Abstract

There is currently limited knowledge concerning the economic value of commercial whale watching from the perspective of the consumer's trip experience. This study outlines the results of an in-person contingent valuation survey, which asked whale watching tourists in Faxaflói Bay, Iceland, how much they would have been willing to pay beyond the paid ticket price. Based on a sample of 163 tourists, only 30 (18.40%) reported any consumer surplus, despite the majority stating positive satisfaction with the experience. Mean consumer surplus was 768 ISK (approximately 5.60 euros). Scaled up to the number of whale watching tourists in Faxaflói Bay in 2018 of 148,442, aggregate CS was approximately 114.0 million ISK (0.83 million euros), a 6.9% mark-up on estimated annual revenue generation derived from average ticket prices. The study provides new information on the economic value of whale watching in an area which had already been part-designated as a whale sanctuary.

Keywords: whale watching; consumer surplus; ecosystem services; contingent valuation; recreational value

1. Introduction

The United Nations has underscored the importance of marine resources in terms of their contribution to human well-being, with Goal 14 of the Sustainable Development Goals, 'Life Below Water', emphasizing the need to "conserve and sustainably use the oceans, seas and marine resources for sustainable development" (UN General Assembly 2015, p. 23). The whale watching industry has, over the past two to three decades, continued to develop all over the world (Tisdell and Wilson, 2012; Ryan et al., 2018; Viera et al., 2018), becoming a significant revenue generator and contributor to human well-being through the ecosystem service of outdoor recreational tourism (Cook et al., 2020; Malinauskaite et al., 2020b; Roman et al., 2014). The most recent estimate of the global economic value of the industry was US $2.1 billion, derived from a study involving over 13,000 people in 119 countries, with more than 13 million tourists taking trips to witness cetaceans in their natural habitat (O'Connor et al., 2009). In addition, a further study estimated that the industry could become worth an additional US $ 400 million and support an extra 5,700 jobs if nations with cetacean populations, but without related tourism activities, were to commence whale watching (Cisneros-Montemayor, 2010).

In recent years, the number of studies focused on the valuation of marine ecosystem services (ES) has expanded (Costanza et al., 2014; Himes-Cornell, 2018; Schumann and Mahon, 2015; Torres and Hanley, 2017), yet considerable gaps in the literature remain (Malinauskaite et al., 2020a; McKinley et al., 2019). One such void concerns the recreational value of whale watching, with few site-specific studies undertaken to date. One study by Schwoerer et al. (2016) applied a producer side approach to estimate the economic rent associated with whale watching in 2006 in Baja California, Mexico. A further study by Mayer et al. (2018) on Baja California evaluated the overall economic impact of whale watching at the site, a study which included a supply-side analysis and provide information about the motivation of whale watchers that could be applied to correct for multiple trip biases. Another publication by Brenner et al. (2016) evaluated the gross turnover of the whale watching industry associated with the El Vizcaino Biosphere Reserve. The research of Loomis et al. (2000) applied the travel cost method to estimate the recreational value of whale watching in California but acknowledged the challenges of applying this method to evaluate consumer surplus (CS)[1] given the presence of multi-purpose and multi-destination trips. Finally, the study by Mitra et al. (2019) analysed the determinants underpinning tourists' expenditure on whale watching trips in Hervey Bay, Australia. As far as the authors are aware, no published studies in recent years have sought to estimate the economic value of commercial whale watching from the perspective of the consumers' experience of the trip, which is the marginal willingness to pay (WTP) to go whale watching.

The use of a CS approach provides new insights into the net economic benefits of whale watchers by differing from economic studies which focus either on (a) the turnover associated with whale watching, and (b) the macroeconomic impact of whale watching. The former approach fails to account for the net benefits of whale watchers since total revenue is derived from the aggregation of ticket sales – a tourist paying the market price for a ticket may have had WTP much more. The latter approach is also likely to focus on revenue, income and employment linked to whale watching, again missing the net gains in consumer utility derived from consumption. Moreover, this study also seeks to overcome one of the main criticisms of the contingent valuation method, a survey-based technique in which respondents are often asked questions about goods they have little or no experience of purchasing. This study surveys

[1] Consumer surplus is defined as the difference between the consumers' willingness to pay for a commodity or experience and the actual price paid by them (Goodwin et al., 2019).

participants after the purchase of the good, investigating WTP in the immediate aftermath of the whale watching experience. In addition, research on the CS concept can provide useful information for the owners of whale watching companies. A high level of CS provides an initial indication of the potential for owners to derive extra producer surplus (profits) through increased ticket prices, assuming demand for the good is relatively inelastic (bin Ramli, 2016; Robertson, 2013).

Given the gaps in coverage in the literature, this study has one main aim, which is to apply the contingent valuation method to estimate the mean CS and annual recreational value of whale watching in Faxaflói Bay, Iceland. As is customary in contingent valuation studies, the paper will also explore the main socio-demographic influences on WTP. The choice of case study reflects the considerable growth in Iceland of the tourism industry in general, which has corresponded with burgeoning whale watching industry in Reykjavík, the capital city of Iceland located on the shores of Faxaflói Bay. Moreover, Faxaflói Bay has also been the focus of heated debate in Iceland concerning the respective merits and trade-offs of commercial whaling and whale watching (Bertulli et al., 2016; Iceland Magazine, 2018; Malinauskaite et al., 2020a), with both industries active during the summer. Most recently, Faxaflói Bay was the focus of a contingent valuation study estimating WTP for ecolabels linked to sustainable boating for whale watching (Lissner & Mayer, 2020).

This paper is structured as follows. Section 2 provides a brief theoretical background concerning the application of non-market valuation techniques – such as contingent valuation – to value marine ES, including recreational tourism. Section 3 describes the case study location and growth of the whale watching industry in Reykjavík. Section 4 sets out the methodology for this study. Section 5 articulates the results. Section 6 discusses the main implications of the outcomes, including their relevance to decision-making and compares the results to other studies. Section 7 provides a short conclusion and details some recommendations for future research.

