaining a distance of at least 100 yards from humpback whales” between PRE versus POST ($p = 0.003$) and PRE versus POST6M ($p = 0.021$) and the percentage of participants who knew “Staying with humpback whales for a maximum of 30 minutes” between PRE versus POST ($p = 0.026$) and PRE versus POST6M ($p = 0.002$). The percentage of participants that correctly selected all of the guidelines and regulations listed doubled between the PRE versus POST6M ($p = 0.008$).

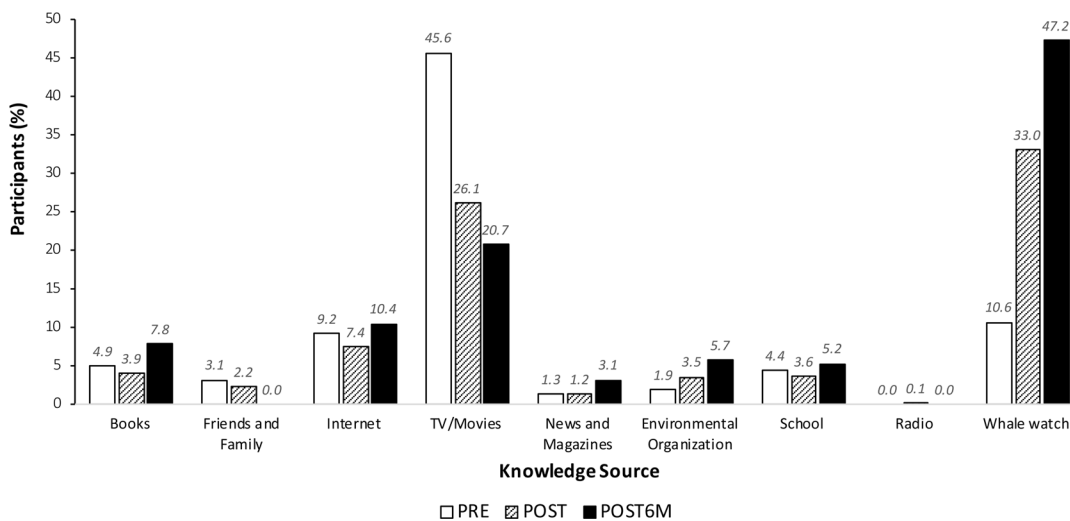


Figure 1. Distribution of passenger-selected sources in response to the multiple answer choice question: “How have you gained most of your knowledge about whales?” Percentages are presented above each bar.

Table 2
Participant Responses to Questions Regarding Knowledge About Guidelines and Regulations (PRE: $n = 971$, POST: $n = 1167$, POST6M: $n = 193$)

	PRE % (n)	PRE-POST	POST % (n)	POST-POST6M	POST6M % (n)	PRE-POST6M
Are you aware of any whale watch guidelines/regulations? (Yes)	35.6% (344)	***	71.0% (828)	*	85.0% (164)	***
If yes, check the items that you think are part of the guidelines/regulations:						
Maintaining a distance of at least 100 yards from humpback whales	77.0% (265)	**	93.0% (770)		89.3% (147)	**
Staying with humpback whales for a maximum of 30 min	22.7% (78)	*	38.0% (315)		43.9% (72)	*
Not encircling or trapping humpback whales between boats, or boats and shore	67.7% (233)		61.6% (510)	***	82.3% (135)	***
Operating vessels at slow, safe speeds when near humpback whales	61.9% (213)		63.0% (522)	0	63.2% (107)	
Do not disrupt the normal behavior or prior activity of a whale ^a	55.2% (190)		45.3% (375)		62.2% (102)	
If selected "yes," participants correctly selected all guidelines/regulations.	18.9% (65)		11.7% (97)	***	36.6% (60)	**

Note. = increase between survey groups, = decrease between survey groups. ^aAdditional component of the regulation added in 2017.
* $p = 0.01-0.05$, ** $p = 0.001-0.01$, *** $p < 0.001$.

