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3 **Whaling tradition along the Cantabrian coast: Public perception towards cetaceans**  
4 **and its importance for marine conservation.**

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18 **DECLARATIONS**

19 The authors declare that this study was not funded by public or private grants.  
20 Authors also declare that to their knowledge there are no conflicts of interest regarding  
21 this article. This study was approved by the Research Ethics Committee of the  
22 Principality of Asturias with reference number 79/19. All participants agree to  
23 participate as volunteers in this research study and all of them agree to publish the  
24 results obtained from its participation. All data can be shared upon request.

25 **ABSTRACT**

26 Whaling is currently a controversial practice and the focus of a relevant public debate.  
27 According to records, it represented an important socio-economic activity in the North of  
28 Spain from the 13<sup>th</sup> to the 18<sup>th</sup> century. The North Atlantic Right Whale (*Eubalaena*  
29 *glacialis*) was the main target species of this activity. As a consequence of the rising of  
30 whaling, the North-East Atlantic population of this species was severely depleted, and it  
31 has not recovered since then. This work presents a study on public perception of cetaceans  
32 and whaling along the Cantabrian coast (North of Spain) and evaluates the differences with  
33 respect to several non-coastal regions. More than 400 anonymous surveys were conducted  
34 in 12 study areas to examine knowledge about cetaceans and whaling, as well as attitudes  
35 and willingness to take action in whale and dolphin conservation. Results showed that  
36 whaling has a great cultural imprint on the Cantabrian coast inhabitants, which plays a  
37 relevant role in citizens' perception. Participants from areas with whaling tradition  
38 demonstrated higher levels of knowledge about the history of this activity, but less positive  
39 attitudes with respect to cetacean conservation than respondents from inland provinces.  
40 Additionally, we observed that there are other influencing factors, such as gender or age.  
41 Our findings indicate that positive attitudes towards the protection of whales and dolphins  
42 are not always sufficient for citizens to collaborate for this cause. Therefore, an  
43 improvement in education programmes and awareness campaigns about the importance of  
44 protecting cetaceans and their environment is needed to achieve real and effective marine  
45 citizenship.

46 **Keywords:** Public awareness, Public engagement, Whaling ports, Cultural heritage,  
47 Cetacean conservation.

## 48 1. INTRODUCTION

49 The exact time in which whaling was initiated in Spain is not clear. There are evidences  
50 that show several societies, such as the Vikings, used to obtain resources from whales  
51 (Hennius et al. 2018). Other studies suggest the possibility that whaling was also  
52 conducted by the Romans (López 2014; Rodrigues et al. 2018; Hurk et al. 2021). However,  
53 the earliest records of industrial whaling activities correspond to Cantabria in the year 1230  
54 (González-Echegaray 1978), Asturias in 1232 (Graells 1889), the Spanish Basque Country  
55 in 1237 and Galicia in 1286 (Ciriquiain-Gaiztarro 1961). Consequently, this activity spread  
56 progressively all over the North of Spain (Aguilar 1986).

57 Whales provided a wide range of products: oil made from the blubber, tools made with  
58 the baleens, different structures made with the bones and meat that was mainly exported to  
59 markets in France, England, Flanders, Friesland, Scandinavia and others (Salvador and  
60 Nores 2017; Hurk 2020). Therefore, whaling represented a very important economic  
61 activity on the Cantabrian coast (North of Spain), mainly from the 13<sup>th</sup> to the 18<sup>th</sup> century  
62 (Azpiazu 2000). Moreover, it also had a great cultural importance, which has been  
63 transmitted through generations. The presence of illustrations related to whaling can still  
64 be observed on the current coats of arms of many towns that used to have whaling ports,  
65 especially in the Basque Country (Campos-Santacana and Peñalba-Otaduy 2000). In  
66 addition, the recovery of whaling historical information by several museums, festivities  
67 and even street art pieces can be found at different locations along the Cantabrian coast  
68 nowadays.

69 The main target species in the Cantabrian Sea was the North Atlantic Right Whale  
70 (*Eubalaena glacialis*). This has not only been proved by historical records (López 2014),  
71 but also confirmed by molecular studies of historical remains (Rey-Iglesia et al. 2018). The  
72 North Atlantic Right Whale represented an easy target for whalers, since it swims slowly

73 and mother-calf associations show a preference for shallow waters (Greene and Pershing  
74 2004; Salvador and Nores 2017). Furthermore, their buoyancy after death made it easier  
75 for whalers to pull the carcass out of the water (Greene and Pershing 2004). The catching  
76 method consisted in using small rowing boats to approach and harpoon the whales.  
77 Moreover, some ports presented ‘Atalayas’ (look-out towers) to spot whales more easily  
78 (Aguilar 1986). This whaling method was mainly directed at calves, since they were easier  
79 to hunt and their catch normally enabled killing the mother as well. For this reason, the  
80 overexploitation of calves caused a significant decrease of the North-East Atlantic  
81 population of this species (Aguilar 1986).

82 The expansion of whaling to other areas in the North of Europe from the 14<sup>th</sup> century, as  
83 well as to the North-West Atlantic during the 16<sup>th</sup> and 17<sup>th</sup> centuries, aggravated the  
84 detrimental effects of this activity on the species (Aguilar, 1986). Moreover, during the  
85 18<sup>th</sup> century, the industrial revolution helped improve the hunting methodology and  
86 consequently, deteriorated the status of the species. Pre-whaling abundance of the North  
87 Atlantic Right Whale has been estimated to be between 9,000 and 21,000 individuals  
88 (Monsarrat et al. 2016). Nevertheless, the most recent estimate is of 409 whales (Pettis et  
89 al. 2020). Even though this species used to be common along both sides of the North  
90 Atlantic, the number of sightings in the North-East Atlantic in the last decades is really  
91 scarce. Therefore, the North Atlantic Right Whale is currently catalogued as critically  
92 endangered by the International Union for Conservation of Nature (IUCN) (Cooke 2020).

93 During the 19<sup>th</sup> century, only four whales were caught. Nevertheless, Graells (1889)  
94 claimed that whaling in the Cantabrian Sea was sustainable. He also affirmed that many  
95 whales were present in the area. This document remains controversial and is not endorsed  
96 by many other authors (Aguilar, 1986; Teixeira et al. 2014; Salvador and Nores, 2017).  
97 The last capture of a North Atlantic Right Whale specimen in the North of Spain occurred

98 in 1901 in Orizaba, Spanish Basque Country (Salvador and Noreas 2017). However, several  
99 whaling companies were founded in Spain after that date. During that period, the main  
100 target species were fin whales (*Balaenoptera physalus*) and sperm whales (*Physeter*  
101 *macrocephalus*), due to the previous depletion of the North Atlantic Right Whale  
102 population (Sanpera and Aguilar 1992). These companies presented their base ports mainly  
103 in Galicia and in the Strait of Gibraltar (Sanpera & Aguilar, 1992; Hansen, 2015). Their  
104 activity lasted for decades, until the last whale was caught in 1985 (Aguilar 2013). One  
105 year later, Spain adopted the commercial whaling moratorium established by the  
106 International Whaling Commission (IWC) and whaling has been banned in this country  
107 since then (IWC 1986). Contemporarily, the social movement rising during the 80s against  
108 whaling had a great impact on the social perception of this activity.

109 Nowadays, whaling can be classified into commercial and aboriginal. Commercial  
110 whaling is authorized in Japan, Norway and Iceland. On the other hand, aboriginal whaling  
111 occurs in several places in the world, including the Caribbean island of Bequia, Greenland,  
112 Alaska, Russia and Indonesia (Ellis 2018; Hofman 2019). However, and regardless of  
113 whether it is commercial or aboriginal, there is a growing citizen perception of whaling as  
114 an activity that should be banned worldwide.

115 Citizens represent an important agent for marine conservation. Marine citizenship is an  
116 emerging concept that describes the rights and responsibilities of an individual towards the  
117 marine environment. It recognises the importance of the role of each citizen in addressing  
118 marine environmental issues through their behavioural choices (Fletcher and Potts 2007;  
119 McKinley and Fletcher 2010). Moreover, it considers how public engagement can be an  
120 important driver of national-level marine policies (McKinley and Fletcher 2012).

