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Visitors' values and perceptions of seal watching management in Northwestern Iceland

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ABSTRACT

Disturbance due to tourism may impact the critically endangered population of harbor seals (*Phoca vitulina*) in Iceland. Improved seal watching management is a promising strategy for seal conservation in Iceland. Previous research indicates that value orientation of tourists can predict acceptance of wildlife management and awareness of potential impacts of tourism on seals. The goal of this study was to (a) define biospheric and egoistic value orientation of seal watching visitors, (b) investigate how these values correlate with the opinion of visitors towards different management actions and awareness of potential impact of tourism on seals, and (c) investigate which management actions would be acceptable for visitors. Visitor questionnaires were distributed in NW Iceland ($n = 597$). Results show that seal watching visitors in general had high biospheric values, low egoistic values, and were open to most management actions suggested in the study. High biospheric values were correlated with acceptance of management actions and awareness of the usefulness of regulations. High egoistic values were correlated with low acceptance of management actions and low awareness of the impacts of seal watching. Results will inform managers on how to optimize management strategies at seal watching sites in Iceland and elsewhere.

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Wildlife tourism; marine ecotourism; sustainable tourism; tourism management; visitor management; interdisciplinary

Introduction

Since 2009, tourism in Iceland has increased in all areas: incoming and outgoing flights of foreign tourists, overnight stays, jobs generated, percent of the GDP generated, etc. (Óladottir, 2018). The number of foreign visitors has nearly quadrupled since the beginning of the decade, with an exceptional increase of 39% between 2015 and 2016, and the number of tourists coming to the island in 2017 was more than 650% of the total population (Óladottir, 2018). While global tourism has significantly decreased due to the COVID-19 pandemic, the reduced number of visitors has highlighted tourism's importance as an industry for Iceland. Furthermore, the extreme reduction has, in some places, shown signs of environmental recovery. Although global tourism has significantly decreased, it is unlikely that northern peripheral environments will lose their appeal.

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Wildlife tourism activities such as seal watching tourism are becoming increasingly popular along the Icelandic coast. Two species of seals breed in Iceland: harbor seal (*Phoca vitulina*) and gray seal (*Halichoerus grypus*). Harbor seals haul out close to shore and are easily accessible to visitors at seal watching sites, while gray seals normally haul out in more remote areas—although they can sometimes be spotted in harbor seal colonies. Thus, the harbor seal is the primary focus of this study. The conservation status of both populations is sensitive in Iceland. On the Icelandic national red list for threatened populations, harbor seals are listed as critically endangered (Icelandic Institute of Natural History, 2021a), while gray seals are listed as vulnerable (Icelandic Institute of Natural History, 2021b). Previous research has shown that disturbance may affect seals negatively both physically and behaviorally, which may affect the fitness of individual seals and seal populations (Gerrodette & Gilmartin, 1990; Granquist & Sigurjonsdottir, 2014). It is essential to find ways to limit negative impacts, especially because the conservation status of the Icelandic seal populations is sensitive. Importantly, it has been shown that a calmer behavior from land-based seal watching visitors may limit these disturbances (Granquist & Sigurjonsdottir, 2014), meaning that better management of visitors at seal watching sites is a promising strategy for seal conservation in Iceland.

Wildlife watching can be managed in different ways, such as through codes of conduct that communicate guidelines to visitors or operators of the tourism activity, or by putting in place regulations such as mandatory guides, entrance fees, or specific prohibitions of certain activities (for example, touching or feeding seals or diving with seals) (Curtin et al., 2009; Öqvist et al., 2018). However, it is important to know what the life guiding values of visitors are concerning the environment. Such values could potentially predict what type of management would be most fruitful in managing wildlife watching sites. Understanding visitor values may help to inform managers on how to implement regulations that could best fit the types of visitors who visit wildlife watching sites and the needs of different sites. Specifically, this study uses two relevant value orientations—the biospheric value orientation and the egoistic value orientation—which may shape visitors' opinions and attitudes towards ethical issues concerning the environment.

It is crucial to determine how to best manage visitors so they will understand and limit their impact on gray seals and harbor seals. The community of Húnaþing vestra relies on seal watching to attract visitors to the area, which is of major economic importance for the region (Aquino & Kloes, 2020) and could aid in economic recovery after COVID-19. To reduce the negative impacts of tourism on wildlife and to improve visitor satisfaction, proper management is necessary. However, such management is currently scarce (Aquino et al., 2021). Therefore, the aim of this study is to analyze biospheric and egoistic values in visitors and investigate them as a possible way to predict ethical decisions in nature.

Literature review

Húnaþing vestra

Húnaþing vestra is one of the seven municipalities which form the Northwest Iceland region of Iceland. The municipality's population was 1,181 inhabitants in 2019 for an area of 3,023 km^2 ("Local Administrative Units (LAU) – Eurostat", 2019). The largest village is Hvammstangi with around 550 inhabitants, which acts as the cultural and economic center of the municipality. Activities in Húnaþing vestra are mostly related to animal farming, including sheep, chickens, cattle, and eider duck farming (Burns, 2018). In the last decades, rural regions of Iceland have struggled to maintain their population as more and more people move to urban areas. For example, Húnaþing vestra, between 1998 and 2012, lost more than 300 residents (almost 22% of the population) (Ragnarsson, 2015, p. 9).

