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# WHALE WATCHING IN NORTHERN PERU: AN ECONOMIC BOOM?

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Whale-watching tourism is growing rapidly worldwide. Currently, it occurs in more than 119 countries and is estimated to produce more than US$2.5 billion in annual revenue. In northern Peru, this industry is relatively new, and the economic impact generated from whale watching remains unknown. This study was designed to provide an assessment of the economic impact of whale-watching activity in northern Peru. In this area the activity is focused on humpback whales (*Megaptera novaeangliae*). In 2018, we conducted surveys to 199 whale-watch tourists and six tour companies to estimate the economic impact of the activity. Our results indicate that whale watching of humpback whales is currently worth an estimate of US$3 million annually as a tourist attraction, an economic input that did not exist in the region 10 years ago. This activity has a significant potential for further growth; however, there is an urgent need for guidelines and regulations to ensure a sustainable and well-managed whale-watch tourism industry.

**Key words: Economic impact; Humpback whales; Expenditures; Tourism industry; Sustainability**

## Introduction

Whale watching, defined as any commercial enterprise that provides for the public to see whales and dolphins in their natural habitat (International Whaling Commission [IWC], 1994), is a nonextractive, low-impact use of marine ecosystem components (Pacheco, Silva, & Alcorta, 2011) and is one of the fastest growing ecotourism activities in the world (Castro, Kaufman, & Hamilton, 2015; Corkeron, 2004). The whale-watching industry is an important economic activity in many coastal areas around the world, with an estimated 13 million people going on whale-watching excursions in 119 countries just in 2008 (New et al., 2015; O'Connor, Campbell, Cortez, & Knowles, 2009). The industry is

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estimated to employ around 19,000 people and to have annual profits of US$2.5 billion (Cisneros-Montemayor, Sumaila, Kaschner, & Pauly, 2010).

In developing countries where artisanal fisheries are jeopardized or in decline, whale watching may serve as a viable alternative economic activity (Castro et al., 2015; Cisneros-Montemayor & Sumaila, 2010; Pacheco et al., 2011; Schwoerer, Knowler, & García-Martínez, 2016). In Australia, for example, Stoeckl, Smith, Newsome, and Lee (2005) found that dolphin-watch tourism contributes between 5% and 11% of the total regional income in Gayscone, West Australia, and that whale watching appears to contribute between 2% and 4% of Hervey Bay's, Queensland, total regional income. In the west coast of Scotland whale watching had an estimated economic impact of US$8 million in 2015 and serves as a reliable source of employment and revenue for the local economy (Ryan et al., 2018).

The humpback whales (*Megaptera novaeangliae*) inhabiting the Southeast Pacific region migrate ca. 8,000 km during the austral winter/spring between Antarctic and Magallanic feeding grounds to the breeding region in neritic waters from the northern coast of Peru to Costa Rica (Acevedo, Aguayo-Lobo et al., 2017; Acevedo, Rasmussen et al., 2007). Whale-watching activities take place during the whale's breeding season, which occurs between July and October (Guidino et al., 2014). In Latin America, in recent years, whale-watching tourism has grown at rates three times faster than the entire tourism industry (Hoyt & Iñiguez, 2008).

Whale-watching focus on the humpback whale population began in northern Peru in 2008 and attracts tourists coming mainly from Peru (58%) followed by people from other countries from South America (22%) and Europe (18.3%) (Garcia-Cegarra & Pacheco, 2017; Pacheco et al., 2011). Apart from humpback whales, 11 other cetaceans species have been observed in the region, including fin whale (*Balaenoptera physalus*), an unidentified beaked whale (most likely *Ziphius* or *Mesoplodon* spp.), dusky dolphin, pantropical spotted dolphin (*Stenella attenuata*), bottlenose dolphin, Bryde's whale (*Balaenoptera brydei*), blue whale (*Balaenoptera musculus*), common dolphins (*Delphinus sp.*), Risso's dolphin (*Grampus griseus*), short-finned pilot whale (*Globicephala macrorhynchus*), and killer whale (*Orcinus orca*) (Pacheco et al., 2019). Such cetacean's species richness may encourage further whale watching outside of the main humpback whale season. Whale watching with the same humpback whale population is also developed in Ecuador (Castro et al., 2015) and in Colombia (Zapetis, Samuelson, Botero Acosta, & Kuczaj, 2017).