121 The first and most important factor of marine citizenship is knowledge (McKinley and  
122 Fletcher 2012). Previous public perception studies observed that participants with high

123 levels of knowledge of marine animals generally have stronger support for their  
124 conservation and avoid behaviours that could be detrimental for these animals (Barney et  
125 al. 2005; Friedrich et al. 2014). However, other studies suggest that awareness of the  
126 marine environment is low and that few people consider the implications of personal  
127 behaviour on marine conservation (Williams 2008; Fletcher et al. 2009; Naylor and  
128 Parsons 2018). In addition, knowledge and awareness are not the only factors that play a  
129 role in marine citizenship, since other variables, such as demographic and cultural  
130 attributes, also have influence (Barr 2003). For instance, Hamazaki and Tanno (2001)  
131 found that citizens from whaling countries have more support for this activity than citizens  
132 from non-whaling countries. Therefore, environmental knowledge and attitudes towards  
133 conservation can vary among different populations (Schultz and Zelezny 2003). For these  
134 reasons, it is important to assess knowledge, awareness and attitudes of citizens towards  
135 different environmental concerns, such as wildlife conservation, and evaluate how these  
136 can be influenced by demographic or cultural characteristics.

137 The main objective of this work is to study the role of tradition, knowledge and  
138 awareness on attitudes towards engagement of citizens in protecting cetaceans and their  
139 environment. We aim to test first the hypothesis that cultural heritage on the Cantabrian  
140 coast implies higher levels of knowledge about cetaceans and whaling in people from  
141 coastal areas, with respect to citizens living in inland provinces. Moreover, a secondary  
142 hypothesis to test is that there is a positive correlation between participants' knowledge  
143 and positive attitudes towards cetacean conservation. Results from this study could help in  
144 the design of more effective strategies for conservation and a sustainable management of  
145 marine resources.

## 146 2. MATERIALS AND METHODS

### 147 2.1 Identification of whaling ports and definition of study areas

148 Prior to the definition of study areas, an exhaustive literature review was conducted to  
149 identify all harbours that presented whaling settlements at some time between the 13<sup>th</sup> and  
150 the 18<sup>th</sup> century along the Cantabrian coast (North of Spain; from Cape Ortegal, in Galicia,  
151 to the French border). In addition, ports which presented Atalayas (look-out towers) to spot  
152 whales were investigated, as well as towns which still have illustrations related to whaling  
153 on their coats of arms. A total number of 50 whaling harbours were identified. At least 26  
154 of them used to present look-out towers to spot whales. Moreover, nine towns where those  
155 ports are located still have illustrations related to whaling on their coats of arms (seven  
156 situated in the Basque Country and two in Cantabria; Table 1).

157 Coastal study areas were established by selecting the whaling harbours that were more  
158 frequently cited in the literature and grouping them into areas according to their proximity  
159 (groups were formed by harbours located less than 20 km away). A total number of nine  
160 study areas (comprising 17 whaling ports) were defined along the Cantabrian coast. Non-  
161 coastal study areas were established in regions that were at least 200 km away from the  
162 coast, and 100 km away from each other. The selected inland areas correspond to  
163 Salamanca, Valladolid and Madrid; which are located at a distance of 335km, 250km and  
164 425km, respectively, to the closest Cantabrian port (Fig. 1).

165 **Table 1**

166 **Ports along the Cantabrian coast that presented whaling settlements at some time between**  
167 **the 13th and the 18th century.** Harbours that presented look-out towers are highlighted and  
168 harbours located in towns that still have whaling-related illustrations on their coats of arms are  
169 marked with asterisks. Sources: Ciriquiain-Gaiztarro (1961), Castañón (1964), González-  
170 Echegaray (1978), Azpiazu (2000), Escudero (2006), Ruano and Lonbide (2006), Unsain (2012)

171

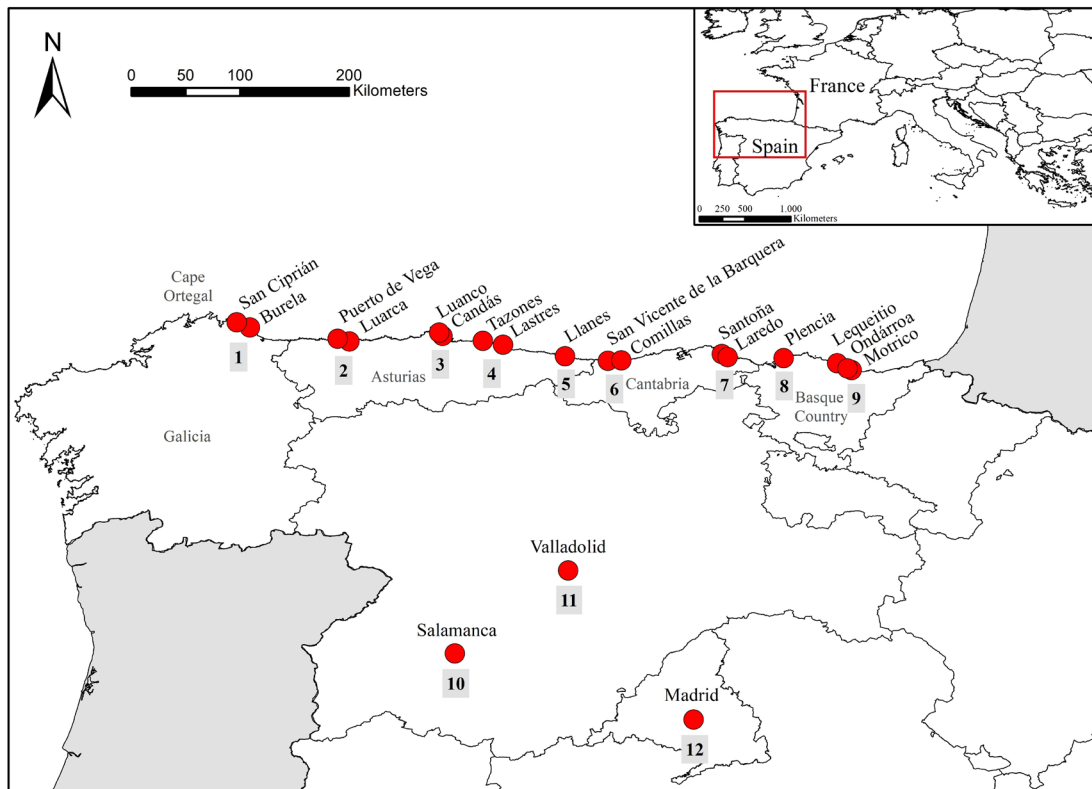
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<b>Galicia</b>	<b>Asturias</b>	<b>Cantabria</b>	<b>Basque Country</b>
Basma - Ría de Foz (Lugo)	Avilés	Castro Urdiales*	<b>Bermeo (Vizcaya)*</b>
Bares (A Coruña)	Bocines	<b>Comillas</b>	Deva (Guipúzcoa)
Burela (Lugo)	Cadavedo	Quejo	Elanchove (Vizcaya)
Nois (Lugo)	<b>Candás</b>	<b>Laredo*</b>	<b>Fuenterrabía (Guipúzcoa)*</b>
Ribadeo (Lugo)	<b>Cudillero</b>	San Vicente de la Barquera	<b>Guetaria (Guipúzcoa)*</b>
Rinlo (Lugo)	Entrellusa	Santander	<b>Lekeitio (Vizcaya)*</b>
<b>San Ciprián (Lugo)</b>	<b>Figueras</b>	San Martín de Arenas	<b>Motrico (Guipúzcoa)*</b>
	<b>Gijón</b>	<b>Santoña</b>	Ondárroa (Vizcaya)*
	<b>Lastres</b>	<b>Uriambre</b>	<b>Orio (Guipúzcoa)</b>
	<b>Llanes</b>		<b>Pasajes (Guipúzcoa)</b>
	<b>Luanco</b>		Plencia (Vizcaya)
	<b>Luarca</b>		<b>San Sebastián (Guipúzcoa)</b>
	Niembro		<b>Zarauz (Guipúzcoa)*</b>
	Ortiguera		Zumaya (Guipúzcoa)
	<b>Puerto de Vega</b>		
	<b>Ribadesella</b>		
	San Pedro de		
	Bocamar		
	Tapia de Casariego		
	<b>Tazonés</b>		
	<b>Viavélez</b>		

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172





173 **Fig. 1 Map showing the location of the study areas.** Each area is indicated by its  
 174 corresponding number and includes from one to three sites, which are indicated by red dots

175 **2.2 Questionnaire design**

176 The questionnaire was divided into eight sections: 1) Demographic variables, 2)  
 177 General knowledge about cetaceans, 3) Knowledge about the history of whaling in Spain,  
 178 4) Knowledge about current whaling, 5) Opinion towards whaling, 6) Opinion towards  
 179 cetacean conservation, 7) Opinion on the current measures to protect cetaceans and 8)  
 180 Willingness to take action in cetacean conservation. The complete questionnaire is  
 181 included in Supplementary Materials A.