Research has shown that properly managed seal watching tourism is an opportunity for a unique touristic activity in Húnaþing vestra (Aquino & Kloes, 2020; Burns, 2018). Seal watching tourism has taken place on the Vatnsnes peninsula since the 1960s (Aquino & Burns, 2021), and has grown significantly since the establishment of the Icelandic Seal Center (ISC) in 2005. Between 2005 and 2015, tourism in Húnaþing vestra increased from 2,200 to 27,150 (Burns, 2018), with seal watching being the main reason for this growth (Ram et al., 2016). If managed sustainably, this rural development can increase the attractiveness of the municipality and make it more resilient. Furthermore, Burns adds that building resilience through proper seal watching tourism management can help in making Húnaþing vestra less vulnerable to the changes and impacts brought on by tourism in small, isolated communities. Like other rural communities, Húnaþing vestra is vulnerable to fluctuations of tourism demands and could suffer negative impacts from rapid changes such as the sudden increase of tourism and its crash during the COVID-19 pandemic. For example, if improperly managed rapid tourism growth were to harm the local seal population and make the population decrease significantly, or change its distribution to more remote areas, seal watching activities in Húnaþing vestra could be a victim of their own development. This would threaten the local economy that has been growing along with these activities. Indeed, as noted in Valentine and Birtles (2004, p. 30), without management for conservation, wildlife tourism is simply a "short-term mining of the resource" that is wildlife. This risk, in addition to the drop in tourism in 2020 and the economic effects afterwards, underline the need to think holistically, as sustainable tourism development should be part of a larger regional development plan rather than a sole focus (Aquino et al., 2021).

Rapid growth in wildlife tourism has been found to have considerable impact on host communities, not only environmentally (Granquist & Sigurjonsdottir, 2014), but also socially (Bachleitner & Zins, 1999; George et al., 2009). For example, a common social impact is challenging the local community's strong beliefs about the biosphere with which it had a previous, more pragmatic, relationship (Burns, 2004). This is extremely relevant in Iceland, where the relationship that existed between residents and seals for hundreds of years was a hunter-prey relationship (Burns, 2018). To encourage a transition towards establishing sustainable tourism and wildlife tourism management with a focus on protecting both seals and the local community, Húnaþing vestra has been at the forefront on cooperation efforts between the ISC, local landowners, and tourism operators.

Seals in Iceland

Worldwide, IUCN estimates the number of harbor seals to about 315,000 individuals and the species is listed as least concern worldwide. However, the Icelandic population is estimated by the ISC and the Marine and Freshwater Research Institute to have decreased by 72% between 1980 and 2018, with the current population size being estimated to around 9400 individuals (Granquist & Hauksson, 2019a). In Iceland, it is considered critically endangered (Icelandic Institute of Natural History, 2021a). The gray seal (*Halichoerus grypus)* is estimated to be of Least Concern on a worldwide scale—however, this assessment was made in 2007 and needs to be updated with current population estimates for the IUCN international red list. In 2017, the Icelandic gray seal population is around 6,300 individuals—down from around 10,000 in 1990 and is considered vulnerable (Granquist & Hauksson, 2019b; Icelandic Institute of Natural History, 2021b).

For both harbor seals and gray seals, it is difficult to define a precise cause for the population declines. Hunting and entanglement in fishing gear are thought to be the main issues (Granquist & Hauksson, 2019a; 2019b; Hauksson & Einarsson, 2010). Traditional sealing for meat and fur have decreased significantly in the last decades and as of December 2019, hunting seals in Iceland is now banned; but limited hunting licenses for utilization may be granted under specific

conditions (Regulations Prohibiting Seal Hunting, 2019). The activity that now causes the most seal deaths is fishing, with the highest seal bycatch occurring in gillnets (mainly lumpfish fisheries, responsible for 1389 ± 486 harbor seal bycatches between 2014 and 2018); but also occurring in bottom trawls (Marine & Freshwater Research Institute, 2019).

Impacts of wildlife watching

Wildlife tourism, as defined by Higginbottom (2004), is any touristic activity of which the focus is wildlife. It can be consumptive, like hunting trips or sea-angling, or non-consumptive, like wildlife-watching. It would be easy to classify consumptive wildlife tourism as harmful and non-consumptive tourism as harmless. However, non-consumptive tourism (Higginbottom, 2004), and in particular wildlife watching, is not without consequences on the biosphere. For example, research has shown that the approach of visitors may result in physiological effects in wildlife, such as increased heart rate (e.g. Carney & Sydeman, 1999; Viblanc et al., 2012) or hormonal changes (French et al., 2010; Zwijacz-Kozica et al., 2013). Both are widely recognized as indicators of stress in wild animals (Broom & Johnson, 1993), which can be linked to a decline in breeding success (e.g. Ellenberg et al., 2007). Animals may also engage in more energy-consuming behavior in the presence of visitors than they would normally, such as being driven to flee (Tyler, 1991), or increased traveling behavior (Christiansen et al., 2010). Additionally, they may be deterred from engaging in important activities, including feeding (Christiansen et al., 2010, 2013) and rearing (Kovacs & Innes, 1990; Stensland & Berggren, 2007). In some cases, some animals may even abandon their young or be permanently separated from them due to disturbance (Carney & Sydeman, 1999; Osinga et al., 2012). Changes in spatial use due to disturbances have been recorded in wildlife watching sites, where animals sometimes will choose a less ecologically optimal site to avoid visitor disturbance (Cassini et al., 2004; Pelletier, 2006). Touristic activity may, in those cases, impair a population's resilience by affecting the health and breeding success of the animals (Ellenberg et al., 2007; Kerbiriou et al., 2009).

More specifically, previous research has shown that disturbance may also affect seals negatively. A study at a seal watching site in Northwest Iceland showed that harbor seals were generally more vigilant (indicated by seals raising their head with open eyes) when visitors were present in the area, and that they changed their spatial distribution to keep their distances with the seal watchers, especially when the groups of visitors were larger (Granquist & Sigurjonsdottir, 2014). Furthermore, a study that used data spanning over 30 years showed that due to recreational activity at Kure Atoll in Hawaii, Hawaiian monk seals (*Monachus schauinslandi*) were abandoning their preferred feeding, nursing, and reproduction areas for ecologically less optimal sites. Survival rates of pups in the suboptimal sites were low, leading to a progressive but severe decline in the population (Gerrodette & Gilmartin, 1990). Both studies underline the importance of proper wildlife watching management and the serious consequences that spatial distribution changes caused by human disturbance can have on seals in general.

Demonstrating the growing enthusiasm for nature-based tourism in Iceland, in 2018 around 92% of visitors declared they were motivated to come to Iceland by the country's unique nature, while 73% of visitors indicated they were planning on participating in a nature-based recreational activity like sailing or wildlife-watching (Óladottir, 2018). Öqvist's (2016) study found that most wildlife-watching visitors in Iceland cared about the biosphere and thought disturbing nature for their benefits was unacceptable. However, the study also showed that visitors' knowledge and interest regarding seals and seal conservation was relatively low compared to knowledge and interest regarding whales.

