Recent advances in whalewatching research: 2009-2010

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ABSTRACT

Whalewatching research encompasses a wide variety of disciplines and fields of study, including monitoring the biological impacts of whalewatching activities on cetaceans and assessments of the effectiveness of whalewatching management and regulations, to the sociological and economic aspects of whalewatching on communities hosting such activities. This article is the latest in a series of annual digests, which describes the variety and findings of whalewatching studies published over the past year, since June 2009.

KEYWORDS: WHALEWATCHING; CODE-OF CONDUCT; REGULATIONS; MANAGEMENT; WHALE-WATCHERS; PROTECTED AREAS

Introduction

Recognising the difficulties of keeping up to date on the wealth of research on whalewatching activities, in particular the impacts of these activities on cetaceans, a paper summarizing the breadth and variety of whalewatching research, published during the previous year, was presented to the International Whaling Commission (IWC) Scientific Committee's Whalewatching Sub-committee (Parsons, Classen, & Bauer, 2004) during the 56th Annual Meeting of the IWC. 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, Lewandowski & Lück, 2006; Parsons, Lück, & Lewandowski, 2006; Scarpaci, Parsons & Lück, 2008; Scarpaci, Parsons & Lück, 2009; Scarpaci, Lück & Parsons, 2009). This is the sixth in this series of review papers, detailing a summary of whalewatching research published over the past year (June 2009-May 2010), since the 61st Annual Meeting of the IWC.

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Impacts of Whalewatching Activities on Cetaceans

Off the San Juan Islands, Washington State the "southern resident" killer whales (***Orcinus orca*)** have declined to fewer than 90 individuals (National Marine Fisheries Service, 2008). This population was listed in 2001, as depleted under the Marine Mammal Act and “endangered” in the United States of America and Canada. The direct cause of the decline, is unknown, but could to be attributed to reduction in prey availability, upload of toxic chemicals and vessel disturbance. The decline in growth rate was first documented in 1990s and further declines (approximately 20%) were recorded from 1996-2001 (National Marine Fisheries Service, 2008). It has been noted that vessel traffic may have contributed to the decline via direct (for example boat collisions with whales) and indirect (upload of toxins via unburned fuel and/or increase in underwater noise levels have created an unfavourable environment that may mask important biological signals or reduce foraging efficiency) mechanisms. The southern resident orcas are targeted by commercial whale watch vessels and non-commercial vessels may also interact with the whales. Current whalewatching guidelines in this region currently dictate that vessels should not approach whales closer than 100m.

Lusseau, Bain, Williams and Smith (2009) assessed whether boat traffic impacted on the behaviour of this population of endangered resident orcas. Vessel traffic was defined as whale-oriented irrespective of whether the vessels were commercial whale watch vessels or not. Land based observers recorded behaviour (rest, travel, forage and socialize), vessel traffic, pod identity and distance between focal schools and vessels (100m, 400m, 1000m). Land based observations occurred in southern (noted as an important foraging area) and northern (utilised by whales for travel and social purpose) regions of the study site. The success of observing orcas was 53.8% (n=128 days orcas were sighted; Lusseau *et al*., 2009). Results demonstrated reduced foraging behaviour from 76% of the time to 60% of the time (a 20% decrease) when boats were within 400m (Lusseau *et al*., 2009). An effect, albeit lesser, was also noted when vessels were within 1km and whales were displaced (short distance) by the presence of vessels (Lusseau *et al*., 2009). As noted above the current guidelines for the area state that vessels should not approach within 100m, and thus there are clearly biologically important impacts on killer whale behavior beyond this distance. Indeed, two of the most significant behaviours which, if cetaceans are denied the ability to accomplish, could lead to a deterioration in health, are foraging and resting. Lusseau *et*

al. (2009) state that their findings support the notion of a need to enforce regulations for whalewatchers (commercial and recreational). The authors also suggested that future research should document whether different approach types impact the whales differently.