While economic growth in the form of whale watch may be desirable for tour operators and coastal communities, it could also negatively impact the biology, ecology, and reproduction of the species if too many boats are operating in a localized area (Di Clemente et al., 2018; Fernandes & Rossi-Santos, 2018; Garcia-Cegarra, Villagra, Gallardo, & Pacheco, 2019). Hence, it is desirable to balance profits with responsible management of the activity to minimize species' impacts. To work towards a better understanding of this balance, herein we aimed to assess the economic impact of the current whale-watching activity in northern Peru. To do this we used questionnaires with tour operators and tourists. Questionnaires of this kind have been shown to be effective tools to study whale-watching economics (e.g., O'Connor et al., 2009; Ryan et al., 2018; Wakamatsu, Shin, Wilson, & Managi, 2018).

## Methods

Two types of surveys were designed; one was administered to tour operators and the second survey was applied to whale-watching tourists. Surveys were conducted at Los Organos (4°10'38.23"S, 81°82'74.83"W) and Punta Sal (3°58'37.68"S, 80°58'32.72"W) communities in northern Peru (Fig. 1), from August 1 to the October 30, 2018. The northern region of Peru is a transitional zone made by the convergence between the cold, nutrient-rich Humboldt Current, which flows northward, and the warm, less productive Equatorial Countercurrent (Guidino et al., 2014; Ibanez-Erquiaga, Pacheco, Rivadeneira, & Tejada, 2018). Los Organos and Punta Sal are two touristic and fishing towns where whale watching has seen a robust growth in the past 6 to 9 years. Whale-watching tours focus on humpback whales and common dolphins, but there are also opportunistic sightings of other species (e.g., Bryde's whales).

Survey development and design was based upon Stoeckl et al. (2005) for the economics component

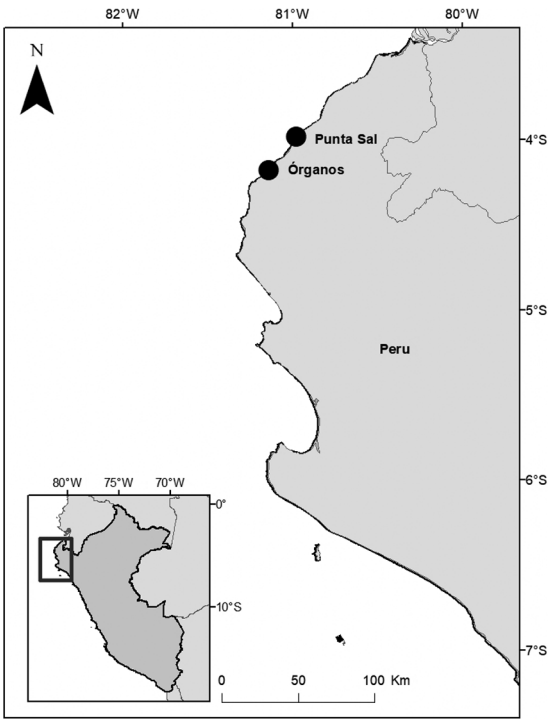


*Figure 1* Study area; surveys were performed in northern Peru, in Los and Punta Sal.

and Alfaro-Shigueto et al. (2010) for the social, demographic, and education sections.