Management tools may be voluntary or enforced through legislation. Although legislation may have more authority to enforce actions, it can be slow to integrate and implement. Therefore, voluntary codes of conduct have been more accessible for Icelandic seal watching

management. In 2010, the ISC, in cooperation with local stakeholders, developed a code of conduct for boat and land-based seal watching in Húnaþing vestra. For land-based seal watching, the code of conduct instructs visitors to move gently, keep a respectful distance, move away from pups, and never touch seals. The full version of this code of conduct can be found on a brochure from the Wild North ("Sustainable Wildlife Tourism: Guidelines and Advice For Sustainable Wildlife Tourism in Iceland, Greenland, Faroe Islands and Norway", 2017). Marschall et al. (2017), reviewed the effectiveness of different types of signs based on this code of conduct on visitor's behavior at Illugastaðir. They concluded that both teleological and ontological signs had a positive effect on visitors' ethical behavior compared with those who did not have access to guidelines. A condensed version of the code of conduct was created by the ISC in 2019 and it is printed on maps of the area so that it can reach more visitors.

This seal watching management is currently being reviewed and remade with the involvement of the community of Hvammstangi and the Húnaþing vestra municipality. The goal of this engagement is to use the knowledge of the locals in terms of common issues encountered with seal watching visitors but also to increase the community's understanding of research efforts that are being conducted. Seal watching takes place on privately owned local farms, so the cooperation of the community is paramount to any tourism activity along the coast. Among other purposes, this study is intended to advise stakeholders in the creation of a new management plan, which has the potential to be adopted throughout Iceland. Although the Vatnsnes peninsula in Northwest Iceland is the best-known area for seal watching in Iceland, other sites have increased in popularity, such as Hvítanes in the Westfjords, Ytri-Tunga in the Snaefellsness peninsula, or the Jökulsárlón glacial lagoon in Southeast Iceland.

Biospheric and egoistic values

Values are "an enduring belief that a particular mode of conduct or that a particular end-state of existence is personally and socially preferable to alternative modes of conduct or end-states of existence" (Rokeach, 1968, p. 550). It has been suggested that values are reliable in predicting people's behavior across a wide variety of contexts, and they are especially reliable in predicting behavior in situations involving ethical elements including the protection of the environment. Dietz et al. (2005, p. 356) argue that values are "the most fundamental determinants of environmental concern." They are more stable than other determinants (such as beliefs) throughout a person's life, meaning that values are difficult to change—but changes in values can have great impacts on ethical behavior towards the environment. Values have been suggested to have major indirect influences on environmental behavior as they substantially shape general beliefs when it comes to environmental decisions (Dietz et al., 2005). Understanding the values of visitors could therefore help inform wildlife managers on how to implement regulations. Knowing what people consider important is crucial when designing a management plan or educating people on the regulations put in place. In other words, the interpretive messages will be better received if they are tailored to the audience and focused on what they value.

Stern et al. (1993) described a theoretical set of three frequently used values—biospheric, altruistic, and egoistic values—as different subsets of an individual's most important held values that act as guiding principles for their behavior throughout their lives. The first possible value orientation is "egoistic"; where a person places themselves, and their well-being, at the center of their decision-making process. A person holding an "altruistic" value orientation is likely to place the well-being of others first when making decisions. They tend to prioritize either all humans or individuals that are part of a particular group in their decision-making process. Finally, a person holding a "biospheric" value orientation will tend to judge actions in terms of the effects they have on the environment (Stern et al., 1993). In the present study, the values examined will specifically be biospheric and egoistic values, since these particular values have been found in

multiple studies to be relevant in shaping human attitude and behavior towards the environment (for example, see Boomsma & Steg, 2014; López-Mosquera & Sánchez, 2012; Passafaro et al., 2015). They may be more relevant than the altruistic value orientation for wildlife tourism management, as they can be used to separate visitors in two fundamentally distinct groups of consumers (Perkins & Brown, 2012).

Biospheric values have been found to be positively correlated with interest in "ecotourism, tourism-specific pro-environmental attitudes, and commitment to environmental protection" (Perkins & Brown, 2012, p. 793). For example, some studies show that people who primarily hold biospheric values are more likely than others to believe that protecting nature is an important life goal (Boomsma & Steg, 2014), to be willing to pay for a suburban natural park (López-Mosquera & Sánchez, 2012), and to prefer environmentally friendly product options (De Groot et al., 2012). Furthermore, it has been suggested that strong biospheric value orientation is linked to environmental concern—for example, people with stronger biospheric values may be more likely to believe that environmental impacts have negative consequences for themselves, other people, and the biosphere (Stern & Dietz, 1994). Finally, biospheric values may affect trust in management, as people who believe they hold the same values as the environmental agencies that design and implement management actions may be more likely to trust these management actions and accept them (Vaske et al., 2007).

On the other hand, the egoistic value orientation is correlated with more interest for unsustainable touristic activities, such as activities focused on leisure and comfort, with greater importance placed on the availability of touristic facilities (Passafaro et al., 2015). Visitors who hold strong egoistic values are usually less interested in the environment in general than those who hold strong biospheric values (Imran et al., 2014). They are also less likely to be interested in natural tourism, and they are thought to be less willing to endorse social and environmental responsibility while on holiday (Passafaro et al., 2015). These visitors may be less likely than others to support the protection of nature, both financially and ethically (Jansson et al., 2011; Nordlund & Garvill, 2002; Passafaro et al., 2015). Finally, people who have higher egoistic values seem to show less environmental concern, believing that anthropogenic impacts have fewer negative consequences on the biosphere than others—while their belief of negative consequences for themselves may not be lessened (Stern & Dietz, 1994).

