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The Global Potential for Whale Watching

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The global potential for whale watching

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Abstract

Whaling as a commercial enterprise is now defunct, not least due to the moratorium placed on it by the International Whaling Commission (IWC) almost 20 years ago. However, two distinct groups, one in favor of 'sustainable' whaling and one completely opposed to any killing of whales, continue to argue at the IWC and other political arenas. Almost ignored in this debate is the current growth of the whale watching industry, a logical alternative use for whale populations. Based on ecological and socio-economic criteria, the potential for whale watching is estimated for maritime countries that do not currently engage in this industry. Results suggest that whale watching could generate an additional 830 million USD (2009) in yearly revenue, supporting 11,000 jobs. Together with current global estimates, this would bring the total potential for the whale watching industry to almost 3 billion USD in yearly revenue and about 24,000 jobs around the world. These results are discussed from an economic and conservation policy perspective, with emphasis on potential benefits and limitations.

Keywords: *Whale watching, economic potential, conservation incentives.*

1. Introduction

As with practically all other marine organisms, whales have historically been subject to human use. Whales have long been, and still are, hunted by some aboriginal groups around the world, including communities in Canada, USA, Greenland, Russia, South-Eastern Asia and the Caribbean [1]. Although their meat, blubber and bones are used, a great value is placed on the hunt itself, which often is a ceremony unto itself and pays homage to community identity and historical traditions [2]. However, much of the current controversy around whales and whaling concerns the much larger industry that operated from the late 1600s until the late 1900s. This was an unequivocally commercial enterprise, and led to the decline of many whale populations around the world [3, 4].

In 1946, what is now known as the International Whaling Commission (IWC; *www.iwcoffice.org*) was created with the mandate of regulating whaling nations and ensuring that their hunts are sustainable. However, due to shifts in country membership and the persistent inefficacy of management measures, the IWC evolved into a preservationist body, culminating with the 1982 proclamation of a global moratorium on the commercial whale hunt. While this was intended to be a temporary measure pending new scientific data, the moratorium has until now not been lifted. Nevertheless, in addition to aboriginal communities, a few countries have continued to hunt whales, either through legal maneuvering or outright objection to the resolution [5]. The IWC voting system has a remarkably political undertone, with pro-whaling (led by Japan, with support from Iceland and Norway) and anti-whaling (led by a coalition of 'like-minded' countries including Australia, New Zealand and the USA) voting blocs [6], each supported by NGOs (representing aboriginal groups in the former, and conservation groups in the latter camp). While these blocs have traditionally included a set of core countries, each side has accused the other of using aid and distorted scientific information to influence the vote of a host of small developing countries which often have not historically had a particular stance on the whaling issue [7, 8].

Pro-whaling arguments contend that the whale hunt is part of a national identity [9], that some whale populations can be hunted sustainably under strict and precautionary

scientific guidelines [10], and that such whaling would, as a side benefit, increase the fish available to fisheries, because, after all, "whales eat fish" [9]. Opposition to whaling hinges on several issues, the main ones being a fundamental aversion to the killing of charismatic and intelligent animals [11], and the past failure of the IWC to ensure sustainable whaling [12]. As for the whales-eat-fish argument, it has been repeatedly shown to be without substance [13, 14, 15]. Moreover, a strong case can be made for sparing whales, which can be a source of significant benefits sustainable over time through the whale watching industry, which requires, and in fact profits from, their continued existence and protection [16].

Whale watching[1] is a rapidly growing industry around the world, currently generating an estimated ~2.1 billion USD (2009) in expenditures and supporting about 13,000 jobs worldwide [16]. The increasing preference of affluent individuals for 'environmentally-friendly' leisure activities suggests that there is further potential for this sector, which in some regions has shown a much higher growth rate than tourism in general. Indeed, many countries have invested in this industry for more than a decade, with generally positive results [17,18]. But can all coastal countries access this market? Using available data on global marine mammal distribution and the current whale watching industry, an estimate of the potential benefits from whale watching is provided for maritime countries that have yet to undertake whale watching operations, or have done so only marginally.

2. Methods

2.1. Input data

A number of large-scale studies of the global whale watching industry were used for this analysis. They included values (measured or estimated) for participation, expenditure (direct and indirect) and employment in whale watching [16, 17, 18, 19]. With the exception of [19], these studies were all prepared for the International Fund for Animal Welfare (IFAW; *www.ifaw.org*) and represent the most comprehensive global surveys of whale watching available; unless otherwise stated, data used in this study are from these reports.