182 A total number of fourteen items were established, including optional follow-up  
 183 questions, which were only asked when participants answered the first question  
 184 affirmatively. For instance, the question ‘Was there whaling in Spain in the past?’ was

185 followed by other questions such as ‘Where in Spain?’ or ‘Which was the main target  
186 species?’

187 Five of the items included yes/no/don’t know options, five were open questions and  
188 four were multiple choice questions, each of them with five possible answers. Some of the  
189 open and multiple choice questions were categorised as a 5- point Likert scale (Nardi  
190 2015) and others had correct/incorrect/don’t know answers. Furthermore, control questions  
191 were included to enhance the reliability of the survey. For example, the question ‘Do you  
192 know what a cetacean is?’ was followed by the question ‘Could you give some examples  
193 of cetacean species?’ which tested the truthfulness of the first answer.

194 The reliability of the questionnaire was estimated by calculating Omega coefficient  
195 (acceptable reliability was set at 0.7 following McDonald 1999). The validity was  
196 evaluated by conducting a pilot test on 20 individuals. In addition, a panel consisting of  
197 three experts in marine citizen science or public perception of marine conservation  
198 analysed the questions and the answers to ensure all items were unambiguous and easy to  
199 understand (Olson 2010).

### 200 **2.3 Data collection and ethics statement**

201 Face-to-face surveys were conducted from December 2018 to April 2019. Opportunistic  
202 sampling was used for the collection of data. Potential respondents were approached in a  
203 friendly way and asked if they could answer a short anonymous survey for scientific  
204 research purposes. Participants who verbally agreed to participate in the survey were  
205 initially asked about the locality where they were from, and only citizens from the study  
206 area were interviewed. The interviews were developed like a conversation and lasted no  
207 longer than ten minutes. All answers were recorded in writing. In addition, anecdotal  
208 comments given by participants were also written down. All respondents were over 18

209 years old. A minimum number of 30 surveys per study area were conducted to ensure  
210 statistical significance (Charmaz 2006). The total number of respondents per study area is  
211 included in Supplementary Table S1.

212 Data confidentiality was ensured for all social data. All surveys were anonymous.  
213 Participants were not photographed and their voices were not recorded to respect privacy.  
214 This study was approved by the Research Ethics Committee of the Principality of Asturias  
215 with reference number 79/19.

## 216 **2.4 Data analysis**

217 Questionnaire responses were coded after their completion to allow a quantitative  
218 analysis. A total number of four indexes were established to cluster items related to the  
219 same concept, corresponding to ‘General knowledge about cetaceans’ (K<sub>C</sub>), ‘Knowledge  
220 about old whaling in Spain’ (K<sub>OW</sub>), ‘Knowledge about whaling in the present’ (K<sub>PW</sub>) and  
221 ‘Opinion towards whaling’ (O<sub>W</sub>) (Table 2). The rest of questions were analysed as an  
222 individual item, and were used to assess support for cetacean conservation, opinion on the  
223 current measures to protect cetaceans and engagement in the protection of cetaceans,  
224 respectively.

225 In order to make appropriate comparisons, the values of all indexes and responses to  
226 individual questions were transformed into a 0-1 scale, with values closer to 1 indicating  
227 higher levels of knowledge, more positive attitudes towards cetacean conservation, and  
228 greater willingness to get involved in cetacean conservation, respectively, for each  
229 index/question. The control questions previously explained were included as part of the  
230 indexes used to assess knowledge, lowering the score of the index when the control  
231 question proved the first answer to be untrue.

232 **Table 2**

233 **Indexes and their corresponding formulas.**  $K_D$  = score of question 1;  $K_{SP}$  = score of question  
 234 1.1;  $K_{WP}$  = score of question 2;  $K_P$  = score of question 2.1;  $K_S$  = score of question 2.2;  $K_{CS}$  =  
 235 score of question 2.3;  $K_E$  = score of question 2.4;  $K_{WN}$  = score of question 3;  $K_{PC}$  = score of  
 236 question 3.1;  $O_G$  = score of question 4;  $O_R$  = score of question 4.1 (see Supplementary Materials  
 237 A for corresponding questions).

238

Index	Formula
General knowledge about cetaceans ( $K_C$ )	$K_C = K_D \times K_{SP}$
Knowledge about old whaling in Spain ( $K_{OW}$ )	$K_{OW} = K_{WP} \times \frac{K_P + K_S + K_{CS} + K_E}{4}$
Knowledge about whaling in the present ( $K_{PW}$ )	$K_{PW} = K_{WN} \times K_{PC}$
Opinion towards whaling ( $O_W$ )	$O_W = O_G \times O_R$

239

240 Statistical data analyses were conducted using the program Past 3.20 (Hammer, Harper  
 241 and Ryan 2001) and IBM SPSS Statistics 25. The values of the calculated indexes and the  
 242 responses to individual questions not included in the indexes were taken into account for  
 243 all analyses. Non-metric Multidimensional Scaling (nMDS) analyses were conducted to  
 244 check if the study groups corresponding to each area were clustered or if they were more or  
 245 less scattered across the plot (indicating similarities or differences between the responses  
 246 of each group, respectively). Euclidian distances were applied. The pairs of ranks were  
 247 plotted (Shepard plot) and stress of obtained over target ranks was calculated (<0.2 was  
 248 considered acceptable following Oksanen et al. 2019). Normality was checked using  
 249 Shapiro-Wilk test, in order to decide which statistical test was more appropriate for  
 250 comparisons among groups. Comparisons were made for all the established groups to

251 elucidate if there were any differences between study areas, age groups and/or genders.  
252 These comparisons were carried out using one-way ANOVA (in case data followed a  
253 normal distribution) or Kruskal-Wallis (in case of significant deviation from normality).  
254 When significant differences were detected, Dunn's post hoc test (Dunn 1964) was applied  
255 to determine which groups were different. Frequencies of all responses were calculated to  
256 assess the profile of each study group. Pairwise correlations were analysed using  
257 Spearman's  $r_s$  (Spearman's rank correlation coefficient). Statistical significance was set at  
258  $p < 0.05$ . Bonferroni correction of the significance level was applied for multiple  
259 comparisons and correlations.

## 260 **3. RESULTS**

### 261 **3.1 Demographics and survey reliability**

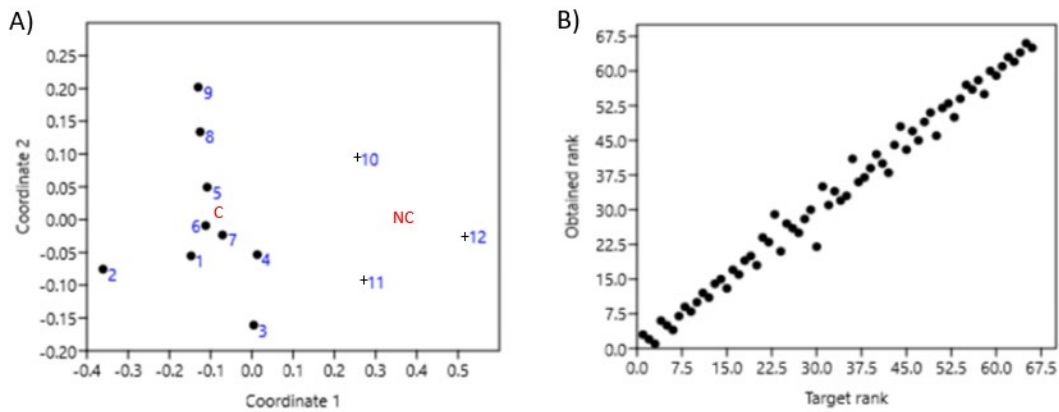
262 In total, 404 participants were interviewed, of which 208 were males (51.49%) and  
263 196 females (48.51%). Additionally, 296 (73.27%) were citizens from areas located along  
264 the Cantabrian coast and 108 (26.73%) from non-coastal areas. The largest age group was  
265 between 31 and 60 years old (50.5%), followed by respondents over 60 years old (29.7%)  
266 and, finally, individuals between 18 and 30 years old (19.8%).