A second paper by Williams, Bain, Smith & Lusseau (2009) analyzed southern resident orca swimming speed, surfacing intervals and the path taken by the whales, in response to boat traffic. Land-based observation teams were situated at both the southern and northern sites (as noted above). Observers, with the aid of a theodolite, documented activity of whales, presence of vessels, boat and whale positions. Once, an individual animal (photo-identified) was selected (for example moved within 3km of the shoreline) the focal individual was tracked for a minimum of 800s. A total of 182 focal animals movements were tracked from 2003-2005 and at least 50% of the animals were tracked more than once during the study. The mean period of time a whale was tracked was for 25.2 minutes over 2.6km. Of the 182 tracks, 25 tracks were recorded in the absence of vessels. The study demonstrated that dive time and swim speed increased as number of vessels increased (Williams *et al*., 2009). Movements of whales were more erratic when accompanied by many vessels, in contrast, smooth travel paths were documented when whales were in the presence of few vessels (Williams *et al*., 2009). The latter meant that whales would have to swim further as the result of boat traffic, with an associated energetic cost. Williams *et al.* (2009) discovered that the level of effect was related to how close boats were, but rather the number of vessels within 400m, i.e. the amount of crowding. This has implications for whalewatching guidelines in this region which currently dictate only that vessels should not approach closer than 100m, and do not proscribe a limit of the number of vessels around a killer whale group.

A third study on "southern resident" killer whales investigated the prevalence of "surface active behaviours" (e.g. spy hops, breaches, tail slaps, pectoral fin slaps) when in the vicinity of boats (Noren, Johnson, Rehder & Larson, 2009). Data was collected from a 225 hp 4-stroke outboard motor boat that on average was approximately 200m-250m from the whales. Distances between whales and boats were recorded when these behaviours occurred, although a distinction was not made as to whether the boats were whale watching or other types of vessel. In the first year of study 91% of boats were within 100m of the whales, dropping to 65% in the second year – which demonstrates a high degree of non-compliance with local voluntary guidelines for whale watching, which requests 100m between whales and boats (Noren *et al*., 2009). Surface active

behaviours generally increased when boats were closer, with the most common behaviour reported was a "tail slap" which is a behaviour that "maybe performed by killer whales when disturbed" (p. 188, Noren *et al*., 2009). The majority of behaviours were performed 30 seconds after the point of closest approach by a vessel (Noren *et al*., 2009). The highest tail slap frequency was recorded when boats were within 150m of the specific whale and, in all, 70% of tail slaps occurred when a boat was within 224m of a whale (Noren *et al*., 2009). There was no effect of gender or age on exhibiting surface active behaviours, although it was noted that younger whales preformed more behaviours within a specific bout. The researchers concluded that "the minimum approach distance of 100 m in whale-watching guidelines may be insufficient in preventing behavioural responses from whales" (p. 179, Noren *et al*., 2009).

Considering, that the southern resident population of killer whales population has been deemed to be “endangered” under US law, implementation of management that mitigates vessel presence may be required particularly, as vessel traffic may have contributed to the decline in the population. At the least introducing strictly enforced regulations instead of voluntary guidelines, with a statutory increase in the 100m approach distance (perhaps to 400m), regulations prohibiting more than one vessel approaching a group of whales and perhaps a requirement for vessels to retreat away from whales if behaviours such as tail slaps are observed.

Like Lusseau *et al*., (2009) a study conducted on an Australia bottlenose dolphin (*Tursiops truncatus*) population, in the coastal waters of Banbury, demonstrated decreases in biologically important behaviours in response to boat traffic. Arcangeli & Crosti (2009) observed bottlenose dolphins for a total of 64 hours and reported that in the animals they observed, the proportion of time engaged in “diving”, “milling” and “travelling” behavior increased when boats were present within 350m. Moreover, they estimated that the proportion of time spent “resting” decreased from 31% of the time to 20% (Arcangeli & Crosti, 2009). Whereas the proportion of their time “foraging” decreased 20% of the time to a mere 7.6% of the time – a 62% decrease (Arcangeli & Crosti, 2009). As noted above, several studies have reported a decrease in cetacean foraging behavior, which would have an energetic cost, but the decrease in the proportion of time spent foraging in this particular study is one of the greatest decreases noted to date. One additional factor in the Arcangeli & Crosti (2009) was that because of the calm local conditions, this particular study allowed the research vessel to observe the dolphins with engines switched

off, and so the effect of the observation vessel would not be a confounding factor, as is the case in several other whalewatching impact studies.