[1] Whale watching is defined here as watching any marine mammal from a boat or shore; depending on the context, 'whales' may include marine mammals other than large cetaceans.

Indicators of whale watching industry performance were calculated for each of the countries in which whale watching occurs. These indicators are: average expenditure per capita, ratio of indirect to direct expenditure, and the number of yearly whale watchers needed to support one job. These indicators were averaged by FAO sub-region, or 'areas' (FAO; *www.fao.org*) and applied to countries which have yet to establish whale watching operations, or where these are marginal (<50 whale watchers/year, in four cases), here called 'non-whale watching' (NWW).

In light of the spotty nature of quantitative information regarding marine mammal occurrence, predictions about large-scale species distribution have been generated based on a Relative Environmental Suitability (RES) model [20]. This model computed probable habitat from a range of oceanographic factors, and outputs were then tested against available observation data to validate predictions for over 100 species of marine mammals. The number of marine mammal species (MS) and their relative abundance (MA) within each country's EEZ, jointly with the yearly total tourist arrivals to that country (World Tourism Organization (WTO); *www.world-tourism.org*), was used to predict the number of whale watchers in a country in one year.

Estimates were calculated using a binomial generalized linear model (GLM) which defined success as the number of whale watchers in a country (w_1) and failure as the number of total tourists to a country who did not go whale watching (w_0); values of MS and MA were used to explain the probability of success. The resulting regression coefficients β were then used together with yearly tourist arrivals *T* in a country *i* to estimate the potential number of whale watchers *W* as:

$$W_i = T_i * \left[\frac{(e^{\alpha+\beta_1 MS_i+\beta_2 MA_i)}}{(1+e^{\alpha+\beta_1 MS_i+\beta_2 MA_i)}}\right] \quad (1)$$

2.2. Regional analyses

To address differing socio-economic characteristics across countries, sub-regional values were used as the baseline for calculating expenditure and employment in NWW countries through a benefit transfer approach. Direct benefit transfer is a form of valuation technique in which data gaps for specific points are filled with values from others that are assumed to be similar, i.e., in independently-defined sub-regions, or strata [21, 22]. While benefit transfer has its shortcomings, it is nonetheless necessary in dealing with data-poor situations and has been used widely in global-scale studies [23]. In this case, potential direct (*DE*) and indirect expenditure (*IE*), and employment (*J*) from whale watching for each country *i* in sub-region *j*, were computed based on the previous estimate of yearly whale watchers (*W*) as:

$$DE_{ij} = W_i * (W_j / DE_j) \quad (2)$$

$$J_{ij} = W_i * (W_j / J_j) \quad (3)$$

$$TE_{ij} = DE_{ij} * (IE_j / DE_j) \quad (4)$$

In the case of employment, sub-regional averages were estimated based on values which were themselves estimated based on a review of several large-scale studies and site-specific case studies [19]. To maintain consistency with other global whale-watching studies, 'direct expenditures' were defined as money spent on the whale watching activity itself (e.g. ticket price), while 'indirect expenditures' are the total amount spent on trip-related goods and services, such as accommodation, food, and travel costs [17]. The mean for Melanesia and Polynesia was used for Micronesia, as no sub-regional values were available in this case.

The assumption that investing in whale watching will necessarily boost total tourism has been avoided; instead, the potential for the industry is considered as an additional source of revenue from current tourist arrivals, bounded by marine mammal distribution and abundance.