Methodology

In this study, the concept of value orientation (biospheric and egoistic) was used, which may help to predict inclination toward environmental protection and ethical behavior in nature (Stern et al., 1998, 2017). People holding strong biospheric values will judge their actions, and the actions of others, by what they believe the impact will be on the environment, nature, and the biosphere (Martin & Czellar, 2017). On the other hand, people with stronger egoistic values will judge their actions, and the actions of others, by what they believe the impact will be for their own well-being (Martin & Czellar, 2017). In practical terms, based on this theory, visitors of seal watching sites with higher biospheric values and lower egoistic values may be more likely than others to be aware of potential negative impacts of tourism on seals and to respect management actions that could facilitate reduced disturbance for the seals. On the other hand, visitors with lower biospheric values and higher egoistic values may be less aware of potential negative impacts of tourism on seals and be less in favor of management actions. In the present study, we use seal watching in the Vatnsnes area as a case study to test this theory. Knowledge regarding the value orientation of visitors could help facilitate suitable management strategies, not only for seal watching in Northwest Iceland, but also more generally for seal and wildlife watching in other regions. Therefore, the goal of this study is to a) define the biospheric and egoistic values of seal watching visitors based on a subset of questions retrieved from Stern et al. (1998),

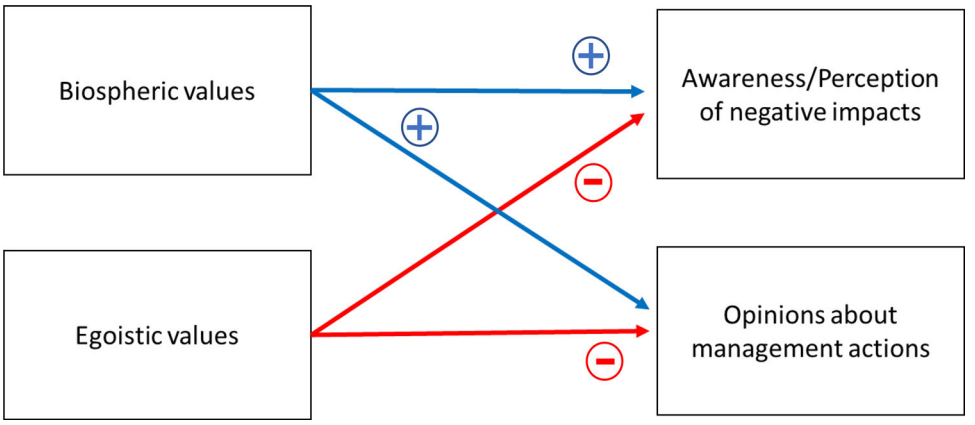

Figure 1. Theoretical model, with blue arrows representing a positive influence, and red arrows representing a negative influence.

b) subsequently analyze how these values correlate with the opinion of visitors towards different management actions and their perception of the impact tourism can have on seals, and c) investigate which management actions are most acceptable to visitors. The following theoretical model (Figure 1) describes the hypotheses we investigate in this study, with blue arrows representing a positive influence, and red arrows representing a negative influence.

- Hypothesis 1a: Visitors with high biospheric values are more likely than others to be aware of their potential impact on seals.
- Hypothesis 1 b: Visitors with high biospheric values are more likely than others to be positive towards management actions at seal watching sites.
- Hypothesis 2a: Visitors with high egoistic values are less likely than others to be aware of their potential impact on seals.
- Hypothesis 2 b: Visitors with high egoistic values are less likely than others to be positive towards management actions at seal watching sites.

Overall description of the research procedures and strategies

Questionnaires were distributed at three different sites in Húnaþing vestra. In 2017, a preliminary test of the study was conducted at the ISC museum. In 2019, data was collected at two seal watching sites (Illugastaðir and Ósar) on the Vatnsnes peninsula. Questions and survey structure are described in Table 1. The questionnaires were divided into five sections, designed to measure: (1) Background information (visitors' gender, age, nationality and education). (2) Levels of biospheric value orientation. (3) Level of egoistic value orientation. (4) Perception of seal watching management and awareness of the impacts of seal watching and of the usefulness of regulations to alleviate these impacts. (5) Opinion about various management actions.

The questions used to measure biospheric and egoistic values were adapted from the Brief Inventory of Values (BIV) developed by Stern et al. (1998) who created statements that showed to be suitable for measuring these values in a 5-point Likert scale survey. Four statements adapted from the BIV were chosen to measure biospheric values, and another four were chosen to measure egoistic values (Table 1). The independent variables considered were biospheric and egoistic orientation of visitors. They were tested as possible predictors for the dependent variables, which are described in Table 2.

The survey was also translated to French for visitors at Illugastaðir and Ósar. The decision to translate the questionnaire was made in coordination with the ISC, since French visitors were

Table 1. Structure and possible answers of the survey.

Category	Question	Question type	Possible answers
Background	Gender	Categorical	Man-Woman
	Age	Numerical	[Number]
	Education	Categorical	Secondary Education (High School)-Technical school or Associates Degree-Bachelor's Degree-Master's degree-Ph.D., M.D., J.D., or equivalent
	Nationality	Categorical	[Country]
Biospheric values	Protecting the environment (BV1) Feeling unity with nature (BV2) Respecting the earth (BV3) Harmony with other species (BV4)	Likert	Unimportant-Somewhat important-Moderately important-Very important-Extremely important
Egoistic values	Being influential, having an impact on people and events (EG1) Wealth, material possessions (EG2) Authority, the right to lead or command (EG3) Social power, control over others, dominance (EG4)	Likert	Unimportant-Somewhat important-Moderately important-Very important-Extremely important
Perceptions of seal watching management	Does seal watching have negative impacts? Can management actions alleviate impacts?	Likert	I don't know-Very unlikely-Somewhat likely-Very Likely-Always
	What distance are seals disturbed by tourists?	Ordinal	10 meters-25 meters-50 meters-75 meters-100 meters
Opinions about management actions	Should guides be mandatory at seal watching sites? Should seal watching sites be closed during pupping season? Should seal watching be regulated? Should helicopters above colonies be banned? Should there be distance limitations for seal watching boats? Are codes of conduct enough? Should swimming with seals be allowed? Should feeding seals be allowed? Should touching seals be allowed? Should there be seal watching distance limitations on land? Should there be a fee to enter seal watching sites? What do you think about regulations? What distance should tourists be allowed to approach seals?	Likert	Strongly disagree-Somewhat agree-Neutral-Somewhat agree-Strongly agree

common respondents in 2017, when the survey was first administered. French is also the third most common nationality of foreign visitors in Iceland after British and German ("Tourism in Iceland in Figures – Summer 2019", 2019). Moreover, French is the native language for many people of other countries, such as Belgium, Switzerland, Canada, and Luxemburg.

