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Recent advances in whale watching  
research: 2018–2019

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# REVIEW

## RECENT ADVANCES IN WHALE WATCHING RESEARCH: 2018–2019

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Whale watching research encompasses a wide variety of disciplines and fields of study, from monitoring the biological impacts of whale watching activities on cetaceans and assessments of the effectiveness of whale watching management and regulations, to the sociological and economic aspects of whale watching. This article is the latest in a series of annual digests, which describes the variety and findings of whale watching studies published over the past year, since June 2018.

Key words: Whale watching; Impacts; Regulations; Management; Whale-watchers; Education; Social science; Human dimensions; Economics; Tourist satisfaction; Public opinion.

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### Introduction

Recognising the difficulties of keeping up to date on the wealth of research on whale watching activities, in particular the impacts of these activities on cetaceans, a paper summarising the breadth and variety of whale watching research, published during the previous year, was presented to the International Whaling Commission (IWC) Scientific Committee's Sub-Committee on Whalewatching (Parsons et al., 2004) during the 56<sup>th</sup> Annual Meeting. As this was deemed to be a useful digest of recently published articles, and as such assisted the work of the sub-committee, similar digests in following years were requested (see Parsons & Brown, 2017, 2018; Parsons & Scarpaci, 2010, 2016; Parsons & Smith, 2018; Parsons, Lewandowski & Lück, 2006; Parsons, Lück & Lewandowski, 2006; Scarpaci, Parsons & Lück, 2008, 2009; Scarpaci, Lück & Parsons, 2009; Scarpaci & Parsons, 2012, 2013, 2014, 2015). This is the 16<sup>th</sup> in this series of review articles, detailing a summary of whale watching research published over the past year (June 2018– April 2019), since the 2018 meeting of the IWC Scientific Committee.

### Impacts of whale-watching on cetaceans

Whale-watching activities are known to elicit a number of negative behavioural changes in both whales and dolphins as well as direct impacts, such as collisions with vessels (see summary in Parsons, 2012). To ascertain impacts of these on whale and dolphin populations, the Whale-watching sub-committee of the IWC has a standing agenda item on the impacts of whale-watching. Under this agenda item the sub-committee, monitors this situation and regularly receives information on additional studies that show impacts (or lack thereof) of whale-watching activities. Over the past year, several studies produced further evidence of the impacts of whale-watching vessel exposure on their target species, and these are summarized below.

Marega-Immura et al. (2018) studied how boat activity impacts the short-term behavior response of Guiana dolphins (*Sotalia guianensis*) in Pontel Bay, Brazil. Although technically the study was not observing “commercial whale-watching”, the study did see an impact from “recreational whale-watching”, i.e., *ad hoc* whale-watching by members of the general public (see definitions in Parsons *et al.*, 2006). Specifically, Marega-Immura et al.’s research attempted to determine if: the number or type of boat impacts how long dolphins stay in the bay; if different boat types evoke different behavior responses; and if there are changes in surfacing behaviors prior and during boat approaches. Over a nine-month period in 2014 observations were made twice a day (morning and afternoon) from two land-based positions. Continuous searches were made via binoculars and the naked eye. Data collected included the size and initial behavior of the group and its response to boat approaches. Additionally, the tide direction and strength were recorded to determine if tide state impacted the occurrence of dolphins in the bay.

Marega-Imamura et al. (2018) found tides influenced the amount of time dolphins spent in the bay, with dolphins staying longer with a flooding or low tide. Animals stayed longer per observation if the boats present had no motor. Boats with inboard motors appeared to cause dolphins to stay shorter time periods in the bay per observation (Marega-Imamura et al., 2018). Additionally, there were more negative behavioral responses than neutral responses to outboard motor vessels. Surfacing rates were found to be higher with no boats present (Marega-Imamura et al., 2018).