The majority of POST participants indicated that after their whale watch in Juneau, they were very likely to “Go on another whale watch or marine ecotourism trip” and “Tell your friends and family about what you learned” (Table 3). Meanwhile, nearly a quarter of participants were very likely to “Join or donate to an environmental or conservation organization.” In comparison to participants that indicated *Very likely* responses in the POST, there were fewer participants 6 months after the whale watch in Juneau (POST6M) that indicated “Yes” to having “Gone on another whale watch or marine ecotourism trip” ($p < 0.001$) and less that indicated “Yes” to “Joined or donated to an environmental or conservation organization” ($p = 0.043$). However, percentage of POST6M participants that told their friends and family about what they learned was higher than those that indicated *Very likely* intentions in the POST ($p = 0.018$).

Previous whale-watching experience did not have a significant effect on POST or POST6M participants’ intentions to “Join or donate to an environmental or conservation organization” or “Tell friends and family about what you learned.” It also did not affect POST participants’ likelihood to “Go on another whale-watching or ecotourism trip”, but POST6M participants with previous whale-watching experience prior to Juneau were significantly more likely to have gone on another whale-watching or ecotourism trip 6 months later ($p < 0.001$) (Table 4).

The mean number of preselected environmental behaviors in which participants from each survey group engaged was three [PRE: 3 ± 1.5 ($n = 971$ range = 1–8), POST: 3 ± 1.6 ($n = 1,167$, range = 1–8), POST6M: 3 ± 1.7 , range = 1–8)]. At least 95% of participants in all survey groups selected at least one environmental behavior. While all environmental behaviors increased POST6M compared to PRE and POST, the only significant result was an increase in “Conserve energy at home” from PRE to POST6M ($p < 0.05$) (Table 5). For all survey groups, the majority of participants selected “Recycle at home” and “Conserve energy at home” as environmental behaviors that they participate in, while the least participated in environmental behaviors were “Vegetarianism” and “Belong to an environmental organization or charity.”

Table 3
Intention following whale watching trip

After your whale watch in Juneau, how likely would you be to:		After your whale watch in Juneau, did you:		Very Likely Versus Yes
POST	% (n)	POST6M	% (n)	POST-POST6M
Go on another whale watch or marine ecotourism trip?				
Very likely	67.2% (784)	Yes	6.2% (12)	***
Somewhat likely	26.8% (313)	No	93.3% (180)	
Not likely	5.5% (64)			
Join or donate to an environmental or conservation organization?				
Very likely	23.3% (272)	Yes	11.9% (23)	*
Somewhat likely	50.0% (583)	No	87.0% (168)	
Not likely	23.0% (268)			
Tell your friends and family about what you learned?				
Very likely	80.4% (938)	Yes	94.3% (182)	*
Somewhat likely	15.4% (180)	No	5.7% (11)	
Not likely	1.5% (18)			

Note. Totals that do not equal 100% or $N = 1167$ (POST), $N = 193$ (POST6M) reflect missing data. = increase between survey groups, = decrease between survey groups. * $p = 0.01-0.05$, *** $p < 0.001$.

The majority of participants in all survey groups indicated that it was very important for them to personally see humpback whales in the wild, with no significant difference in responses between survey groups (PRE: 62%, POST: 61%, POST6M: 72%). The top PRE responses to “Which of the following was the *single most important* factor in determining the quality of your whale watch experience in Juneau?” were “getting close to the whales” and “seeing the whales do interesting behaviors like feed or leap.” For both POST and POST6M, these remained as the top importance factors, with no significant difference between survey groups (Fig. 2). The percentage of participants that indicated awareness of the NOAA regulation “Maintaining a distance of at least 100 yards from humpback whales” did not significantly affect their selection of “getting close to the whales” as the single most important factor (PRE: 22%, POST: 40%, POST6M: 29%).

The majority of participants agreed or strongly agreed that “Following whale watch guidelines and regulations is important for the protection of whales,” with the percentage that strongly agreed significantly increasing between PRE versus POST ($p = 0.016$) and PRE versus POST6M ($p = 0.008$)

(PRE: 60%, POST: 66%, POST6M: 73%) (Fig. 3). Approximately half of participants were neutral on the statement “Observing whales from boats can have negative impacts on whales” (PRE: 51%, POST: 40%, POST6M: 47%), with the percentage of participants who disagreed higher in the POST versus PRE ($p < 0.001$) and lower in POST6M versus POST ($p < 0.001$) (PRE: 27%, POST: 35%, POST6M: 28%). The majority of participants agreed or strongly agreed that “Observing whales from boats can have positive impacts on people,” with the percentage that strongly agreed higher in POST6M versus PRE ($p = 0.001$) and POST6M versus POST ($p = 0.011$) (PRE: 22%, POST: 27%, POST6M: 37%).

