Whale Watching in the Pelagos Sanctuary: Status and Quality Assessment

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In 2001 Italy, France, and Principality of Monaco instituted a protected area for marine mammals in northwestern Mediterranean Sea, named the *Pelagos* Sanctuary. The agreement foresees the commitment by signing parties to manage human activities in the area, with a special mention to whale watching. Whale watching is a form of wildlife tourism which has considerably grown in the last decades. Understanding the profile of whale watchers and their satisfaction toward the activity, is the first step toward a sustainable and effective management of this touristic activity. In this work we provide the first analysis of the whale watching activity in the *Pelagos* Sanctuary, focusing on commercial whale watching tours departing from Italian harbors in Liguria. We provide a census of the activity and the results of close-ended questionnaires filled by whale watchers during trips in summer 2016 and 2017. The aim of the questionnaires was to understand the level of awareness of experienced and new whale watchers regarding the *Pelagos* Sanctuary and some conservation initiative going on in the area. Finally, we analyzed the satisfaction level, with the aim of evidencing weakness and strengths of the service offered. Our results evidence a growth in the activity in the last 15 years, with a wider differentiation of offers and impacting a larger area than previously found. Whale watchers in the area come from a variety of countries, demonstrating the importance of the Pelagos as a hot spot for this activity. A high level of satisfaction has been evidenced, with no difference among new and experienced whale watchers. At the same time, more effort is needed to increase awareness of Pelagos and its conservation initiative both at a national and international level. This study provides useful information for the start of an effective management of whale watching in this protected area.

Keywords: whale-watching, pelagos sanctuary, satisfaction analysis, cetaceans, tourism

INTRODUCTION

Since the late 1990s, when whale-watching started in California, the whale watching industry has grown considerably worldwide (Hoyt and Parsons, 2012). From its expansion, whale watching has been reported to bring considerable economic benefits (Cisneros-Montemayor et al., 2010; Parsons and Brown, 2017). Whale-watching can also positively influence cetacean conservation (e.g., Jacobs and Harms, 2014), considering that it has replaced whaling in some countries (Cunningham et al., 2012; Vieira et al., 2018), and is considered to be an essential part of cetacean research

(Hauser et al., 2006; Higby et al., 2012; Tepsich et al., 2014; Alves et al., 2018; García et al., 2018). Together with the increase of whale watching popularity and the consequent proliferation of vessels and tours, the interest in understanding and measuring its impacts has grown (Parsons, 2012). The impact of whale watching is measured either by considering the potential negative impact on the exploited cetacean population, or by considering the positive impact on the tourism sector and, when sustainable managed, by considering the positive impact on the species in term of conservation (Sitar et al., 2017). Potential negative impacts of whale watching activities have been reported to be derived from disturbance reasons, with consequent stress index increases and behavioral changes (Magalhaes et al., 1999; Erbe, 2002; Lusseau, 2006; Richter et al., 2006; Visser et al., 2011; Parsons, 2012; New et al., 2015). At the same time, it has been demonstrated that whale-watching can be an effective tool to raise awareness about species conservation issues and to educate tourists on cetaceans' ecology and threats, especially when the tourist experience is enriched by good environmental education (Lien, 2001; Lück, 2003; Stamation et al., 2007; Wearing et al., 2014; García-Cegarra and Pacheco, 2017; La Manna et al., 2020).

The *Pelagos* Sanctuary (hereafter Pelagos) was established in 2001 in the northwestern Mediterranean sea (Notarbartolo-di-Sciara et al., 2008). Pelagos covers around 87,500 sq. km and it is subjected to an agreement between Italy, Monaco, and France for protection purposes of several species of cetaceans that inhabit the area. The *Pelagos* Sanctuary is characterized by the presence of various marine mammal species, being the habitat suitable to sustain their breeding and feeding needs. The species mostly found in the area are common bottlenose dolphins *Tursiops truncatus*, striped dolphins *Stenella coeruleoalba*, Risso's dolphins *Grampus griseus*, short-beaked common dolphins *Delphinus delphis*, sperm whales *Physeter macrocephalus*, fin whales *Balaenoptera physalus*, Cuvier's beaked whales *Ziphius cavirostris*, and long-finned pilot whales *Globicephala melas* (Notarbartolo-di-Sciara et al., 2008). Three different types of whale watching activities are known to occur in the area: true commercial activities (COM), characterized by daily trips of 4–8 h; Cetacean ecotourism (ECO), characterized by cruises lasting from weekends to weeks; and Research whale watching (RES), where eco-tourists are involved in research activities for funding reasons (Fortuna et al., 2004; Parsons et al., 2006). ECO and RES activities, organized and managed mainly by associations and NGOs involved in cetacean research and conservation, usually target a specialized type of public, where tourists are willing to spend several days aboard for training reasons, developing skills useful for cetacean research. On the other hand, COM whale watching targets more general tourists, attracted to tours by pure leisure reasons.