Although the frequency and group size of animals has stayed, boat traffic in the area has increased due to increased urbanization constant (Santos et al., 2010; Marega-Imamura et al., 2018). Although there is no formal dolphin watching industry in the area, this study observed vessels often changed course to intersect dolphins. This caused dolphins to change directions or leave the area entirely (Marega-Imamura et al., 2018). After boat encounters travelling behavior increased while foraging and resting behavior decreased. The bay is a primary feeding ground for this population of dolphins and the negative interactions may impact their ability to forage for food, cause energetic deficits as boats numbers increase in the region (Marega-Imamura et al., 2018). Guiana dolphins in Nicaragua previously abandoned a site due to boat traffic (Edwards & Schnell, 2001), therefore, Marega-Imamura et al. (2018) - in addition to suggesting further, long-term research - suggested voluntary codes of conduct be put into place and boat drivers be educated on their potential impacts upon the dolphins.

In Patagonia (Argentina) the whale-watching industry primarily focuses upon southern right whales (*Eubalaena australis*) as a target species. Although this population has exhibited steady growth, Crespo et al., (2017) reported a slowing of population growth possibly due to density-dependent factors. Individuals have migrated from their primary location in Península Valdés to northern San Matías Gulf (Zerbini *et al.*, 2016). Since 2012, within San Matías Gulf in the Antonio Bay Marine Protected Area a temporary whale-watching program has been established. Prior to the start of this whale-watching activity, six years (starting in 2006) of population and ecological data had collected on this population (e.g. Crespo et al., 2011; Svendsen, 2013). This provided baseline data on the species prior to any interactions between whale-watching vessels and whales. In order to create effective management guidelines Arias et al. (2018) conducted an evaluation of the potential impacts that whale-watching vessels may have on this new extension of the right whales' habitat.

Starting in 2012, data was collected over five whale-watching seasons. This data was collected from four vessels by trained observers, via three minute point sampling. During observations, group type, vessel maneuver type, the whale's reaction and its distance from the vessel were recorded. Arias et al. (2018) found whale-watching mainly occurred with non-social active groups or individuals. This is different from Península Valdés where the primary focus is mother and

calves and individuals (Arias et al., 2016). Whales primarily reacted to vessels as they became closer (50 meters), however, reactions were dependent upon how the vessel approached and whether engines were on or off (Arias et al., 2018). Active boat maneuvers, or vessels with their engines on, elicited the most substantive reactions from whales. Of the whale groups, mother and calves were the most evasive from vessel approaches, whereas, solitary and non-social active groups were the least reactive (Arias et al., 2018). This supported the current regulations in the area, that whale-watching should be conducted on solitary animals, or non-social active groups. Overall, Arias et al. (2018) concluded whale-watching should continue to avoid interactions with mother and calves. Additionally, they suggested an update to regulations which would allow boat captains, as long as safety conditions were met, to turn engines off when approaching whales. In 2015, whale-watching regulations were modified to allow for mother and calf whale-watching, if vessels approached appropriately. Arias et al. (2018) suggested that if whale-watching must occur on mother and calves, or breeding groups, appropriate boats should approach in such a way as to reduce evasive reactions, and if avoidance reactions should occur, whale-watching encounters should cease (Arias et al., 2018).

Another study investigated the impacts of tourist (and other human) exposure of a small, genetically isolated population of spinner dolphins (*Stenella longirostris*) in Hawaii. Tyne et al. (2018) investigated the effects of exposure to humans (which included motor vessels, kayacks and human swimmers) on the energy budgets of the dolphins. During the study, dolphins were exposed to human activities within just 100m for 83% of the day, with a median duration of just 10 min between exposure events. The dolphins spent 62% of the day resting, although, despite the high level of exposure to humans, no significant effect was seen on dolphin resting behaviour (Tyne et al., 2018). However, Tyne et al. (2018) thought that the resting state observed, might reflect “a resting behaviour of a more vigilant nature”, i.e. resting, but nonetheless remaining wary, due to the almost continuous nature of the disturbance. Thus, the dolphins may not have been fully resting. It was suggested that this high level of exposure to humans, which is one of the highest levels of exposure thusfar reported “could lead to rest deprivation, displacement from preferred resting habitats and ultimately negative population level effects” (p. 1 in Tyne et al., 2018).