NEP values ranged from 6 to 30. Mean NEP score was not significantly different between survey groups [PRE: 24 ± 3.8 ($n = 971$, range = 11–30), POST: 24 ± 4.1 ($n = 1167$, range = 6–30), POST6M: 24 ± 3.8 ($n = 193$, range = 10–30)].

Objective 2

To determine variation in *Strongly agree* versus “Other” (*Strongly disagree*, *Disagree*, *Neutral*, *Agree*) in response to “Following whale

Table 4
POST and POST6M Participants' Intention According to Previous Whale Watch (WW) Experience

	First WW % (n)	1 WW % (n)	Pearson ²	df	p
After your whale watch in Juneau, how likely would you be to: (POST)					
Go on another whale watch or marine ecotourism trip?					
<i>Very likely</i>	61.4% (461)	77.6% (323)	5.8667	2	0.053
<i>Somewhat likely</i>	31.4% (236)	18.5% (77)			
<i>Not likely</i>	6.4% (48)	3.9% (16)			
Join or donate to an environmental or conservation organization?					
<i>Very likely</i>	22.5% (169)	24.8% (103)	0.25412	2	0.881
<i>Somewhat likely</i>	49.4% (371)	51.0% (212)			
<i>Not likely</i>	23.8 (179)	21.4 (89)			
Tell your friends and family about what you learned?					
<i>Very likely</i>	80.2% (602)	80.8% (336)	0.27636	2	0.871
<i>Somewhat likely</i>	15.6% (117)	15.1% (63)			
<i>Not likely</i>	1.2% (9)	2.2% (9)			
After your whale watch in Juneau, did you: (POST6M)					
Go on another whale watch or marine ecotourism trip?					
Yes	0.0% (0)	13.8% (12)	12.906	1	<0.001
No	100.0% (106)	85.1% (74)			
Join or donate to an environmental or conservation organization?					
Yes	10.4% (11)	13.8% (12)	0.34143	1	0.559
No	89.6% (95)	83.9% (73)			
Tell your friends and family about what you learned?					
Yes	95.3% (106)	93.1% (81)	0.12722	1	0.721
No	4.7% (5)	6.9% (6)			

Note. Totals that do not equal 100% or N = 1,167 (POST), N = 193 (POST6M) reflect missing data. Significant p-value is shown in italic.

Table 5
Participant Responses to “Which of the Following Environmental Activities do you do? Check all That apply”

	PRE % (n)	POST % (n)	POST-POST6M	POST6M % (n)	PRE-POST6M
Recycle at home	80.0% (777)	83.3% (972)		86.5% (167)	
Recycle at work	51.3% (498)	53.9% (629)		59.1% (114)	
Conserve energy at home	70.7% (686)	74.7% (872)		83.9% (162)	*
Vegetarianism	4.7% (46)	6.3% (74)		4.2% (8)	0
Avoid cosmetics tested on animals	24.2% (235)	25.2% (294)		30.6% (59)	
Avoid using the car when possible	17.0% (165)	19.7% (230)		27.5% (53)	
Compost	16.4% (159)	21.6% (252)		25.9% (50)	
Belong to an environmental or conservation organization	7.3% (71)	9.9% (116)		13.5% (26)	
None of the above	5.0% (48)	3.9% (45)		0.5% (1)	

Note. = increase between survey groups, = decrease between survey groups.
*p < 0.05.

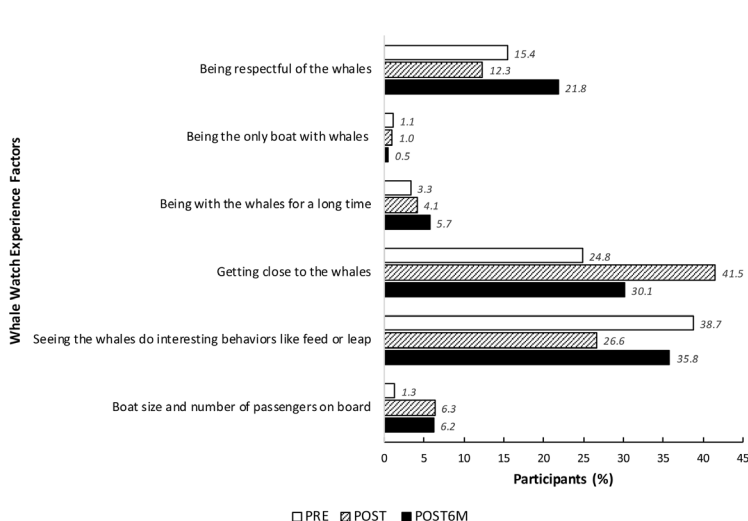


Figure 2. Participant responses to the multiple answer choice question: “Which of the following do you think will be/was the single most important factor in determining the quality of your whale watch experience?” Percentages are presented next to each bar.