2. Conceptual background

2.1 CS of commercial whale watching and Marshallian demand

CS has been defined as *"the amount that leaves the consumer indifferent to the new versus old situation i.e. on the same indifference level"* (Silberberg and Suen, 2001, p.350). In the context of whale watching, this equates to the maximum amount an individual would be willing to pay in addition to the price of their ticket in order to still undertake the trip. This is in line with the observation of Walsh (1986), who stated that assuming sufficient disposable income, individuals will purchase marketed goods when their marginal benefits exceed marginal costs, and not incur expenditure when the latter are greater than the former. A basic rule of thumb such as this also implies that an individual's CS from any marketed recreational activity can only be non-negative.

Another important factor in determining the CS of commercial whale watching is the associated demand curve. Maximising an individual's utility with respect to the price levels gives the Marshallian demand (Robertson, 2013). This section builds on the fundamental microeconomic theory presented in Silberberg and Suen (2001) and Robertson (2013). Consumers are assumed to be rational agents, seeking to maximise their utility from the whale watching experience and other goods with respect to given prices and disposable income. Thus, a consumer's utility

function is expressed by equation (1), whereby U is total utility, X_1 is the whale watching good, and X_2 is the sum of all other marketed goods consumed by the individual.

$$U = U(X_1 X_2) \quad (1)$$

From equation (1), the marginal rate of substitution (the ratio of the two marginal utilities) between X_1 and X_2 can be determined as per equation (2), which is the slope of the utility function of X_1. The left-hand side of equation (2) is a consumer's willingness to exchange one whale watching ticket for other marketed goods, while the right-side is the marginal rate of substitution. Assuming a diminishing marginal rate of substitution, the marginal utility of X_1 decreases as the quantity of X_1 increases.

$$\frac{\partial X_2}{\partial X_1} = \frac{\partial XU/\partial X_1}{\partial XU/\partial X_2} \quad (2)$$

As the marketed goods $(X_1 X_2)$ have a price, consumers must also consider this in relation to their disposable income. An individual's budget constraint, M, is denoted by equation (3), with P representing the price of each good.

$$M = P_1 X_1 + P_2 X_2 \quad (3)$$

Maximising utility (equation 1) with respect to the budget constraint (equation 3) leads to the Lagrange function (equation 4).

$$L = U(X_1 X_2) + \lambda\,(M - P_1 X_1 + P_2 X_2) \quad (4)$$

Assuming the Lagrange partial derivatives equal zero, and negative second derivatives, the Marshallian demand function is outlined in equation (5).

$$X_i = X_i(P_1, P_2, M), i = 1, 2 \quad (5)$$

Demand for whale watching is thus determined with respect to the consumer's utility from whale watching and the given budget constraint. A change in the price of good X_1 or X_2, or a different level of disposable income, M, will affect an individual's recreational value.

2.2 Non-market valuation

Although commercial whale watching is a good traded in a market, it is not possible to determine an individual's CS directly from ticket prices and demand, as this necessitates information on WTP. It is therefore necessary to utilise non-market valuation techniques, such as contingent valuation and the travel cost method, which have been in existence since the 1960s and are nowadays increasingly applied to link changes in the quantity and quality of ES to human well-being (Buchholz and Rubbelke, 2019; Luisetti et al., 2011; Torres and Hanley, 2017). In so doing, such studies provide an evidence base for decision-makers, particularly concerning trade-off analysis or knowledge accumulation about the economic value of potential losses or impacts to ES (Atkinson and Mourato, 2008).

Despite a burgeoning literature on marine recreational value (Hynes et al., 2018), only two academic publications have been conducted on the recreational value pertaining to commercial whale watching. Both of these applied the travel cost method to estimate the CS of whale

watching (Hoagland and Meeks, 2000; Loomis, 2000), however, the studies also acknowledged the limitations of their approach as many whale watching tourists visit several destinations during a holiday, often with many purposes in mind. Ascribing the 'correct' proportion of travel costs to a whale watching trip, in addition to the price of a ticket, is challenging and likely to lead to arbitrary judgments on the part of researchers, and often overestimates of WTP (Loomis, 2000). Furthermore, a revealed preference technique such as the travel cost method does not necessarily generate an upper limit for WTP and thus CS, given that whale watchers may have been prepared to pay more than their travel costs for the experience.

2.3 Contingent valuation method

Stated preference techniques, such as the contingent valuation method, involve the surveying of a representative sample of whale watchers and the creation of a hypothetical market for their consideration and subsequent elicitation of WTP (Mitchell and Carson, 2013). Considered to be consistent with economic welfare theory (Boyle, 2003), the method has been applied in a wide variety of contexts to elicit WTP in relation to obtaining an ES, increased provisioning or quality improvements of an ES, and to prevent diminished provisioning and quality decline of ES (Brander and Koetse, 2011; Damigos et al., 2017; Loomis and Keske, 2009). In the context of this study, the approach seeks to elicit preferences and estimate the maximum WTP of survey participants for the good of commercial whale watching.

3. Case study description

Faxaflói Bay is a large bay located in the south-west of Iceland (Fig. 1). To the north is the popular tourist location of Snæfellsnes Peninsula. Iceland's capital city of Reykjavík is located on Faxaflói Bay's south-eastern shore. Reykjanes Peninsula is located on the southern shore of the Bay.

For many centuries, Faxaflói Bay's abundant fishing resources have provided important sustenance and income-generators for the people living on its coastline. In addition, a broad variety of wildlife is present in the Bay, including minke, humpback and fin whales (Bertulli et al. 2013), dolphins, harbour porpoises (Rasmussen and Miller, 2002), and puffins (Bertulli et al., 2016). Today, a broad array of economic activities continues to take place in Faxaflói Bay, including fishing, shipping, cruise ship tourism, sailing, whale watching and commercial whaling.

In line with five-fold growth in the number of tourists visiting Iceland between 2008 and 2018 (Icelandic Tourist Board, 2019), there has been a corresponding expansion in the volume of tourists going whale watching. Specific to Faxaflói Bay, the number of whale watchers has increased by more than ten-fold from 14,000 in 2001 to 148,442 in 2018, with peak volume in 2016 of 176,659 (Icelandic Tourist Board, 2019). Over 40% of all whale watchers in Iceland currently undertake trips in Faxaflói Bay, departing from the harbour in Reykjavík.

Approximately one-third of Faxaflói Bay is currently designated by the Icelandic Government as a whale sanctuary. As such, and in accordance with regulation 1035/2017, no commercial whaling is permitted in the area between Garðskagaviti in Reykjanes to the south and Skógarnes on Snæfellsnes Peninsula to the north (Government of Iceland, 2017).