A similar alteration of behaviours was also noted in small population Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) inhabiting the coastal waters of Zanzibar, Tanzania (Christiansen, Lusseau, Stensland, & Berggren, 2010). In this study, a similar method as used in Lusseau (2003) to investigate changes between behavioural states, i.e. a Markov chain analyses. Dolphins were observed from a distance of 20m or more in a small outboard motor boat. In the presence of boats (if another vessel other than the one observation vessel came within 50m) the analysis determined that dolphins were less likely to remain "resting" or "socializing", but were more likely to forage or begin "travelling" (Christiansen *et al*., 2010). Over all, biologically important behaviours such as "resting", "foraging' and also "socialising" tended to decrease in the presence of boats (Christiansen *et al*., 2010). Reproductive behaviour, such as courtship, is also biologically important, and can have a detrimental impact on populations if curtailed. This was reported in a study by Sousa-Lima & Clark (2009) for male humpback whales (*Megaptera novaeangliae*). Sousa-Lima & Clark (2009) used automated acoustic recordings to monitor and track the singing behavior of male humpback whales in Abrolhos Marine National Park, Brazil, the location of a major humpback whale breeding ground. The behavior of eleven tracked whales in response to approaches by tourist boats was evaluated: of the eleven whales approached by boats, nine moved away, and of these five singing ceased for at least 20 minutes (Sousa-Lima & Clark, 2009). Of these animals that moved away, two-thirds did so when the tourist boat was more than 4km away, with a mean response distance of 7.5km (Sousa-Lima & Clark, 2009). This is in contrast to previous studies that showed humpback whales moving away from tour vessels at distances of less than 0.3 km (e.g. Corkeron, 1995; Sousa-Lima, Morete, Fortes, Freitas, & Engel, 2002). The researchers advise that managers for the marine park should reduce noise levels in the park, and suggested that perhaps there should be regulations to that effect, requiring, for example, quieter engines as well as speed limits and restrictions of numbers of boats, which are often a component of whalewatching regulations (Sousa-Lima & Clark, 2009).

A second study on humpback whales, monitored the behaviour of groups off of Queensland Australia, from both whalewatching vessels (206 groups) and land-based platforms (144 groups; Stamation, Croft, Shaughnessy, Waples, & Briggs, 2010). Nearly half (46%) of the groups observed from whalewatching vessels exhibited no detectable response, 23% approached

whalewtaching vessels and 17% moved away from vessels (Stamation *et al*., 2010). There appeared to be no relationship between the behavior of the group (e.g. "foraging", "travelling" or "surface active") and their response (Stamation *et al*., 2010). Certain behaviors such as "spy hop", "trumpet blows" and "tail swishes" were more frequent in whales approaching vessels, and it was suggested by Stamation *et al.* (2010) that these latter two behaviours might be aggressive and directed to the whalewatching vessels that were being approached. For those whales that avoided vessels, time spent submerged was higher (Stamation *et al*., 2010). Nearly four-fifths (78%) of the whalewatching vessels observed were 100m or further from the whales (the distance required by local whalewatching guidleines), the remaining 22% approached closer than 100m or intersected the whales' route (Stamation *et al*., 2010). Avoidance behavior was significantly more likely to be observed avoiding vessels when boats approached closer than 100m (Stamation *et al*., 2010). Local regulations require whalewatching vessels to be no closer than 300m to whales with calves – only 14% of interactions between calf containing groups and whalewatching vessels adhered to this guideline (Stamation *et al*., 2010). Avoidance behavior again was more likely to be observed from these groups when vessels came within 200m (Stamation *et al*., 2010). The results of this study suggest that regulations with respect to groups containing calves need to be more strongly enforced and that there is some effect of whalewatching vessels on humpback whales – although impact of these effects on humpback whales need to be determined.