watch guidelines and regulations is important for the protection of humpback whales,” significant explanatory variables for the strongest model using bivariate analyses and likelihood ratio tests included: awareness of guidelines and regulations, attitudes towards importance factors, attitudes towards negative effects of whale-watching

vessels, NEP, nationality, sex, and age (Table 6). While survey group was significant in bivariate analysis, likelihood ratio tests indicated that it did not contribute to the best model. In response to “Are you aware of any whale watch guidelines/regulations?” participants that selected “Yes” rather than “No” were 46% more likely to

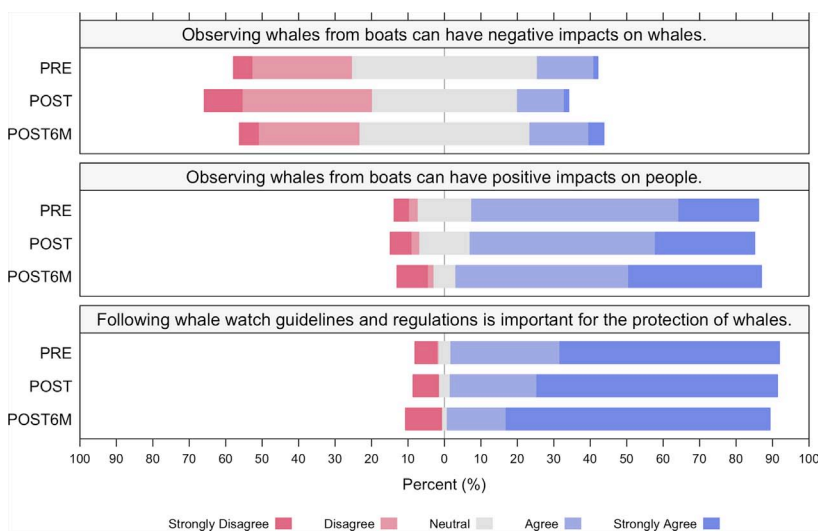


Figure 3. Participant’s attitudes regarding whale watching on a Likert-type scale (PRE: n = 963, POST: n = 1,136, POST6M: n = 192).

choose *Strongly agree* over “Other” responses [odds ratio: 1.460, 95% CI (1.249,1.668)]. In response to “Which of the following was the single most important factor in determining the quality of your whale watch experience?” participants that selected “being respectful of the whales” rather than “getting close to the whales” were 44% more likely to choose *Strongly agree* over “Other” responses [odds ratio: 1.442, 95% CI (1.012, 2.053)]. In response to “How important is it to you personally to be able to see humpback whales in the wild?” participants that selected *Somewhat important* versus *Very important* were 60% as likely to select *Strongly agree* over “Other” responses [odds ratio: 0.596 (95% CI (0.474,0.749))]. Compared to participants that

agreed that “Observing whales from boats can have negative impacts on whales,” those that were neutral were 68% as likely to select *Strongly agree* [odds ratio: 0.684, (95% CI (0.486, 0.967))] and those that disagreed were 65% as likely to select *Strongly agree* [odds ratio: 0.649, (95% CI (0.457, 0.922))]. For each unit increase in participant NEP score, the odds of choosing *Strongly agree* over “Other” responses increased by 15% [odds ratio: 1.147, (95% CI (1.114, 1.182))]. Also, males were 77% as likely to select *Strongly agree* as females [odds ratio: 0.769, (95% CI (0.617, 0.959))] and participants of “USA” nationality were 54% more likely to select *Strongly agree* than those from “Other” nationalities [odds ratio: 1.541 (95% CI (1.134, 2.094))].