Despite the fact that the *Pelagos* agreement foresees a commitment by signing parties to manage whale watching activities in the Sanctuary (Art. 8), no official census or regimentation of whale-watching activities has been implemented so far by the signing countries. Two management actions regarding whale watching activity have been implemented by the *Pelagos* Secretariat and further enforced by the ACCOBAMS secretariat as well: The High Quality Whale Watching Label (HQWW®) (Ratel et al., 2016) and the Code of Good Conduct for whale watching in the Mediterranean Sea (ACCOBAMS, 2016). The HQWW® label is a quality certification that whale watching operators can request. The accreditation is on a voluntary basis and the process foresee several steps: crew members (biologists, captain, and mariners) must undertake a training program and at least one member of the crew who successfully attended the training must be onboard during the excursion; the operator must commit to conduct educational/awareness activities during the trips, to contribute to research by sharing sighting data and especially to comply with the Code of Good Conduct to approach cetaceans. Furthermore, some activities are identified as not compliant with the HQWW® certification, such as swimming with cetaceans; using airborne detection systems to locate cetaceans (e.g., planes or drones); combining any form of fishing with cetacean watching and feeding cetaceans. The Code of Good Conduct defines two areas when approaching cetaceans: the area of vigilance and the forbidden area. Particularly, the forbidden area, in which no boat is allowed to enter, includes the front, the back and a 100 m area around the animal; the vigilance area, in which the boat can enter at a reduced speed of five knots, is a 300 m sector around the animal (still excluding the front and the back). Considering the disturbance that a boat can cause also in the vigilance areas, maneuverings, number of boats, and other specific indications are also foreseen by the Code. In this work we aim to draw an updated picture of the status and quality of whale watching activities in the *Pelagos* Sanctuary area (**Figure 1**), specifically targeting Italian COM operators. First, a general census of whale watching operators along the Italian coasts of the *Pelagos* Sanctuary is provided. This census, together with available information from the French part of the sanctuary (Mayol et al., 2014), allowed us to build a comprehensive assessment of the status and development of the whale watching activity in this protected area. Then, a specific study on participants to COM whale watching tours in the central part of the Sanctuary (departing harbors located in Liguria-Italy) was carried out, with the support of the whale watching operating in the area. This study focused on:

