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## The use of marine wildlife-watching codes and their role in managing activities within marine protected areas in Scotland

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31 March 2016

Dear Editors of Ocean and Coastal Management,

It is with pleasure we submit the following research manuscript:

*The use of marine wildlife-watching codes and their role in managing activities within marine protected areas in Scotland.*

This work is a result of four authors whose backgrounds and experiences bring together marine science, management, policy and practice, as we collectively come from academia, government and non-government.

As Scotland is a global leader on practices around ocean and coastal management that integrate both conservation and blue growth horizons, one of the key emerging issues and opportunities is the nexus of marine nature based tourism with marine wildlife, e.g. megafauna in particular.

Currently there is a confluence of international and national aspirations in creating new modes of dynamic marine protected areas that take into account the life history considerations (temporal and spatial) of 'marine mammals, sharks, turtles'. Scotland's new 'Sea of the Hebrides' MPA is noteworthy as it is listed for: minke whales, basking sharks, and significantly the productive bathymetric features that support plankton prey as well as sea-floor elements, providing a robust illustration of integrated 'ocean and coastal management'. Similar trends are evident in Australia, North America and Europe. Interestingly this niche is cultivating audience interest in participatory marine fauna watching, beyond boat and shore based observations, but increasingly 'swim-with' experiences. This brings about new opportunities and challenges to better understand the intersections (literally) with the animals and observers, increasingly requiring new 'codes of conduct' to ensure positive experiences for animals and people alike.

With the Sea of Hebrides as an inspiration, we found ourselves taking a deeper look at the literature (academic and practitioners), finding that the guidance on such interactions was inconsistent, largely anecdotal, even within Scotland (and globally), and often relying on voluntary compliance by operators. Most critically there were very few studies on observed monitored interactions of the guidance to see if it was complied with, and even if so, to assess if it was effective and positive in outcome – again for both marine animals and people.

Thus our research reviews both the policy and practice currently emerging in Scotland, but is framed within this global trend. We hope you find it interesting and worthy of publication, to encourage more engagement in between scientists, ecotourism operators, statutory bodies and local communities on this rich arena.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'Meriwether Wilson'.

Dr. Meriwether Wilson  
Senior Lecturer in Marine Science and Policy  
Programme Director | MSc in Marine Systems and Policies

**The use of marine wildlife-watching codes and their role in managing activities within marine protected areas in Scotland**

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## Highlights

- The five main UK marine wildlife watching codes are inconsistent in guidance
- All Scottish codes advise against deliberate human interactions (such as swim-with)
- There is limited monitoring and evidence on the effectiveness of codes in practice
- A formal, single comprehensive code could better support implementation and awareness
- Further research is needed on environmental impacts of marine wildlife watching

1 **Highlights**

- 2 • The five main Scottish codes are inconsistent in key messages and policies  
3 • All Scottish codes advise against deliberate human interactions (such as swim-with)  
4 • A single, comprehensive code would be more suitable and measurable  
5 • Further research is needed on environmental impacts of marine wildlife watching  
6

7 **Abstract**

8 Marine wildlife-watching is a developing industry in Scotland contributing to overall growth and  
9 aspirations of the marine tourism sector. Despite European-level legal protection of cetaceans, and  
10 Scottish legislation for the protection of seals at designated haul-out sites, there are currently no  
11 formal or mandatory regulations to specifically manage tourism activities in relation to marine  
12 wildlife. However, most Scottish wildlife-watching operators adopt one, or more, five key voluntary  
13 codes of conduct which have been developed in the UK since 2003. In this paper, we review the  
14 consistency of policy messages and recommendations across voluntary codes of conduct for the UK  
15 and Scotland, taking into consideration global use and effectiveness in the use of similar codes. In  
16 this context, we specifically examine the potential impacts of wildlife watching and management of  
17 future activities, both within and outwith marine protected areas (MPAs) in Scotland. For this, the  
18 research also incorporates data from field surveys, *in-situ* observations and operator questionnaires  
19 conducted in Scotland relating to the implementation of the codes in practice. Key findings  
20 highlighting consistencies in some of the key recommendations across the five UK codes in particular,  
21 the distance and speed when approaching an animal. However, all of the codes also have some  
22 similarities, including advising against deliberate human interaction, e.g. swimming with marine  
23 megafauna, including a separate code on basking sharks, published by the Shark Trust in the UK.. In  
24 light of the growing network of wildlife-focused MPAs in Scotland (in particular the Sea of Hebrides  
25 proposed MPA for mobile species), and national aspirations for the growth of the marine tourism  
26 sector, we consider the potential implications of unregulated wildlife watching and the conservation  
27 objectives of protected areas for marine mammals and basking sharks. We also provide  
28 recommendations on how more formal wildlife-watching regulations could enhance MPA  
29 effectiveness and contribute to the emerging processes for Regional Marine Plans across Scotland and  
30 provide some insights for global marine wildlife tourism.

31

32 **Keywords:** marine mammals; basking shark; wildlife watching; code of conduct; conservation,  
33 disturbance, marine protected areas; marine planning

34

35

## 36 1. Introduction

37

38 Wildlife-watching is a relatively recent development within the global tourism industry, which  
39 involves the organised or incidental viewing of animals in their natural environment. It is broadly  
40 considered to be an ‘environmentally-friendly’ form of tourism and is increasingly contributing to  
41 tourism portfolios and economies for many countries (Duffus and Dearden, 1990; Tapper, 2006).  
42 Wildlife-watching and ecotourism can have multiple benefits, such as supporting conservation efforts  
43 through data collection, employing and uniting local communities, and increasing public awareness  
44 about environmental issues (Stem *et al.* 2003; Stronza and Gordillo, 2008). Marine wildlife-watching  
45 tours can be used as platforms for scientific research and used to educate the public on conservation  
46 issues relating to cetaceans (whales, dolphins and porpoises - IWC, 2013). This can sensitise people to  
47 the conservation threats of these species, and as a result, raise environmental awareness (Garrod &  
48 Fennel, 2004). However, emerging evidence indicates that there can be potential negative impacts of  
49 human interactions with wildlife, primarily on the species of interest to marine wildlife-watching,  
50 which can have immediate and cumulative effects on the animals behaviour (Green and Giese, 2004).

51

52 Unlike other boat traffic, marine wildlife-watching boats repeatedly target and remain with an animal  
53 rather than passing by (Wursig & Evans, 2001; Erbe, 2002; Lusseau & Bejder, 2007). Boat presence  
54 can interfere with the ability of marine wildlife to communicate due to boat noise, and disrupt  
55 behaviour such as feeding, during which an animal may avoid interacting with a boat (Erbe, 2002;  
56 Lusseau, 2004; Williams *et al.*, 2006; Parsons, 2012). These changes in energy expenditure can have  
57 short- and long-term negative impacts on individuals and populations, potentially reducing fitness, the  
58 reproductive capability of individuals and the overall health of a population, and pose a threat to small  
59 populations (Erbe, 2002; Lusseau & Bejder, 2007).

60

### 61 1.1 International Regulation of Marine Wildlife-Watching in MPAs

62 A ‘protected area’ is defined by the IUCN as ‘*a clearly defined geographical space, recognised,*  
63 *dedicated and managed, through legal or other effective means, to achieve the long-term conservation*  
64 *of nature with associated ecosystem services and cultural values*’. There are a number of ways that  
65 marine tourism is managed around the world through marine protected areas (MPAs) and other  
66 marine designations (such as marine reserves) (Hoyt, 2012). Zoning, permits, codes of conducts, and  
67 enforced minimum approach distances are all strategies used to manage marine wildlife-watching  
68 activities within protected areas for cetaceans (Reeves, 2000; Notarbartolo-di-Sciara *et al.* 2008;  
69 NOAA, 2014). There are a number of examples globally where there has been poor compliance to  
70 statutory and voluntary regulations, such as in South Australia where authorities have had to limit the  
71 number of marine wildlife-watching operators in the area Allen *et al.*, 2007. In 2004, approximately

72 one-third of global cetacean-watching codes were regulatory, with two-thirds adopted on a voluntary  
73 basis (Garrod and Fennel, 2004; Parsons, 2012).

74

75

76 Species-specific codes of conduct provide more targeted management enabling the establishment of  
77 stricter regulations to limit disturbance to species within particular locations (Giles, 2014). For  
78 example, in the Hawaiian Islands Humpback Whale Marine Sanctuary, there is a legally enforced  
79 minimum approach distance of 100 yards for approaching humpback whales in the sanctuary, which  
80 is applicable for both recreational and commercial boat users (NOAA, 2014). These more specific  
81 codes of conduct can be designed to allow for seasonal species distributions and tourism cycles,  
82 making the management more targeted to the preferences of the animals.

83

84 The allocation of an MPA can act as a marketing tool that raises awareness for marine wildlife-  
85 watching activities as protected areas are often synonymous with tourists as high-quality examples of  
86 a particular habitat, encouraging growth of the industry (Warburton *et al.*, 2001; Reinius & Fredman,  
87 2007). In the process, however, the profile of an MPA can increase pressure and the degradation of  
88 the environment (Buckley, 2012). For example, MPA designation in the Medes Islands, Spain, in the  
89 1980's resulted in large increases in unregulated diving activity that damaged benthic communities  
90 (Badamenti *et al.*, 2000; Milazzo *et al.*, 2002).

91

92 The ideal situation is for a particular marine environmental setting and species to be managed in such  
93 a way that the species can actually benefit from tourism and MPA designation. Potts *et al.* (2014)  
94 suggest that '*protection will maintain an ecosystem in good ecological condition, which will have a*  
95 *positive effect on the delivery of ecosystem services,*' which in this case is the marine wildlife-  
96 watching industry. Therefore, there is the potential that optimal protection of the environment will  
97 benefit both the environment and the industry if appropriate regulations are in place and adhered to.