Table 6
 Logistic Regression Output for Predicting the Probability of Participants Selecting *Strongly agree* Versus “Other” Responses (*Strongly disagree*, *Disagree*, *Neutral*, *Agree*) to “Following Whale Watch Guidelines and Regulations Is Important for the Protection of Humpback Whales”

	Estimate	SE	z Value	Pr(> z)
(Intercept)	-2.010	0.485	-4.146	<0.0011
Awareness of guidelines/regulations: No	Ref	Ref	Ref	Ref
Awareness of guidelines/regulations: Yes	0.378	0.080	4.749	<0.001
Belong to an organization: No	Ref	Ref	Ref	Ref
Belong to an organization: Yes	0.202	0.213	0.948	0.343
Importance factor: Getting close	Ref	Ref	Ref	Ref
Importance factor: Boat size	0.430	0.278	1.546	0.122
Importance factor: See behaviors like feed or leap	0.003	0.125	0.021	0.983
Importance factor: Long time with whales	-0.086	0.268	-0.321	0.748
Importance factor: Only boat	0.081	0.504	0.161	0.872
Importance factor: Being respectful to whales	0.366	0.180	2.029	0.042
See whales in the wild: <i>Very important</i>	Ref	Ref	Ref	Ref
See whales in the wild: <i>Somewhat important</i>	-0.518	0.117	-4.428	<0.001
See whales in the wild: <i>Not important</i>	-0.350	0.268	-1.305	0.192
Boats have negative effects: <i>Agree</i>	Ref	Ref	Ref	Ref
Boats have negative effects: <i>Neutral</i>	-0.379	0.176	-2.152	0.031
Boats have negative effects: <i>Disagree</i>	-0.432	0.179	-2.412	0.016
NEP	0.137	0.015	9.059	<0.001
SDRS	0.014	0.042	0.343	0.731
Nationality: Other	Ref	Ref	Ref	Ref
Nationality: USA	0.432	0.156	2.766	0.006
Sex - Female	Ref	Ref	Ref	Ref
Sex: Male	-0.262	0.112	-2.334	0.020
Age: 18-25	Ref	Ref	Ref	Ref
Age: 26-40	-0.254	0.262	-0.970	0.332
Age: 41-60	-0.415	0.244	-1.705	0.088
Age: 60+	-0.562	0.250	-2.252	0.024

Note. Predictor variables included awareness of guidelines/regulations, attitudes towards whale watching, proenvironmental attitudes (NEP), and demographics (nationality, sex, age), while controlling for SDRS. Ref = reference group in the analysis. Significant *p* values are shown in italic.

Objective 3

Bivariate analysis indicated that behaviors (“Recycle at home” and “Belong to an environmental or conservation organization”), importance factors, attitudes towards whale watching, nationality, and sex were all significant explanatory variables in determining variance in NEP scores. Participants that recycled at home or were a part of an environmental organization had a significantly higher NEP score than those that did not (Table 7). In comparison to “getting close to the whales” as the single most important factor, participants that indicated “being respectful to the whales” had a significantly higher NEP score. In response to “Following whale watch guidelines and regulations are important for the protection of whales,” participants that were neutral had a significantly lower NEP score than those that agreed. However, NEP score was not significantly different in those

that disagreed compared to those that agreed. In comparison to participants that agreed in response to “Observing whales from boats can have negative impacts on whales,” participants had a significantly lower NEP score if they were neutral or disagreed. Males had a significantly lower NEP score than females and participants of “USA” nationality had a significantly lower NEP score than “Other” nationality.

Discussion

The present study indicated that whale watching in Alaska has potential to be a conduit for conservation and protection of whales and the environment. The conservation benefits identified in this study include spreading knowledge and awareness about whales, whale watching, and whale-watching guidelines and regulations and increasing support

Table 7
Linear Modeling Output for Proenvironmental Attitudes (NEP Value) Including Predictor Variables of Behavior (“Recycle at Home” and “Belong to an Environmental or Conservation Organization”) and Attitudes Towards Whale Watching, While Controlling for SDRS and Demographics (Nationality, Sex)