Description of the sample, sampling techniques, and the subjects

During summer, the peak tourism season, an upper estimate for the number of visitors who stop at the ISC is 12,000 a month. The ISC estimates that possibly more than half of the visitors to the peninsula stop at the ISC (ISC, personal communication, 2019). Using this estimate, the number of visitors along the Vatnsnes peninsula per month in the summer was rounded up to around 25,000. With a margin of error of 5% and a confidence level of 95%, this brought the

Table 2. Dependent variables.

Perceptions of seal watching management	Opinions on the management of seal watching sites
Awareness of negative impacts	Opinions of the general idea of seal watching regulations
Perceptions regarding whether regulations may alleviate negative impacts on seals	Distance at which visitors should be allowed to approach seals
Perception of the distance at which seals may be disturbed by visitors	Agreement towards different management actions

total of questionnaires needed for statistical significance to 379 for the area for a random sample. Since the first data set was conducted in 2017 with 200 surveys, it was decided that the acceptable minimum goal was $n = 400$ surveys over the research sites in 2019. All study sites combined brought the total number of completed surveys to $n = 600$.

Statistical analysis

To test if there was a significant linear correlation between different variables (for example between questions related to biospheric values and opinions towards management actions), a Pearson correlation test was used. A significance level of <0.05 was chosen for this Pearson test. When the correlation was significant, the Pearson correlation coefficient, or Pearson's *r*-value, was used as a measure of correlation. In the results, positive significant correlations will be presented in blue and negative correlations in red for easier legibility. A principal component analysis (PCA) was used on both the four biospheric value indicators and the four egoistic value indicators to determine if any linear combination of these variables would be able to explain a majority of the variance without losing too much information (Jollife & Cadima, 2016). The "I don't know" answer lead to the question being considered as a non-answer for the PCA analysis.

To compare the demographics of visitors between sites, a Kruskal-Wallis test was used. This test was chosen because it is used to determine if multiple independent samples come from different populations. If the Kruskal-Wallis test is significant (p-value < 0.05), it means that at least one of the groups is significantly different from the others concerning the variable tested.

Findings

Demographics

Respondents came from 41 countries including Iceland. 80% of respondents were European, 12% were North American, 6% Asian, 1% Oceanian, 1% South American, and less than 1% African. Although the prevalence of Europeans was high, tourism at these sites was mainly foreign as Icelanders only represented 8.5% of the total questionnaires. Overall, 53% of the respondents were men, and 47% were women. The people surveyed were most often aged 21-40 years old (43%), and 41-60 years old (41%). 10% of respondents were 61 or older and 6% were 17-20 years old. The mean age of respondents was 41.3 years old. Finally, a master's degree was most common in terms of education (39%) followed by a bachelor's degree (24%), secondary education (15%), a PhD (12%), and technical school (9%). There was no significant difference in demographics between respondents at different sites (Kruskal-Wallis test: p-value > 0.05), therefore the data for all sites was pooled in further analysis.

Biospheric values

To explain the results, Likert scale answers were grouped in the following way. *Unfavorable* answers were "Unimportant" or "Somewhat important", "Very unlikely" or "Somewhat unlikely", and "Somewhat disagree" or "Strongly disagree". Some questions had *neutral* options, which

were either "Neutral" or "Moderately important". Finally, *favorable* answers were "Very important" or "Extremely important", "Very likely" or "Always", and "Somewhat agree" or "Strongly agree".

An overwhelming majority of visitors rated the biospheric value indicators as important in their life, with more than 90% of visitors considering "Protecting the environment" and "Respecting the Earth" as very important or extremely important guiding principles in their life, and more than 80% for the statements "Feeling unity with nature" and "Harmony with other species".

Egoistic values

In general, visitors regarded the statements related to egoistic values as less important than statements related to biospheric values. The egoistic value indicator toward which visitors were most positive was "being influential, having impact on people and events" with around 55% of visitors considering it a guiding principle in their life. Around 15% stated it was unimportant or somewhat important, the rest being neutral. On the other hand, most visitors disagreed that "social power, control over others, dominance" was one of their guiding principles (67% disagreeing, 13% agreeing). Finally, 22% of visitors agreed and 35% disagreed that "wealth, material possessions, money" were a guiding value in their life, while 29% agreed and 38% disagreed for the statement "authority, the right to lead or command", the rest being neutral.

Perceptions of seal watching management and awareness of possible impact

For the question, "in general, do you think seal watching could have a negative impact on seals?" around 67% of respondents thought that seal watching does not have a negative impact or that it is unlikely, and 19% did not know if seal watching can cause negative impacts. About 14% of visitors believed seal watching has or may have a negative impact. However, more respondents felt positive about the usefulness of regulations to alleviate possible negative impacts ("to the best of your knowledge can management actions, such as ethical guidelines for tourists, help alleviate negative impacts on seals?"). Respectively 21% and 42% of visitors answered that they believed regulations were very likely or likely to be useful in alleviating impacts. 28% answered that regulations were unlikely or very unlikely to be useful. Finally, 9% stated they did not know.

When asked what distance they think seals are disturbed by tourists, "50 meters" was the answer chosen by the most visitors (30%), followed by "25 meters" (22%), "100 meters" (20%), "10 meters" (18%), and "75 meters" (10%). Therefore, 70% thought that seals could not be disturbed by visitors further than 50 meters.