A different approach to assessing the impacts of whalewatching on humpback whales was taken by Weinrich & Corbelli (2009), who tested whether whalewatching exposure affected calving rates or calf survival (at age 1 and 2) of Southern New England humpbacks. The researchers collected data on individual whale identification, behaviour of the whale, exposure time to vessels and total number of boat-whale interactions. To determine if a whale watch vessel impacted on female humpback whale ability to reproduce, the authors tested her exposure to whalewatching operations in each of the two years that were prior to a putative conception, and the year during a putative pregnancy, against whether she was observed with a calf in that year (Weinrich & Corbelli, 2009). To document, if whalewatching impacted calf survivorship, the mother-calf pair were observed (when feasible) and the first year the calf was independent was observed (when feasible). Survival was deemed as a resighting of the calf. Results indicated that mean calving rate was 0.35+/-2.4 calves per year (Weinrich & Corbelli, 2009). No correlation was found between calving rate and exposure rate or the cumulative number of boat interactions

(Weinrich & Corbelli, 2009). Females with calves spent significantly more time with vessels in both the year prior and during a possible pregnancy than other females and no significant difference was found between the calves that survived at age 1 and 2 and those that did not based on mothers whale watch exposure (Weinrich & Corbelli, 2009). Furthermore, exposure was found to be significantly greater in the calf year for the females that returned post weaning (Weinrich & Corbelli, 2009). The authors stated that no negative impacts of whalewatching exposure on calving rate and success was documented, although it should be noted that even though the study represented long-term data, this was only a small portion of their lives and factors such as chronic stress through multiple exposures to whalewatching, and other stressors, over an animal's life time might have a negative impact (Weinrich & Corbelli, 2009).

Turning to a less well-studied species than the orca or humpback whale, another study investigated the impacts of whalewatching on estuarine dolphins or "costero" (*Sotalia guianensis*). Tourism has provided economic benefits to a region in southeast Brazil, known as Cananéia, and dolphinwatching from schooners (large motorised marine vessel that are heavy, slow and have wooden hulls) occurs throughout the year. Filla & Monteiro (2009) monitored the affects that tourism may induce in these estuarine dolphins and categorized these impacts according to the type of boat tour interacting with animals. Three trip/tour types were identified: a dedicated dolphinwatch trip; a lengthy trip that transported tourists to an overnight camp site and dolphins could be encountered opportunistically and short dolphin "courses" which included 2-3 dolphinwatching trips and taught materials (Filla & Monteiro, 2009). As a result of the trip types offered, interaction with dolphins with vessels was varied, ranging in time from 0-1min to 30 min. Filla & Monteiro (2009) documented responses of dolphins as being either positive (e.g., voluntary movement of dolphins towards the schooner), avoidance (e.g., short-term displacement) and neutral (e.g., animals continued exhibiting the same behavior regardless of vessel presence). The results from the study indicated that dolphins' response was influenced by interaction time, with longer periods producing less negative responses (Filla & Monteiro, 2009). "Direct" or "Chase" approaches to dolphins resulted in negative responses 100% of the time. The longer trips that yielded less negative responses consisted of the student groups (trip 3) and vessel approaches during these interactions were conducted at a slow speed, from a distance and skipper waited for dolphins to voluntarily approach the vessel (Filla & Monteiro, 2009). This finding, is of importance as it supports the notion further that direct approaches are inappropriate and

produce negative responses. Furthermore, type of tourists onboard a tour may motive approach type. Although Filla & Monteiro (2009) did not discuss this in the paper however; this is of importance as it may indicate that tourist type (e.g. undergraduate students versus 'average' tourists) could influence the approach type used by the skipper. Few impacts studies on whalewatching categorize the type of tour, and type of participants and this perhaps could warrant more research. Moreover, it is evident that species such as *Sotalia guianensis* are receiving attention *by* whalewatching operators, and *there are a growing number of papers investigating impacts of this increasing pressure on this species* (e.g., Tosi & Ferreira, 2009).