	Estimate	SE	t Value	Pr(> t)
(Intercept)	24.224	0.416	58.289	<0.001
Recycle: No	Ref	Ref	Ref	Ref
Recycle: Yes	0.826	0.238	3.478	0.001
Belong to an organization: No	Ref	Ref	Ref	Ref
Belong to an organization: Yes	1.724	0.306	5.626	<0.001
Importance Factor: Getting close	Ref	Ref	Ref	Ref
Importance Factor: Boat size	0.452	0.425	1.063	0.288
Importance Factor: See behaviors like feed or leap	0.217	0.207	1.051	0.293
Importance Factor: Long time with whales	0.069	0.444	0.154	0.877
Importance Factor: Only boat	0.370	0.819	0.452	0.651
Importance Factor: Being respectful to whales	1.483	0.271	5.466	<0.001
See whales in the wild: <i>Very important</i>	Ref	Ref	Ref	Ref
See whales in the wild: <i>Somewhat important</i>	-0.712	0.311	-2.290	0.022
See whales in the wild: <i>Not important</i>	0.166	0.220	0.753	0.451
Boats have negative effects: <i>Agree</i>	Ref	Ref	Ref	Ref
Boat have negative effects: <i>Neutral</i>	-0.663	0.264	-2.511	0.012
Boat have negative effects: <i>Disagree</i>	-0.823	0.268	-3.067	0.002
Regulations important: <i>Agree</i>	Ref	Ref	Ref	Ref
Regulations important: <i>Neutral</i>	-2.816	0.540	-5.213	<0.001
Regulations important: <i>Disagree</i>	-0.102	0.248	-0.411	0.681
SDRS	0.177	0.067	2.646	0.008
Nationality: Other	Ref	Ref	Ref	Ref
Nationality: USA	-1.628	0.248	-6.550	<0.001
Sex: Female	Ref	Ref	Ref	Ref
Sex: Male	-0.592	0.184	-3.223	0.001

Note. Ref = reference group in the analysis. Significant values are shown in italic.

of guidelines and regulations for the protection of whales. Meanwhile, getting close to whales and seeing interesting behaviors like feed or leap (e.g., an activity that breaks the surface of the water) remained the most important factors in a participant's whale watch. With regulations in place prohibiting close encounters with whales, fostering passenger understanding of whales and whale watching will be essential in managing expectations of these importance factors. Furthermore, participants had a higher likelihood of strongly supporting guidelines and regulations if they indicated that boats can have a negative impact on whales or were aware of guidelines and regulations. Lastly, participants with higher overall proenvironmental attitudes were more likely to agree that boats can have a negative impact on whales and acknowledge the importance of being respectful to whales.

Following the whale-watching tour, the majority of participants indicated their whale-watching tour in Juneau was the primary source of knowledge about whales and there was a significant increase in participant awareness of whale-watching guidelines and regulations. Other studies of whale-watching tourism have indicated that participants want to learn (Filby et al., 2015; Lück, 2003, 2015; Russell & Hodson, 2002) and are more satisfied with their tour when there is information provided about whales and the marine environment (Andersen & Miller, 2006). Other studies argue that information from whale watches is usually not retained due to lack of background knowledge prior to the whale watch and frequent distractions (Malcolm & Duffus, 2003), as well as the absence of structured education programs (Stamation et al., 2007). However, the present study determined that gains can be made in knowledge and awareness from whale watching immediately after and 6 months after the tour, despite the majority of participants being first-time whale watchers. Furthermore, while the majority of participants in the present study did not correctly identify all of the guidelines and regulations, the percentage of correct responses significantly increased between the PRE versus POST6M and POST versus POST6M. Knowledge gains were not immediately demonstrated after the whale watch, but it may have allowed passengers to be more open to messages about whales and whale watching after the experience.

Across all survey groups, the most important factors in determining the quality of the whale watch were getting close to the whales and seeing interesting behaviors like feed or leap. Awareness of whale-watching guidelines/regulations and knowledge of the 100-yard distance regulation did not affect participants' attitudes regarding the importance of getting close to whales. The importance of close encounters and observing interesting behaviors could largely be due to perceptions of whales from the media and the way whale watching is advertised. This study indicated that the majority of PRE participants received their information from TV and movies, which can sometimes feature false perceptions about viewing whales and the behaviors frequently seen. As mentioned by Malcolm and Duffus (2003), people may not realize that movies, TV, and pictures are the result of hundreds of hours of work and that they are often only shot in perfect conditions. Furthermore, whale-watching companies will advertise, "Guaranteed Sightings" next to a photo of a breaching whale or a close-up of a whale (Malcolm & Duffus, 2003).