267 The obtained Omega coefficient value for the questionnaire was 0.75, which indicates  
268 a good level of reliability (McDonald 1999).

### 269 **3.2 Coastal vs. non-coastal regions**

270 The surveys global analysis showed a clear difference in answers between coastal and  
271 non-coastal areas (Fig. 2). When comparing the answers to each question given by

272 participants from the Cantabrian coast with the ones of respondents from inland areas,  
273 several significant differences were detected (Fig. 3).

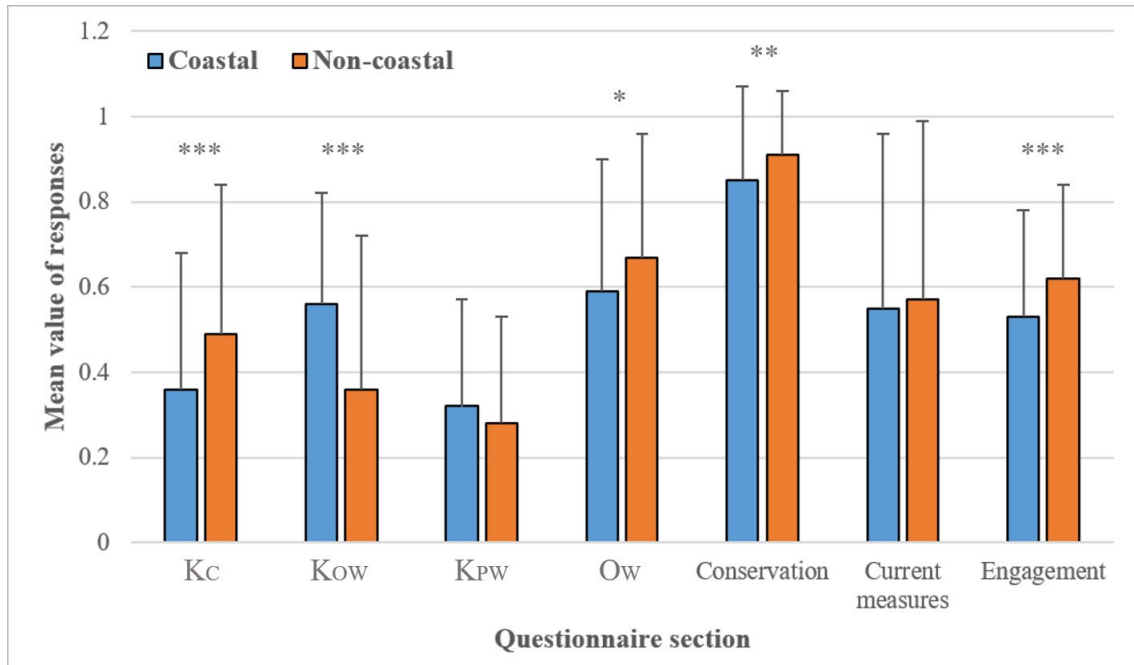


274 **Fig. 2 Non-metric Multidimensional Scaling of the twelve study areas located in coastal**  
275 **and non-coastal regions. A: Scatter plot. B: Shepard plot.** Areas located along the  
276 Cantabrian coast and in inland provinces are represented with dots and crosses, respectively.  
277 The number of the area is given. C = coastal regions, NC = non-coastal regions. The stress value  
278 of the Shepard plot is  $<0.2$

279 First, significant differences were found regarding the index ‘General knowledge  
280 about cetaceans’ (Kruskal-Wallis H ( $\chi^2$ ) = 12.84;  $H_c$  (tie corrected) = 14;  $p = 0.0002$ ).  
281 Citizens from coastal regions showed lower levels of knowledge about cetaceans ( $K_C =$   
282  $0.36 \pm 0.32$ ) than inhabitants of non-coastal areas ( $K_C = 0.49 \pm 0.35$ ). Although a similar  
283 proportion of participants from both groups affirmed to know what cetaceans are (84% vs.  
284 83%, respectively), a lower number of individuals from coastal regions were able to give at  
285 least one example of cetacean species (53% vs. 67%, respectively).

286 The index ‘Knowledge about old whaling in Spain’ was also significantly different  
287 among coastal and inland areas (Kruskal-Wallis H = 22.61;  $H_c = 23.03$ ;  $p = 1.595 \times 10^{-6}$ ).  
288 Citizens from the North of Spain showed higher levels of knowledge about this topic ( $K_{ow}$   
289 =  $0.56 \pm 0.26$  vs.  $K_{ow} = 0.36 \pm 0.36$ , respectively). A larger proportion of them knew that

290 there was whaling in Spain in the past (82% vs. 50%, respectively) and were able to  
 291 mention at least one region in which this activity was carried out (74% vs. 34%,  
 292 respectively).



293 **Fig. 3 Mean and standard deviation of several aspects concerning public perception of**  
 294 **cetaceans and their conservation, in coastal and non-coastal areas.** K<sub>C</sub> = General knowledge  
 295 about cetaceans, K<sub>OW</sub> = Knowledge about old whaling in Spain, K<sub>PW</sub> = Knowledge about  
 296 whaling in the present, O<sub>W</sub> = Opinion towards whaling. The obtained values of the indexes and  
 297 responses to individual questions were transformed into a 0-1 scale (going from lowest to  
 298 highest levels of knowledge, positive attitudes towards cetacean conservation and engagement,  
 299 respectively). Significant differences are indicated with asterisks (\* p < 0.05, \*\* p < 0.01, \*\*\* p  
 300 < 0.001)

301 Significant differences were found for the index ‘Opinion towards whaling’ (Kruskal-  
 302 Wallis H = 4.59; H<sub>c</sub> = 5.63; p = 0.0177). Participants from the Cantabrian coast showed  
 303 less opposition to whaling (O<sub>W</sub> = 0.59 ± 0.31 vs. O<sub>W</sub> = 0.67 ± 0.29, respectively). Even  
 304 though the majority of them affirmed to be against whaling, the proportion of participants

305 who supported this activity was higher than in non-coastal areas (25% vs. 8%,  
306 respectively).

307 The opinion towards the establishment of measures for the protection of whales and  
308 dolphins was also significantly different between respondents from the North of Spain and  
309 from inland provinces (Kruskal-Wallis  $H = 5.14$ ;  $H_c = 6.83$ ;  $p = 0.0089$ ). Although in both  
310 groups the greatest majority considered that it is very important or important to establish  
311 measures for the conservation of cetaceans, the proportion was lower in participants from  
312 the North of Spain (92% vs. 98%, respectively).

313 The final item for which significant differences were found was the willingness to  
314 engage in the protection of whales and dolphins (Kruskal-Wallis  $H = 8.87$ ;  $H_c = 11.35$ ;  $p =$   
315  $0.0007$ ). The number of respondents who affirmed that they would collaborate in the  
316 conservation of cetaceans was lower on the Cantabrian coast than in non-coastal areas  
317 (52% vs. 71%, respectively).

318 Regarding knowledge about whaling in the present and opinion towards the current  
319 measures to protect whales and dolphins, no significant differences were found among  
320 citizens living in coastal and inland areas.