Opinions towards various management actions

In general, the results show a strong agreement towards most of the managements actions that were presented in the questionnaire. The statements "touching seals should not be allowed," and "feeding seals should not be allowed" were rated the most positively out of all management actions presented in the survey, with more than 90% of respondents stating strong agreement or agreement, followed by the statements "seal watching sites should be closed during sensitive periods such as pupping season," (89% agree); "The distance tourists can approach seals on land should be limited" (86% agree); "The distance seal watching boats can approach seals should be limited" (86% agree); "Helicopter tours above seal colonies should not be allowed" (82% agree); "Seal watching should be regulated" (81% agree); and finally "Swimming or diving with seals should not be allowed" (73% agree). Finally, three statements showed no clear consensus by visitors: "Seal watching management using a code of conduct is not enough" (28% disagree, 40% agree), "Entrance to seal watching sites should be allowed with a guide only" (41% disagree,

33% agree), and "Seal watching sites should be accessible through an entrance fee" (48% disagree, 22% agree).

Correlation between values, perceptions of seal watching management, and opinions towards various management actions

A principal component analysis (PCA) was used on the four biospheric value indicators to determine if there were correlations between these indicators, and therefore if any linear combination of them would be able to explain a majority of their variance without losing too much information (Jollife & Cadima, 2016). The PCA showed that the biospheric value indicators were highly correlated to each other, meaning that they could be combined to reduce the number of variables. The first component (which represents the maximum variance in the data) of the PCA was found to explain 62.3% of the variation of these four variables (the other components explaining 15.4%, 13.0% and 9.2% of the variation). The same process was also used on the four egoistic value indicators. The first component of the PCA done on the egoistic value indicators was found to explain 52.0% of the variation of these four variables (the other components explaining 20.4%, 17.2% and 10.4% of the variation). The first components, explaining much of the variance of both sets of value indicators, were chosen as a suitable approximation of respondents' level of biospheric and egoistic values. The linear combinations of indicators were therefore calculated as follows, according to the loadings of both PCAs. BVx are the biospheric value indicators and EGx are the egoistic value indicators (see Table 1).

- Biospheric value indicator (BV) $\leftarrow 0.519^{*}BV1 + 0.463^{*}BV2 + 0.537^{*}BV3 + 0.477^{*}BV4$
- Egoistic value indicator (EG) $\leftarrow 0.384^{*}EG1 + 0.440^{*}EG2 + 0.593^{*}EG3 + 0.555^{*}EG4$

Possible correlations between BV and EG, and visitors' answers to questions about a) their awareness of possible impacts of tourism on seals; and b) their opinions towards management actions were then tested. A Pearson's correlation test was done between each of these questions and the two indicators respectively, with the results described in Table 3.

As Table 3 shows, one out of three questions about perceptions of the impacts of tourism on had a significant positive correlation to the biospheric value indicator, meaning that a higher biospheric value orientation was correlated to a higher awareness concerning the possible impacts of tourism on seals in that case. Specifically, higher biospheric value orientation was associated with a higher awareness of the usefulness of regulations to alleviate possible negative impacts. Nine of the questions about opinions towards management actions had a significant positive correlation to the biospheric value indicator (69%), meaning that a high biospheric value orientation was correlated to more agreement with seal watching management actions. One of the three questions about perceptions of the impacts of tourism on seals had a significant positive correlation to the egoistic value indicator, meaning that a high egoistic value orientation was correlated to lower awareness concerning the impacts of tourism on seals in that case. Specifically, higher egoistic value orientation was associated with a lower awareness of the likelihood that tourism has any negative impacts on seals. Finally, six of the questions about opinions towards management actions had a significant positive correlation to the egoistic value indicator (46%), meaning that a high egoistic value orientation was correlated to disagreeing with seal watching management actions.

Correlation between perceptions of seal watching management and opinions towards various management actions

It was investigated if there was a possible correlation between management opinions, and the perception that visitors had of tourism's impacts on seals and the usefulness of regulations

Table 3. Correlations between value orientation, and opinions and perceptions of management actions, with positive correlations in blue and negative correlations in red.

		Biospheric value orientation (BV)		Egoistic value orientation (EG)	
		p-value	*r*-value	*p*-value	*r*-value
Perceptions of seal watching management	Does seal watching have negative impacts?	3.7E-01		1.2E-02	−0.12
	Can management actions alleviate impacts?	4.3E-02	0.09	1.5E-01	
	What distance are seals disturbed by tourists?	4.3E-01		9.8E-01	
Opinions about management actions	Should guides be mandatory at seal watching sites?	4.5E-04	0.14	1.5E-02	−0.10
	Should seal watching sites be closed during pupping season?	3.9E-02	0.09	7.1E-03	−0.11
	Should seal watching be regulated?	5.4E-03	0.11	1.1E-04	−0.16
	Should helicopters above colonies be banned?	1.2E-02	0.10	3.3E-02	−0.09
	Should there be distance limitations for seal watching boats?	2.8E-02	0.09	6.4E-02	
	Are codes of conduct enough?	7.4E-01		1.3E-02	−0.10
	Should swimming with seals be allowed?	1.2E-01		5.4E-01	
	Should feeding seals be allowed?	3.4E-01		2.0E-01	
	Should touching seals be allowed?	4.2E-02	0.08	6.8E-01	
	Should there be seal watching distance limitations on land?	1.0E-03	0.14	1.1E-02	−0.11
	Should there be a fee to enter seal watching sites?	1.3E-01		3.5E-01	
	What do you think about regulations?	8.8E-08	0.22	7.7E-02	
	What distance should tourists be allowed to approach seals?	4.5E-03	0.12	3.9E-01	

(Table 4). Table 4 shows the *r*-values and *p*-values of the Pearson tests between all variables related to seal watching impact perception and all variables related to acceptance of various management actions at seal watching sites.

All *r*-values of the significant Pearson tests done on these pairs were positive, meaning there was a positive correlation between awareness of possible seal watching impacts and acceptance of different management actions at seal watching sites. The distance at which visitors thought seals are disturbed by approaching tourists was significantly correlated to all management action opinions, which means that the higher the distance that the respondent answered, the more likely they were to be positive towards all management actions. The perception of seal watching's negative impacts was significantly and positively correlated to 69.2% of opinions about management actions. Finally, the belief that management actions could alleviate negative impacts on seals was significantly positively correlated to 53.9% of management action opinions.