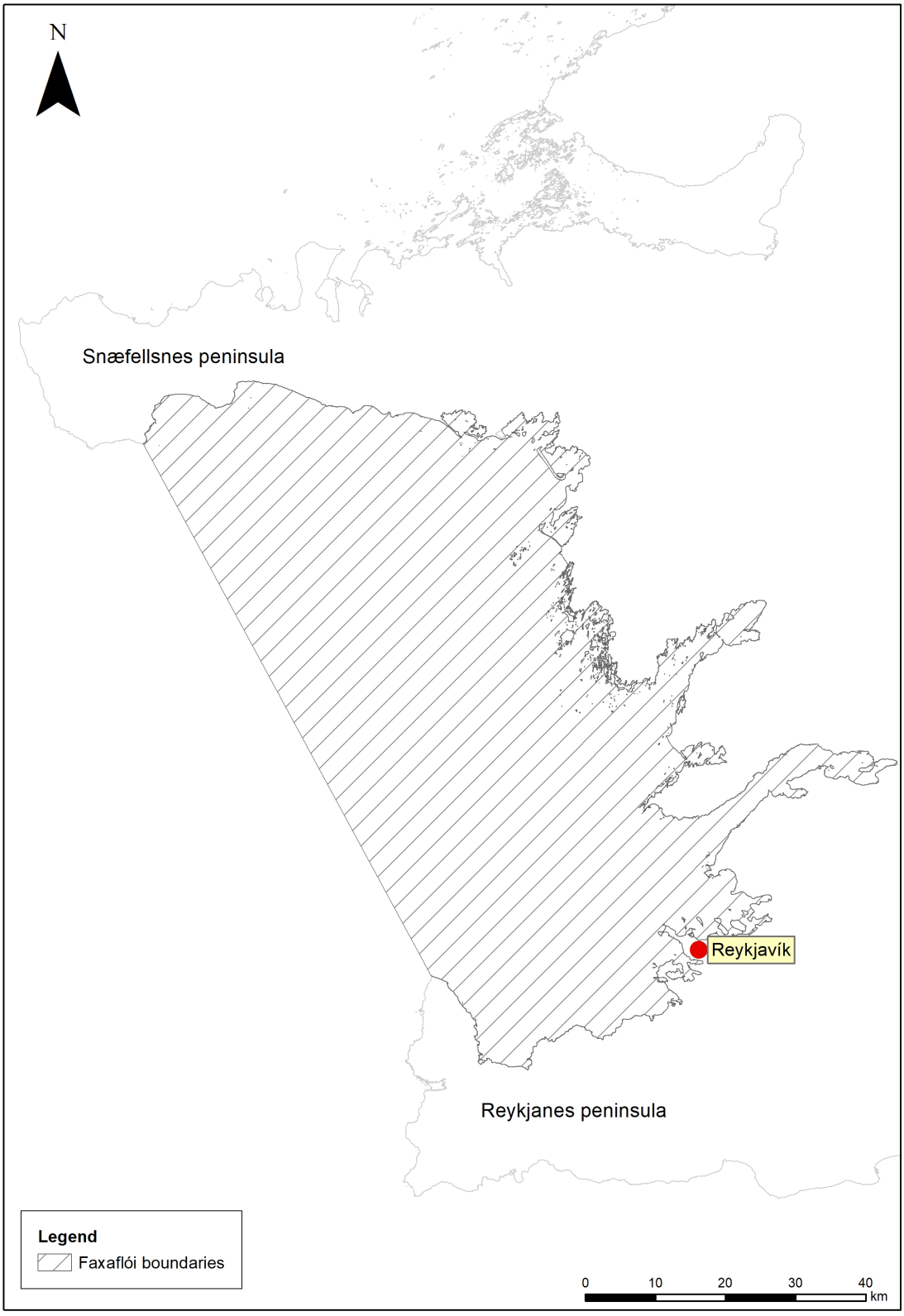

Fig. 1. Map of Faxaflói Bay, Iceland

4. Data and methods

4.1 Survey design and administration

There are a variety of different methods of administering contingent valuation surveys, although the two main approaches these days are via the internet and in-person interviews. Web-based surveys have become increasingly favoured by practitioners, especially in Iceland due to the fact that nearly everyone in the country has access to the internet (Cook et al., 2018; Einarsdóttir et al., 2019; Malinauskaite et al., 2020a). However, although higher response rates have been reported elsewhere (Lindhjem and Navrud, 2011), Icelandic contingent valuation studies to date have received a mean response rate of less than 45%. Given the additional factor of the international composition of whale watching tourists in Iceland, in-person interviews were the preferred method for this study, which offered survey participants with the opportunity to ask questions if they did not understand a question (Marta-Pedroso et al., 2007) and involved responses to the scenario question in the immediate aftermath of their whale watching experience.

The paper-based survey was short and designed to be completed in a maximum of five to ten minutes. However, it still followed a fairly customary approach, consisting of three sections and asking: (1) introductory questions about visitor behaviour, environmental attitudes and trip satisfaction; (2) trip specific issues and WTP for the hypothetical scenario; and (3) an array of socio-demographic questions. With regards to (1), survey participants were asked about when they booked their whale watching trip, the duration of their visit (if foreign), how often they had been whale watching in the last 5 years, whether they were a member of an environmental organisation, and opinions concerning Icelandic whaling practices. In relation to (2), participants were asked to state the company providing their trip, and asked questions about its duration, their satisfaction and the frequency with which they witnessed marine mammals on their trip. This then led into the scenario and WTP component of the survey. In part (3), the socio-demographic questions included number of children, educational attainment, employment status, gender, age, disposable income, marital status, and nationality.

A successful pilot study was conducted in Reykjavík Harbour during early May 2019. Although no problems were discovered with the survey itself, it was evident that maximising the number of responses required the survey to be completed whilst participants were returning from their whale watching experience, rather than dispersing in its aftermath. Following consultations with the whale watching companies, this arrangement was facilitated, and all surveys were either then completed on-board during return journey or immediately upon return to the harbour. Occasionally there were no whale sightings during trips. When this happened, participants were not surveyed. This was for two reasons: (1) the participants had not benefitted from the ES of recreational whale watching; and (2) it is standard practice in the whale watching industry in Iceland to offer tourists another trip at no additional cost should they not see whales on a previous outing. All surveys were completed in the period May to November 2019, which included 52 days of sampling. Over 95% of those asked refused to answer the survey. The full survey was conducted in English only and is available for download in the online supplement to this paper.