### 321 **3.3 Public perception along the Cantabrian coast**

322 The mean value of the index 'General knowledge about cetaceans' for respondents  
323 residing in the North of Spain was  $K_C = 0.36 \pm 0.32$ , which indicates a low level of  
324 knowledge. Whereas 83% of participants affirmed to know what a cetacean is, only 53%  
325 were able to give at least one example of cetacean species and solely 2% knew four or  
326 more species.

327 In the case of 'Knowledge about old whaling in Spain', the mean value was  $K_{ow} =$   
328  $0.56 \pm 0.26$ , indicating a moderate level of knowledge. A percentage of 82% participants



329 from the Cantabrian coast asserted that there was whaling in Spain in the past. However,  
330 only 18% knew that this activity was carried out all over the North of Spain, while the  
331 majority (54%) were only aware of whaling activities that took place in the town where  
332 they live or places nearby. Solely 1% knew which the main target species was, but 49%  
333 believed that the species is currently endangered or extinct as a consequence of hunting.  
334 Finally, most respondents (69%) affirmed that whaling was economically important or  
335 very important.

336 Significant differences among the nine study areas on the Cantabrian coast were  
337 detected (Kruskal-Wallis  $H = 26.28$ ;  $H_c = 26.82$ ;  $p = 0.0008$ ). The groups that were  
338 significantly different corresponded to areas 7 -Santoña and Laredo- and 8 -Plencia-  
339 (Dunn's post hoc  $p = 0.0444$ ), as well as areas 7 and 9 -Lequeitio, Ondárroa and Motrico-  
340 (Dunn's post hoc  $p = 0.0037$ ). Participants residing in areas 8 and 9 showed higher levels  
341 of knowledge about whaling in Spain in the past ( $K_{OW} = 0.62 \pm 0.28$ ;  $K_{OW} = 0.68 \pm 0.17$ ,  
342 respectively) than citizens from area 7 ( $K_{OW} = 0.42 \pm 0.29$ ). In general,  $K_{OW}$  was higher in  
343 areas located in the Basque Country (8 and 9) than in the rest (Fig. 4A). With respect to the  
344 other indexes and questions, no significant differences were found between areas along the  
345 Cantabrian coast. The mean value and standard deviation obtained for each of them in each  
346 study area are included in Supplementary Table S1.

347 The mean value of the index 'Knowledge about whaling in the present' was  $K_{PW} =$   
348  $0.32 \pm 0.25$ , which indicates a low level of knowledge. A proportion of 84% of the  
349 interviewed citizens from coastal areas affirmed that whaling activities are conducted  
350 nowadays. Even though half of them (51%) were aware of whaling activities taking place  
351 in Japan, only 6% knew that there is whaling in Norway and 1% were aware of this activity  
352 being conducted in Iceland.

353        Regarding the index ‘Opinion towards whaling’, the mean value was  $O_w = 0.59 \pm$   
354        0.31, indicating moderate opposition to whaling. Almost two thirds (65%) of participants  
355        from coastal regions asserted that they are against whaling. Less than one fourth (22%)  
356        supported whaling only under certain regulations and solely 3% were completely in favour  
357        of this activity. Furthermore, 92% affirmed that establishing measures to protect whales  
358        and dolphins is very important or important. A percentage of 57% believed that the current  
359        measures to protect whales and dolphins are not sufficient or very insufficient and no more  
360        than 10% asserted that they are sufficient or that cetaceans are overprotected.

361        Lastly, 52% of respondents residing on the Cantabrian coast affirmed that they would  
362        be willing to contribute to the protection of whales and dolphins (by participating in  
363        campaigns, volunteering, doing donations to associations, etc.) and 47% said they would  
364        not contribute (40% because they were not interested and 7% due to lack of time, physical  
365        incapacity or economic difficulties).

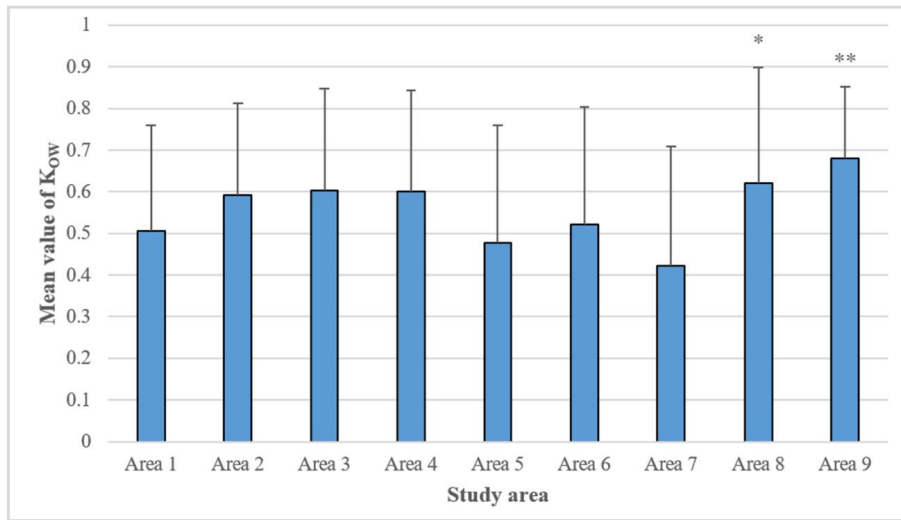
366        Significant differences were found between females and males concerning the three  
367        knowledge indexes:  $K_c$  (Kruskal-Wallis  $H = 4.13$ ;  $H_c = 4.56$ ;  $p = 0.0327$ ),  $K_{ow}$  (Kruskal-  
368        Wallis  $H = 15.6$ ;  $H_c = 15.92$ ;  $p = 6.596 \times 10^{-5}$ ) and  $K_{pw}$  (Kruskal-Wallis  $H = 12.79$ ;  $H_c =$   
369        14.1;  $p = 0.0002$ ). In all cases, males showed higher levels of knowledge than females.  
370        Moreover, the opinion towards the establishment of measures to protect whales and  
371        dolphins was also significantly different between genders (Kruskal-Wallis  $H = 4.09$ ;  $H_c =$   
372        5.24;  $p = 0.022$ ). In this case, females showed stronger support for conservation than men  
373        (Fig. 4B).

374        Significant differences were found between age groups regarding  $K_c$  (Kruskal-Wallis  
375         $H = 11.57$ ;  $H_c = 12.77$ ;  $p = 0.0017$ ). Middle-aged participants (31-60 years old)  
376        demonstrated higher levels of general knowledge about cetaceans than younger (18-30  
377        years old; Dunn’s post hoc  $p = 0.0013$ ) and older respondents (>60 years old; Dunn’s post

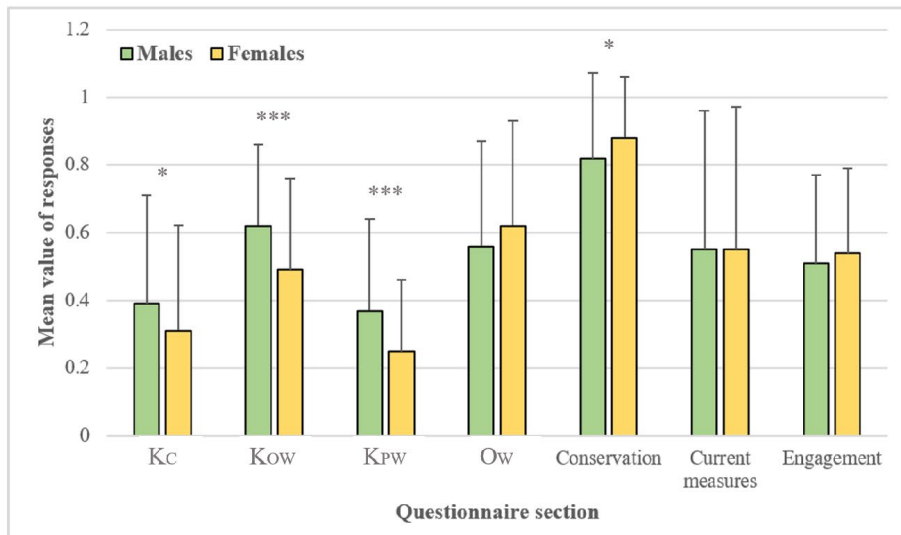
378 hoc  $p = 0.0154$ ). Significant differences between age groups were also found concerning  
379 the opinion towards the establishment of conservation measures to protect cetaceans  
380 (Kruskal-Wallis  $H = 7.85$ ;  $H_c = 10.06$ ;  $p = 0.0065$ ) as well as regarding willingness to  
381 contribute to cetacean conservation (Kruskal-Wallis  $H = 10.77$ ;  $H_c = 13.34$ ;  $p = 0.0013$ ).  
382 Citizens older than 60 years of age showed less support for cetacean conservation than  
383 middle-aged (Dunn's post hoc  $p = 0.0352$ ) and young individuals (Dunn's post hoc  $p =$   
384  $0.0151$ ). Moreover, they were less willing to engage in the protection of whales and  
385 dolphins than middle-aged (Dunn's post hoc  $p = 0.0264$ ) and young respondents (Dunn's  
386 post hoc  $p = 0.0019$ ) (Fig. 4C).