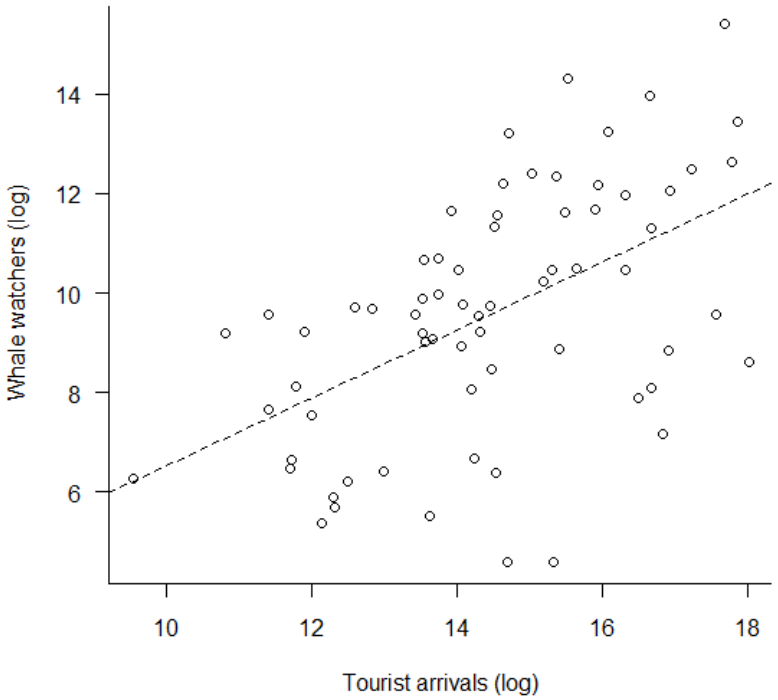
3. Results

In total, 144 maritime countries were included in the analysis, spanning 21 sub-regions around the world. Of these countries, 68 have already invested in the whale watching industry. A summary of whale watching indicators by sub-region is presented in Table I. All results are presented by regional values, which (with the exception of Micronesia; see Section 2) represent the average of specific country estimates in that region.

Table I. Regional indicators for whale watching industry performance: countries with whale watching compared to total countries in the region (CWW(TC)); percentage of whale watchers relative to total tourist arrivals (WW/T%); yearly whale watchers per job created (WW/Job); number of marine mammal species (MS) and the sum of their relative abundance (MA) within a country's EEZ. Expenditure is in USD (2009).

FAO Area	CWW (TC)	WW/T %	Expenditure/ Capita (USD)	WW/ Job	MS	MA
Africa	**11 (38)**	**2.62**	**115**	**623**	**33**	**0.26**
Eastern Africa	5 (10)	2.17	119	623	33	0.26
Middle Africa	1 (7)	0.14	78	150	28	0.09
Northern Africa	1 (6)	0.29	98	334	25	0.10
Southern Africa	2 (2)	5.31	90	2,405	49	0.97
Western Africa	2 (13)	3.46	160	180	27	0.03
Americas	**24 (33)**	**3.24**	**282**	**1,283**	**36**	**1.11**
Caribbean	7 (13)	4.00	271	1,438	26	0.04
Central America	6 (8)	1.40	305	348	32	0.56
North America	2 (2)	8.53	162	3,657	61	5.33
South America	9 (10)	2.69	303	1,259	41	1.36
Asia	**16 (34)**	**1.44**	**63**	**1,549**	**31**	**0.62**
Eastern Asia	4 (5)	3.06	72	4,215	44	1.14
South-Eastern Asia	5 (9)	1.13	54	650	29	0.78
Southern Asia	4 (6)	1.10	45	217	31	0.31
Western Asia	3 (14)	0.25	94	1,267	17	0.08
Europe	**11 (26)**	**1.46**	**225**	**1,016**	**37**	**1.45**
Eastern Europe	1 (5)	0.01	892	86	39	5.26
Northern Europe	5 (10)	2.71	129	937	40	1.38
Southern Europe	4 (7)	0.63	161	1,557	23	0.37
Western Europe	1 (4)	0.01	295	173	76	2.30
Oceania	**6 (13)**	**12.75**	**101**	**1,544**	**39**	**1.57**
Australia and New Zealand	2 (2)	25.75	127	4,334	57	4.32
Melanesia	2 (4)	2.19	55	81	30	0.33
Micronesia	0 (5)	6.25	88	149	30	0.20
Polynesia	2 (2)	10.32	120	218	30	0.07
Total	**68 (144)**	**3.26**	**179**	**1,219**	**35**	**0.95**

149 Current data suggests that the number of whale watchers is significantly related to the
150 magnitude of a given country's overall tourism industry (Fig. 1), which is comforting given the
151 large spatial scale of the analysis. Nevertheless, the occurrence and abundance of whales are
152 logical constraints to the potential for whale watching growth. These parameters are therefore
153 included as explanatory variables for whale watchers in a binomial GLM; the resulting
154 coefficients were used to estimate the potential yearly whale watchers in each country (Fig. 2).
155 The number of total tourist arrivals, as well as the number of marine mammal species and their
156 relative abundance within a country's EEZ were significantly ($p<0.001$) and positively correlated
157 to the number of whale watchers.