4.2 Scenario description and elicitation mode

In section (2) of the survey, participants were asked to state the cost of their individual ticket in Icelandic krona (ISK). For cases where group tickets had been purchased, the respondent was

required to state their share of the total costs. Participants were then asked the following question: *"Having now experienced the trip, how much extra would you have been prepared to pay for your ticket?".* In accordance with the findings of Ready et al. (2001) and advice of Navrud et al. (2008) in relation to undertaking contingent valuation through in-person interviews, a payment card format was provided in order to elicit WTP (CS). This type of format is likely to be one that was relatively familiar to respondents, given that consumers face fixed price decision-making every day, in comparison to an open-ended question (Navrud et al., 2008). Ready et al. (2001) also discovered greater certainty in stated preference responses using payment cards than the other commonly adopted elicitation format of double-bounded dichotomous choice.

As per the conclusions of Rowe (1996), responses to payment cards are insensitive to the payment card design as long as the range of values is sufficient to cover most potential WTP values. The payment card included value options at 500 ISK intervals, ranging from "zero ISK" up to "more than 10,000 ISK". Respondents could also select an "I don't know" option if they were unable or unwilling to decide on an amount. The upper point-value of 10,000 ISK equated to approximately the price of a typical whale watching ticket and was considered during pilot testing to be a plausible upper limit of the range of value options. A list of all payment values in ISK and equivalent amounts in euros and US dollars (based on average 2019 exchange rates) is provided in Table 1 below. The interviewer was also able to convert these amounts into other currencies if this was helpful to the participant.

Table 1. Payment card values.

Value in ISK	Equivalent in Euros	Equivalent in US Dollars
0	0	0
500	3.65	4.05
1,000	7.29	8.10
1,500	10.94	12.15
2,000	14.58	16.20
2,500	18.23	20.25
3,000	21.88	24.30
3,500	25.52	28.35
4,000	29.17	32.40
4,500	32.81	36.45
5,000	36.46	40.50
5,500	40.11	44.55
6,000	43.75	48.60
6,500	47.40	52.65
7,000	51.04	56.70
7,500	54.69	60.75
8,000	58.33	64.80
8,500	61.98	68.85
9,000	65.63	72.90
9,500	69.27	76.95
10,000	72.92	81.00

Participants stating "zero ISK" were asked a follow-up question to establish their reasoning. They had the opportunity to tick up to seven options, and additionally write an eighth reason for "other". Similarly, participants stating a positive amount for WTP were asked about their decision, with five options provided and an additional checkbox for "other" and a space to write

an explanation. The various reasons had been tested during the pilot study in May 2019, and no participant stated an opinion that was outside of the scope of the total of twelve statements provided.

4.3 Statistical model

The standard approach for payment card data is to treat each WTP response as occurring in an interval between the point-estimate and the next highest value in the list (Voltaire et al., 2019), and then utilise maximum likelihood estimation methods for the estimation of discrete and non-negative values (Navrud et al., 2008). Given the presence of intervals and dominance of censored data, ordinary linear regression models were inappropriate for calculating mean CS.

As per other contingent valuation studies to date in Iceland (Cook et al., 2018a, 2018b; Einarsdóttir et al., 2019; Malinauskaite et al., 2020a), interval regression was adopted, which is derived from the Tobit estimation method and relies on the assumption of normally distributed WTP in the payment card interval. The interval regression model is as follows:

$$y_i = x_i\beta + \varepsilon_i \quad (6)$$

Where:

y_i = the continuous, unobserved and underlying latent variable of WTP
x_i = the vector of predictor variables associated with respondents
β = the vector of coefficients on WTP to be evaluated
ε_i = a random error component of unobserved factors; $\varepsilon \sim N(0, \sigma^2)$

The maximum likelihood equations for the respective interval ranges are written as follows:

$$L_i(\mu|t) = P(\mu + \varepsilon_i > 10{,}000) \quad (7)$$
$$L_i(\mu|t) = P(t_2 - \mu > \varepsilon_i > t_1 - \mu) \quad (8)$$
$$L_i(\mu|t) = P(\mu + \varepsilon_i < 500) \quad (9)$$

Where:

L_i = the maximum likelihood of a WTP outcome
μ = mean WTP
ε_i = a random error component
t_1 = stated WTP on the payment card
t_2 = next highest WTP amount on the payment card
P = probability

Equation (7) relates to the non-truncated values for participants stating WTP of "more than 10,000 ISK". Equation (8) is specified in accordance with the approach of Hanemann (1984), whereby the upper bid values for ("more than 10,000 ISK") responses were not truncated, since stating this answer is not indicative of a maximum WTP but rather a lower bound. Equation (9) relates to stated cases of zero WTP, with true WTP occurring in the interval between zero and the lowest positive value on the payment card of 500 ISK.

Given that true WTP (y_i) for each participant lies somewhere in one of three ranges (equations 7-9) for $L_i \leq y_i \leq U_i$, where L_i and U_i represent the lower and upper limits of the interval,

the conditional WTP for each participant was predicted based on the expected payment, expressed by:

$$y_i = E(y_i | L_i < y_i < U_i) \quad (10)$$

Confidence intervals for mean and aggregate WTP were calculated based on the normal distribution given known variance of the population, as follows:

$$WTP - \frac{\frac{z\alpha\sigma}{2}}{\sqrt{n}} < \mu < WTP + \frac{\frac{z\alpha\sigma}{2}}{\sqrt{n}} \quad (11)$$

With regards to x_i in equation (6), the visitor, behavioural and socio-demographic variables in the interval regression model were coded as per Table 2.

Table 2. Predictor variables and coding.