Like in the study noted above, in Egypt spinner dolphins also are found resting in specific areas during the day, notably Samadai, Satayah and Qubbat'Isa reefs in the Red Sea (Fumagalli et al., 2018). Human interactions with the dolphins (i.e., boat trips to go swimming with dolphins) are regulated at Samadai, with temporal closures to tourism activities. However, tourism activities were unregulated at Satayah. Interactions less frequently occur at Qubbat'Isa and, thus, this could act as a "control" site (Fumagalli et al., 2018). The intensity and duration of interactions, and thus, dolphin exposure to tourism, was different between the sites. Focal dolphin groups were exposed to boats and/or swimmers during 26%, 42% and 53% of their follows at Qubbat'Isa ("control"), Samadai (regulated) and Satayah (unregulated) sites, respectively (Fumagalli et al., 2018). At the two locations with tourism activities, Fumagalli et al. (2018) considered that the dolphins' rest was being disturbed (with a notable reduction of tight, inactive and single groups – which indicate resting behaviour - compared to the control site) especially during the middle of the day. This disturbance was exacerbated at Satayah, where dolphin tourism was unregulated. Conversely, the closures at Samadai did seem to reduce the amount of disruption of the dolphins' rest. As a result, Fumagalli et al. (2018) suggested that similar temporal closures be instigated at other locations. Fumagalli et al. (2018) note that contrasting with the control site allowed them to better interpret behaviors and noted that without said site they may have severely underestimated the level of disturbance caused by the tourism activities. Regardless, Fumagalli et al. (2018) urged the Egyptian authorities to strictly regulate existing tourism operations in dolphin resting areas and, moreover, advised against the further development of swim-with dolphin tourism in the region.

In addition to the above published studies, there have been several reviews of whale-watching impacts that have been published over the past year as either book chapters or Governmental reports. For example, Fumagalli et al. (2019) provide an overview of the basic ecology and importance of resting behavior of dolphins in the Red Sea. They summarized available information and discuss the impacts to dolphin populations if resting behavior is disturbed. The researchers conclude that both data and the overall management of dolphin species in the Red Sea are minimal. As resources are lacking, it is suggested a practical approach to conservation move forward. Specifically, Fumagalli et al. (2019) suggest an accelerated course of action to reduce human induced pressures on the local dolphin populations.

Yerbury and Boyd (2018) discuss the relationship of dolphins and humans during human leisure time (ecotourism). Using current literature, they overviewed these associations and how dolphins are potentially positively and negatively impacted by them. Finally, they explore how humans can mitigate negative impacts while enjoying dolphin-human interactions.

Finally, Machernis et al. (2018) is a US Government technical report which updates a previous compilation (Samuels et al., 2000) of studies on the impacts of tourism on cetaceans. The review categorizes the impacts of tourism into four major themes: (1) behavior; (2) habitat use; (3) health; and (4) reproduction. The report concludes that a major concern about tourism is its effect on marine mammal health and survival, in particular how “repeated exposure to disturbance may alter an individual animal’s behavioral budget, resulting in increased energy expenditure and decreased energy acquisition” (p. 52). It was noted that although behavioral changes resulting from tourism activities may be substantial, the total exposure to disturbance, and the energetic impact of the exposure may be low, at least in the studies to date.

### **Whale-watching research methods**

Piwetz et al. (2018) provide a history of the use of the theodolite in marine mammal research, including its use in monitoring whale-watching impacts. This study included the development and use of the modern digital theodolite and software systems. Additionally, they conducted a web-based literature review of current uses of the device and discuss potential limitations. Overall, Piwetz et al. (2018) found the theodolite to be a useful tool for whale research as the observations are not impacted by observer presence. They found careful consideration had to be used when determining which species and variables were obtained in order to prevent such problems as pseudo-replication. Furthermore, they noted that the experience of the observer, the theodolite position and environmental conditions can all impact the accuracy of marine positioning information.