Swim-with-cetacean tourism

The impact of swim-with-cetacean tourism (see definition in Parsons, Fortuna, Ritter, Rose *et al*., 2006) on bottlenose dolphins within a disclosed " sanctuary zone" in Port Phillip Bay, Australia was documented by Scarpaci, Nugegoda & Corkeron (2010). The sanctuary zone was implemented as part of the Wildlife Act, to provide a refuge for the dolphins from vessel activity and was suspected to be a site of biological importance to the dolphins. A land -based observer monitored activity budgets of dolphins in the presence and absence of vessels across a two year period within the sanctuary zone (Scarpaci *et al.* 2010). Dolphins were observed 47.4% of time in the presence of at least one vessel and 52.6% of the time in the absence of vessels (Scarpaci *et al.* 2010). Swim-with-dolphin trip operations accounted for the majority of vessel traffic in the vicinity of dolphins (43.1%; Scarpaci *et al.* 2010). It was found that dolphin groups with calves were significantly larger than groups without and vessel presence resulted in larger schools regardless of school composition (Scarpaci *et al.* 2010). The results of the study also indicated a significant, decreased, likelihood of bottlenose dolphins engaging in foraging behaviour when vessels were present (Scarpaci *et al.* 2010) echoing many of the studies noted above. The high proportion of feeding behaviour, that was observed in the absence of vessels, was suggested by the authors to imply that this site is preferentially used as a feeding site, although the significance of reduced feeding for the long-term conservation of these dolphins will remain unclear until information is available on the behavior of these in areas where tourists operations do not venture (Scarpaci *et al.* 2010).

Small Boat Noise and Dolphins – Implications for Whalewatching

Although not actually a study involving whalewatching vessels, the results of the study conducted by Jensen, Bejder, Wahlberg *et al.* (2009) have implications for the impacts whalewatching from small outboard boats, and especially for whalewatching research activities using small outboard vessels as research platforms. Jensen *et al.* (2009) attached acoustic tags to common bottlenose dolphins and short-finned pilot whales (*Globicephala macrorhynchus*) to assess the effect of motorboat noise (2 stroke and 4 stroke outboard motor boats in the case of this study) on cetacean communication. It was found that at 50m (a standard maximum approach distance for many whalewatching guidelines), and a boat speed of 5 knots, communication ranges of pilot whales were reduced by 58%, and by 26% for bottlenose dolphins (Jensen *et al*., 2009). However, at a speed of 2.5 knots noise levels were such that there was little masking of communication calls (Jensen *et al*., 2009). At a speed of 10 knots there was approximately a 70% decrease in communication distance for both species at 200m from the boats (potentially up to nearly a 80% decrease; Jensen *et al.,* 2009). At 50m the communication reduction was over 90% for pilot whales (up to potentially 95%) and over 80% for bottlenose dolphins (up to c. 90%; Jensen *et al*., 2009).

Another issue highlighted in this study was the loud broadband sound emitted when the boats changed gears, which could occur several times a minute during manoeuvring around the cetacean groups (up to 200dB re 1 µPa peak-peak; Jensen *et al*., 2009). It was suggested that minimizing gear changes would be an important consideration for reducing disturbance of boats on cetaceans in, for example, whalewatching guidelines. The authors considered that to minimize masking effects of sound, small outboard vessels should restrict themselves to speeds below 2.5 knots and follow animals “at a distance’ (Jensen *et al*., 2009) and, therefore, the researcher’s findings support whalewatching guidelines that suggest boats should travel at low speeds at a distance of 50m or more. Although it was emphasized that this does not take into account the potential impacts of multiple vessels in the proximity to cetaceans, nor the effects, or stress caused by, following groups for long periods of time. There were also implications for marine mammal researchers – following focal groups, at close distance, in a small boat is common method for researchers who are studying small cetacean behaviour and the authors warn that "the behaviour and noise profiles of research vessels may be a source of potential bias in studies of free-ranging delphinids and should be considered when designing field experiments" (p. 172-173, Jensen *et al*., 2009).

Defining Whalewatching Impacts: Absence of Evidence is Not Necessarily Evidence of Absence