In contrast to the present study, Filby et al. (2015) determined that participant importance for close encounters in swim-with dolphin tourism decreased over time. Meanwhile, seeing dolphins in their natural environment remained a factor of very-high importance for participants (Filby et al., 2015). Similarly, in the present study, the majority of participants indicated that it was very important for them to personally see humpback whales in the wild.

Of participants that were aware of guidelines and regulations, participants that correctly selected the regulation "Maintaining a distance of at least 100 yards from humpback whales" and guideline "Staying with humpback whales for a maximum of 30 minutes" significantly increased between the PRE versus POST and PRE versus POST6M. These limitations are likely the most memorable of the guidelines and regulations because they influence passenger viewing experience.

Participants in the present study largely agreed or strongly agreed that "observing whales from boats can have positive impacts on people," with the percentage that strongly agreed significantly increasing 6 months later. These results mirror dolphin-swim participant responses in Australia, in which the

proportion of passengers that agreed or strongly agreed that “observing dolphins from boats can have a positive impacts on people” grew between the surveys before, after, and 6 months after a tour (Filby et al., 2015). Therefore, the positive impact may be most strongly felt over time. Orams (2000) indicated that the presence of whales alone can positively influence whale watcher satisfaction. Across all survey groups, the majority of participants were neutral in response to “observing whales from boats can have negative impacts on whales.” However, while there was a significant increase from PRE to POST in participants that disagreed that boats have negative impacts on whales, there was a significant increase in participants that agreed 6 months later. This trend has also been demonstrated in dolphin-swim tourism, in which following a dolphin-swim the percentage of passengers that agreed or strongly agreed that “observing dolphins from boats can have negative impacts on dolphins” decreases following a dolphin-swim but is highest before and 6 months after (Filby et al., 2015). Furthermore, the majority of participants across all survey groups agreed or strongly agreed that “Following whale watch guidelines and regulations is important for the protection of whales,” and the *Strongly agree* significantly increased between PRE versus POST and PRE versus POST6M. Since most wildlife tourists do not desire to cause harm to the environment in which they are visiting (Curtin, 2010; Wiener, Needham, & Wilkinson, 2009), they may be more likely to recognize their possible impact 6 months later rather than immediately after the whale watch. Additionally, after participants become aware of guidelines and regulations during a whale watch, it is likely that they more positively perceive the existence of guidelines and regulations responsible for reducing negative impacts on whales.

The present study indicated that participants that were aware of whale-watching guidelines and regulations were significantly more likely to indicate strong support for guidelines and regulations for the protection of humpback whales than those that were not. This supports findings by Filby et al. (2015) that as participants become knowledgeable about guidelines and regulations, they are more likely to support them. Participants who are aware of guidelines and regulations are less likely to be dissatisfied with viewing distance (Andersen &

Miller, 2006). Operators can better alleviate disappointment and negative perceptions associated with the absence of close encounters by educating passengers about existing guidelines and regulations and why they are in place. Filby et al. (2015) also determined that passengers with knowledge of regulations are more satisfied and ultimately can positively reinforce tour operator compliance to regulations. By managing expectations of participants and emphasizing conservation messages on trips, participants may be more satisfied with their overall experience. This indicates that operators can follow whale-watching guidelines and regulations without risking passenger enjoyment. Also, in regions with low enforcement of regulations, there is a low likelihood of operator adherence to guidelines and regulations (Filby et al., 2015; Kessler & Harcourt, 2013). In such cases, education can be a useful tool in increasing operator compliance.

Proenvironmental attitudes, measured by the NEP-based scale, were similar between survey groups. Other studies have similarly indicated that, over time, proenvironmental attitudes do not increase as a result of ecotourism (Beaumont, 2001). However, participant proenvironmental attitudes largely correlated with attitudes towards whale watching. Participants who indicated importance for operators being respectful to whales and participants with greater concern for the impact of vessels on whales had a higher NEP score. Interestingly, in response to “Following whale watch guidelines and regulations is important for the protection of whales,” participants that selected *Neutral* had a significantly lower NEP score than those that agreed, but those that disagreed did not have a significantly different NEP score than those that agreed. While protection of resources is a fundamental proenvironmental attitude, how people believe it should be protected may vary. The connection between attitudes towards the conservation and protection of whales may not always extend to that of general protection of the environment and vice versa (Stamation et al., 2007). However, the present study supports results of Christensen et al. (2009), which indicated that whale watchers that were stronger in their proenvironmental values were more likely to be aware of effects of their behavior on whales and their habitat. The incorporation of social desirability as a control also proved to be an

important factor in modeling for proenvironmental values because SDRS significantly increased with each unit increase of NEP score. Future research should include SDRS to increase quality of self-reported answers.