1. Defining the profile of customers taking part in the whale watching activity in Pelagos, as no study has ever been conducted on whale watchers in the area;
2. Evaluating the customers' awareness about the existence of the *Pelagos* Sanctuary and the whale watching management activities associated with it (HQWW® and Code of Good Conduct), and test whether this depends on the experience and age, education level or origin of the whale-watching customers;
3. Analyzing the motivations and satisfaction of the whale-watching customers, in order to assess the success of this industry in the *Pelagos* Sanctuary and its value as a conservation/awareness activity;
4. Analyzing the factors mainly contributing to satisfaction, in order to evidence weaknesses and strengths of the service that could help in better addressing its further sustainable development.
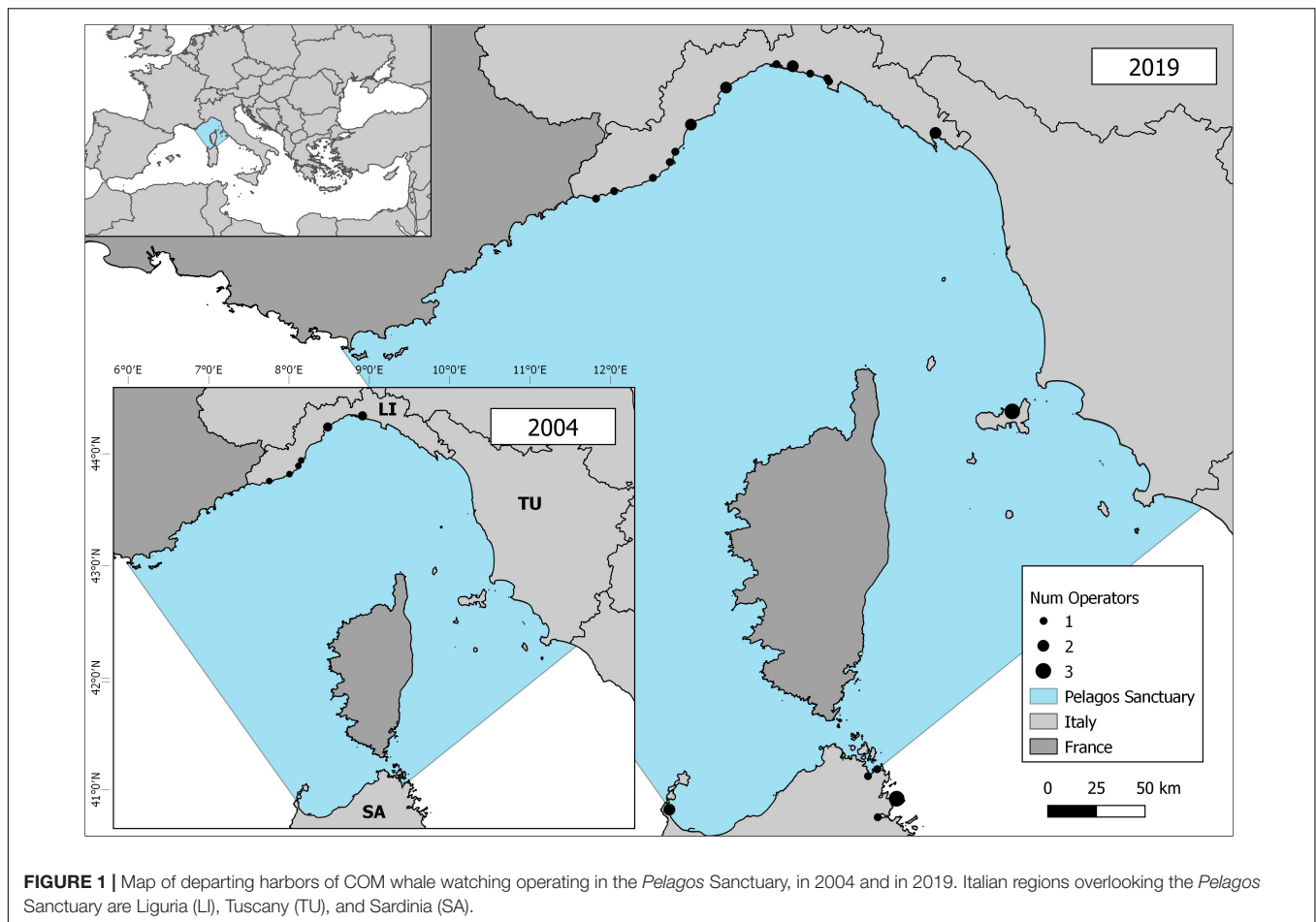
FIGURE 1 | Map of departing harbors of COM whale watching operating in the *Pelagos* Sanctuary, in 2004 and in 2019. Italian regions overlooking the *Pelagos* Sanctuary are Liguria (LI), Tuscany (TU), and Sardinia (SA).

MATERIALS AND METHODS

We started from the census by Fortuna et al. (2004), where three different categories of whale watching have been highlighted: true commercial (COM), Cetacean ECO, and RES (see Fortuna et al., 2004 for details on definition). A detailed survey based on the material available on the internet and on social networks, both in English and in Italian, has been conducted to identify the current state and amount of Italian Whale Watching operators in 2019. Data were then refined with information available through the research group involved with the application of HQWW® Certification in Italy. For this study we considered only operators organizing surveys in the *Pelagos* Sanctuary area or adjacent waters (within 25 km distance from borders of *Pelagos*). Information on all type of operators has been collected, but for the analysis we focused only on COM operators.