It has often been claimed that cetaceans will eventually habituate to underwater noise, or if animals appear to have habituated to noise, it is not having an adverse impact. However, Bejder, Samuels, Whitehead, Finn & Allen (2009) emphasise that true habituation is defined as a learning process that occurs over time and that what many refer to as habituation is, rather, "tolerance". Bejder *et al.* (2009) emphasized that sensitive animals may be the first animals to be displaced from a population as the result of disturbance, leaving behind "tolerant' animals. This could leave researchers in the mistaken belief of no adverse impact if the population were to be studied. Moreover, Bejder *et al.* (2009) note that there may be many factors that could result in animals tolerating disturbance, for example, the fact that a disturbed area is important for feeding or breeding; whether an animal has made a significant investment in time and energy in a site, such as having established and defended a territory, or having learnt information about the location and availability of local resources; whether there is appropriate habitat to move to, or whether there could be increased competition or predation outside of the current habitat. Therefore, lack of displacement does not necessarily indicate lack of disturbance. Moreover, Bejder *et al.* (2009) note that there may be physiological effects (e.g. an increased 'stress' response) from chronic disturbance that could impact the fitness and health of animals even when tolerance occurs and there is no immediately observable behavioural response. The paper by Bejder *et al.* (2009) could effectively be summarized in the statement that, in the case of disturbance, absence of evidence (i.e. displacement or behavioural changes) is not necessarily evidence of absence (a negative effect on cetaceans). Therefore, when making management decisions, particularly with respect to whalewatching, managers should take this into account and take a precautionary approach, i.e. assume that there is disturbance even though there is no immediately observable change in behavior.

The Nature of Whalewatchers and Whalewatching Education

Mayes & Richins (2009) investigated the demographics and opinions of whalewatching (specifically, bottlenose dolphin-watching) tourists on two vessels delivering trips in Port Stephens, New South Wales. One of the vessels was a large (300 passenger), multi-level, multi-

hulled catamaran, and the other a smaller (40 person maximum) sailing catamaran. The smaller operation had slightly higher environmental credentials (e.g. using biodiesel), than the larger vessel (Mayes & Richins, 2009). The demographics of the whalewatchers in this study were similar to other whalewatching studies: with more female participants (60.5% female vs 39.5% male), more middle-aged passengers (47.7% were 31-50 years of ages, versus 33% between18 and 30, and only 19.3% over 50), and nearly half (48.4%) had a university degree (Mayes & Richins, 2009). Just under a quarter were return visitors to the area (21.2%), and 40.9% had engaged in some sort of dolphin tourism previously (of which 17.1% had been whalewatching and 20% had been to a captive dolphin facility; Mayes & Richins, 2009). Moreover, they were mostly domestic tourists (Mayes & Richins, 2009), with only 23% coming from outside Australia (mostly Europeans).

In terms of their expectations from the trip, most stated that they wanted opportunities to see dolphins (91.6%), in their natural habitat (90.5%), behaving naturally (88.5%), and wanted to gain interesting information on dolphins (70.2%; Mayes & Richins, 2009). Whalewatchers on the smaller operation were more concerned about the level of environmental information offered and the knowledge of the boat staff, whereas tourists on the larger vessel were more concerned about the ability to see dolphins and the number of dolphins observed (Mayes & Richins, 2009).

The whalewatchers were asked to assess themselves on their level of knowledge about dolphins (on a score of 1 to 10) which they ranked before and after their dolphin encounter. The study found that this ranking increased, suggesting that the tourists felt they had become more knowledgeable about dolphins (Mayes & Richins, 2009).

The tourists were also questioned about a variety of types of information and were asked which were they most interested in obtaining. The most highly ranked was information on how to conserve the dolphins' environment (78.7%), followed by information on dolphin intelligence (73%), on conserving dolphins (80%), on strange characteristics of dolphin (75%) and the dolphins' place in their ecosystem (75.2%; Mayes & Richins, 2009).

The tourists were asked about their levels of satisfaction with the trip, and on average they gave their trip 7 out of 10, with many (about 20%) giving 10 out of 10 – there was a significant difference in this level of high satisfaction with tourists from the smaller operation being more likely to rank their satisfaction as 10 out of 10 (Mayes & Richins, 2009). When asked what aspects of their experience they were most satisfied with, the operation's encounter rules and

practices scored highest (89.4%), followed by the health of dolphins (87.3) and experiencing the dolphins natural behavior (87%; Mayes & Richins, 2009). The lowest ranked characteristic of the trip in terms of satisfaction was the number of other vessels present (47%; Mayes & Richins, 2009). Again there were higher levels of satisfaction with the smaller operation.