98

### 99 *1.2 Marine protected areas in Scotland*

100 In Scotland, there is a growing network of MPAs, some of which are designated or proposed for the  
101 conservation of cetaceans, pinnipeds (seals) and chondrichthyan (sharks, rays and skates); these sites  
102 are summarised in Table 1. Given the dynamic nature of marine wildlife in time and space across  
103 different life-history stages, the management connection with typically static zoning and spatially  
104 oriented activity management is a growing area of interest to researchers and practitioners alike  
105 (Cañadas *et al.* 2005; Hooker *et al.* 2011). MPAs are increasingly considered to be an important tool  
106 for biodiversity protection under a number of international frameworks and are beginning to



107 demonstrate some effectiveness where monitoring has been carried out (Gormley *et al.*, 2012;  
108 O'Brien and Whitehead, 2013). A number of studies have demonstrated that spatial protection and  
109 management within MPAs can lead to an increase in higher predator populations (such as sharks), and  
110 furthermore can be highly attractive for marine tourism with economic opportunities through local  
111 management (Brunnschweiler, 2010; Jaiteh *et al.*, 2016).

112

113 All European cetacean species, pinnipeds and basking sharks are currently protected from deliberate  
114 or accidental harassment, injury or death through national transposition of the EU Habitats Directive  
115 (1992) and the Nature Conservation (Scotland) Act 2004. Some are listed as qualifying species for  
116 spatial protection within Special Areas of Conservation (SACs), including bottlenose dolphin and  
117 harbour porpoise. Furthermore, in Scotland, since the introduction of the Marine (Scotland) Act  
118 2010, nature conservation marine protected areas (ncMPAs) have been identified for selected mobile  
119 species based on evidence of significant areas where species aggregate for key functions or life stages  
120 (e.g. feeding or spawning). Nature conservation MPAs mandate considerations for licensable  
121 activities, through the environmental impact assessment stage, and a separate process is currently  
122 underway in Scotland to determine ncMPA and SAC management measures for non-licensable  
123 activities, including commercial fisheries. At present, based on the current implementation of MPA  
124 management options in Scotland, it appears no additional statutory management considerations will  
125 be given to recreational use and wildlife-watching within MPAs under the Act, and there is little  
126 evidence available that these activities have a site-level impact on protected species within many of  
127 these sites. However, voluntary measures within the Moray Firth bottlenose dolphin SAC, where  
128 impacts have been demonstrated (Hastie *et al.*, 2003; Cheney *et al.* 2012) and the industry is  
129 considered to be at capacity (Lusseau, 2013), are currently being tested (personal observation, S.  
130 Dolman).

131

132 Marine tourism is considered as part of Scotland's National Marine Plan, which was adopted in  
133 March 2015 and includes marine planning policies to comply with codes of conduct for marine  
134 wildlife-watching. Scotland's National Marine Plan also contains reference points for the  
135 development of Regional Marine Plans. These will be important mechanisms for considering the  
136 management of wildlife-watching within specific MPAs and local sea areas for specific species.  
137 Furthermore, Scotland, a country with a strong commitment and reputation for nature-based tourism,  
138 plans to increase its marine tourism industry, including wildlife-watching. , as evidenced through an  
139 action plan<sup>1</sup>, launched in November 2015, to enhance the value of the marine tourism industry by  
140 nearly £100 million..

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<sup>1</sup>Awakening the Giant, a Strategic Framework for Scotland's Marine Tourism Sector: <http://scottishtourismalliance.co.uk/wp-content/uploads/2014/02/Awakening-the-Giant-final.pdf>

141 **Table 1: Summary of spatial protection measures for cetaceans, pinniped and chondrichthyan species in Scotland (up-to-date March 2016)**

142

143 SEE SEPARATE File

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144 *1.3 Regulation of Marine Wildlife-Watching in Scotland*

145 The regulation of marine wildlife-watching can be divided into two forms of management: formal and  
146 voluntary (Duprey *et al.*, 2008; Garrod & Fennel, 2008). Formal regulations are mandatory guidelines  
147 established by government through administering permits or licences, codes of conduct and area and  
148 species restrictions (Gjerdalan & Williams, 2000; Garrod & Fennel, 2004; Duprey *et al.*, 2008;  
149 Queensland Government, 2013; Giles, 2014). Voluntary management depends on informal  
150 agreements and is increasingly used to incorporate conservation goals and concerns without requiring  
151 government regulations (Garrod & Fennel, 2004; Duprey *et al.*, 2008; Wiley *et al.*, 2008). For marine  
152 wildlife-watching activities in particular, codes of conduct are commonly used as a way of managing  
153 the industry on a voluntary, self-regulatory level by the operators (Gjerdalan & Williams, 2000),  
154 and/or in conjunction with regulatory measures (Allen *et al.*, 2007). Wildlife tour operators, along  
155 with other types of nature-based tourism businesses (e.g. SCUBA diving companies) tend to be  
156 locally owned and play an important role in their local communities. For example, through  
157 employment or attracting visitors – Parsons *et al.*, 2003), with some becoming involved in local  
158 management initiatives, such as the Moray Firth ‘Dolphin Space Programme’ (Arnold 1997).

159

160 There are advantages and disadvantages to voluntary and statutory codes of conduct for wildlife-  
161 watching. Statutory regulations ensure the accountability of operators or leisure users by establishing  
162 requirements to monitor and enforce wildlife-watching activities. However ‘top-down’ approaches to  
163 management require oversight may be less well-received by operators, and there is a general  
164 preference for non-statutory NGO- or operator-led regulation (Parsons and Woods-Ballard, 2003).  
165 Handing management over to operators and local wildlife guides can impart a moral duty towards  
166 protecting the communities’ best interests and can encourage compliance with the code (Gjerdalan  
167 and Williams, 2000; Parsons and Woods-Ballard, 2003; Garrod and Fennel, 2004). Operators need to  
168 feel confident that the codes will also help support sustainability of the tourism industry, and  
169 providing protection to wildlife (Hughes, 2001). However, voluntary codes rely on the integrity of the  
170 operators to adhere to the guidelines and are harder to enforce. The risk of disturbance to wildlife may  
171 be less certain; operators who follow good practice may be disadvantaged by others who fail to do so.  
172 Furthermore, voluntary guidelines can enable the perception that the tourism industry is being  
173 regulated and disturbance to wildlife is understood and being minimised. It may be assumed that no  
174 other form of regulation is needed, resulting in less confirmation that the voluntary guidelines are  
175 being monitored and are effective (Wiley *et al.* 2008). Unlike mandatory regulations, voluntary codes  
176 of conduct need to be constantly reinforced through education and awareness campaigns and may not  
177 necessarily be self-sustaining as a long-term measure particularly in a growing industry (Berrow,  
178 2003),

179

180 The marine wildlife-watching industry in Scotland is managed largely through using voluntary codes  
181 of conduct (Woods-Ballard *et al.* 2003), incorporating local knowledge and demonstrating a high  
182 degree of engagement and responsibility (Garrod and Fennel, 2004). Parsons and Woods-Ballard  
183 (2000) reviewed the use of the different types of codes of conducts being used specifically by whale-  
184 watching operators, at which time the primary code in use was the ‘Scottish Marine Wildlife  
185 Operators Association code of conduct for marine wildlife operators’. O’Connor *et al.* (2009) found  
186 that at the time of their study there are five main codes of conduct used by over 50 operators in  
187 Scotland. In 2006 Scottish Natural Heritage (SNH), the Scottish Government’s statutory nature  
188 conservation advisers, produced the *Scottish Marine Wildlife Watching Code*<sup>2</sup> (SMWWC), as a duty  
189 under part 3 section 1 of the Nature Conservation (Scotland) Act 2004. The other four codes have  
190 been produced by non-governmental organisations (NGOs) over the past 13 years: the WiSe (**W**ildlife  
191 **S**afe) accreditation scheme, Wild Scotland (Scottish Wildlife & Adventure Tourism Association),  
192 Whale and Dolphin Conservation, and the Sea Watch Foundation. A sixth code of conduct produced  
193 by the Shark Trust (a UK NGO) provides specific guidance for viewing and swimming with basking  
194 sharks and is also followed by some operators. Collectively, these codes of conduct provide  
195 recommendations for recreational and commercial boat users on human behaviour that seek to limit  
196 disturbance to marine wildlife (Gjerdalan & Williams, 2000). However there is limited documented  
197 evaluation of the efficacy of the codes and few examples of monitoring. Therefore, it is difficult to  
198 suggest whether, or how well, the codes have been rigorously tested or evaluated through on-site  
199 monitoring and analysis.

200

201 In light of the diverse approaches outlined above and respective tensions and opportunities associated  
202 with marine wildlife tourism, this study sought to build on the work by Parsons and Woods-Ballard  
203 (2000) with a focus on reviewing the current consistency and effectiveness of voluntary marine  
204 wildlife-watching codes in Scotland. The degree to which formal regulation could contribute to  
205 achieving marine megafaunal conservation objectives was reviewed in order to align with innovative  
206 and emerging approaches of marine planning.

207

## 208 **2. Materials and methods**

### 209 *2.1 Review of Scottish Marine Wildlife-Watching Codes of Conduct*

210 A review of the five main voluntary codes of conduct used in Scotland was conducted in 2015: the  
211 Scottish Marine Wildlife Watching Code, Sea Watch Foundation, Whale and Dolphin Conservation,  
212 Wild Scotland and the WiSe Scheme Cetacean Code of Conduct. A compilation of the  
213 recommendations within these codes of conduct was assembled, with each recommendation being  
214 recorded once, even if present in multiple codes of conduct. The recommendations that differed

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<sup>2</sup> <http://www.marinecode.org/documents/Scottish-Marine-Code-web.pdf>

215 between organisations were also noted, as well as analysed in more detail. Given the breadth of  
216 species that the codes of conduct apply, this study concentrates on the main groups and species that  
217 were considered to be the primary focus of marine wildlife-watching in Scotland, namely cetaceans  
218 (whales, dolphins and porpoises) and basking sharks (*Cetorhinus maximus*). They may be referred to  
219 collectively as *marine megafauna*.

220

## 221 *2.2 Marine Wildlife-Watching Surveys*

222 Over the summer of 2015, surveys were conducted with a marine wildlife-watching tour operator in  
223 the Sea of Hebrides to establish the effectiveness of codes of conduct at limiting disturbance to marine  
224 wildlife and to observe basking shark behaviour in response to swim-with interactions. The following  
225 surveys were conducted:

226

### 227 *a) Marine Wildlife-Watching Survey*

228 Marine wildlife-watching surveys were completed on a marine wildlife-watching tour boat operating  
229 out of Tobermory, Isle of Mull, which adheres to the WiSe Scheme code of conduct<sup>3</sup>. The survey was  
230 carried out over a three-week period at the end of June until the beginning of July 2015. The  
231 following information was recorded when a sighting was made by the observer:

- 232 • **length of encounter:** the time from when an animal was first sighted to when the animal was  
233 last sighted;
- 234 • **location of sighting:** using the on board Global Positioning System (GPS);
- 235 • **species and number sighted** (including recording the presence of a mother and  
236 calf/juvenile);
- 237 • **minimum approach distance:** the closest approach made by the boat to the animal, or by the  
238 animal to the boat;
- 239 • **behaviour of the cetacean when first sighted;**
- 240 • **behaviour of the cetacean when last sighted;**
- 241 • **number of other boats within a 0–300m radius and a 300m–1km radius** (0–300m is  
242 considered the caution zone for observing marine wildlife).