Although the theodolite has its limitations, such as tracking animals with larger ranges, the web-based survey found its use for marine mammal tracking occurred in 36 countries over six continents. It has been used in 46 species of marine mammals and is often used in concurrence with other research methods such as passive acoustics recording. The authors conclude the theodolite continues to be a useful non-invasive research tool. It provides a low-cost research

device that can allow researchers to determine animal movement and behavior. With continued use in the future, data procured from theodolites can continue to help inform marine mammal policy. For example, as a method to evaluate the impacts of whale-watching vessels on cetaceans, and the effectiveness of regulations, in a way that does not impact or influence the study subject (unlike whale-watching observations via boat).

### **Whale-watching Vessels as Platforms of Opportunity**

Whale-watching vessels can be important platforms of opportunity to collect scientific data. Although they typically have a limited area of operation, the frequency that they visit said area means that extensive amounts of data can be gathered. A study in Peru utilized whale-watching platform-gathered data to investigate species diversity (Pacheco et al., 2019). The study recorded 13 cetacean species (4 mysticete and 9 odontocete species). In addition to sightings of live species *in situ*, which had only previously been reported from strandings (such as beaked whales), there were several new records from the region including dusky dolphins () and fin whales (*Balaenoptera physalus*), which were previously believed to not range so close to the equator. The study also provided evidence of orcas in nearshore waters. Pacheco et al. (2019) state that “Our results highlight the importance of commercial whale-watching as a source of information regarding the presence of cetaceans in northern Peru. Even though whale-watching surveys may not cover the total spatial extent of most cetaceans’ distribution, it does provide an intense and localized effort (although seasonal) that may reveal an important representation of the diversity of species” (p. 119).

### **Economic Impacts of Whale-watching**

Mayer *et al.* (2018) investigated the intersection between economic impact and governance, of whale-watching in the El Vizcaíno Biosphere Reserve in Mexico. In 2007 and 2010, they conducted surveys and interviews of both whale-watchers and whale-watching related businesses such as hotels and tour operators. The supply and demand of whale-watching was examined utilizing the Ojo de Liebre and San Ignacio lagoons within the reserve. This area is the primary breeding and calving ground for Pacific grey whales (*Eschrichtius robustus*).



The researchers found that the gross turnover of whale-watching was approximately \$2.5 million (US) from the demand side, and slightly over \$3 million (US) from the supply side. With a large number of goods and equipment imported into the reserve a high “leakage rate” was discovered. This means a large amount of the revenue generated by tourism does not stay in the area, which reduces the overall economic impact. Whale-watching, however, has seen steady growth over the years with increased tourist numbers. Additionally, it is operated by local companies and fishermen who whale-watch via a governance program that encourages local participation (Mayer *et al.*, 2018).

Overall Mayer *et al.* (2018) conclude the reserve is a good example of a balance between economic prosperity and species conservation. With a more pro-government whale-watching management system small and large whale-watching operators have an equal voice. Foreign operators are not allowed. This allows for a greater local distribution of income generated by whale-watching, while at the same time creating regulations to preserve the resource (whales).

Tkaczynski and Rundle-Thiele (2018) proposed that “selective market segmentation” be used to identify whale-watchers with a pro-environmental viewpoint that could also provide increased tourism profitability. By identifying these tourists within the whale-watching industry it would allow destination marketing organizations (DMOs) to target these potentially profitable tourists in their planning. They used Kotler’s (1988) target marketing criteria of: accessibility, actionability, measurability and substantiality, whilst adding a fifth standard of “sustainability”. Ideally this would allow DMOs to create a tourist industry that allows for maximum profitability while sustaining the environment. The researchers hypothesized that: 1) segments would increase with the addition of the sustainability criteria into the segmentation analysis; and 2) there is enough difference between tourist characteristics to allow DMOs to focus on one segment. Data was collected in Hervey Bay, Queensland, Australia via an eight question survey. Data was collected between July to October 2015 and whale-watching tourists over 18 years of age were targeted using a convenience sampling method on predetermined days (Tkaczynski & Rundle-Thiele, 2018).