158

159 **Figure 1.** Relationship between total tourist arrivals and whale watchers (observed) by country [16, 18,
160 *www.world-tourism.org*]. R^2= 0.29.

161

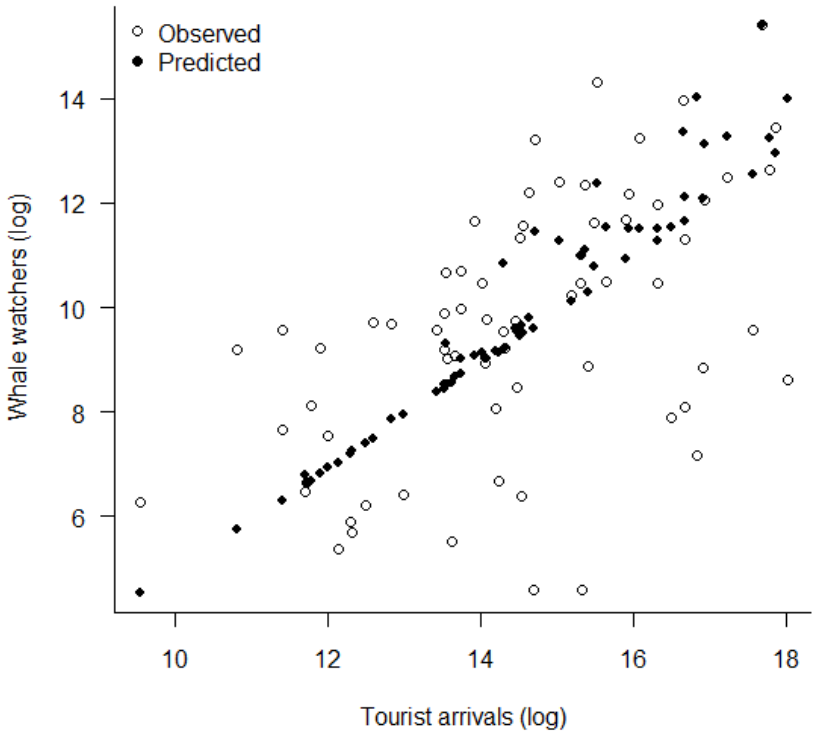


Figure 2. Observed and predicted yearly whale watchers for countries which currently engage in the activity.

Based on the resulting estimated potential whale watchers, sub-regional data were used to calculate the potential expenditure and employment for NWW countries. These results are presented in Table II.

Table II. Estimated potential yearly whale watchers (WW), expenditures and employment generated by whale watching.

FAO Area	WW (1000)	Direct expenditure (1000 USD)	Total expenditure (1000 USD)	Employment
Africa	**292**	**16,375**	**31,387**	**1,039**
Eastern Africa	4	153	440	37
Middle Africa	7	375	550	47
Northern Africa	237	13,773	23,272	711
Western Africa	44	2,074	7,125	244
Americas	**94**	**11,498**	**55,380**	**125**
Caribbean	65	7,729	31,146	35
Central America	27	3,465	15,004	89
South America	2	304	9,230	1
Asia	**1,019**	**34,533**	**93,920**	**1,068**
Eastern Asia	100	2,263	6,716	24
South-Eastern Asia	163	6,406	20,980	306
Southern Asia	32	826	2,016	167
Western Asia	724	25,038	64,208	572
Europe	**1,322**	**302,304**	**650,315**	**9,221**
Eastern Europe	522	218,612	466,247	6,099
Northern Europe	167	7,867	22,788	178
Southern Europe	126	4,540	11,768	14
Western Europe	507	71,286	149,511	2,930
Oceania	**10**	**573**	**597**	**122**
Melanesia	9	491	491	111
Micronesia	1	82	106	11
Total	**2,737**	**365,283**	**831,599**	**11,575**

* Total expenditure is equal to the sum of direct and indirect expenditure, where direct expenditure is the amount spent on a whale watching trip (e.g., ticket price) and indirect expenditure is the amount spent on trip-related costs (e.g., travel and accommodation) attributable to whale watching [17].