Predictor variable	Explanation of coding
Socio-demographic variables	
Age	Age based on grouping as follows: (1) under 18; (2) 18-35; (3) 36-54; (4) 55-73); and (5) 74+.
Gender	A dummy variable, with 0 = male and 1 = female.
Education	A dummy variable, with 0 = no degree education and 1 = at least an undergraduate degree.
Nationality	A dummy variable, with 0 = non-European and 1 = European.
Participation in labour market	A dummy variable, with 0 = not actively participating in the job market at the time of the survey and 1 = active participant. Non-participation included students, the retired, sick or disabled, carers, people on maternity/paternity leave and the unemployed, while active participation included all employed and self-employed individuals, irrespective of whether this work was part-time or full time.
Disposable income	A dummy variable, with 0 = individual disposable income under 400,000 ISK and 1 = high individual disposable income of over 400,000 ISK (or equivalent amounts in participant's domestic currency).
Marital status/ cohabitation	A dummy variable, with 0 = not married or cohabiting with a partner and 1 = married or cohabiting.
Number of children	Metric variable based on the participant's number of dependent children aged under 18 years.
Behavioural and satisfaction variables	
Member of environmental organisation	A dummy variable, with 0 = never a member and 1 = a member at some point.

Prior trips	A dummy variable, with 0 = no whale watching trips undertaken in the last five years before the current one and 1 = at least one whale watching trip undertaken in the past five years.
Trip satisfaction	A dummy variable, with 0 = a response of either very dissatisfied, somewhat dissatisfied, slightly dissatisfied or neither dissatisfied nor satisfied in connection to the whale watching trip and 1 = a response of either slightly satisfied, somewhat satisfied or very satisfied.

All statistical analysis was conducted in December 2019 using Stata software (version 16).

5. Results

5.1 Attitudinal, behavioural and satisfaction responses

A total of 163 completed survey responses were attained in the period May to November 2019. Of these, an equal number (55, 33.74%) had booked their whale watching trip either at home and before booking their trip to Iceland, or after arriving in Iceland. The former group could be construed to be more motivated to undertake whale watching than the latter. A further 48 respondents (29.45%) booked their whale watching trip at home after arranging their trip to Iceland. Out of the 163 responses, 97 (59.50%) were female and the estimated average age was 45 years.

Survey participants belonged to a broad variety of nationalities, with 28 different types. In line with general patterns in Icelandic tourism, the most common tourists were from the US (25.77%), UK (20.25%) and Germany (13.50%) (Icelandic Tourist Board, 2020). Only one whale watcher was Icelandic.

The reported length of stay of participants in Reykjavík varied considerably across the sample. The mean duration was 5.45 days, with a standard deviation of 5.04 days and the range across the sample was from 1 to 30 days.

The sample's mean number of whale watching trips undertaken over the past five years was 0.64, with a standard deviation of 1.59[2]. The mode number of trips was zero, with 116 respondents (71.17%) providing this answer, meaning that most respondents were going on their first whale watching trip.

Concerning Iceland's hunting of minke and fin whales, there was a strong consensus among the survey participants. A total of 121 respondents (74.23%) asserted that whaling should be illegal in all Icelandic waters. A further 14 participants (8.59%) opined that Iceland should be able to practice whaling if it is sustainable. A total of 13 respondents (7.98%) stated that whaling should be illegal in Iceland waters where people enjoy whale watching. Only 3 participants (1.84%) voiced an opinion in favour of Icelandic whaling. None of these three individuals later reported any CS.

With regards to customer satisfaction, participant responses to a seven-point Likert scale are set out in Table 3. Overall, most of the sample were happy with their whale watching experience,

[2] These statistics excluded three outliers, participants who stated that they had been on approximately 100 to 300 trips in this time period.

with 126 respondents (77.30%) stating that they were either slightly, somewhat or very satisfied. Only 26 participants (15.95%) voiced any dissatisfaction with their trip. The mean level of customer satisfaction was 5.31, between slightly and somewhat satisfied, and the standard deviation was 2.29.

Table 3. Customer satisfaction concerning the whale watching experience.

	1 (very dissatisfied)	2 (somewhat dissatisfied)	3 (slightly dissatisfied)	4 (neither satisfied nor dissatisfied)	5 (slightly satisfied)	6 (somewhat satisfied)	7 (very satisfied)
Number	1	11	14	11	37	49	40
Percentage	0.61	6.75	8.59	6.75	22.70	30.06	24.54

In response to the question about marine mammal sightings on trips, the most common answer was 4-6 observations, reported by 59 survey respondents (36.20%). A further 39 respondents (23.93%) stated that they had witnessed marine mammals on 7-9 occasions, whilst 28 participants (17.18%) contended that they had seen 1-3 observations. A total of 20 respondents (12.27%) claimed to have seen 10 or more marine mammals during their trip.

5.2 Sample statistics and regression model outcomes

When asked how much extra survey participants would have been prepared to pay for their ticket, only 30 of the 163 respondents (18.40%) provided a positive value. They were asked to explain their reasoning from a list of five options, plus a free form response to 'other'. The most common response by 21 respondents (70.00% of the sub-sample) was that they had enjoyed the coastal and mountainous scenery available in Faxaflói Bay. Additionally, 13 participants (43.33% of the sub-sample) claimed they would have paid more because the tour had provided new educational insights. Only one survey respondent stated that he/she would have paid more due to their trip being under-priced.

The 133 respondents (81.60%) stating that they had zero CS were asked to provide their reasoning, and they could select as many answers as they wanted from a list of seven options, as well as providing an additional explanation in response to 'other'[3]. The most frequent contention by 64 participants (48.12% of the sub-sample) was that the tour was not worth any more money. In addition, 37 participants (27.81% of the sub-sample) claimed that budgetary restrictions prevented them being able to pay more for the trip. There appeared to be little connection between the degree of customer satisfaction and the expression that the whale watching tour was not worth more money. Of the 64 persons stating this view, 50 (78.13%) had stated that they had been either slightly, somewhat or very satisfied with their trip. Moreover, of the 69 participants who had zero CS but had not stated that the whale watching tour was not worth any more money, 52 (75.36%) had been either slightly, somewhat or very satisfied with their adventure. The cross-tabulation of customer satisfaction with WTP revealed that 4 of the 26 dissatisfied participants still reported CS. All four of these respondents had stated that they were 'slightly dissatisfied' with their experience. In contrast, 11 of the 30 participants (36.67%)

[3] One of these responses and the option of 'other' sought to identify 'protest voters' who were potentially concealing their true preferences and WTP, particularly due to the immediacy of an emotional response after the tour. This response related to whether they found the tour especially disappointing and failed to meet their expectations. However, no participants specified this as their reason for not having WTP. The zero rate of protest voters is thus much lower than is typically reported in many contingent valuation studies e.g. Carson (1991) reported a typical rate of 20 to 40%. However, this survey differed from traditional contingent valuation studies in that it asked participants for WTP after they had experienced the good, not a priori. In addition, the payment vehicle of an increase in ticket price was likely to be much more incentive compatible than a tax, a payment vehicle that commonly leads to very high levels of protest (see Cook et al., 2018a).

who declared themselves to be 'very satisfied' later reported CS, which was approximately double the percentage of the overall sample affirming CS.