A closed-ended questionnaire was developed based on a literature review, and using the study of Bentz et al. (2016) as a benchmark. The questionnaire was then evaluated by three different researchers and finally it was validated by the crews of the whale watching companies (captains, mariners and biologists on board) to ensure avoiding confusing questions. The questionnaire was distributed during July–August 2016

and 2017 (covering the main touristic season) on board of whale watching vessels from two COM operators in Liguria (Italy). The involved operators were chosen as their activity is representative of the True Commercial whale watching definition: trip duration is about 4–6 h, organized weekly (up to 7 days a week in highest season), on board of big motorboats specifically aimed at encountering cetaceans (Parsons et al., 2006).

In order to enhance tourist involvement, the biologist on board presented to tourists both the researcher and the aim of the research, while the researcher was also available for questions and helping with the filling of the questionnaires. Questionnaires were conceived in order to provide information on socio-economic characteristics of whale-watchers, their motivation and expertise, their knowledge about the *Pelagos* Sanctuary and conservation actions carried out in the area and their expectation and satisfaction regarding the trip (Annex). Questionnaires were provided in Italian and English and distributed by the researchers onboard to participants who agreed to contribute to this study, at the end of the trip, during the way back to the harbor.

In order to evaluate the effect of experience, age, education level and origin of the participants' knowledge about the *Pelagos* Sanctuary and conservation measures related to whale watching

(HQWW®, Code of Good Conduct), whale watchers where divided first into 2 groups: *Experienced*, encompassing all whale watchers having already participated in at least one whale watching trip, and *New*, encompassing all customers in their first experience with whale watching. Secondly, each group was divided into subgroups, based on their age, education level or origin. Specifically, concerning the origin two subgroups were identified: *Pelagos*, coming from one of the regions overlooking Pelagos Sanctuary (Tuscany, Liguria, Sardinia, France or Principality of Monaco) and *ExtraPelagos*, not being from one of the regions overlooking the Pelagos Sanctuary. Chi-square tests were performed to explore differences among groups and subgroups. In case of significant difference between age and educational level subgroups, *post hoc* pairwise chi-square tests were applied in order to define which subgroups are significantly different from each other.

Tourists' satisfaction was examined in two different ways. First, a performance-only perspective was applied: participants were asked to rate their level of satisfaction regarding the excursion on a 10-point scale (1 = very unsatisfied; 10 = very satisfied). The Level of satisfaction was determined according to two different scale: Pearce (2006) and Hanan and Karp (1991). The Pearce scale considers the mean value obtained, indicating high satisfaction for mean scores greater than 7.8, moderate if between 7.1 and 7.8, and low if the mean score is smaller than 7.1. The Hanan and Karp scale, on the other hand, considers the percentage of the scores between 8 and 10 (values included). A high satisfaction level is indicated by 85–90% of scores between 8 and 10, a medium level when 70–80% of responses are 8, 9, or 10, while if less than 60% of customers rated the satisfaction between 8 and 10, the satisfaction level is considered low. Kurskall-Wallis test was used to inspect differences among the two groups (*Experienced* vs. *New*) and subgroups.

Several factors where then considered, grouped into three categories, distinguishing Trip related features ("*See at least one cetacean*," "*See several cetacean species*," "*See a fin whale or sperm whale*," "*See animals close to the boat*," "*See several marine species*," "*Absence of crowding by other boats during sightings*"), Conservation/Awareness related ("*See animals in a respectful manner*," "*Commitment to the environment by the operator*," "*Information on marine species provided on board*," "*Environmental education onboard*," "*Information on Pelagos Sanctuary provided on board*," "*Collaboration with scientific research*") or Service related ("*Professionalism of the crew on board*," "*Good weather conditions*," "*Crowding on board*," "*Good photo opportunities*," "*Cost of the trip*," "*Boat type*"). For each factor, expectations and satisfaction were measured on a five-point Likert scales (between 1 = not at all important/very unsatisfied and 5 = very important/very satisfied). Spearman's correlation was then used to identify the category that most contributed to satisfaction, separately for the two groups of whale watchers, as well as to test the contribution of each factor separately.