*Direct Expenses*

To evaluate the economic input of whale watching to the local community, we calculated direct expenditures (DE) (O'Connor et al., 2009). We considered DE (i.e., the direct cost of going whale watching) as 100% of the ticket price multiplied by the total number of whale watchers purchasing tickets. This information was gathered from the surveys applied to the tour operators. These surveys were designed to assess the tour operator's ticket price, number of boats, number of employees, and the total number of people taken on whale-watching tours. Ticket price was separated into adult and child tickets, and the relevant price was applied depending on the operator. The total DE was the number of tourists each operator had during the 2018 tourist season (July to October) multiplied by the ticket price.

*Indirect Expenses*

Indirect expenditures (IE) are expenses attributed to the tourists participating in whale watching. This constitutes expenses during their trip to northern Peru. To determine IE, we administered surveys to the tourists. To avoid overestimation of IE, we conducted surveys to one representative per group who answered for the entire group. If a person was traveling by themselves, they filled out a survey for their individual expenses.

Respondents were asked to indicate the approximate amount spent in the national currency, Peruvian soles (PEN), per day on different categories of goods. When estimating the expenditure, we used the midpoint of each expenditure category from surveys (e.g., S/0.75 for the range S/0.51–S/0.100; S/0.150 for the range S/0.101–S/0.200, etc.), except from the final category that we used the lowest amount (e.g., S/0.300) (Stoeckl et al., 2005).

To estimate the IE, we focused on tourists who traveled to the area mainly for whale watching. We called this type of tourist an "Icon Tourist" (IT) (Stoeckl et al., 2005). IT are the subgroup of respondents that indicated that whale watching was the main or one of the main reasons for their trip. This was done to avoid overestimation of IE, as not all tourist expenditures in the region were attributable to whale watching (Stoeckl et al., 2005). The total economic input is the sum of DE and IE.

Questionnaires were printed out on paper and provided to tourists to complete after their whale-watching tour. Surveys were initiated by the data collectors specifying the purpose of the survey (i.e., research purposes) and the confidential nature of all responses. Tourists filled out the surveys anonymously in a private area. The survey (Supplemental 1) had 12 closed-ended questions and was organized into four parts: Part I—sociodemographic characteristics, Part II—the purpose for visiting the area, Part III—estimated expense, and Part IV-education level. Surveys were available in Spanish and English. Surveys were conducted by five trained local scientists (either authors or acknowledged), all with previous survey experience.

Official numbers for the years 2017 to 2019 of tourists traveling to the area and entering the pier where the boats pick up the tourists were provided by FONDEPES (Fondo Nacional de Desarrollo

Pesquero, National Fund of Fisheries Development), the government authority present at the Los Organos pier.

*Data Analysis*

The average of the expenses (all values are presented in US dollars) from the IT were used to determine the daily expenses of one tourist. This allowed us to generate the total IE using the following equation:

$$IE = N_{IT} \times \text{average daily expenditure}$$

To assess the relationships between the survey categories, a multiple correspondence analysis (MCA) was performed. MCA analysis allows for the identification and visualization of associations between categories and levels thereof in a biplot. MCA was performed using the following categories: reasons for traveling to northern Peru (four levels: main reason; one of the main reasons; don't care; and it was not important), education level (three levels: postgraduate; higher level University; basic technical or high school), and residency status (foreigners, Peruvians coming from Lima, and outside of Lima). In this MCA, the significance of the ordinations was tested using a chi-square statistic. A Kruskal–Wallis test was used to determine significant differences between the expenses of tourists with different residence status. Kruskal–Wallis and multiple correspondence analyses were run using the software IBM Statistical Package for Social Sciences (SPSS) v.15.0.

## Results

We interviewed representatives of 6 of 13 whale-watching companies that operate in northern Peru. Two-hundred and fifty tourists participated in the study; 199 fully completed the questionnaire while 51 did not complete it in full (response rate of 79.6%), accounting for a total of 743 responses. Of these, 83% ($n = 620$) were considered IT and were used for the IE calculations.