Following a whale watch, the majority of passengers were very likely to participate in another whale watch and tell friends and family about what they learned. However, participants were *Somewhat likely* to join or donate to an environmental or conservation organization. Within 6 months, participants were unlikely to have gone on another whale watch or ecotourism trip or to have joined or donated to an environmental or conservation organization but were very likely to have told friends and family about what they learned. This supports other studies that have also indicated that participants are more likely to engage in proenvironmental behaviors that require less commitment regarding effort, time, and/or money (Filby et al., 2015; Mayes & Richins, 2009). The majority of participants in all survey groups engaged in at least one environmental behavior, with recycling at home being the highest. This reflects the concern of Beaumont (2001) that ecotourism may be just “preaching to the converted” and that little proenvironmental behavioral gain occurs from ecotourism because participants who seek those experiences are already engaging in proenvironmental behaviors.

Other studies argue that while proenvironmental behavioral intentions and environmental knowledge are high after a whale watch, participants were not likely to adopt or maintain these changes when they returned home (Beaumont, 2001; Stamation et al., 2007). Some proenvironmental behaviors may have barriers for adoption such as lack of knowledge on how to adopt, level of effort necessary (Pearson et al., 2012), or it is not possible to adopt (e.g., recycling at work). In order to change behavior, Orams (1997) indicated that educational programs must be structured to do so. Whale-watching programs should be encouraged to develop programs that motivate participants to adopt proenvironmental behaviors (Packer & Ballantyne, 2012). The likelihood of participants supporting the protection of marine mammals increases when conservation messages and actions are incorporated into the whale-watching tour (Zeppel & Muloin, 2008). The most effective way

to enable participants to engage in conservation actions is to provide opportunities to take action on the trip itself (Orams, 1997).

All companies in which participants were surveyed belonged to the Whale SENSE program, indicating that their staff had received additional training and had agreed to abide by additional guidelines. In comparison to a preliminary study conducted by Lopez and Pearson (2017) of the Juneau whale-watching industry prior to the inception of Whale SENSE in 2015, awareness of whale watch guidelines and regulations increased from 49% to 71%. While the previous study did not measure the long-term effects, the present study also suggested an additional increase in awareness 6 months later (85%). This could indicate that the implementation of the Whale SENSE program has fostered increases in participant awareness of guidelines and regulations. However, after a whale-watching tour in both studies, the majority of participants indicated that their whale watch was their primary source of information about whales, that most participants were very likely to go on another whale watch or tell friends and family about what they learned, and that the primary factors of importance were getting close to the whales and seeing interesting behaviors like feed or leap.

The importance of close encounters in Lopez and Pearson (2017) and the present study supports the finding in this study that awareness about guidelines and regulations and knowledge about whales alone is not enough to influence the importance of getting close to whales for participants. It will be important to evaluate the quality of information being presented about the purpose of guidelines and regulations on whale-watching tours to determine aspects that could be improved for training. However, as determined in the present study, the majority of whale-watching participants indicated close encounters as the single most important factor in their whale watch before even going on the whale watch. Therefore, an important consideration for operators is to better manage expectations before participants begin their whale watch. Ultimately, by using media that reflects compliance with guidelines and regulations and incorporating educational messages into advertisements, operators can better support conservation messages and responsible viewing practices.

Conclusions

As whale watching continues to grow in Juneau and throughout the world, incorporating education and conservation into tours will be increasingly important. Participants in this study demonstrated that whale watching can increase awareness, knowledge, and support of whale-watching guidelines and regulations. By managing expectations for close encounters with whales through education, operators can be encouraged to abide by guidelines and regulations without sacrificing participant satisfaction. The implementation of voluntary programs, such as Whale SENSE, has shown promise in encouraging participant awareness about whales and whale watching. Therefore, structured and comprehensive educational programs can be used to better support management objectives seeking to conserve and protect whales and their environment. This study indicates that educational programs on whale-watching tours should be considered as a management tool in encouraging operator compliance.

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