Tkaczynski and Rundle-Thiele (2018) concluded that including the sustainability criteria to Kotler's (1988) original research allowed them to identify a market segment that would attract tourists that both allow for tourism profitability and environmental conservation: the primary segment identified included wealthy, domestic families. However, this study was not without its limitations. At present it has only been used in one geographic area and within the whale-watching context. Therefore, expanding it to other areas and fields needs to occur. Furthermore, in future studies, models such as the New Ecological Paradigm (Dunlap *et al.*, 2000) should be employed to determine tourists' specific environmental values. Finally, although this study identified a specific tourist segment it did not determine if targeting this segment would increase profitability in the whale-watching industry. A follow-up study to ground-truth these findings would be useful.

### **Whale-watching Management**

Tischer *et al.* (2018) provide a case study on whale-watching in the Fernando de Noronha Archipelago, an area in Brazil with an active whale-watching industry, primarily focused on the spinner dolphin (*Stenella longirostris*). The researchers took a "Tourism Area Life Cycle" (TALC) approach when reviewing tourism activity in the area, identifying the main events or changes in whale-watching activity in the archipelago. The area hosts both boat-based and land-based whale-watching, but three times as many tourists engage in boat-based activities. However, Tischer *et al.* (2018) considered that land-based whale-watching to provide more education and information to tourists.

The industry in the area started on an *ad hoc* basis in the 1970s with repurposed fishing boats taking tourists to see dolphins, on route to a Bay where they could swim. This bay, became re-named "Dolphin's Bay" and a land platform was built for watching (Tischer *et al.*, 2018). In 1986 a protected area was established in the region. In addition, tourism was seen as a way to boost the economy of the area in the late 1980s, and in 1989 a tax was introduced that was supposed to tax tourism activities and the proceeds be input into environmental and conservation measures. In 1987 a law was passed (Law 7643) that prohibited the intentional disturbance of cetaceans. By 1988 there was just one government-run whale-watching vessel and two repurposed fishing vessels offering trips, and local residents started acting as tour guides taking visitors to the land-platform to watch the dolphins (Tischer *et al.*, 2018).

In the 1990s, tourism and whale-watching grew, and amongst other activities a visitor center was established. To try minimize impacts upon the dolphins, in 1995 regulations were passed (Ordinance 05 of IBAMA, the Brazilian institution managing the protected area) which outlawed touching, feeding and persecuting dolphins anywhere in the archipelago and, moreover, in 1999 diving with dolphins was prohibited. In 2001, the archipelago was designated a UNESCO World Heritage site. Limits were placed on whale-watching operations and other activities with no more than 8 fishing vessels, 35 other vessels and no more than 600 tourists per day. Also, motor vessels were prohibited within the waters of the protected area and only local residents could own whale-watching companies. Local researchers started to offer training to boat operators to professionalize trip operators. The watching deck was also used for tourism, with more professionalized and specific tours and trips organized to the watching deck and guides offer talks about the dolphins. Eventually substantial infrastructure built up around the watching deck and access to said deck, including snack and gift shops, toilets and lockers (Tischer et al., 2018).

In 2008, Presidential decree 6698 made Brazilian waters a “sanctuary” for whales and dolphins. By 2010, thirteen dolphin-watching boats, nine diving vessels, one free diving vessel, twenty-three other tourism boats, and thirty fishing vessels were operating in the area (Tischer et al., 2018). This high rate of use, plus the high tourist numbers and the impacts this brings (for example increased sewage and pollution) there are concerns about the sustainability of the tourism industry - the continuous growth of the industry, whilst remaining simultaneously remaining environmentally sustainable, is currently not feasible (Tischer et al., 2018). Specifically, with regards to dolphin-watching, Tischer et al. (2018) recommend stricter regulations with limits on the number of daily visits, the speed of vessels, limits on the length of dolphin interactions, and regulating types of vessel approaches. They also noted that this management should be done in consultation and engagement with the local whale-watching operators (Tischer et al., 2018).