387 The three knowledge indexes ( $K_C$ ,  $K_{OW}$  and  $K_{PW}$ ) were positively correlated.  
388 Correlations between the different sections of the survey are presented in Table 3.  
389 Furthermore,  $O_W$ , the opinion towards the establishment of cetacean conservation  
390 measures and the opinion towards the current measures to protect cetaceans were also  
391 positively correlated. Even though there was a positive correlation between the two  
392 questions concerning measures to protect whales and dolphins and participants'  
393 willingness to engage in cetacean conservation, there was no correlation between  $O_W$  and  
394 engagement.

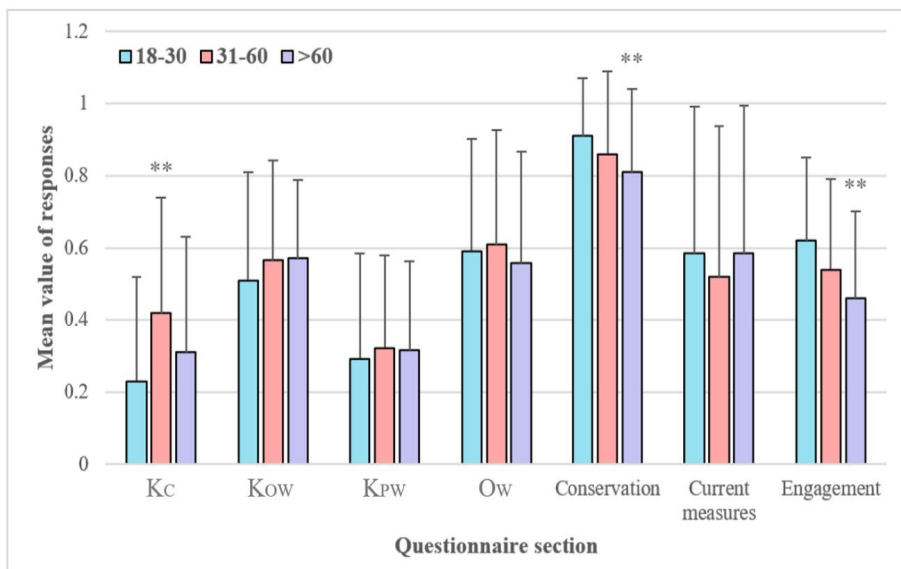
A)



B)



C)



396 **Fig. 4 Mean and standard deviation of several aspects concerning public perception of**  
397 **cetaceans and their conservation, in study areas located along the Cantabrian coast (A),**  
398 **females and males (B) and age groups (C).**  $K_C$  = General knowledge about cetaceans,  $K_{OW}$  =  
399 Knowledge about old whaling in Spain,  $K_{PW}$  = Knowledge about whaling in the present,  $O_W$  =  
400 Opinion towards whaling. The obtained values of the indexes and responses to individual questions  
401 were transformed into a 0-1 scale (going from lowest to highest levels of knowledge, positive  
402 attitudes towards cetacean conservation and engagement, respectively). Significant differences are  
403 indicated with asterisks (\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ ). **A:** asterisks indicate which areas  
404 are significantly different from area 7. **C:** asterisks indicate which of the three age groups is  
405 significantly different from the others for each section

406 **Table 3**

407 **Pairwise Spearman's rs correlation results for participants residing along the Cantabrian**  
408 **coast.** The rs and p values are above and below the diagonal, respectively. Significant  
409 correlations (after Bonferroni correction) are indicated in bold and significant p values are  
410 marked with asterisks (\*\*\*  $p < 0.001$ ). General knowledge about cetaceans ( $K_C$ ), knowledge  
411 about old whaling in Spain ( $K_{OW}$ ), knowledge about whaling in the present ( $K_{PW}$ ), opinion  
412 towards whaling ( $O_W$ ), opinion about the importance of establishing conservation measures to  
413 protect cetaceans, opinion towards the current cetacean conservation measures and willingness  
414 to collaborate in whale and dolphin conservation are shown

415

	$K_C$	$K_{OW}$	$K_{PW}$	$O_W$	Conservation	Current measures	Engagement
$K_C$		<b>0.3248</b>	<b>0.3441</b>	0.0215	0.0867	0.0883	0.0717
$K_{OW}$	$2.24 \times 10^{-3***}$		<b>0.2998</b>	0.0371	0.1756	0.0796	0.1704
$K_{PW}$	$2.48 \times 10^{-4***}$	$3.07 \times 10^{-2***}$		0.0201	0.0958	0.0514	0.0786
$O_W$	1	1	1		<b>0.2967</b>	<b>0.2667</b>	0.1249
Conservation	1	0.051	1	$4.16 \times 10^{-2***}$		<b>0.4122</b>	<b>0.3125</b>
Current measures	1	1	1	$6.84 \times 10^{-1***}$	$3.03 \times 10^{-8***}$		<b>0.3424</b>
Engagement	1	0.0688	1	0.6633	$8.30 \times 10^{-3***}$	$3.03 \times 10^{-4***}$	

416

#### 417 4. DISCUSSION

418 In this study, face-to-face surveys were used to provide insights into public perception  
419 towards cetaceans and whaling on the Cantabrian coast and assess differences with respect  
420 to areas without whaling tradition. Questionnaires are the most widely used data collection  
421 method for evaluating human behavior (White et al. 2005; Radhakrishna 2007, Rowley  
422 2014), such as perceptions or attitudes towards conservation (Kerr and Cullen 1995; Obiri  
423 and Lawes 2002; White et al. 1997, 2005). Nevertheless, the use of questionnaires may  
424 include several limitations, which should be taken into account for a correct interpretation  
425 of the results. In this work, some additional demographic variables, such as educational  
426 level, occupation or income level, could have played a role in the obtained results. The  
427 educational level was initially included in the survey. However, numerous participants  
428 were reluctant to provide this information and, consequently, this question was removed  
429 from the questionnaire. This might represent a drawback of face-to-face surveys, in which  
430 the presence of an interviewer can make respondents feel less anonymous and avoid  
431 answering certain personal questions (Duffy et al. 2005).

432 More specifically, the educational level could have influenced the results obtained  
433 when comparing coastal and non-coastal areas. The selected inland areas have a bigger  
434 population size, which could imply an overall higher educational level. This could explain  
435 the higher levels of general knowledge about cetaceans observed in non-coastal areas (Fig.  
436 3). Nevertheless, participants from coastal regions showed higher levels of knowledge  
437 about whaling in the past. This evidences the importance of the historical and cultural  
438 tradition related to this activity along the Cantabrian coast. Furthermore, most of the  
439 interviewees were only aware of whaling activities that took place in the town where they  
440 live or areas nearby, which indicates the relevance of whaling as local cultural heritage.