*Sociodemographic Characteristics of Whale-Watching Participants*

Of the 199 respondents who completed the survey, most were Peruvians (78%) while 22% were foreigners (Table 1). Peruvians came from many regions and provinces ($n = 10$ regions) of the country but mainly from the capital, Lima (81%). Most foreigners came from Europe (62%) and other countries of South America (26%). Peruvians typically traveled in small groups of up to two people (56%) while foreigners traveled in larger groups, from three to five persons (83%). Group size ranged from 1 to 18 people (mean $2.7 \pm SD$ 2.5), and participants ranged in age from 20 to 68 years (mean $37 \pm 11$). Fifty-three percent of the participants had postgraduate education.

Multiple correspondence analysis (Fig. 2) shows that the majority of Peruvian tourists that came from out of Lima (OOL) with low levels of education and those that came from Lima had whale watching as their primary reason for traveling to northern Peru. There was also a statistically significant association indicating that visitors from Lima, whose main reason for travel was a whale watch, had higher levels of education (university and postgraduate) (Kruskal–Wallis $Hc = 0.091$, $p < 0.05$). In contrast, no strong associations between foreign tourists and their reasons for traveling to go whale watching. Responses from foreign tourists indicate that most found out about whale-watching tours while they were in Peru. This is reflected in the results (Fig. 2)

Table 1
Demographic Characteristics of Whale Watchers in Northern Peru Included in This Study

| | Group Size | | | Age | | | Education | | |
|---|---|---|---|---|---|---|---|---|---|
| Country | <2 | 3–5 | >6 | <19 | 20–40 | >41 | Basic | High | Postgraduate |
| Peruvians ($n = 155$) | 55.7% | 32.2% | 12.1% | 0 | 61.6% | 38.4% | 6.7% | 39.6% | 53.7% |
| Foreigners ($n = 44$) | 54.2% | 83.3% | 14.3% | 0 | 86.1% | 13.9% | 2.9% | 45.7% | 51.4% |
| Total ($n = 199$) | 61.8% | 28.3% | 9.9% | 0 | 66.5% | 33.5% | 5.9% | 40.8% | 53.3% |

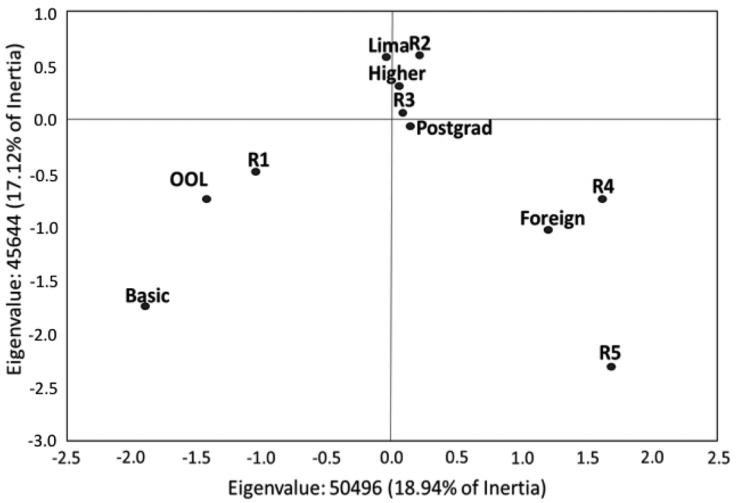


*Figure 2.* Multiple correspondence analyses [$\chi^2(100) = 1222.3$, $p < 0.05$]. Reasons for traveling to northern Peru: R1 (main reason), R2 (one of the main reasons), R3 (don't care), R4 (less interest), and R5 (it was not important). Education level: postgraduate (master or Ph.D.), higher level (university), and basic (technical or high school). Residency status was grouped into either foreigners or national whale watcher that came from the capital, Lima or out of Lima (OOL).

showing foreign tourists in the lower and right quadrant associated with responses "do not care," "less interest," and "it was not important."