With respect to belonging to an environmental organisation, the majority of the sample (133, 81.60%) confirmed that they had never been a member. In a subsequent cross-tabulation, of the 30 survey participants who stated that they had been a member, only 7 (23.33%) had been willing to pay more than the ticket price for their whale watching experience. This was identical to the overall number and percentage of participants with CS.

Table 4 details the main descriptive statistics pertaining to the predictor variables of the regression model. Mean outcomes with standard deviations in parentheses are provided for each predictor variable. These are grouped according to whether participants had positive or zero CS.

Table 4. Summary of predictor variables in regression model.

Predictor variables	Positive CS (n = 30)	Zero CS (n = 133)
Socio-demographic variables		
Age (years)	45 (0.16)	45 (0.61)
Gender	67% female (0.88)	58% female (0.43)
Education	0.80 (0.74)	0.57 (0.43)
Nationality	0.57 (0.92)	0.68 (0.41)
Participation in labour market	0.80 (0.74)	0.68 (0.41)
Disposable income	0.27 (0.82)	0.17 (0.32)
Marital status/ cohabitation	0.70 (0.85)	0.62 (0.42)
Number of children	0.10 (0.05)	0.42 (0.66)
Behavioural and satisfaction variables		
Member of environmental organisation	0.23 (0.78)	0.17 (0.33)
Prior trips	0.27 (0.82)	0.29 (0.39)
Trip satisfaction	0.80 (0.74)	0.77 (0.37)

Although the size of the sub-sample with positive CS is very small and thus the outcomes of the descriptive statistics should be treated with caution, a few differences can be distinguished in comparison to the sub-sample with zero CS. A much lower proportion of the respondents with positive CS had dependent children, by a margin of 32% compared to those who had zero CS. This group was more likely to be educated to degree level, by a margin of 23%, and 10% more of this sub-sample fell into the high disposable income category. The latter outcome may, at least in part, relate to employment status, since 12% more of the sub-sample with positive CS claimed to be active members of the workforce. This group were also less likely to be European, by a margin of 11%, and mainly heralded from the US.

Table 5 outlines the outcomes from the interval regression model, with standard errors in parentheses.

Table 5. Regression model results.

Predictor variables	Coefficient (Standard Error)
Socio-demographic	
Age (group)	0.411 (0.312)
Gender	0.312 (0.467)

Education	1.170 (0.545)**
Nationality	-0.084 (0.504)
Participation in labour market	0.710 (0.547)
Disposable income	0.515 (0.548)
Marital status/ cohabitation	0.379 (0.488)
Number of children	-1.444 (0.550)***
Behavioural and satisfaction	
Member of environmental organisation	0.385 (0.553)
Prior trips	-0.309 (0.516)
Trip satisfaction	-0.137 (0.577)
Constant	-3.907 (1.368)***
N	163
Log-likelihood	-67.227
LR Chi^2	21.200
Prob. > Chi^2	0.031
Pseudo R^2	0.136

Only two socio-demographic variables were found to be statistically significant determinants of CS. These were education (5% level) and number of children (1%). Possessing at least a degree level of education increased the likelihood of having positive CS, whereas a higher number of children decreased the probability. None of the behavioural and satisfaction variables were found to be statistically significant determinants. Economic theory and past empirical evidence often suggest that income has a positive effect on WTP estimates (Bishop and Boyle, 2017). However, this was not the case in this study nor other recent contingent valuation studies in Iceland, including those of Cook et al. (2018b) and Malinauskaite et al. (2020a).

5.3 Consumer surplus and total willingness to pay

Table 6 set out the mean CS, standard error and 95% confidence interval pertaining to the sample of 163 observations. In addition, mean outcomes are scaled up to (a) the total number of whale watching tourists in Faxaflói Bay in 2018, and (b) the total number of whale watching tourists in Iceland in 2018. Part (b) is undertaken on the basis that whale watching is a relatively homogenous product, unlikely to vary significantly from one Icelandic location to another, and it is also interesting to gain a ballpark approximation of the scale of the CS associated with this segment of the national tourism sector. IceWhale (2019) reports that there were 148,882 tourists going whale watching in Faxaflói Bay in 2018, whilst the Icelandic Tourist Board states that 345,000 people undertook the experience across the nation in the same year (Icelandic Tourist Board, 2019).

Table 6. Mean and aggregate CS outcomes – Faxaflói Bay and Iceland

Mean (ISK)	**Standard Error (ISK)**	**95% Confidence Interval (ISK)**		**Total CS – Faxaflói Bay (million ISK)**	**Total CS – Iceland (million ISK)**
768	1,741	499	1,038	114.0	264.9

Mean CS is 768 ISK (approximately € 5.60 / USD 6.22) which, when scaled up to the number of whale watching tourists, amounts to 114.0 and 264.9 million ISK for Faxaflói Bay and Iceland, respectively. The former value for Faxaflói Bay is equivalent to around € 832,000 / USD 923,400; the latter is approximately € 1.93 million euros / USD 2.15 million.

Mean CS is undoubtedly low; however, it is evident from the scale of the industry in Faxaflói Bay and Iceland as a whole that considerable CS is extracted from the whale watching industry in aggregate. It is thus also important to consider total WTP, inclusive of CS, and for these values to be upscaled to the industry in Faxaflói Bay and the nation. This is outlined in Table 7, together with the standard error and 95% confidence intervals. Mean total WTP is the aggregation of the mean ticket price of 11,164 ISK (approximately € 81.41 / USD 90.43) and mean CS of 768 ISK (approximately € 5.60 / USD 6.22).

Table 7. Total WTP.