To allow for comparison across regions, the number of marine mammal species and their abundance within the EEZ, as well as yearly tourist arrivals, were calculated relative to all countries in the analysis. In the case of potential whale watchers, values are relative to other countries for which estimates are provided (Fig. 3).

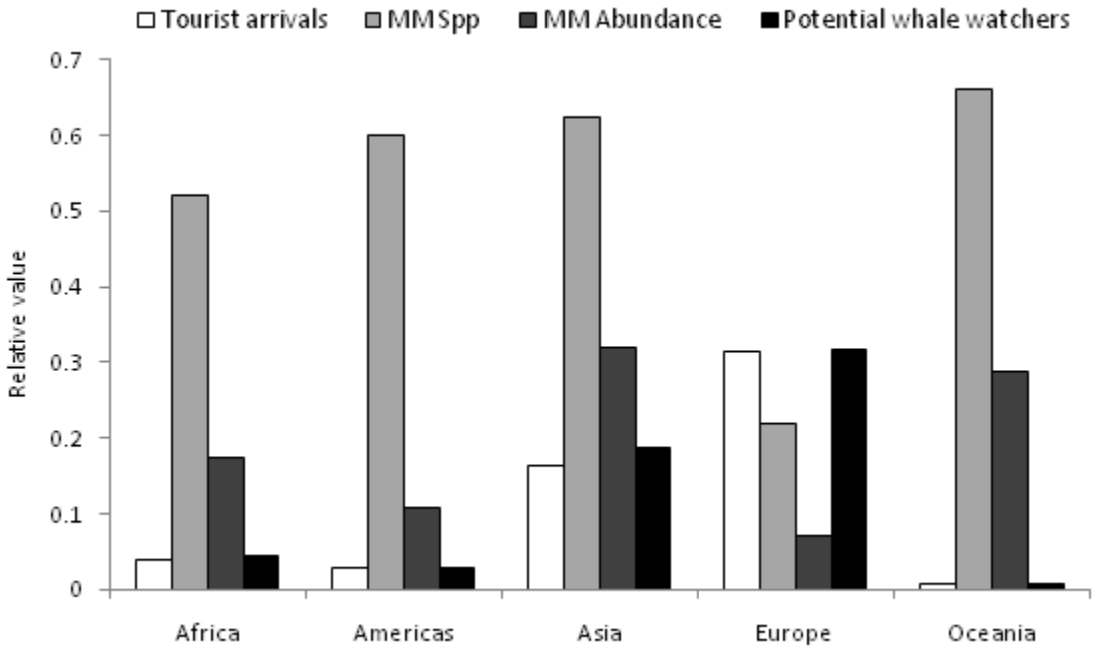


Figure 3. Average yearly tourist arrivals (white), species of marine mammals (light grey), abundance of marine mammals (dark grey) relative to all countries included in the analysis, and potential whale watchers (black), relative to the number in countries that do not currently engage in whale watching.

4. Discussion

Many countries around the world have invested in whale watching for several decades, and currently host about 13 million whale watchers a year, generating a total of over 2.1 billion USD (2009) and supporting about 13,000 jobs [16]; around 20% of these totals are accrued by developing countries (as defined by the UN; [24]). The results of this study suggest that an additional 830 million USD and 11,000 jobs (Table II) could potentially be generated by starting whale watching operations in countries that do not currently do so. Together with current

reported figures, these estimates would bring the total benefits from whale watching to almost 3 billion USD a year, supporting over 24,000 jobs around the world. Because the assumption that more whale watchers would necessarily result in more total tourists has been avoided, these estimates reflect the potential for whale watching as added value given current tourist arrivals to a country. A key finding is that about half of these estimated potential benefits would be captured by developing countries.

Based on worldwide marine mammal distributions, almost any coastal country could theoretically engage in whale watching (Fig. 3). However, the potential for this industry is also bounded by the total number of tourists that currently visit a country (Fig. 1), which is dependent on factors such as ease of access and security. In the case of small and remote island states in Melanesia, Micronesia and the Caribbean, the whale watching experience, e.g., of tourists from Europe and North America, would be strongly enhanced by the surrounding coastal and marine environments, which are in themselves appealing. However, this would be subject to the constraints and potentially strong fluctuations in overall tourism, which are driven externally by relatively high travel costs and the availability of alternative destinations [25, 26]. Conversely, marine mammals in a given country may not be sufficiently abundant to support a whale watching industry despite overall tourism. Regardless of the fact that some species may draw more whale watchers than others, the extensive global distribution of marine mammals [20] suggests that few regions should have this problem (Fig. 3).