441 Citizens from non-coastal areas exhibited stronger opposition to whaling, stronger  
442 support for cetacean conservation and greater willingness to engage in the protection of  
443 whales and dolphins (Fig. 3). This might indicate that culture plays an important role in the  
444 perception towards cetaceans of individuals from areas with or without whaling tradition.  
445 However, this finding could also be related to higher levels of education in the selected  
446 inland areas. Despite it being hard to determine which factor is the main driver of this  
447 difference, the absence of a correlation between the established knowledge indexes and  
448 more positive attitudes towards conservation (Table 3) might indicate that the influence of  
449 education in all these aspects is low. In addition, several of the anecdotal comments given  
450 by participants from the Cantabrian coast express their view of cetaceans as resources,  
451 which has been transmitted through generations. For example, some participants affirmed  
452 they still consume dolphin meat. Similarly, previous studies observed more positive  
453 attitudes towards hunting whales in whaling than in non-whaling countries, which has been  
454 attributed to cultural differences and the view of whales as consumptive resources  
455 (Freeman and Kellert 1994; Hamazaki and Tanno 2001). Although support for whaling is  
456 notably higher in regions where whaling is conducted nowadays than on the Cantabrian  
457 coast, the findings of this study indicate, as stated by Nagasaki and Misaki (1994), that  
458 public views of cetaceans and whaling are reflections of sociocultural circumstances.

459 In coastal areas, participants living in the Basque Country showed higher levels of  
460 knowledge about old whaling than citizens from other study areas (Fig. 4A). This can be  
461 explained by the fact that the Basques were not only among the pioneers of this activity  
462 (Aguilar 1986), but also the last commercial whalers on the Cantabrian coast (Gracia-  
463 Cárcamo 1996; Azpiazu 2000; Escudero 2006). Moreover, the highest value of Kow was  
464 found in towns that still present whaling illustrations on their coats of arms (Lequeitio,  
465 Ondárroa and Motrico, corresponding to Area 9), which was indicated by several

466 respondents and probably has an influence on the higher levels of historical knowledge of  
467 the inhabitants of these areas.

468 It is remarkable that the proportion of participants who knew that old whaling in Spain  
469 had a great economic importance was higher than the one corresponding to those who were  
470 aware of its consequences. Nowadays, the North Atlantic Right Whale is catalogued as  
471 critically endangered by IUCN (Cooke 2020) and has practically disappeared from its  
472 North-East Atlantic distribution. Accordingly, almost two thirds of respondents who knew  
473 about old whaling believed the target species is currently endangered or extinct as a  
474 consequence of this activity, but there was still more than one third who affirmed it had no  
475 negative consequences or ignored the effects it had on the whale population. This could be  
476 explained by the transmission of whaling as a heroic activity related to bravery, rather than  
477 an activity with serious environmental consequences.

478 A previous study about public perception of cetaceans carried out in different  
479 countries around the world (Naylor and Parsons 2018) found that more than half of  
480 respondents were aware of whaling operations being currently conducted in Japan, whereas  
481 only a small proportion indicated other countries where whaling is conducted. Similarly,  
482 slightly more than half of participants of our study were aware of whaling taking place in  
483 Japan, while less than a tenth knew this activity is also conducted in Norway and Iceland.  
484 Despite not having high levels of knowledge about cetaceans and whaling, the majority of  
485 participants showed positive attitudes towards whale and dolphin conservation. Almost  
486 two thirds of respondents affirmed to be against whaling, more than 90% asserted that it is  
487 very important or important to establish measures to protect whales and dolphins and more  
488 than a half stated that current cetacean conservation measures are not sufficient or very  
489 insufficient. This overall public concern about cetacean conservation has been previously  
490 observed in other places of the world (Scott and Parsons 2005; Howard and Parsons 2006;



491 Luksenburg and Parsons 2014; Naylor and Parsons 2018). Our findings show, in  
492 congruence with Naylor and Parsons (2018), that knowledge is not a prerequisite of  
493 positive attitudes towards cetacean conservation, which might be related to the general  
494 vision of whales and dolphins as charismatic animals.

495 Congruent with previous findings of Hamazaki and Tanno (2001), stronger opinions  
496 against whaling were correlated with more support for the establishment of cetacean  
497 conservation measures and the belief that current measures are insufficient (Table 3).  
498 However, we did not observe a correlation between any of the three knowledge indexes  
499 and positive attitudes towards conservation, as we hypothesized and contrary to the results  
500 of other studies (Barney et al. 2005; Flamm 2006). This might be explained by the overall  
501 conservation concern that was observed for most participants, regardless of their level of  
502 knowledge. Furthermore, the majority of participants affirmed that whaling had high  
503 economic importance, which can lead to a more positive perception of whaling and the  
504 view of whales as resources, as it was commented by several citizens.

505 Consistent with these findings, results did not show a correlation between any of the  
506 three knowledge indexes and engagement in cetacean conservation (Table 3). This  
507 knowledge-action gap has been observed by other authors, indicating that behavioural  
508 responses are influenced by other factors, such as attitudes, culture or demographic  
509 variables (Kollmuss and Agyeman 2002; Friedrich et al. 2014). On the other hand, we  
510 observed a positive correlation between the two questions about conservation measures  
511 and engagement. This demonstrates, as stated by Flamm (2006), that attitude is further  
512 connected to behaviour. Nevertheless, stronger opposition to whaling was not correlated to  
513 taking action to protect cetaceans. In addition, the proportion of participants who showed  
514 positive attitudes towards cetacean conservation was greater than the one corresponding to  
515 those who declared to be willing to engage in the protection of these animals, which

516 indicates that positive attitudes towards conservation are not always sufficient for citizens  
517 to contribute to the protection of whales and dolphins.

518 When analysing demographic factors, significant differences between females and  
519 males residing on the Cantabrian coast were found (Fig. 4B). Males showed higher levels  
520 of knowledge than females regarding cetaceans, old whaling and current whaling.  
521 Nevertheless, females demonstrated stronger support for the establishment of measures to  
522 protect whales and dolphins. This is consistent with previous studies, which found that,  
523 even though men generally have more knowledge about wildlife, females have more  
524 concern regarding the protection of animals and value them as objects of affection (Kellert  
525 and Berry 1987; Miller and McGee 2000; Naylor and Parsons 2018).

526 In this study, middle-aged participants showed higher levels of general knowledge  
527 about cetaceans than young interviewees (Fig. 4C). Similarly, Barney et al. (2005) found  
528 higher levels of knowledge about bottlenose dolphins in older than younger respondents.  
529 However, in our case, citizens older than 60 years of age showed less knowledge than  
530 middle-aged individuals. Moreover, the oldest group demonstrated less support for the  
531 establishment of conservation measures, as well as less willingness to engage in cetacean  
532 conservation, than middle-aged and young citizens. This might be related to the perception  
533 that they do not have the appropriate physical conditions to participate in campaigns or  
534 volunteering activities, according to the personal comments of several participants.

535 In accordance with previous studies (Steel et al. 2005; Scott and Parsons 2004), our  
536 results show that there is little knowledge about the marine environment among the general  
537 public. This has been attributed mainly to a lack of information available to citizens, which  
538 should be improved by implementing more marine education programs (Steel et al. 2005;  
539 Castle, Fletcher and McKinley 2010). Despite increasing public general knowledge about  
540 cetaceans and whaling activities is important, our findings indicate that this would not

541 further result in greater engagement in cetacean conservation. According to the concept of  
542 marine citizenship, individuals who take responsibility towards the protection of the ocean  
543 exhibit awareness of the marine environment and its issues, an understanding of the  
544 impacts of personal behaviour on the marine environment and motivation to change  
545 personal behaviour to reduce their impact on the marine environment (McKinley &  
546 Fletcher 2010). Therefore, in order to increase citizens' engagement in cetacean  
547 conservation, it is important to raise awareness of the threats cetaceans are currently  
548 exposed to, such as collisions with ships, by-catch, reduction of fish stocks, anthropogenic  
549 noise, habitat loss, pollution and climate change (e.g. Murphy et al. 2015; Dolman et al.  
550 2016; Jepson et al. 2016; Pennino et al. 2017; Dolman and Brakes 2018; Sheppard 2018).  
551 Furthermore, and more importantly, it is necessary to increase citizens' understanding of  
552 the importance of the role of each individual in addressing marine environmental issues  
553 and promote motivation and positive attitudes towards the protection of cetaceans and the  
554 marine ecosystem.