*Economic Assessment*

From the tour operator surveys, we calculated that during the 2018 humpback whale breeding season, more than 8,500 tourists arrived in northern Peru for whale watching. However, this is a conservative number since we could not interview all of the tour operators. In contrast, we found that FONDEPES reported that during the whale season, a total of 12,985 tourists entered the pier (Fig. 3). For our DE analysis, we used the number of tourists provided by tour operators (8,500) as we know the percentage of IT and their confirmed participation in whale watching activities.

Daily expenses for IT were calculated from the tourist surveys, resulting in an average total expenditure per person of about US$107 (CI 95%, $14–$344) per day, with an average length of stay

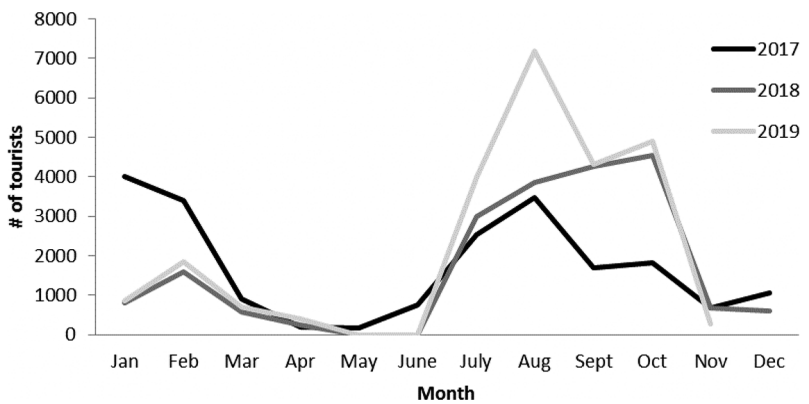


*Figure 3.* Numbers of tourists that entered Los Organos pier from 2017 to 2019. Data from FONDEPES, 2019.

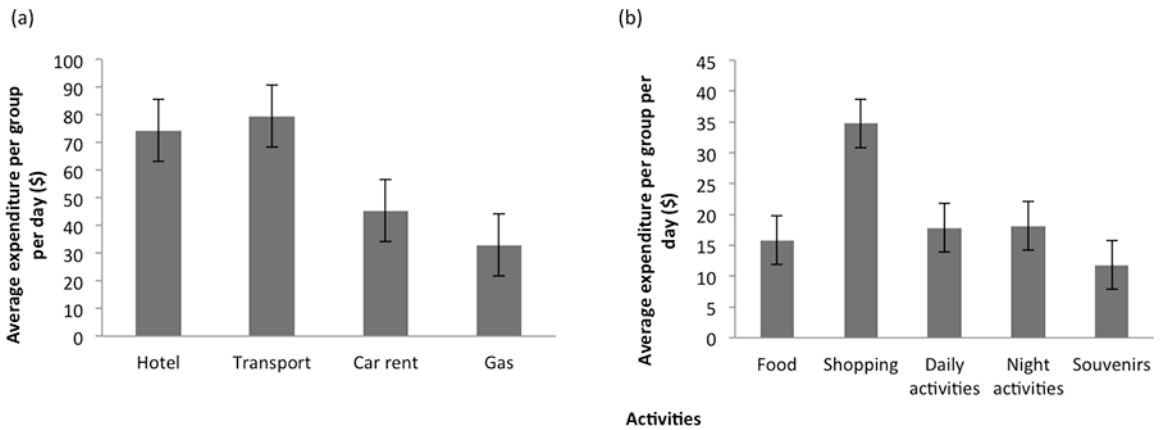


*Figure 4.* Average expenditure (US$) per group per day by category of expenditure with standard error bars. Higher expenses (a) and lower expenses (b).

of 4.3 days. If IT expenditure patterns are like those included in the survey (i.e., at approximately $107 per person x average length of stay of 4.3 days for the IT) then the total trip cost would be US$460. Most IE were for transportation and accommodation, followed by car rental and food (Fig. 4). This includes airport transport to northern Peru. There was no statistically significant difference in IE between the amount spent per day by national ($113) and foreign ($108) tourists.