243

244 Sightings were recorded only when made by the observer; the sightings made by crew or passengers  
245 were not recorded. The minimum approach distance was estimated by unaided eye, using boat length  
246 to calibrate distance (Dawson et al., 2008). This technique was used because no laser finder was  
247 available to the observer and the nature of the tours meant that line transect surveys were not possible  
248 (Dawson et al., 2008).

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<sup>3</sup> [http://www.wisescheme.org/?page\\_id=1128](http://www.wisescheme.org/?page_id=1128)

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The minimum approach distance, the length of the encounter and the presence of other boats were recorded to determine whether the code of conduct was being correctly followed.

Behaviour was recorded when the animal was first sighted and when the animal was last sighted. This was to establish if any changes in behaviour occurred as a result of boat presence to evaluate whether disturbance had resulted from the encounter (Lusseau, 2004). Behaviour was categorised as travelling, milling, socialising or foraging, modelled using Gill *et al.* (2000), Constantine *et al.* (2004) and Stockin *et al.* (2009) descriptors for common bottlenose dolphin (*Tursiops truncatus*), short-beaked common dolphin (*Delphinus delphis*) and northern minke whale (*Balaenoptera acutorostrata*) behaviours, respectively. The different behaviours are defined as follows:

1. Travelling: making headway with constant movement in one direction;
2. Socialising: close contact between individuals, with leaping sometimes being observed;
3. Foraging: observed attempting to catch prey. Behaviour may include rapidly swimming in circles and deep diving, but distinct from socialising in that no contact between individuals is observed;
4. Milling: frequent changes in direction, making no headway.

Lusseau (2004) suggests that horizontal avoidance techniques, such as travelling, are used by bottlenose dolphins to avoid interactions with boats. Therefore in this study a behavioural change that results in a horizontal avoidance technique that removes an animal from an interaction will be considered avoidance behaviour in response to disturbance from boat presence (Lusseau, 2004).

#### *b) Basking shark behaviour*

In light of the growing interest in basking-shark tourism in Scotland and a proposed MPA for this species (Sea of Hebrides), there is a need to better understand the potential effects of the presence of human swimmers on basking sharks and the respective codes of practice. Observational and anecdotal information was obtained from three basking shark swim-with charters from 11–25<sup>th</sup> July 2015; however, the touristic focus of the charter precluded employing a more formal quantitative approach.

The first two charters were five-day long trips and involved experienced divers and photographers, many of which had previously carried out in-water filming of marine mega-faunal species. The third charter was one-day long and consisted of mixed-experience snorkelers, some of whom had previously interacted with basking sharks.

286 Despite the previous experience of the swimmers, they were briefed by the crew regarding how to  
287 adhere to the Shark Trust Basking Shark Code of Conduct at the beginning of each charter. Swimmers  
288 were advised to swim on their side to minimise splashes as potential disturbance from finning as well  
289 as staying in their pairs rather than forming groups in the water. The swimmers were taken within  
290 100m of a shark and 2 at a time entered the water from a dive platform at the back of the boat. Once a  
291 pair had entered the water another 2 swimmers would be taken within 100m of the same shark but  
292 from the other side to its swimming trajectory. The skipper and crew then observed swimmers and  
293 sharks, signalling from the boat the direction the nearest shark was to them and also standing by if the  
294 swimmers were ready to be picked up by the boat. After 10 minutes, the boat would pick up the  
295 swimmers and bring them aboard and another two persons could then enter the water. In the  
296 anticipation of a swim-with basking shark encounter, data collection sheets were taken on board by  
297 the crew, and information was recorded for each encounter (Appendix A). Comments from the  
298 skipper and crew were noted as observational information in an attempt to identify potential factors  
299 influencing basking shark behaviour, which in future could direct more specific areas of study or  
300 improve the codes of conduct.

301

302 The briefing given to the swimmers at the beginning of each charter included the main points  
303 emphasised by The Shark Trust Basking Shark Code of Conduct, which are as follows:

- 304 • Maintain a distance of at least 4 metres from each shark and be wary of the tail
- 305 • Do not try to touch the sharks
- 306 • Do not swim towards them if they are near you
- 307 • Ideally, swimmers should remain on the surface and stay in a small group rather than  
308 stringing out around the sharks
- 309 • No more than four people should be in the water within 100 metres of a shark at any one time

310

311 The locations visited to search for sharks depended on the most recent sightings from boats in the area  
312 that had contacted the skipper. The first two days of the first charter were spent around the islands of  
313 Coll and Tiree (Figure 1). After sightings from other vessels were reported near St Kilda, the last three  
314 days were spent travelling to and searching the surrounding waters of St Kilda (Figure 1). The next  
315 two charters were spent around the north end of Coll, as by this time (22<sup>nd</sup>–25<sup>th</sup> July), sharks had been  
316 sighted there in larger numbers.

317

318 Figure 1: Locations of shark encounters

319 (see separate file)

320

321

322

### 323 *2.3 Marine Wildlife Tour Operator Questionnaire*

324 A questionnaire was distributed to 27 marine wildlife-watching tour operators on the west coast of  
325 Scotland. These operators were chosen based on information on their websites that suggested their  
326 tours travel into the Sea of Hebrides proposed MPA. The questionnaire consisted of eight questions  
327 (Appendix B) with the option of providing comments at the end. It was compiled to establish how  
328 many tour operators on the West Coast travel into the Sea of Hebrides proposed MPA, how many of  
329 them already use codes of conduct and which codes of conduct they follow.

330

## 331 **3. Results**

### 332 *3.1 Review of Scottish Marine Wildlife-Watching Codes of Conduct*

333 In total, 51 recommendations were identified in the codes of conduct of the five organisations  
334 (Appendix C). The WiSe Scheme, the Scottish Marine Wildlife Watching Code and Wild Scotland  
335 provide species-specific codes of conduct for watching cetaceans, basking sharks and birds. Whale  
336 and Dolphin Conservation does not provide species-specific codes of conduct but does recommend  
337 using the Scottish Marine Wildlife Watching Code as a reference for appropriate encounter behaviour  
338 with different species. The Sea Watch Foundation only provides a code of conduct for cetaceans. In  
339 all the cetacean codes of conduct, some recommendations are made specifically for dolphins in  
340 relation to bow riding; however, in general there is no distinction made between the recommendations  
341 for whales, dolphins and porpoises except for minimum approach distances.

342

343 The Sea Watch Foundation, the WiSe Scheme Cetacean Code of Conduct, the Scottish Marine  
344 Wildlife Watching Code of Conduct and Whale and Dolphin Conservation provide some explanation  
345 of the consequences for marine wildlife if certain recommendations are not followed. Wild Scotland  
346 does not provide reasoning behind certain recommendations but does suggest referring to the Scottish  
347 Marine Wildlife Watching Code for further reference, which does provide rationales.

348

349 There are some points where the above organisations agree in their recommended guidelines for  
350 marine wildlife-watching, including:

- 351 • do not swim with marine wildlife;
- 352 • if an animal approaches to bow ride, maintain a steady course and speed;
- 353 • never chase the animals;
- 354 • do not interfere or separate mothers and calves and avoid close approaches to



355 mothers and calves;

- 356 • do not feed the animals.

357

358 However, there are some inconsistencies in the more precise aspects of the codes of conduct (Table  
359 2); for example, the approach speeds, minimum approach distances, minimum approach distances  
360 when other boats are present and the maximum length of an encounter.

361

362 **Table 2:** Identified inconsistencies between the Scottish voluntary codes of conduct: Scottish Marine  
363 Wildlife Watching Code (SMWWC), the WiSe Scheme (WiSe), Wild Scotland (Wild), the Sea Watch  
364 Foundation (SWF) and Whale and Dolphin Conservation (WDC). (see separate file)

365

### 366 *3.2 In situ use of codes of conduct and megafauna behavioural observations*

#### 367 *a) Marine Wildlife-Watching Survey*

368 A total of 90.4 hours were spent at sea on 17 marine wildlife-watching trips over the three-week  
369 period from the end of June to the beginning of July. During that time, there were 55 cetacean  
370 sightings on 10 of the trips, but no sightings of marine megafauna on 7 of the trips.

371

372 The recommended distance for sighting porpoises, dolphins and whales according to the WiSe  
373 Scheme is 100m. 20% of initial harbour porpoise, bottlenose dolphin or common dolphin sightings  
374 occurred within 100m, and 9% of minke whale sightings were made within 100m. These occasions  
375 were the result of animals approaching the boat or surfacing in close vicinity to the boat, either on first  
376 sighting or once an approach was made in the general direction of a distant sighting, resulting in  
377 unintentional non-compliance (Wiley *et al.*, 2008).

378

379 In total, 11% of interactions (two bottlenose dolphin encounters, three common dolphin encounters  
380 and one minke whale encounter) exceeded the 15 minute recommended encounter limit according to  
381 the WiSe Scheme. The recommended encounter length was not exceeded in harbour porpoise  
382 sightings. During four encounters, bottlenose dolphins and common dolphins were bow riding and  
383 travelling with the boat, and when the dolphins left the interaction the boat did not follow. On these  
384 occasions, it may appear that the boat was not abiding by the code of conduct, but in practice the boat  
385 followed the recommended code of conduct by maintaining a steady speed and course while the  
386 dolphins were bow riding. During the minke whale encounter, the minke whale approached the boat,  
387 which stopped, and the minke whale proceeded to closely interact with the boat. This may have

388 contributed to exceeding the recommended length of encounter as appropriate protocols were  
389 followed for a close approach situation, including maintaining a stationary position. During one of the  
390 common dolphin interactions, the dolphins were spotted at a distance of 1km and approached to a  
391 distance of 200m. On approach, the dolphins began travelling in the opposite direction to the boat, at  
392 which point the boat remained stationary. The recommended encounter length was exceeded;  
393 however, the majority of the encounter was not spent in close proximity to the dolphins but at a  
394 considerable distance.