## 555 **5. CONCLUSIONS**

556 Citizens from the Cantabrian coast have higher levels of knowledge about old whaling  
557 in Spain than individuals from non-coastal regions of this country. Therefore, traditional  
558 whaling has major cultural importance in areas where it used to be conducted. The  
559 majority of participants of this study showed strong support for cetacean conservation,  
560 independently of their level of knowledge about these animals. However, less positive  
561 attitudes towards the protection of whales and dolphins and lower opposition to whaling  
562 were observed on the Cantabrian coast than in inland regions. This could indicate that  
563 inhabitants of areas with whaling tradition tend to have more positive views of this  
564 activity. Overall, public engagement in cetacean conservation is influenced by different

565 factors, such as attitudes, cultural tradition and age. In order to increase engagement, it is  
566 necessary to promote awareness of current marine environmental issues, the behaviours  
567 citizens can change to contribute to the protection of whales and dolphins and the  
568 importance of the role of each individual in cetacean conservation.

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**Supplementary Materials A. Survey used to evaluate public perception of cetaceans.**

Gender:	M	F	O	Locality:
Age:	18-30	31-60	>60	Date:

1. Do you know what a cetacean is?      Yes    No
  - 1.1 Could you give some examples of cetacean species?
2. Was there whaling in Spain in the past?    Yes    No    I don't know
  - 2.1 Where in Spain?
  - 2.2 Which was the main target species?
  - 2.3 What consequences did whaling have on this species?
    - A. The species became extinct.
    - B. The species is endangered.
    - C. It served as control and decreased the species' overpopulation.
    - D. It had no consequences.
    - E. I don't know.
  - 2.4 How economically important was whaling?

Very important	Important	Slightly imp.	It wasn't imp.	I don't know
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3. Is whaling currently conducted somewhere in the world?    Yes    No    I don't know
  - 3.1 Where?
4. Do you support whaling?    Yes    No    I don't know
  - 4.1 Why?
5. How important do you think it is to establish measures to protect whales and dolphins?

Very important	Important	Slightly imp.	It is not imp.	I don't know
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6. Do you think the current measures to protect whales and dolphins are sufficient?
  - A. Yes, in fact, whales and dolphins are overprotected.
  - B. Yes, they are sufficient.
  - C. They are not sufficient.
  - D. They are very insufficient.
  - E. I don't know.
7. Would you be willing to contribute somehow in the protection of whales and dolphins (campaigns, volunteering, donations...)?    Yes    No    I don't know

The provided information is voluntary and completely anonymous. The data obtained in this survey will be used for scientific research exclusively.

### Supplementary Table S1

**Number of respondents per study area and summary statistics obtained for each section of the questionnaire.** N = number of respondents. K<sub>C</sub> = General knowledge about cetaceans, K<sub>OW</sub> = Knowledge about old whaling in Spain, K<sub>PW</sub> = Knowledge about whaling in the present, O<sub>W</sub> = Opinion towards whaling. SD = Standard Deviation. SE = Standard Error. Min = Minimum value. Max = Maximum value. The obtained values of the indexes and responses to individual questions were transformed into a 0-1 scale (going from lowest to highest levels of knowledge, positive attitudes towards cetacean conservation and engagement, respectively). Area 1: San Ciprián and Burela; 2: Puerto de Vega and Lueca; 3: Luanco and Candás; 4: Tazones and Lastres; 5: Llanes; 6 San Vicente de la Barquera and Comillas; 7: Santoña and Laredo; 8 Plencia; 9: Lequeitio, Ondárroa and Motrico; 10: Salamanca; 11: Valladolid; 12: Madrid

Area	N	K <sub>C</sub>					K <sub>OW</sub>					K <sub>PW</sub>					O <sub>W</sub>					Conservation					Current measures					Engagement				
		Mean	SD	SE	Min	Max	Mean	SD	SE	Min	Max	Mean	SD	SE	Min	Max	Mean	SD	SE	Min	Max	Mean	SD	SE	Min	Max	Mean	SD	SE	Min	Max	Mean	SD	SE	Min	Max
1	32	0.32	0.32	0.06	0.00	0.75	0.51	0.25	0.04	0.00	0.92	0.30	0.26	0.05	0.00	1.00	0.54	0.35	0.06	0.00	1.00	0.75	0.34	0.06	0.00	1.00	0.51	0.46	0.08	0.00	1.00	0.52	0.26	0.05	0.25	1.00
2	37	0.29	0.31	0.05	0.00	0.75	0.59	0.22	0.04	0.00	0.92	0.20	0.23	0.04	0.00	0.75	0.58	0.36	0.06	0.00	1.00	0.89	0.19	0.03	0.25	1.00	0.58	0.39	0.06	0.00	1.00	0.50	0.24	0.04	0.25	0.75
3	35	0.46	0.32	0.05	0.00	1.00	0.60	0.25	0.04	0.00	0.92	0.30	0.25	0.04	0.00	1.00	0.55	0.34	0.06	0.00	1.00	0.87	0.14	0.02	0.50	1.00	0.63	0.42	0.07	0.00	1.00	0.60	0.24	0.04	0.00	0.75
4	33	0.45	0.32	0.06	0.00	1.00	0.60	0.24	0.04	0.00	0.92	0.37	0.25	0.04	0.00	0.75	0.61	0.23	0.04	0.00	0.75	0.77	0.28	0.05	0.00	1.00	0.55	0.41	0.07	0.00	1.00	0.57	0.24	0.04	0.25	0.75
5	32	0.30	0.33	0.06	0.00	0.75	0.48	0.28	0.05	0.00	0.92	0.33	0.23	0.04	0.00	1.00	0.59	0.35	0.06	0.00	1.00	0.86	0.14	0.02	0.50	1.00	0.60	0.39	0.07	0.00	1.00	0.53	0.26	0.05	0.00	0.75
6	32	0.34	0.35	0.06	0.00	1.00	0.52	0.28	0.05	0.00	0.92	0.32	0.24	0.04	0.00	0.75	0.57	0.31	0.05	0.00	1.00	0.85	0.19	0.03	0.25	1.00	0.52	0.37	0.07	0.00	1.00	0.48	0.26	0.05	0.25	1.00
7	31	0.35	0.28	0.05	0.00	1.00	0.42	0.29	0.05	0.00	0.92	0.33	0.29	0.05	0.00	1.00	0.55	0.32	0.06	0.00	1.00	0.83	0.31	0.05	0.00	1.00	0.52	0.43	0.08	0.00	1.00	0.51	0.26	0.05	0.00	0.75
8	31	0.35	0.33	0.06	0.00	1.00	0.62	0.28	0.05	0.00	1.00	0.35	0.24	0.04	0.00	1.00	0.64	0.26	0.05	0.00	1.00	0.93	0.12	0.02	0.75	1.00	0.53	0.44	0.08	0.00	1.00	0.48	0.27	0.05	0.00	1.00
9	33	0.33	0.33	0.06	0.00	0.75	0.68	0.17	0.03	0.25	0.92	0.36	0.22	0.04	0.00	0.75	0.67	0.28	0.05	0.00	1.00	0.89	0.14	0.02	0.50	1.00	0.51	0.44	0.08	0.00	1.00	0.52	0.24	0.04	0.25	0.75
10	37	0.47	0.34	0.06	0.00	1.00	0.49	0.34	0.06	0.00	1.00	0.27	0.23	0.04	0.00	0.75	0.70	0.26	0.04	0.00	1.00	0.94	0.11	0.02	0.75	1.00	0.62	0.43	0.07	0.00	1.00	0.66	0.21	0.03	0.25	1.00
11	35	0.49	0.32	0.05	0.00	1.00	0.37	0.36	0.06	0.00	1.00	0.31	0.26	0.04	0.00	1.00	0.64	0.31	0.05	0.00	1.00	0.95	0.12	0.02	0.50	1.00	0.65	0.35	0.06	0.00	1.00	0.59	0.23	0.04	0.00	0.75
12	36	0.52	0.38	0.06	0.00	1.00	0.21	0.33	0.06	0.00	0.92	0.25	0.25	0.04	0.00	0.75	0.67	0.30	0.05	0.00	1.00	0.85	0.19	0.03	0.00	1.00	0.44	0.45	0.08	0.00	1.00	0.60	0.23	0.04	0.25	0.75