The calculated estimate of total DE of the six principal tour operators was US$394,306 (sum of whale watch tickets) while the IE of the IT was estimated to be $754,885 for the season (83% of the total whale watchers in a season × $107). If we consider the IT (83%) average length of stay, then the total IE of the entire trip would be $3,246,006. The total regional expenditure of IT that come to see whales in the area was therefore more than $3 million (DE + IE) for the period of mid-July to the end of October for the year 2018.

## Discussion

This study provides the first economic analysis of whale-watching activity in northern Peru considering a suite of tourist traits and providing a monetary value to the wildlife icon that is the humpback whale. Given the fact that whale watching did not exist 12 years ago, our research indicates that this industry constitutes an important economic activity for the local community, bringing ca. 8,500 tourists to see whales just in 2018. During 2014, in the single community of Puerto Lopez (within the Machalilla National Park), Ecuador, around 39,737 tourists arrived during humpback whale season, with most tourists going on whale-watching excursions. In 1997, they had 13 tour-related businesses. That number has increased to 148, including tour agencies, restaurants, hotels, and other small businesses (Castro et al., 2015). This shows a considerable growth rate (i.e., 51% in 7 years) of the same activity, in a similar economy with the same icon species. This suggests that there could be a similar growth potential in northern Peru due its proximity and social similarities to Ecuador.

We found that whale watchers in the area were mainly Peruvians (81%), which concurs with Garcia-Cegarra and Pacheco (2017) who found in their study of 196 respondents that Peruvians made up 58.1% of the tourists. In their study, they have shown that Peruvians did not know about the presence of cetaceans in Peruvian waters. Moreover, most Peruvians did not know that humpback whales could be seen during the winter and spring months. Results from our multiple correspondence analysis suggest that this dynamic is changing. The whale-watching industry is attracting local tourism, as they mainly travel to northern Peru to see humpback whales. This shows that there might be a shift in national interest towards wildlife, as an earlier economic assessment of whale-watching tourism found more foreigners than locals in Peru (Hoyt & Iñiguez, 2008). This is a notable shift

as nature-based tourism can provide educational opportunities to people that encourage conservation in the region (Garcia-Cegarra & Pacheco, 2017; Wakiman, Ibrahim, Sabri, & Zulfikri, 2019).

Our estimates yielded a total of direct expenses of ca. $394,306, indirect expenses of ca. $754,885, and a total annual expenditure of approximately US$3 million. This is a significant economic injection to this area considering that the national minimum monthly wage in Peru is an estimated US$280 (US$3360 annual income) (https://busquedas.elperuano.pe/normaslegales/decreto-supremo-que-incrementa-la-remuneracion-minima-vital-decreto-supremo-n-004-2018-tr-1629081-2/). However, these estimated values should be considered with some caution. First, this estimate was prepared from our sample of 6 of 13 tour operators. Total expenditures could in fact be larger if applied to all companies operating in the area. Second, respondents were responsible for their expense calculations when they completed the survey and could have over- or underestimated the cost of their trip. Yet, results from the official government tourism agency (PROMPERÚ, 2017) reported a similar amount for estimate of daily expenditures (ca. $110) for the region.

There is variation in the reported economic impact that whale watching generates for local economies. In Ecuador, Castro et al. (2015) estimated a total whale-watching DE and IE of US$2,812,670, for Machalilla National Park in Puerto Lopez. Differences in the total expenses with this study could arise because they did not use surveys and did not consider the average length of stay of visitors. In a smaller area like Vancouver Island (British Columbia, Canada) whale watchers contributed ca. US$3 million to the Vancouver Island economy (Duffus & Dearden, 1990). Cisneros-Montemayor et al. (2010) reported incomes for Africa of US$15.6 million, Asia $46.7 million, Europe $323 million, North and South America $27.5 million, and Oceania $0.3 million, highlighting the economic value that this industry can generate.