The final part of the study investigates how the dolphinwatching trip may have influenced the participants to engage in pro-environmental activities. The participants were asked about whether they intend to do a variety of activities in the future (on a 5 point likelihood scale). The highest ranking activity was removing trash from the marine environment (with 79.6% saying the likelihood of them doing the activity was moderate to very high); followed by talking to others about caring for the marine environment/marine species (78.7%); trying to reduce their personal pollution of water (76.9%); assisting with the protection of dolphins (76.9%); removing trash from beaches (74.6%); donating money to an environmental group (59.9%); becoming more involved in conservation (57.5%); assisting with cetacean strandings (48.7%); donating their time to wildlife conservation (48.7%); and joining a wildlife/dolphin conservation organisation (45.6%; Mayes & Richins, 2009). When asked how the whalewatching experience effected the strength of their feeling and support towards an activity, supporting marine environmental conservation ranked highest, followed by conserving marine wildlife, helping conservation of the marine environment, supporting dolphin conservation and assisting with marine conservation programs (Mayes & Richins, 2009).

Mayes & Richins (2009) were of the opinion that whalewatching tourists primarily wanted to see dolphins behaving naturally in their natural habitat, and that an uncrowded, boat-based trip was the best way to do this; they noted the lower levels of satisfaction cited by participants in the large, high capacity whalewatching vessel. They considered that the survey provided evidence that seeing wild dolphins heightened tourists appreciation for the environment and promoted pro-environmental intentions. In light of this they made several recommendations which included training courses for whalewatching staff, with information on how to promote and heighten tourists experiences and to maximize the positive (educational and environmental) impacts of trips; to make provision of high-quality education mandatory on board boats, with minimum levels of information to be provided (which would presumably require oversight and monitoring with testing, for example); to provide incentives to develop high quality interpretation/ commentaries and other materials; to have multiple levels of accreditation and

awards to encourage operators to aim ever higher; and to evaluate the environmental performance of whalewatching platforms (e.g. more environmentally friendly vessels) as part of the accreditation program for whalewatching operators (Mayes & Richins, 2009).

Economic Value of Whalewatching

Einarsoon (2009) documents the current changes in perceptions of whales from pest to resource in Iceland with the emergence of whalewatching operations. The economy of Iceland is dependent on fishing - cod is of significance to this fishing industry and accounts for 36% of total fish catch (Einarsoon, 2009). Decreases in cod stocks, however, have resulted in a reduction of the allowable take of cod and this has resulted in a negative financial impact upon Icelandic fishing communities (Einarsoon, 2009). In 1990, the IFAW (International Fund for Animal Welfare) reported that cetacean tourism in Iceland was feasible, although at the time whales in Iceland were perceived as fishery competitors and a pest species (Einarsoon, 2009). Cetacean tourism was developed in Iceland as it was thought that this practical and productive use of marine mammals could yield financial benefits and the opportunity to transcend business prospects from declining fisheries to tourism without the financial outlay of purchasing a vessel (Einarsoon, 2009). In fact some funds were provided to help companies initiate whale tourism activities (Einarsoon, 2009).

Of the seven locations that whale tourism has become established in Iceland Einarsoon (2009) specifically documents activities in Húsavík in northeastern Iceland, and in particular, two Húsavík-based whalewatching companies. Einarsoon (2009) considers the presence of these industries as an economic success due to the perceptual shifts in the communities of live whales as pest to an economic resource; the economic diversification that these industries have projected into these fishing communities; the positive infrastructure changes in Húsavík (e.g. the establishment of a popular whale museum); and the spectrum of new and increased employment opportunities in the area. It is also proposed that the new jobs created via whalewatching tourism have compensated for the job losses within the fishery sector (Einarsoon, 2009). However, the development of this industry has resulted in conflicts with traditional Icelandic practices in the region (e.g. hunting of dolphins for consumption or shark bait) that are within view of tourists (Einarsoon, 2009). Also crowds of tourists on the foreshore have made this fishing practices

difficult (e.g. moving fishing gear). Meetings with stakeholders have resulted in fishermen hunting small cetaceans further away from the village (Einarsoon, 2009).