### **Whale-watching Tourists**

Whale-watching tourists are often well-educated, affluent (Duffus, 1988; Filby et al., 2015; Finkler, 2001; Finkler & Higham, 2004; Forestell & Kaufman, 1990; Fundación Cethus 1999; Lück, 2015; Mayes & Richins, 2008; Neil, Orams, & Baglioni, 1996; Parsons et al., 2003; Sitar et

al., 2017; Tilt, 1987), and middle aged (Duffus, 1988; Muloin, 1996; Parsons et al., 2003), although there can be exceptions (e.g. Panama & New Zealand; (Lück, 2003, 2015; Sitar et al., 2017). Additionally they tend to show pro-environmental opinions and behaviors (Rawles & Parsons, 2012; Sitar et al., 2017). Using sub-groups of age, education, gender and nationality Vieira et al. (2018) examined customer satisfaction and participation on board whale-watching vessels in the Azores (Portugal). Data was collected in 2014 and 2015 and tourists were interviewed at the departure gates of three major airports.

Vieira et al. (2018) concluded that whale-watching participation was not skewed by age, education or gender. Specifically data was not biased toward: women, highly educated or young tourists. Nationality, however, did play a role in whale-watching participation. In the Azores tourists from the Nordic countries tend to dominate, as do tourists with a more pro-environmental outlook. Customer satisfaction was influenced by education and gender. Males and those with a secondary education tended to be less satisfied with the whale-watching trips. Portuguese tourists, although less likely to participate in whale-watching, tended to be more satisfied when they did (Vieira et al., 2018).

This study concluded that sample selection issues occur and should be considered when analyzing tourists participation and satisfaction (Vieira et al., 2018). Without doing so, results can be biased. This can lead to incorrect policies, especially when considering customer satisfaction. It is important to understand why people are participating in whale-watching and if they are satisfied with the whale-watching trip. With this level of understanding policy changes can be made and whale-watching can expand.

Cornejo-Ortega et al. (2018) looked at whale-watcher satisfaction in Bahía de Banderas, Mexico. Specifically, they compared satisfaction levels between privately owned vessels and community-based (operated by a local cooperative) whale-watching vessels. Whale watching in the area has grown in the region from 14,000 tourists in 2001–2002 to 76,000 in 2008–2009 (Chávez & De la Cueva, 2009). With an increase in permitted vessels from 44 in 2005, to 183 in 2014.

A questionnaire survey was given to whale-watchers on the different types of vessels (private, n=246; community-based, n=101; Cornejo-Ortega et al., 2018). There was a difference in clientele between the two types of vessels: domestic tourists preferred community-based vessels (81% of customers were Mexican, versus just 20% on private boats). There were significantly more males on the community-based boats too (57% versus 40%). Tourists on community-based boats were also significantly younger (74% were 20-39 years of age, versus 58% being over 50 on private vessels; Cornejo-Ortega et al., 2018). Education levels were similar however, with 68% and 62% of private and community-based clientele having college degrees, respectively (Cornejo-Ortega et al., 2018).

Various expectations were ranked by the tourists (out of 4, with a score of “4” meaning that it was “essential”; Cornejo-Ortega et al., 2018). “See whales in a manner which is respectful to the whales and their environment” (private: 3.5; community: 3.3; combined: 3.44) “Learn about protection of whales” was ranked third (private: 2.96; community: 3.08; combined: 2.99), and “Learn about ocean conservation” was ranked fifth (private: 2.94; community: 3.06; combined: 2.98), although “See whales up close to the boat” and “See spectacular behaviours such as jumping or a whale’s tail as it dives” were ranked fourth and sixth, respectively. “Learn about whale behaviours” was ranked seventh (private: 2.94; community: 3.0; combined: 2.96), and “Learn about whale biology” was ranked eleventh (private: 2.81; community: 2.92; combined: 2.84). Whale-watchers on private boats had slightly higher satisfaction scores, compared to community-based boats (Cornejo-Ortega et al., 2018). In conclusion, Cornejo-Ortega et al. (2018) noted that the fact that the tourists ranked “to see whales in a respectful manner” so highly, it helps to reinforce the need for responsible, sustainable, whale-watching practices in the region.