Secondly, an Importance-Performance analysis (IPA) that compares expectations with satisfaction was performed. This technique was chosen considering its ability to highlighting

strengths and weakness of the activity, thus potentially suggesting improvements (Bentz et al., 2016). A gap analysis of satisfaction median scores (S) and importance median scores (I) was performed both considering features grouped in the three categories both for each parameter, separately for the two considered groups of whale watchers.

The gap G, where

$$G = I - S$$

was then used to highlight category and features meeting or exceeding tourists' expectations (G ≤ 0) or evidencing the need for improvement (G > 0).

RESULTS

Whale Watching Operators in the Italian Part of the Pelagos Sanctuary

Seventeen COM, four RES and eight ECO, for a total of 29 whale watching operators were found operating along the Italian coasts of the *Pelagos* Sanctuary and adjacent areas (see **Supplementary Material**).

Looking specifically at COM operators, while they were initially concentrated in the western coast of Liguria (**Figure 1**), nowadays, departing harbors are located along the eastern Ligurian coast, as well as in Tuscany and Sardinia. Generally, it is possible to identify two different types of offer: pre-planned surveys based on a fixed calendar (from 1 to 7 days a week), on big motorboats hosting 200–350 persons on board, or a "on request," where trips are organized only if a certain number of participants made a booking. These are generally organized onboard smaller motorboats, sailing boats, catamaran, or RHIBs.

The main operation period is summertime (June–September); an extension in spring and autumn is foreseen but only for few operators.

Sixty five percent of COM operators have a biologist or a specialized guide on board; 24% declare to be actively collaborating with research institutions.

Eleven out of 17 COM operators have received a whale watching quality certification (eight the HQWW® and three another international certification). All the certified COM operators follow a code of good conduct for approaching cetaceans at sea (as foreseen by the certification), while for operators not certified, no evidence of any code of conduct is present on their web sites.

Pelagos Whale-Watchers Profile

In total, 915 questionnaires were distributed to whale watchers on board two Italian COM operators in Liguria, during 85 different trips during summer 2016 and 2017. A high response rate was recorded, with 98% of the questionnaires filled at least partially, while 15 were left blank and consequently discarded from the study. As not all questionnaires were filled completely, results for each question will be presented as a proportion relative to the number of questionnaires in which the question was filled, indicating the total number of questionnaires in

which the question was filled in brackets. The number in brackets then refers to the real sample size to which percentage should be referred to.

Sixty one percent of questionnaires were filled by females ($n = 837$ questionnaires); considering age, whale-watchers were mainly adults, within the age group 36–45 and 46–55, with 29 and 24%, respectively, followed by youngsters, within age groups < 25 and 26–35 recording 19 and 17%, respectively, and finally elderly ($n = 711$). Almost half questionnaires were filled by someone with a university education level (49%) or high school level (38%), while only 8 and 3%, respectively, were from secondary or elementary school level ($n = 848$).

More than half of the participants in the trips were families with kids (53%), 28% where couples and 13 % were group of friends. The remaining 6% was composed by single or organized groups ($n = 882$).

Concerning the whale-watchers' origin, 80% of questionnaires were filled by not-local tourists (not coming from the Liguria region), coming from 21 different countries ($n = 893$). The majority of tourists were spending long holidays in the Liguria region, with 34% declaring to stay from 8 to 15 days and 21% up to a month. Fourteen percent declared to have traveled to Liguria only for the whale watching excursion and consequently to spend only 1 day in the region, while the rest was staying for short term holidays (1 week maximum).

Eighty nine percent of whale watchers declared to be passionate about naturalistic excursion ($n = 880$) and 73% to be passionate about cetaceans ($n = 868$). Despite this, 71% were participating in a whale watching trip for the first time and were then considered as *New*. Among *Experienced* whale watchers, 42% already participated in a whale watching trip with the same operator at the time of the questionnaire.