Obviously, the highest potential for whale watching exists in regions which have a relatively high abundance of whales and/or tourists (Fig. 3; Table II). However, even seemingly 'marginal' benefits can be very important to the countries considered here, and may be relatively easy to achieve [27]. Insufficient guidance on adequate implementation, as well as a lack of foresight as to the potential benefits from it, seem to be the main reasons for these countries not entering the whale watching market [25]. An important point to consider when establishing whale watching as an industry in any area is that it should be done in a precautionary manner to avoid potential negative impacts on marine mammals [28, 29] or the marine ecosystem in general [30] and ensure that the industry be sustainable at a benefit-

maximizing level. Particular attention should be paid to user preferences in order to avoid placing unnecessary stress on whales or other marine mammals. It has been shown that aggressive whale watching, potentially harmful for whales, does not result in increased consumer satisfaction [31, 32].

Although whale watching can evolve into a very large commercial enterprise, in many developing countries it can be launched with little initial investment and can be carried out by local fishers who are already familiar with the area [18, 33]. This can therefore be an excellent alternative to expand income sources in the face of declining fisheries [34], which are the pillar of livelihoods for communities in many coastal developing countries [35]. Indeed, the involvement of local communities is vital for the implementation of conservation measures in an ecotourism context, as it is often these people who have the most to lose from restrictive management policies [36].

A fact which must be stressed is that investing in the development of whale watching does not guarantee that it will bring in additional tourism. Rather, available data suggests that the number of tourists that already visit a particular country explains a large part of the number of whale watchers there (Fig. 1). Judging by the number of whale watchers as a percentage of total tourists to a given country (about 3% worldwide; Table II), the converse is probably not true, though whale watching may indeed become an additional attraction to a given site. An important point to consider is that tourism activities in general require both material and social infrastructure, which must be in place before any significant benefits can be realized from whale watching [37].

It has been reported that the stance of a particular country towards whaling significantly influences that country's appeal to whale watchers [38], although countries supporting whaling at meetings of the IWC [8, 39] have nonetheless become involved in the whale watching industry, generating yearly totals of about half a million visitors, 40 million USD in total revenue and 400 jobs [16]. While this suggests that maintaining a pro-whaling stance (or at least voting as such in the IWC) and investing in whale watching by a country are apparently not mutually exclusive (and may in fact be a rational choice; [40]), commercial whaling of the sort that

255 occurred in the past will lead to further declines in whale populations [41], directly and
256 negatively impacting whale watching around the country in question, and the world.

257 Although it is becoming increasingly obvious that animals such as whales have intrinsic
258 value, the fact remains that, in many regions of the world, a low potential for profits from non-
259 extractive resource use translates into little incentives for conservation [42]. Given these
260 conditions, it would be interesting to explore the potential role of international side payments,
261 in the form of payments for ecosystem services [43], from countries that accrue significant
262 benefits from whale watching to those which do not, as an incentive for conservation [44].
263 While this study offers an estimate of potential revenue from whale watching, there is much
264 less information regarding the possible costs (e.g., foregone fishing opportunities or foreign aid
265 contingent on expressions of support for whaling) of marine mammal conservation, necessary
266 for a full cost-benefit analysis to be undertaken. This is clearly an interesting future research
267 project, particularly as the widespread development of whale watching industries may
268 contribute to a shift of votes at the IWC, and a dissolution of the blocs which have made it
269 largely dysfunctional.

270 **5. Concluding remarks**

271 Whale watching is undoubtedly an industry capable of generating socio-economic and
272 ecological benefits to a country over time. However, a lack of proper infrastructure and/or a
273 perceived lack of opportunity for entering the market have prevented some countries
274 (particularly in the developing world) from realizing potential benefits from whale watching.
275 With proper guidelines in place, and even without assuming any subsequent increases in total
276 tourist arrivals, the continued protection of marine mammals can translate into benefits which
277 are significant, sustainable, and relatively easy to attain.

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