395

396 The WiSe Scheme recommends that no more than two boats are present within 1km during an  
397 encounter. There were no sightings where more than two boats were present within 300m (the caution  
398 zone) during an encounter, and six sightings where three or four other boats were present during an  
399 encounter within 300m–1km. In most cases when an animal was sighted, other boats within 1km were  
400 likely unaware of the presence of the animal, and no crowding of an animal was recorded. This could  
401 account for the presence of more than the recommended number of boats within the 1km range.

402

403 Surface changes in behaviour may suggest that boat presence had an impact on harbour porpoise  
404 behaviour from first to last sighting on two occasions, however, on both these occasions the boat was  
405 already stationary or stopped in response to the sighting, and no other boats were present within  
406 300m. Therefore the crew could be considered to have reacted appropriately for the situation and  
407 along the recommended guidelines to limit disturbance. Minke whale behaviour observed during the  
408 surveys was always travelling, both on first and last sighting.

409

410 On four of the five occasions when a change in behaviour was recorded for bottlenose and common  
411 dolphins, it was not considered disturbance because the change was a result of the dolphins interacting  
412 with the boat. On one of those occasions, however, a group of common dolphins were sighted  
413 approximately 1km away and an approach was made to around 200m. On approach, the dolphins  
414 travelled away from the boat. which could be considered avoidance behaviour in response to  
415 disturbance. The boat did not follow, as per the recommended guidelines, and later that day the same  
416 group was spotted and interacted with the boat for 26 minutes before leaving the encounter.  
417 Therefore, it could be suggested that the boat caused an initial disturbance during the first encounter.  
418 However, it did not have a long-term negative effect on the dolphins as they later interacted with the  
419 boat.

420

421 *b) Swim-With Basking Sharks Observations*

422 From observational experiences (Tables 3&4) from the skipper and crew during the two week period  
423 of swim-with shark charters, the more experienced group of swimmers (encounters 1&2) were more  
424 relaxed in the water and maintained their separated pairs, which made their movement in the water  
425 more gentle and controlled. The less experienced group, however (encounters 3&4), despite being  
426 briefed on the code of conduct prior to entering the water, put more effort in to energetic finning in  
427 the water and also tended to cluster into larger groups, despite being prompted to stay in groups of  
428 two by the skipper.

429 Table 3: see separate file

430 Table 4: see separate file

431

432 From the anecdotal information collected, larger sharks did not appear to change their course of  
433 direction according to the boat, whereas smaller sharks (<4m) tended to dive or change direction on  
434 approach to swimmers who entered the water ahead of the shark's trajectory. Sharks that were feeding  
435 displayed fewer responses to the swimmers in the water. Feeding behaviour was assumed where  
436 sharks were seen swimming with their mouths open, the gill plates clearly visible from the crew on  
437 the boat and swimming relatively slowly. Sharks that were recorded as travelling tended to change  
438 their course when they were approached by the swimmers. Sharks that displayed courtship behaviour  
439 (e.g. nose to tail following) were not approached to comply with the Shark Trust code of conduct.

440

### 441 *3.3 Operator Questionnaire Results*

442 In total, there were seven responses to the questionnaire, resulting in a 26% response rate. Of those  
443 seven responses, four of the operators travelled into the Sea of the Hebrides proposed MPA, and all  
444 respondents stated that they followed one or more code of conduct. However, from the inconsistencies  
445 in the recommendations highlighted by the analysis of the codes of conducts (see 3.1), it may not be  
446 possible to clarify which specific recommendations the operators adhere to. All respondents were  
447 WiSe Scheme accredited, with the SMWWC and Whale and Dolphin Conservation code being used  
448 by five of the respondents. The Wild Scotland and Shark Trust codes were also cited, and three  
449 respondents stated that they followed a code of conduct they had developed themselves.

450

## 451 **4. Discussion**

452 Through qualitative and quantitative observations of wildlife-watching tour operators and the  
453 behaviour of some of the species they seek to encounter, this study has highlighted varied benefits and  
454 issues around the regulation of wildlife-watching activities in Scotland. It is evident from the operator

455 questionnaire and by reviewing operators' business websites that the majority of operators place a  
456 conservation value on marine wildlife by seeking to abide by at least one authoritative code of  
457 conduct. Through *in situ* observations of one operator during the summer season in 2015, it may be  
458 concluded that the operator adheres stringently to the code they follow, and in doing so, the impacts  
459 on megafauna encountered were likely minimised. However, as the wildlife-watching and marine  
460 tourism industry in Scotland has the potential and indeed is poised to expand (Howard and Parsons,  
461 2006), there are a number of issues that need to be addressed going forwards, in addition to scientific  
462 and social research needed to better understand the potential impacts of human disturbance on marine  
463 megafauna. Lessons must also be learned from other locations where the negative environmental and  
464 socio-economic impacts of increasing wildlife-watching have been clear, such as in Crystal River,  
465 Florida where regulations to reduce harassment for the federally-protected Florida manatee  
466 (*Trichechus manatus latirostris*) are not well enforced (Sorice et al. 2006). This will be essential in  
467 order to ensure that the tourism industry can grow within the limits of sustainable development.

468

#### 469 *4.1 Review of Marine Wildlife-Watching Codes in Scotland*

470 The key point under which to frame this discussion is noting the complex and potentially confusing  
471 regulatory landscape of the Scottish marine wildlife-watching industry.. The five main voluntary  
472 codes used in Scotland have changed since Parsons and Wood-Ballard's assessment (2003). This is  
473 partly due to legislative provision (i.e. SNH's SMWWC under the Nature Conservation (Scotland)  
474 Act 2004), but also potentially also due to increasing scientific understanding of the impacts of  
475 wildlife-watching (Parsons, 2012), and increased stakeholder involvement. In addition, some  
476 recommendations may have been developed from previous codes, while others have been updated to  
477 incorporate advances in scientific understanding. This has resulted in codes containing various  
478 recommendations with inconsistencies in some of the precise aspects of the codes (see Table 2),  
479 resulting in potential confusion for boat operators as to which guidelines to follow and differences in  
480 measures undertaken. As a result, it is not unusual for operators to follow more than one code, as  
481 highlighted by the operator survey (see 3.2), or to create their own (Garrod and Fennel, 2004).  
482 Inconsistencies in the different codes' recommendations indicate that there are still significant  
483 research gaps of the impacts of wildlife-watching on marine animals, including specifically  
484 behavioural responses of charismatic marine mega-fauna to boat activity. Whilst there are numerous  
485 codes, there is little effort or evidence to ensure that these codes are adhered to, or that they are  
486 effective in achieving their aim to reduce impacts on marine wildlife.

487

488 Not all of the codes of conduct analysed provide explanations for the scientific or obvious basis for  
489 respective recommendations. Gjerdalan & Williams (2000) and Garrod & Fennel (2004) suggest that  
490 codes of conduct that do not seem reasonable or understandable to the user are usually not practiced.

491 By providing an explanation of why a recommendation has been made (for example, ‘Avoid close  
492 approach to cetaceans with young. You risk disrupting mother-calf bonds and expose inexperienced  
493 young to stress and possible boat strikes’ (WiSe Scheme Cetacean Code of Conduct)), the  
494 consequences of actions can be better understood, which can encourage the uptake of codes of  
495 conduct on a voluntary basis (Gjerdalan & Williams, 2000; Garrod & Fennel, 2004).

496

497 One of the commonalities of the five main codes used in Scotland is a recommendation against  
498 swimming with marine wildlife. Swim-with programmes are an emerging aspect of marine wildlife-  
499 watching, and in Scotland, a small number of operators offer opportunities to swim with basking  
500 sharks and seals. As a result, adherence to the majority of existing guidance does not occur and  
501 without resulting enforcement or repercussion to date. This is notable given the legal basis of SNH’s  
502 SMWWC, which recommends against intentionally swimming with any marine animal. As previously  
503 mentioned, a specific code of conduct guidance for in-water interactions with basking sharks has been  
504 produced by the Shark Trust, upon which at least one operator in Scotland bases their swim-with  
505 activities. It should be noted that the Shark Trust code of conduct, while providing guidance for in-  
506 water interactions with basking sharks, initially suggests that swimming with sharks is not advisable  
507 and that the guidance is offered in the event that this type of interaction is not avoidable. The impacts  
508 of direct human interaction with large marine wildlife species are not well understood, which in itself  
509 could be rationale for a more precautionary position against the practice. The observational results  
510 (see 3.2) collected on the swim-with shark excursions do not provide data suitable to test whether the  
511 swimmers had any significant effect on the basking shark behaviour, and the behaviours recorded in  
512 this small sample are inadequate to draw any meaningful conclusions.

513

514 However, the results raise questions that may be addressed by future behavioural studies to better  
515 understand swim-with shark interactions and potential effects on sharks. These experiences may be  
516 valuable for education and outreach potential; some existing studies and anecdotal testimonials have  
517 highlighted positive effects on humans, particularly in the case of naturally sociable species, such as  
518 seals and dolphins. The evidence base for impacts of swim-with on basking sharks is limited; however  
519 numerous studies have documented the implications of swimming with whale sharks (*Rhinocodon*  
520 *typus*) in pacific countries where such activities are a major tourist attraction, such as Australia and  
521 the Philippines. For example, Quiros (2007) found that whale sharks in the Philippines change their  
522 behaviour in response to a variety of human stimuli, such as touching, path obstruction and proximity  
523 of swimmers, and the magnitude of the disturbance was also significantly influenced by different  
524 approaches. The same study noted that different facets of the code of conduct had different levels of  
525 average compliance (e.g. minimum distance = 44%, no flash photography = 99%). A number of  
526 human safety considerations are also potential issues for swim-with tours, not least the possible  
527 reciprocal transfer of pathogenic organisms between humans and marine wildlife (Bailey *et al.* 2015),

528 which may prevent the introduction or expansion of cetacean swim-with in Scotland. However, this  
529 should be a consideration for seal swim-with, as disease can be reciprocally transferred to domestic  
530 dogs.