Empirical model based on results

Figure 2 shows the resulting model after our analysis of the results, with blue arrows representing a positive influence, red arrows representing a negative influence, and black arrows representing an influence that can be both positive and negative.

The relationships that we had expected are indeed present, but this model also shows the positive relationship between awareness of seal watching impacts and opinion of seal watching regulations. The empirical model also suggests that visitor background may influence value orientation, and opinions about management actions. These potential links should be further analyzed in future studies.

Table 4. Correlations between opinions towards different management actions and perceptions of the impacts of tourism, with positive correlations in blue and negative correlations in red.

		Perception of seal watching and its impacts					
		Does seal watching have negative impacts?		Can management actions alleviate impacts?		What distance are seals disturbed by tourists?	
		p-value	*r*-value	*p*-value	*r*-value	*p*-value	*r*-value
Opinions about management actions	Should guides be mandatory at seal watching sites?	2.0E-07	0.24	1.2E-03	0.14	5.9E-06	0.19
	Should seal watching sites be closed during pupping season?	4.1E-06	0.21	2.8E-02	0.09	8.9E-05	0.16
	Should seal watching be regulated?	4.9E-04	0.16	8.8E-07	0.19	5.8E-05	0.17
	Should helicopters above colonies be banned?	1.4E-03	0.15	7.9E-01		1.5E-03	0.13
	Should there be distance limitations for seal watching boats?	1.4E-01		3.0E-08	0.24	3.2E-04	0.15
	Are codes of conduct enough?	2.3E-06	0.22	6.7E-02		3.1E-04	0.15
	Should swimming with seals be allowed?	8.6E-03	0.15	2.1E-01		2.4E-03	0.13
	Should feeding seals be allowed?	7.7E-01		7.8E-01		1.8E-02	0.10
	Should touching seals be allowed?	2.1E-01		1.2E-01		7.7E-03	0.11
	Should there be seal watching distance limitations on land?	1.6E-03	0.14	3.6E-05	0.18	1.4E-02	0.10
	Should there be a fee to enter seal watching sites?	1.3E-01		3.0E-02	0.09	4.6E-02	0.08
	What do you think about regulations?	1.2E-04	0.17	1.9E-12	0.30	1.5E-03	0.13
	What distance should tourists be allowed to approach seals?	1.9E-04	0.17	9.4E-02		< 2.2e-16	0.60

Discussion

Influence of values on visitors' opinions towards seal watching regulations

Visitors in general had high biospheric value orientation and low egoistic value orientation, which is consistent with the results of previous studies, like Perkins and Brown (2012), in which tourists with stronger biospheric values are shown to be more likely to be interested in "ecotourism" activities such as wildlife watching. In general, visitors agreed that management is important. The results also suggest that the level of biospheric value of visitors can be an indicator of willingness to accept specific management actions at seal watching sites and of higher awareness of the usefulness of regulations to alleviate negative impacts of tourism on seals. On the other hand, the results indicate that a higher egoistic value orientation of visitors was associated with lower willingness to accept some management actions and less awareness that there are potential negative impacts of seal watching.

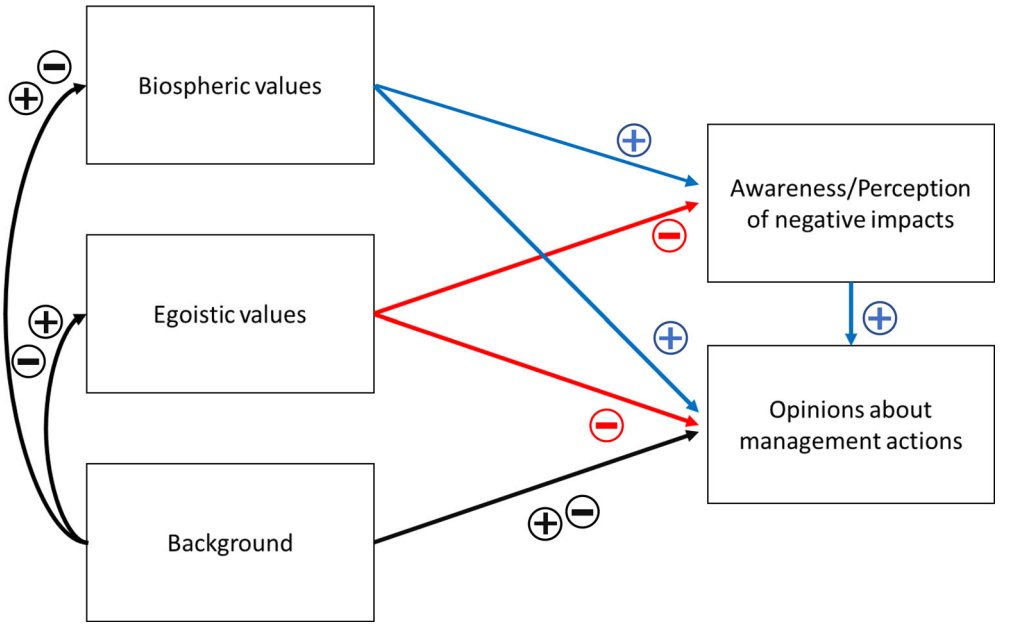

Figure 2. Empirical model, with blue arrows representing a positive influence, red arrows representing a negative influence, and black arrows representing influences that will be investigated in further research.

Influence of values on visitors' general perceptions of the impacts of seal watching tourism

Visitors at the seal watching sites and at the ISC did not generally have a high perception of visitor impacts on wildlife. For example, 67% thought that seal watching has no impact on seals or that it is very unlikely, and 19% did not know. Only 14% of visitors believed that it is extremely or very likely that seal watching does have an impact on seals. This is comparable to Taylor and Knight (2003) where 50% of visitors to Antelope Island State Park, Utah believed that recreation (biking, horse-riding or hiking) had no negative impact on wildlife. The same study found that most visitors to this park found it acceptable to approach wildlife at distances where animals were extremely likely to be disturbed (Taylor & Knight, 2003). The same was true for our study—with 66% of visitors believing that seals are not disturbed when tourists are more than 50 meters away and 77% believing that seals are not disturbed when tourists are more than 75 meters away. As research shows, seals may be disturbed by visitors as soon as they are aware of them, which can be at 100 meters or more (Granquist & Sigurjonsdottir, 2014). Additionally, the Association of Arctic Expedition Cruise Operators recommends never approaching within 100 meters of hauled-out seals ("AECO Guidelines: Seals", 2019).