A growing economy is desirable in small fishing communities such as those in northern Peru to diversify their economic activities (Pacheco et al., 2011). We found that of the 13 tour operators, only two operate in Punta Sal, and they take only a small number of tourists, with tours occurring mainly during the weekend. Therefore, Los Organos pier is the leading location for tourists to board the whale-watching boats. This means that there are more than 15 boats looking for whales at the same time, sometimes resulting in an excessive number of vessels with the same whale group (García-Cegarra et al., 2019).

Against this backdrop of economic opportunity from a growing whale-watch industry lies the potential for harm to the species and to the tourism experience resulting from mismanagement or an absence of whale-watch industry guidelines. Responsible expansion of whale watching must balance the economic benefits and the welfare of the species (Di Clemente et al., 2018; Garcia-Cegarra et al., 2019; Parsons, 2012; Wearing, Cunningham, Schweinsberg, & Jobberns, 2014). For example, a high number of vessels observing whales may induce several negative responses including disturbance of acoustic communication, avoidance behavior, as well as changes in feeding and reproductive behavior (Christiansen & Lusseau, 2014; Lusseau, Lusseau, Bejder, & Williams, 2006; Parsons, 2012; Scarpaci & Parsons, 2012; Scheidat, Castro, Gonzalez, & Williams, 2004). We found that numbers of tourists entering Los Organos pier has grown over the past years, and that these numbers grow significantly in the months of whale watching from July to the end of October (Fig. 3). This pattern of seasonal and overall growth in tourism for the region further demonstrates the impact that whale-watching activity is having in the area, which will likely continue to increase in the coming years.

In Peru, in 2019 a new regulation (Resolucion Ministerial Nº 451-2019-PRODUCE) was promulgated directed toward whale-watch tourism vessels establishing minimum approach distances to cetaceans. Approach distance is the only factor specified in the regulation. Peru does not have guidelines about numbers of vessels that can observe the same group of cetaceans or that specify acceptable vessel speed or direction of travel. These guidelines will also need to be implemented if the aim is to attain economic benefits without disturbing the species and to implement sustainable ecotourism. A code of conduct of compliance from the whale-watching companies is also recommended to help ensure a positive tourist whale-watching experience. However, as high levels of noncompliance with whale-watching guidelines

have been reported worldwide (Parsons & Brown, 2018), enforceable regulations will are also likely be necessary to ensure a robust and responsible whale-watching industry.

Our aim for this research was to estimate the economic value of an industry that depends on a wild animal whose habitat is currently threatened by human activities. Small-scale fisheries are massive in Peru, having more than 18,000 vessels and 45,000 fishermen (Alfaro-Shigueto et al., 2010), increasing threefold since 1995 (Guevara-Carrasco & Bertrand, 2017). These fisheries have high bycatch rates of small cetaceans (Mangel et al., 2010) and large cetaceans are also reported entangled in fishing gear especially in northern Peru (García-Godos, Van Waerebeek, Alfaro-Shigueto, & Mangel, 2013; Thiel et al., 2018). Whale watching is a nonextractive activity that, if correctly managed, could be an alternative livelihood to reduce these anthropogenic threats. And it is also an activity for which the presence of these species is not necessarily seasonal, thus whale watching in the region may have the potential to become a year-round activity. In northeastern Iceland whale watching is considered an economic success, as it has replaced the job losses for the decreasing cod fishery. It has also led to infrastructure improvements and increased job opportunities for the area (Parsons & Scarpaci, 2010). For this activity to be sustainable over time this area needs to implement effective management of whale-watch tourism activity, locally adapted conservation governance, and monitoring and enforcement of local tour operators to ensure a long-lasting and well-managed ecotourism industry.

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