531

532 Evidence exists in which marine animals, cetaceans in particular, have also been documented to  
533 negatively change their behaviour in the presence of humans, including visual or noise-related  
534 disturbance (e.g. reduced resting time, changes in breathing rates - Hastie *et al.* 2003; Visser *et al.*,  
535 2011; New *et al.*, 2015), avoidance or aggression (Constantine and Baker, 1997; Visser *et al.* 2006).  
536 In addition, some marine animals have been known to become habituated to human presence  
537 (Samuels and Bejder, 2004), although habituation and sensitisation can be difficult to distinguish, and  
538 it has been demonstrated that an animal might not leave an area because it cannot afford to do so from  
539 a bioenergetic perspective (Beale and Monaghan, 2004). However, displacement from cetacean  
540 watching has been documented (Richter *et al.* 2003; Bejder *et al.*, 2006). Approaches by animals can  
541 result in unintentional non-compliance as porpoises, dolphins and whales can approach closer than  
542 recommended and for longer than recommended (Wiley *et al.*, 2008), and other boats may not be  
543 aware of the presence of cetaceans, especially the smaller species such as porpoises. From  
544 observations made on the wildlife-watching trips monitored for this study, the crew reacted  
545 appropriately according to the recommended guidelines when these situations occurred. As a result,  
546 there was only one incident of potential disturbance recorded in this study overall, and it could be  
547 considered that following voluntary guidelines keeps disturbance of marine wildlife to a minimum.

548

#### 549 *4.2 Voluntary or Statutory Regulation?*

550 All wildlife-watching codes, particularly the SMWWC, have a statutory basis in that it is illegal to  
551 harass or harm cetaceans, sharks and seals under the Nature Conservation (Scotland) Act 2004, and  
552 codes of conduct provide recommendations for behaviour to prevent such incidents. These  
553 recommendations should be considered by operators to be a minimum, ensuring as little impact as  
554 possible on wildlife. Given this statutory basis, monitoring to understand the effectiveness of existing  
555 guidance and any resulting impacts would also appear to be important. Anecdotal evidence indicates  
556 that in Scotland, general adherence to wildlife-watching code guidelines may be relatively high (with  
557 the exception of recommendations against swim-with programmes, as previously mentioned), but as  
558 with any regulations, there is no guarantee (or indeed evidence) that all operators or indeed their  
559 guests will fully abide by them. Whilst the majority of people who engage in wildlife-watching  
560 activities are likely to be highly environmentally motivated (by the very nature of the attraction of the  
561 activity), appropriate behaviour still requires operators to communicate and enforce codes of conduct  
562 to their guests. Statutory regulation ensures a level playing field for all operators, certainty in any  
563 rules or 'caps' in numbers of vessels and accountability for any contraventions. Furthermore, a single

564 set of statutory regulations should be more transparent and less confusing than several voluntary  
565 codes that offer different recommendations. Monitoring through regulation would provide a better  
566 understanding of the current extent and locations of the industry, future changes and perceived ‘hot  
567 spots’ or bottle necks where further management may be required, as well as enabling the assessment  
568 of cumulative impacts with other sectors. Enforcement will continue to be a challenge as Scotland’s  
569 competent authority, the Police service, have little capacity to monitor the marine area (Simmonds,  
570 2000).

571

572 Some of the comments in the responses to the operator questionnaire demonstrate practically some of  
573 the advantages and disadvantages of the codes of conduct used in Scotland and of voluntary codes of  
574 conduct in general. The first is related to operators’ compliance to the codes: *‘One particular boat  
575 that operates in the same area has an adverse effect on whales, and they leave as soon as he arrives.’*  
576 This statement is highly subjective and may suggest that the operator may be causing disturbance to  
577 marine wildlife, but it may also indicate competitive rivalries between operators. The former,  
578 highlights a failing of voluntary codes of conduct as compliance cannot be centrally monitored and  
579 enforced (Allen *et al.* 2007). Another comment relates to the regulation of commercial and  
580 recreational boats that may disturb marine wildlife: *‘wildlife is affected by more than just tour  
581 operators ... the leisure users of sensitive areas generally, in my opinion, do not have a level of  
582 understanding regarding wildlife and their impact on it.’* This suggests that further outreach may be  
583 helpful in order to target a wider audience, as referenced in the marine tourism policies in Scotland’s  
584 National Marine Plan (Lancaster *et al.* 2014). It should be noted that the SMWWC states that it is  
585 designed for all recreational sea users and activities, which indicates that the full range of intended  
586 audiences of this code may not be aware of its application to their area of interest.

587

588

## 589 **Conclusions**

590 As a growing part of the developing marine tourism industry in Scotland, wildlife watching can play a  
591 key role in wildlife monitoring and conservation, raise public awareness of environmental issues, and  
592 support local coastal communities and contributions to national economies. A coherent code of  
593 practice is essential to guide marine users, including wildlife-watching tour operators, to behave  
594 responsibly around marine wildlife. Based on the syntheses in this paper, however, inconsistencies  
595 and drawbacks of the current multiple codes used in Scotland compromise the benefits of having such  
596 codes. Furthermore, a precautionary approach is required to advise against the further development of  
597 swim-with programmes in the Scottish tourism industry. Assuming the operations that exist will  
598 continue, despite the codes that are in place, dedicated research is needed to quantify the scale and  
599 longevity of the effects of swim-with programmes on their target species and participants in Scottish  
600 waters. Research might usefully be focused in designated protected areas, such as nature conservation

601 MPAs, SACs and designated seal haul-out sites, where legislation has been established for the  
602 protection of key functions or life stages of a population or species (e.g. breeding, resting or feeding).  
603 In the meantime and as a precautionary measure, swim-with activities should be brought within a  
604 regulatory framework to prevent them expanding. For example, the disturbance of seals at haul-out  
605 sites to encourage them into the water should be prohibited.

606

607 As a minimum requirement and to curtail unnecessary regulatory burden on an existing and  
608 potentially expanding industry, one option could be to introduce local wildlife-watching regulations  
609 (potentially based on or additional to local Biodiversity Action Plans) and associated monitoring of  
610 effectiveness in protected areas through Regional Marine Plans. This would be a mechanism that  
611 could ensure that local data and knowledge is incorporated and the regulations will match the needs of  
612 the local conservation objectives, resident and transient wildlife in the region and local operators.  
613 Such regulations should be driven by government/statutory agencies, with the support of local  
614 operators and communities to cultivate a sense of ownership and ensure suitable compromises where  
615 necessary.

616

617 The following recommendations are suggested to improve the current approach and appreciation of  
618 regulating marine wildlife-watching in Scotland to benefit both nature conservation and the  
619 experience of marine users:

- 620 • Government-facilitated but locally-led development of a single comprehensive wildlife-  
621 watching code where operator and scientific input and support is considered – current codes  
622 need to be consolidated and consistent recommendations agreed;
- 623 • Area-specific regulations and caps in operator numbers must be scientifically explored and  
624 implemented and should account for local populations (e.g. bottlenose dolphins in the Moray  
625 Firth SAC);
- 626 • A central database should be set up to include a list of all operators and other pertinent  
627 information (such as those who are WiSe-accredited) and collect scientific data, information  
628 on which code is followed and primary activities that are undertaken, etc.;
- 629 • Greater public awareness of wildlife-watching codes is necessary to ensure good practice by  
630 all leisure users (including within MPAs where attention might be focused);
- 631 • Further scientific research to better understand the impacts of boat-based watching and swim-  
632 with is urgently required (possibly involving operators as platforms – New *et al.*, 2015) and  
633 appropriate resulting recommendations and enforcement is necessary;
- 634 • Scottish Regional Marine Plans could consider the introduction of statutory regulations in  
635 ecologically sensitive areas (e.g. MPAs). This would support the National Marine Plan  
636 objectives for marine tourism and could also contribute to the UK's biodiversity and



637 sustainable development commitments, such as the Convention on Biological Diversity and  
638 Marine Strategy Framework Directive targets to achieve good environmental status by 2020.

639

640 The above recommendations provide opportunities to establish more meaningful codes of conduct for  
641 mobile species, and when aligned with MPAs may provide critical life-history anchors for trans-  
642 boundary and migratory species, as well as supporting sustainable and ecologically positive tourism.  
643 The proposed MPA in Scotland's Sea of the Hebrides provides a potential innovative opportunity to  
644 trial effective management for marine wildlife-watching activities. Such efforts, can foster research  
645 opportunities and knowledge exchange amongst diverse groups of stakeholders and help ensure long-  
646 term protection of these special marine species globally, as well as long-lasting enjoyment by  
647 generations of observers..

648

649

650

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Table 1: Summary of spatial protection measures for cetaceans, pinniped and chondrichthyan species in Scotland (up-to-date March 2016)

Species	Designation	Directive	Current status	Management measures
<b>Cetaceans</b>				
Bottlenose dolphin ( <i>Tursiops truncatus</i> )	Special Area of Conservation (Moray Firth)	EC Habitats Directive	Designated	Moray Firth SAC Management Scheme
Minke whale ( <i>Balenoptera acutorostrata</i> )	Nature Conservation MPA (Sea of the Hebrides; Southern Trench)	Marine (Scotland) Act 2010	Proposed	N/A
Risso's dolphin ( <i>Grampus griseus</i> )	Nature Conservation MPA (Northern Minch)	Marine (Scotland) Act 2010	Proposed	N/A
<b>Pinnipeds</b>				
Harbour seal ( <i>Phoca vitulina</i> )	Special Area of Conservation (Aserib, Isay and Dunvegan; Dornoch Firth and Morrich More; Eileanan agus Sgeiran Lios mòr; Firth of Tay & Eden Estuary; Mousa; Sanday; South-East Islay Skerries; Yell Sound Coast)	EC Habitats Directive	Designated	Fisheries management measures under development
	Seal Haulout Sites (194, Scotland-wide, both species)	The Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014 (under Marine (Scotland) Act 2010)	Designated	Harassment of seals at designated sites prohibited