The results of our study showed that biospheric value orientation was not correlated to awareness that there can be negative impacts of tourism on seals but was correlated to higher awareness of the usefulness of regulations to alleviate potential impacts. Egoistic value orientation, on the other hand, was negatively correlated with visitors' awareness of tourism's potential negative impact on seals, but not with their perception of the usefulness of regulations. In Stern and Dietz (1994), egoistic values were likewise linked to decreased perception of the negative consequences of environmental impacts. However, biospheric values were also linked to an increased perception of these potential impacts. Therefore, it is surprising that biospheric values were not significantly correlated in our results to an increased perception of tourism's impact on seals. While a higher awareness of the usefulness of regulations could partially explain why visitors with high biospheric values would be more willing to accept management actions, this also

raises the question of why visitors with a higher biospheric orientation would likely think that regulations are more useful, if they do not perceive more negative impacts. Vaske et al. (2007) showed that people are more likely to accept management actions when they are implemented by agencies with which they feel that their values aligned. A possible reason for the fact that visitors with higher biospheric values were more willing to accept some management actions or that they thought that regulations were more useful could be that they are more trusting than others towards management actions that seem to be compatible with their biospheric orientation.

The results of our study also showed that the perceptions that visitors had of the negative impacts of tourism on seals, the usefulness of regulations, and the distance at which seals were disturbed, were positively correlated to their acceptance of management actions. In particular, the distance at which visitors believed that seals are disturbed by tourists was significantly positively correlated to the acceptance of all management actions mentioned in the questionnaire. Other research has shown that perceptions and knowledge of environmental issues are linked to environmental attitudes—i.e. high perception of the impacts of climate change were found to positively affect Korean nature tourists' ethical behavioral intentions (Han et al., 2016). A study with high school students also showed that they had more pro-environmental attitudes with higher levels of environmental education (Bradley et al., 1999). Multiple studies recommend educating visitors and raising awareness to promote ethical behavior at wildlife watching sites where the perception of impacts is low (Curtin, 2010; Granquist & Sigurjonsdottir, 2014; Taylor & Knight, 2003). This could be effective at seal watching sites to increase acceptance of any management actions, which highlights the need for an effective teleological management plan (Marschhall et al. 2017).

Conclusion

Practicality

The theoretical acceptance of some management actions was surprisingly high regarding management actions that may not be easy to implement successfully. The code of conduct, which was created in 2010, can be found on maps at the ISC and at one of the seal watching sites included in the present study (Illugastaðir). It includes management actions that most visitors agree with, such as maintaining a minimum distance limitation for land-based seal watching ("Sustainable Wildlife Tourism: Guidelines and Advice For Sustainable Wildlife Tourism in Iceland, Greenland, Faroe Islands and Norway", 2017), but these regulations are not always respected . Another example is the closing of sites during some sensitive periods, which was agreeable to 89% of visitors in the current study and is already implemented at Illugastaðir. This site is closed from the 1st of May to the 20th of June to protect nesting eider ducks. Another site on Vatnsnes, Svalbarð, used to be open for visitors until 2019 but is now temporarily closed to protect the site from mass tourism. In practicality, visitors can be dissatisfied or simply not understand that the site is closed and try to enter anyway. This is very common in Svalbarð and is sometimes seen at Illugastaðir, but the flow of visitors is nearly stopped there during the seasonal closure, in part because the landowners are present to stop them . However, the third site included in the survey, called Ósar, is open during this seasonal closure. The problem would be exasperated if Ósar were to close, leaving nowhere for seal watchers to stop on Vatnsnes. Restrictions that could seem less limiting than the site closing for pupping season, like mandatory guides or entrance fees, were much less popular (33% and 22% agreement respectively). Nevertheless, these regulations may have to be implemented to keep at least one site open for visitors year-round. For any of these regulations, even the ones for which opinions were mostly positive, implementation will have to be done through coordinated efforts between the ISC, the seal museum, landowners, and the municipality. The seal museum, especially, will be

instrumental in communicating the regulations to seal watching visitors before they visit the sites. Going forward, it will therefore be important to advertise the museum as an important step in Vatnsnes seal watching trips, to make the museum more attractive to seal watchers, and to keep it up to date with information about the management plan.

Further research

Recommended management actions

This study investigates visitors' values, and the perception of visitors towards different types of management actions and needs. It looks at one aspect of management from the angle of visitors' awareness, opinions, and life guiding values, but more research is necessary to define what management actions are preferrable. Research must be conducted to evaluate what is physically and financially feasible, what would be accepted by the landowners and other stakeholders, how the seal populations are affected and how impacts can be reduced, and how visitors would actually behave if different regulations were in place. This highlights the need for further interdisciplinary research between social sciences and biology in this field.

Background

As we suggest in the empirical model (Figure 2), visitor background may have an influence on egoistic values, biospheric values, and opinions about management actions. Specifically, women had higher biospheric values on average, and were more likely to agree with regulations than men. Older respondents, on the other hand, were more likely to have higher egoistic values, and less likely to agree with regulations in general. The links between background and opportunities for seal watching management should be further investigated, with a focus on gender and the potential of female ecotourists as drivers towards ethical conduct. Further understanding of gender dynamics or possible factors promoting the ethical behavior of a group of visitors would be valuable in designing proper management strategies at seal watching sites.

Additional observations in further studies

A survey of different sites with larger sample sizes is planned by the authors, on a national level. We recommend that this survey be paired with observations of visitor behavior to examine the concrete link between the values of seal watchers, their perceptions of negative impacts, and their behavior at seal watching sites. It would also be valuable to add observations of seal behavior at these sites, as well as interviews of local residents and tourism operators, to get a more complete picture of the interaction between visitors, wildlife, and the local community at these sites.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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