Mean total WTP (ISK)	Standard Error (ISK)	95% Confidence Interval (ISK)		Total WTP – Faxaflói Bay (billion ISK)	Total WTP – Iceland (billion ISK)
11,932	3,034	11,462	12,401	1.771	4.116

Including mean CS, the approximate total WTP of the whale watching industry in Faxaflói Bay is 1.771 billion ISK, which is around € 12.9 million and USD 14.35 million. Using the mean total WTP for whale watching in Faxaflói Bay as a proxy for Icelandic whale watching as a whole, the total WTP is 4.1 billion ISK, around € 29.9 million and USD 33.2 million. The aggregate figures equate to estimated values for gross turnover from whale watching trips plus CS in Faxaflói Bay and Iceland, respectively.

The difference between the estimated values for gross turnover from whale watching trips and total WTP quoted in Table 6 amount to the aggregate values for CS articulated in Table 5. As a proportion of the total WTP values stated in Table 6, aggregate CS is very small, just 6.44%.

6. Discussion

6.1 Practical and decision-making implications of study outcomes

A mean CS of less than 6 euros, combined with zero CS for 81.60% of the sample, suggests that consumers benefit from few marginal gains from whale watching in Faxaflói Bay. Given generally positive levels of satisfaction with the whale watching experience, the results might imply that ticket prices are currently set close to the maximum level at which consumers will purchase a trip and still report enjoyment of whale watching. From the perspective of the whale watching company, the results suggest that there are few, if any, opportunities to transfer CS into additional producer surplus through the raising of prices. It might be the case that some consumers are being priced out of whale watching. Although, as far as the authors are aware, no studies have been conducted examining the price elasticity of demand in relation to whale watching, it may be of interest for whale watching companies to study the likely impact of lowering prices in order to increase their revenue-generating capacities, in so doing also increasing CS from this market.

The results of this study should be of interest to a broad array of decision- and policy-makers in the arena of marine spatial planning. The total estimated value of the industry in Faxaflói Bay, including aggregate CS, was 1.771 billion ISK, which, although a ballpark figure, is still of considerable magnitude. As such, the planning or expansion of any marine activity in Faxaflói Bay, especially economic such as cruise ship industry expansion, should bear in mind

any knock-on effects to whale watching. The outcomes and their scale are of potential relevance to decision-support tools, such as cost-benefit analysis, which are focused on determining the welfare gains or losses of economic ventures. The scale of the results can also be used as a general informative to marine spatial planning, particularly concerning the merits of marine protected areas in Faxaflói Bay.

Currently around one-third of Faxaflói Bay is designated as a whale sanctuary, an area where commercial whaling is banned and, in effect, whale watching is prioritised as an important economic activity. A recent contingent valuation survey by Malinauskaite et al. (2020a) estimated the WTP of Icelanders to expand the sanctuary to the full extent of Faxaflói Bay. Based on a final sample of 320 respondents, 29.7% of Icelanders were willing to pay a mean additional lump-sum tax of 5,082 ISK for the expansion. In response to attitudinal questions on whaling, 36.84% of Icelanders had been against this activity. The study acknowledged, however, that the perspective of Icelanders was only one informative to marine spatial planning, and more data was required concerning the perspectives of other stakeholders. Until the studies of Malinauskaite (2020a) and Lissner & Mayer (2020), whale watchers have been an understudied stakeholder in Faxaflói Bay. The attitudinal data in this study suggests that tourists are considerably more anti-whaling than Icelanders, with 74.23% asserting that whaling should be illegal in all Icelandic waters. On this basis, the results might be suggestive of a tourist preference to expand the size of the sanctuary to the full extent of Faxaflói Bay or even beyond. Most empirical studies have determined that whaling and whale watching are perceived as being either incompatible activities or the former has a severely detrimental impact on the latter (Hoyt, 2002; Kuo et al., 2012). This was also the finding of the survey-based study by Bertulli et al. (2016) focused on Faxaflói Bay, which found that most tourists did not think whaling and whale watching could exist side by side, a finding which again has potential marine spatial planning implications with regards to the size and scope of the Faxaflói Bay whale sanctuary.

Another recent study by Lissner & Mayer (2020) estimated WTP for sustainable boating ecolabels linked to whale watching in Faxaflói Bay. Based on a survey of 337 whale watchers, the authors found that 60% of the sample would prefer to go on an eco-labelled tour. Almost two-thirds of the sample stated that they would have been willing to pay more, up to an average premium of 20%. Based on the average ticket price estimated in this paper of 11,164 ISK, this would equate to a mark-up of 2,233 ISK, approximately three times more than the mean CS in this study of 768 ISK. However, Lissner & Mayer (2020) concluded that environmental issues were of low importance to whale watchers when choosing their operator and that ecolabels would likely only influence preferences in a limited market segment. There are perhaps some parallels in that sense with this study, whereby the quality of the whale watching experience was found to be a statistically insignificant determinant of whether the watcher stated non-zero CS.

The results of this study provide information about the economic value of one ecosystem service linked to whales, recreational tourism, viewed from a consumer perspective. Recent research suggests that whales provide many different ecosystem services, including multiple provisioning, regulating and maintenance, and cultural benefits (from whaling and whale watching) to human well-being (Roman et al., 2014; Cook et al., 2020; Malinauskaite et al., 2020b). These are likely relevant to whales in the context of Faxaflói Bay and, though lightly studied, may be of considerable value to the well-being of Icelanders and non-Icelanders alike. There is merit, therefore, to conducting both economic and non-monetary studies concerning the ecosystem services of whales, in Faxaflói Bay and elsewhere, particularly on aspects such as their carbon sequestration potential, whale watching and pure existence value.

Another issue of relevance to decision-making is the potential for trade-offs because of expanded whale watching in Faxaflói Bay. The results of this study could be used to substantiate an argument for further expansion of this activity, especially given the trip satisfaction data and economic scale of the industry. However, caution should be applied. The studies by Higby et al. (2012) and Christiansen et al. (2013) reported the disruption of feeding activities of minke whales in Faxaflói Bay due to whale-watching boat interactions and vessel noise, including reduced foraging activity and less likelihood of witnessing surface feeding events, thus reducing the quality of the whale watching experience. These descriptions have been echoed elsewhere in popular whale watching locations. Sitar et al. (2016) found in Bocas Del Toro that failure to follow national guidelines for whale watching, including surrounding marine mammals with more than 15 boats, presented a long-term threat to populations. There is thus the potential for the negative externalities of whale watching to undermine the long-term viability of the industry (Higham et al., 2016). Arguments have been put forth in the academic literature that the externalities of nature-based tourism provide a justification for the imposition of higher prices to cover these 'costs' and reduce the quantity of trips demanded (Navrud and Vondolia, 2005). This approach would further diminish scarce CS in the case of whale watching in Faxaflói Bay, but might still prove economically advantageous to whale watching companies if demand for the good was price inelastic. If this was the case, there could be an economic argument for expanding the size of the whale sanctuary in Faxaflói Bay, or perhaps a more nuanced approach to marine spatial planning could be adopted whereby parts of the sanctuary are closed for just whale watching rather than the array of economic and leisure activities permitted currently.