Grey seal ( <i>Halichoerus gryppus</i> )	Special Area of Conservation (Faray and Holm of Faray; Isle of May; Monach Isles; North Rona; Treshnish Isles)	EC Habitats Directive	Designated	Fisheries management measures under development
	Seal Haulout Sites (194, Scotland-wide, both species)	The Protection of Seals (Designation of Haul-Out Sites) (Scotland) Order 2014 (under Marine (Scotland) Act 2010)	Designated	Harassment of seals at designated sites prohibited
<b><i>Chondrichthyan</i></b>				
Flapper [prev. common] skate ( <i>Dipturus flossada</i> )	Nature Conservation MPA (Loch Sunart to the Sound of Jura)	Marine (Scotland) Act 2010	Designated	Zonal demersal trawling and dredging restrictions.
Basking shark ( <i>Cetorhinus maximus</i> )	Nature Conservation MPA (Sea of the Hebrides)	Marine (Scotland) Act 2010	Proposed	N/A

**Table 2: Identified inconsistencies between the Scottish voluntary codes of conduct: Scottish Marine Wildlife Watching Code (SMWWC), the WiSe Scheme (WiSe), Wild Scotland (Wild), the Sea Watch Foundation (SWF) and Whale and Dolphin Conservation (WDC).**

	SMWWC	WiSe	Wild	SWF	WDC
<b>Minimum approach distance</b>	50m for dolphins and porpoises, 100m for whales, 200–400m for mothers and calves	100m	50m for small cetaceans, 100m for whales	100m	100m
<b>Minimum approach distance when other boats present</b>	No more than 2 vessels within 300m	No more than 2 vessels within 1km	No more than 2 vessels within 100m	No more than 2 vessels within 1km	No more than 2 vessels within 200m
<b>Time spend in the vicinity of an animal</b>	15 minutes when other vessels are present, 30 minutes if single vessel	15 minutes	No recommendation	20 minutes	15 minutes
<b>Speed on approach to animal</b>	Slow down to 6 knots when at least 300m away, some recommend 1km	Slow down to 6 knots within 1km	No recommendation	Do not exceed 10 knots within 1km	No recommendation

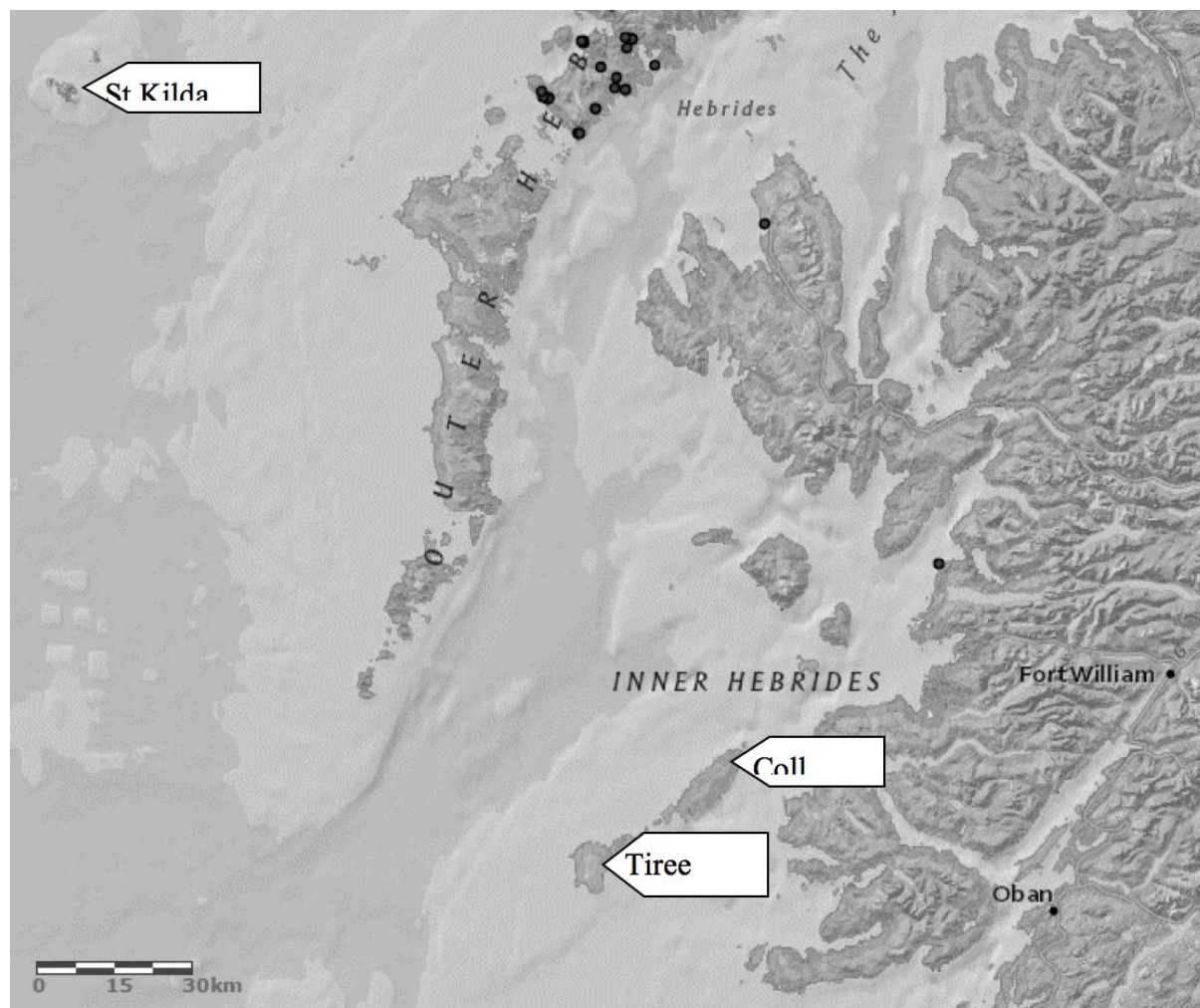
Table 3: Swim-with basking shark observations - boat conditions.

Encounter No.	Date	Time when boat leaves harbour	Sea state	Weather conditions	Location: lat, long	Time of observation	Direction of boat approach to basking shark	Distance between boat and basking shark (m)	Number of other boats within 100m radius	Basking shark behavior before swimmers enter the water	Time when swimmers enter the water
1	16/07/15	0600	2-3	clear	57.805322, -8.564308	1430	Side	50	2	travelling	1445
2	22/07/15	0600	3-4	overcast	56.556798, -6.740578	0945	Side/in line	100	0	feeding	1030
3	23/07/15	0600	2-3	clear	56.556798, -6.740578	0900	Side	75	1	feeding	1030
4	25/07/15	0930	1-2	clear	56.556798, -6.740578	1200	Side	100	0	feeding	1215

Table 4: Swim-with basking shark observations - swimmer and shark interactions.

Encounter No.	Number of basking sharks present during interaction	Size of basking shark(s) (m)	Number of swimmers in water	Direction of swimmers approach to basking shark	Min. distance between swimmers and basking shark (m)	Max. distance between swimmers and basking shark (m)	Was the basking shark touched during the interaction? If yes, how many times?	Time when the swimmers return to the boat	Time when basking shark last observed	Time when boat returns to harbour
1	2	3-4	3	Rear-left	2-3	15+	N	1600	1730	0000
2	7	7-9	3	Side, in line	2-3	15+	N	1230	1330	1600
3	10	6-8	4	Side	2-3	15+	N	1300	1500	1700
4	15	7-9	4	Side	1-3	15+	N	1430	1500	1700

Figure 1: Locations of shark encounters



(ArcGIS 2016)

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## \*Detailed Response to Reviewers

Ms. Ref. No.: OCMA-D-16-00159

Title: The use of marine wildlife-watching codes and their role in managing activities within marine protected areas in Scotland.

Ocean & Coastal Management

Dear OCM Team,

Kindly find our responses to comments by 3 reviewers, detailed below.

These comments are reflected in the revised manuscript. With regard to the manuscript, we provide one version w/ 'track changes' as evidence of our incorporation of the reviewer's excellent suggestions.

I also provide a 'FINAL' manuscript, which has accepted all the track changes and serves as a final clean copy.

Thank you in advance for your kind consideration of our resubmission.

We look forward to working with you to progress this manuscript towards publication.

Sincerely,

Dr. Meriwether Wilson (corresponding author).

12 July 2016

No.: OCMA-D-16-00159

Title: The use of marine wildlife-watching codes and their role in managing activities within marine protected areas in Scotland.  
Ocean & Coastal Management

### **Reviewers' comments and Responses:**

[NB: In light of the length of Reviewer No 2's comments and our responses, we provide the comments and responses in the following order: no 1 > no 2 > no 3. ]

#### **Reviewer #1:**

*The article "The use of marine wildlife-watching codes and their role in managing activities within marine protected areas in Scotland" presents an interesting current issue deserving attention.*

*The combination of research techniques used by the actors adds to the publication.*

*I recommend revise and edit the article carefully ,to improve article's quality, making it more attractive for readers. There are some parts especially in the introduction, discussion and conclusions that could be expressed with more clarity.*

**Author Response: The document has been revised throughout.**

*These are some examples:*

*"A separate code on basking sharks is available in UK, specifically to guide incidental or unintentional in-water interactions with the sharks. In light of the growing network of wildlife focused MPAs in Scotland (in particular the Sea of Hebrides proposed MPA for mobile species) and national aspirations for the growth of the marine tourism sector, we consider the potential implications of unregulated wildlife watching and the conservation objectives of these sites".*

**Author Response: This has been revised and clarified.**

*It is not clear if the code for basking sharks is from the government or from one of the tour providers. Also the last sentence is not clear. "we consider the ... conservation objectives of these sites"?*

**Author Response: This has been revised and clarified.**

*Another example:*

*"There is an opportunity to establish mobile species MPAs in Scotland as innovative examples of effective management for marine wildlife-watching activities and the protection of mobile species. Management in Scottish mobile species MPAs could set a precedent for the rest of the UK and could be used as an example of management for future mobile species MPAs, both nationally and internationally". What do you mean by future mobile species?*

**Author Response: This has been revised.**

*In the last paragraph, there are 4 "mobile species" in 5 lines.*

**Author Response: This has been revised.**

*These are only some examples, the document needs to be revised entirely.*

**Author Response: The document has been revised throughout.**

#### **In sum to Reviewer 1:**

**The authors have gone through the manuscript in considerable detail, with attention to editing overall, as well as noting and amending the above examples. A 'track changes' version of the manuscript (along w/ a final - clean) has been provided to OCM should the reviewer wish to see the extent of editorial changes throughout.**