Twenty three percent of the customers came from regions overlooking the *Pelagos* Sanctuary (Tuscany, Liguria, Sardinia, France, or Principality of Monaco). The percentage changes among *Experienced* or *New*, with 28% of *Experienced* whale watchers being from a region overlooking the *Pelagos* Sanctuary, and 21% of New being from Pelagos (**Figure 2**).

Pelagos Sanctuary, HQWW®, and Code of Good Conduct Awareness

Among all the participants, half of the customers stated that they were aware of the existence of the *Pelagos* Sanctuary ($n = 881$). *Experienced* whale watchers are more likely to be aware of the *Pelagos* Sanctuary existence (67% declaring to know about it), while this percentage is lower (44%) for *New* [$\chi^2_{Pearson}(1) = 37.77$, $p < 0.001$, $n = 839$] (**Table 1**). Looking at their origin, *Experienced_Pelagos* are more aware than *Experienced_ExtraPelagos* [$\chi^2_{Pearson}(1) = 10.41$, $p = 0.001$, $n = 244$]. Similarly for the *New* group, origin plays a significant role in the awareness about the existence of the Pelagos Sacntuary [$\chi^2_{Pearson}(1) = 28.34$, $p < 0.001$, $n = 591$] (**Table 2A**). Concerning age class, no difference was found amongst *New* (**Table 2B**), while an higher percentage of elderly (> 55 years old) and youngers (< 25 and 26–35 years old) were recorded amongst *Experienced* [$\chi^2_{Pearson}(4) = 16.16$, $p = 0.003$, $n = 209$]. Specifically, the elderly

age class differed significantly from other classes (all *post hoc* tests elderly age class vs. other age classes: $p < 0.05$). No statistical difference was found comparing education level (**Table 2C**).

Concerning the code of conduct, 30% of whale watchers knew about the existence of a code of good conduct to approach cetaceans ($n = 872$), with a higher percentage in *Experienced* than in *New* [44 and 25%, respectively, $\chi^2_{Pearson}(1) = 31.30$, $p < 0.001$, $n = 832$] (**Table 1**). Nor origin, age or education level had an influence for both *Experienced* and *New* whale watchers (**Tables 2A–C**).