6.2 Comparison of outcomes to other studies

As the introduction to this paper set out, the results of this study should to some extent be considered in isolation given the lack of other evaluations focused on the recreational value of whale watching, especially the marginal gains of the experience from the perspective of the consumer. Perhaps the most comparable study in terms of estimating CS, albeit reliant on the travel cost rather than contingent valuation method, was the work of Loomis et al. (2000). Focused on whale watching in California, this study estimated mean CS for single purpose trips of US$ 9.89, equivalent to around US$ 14.77 in 2019 prices, or 1,800 ISK. The mean CS value reported by Loomis et al. (2000) is thus 2.3 times greater than this study's result. However, the results should also be considered in the light of the high price level for locals and tourists alike in Iceland and diversity of available nature-based tourist experiences. In this study, a sizeable proportion of survey respondents with zero CS (27.81%) reported that they may have been willing to pay more if their budgets were not constrained by all other costs on their trip.

Other studies with a broadly similar focus are significantly less comparable, but still worthy of a brief mention. Schwoerer et al.'s (2016) publication on the economic rent of whale watching in Baja, Mexico found that grey whales generated a net benefit of approximately US$ 260,000 per annum for local communities across a three-month whale watching season. Akin to this study, the results were interpreted in terms of their value to decision-makers and the interests of various stakeholders linked to the whale resource. The study by Brenner et al. (2016) conducted a visitor spending survey and determined gross turnover of just under US$ 3 million linked to whale watching in the El Vizcaino Biosphere Reserve, Mexico. Mitra et al.'s (2019) work investigated the determinants of expenditure on whale watching trips in Hervey Bay, Australia. Statistically significant results included the influence of income and origin, as well as trip-related and psychographic characteristics. None of these predictor variables were found

to be statistically significant determinants of CS in this study, however, in contrast, education and number of children were identified as being significant.

6.3 Study limitations and biases

This study was based on a relatively small sample of 163 observations. This was sufficient to provide considerable indicative evidence concerning the marginal gains of consumers from whale watching in Faxaflói Bay, but was likely too small a sample size to determine many statistically significant predictor variables. A larger study on Faxaflói Bay, optimally resourced and with a sample size of several hundred participants, might resolve this shortcoming. In addition, the use of many dummy variables may have been too simplistic, resulting in few statistically significant socio-demographic determinants.

Several biases may also have impacted the results of this study, in ways that are difficult to determine. These include hypothetical and informational effects, which have been commonly reported in the contingent valuation literature (Bergstrom et al., 1989; Ajzen et al., 2004; Lee et al., 2010). Asking survey participants about their WTP immediately after rather than before whale watching was motivated by the advantages of experiential knowledge from the trip, however, this may have increased the perception that the WTP elicitation was implausible or unlikely, all the more so if the respondent viewed their trip as a one-off experience. Additionally, informational issues may have affected the results of the study, including how the survey was communicated by the interviewer and the variety of monetary values presented on the payment card. Although the authors sought to include as many monetary values as possible, without presenting an overwhelming list, two survey participants still chose the option of more than 10,000 ISK, suggesting that perhaps the range was not quite broad enough. Finally, the in-person act of asking survey participants their WTP may have biased the results due to so-called 'yea-saying', whereby responses provide the answers they perceive are expected of them rather than a true response.

Finally, this study was based on data collected in 2019. The economic value of the Icelandic whale watching industry will fall considerably in 2020 due to the travel limitations imposed by the COVID-19 crisis. Whale watching operations are currently suspended throughout Iceland and almost no tourists can visit the country. Recreational whale watching is a co-produced ecosystem service involving overlap between human and ecological systems, leading to the generation of monetary benefits for producers and consumers alike (Malinauskaite et al., 2020b). The near-certain decline in the economic value of whale watching in Iceland during 2020 reinforces the importance of always evaluating the outcomes of any static monetary valuation study of ecosystem services according to its temporal context, recognising the potential for a multitude of human, societal and environmental factors to affect its results in the future.

7. Conclusion

This study applied the contingent valuation method to estimate mean CS and the total annual recreational value of whale watching in Faxaflói Bay, Iceland, a growth area for the industry in recent years. Based on a sample of 163 observations, mean CS was estimated to be 768 ISK (€ 5.60 / USD 6.22) and the annual economic value of the industry in Faxaflói Bay, including CS, was 1.771 billion ISK (€ 12.91 million / USD 14.35 million). Although mean CS is relatively low, its addition to ticket-related expenditure gives an insight into the economic value of the

whale watching industry in Iceland from the perspective of the consumer. The results provide decision- and policy-makers with valuable insights from the tourist stakeholder perspective concerning a location where multiple economic and leisure activities occur, often concurrently. In addition, the macro-economic impact of the whale watching industry is likely to be much larger than estimated in this study, since it will include trip-related expenditure in the Reykjavík area, job-related earnings and multiplier effects.

Several possible future research avenues emerge from this study. Firstly, globally, there are few studies in the economic literature concerning the economic value of commercial whale watching, especially from the perspective of the marginal gains of consumers. More studies are advocated given the growth of the industry all around the world in recent decades. Secondly, more nuanced economic valuation studies would be useful. These could perhaps explore the price elasticity of demand of whale watching or involve more complicated non-market valuation techniques involving scenarios. The latter could include discrete choice experiments focused on different marine spatial planning permutations involving the management of whale resources, for instance the scope and size of whale sanctuaries. Thirdly, the academic literature has a lack of non-monetary valuation studies in the context of whale ES, particularly about the more intangible benefits to human well-being. Although revealing the extent of ES values using economic information is helpful when exchange values can be determined, in other contexts, such as subsistence economies reliant on provisioned resources from whales, non-monetary valuation techniques will probably provide more relevant stakeholder information for decision-makers.

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