### **Reviewer 3**

1. *Wildlife-watching and ecotourism can have multiple benefits, such as supporting conservation efforts through scientific data collection, employing and uniting local communities, and increasing public awareness about environmental issues. Therefore, this paper can serve as a useful reference to the countries where are developing the wildlife-watching business.*

**Author Response:** Thank you.

2. *This paper reviews the consistency of the voluntary codes of conduct and explores the potential impacts of wildlife watching with a focus on the adequate management of future activities. The review also incorporates data from field surveys, in-situ observations and operator questionnaires conducted in Scotland to better consider how codes are implemented in practice. Its materials and methods applied are adequate.*

**Author Response:** Thank you.

3. *As stated by the authors, the Scottish marine wildlife-watching industry is complex and potentially confusing. And, the five main marine wildlife-watching codes of conduct used in the Scottish tourism industry are voluntary and have each been developed by different authorities and stakeholders, including the Scottish Government and environmental NGOs. I am wondering if those authorities and stakeholders could be invited and work together to make the relevant conservation programs /codes of conduct more consistent and effective. I hope this point can be further discussed and/or included in the section of "conclusions".*

**Author Response:** This comment (largely in the Discussion and Conclusions) has been noted and elaborated.

4. *The authors mentioned that inconsistencies in the different codes' recommendations indicate that there are still significant research gaps of the impacts of wildlife-watching on marine animals, not all of the codes of conduct analysed provide explanations for their recommendations, codes of conduct should be understandable to the user, and further outreach may be helpful in order to target a wider audience. I will be more than happy to see the related policy recommendations that in response to those issues can be included in the recommendations of the last section.*

**Author Response:** This comment (first in the Introduction, also the Conclusion) has been noted and elaborated.

5. *Line 521 states, "marine wildlife, , but it may also indicate competitive rivalries between operators." The duplicated comma should be deleted. Thus, the authors are encouraged to check the paper's format and/or any typing error again.*

**Author Response:** done

6. *Since the paper is well done, it is also helpful for wide readers including scientists, ecotourism operators, statutory bodies and local communities on marine wildlife watching, I'd like to recommend the paper can be accepted by our OCMA with minor revision.*

**Author Response:** Thank you.

**Reviewer #2:**

*The paper misses one major issue related to codes of conduct in Scotland. The Nature (Scotland) Act 2004 contained a clause that required the production of a national set of wildlife guidelines. The act also made it illegal to recklessly disturb or harass wildlife and to aid prosecution it is deemed that activities that are prohibited in these guidelines are examples of harassment (see The conservation of British cetaceans: a review of the threats and protection afforded to whales, dolphins and porpoises in UK Waters, Part 2 - in The International Journal of Wildlife Law and Policy). The national marine animal watching guidelines were produced with stakeholder involvement due to the findings of Parsons and Woods-Ballard (2003) that there was a preference for locally produced guidelines.*

**Author response: We have added in reference to the Nature Conservation (Scotland) Act 2004, in relation to it being the legal basis for the Scottish Marine Wildlife Watching Code (developed by SNH in 2006).**

*line 34-36 - there are who,e papers specifically on the issue of whale-watching vessels as platforms of opportunity, which are better references than Brian Garrod and Dave Fennell's paper which just mentions the issue in passing. There is, for example, a standing agenda item on this in the International Whaling Commission (IWC - the international competent authority for the management of whales) sub-committee on whale watching, which is summarised every year in the report of the IWC scientific committee (see Journal of Cetacean Research and Management)*

**Author response: citation has been updated as per recommendation**

*For impacts of whale watching on target species there is a review by Parsons (2012). The IWC also produces an annual review with is published in the journal Tourism in Marine Environments, and is discussed in the IWC scientific committee report (published every year in Journal of Cetacean Research and Management)*

*45-46 - there is a much wider body of whale-watching impact literature than this. Note that the vessels in the Lusseau papers for Fiordland New Zealand are not technically whale-watching vessels but scenic tours, and are a category referred to as "incidental whalewatching" by the IWC.*

**Author response: citation has been updated as per recommendation**

*As this study has a large shark-watching component, where is the literature on shark tourism? In particular swim-with-whale shark tourism, or shark MPAs?*

**Author response: improved reference to such literature has been added in (e.g. line 116-119, revised draft).**

*46 - note that the Christensen et al. studies in Iceland have been heavily criticized by the IWC and whalewatching researchers for poor experimental design - the observed differences are likely to be the result of two different observation methodologies (one boat based and one land based) and data collected rom two different areas where minke whales behave differently, rather than differences due to whalewatching vessel presence.*

**Author response: citation has been updated as per recommendation**

*52 - What is an MPA? Some definition needed. Not that there many different types of MPAs and many MPAs are considered to be POOP (protection only on paper).*

**Author response: definition of an MPA has been inserted**

*63 - It would be worth citing several of the studies from this region which have shown poor compliance with these regulations, including by the author cited.*

**Author response: the paragraph between lines 60-69 (submitted draft) has been revised to better reflect the body of evidence on this subject.**

*77-80 - The manatees aren't a good example. Technically there are regulations, but boy are those animals harassed ! There are studies that show how ineffective the manatee regulations are.*

**Author response: this reference has been removed (but used later on in the paper between lines 461-464, revised draft, instead of the Kaikoura example – see reviewer comment on line 437, submitted draft)**

*111-129 - Some explanation is needed to discuss the differences between SACs designated under the Habitat's Directive. The assumption is that activities that have been undertaken in SACs must not be greatly impacting target species or these*

areas would not have enough animals to be SACs, thus activities being conducted prior to designation (such as marine wildlife-watching around the Treshnish Isles SAC) is considered to be relatively benign.

It should be noted that species specific legislation probably has more impact for most key marine wildlife species e.g. all cetaceans are protected from disturbance and harassment by the Nature (Scotland) Act as well as the EU Habitats Directive (12nm to 200nm from the coast) - and various seabirds have a host of legal protections.

Author response: this has been clarified between lines 132-136 (revised draft)

For a review of legal protection on cetaceans see :

152 - Surely better references would be Arnold 1997 (The dolphin space programme. The development and assessment of an accreditation scheme for dolphin watching boats in the Moray Firth. Scottish Wildlife Trust, Scottish Natural Heritage and the EU Life Programme) or Parsons et al. 2003 (The value of conserving whales: the impacts of cetacean-related tourism on the economy of rural West Scotland - in Aquatic Conservation) which specifically talk about the local community economic benefits of marine wildlife tourism? For the value of marine wildlife tourism in Scotland also look at: Masters D, Nautilus Consultants, Carter J. (1998) Marine wildlife tourism: developing a quality approach in the Highlands and Islands. Tourism and Environment Initiative and Scottish Natural Heritage.

Author response: Arnold (1997) citation included, as per reviewer recommendation.

175-176 - The Parsons and Woods-Ballard study should be described as the current study is partly a repeat of what they did in 2000.

Author response: reference to this study has been added in lines 198 and 217 (revised draft)

179 - Note the legal basis on which the SNH code was produced. Also you need to explain to readers who SNH is...

Author response: both these points have been clarified (see lines 203-205, revised draft)

218 - The guidelines in the WiSE COC should be linked.

Author response: We are confused as to the reviewers meaning – ‘linked’ in terms of connecting the codes within the WiSe Scheme to the different target species of marine wildlife-watching (there are species/group-specific codes within this scheme)? As a response to this point, we have included a hyperlink as a footnote to the WiSe scheme webpage that lists these codes, which will allow the reader to explore further as they may wish, and to reduce the amount of text being added in to the paper.

226 - How were approach distances determined? With lazer range finders or my guesstimating? How were estimated distances calibrated? What distance did the operator think they were at ? Guessing distances at sea is extremely difficult especially in poor weather conditions. Also how did you deal with bowriding animals, when they swim towards the boat, and where manoeuvring to avoid the animals might be more dangerous/disturbing?

Author response: information on how approach distances were determined has been added as per reviewer’s recommendation (see lines 253-256, revised draft). Bow riding animals are acknowledged on lines 352-356 (original draft).

241- Delete second comma and should be common bottle nose dolphin, short-beaked common dolphin and northern minke whale (there are multiple species of minke whales, common dolphins and bottlenose dolphin)

Author response: done

242- An incorrect assumption. Cetaceans, especially bottlenose dolphins, frequently travel. The BND in western Scotland travel great distances (sometimes tidally-induced movement) and are often travelling when first encountered.

Author response: point has been clarified to acknowledge reviewer recommendation (see line 272-275, revised draft)

285 - A map is needed to show these locations. in particular, how far St Kilda is from Tiree.

Author response: Map has been added from ArcGIS showing these locations in relation to each other (see line 346, revised draft)

Table 2 - Note these COCs are not independent. Many of the same people were involved in drafting multiple codes, and later codes used earlier codes as models. Some of the guidelines were changed in latter codes due to input from operators and scientists, which would explain some some inconsistencies.

Author response: point has been acknowledged as per the reviewer's recommendation (see lines 466-468, revised draft)

345 - 11 sightings of 55 encounters - so 20% ?

Author response: done

349 - 6 of 55 ? 11%?

Author response: done

347 - See comment above about estimating distance. Also it should be noted whether the minke whales were approached and that's why they were closer than 100m or whether they headed to the general region and the minke whale popped up within 100m. Minke whales can travel underwater considerably, especially early in the whale-watching season, when they dive to the seabed (see papers on dive profile by Karin Stockin et al. and feeding behaviour and habitat use by Kelly MacLeod et al. )

Author response: point has been clarified as per reviewer's recommendation (see lines 362-365, revised draft)

353 - Who left and who did not follow? Dolphins or boat?

Author response: point has been clarified as per the reviewer's recommendation (see line 369, revised draft)

357 - "stopped" or "became stationary" is better than "brought to a stationary position"

Author response: done

377 - "milling" behavior is not a great category for porpoises. They can swim about considerably underwater and "travelling" and "milling" behaviour at the surface may not echo what is actually going on underwater - they could be foraging, mating, socializing or simply keep changing direction, which might be the result if disturbance. Also telling porpoises apart is very difficult and "travelling" and "milling" animals might actually a large number of almost identical animals surfacing. Anyway, caution should be used with harbour porpoise behaviour as the brief appearance at the surface may not be indicative if what is actually happening subsurface.

Author response: point has been amended as per the reviewer's recommendation (see line 390-394, revised draft)

399-400 - Some explanation is needed.