Most visitors responded that “The number of whale watching boats around the whales should be limited,” (private: 89%; community: 79%), likewise that “There should be some areas set aside where whale watching is not permitted” (private: 78%; community: =79%; Cornejo-Ortega et al., 2018). “A portion of the costs to go whale watching should go directly to whale research and management,” was agreed, or strongly agreed, to by 91% of private whale-watchers versus a statistically significant 78% of community-based whale-watchers (Cornejo-Ortega et al., 2018). To the statement “It is acceptable to keep whales in aquariums”, 74% of private whale-watchers

disagreed or strongly disagreed, as did 64.0% of community-based whale-watchers. In general, whale-watchers on both types of vessels reported high satisfaction for education provision on their trips (Cornejo-Ortega et al., 2018).

Using a different methodology, Prakash et al. (2019) also looked at whale-watcher satisfaction, in Sri Lanka. Whale-watching began in Sri Lanka in 1983 with a small number of operators departing from the town of Trincomalee with just an estimated 620 tourists *per annum* (O'Connor et al., 2009). However, the number of whale-watchers expanded rapidly to nearly 80,000 in 2014 (Buultjens et al., 2016). There are currently there are three main locations where whale-watching occurs in Sri Lanka: Mirissa in the south-west, Kalpitiya on the west coast and Trincomalee in the north-east. In addition, a large Sri Lankan Navy owned vessel leaves from the town of Galle (near Marissa) which primarily takes domestic tourists (de Vos et al., 2013). The rapid expansion of whalewatching is partially due to stabilization of the country after their civil war, and regular sightings of blue whales (*Balaenoptera musculus*) and sperm (*Physeter macrocephalus*) off of the coast of Marissa, that led to sudden growth in the industry (Williams, 2013; Buultjens et al., 2016). To investigate levels of tourist satisfaction in Marissa, Prakash et al. (2019) investigated entries on tourism review website Trip Advisor (n=131). They found that reviews had been posted by tourists from 29 countries with the highest proportion of tourists coming from the United Kingdom (43%) followed by India (15%), Australia, Ireland, Singapore, and Spain (all 3%). Only 6% of the reviewers were posted by domestic tourists. In terms of ratings, 26 % rated their whale-watching experience as excellent, 24 % as very good, and 20 % as average. Conversely 7 % stated their experience was poor and 23% stated their experience was “terrible” (Prakash et al., 2019). The reviews also noted that 88 % of were satisfied with their observations of animals, 76 % of were satisfied with the organization of whale-watching trips and 64% were also satisfied with the service they were given 79% (Prakash et al., 2019). In terms of the sustainability and conservation aspects of their trip and their trip 59 % were satisfied but 41 % were not (Prakash et al., 2019), which is a high proportion of dissatisfied customers. Also, 62 % noted that a large number of vessels were chasing whales and this was unacceptable, and only 38 % believed that their vessels kept a safe distance from whales (Prakash et al., 2019). In addition, 57 % noted that they thought the price of trips were too high, 59% thought that they spend too much time on the ocean, and only 41 % were

satisfied with the duration of their whale-watching trip (Prakash et al., 2019). In addition, 71 % thought that their vessel was overloaded with passengers.

The relatively high level of dissatisfaction over the sustainability of the trips and high proportion of those that were concern with crowding, chasing and getting too close to whales, is a cause for concern. Bearing in mind the main target species for their trips are “endangered” blue whales, the potential impacts of whale-watching activities (at least based on the perceptions of participants) is a cause for concern.