At the International Whaling Commission, and other venues, claims have been made that cetaceans negatively impact fisheries (e.g. Tamura & Ohsumi, 1999; Morishita & Goodman, 2003), although scientists have supplied data to have imply the overlap between cetacean prey species and human fisheries is minimal (Young, 2000; Kaschner & Pauly 2005; Gerber, Morissette, Kaschner & Pauly, 2009). A study by Lee (2010), however, introduces an interesting paradigm shift to the above debate, and models the impacts of fisheries (specifically herring removals) on the whalewatching industry in the Gulf of Maine. Cost is pertained as an increase in search effort (i.e. the time it will take a whale watch vessel to locate a whale) and the ramifications of this consequence (e.g. fuel costs; Lee, 2010). Extreme trawling for herring equates to a reduction in both herring abundance and, thus, mobile predators (i.e., whales; Lee, 2010). Fin whales (*Balaenoptera physalus*), humpback whales and northern minke whales (*B. acutorostrata*), targeted by whalewhatching operations, have shown strong site fidelity at regions in the Gulf of Maine, which overlaps with sites used by the herring fishing industry (Lee, 2010). The rationale for these areas of high site fidelity is prey availability. Search time (for whales) was monitored in five of the seven whalewatching companies in the study area. - vessel speed was consistent across the study. The search effort times were input into a localised depletion hypothesis model as the dependent variable (Lee, 2010). Further data was collected on the fishery effort and catch data, oceanographic data and vessel trip reports. Results indicated that whale search effort was variable and dependent on the whalewatching operator (Lee, 2010). In was concluded that states that fishing may have an unfavourable impact on search time; however, it was considered that the scale of this outcome would be minimal (Lee, 2010). Therefore, according to the results, a policy of excluding fishing activity in the whalewatching would have minimal negative impacts on the time taken to search for whales. The results from the study would be of interest to policymakers in the realm of ecosystem-based fisheries management.

Conclusion

A number of studies over the past year have again indicated that disturbance from whalewatching activities could have an impact on cetacean fitness through reducing their ability to forage, rest or communication important information, such as calls involved in reproductive behaviour.

Moreover scientific studies have produced evidence that support whalewatching guidelines with distance requirements and speed limits. If anything these studies suggest that distance requirements should perhaps be increased in some locations. Moreover, the studies suggest that factors such as the number of vessels in a location (i.e., crowding) should also be included in guidelines. Finally, several studies seem to indicate that even with guidelines in an area, compliance can be poor, thus reinforcing the need for perhaps legal regulations that are enforced. In 2008, the Scientific Committee of the International Whaling Commission made the following recommendation with respect to whalewatching codes of conduct:

> "*The Committee recommends that , in general, codes of conduct should be supported by appropriate legal regulations and modified if necessary as new biological information emerges*" (p. 59 in International Whaling Commission, 2009).

The studies produced over the past year add evidence that in some locations enforced legal regulations would be preferable, and moreover, that in light of recent scientific discoveries, modification of whalewatching guidelines, especially activities targeting some populations such as the southern resident killer whales, need urgent revision.

Moreover, the study by Mayes & Richins (2009) provides more data on the possible non-economic benefits that whalewatching can bring in terms of education and promoting pro-environmental behaviour. The recommendations that they make, such as mandating minimum levels of information provision on whalewatching vessels, monitoring the provision of education/conservation commentaries and developing incentives to promote better interpretation of the marine environment, should be seriously considered by whalewatching managers. Their idea that the environmental impact of the whalewatching platform (i.e., how "environmentally-friendly" is the whalewatching boat) to be considered during accreditation is also an important concept – which should at the very least consider whether the vessel produces pollutants (e.g. air pollution or chemical leaks) and also the level of noise the vessel inputs into the water. In 2005, the Whalewatching sub-committee of the International Whaling Commission developed a definition of "whale ecotourism" which was defined as an operation that had taken steps to:

> " *(a) Actively assist with the conservation of their resource (cetaceans),*
> *(b) Provide appropriate, accurate and detailed interpretative/educational materials or activities for their clientele about the cetaceans viewed and their associated habitat;*
> *(c) Minimize their environmental impact (such as reducing emissions or disposing of refuse appropriately);*

(d) Adhere to whalewatching regulations or an appropriate set of guidelines, if no specific regulations are available for the area; and
(e) Provide some benefits to the local host community within which the company operates" (p. 251, Parsons *et al*., 2006).

The recommendations of Mayes & Richins (2009), if enacted by managers, would be an important step in turning "whalewatching" operations into "whale ecotourism" operations and hopefully increase the sustainability of this industry.

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