Author response: More information regarding the methodology of shark swim observations has been added for clarity, (see line 316-323)

405 - 410. Can we have some data? How many encounters and what percentages ? Was this statistically significant? This is more of an anecdote rather than data.

Author response: Tables showing observational data recorded have been added and edited to ensure it is clear that this is anecdotal data rather than statistically tested (see line 469- 473)

415 - What is the response rate? How many were approached?

Author response: a response rate has been added to the revised draft (see line 432, revised draft) and the number of operators approached can be found on line 291 (original draft)

433 - Citations on potential for expansion? How about survey by Claire Howard on public knowledge of marine wildlife tourism opportunities? (Public awareness of whale-watching opportunities in Scotland - in *Tourism in Marine Environments*)

Author response: citation has been added as per recommendation

437 - Kaikoura is often portrayed as a socioeconomic success - it was an economically impoverished area that is now a major tourism destination, with Maori-owned and operated companies.

Author response: Kaikoura example removed to avoid undermining this point, as per reviewer's recommendation and replaced with manatee example - see author response to reviewer's comment on lines 77-80 (original draft).



449 - See comment above. The codes were done at different times, but there has been an evolution with recent codes often using better scientific understanding and also with operator input. How do these codes compare to the ones described in Woods-Ballard & Parsons 2003?

Some of the inconsistencies might be issues that have arisen since the earlier codes, or items in earlier codes that were dropped because of irrelevance/ better scientific understanding.

Author response: point has been clarified as per the reviewer's recommendation (see lines 470-474, revised draft)

468 - The fact that swim-with activities occur is a failing of SNH to enforce the letter of the Nature (Scotland) Act.

Author response: acknowledged in line 498 (revised draft)

487 - Again, there are a lot more examples than this, and there are now studies on the bioenergetic impacts of this disturbance. There was a workshop in Glasgow in 2014 on the impacts of whalewatching and modelling short-term behavioural impacts in terms of population-level impacts which has been published in this very journal (New et al. 2015. The modelling and assessment of whale-watching impacts in *Ocean & Coastal Management*).

Author response: We acknowledge this and we have cited a number of references for these points (see lines 524-534, revised draft) and recognise that we could cite many more studies – in the interest of keeping this paper as short as possible (recognising it is already quite long) we have chosen to add in only the New et al. 2015 reference, as per the reviewer's recommendation. However, we have slightly restructured the paragraph between lines 511-522 (revised draft) to improve clarity and to reflect the reviewer's comments on lines 506 (original draft) and their early point about including more literature on shark swim-with tours.

506 - It's unlikely swim-with cetacean programs will start in Scotland for various logistic reasons, including swimmer safety.

Author response: acknowledged in context of discussion – see line

510 - This has been discussed by many authors including the IWC - operators may cherry pick less exacting guidelines, but could still be following guidelines. The Nature (Scotland) Act guidelines were intended to be a minimum (and if these are being disobeyed then harassment is occurring) - operators can use more rigorous guidelines if they wanted.

Author response: acknowledged in lines 542-546 (revised draft)

521 - Delete second comma.

Author response: done

522 - Technically the codes are not voluntary there are legal underpinnings, at least for cetaceans, as harassment and disturbance is illegal.

Author response: acknowledged in lines 542-546 (revised draft)

524 - This is referred to as "recreational whalewatching" by the IWC in their definitions (see "Glossary of whalewatching terms" in *Journal of Cetacean Research and Management* 8 (Suppl.), pp. 249-251) and has been discussed by other researchers (eg in New et al. 2015 in this journal, among others)

Author response: acknowledged, but no edit made as: i) the reviewer does not suggest a specific edit (although presumably they imply this definition should be formally cited in the text), and ii) this paper is in the context of marine wildlife-watching in general (albeit with specific reference to cetaceans and basking sharks), therefore we do not feel that this definition (specific to whale-watching) is necessarily needed or appropriate.

553- Introduced additional guidelines? If this is within the context of an MPA more stringent than the 2006 guidelines might be warranted, but these would have to be turned into regulations for MPA users.

Author response: we assume the reviewer means line 533, not 553. We have made no edit in response to this comment, as we feel our suggestion is clear enough: i.e. to develop local regulations through Regional Marine Plans which supersede voluntary codes and will satisfy the legislative needs of the area (e.g. MPA conservation objectives, Nature Conservation (Scotland) duties, as well as ensuring that all operators are working on a level playing field.

561 - This has already been done. Also it is important that any guidelines are not government led but gov facilitated/sanctioned but ultimately locally led - the Hebridean Whale and Dolphin Trust would be the ideal lead.

Author response: agreed, however not all operators follow this code and the main message of this paper is to call for improved consistency in how/which codes are followed. We have edited the sentence slightly for improved clarification on this point.

564- Capping numbers should be done after scientific studies of carrying capacity otherwise the number of permits could be considered to be arbitrary and capricious. Use of Erich Hoyt's sustainability report card would be a good option to monitor locations.

Author response: this sentence has been edited slightly for clarification, as per the reviewer's recommendation

566 - Doesn't Wild Scotland have such a database?

Author response: Wild Scotland does maintain a list of operators on their website, however it does not appear to be comprehensive (this is perhaps just a list of those who are signed up to/members of Wild Scotland) and does not include information about accreditation or codes of practice, as suggested is needed by the authors in this concluding point. We feel this point still stands as originally proposed.

569 - This is probably key as most of the bad actors are "recreational" or "incidental" whalewatchers (to use IWC definitions). Many recreational whalewatchers are yachties that attend various regattas etc (although the regattas have issued wildlife guidelines in the past)

Author response: agreed, although no edit made as it is not clear whether the reviewer is recommending an edit (unless just to emphasise the importance of the point)

571- Research on impacts is being done. What sort of research? HWDT has a stack of theses on behavioural changes in response to boat traffic. Elly Roland is currently monitoring noise levels using Sea Life Surveys as a platform of opportunity. The research that is done needs to be strategic, and addressing a specific unknown.

Author response: this sentence has been edited to reflect the reviewer's recommendation

576 - On biodiversity objectives, have you looked at the Biodiversity Action Plans for the region or Local BAPs? These include issues related to marine wildlife tourism.

Author response: we have included reference to LBAPs in line 580 (revised draft) and to the Convention on Biological Diversity in line 625 (revised draft), the commitment under which the LBAPs have been developed.

One of the problems in Scotland is that the competent authority for enforcing laws is the police, and they cannot monitor marine areas (see discussion on this issue in the International Journal of Wildlife Law and Policy article noted above, as well as discussion on legal protection of cetaceans vs whalewatching).

Author response: this has been acknowledged in line 609 (revised draft)

Some discussion is needed about the nature of marine wildlife (especially whale-watching) tourists in Scotland. They are extremely environmentally motivated and aware (there are numerous studies on this by Chris Rawles [Environmental motivation of whale-watching tourists in Scotland in Tourism in Marine Environments] and others) and this highly motivated pool of tourists in some ways ensures compliance with regulations.

Author response: this has been acknowledged in line 601 (revised draft)

Also, there are many studies on compliance with guidelines (or lack thereof) and this substantive body of work has seemingly not been reviewed (e.g. papers by Carol Scarpaci, Simon Allen, Claudio Corbelli, Kasey Stamation, Ashley Sitar and various others).

Author response: we acknowledge that there is research we have not been able to cite as part of this study. This is not a review paper and it is framed in the context of Scotland, and Scottish-specific species and examples (although we have referred to a limited number of international case studies for comparative purposes). In the interests of time and length of the paper, we have had to limit the amount of previous work we describe.

While this paper has some interesting results, the large discussion about MPAs isn't really relevant as many of the species are listed under the Nature(Scotland) Act and EU (not EC as listed in the table) Habitats Directive.

Author response: we are confused as to the reviewer's reference to the 'large discussion' about MPAs – presumably this refers to the sections in the introduction which explores the development of MPAs in Scotland for a number of species targeted by the wildlife-watching industry. We feel this is important context for the paper as, while these species have legal protection from harassment and harm in any part of Scottish waters (as the reviewer suggests) MPAs afford targeted spatial protection for important areas for the life history of some of these species. This study was primarily about exploring the implications of marine wildlife-watching (and the potential expansion of the industry) within the proposed Sea of the Hebrides ncMPA (proposed for basking shark and minke whale, but also a key area for watching numerous other marine species, including dolphins, harbour porpoise, sea birds, seals, sea eagles and otters, and a very popular recreational marine tourism hotspot for the same reasons). Therefore the implications for this study are important to consider in future management measures for such an MPA. We have decided to retain the text about MPAs for this reason, however we have attempted to consolidate this section slightly.

*The authors would have done well to look into the history of guideline establishment in Scotland and would do well to talk with (or show drafts of their manuscript to) people such as Caroline Warburton, Mike Tetley, Mark Simmonds and others. There is a lot of relevant, even essential, research that has been done in Scotland on marine wildlife tourism (especially whalewatching), on codes of conduct and compliance, and on marine mammal MPAs and protection in the UK, which have not been touched upon in this paper.*

Author response: we have discussed our paper with, and sent draft versions to, colleagues from the Hebridean Whale and Dolphin Trust (who have been involved in similar work, as also alluded to by the reviewer by line 571, original draft) and SNH (who have developed the SMWWC). We are happy to consult more widely with other colleagues, but feel that this may have further delayed submission of the manuscript and, given that SNH are currently revising the SMWWC, timing is fairly critical so that this paper may be usefully considered.

*There is a lot of relevant work in the IWC annual reports if the Scientific Committee in particular. The authors missed major two workshops on marine wildlife tourism in Glasgow in 2014 on the topics of impacts and management (one of which published as New et al. 2015 in this journal and, as noted above, covers some of the issues discussed in this paper. A second one which is currently being written up by Carol Scarpaci discussed problems in, and management of, marine megafauna tourism including sharks) which would be useful for them to refer to. Many of their recommendations have been made before.*

Author response: we have cited the New et al., 2015 paper in response to a previous reviewer comment, and we have added in further detail about shark wildlife-watching and swim-with, also in response to a previous comment. We hope this will also satisfy this point, but again it would be challenging to incorporate all the literature on this subject and have tried to cite the most relevant to our study.

*In summary, this paper is very useful, but it needs a more thorough grounding in the marine wildlife tourism/ policy literature.*

Author Response: This has been taken into account and done through the above series of amendments and additions.