Gleason and Parsons (2018) assessed the knowledge and opinions of whale-watching tourists in Samaná, in the Dominican Republic. To help improve current education programs, and encourage their creation on board boats that lack them, this study focused on whale waters’ knowledge regarding marine conservation and threats to marine mammals. A questionnaire survey-based methodology was used. Overall tourists stated that they wanted on board education present on their whale-watching trip, however, these programs were absent on most boats in Samaná (Gleason & Parsons, 2018). Those tourists surveyed had basic knowledge regarding whale biology but lacked a broader understanding of conservation issues (Gleason & Parsons, 2018). The researchers recommended that education and interpretation be provided on all whale-watching boats, with more of a focus on conservation concerns and less on basic biology (i.e. part of the whale). Furthermore, as whale-watching is primarily undertaken by foreign tourists in the Dominican Republic, Gleason & Parsons (2018) suggested that multi-lingual educational materials be created in order to better reach a global audience with information on whale conservation.

Naylor & Parsons, (in press) present the results of an international online survey was conducted to investigate public attitudes on keeping cetaceans in captivity. Their respondents were significantly more likely to be opposed to displaying dolphins and whales in marine theme parks and aquariums (opposed to captive display: 54.4%; support captive display: 45.5%). There were two large samples in the survey from members of the public in the US and in India and only 5% of respondents from the USA stated they “strongly support” (with 33.3% “support”) keeping dolphins and whales in marine theme parks and aquariums, while 21% of participants from India did so (43.4% “support”). Interestingly, participants that support cetaceans in captivity were significantly

more likely to believe that cetacean conservation is not important. This somewhat supports Jiang et al. (2007) which found that visiting a marine theme park did not increase visitors' support for conservation. This also contrasts to several studies that found that going on a whale-watching trips led to an increase in concern for conservation (Zeppel & Muloin, 2008; García-Cegarra, & Pacheco, 2017; Lopez & Pearson, 2017).

Of particular relevance to whale-watching was the finding that six times as many respondents, or 86%, preferred to view cetaceans in the wild via whale-watching (61% preferring boat-based, 25% land-based) versus watching them in captivity. Respondents from the USA were less likely to prefer watching cetaceans in a marine theme park (9% versus 24% for land-based and 67% for boat-based whale-watching) than those from India (preferred a marine theme park: 26%; land-based whale-watching: 27%; boat-based whale-watching: 47%). This seems to suggest that watching cetaceans in the wild may be replacing watching cetaceans in a captive setting, particularly in the US, perhaps as public support for captive cetacean facilities diminished in the wake of successful documentaries like *The Cove* and *Blackfish*, and the negative press associated with these (Parsons, 2012; Parsons & Rose 2016).

### **Summary**

As in previous years, studies have investigated the impacts of whale-watching activities upon cetaceans, and have found behavioral changes resulting from exposure, in particular, disruption of resting and feeding behavior. However, the population-level impacts of these exposures is still largely unknown. A social science approach to whale-watching research appears to be increasing, with researchers looking to tourists to provide information to provide information that might help whale-watching management, whether it be tourists reporting crowding and vessels getting to close to target species, or reports of high levels of tourist satisfaction when trips are performed responsibly with conservation and minimizing impacts to the species in mind - and when guides provide information on conservation issues. Social science data that could help persuade operators to behave in a more sustainable manner, for the sake of the satisfaction of their whale-watching clientele, appears to be a very important tool in encouraging sustainability.



Another interesting finding in several studies is how the public states that they prefer watching cetaceans in the wild, compared to in aquariums. Generally, public concerns over captive cetaceans, primarily based on welfare concerns, appear to be increasing, which in turn is linked to decline in visitors to this sector of cetacean tourism (Parsons & Rose, 2018). When coupled with a preference for watching cetaceans in the wild - and thanks to the growing number of whalewatching operations a greater ability to go whale-watching – this cause a shift in the cetacean tourism market that benefits whalewatching, especially whalewatching were there is concern for the welfare of the target species.

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