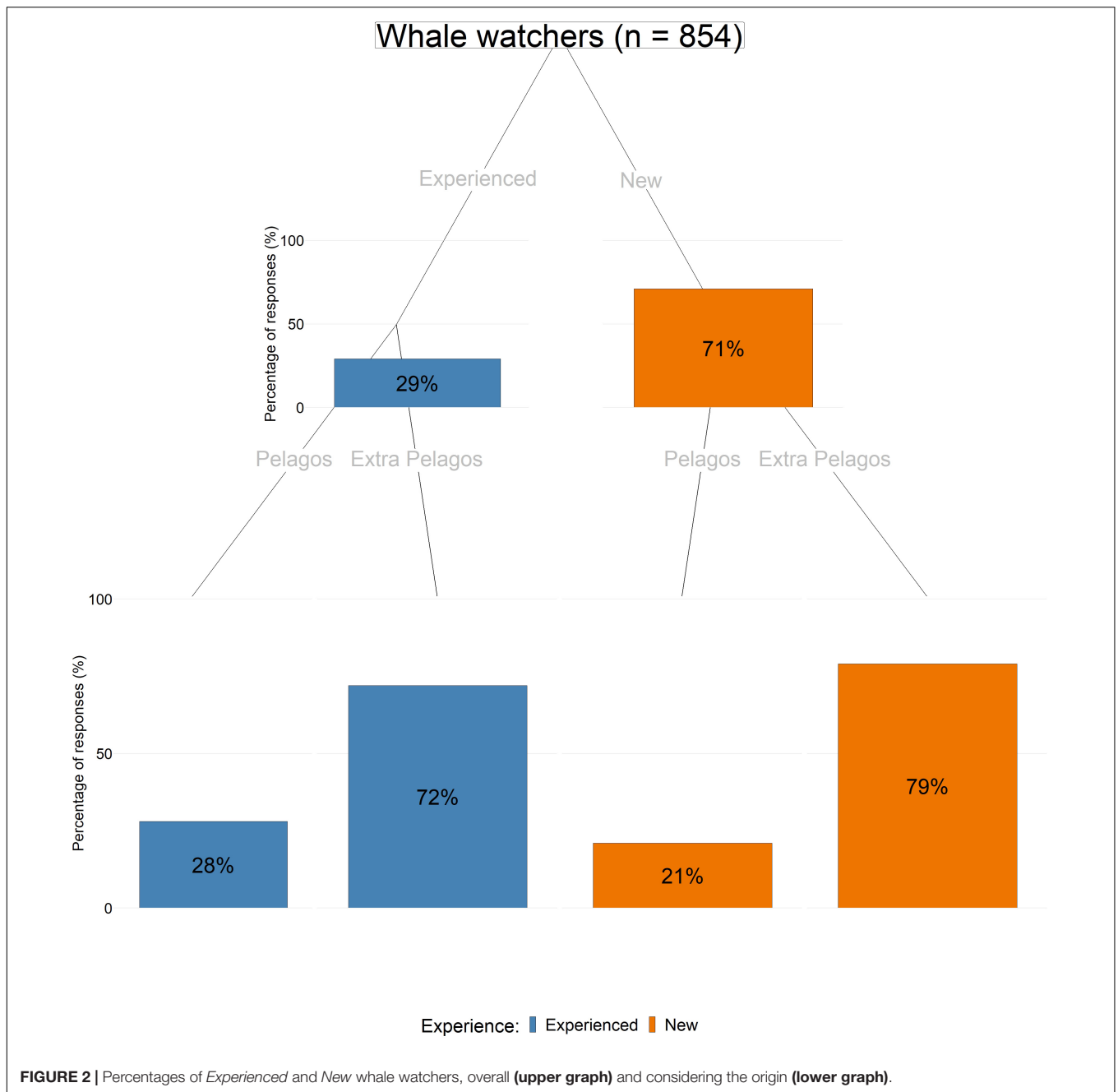Regarding the HQWW® label, only 9% of the respondents were aware of the existence of this label ($n = 875$). Awareness of the label is higher in *Experienced* whale watchers [14 vs. 7% for *Experienced* and *New*, respectively, $\chi^2_{Pearson}(1) = 9.81$, $p = 0.002$, $n = 830$]. Origin has no role for *Experienced*, but a higher proportion of *New_Pelagos* is aware of its existence, compared to *New_ExtraPelagos* [$\chi^2_{Pearson}(1) = 4.60$, $p = 0.032$, $n = 585$] (**Table 2A**). No statistical difference was found among age classes for both groups, while regarding the education level, among *Experienced*, an higher percentage of whale watchers with primary or secondary education level were more aware of the existence of the label [$\chi^2_{Pearson}(3) = 9.61$, $p = 0.022$, $n = 230$]. *Post hoc* test nevertheless did not confirm a statistical significant difference among the four subgroups (all *post hoc* tests: $p > 0.05$).

Fifty nine percent of whale watchers declared that the presence of the label would affect the choice of a whale watching operator ($n = 830$), but no statistical difference was found among the two groups (**Table 1**) nor among the subgroups based on origin or age class (**Tables 2A,B**). Education level plays an important role among both groups, with significantly higher proportion of whale watchers with higher education level declaring being influenced by a quality label in the choice of an operator [$\chi^2_{Pearson}(3) = 13.14$, $p = 0.004$, $n = 220$ and $\chi^2_{Pearson}(3) = 12.95$, $p = 0.005$, $n = 527$ for *Experienced* and *New*, respectively] (**Table 2C**). This difference was also confirmed by the *post hoc* test for *Experienced* (*post hoc* test university education level vs. high school level: $p < 0.05$) but not for *New* whale watchers.

Satisfaction Analysis (Performance Only Approach)

Satisfaction was measured with a mean score of 8.24 and 77.2% of answers between 8 and 10 ($n = 882$). No differences were found among *Experienced* or *New* whale watchers (Kruskal-Wallis $\chi^2 = 3.05$, $p = 0.08$). Based on both scales, the overall satisfaction score for both *New* and *Experienced* whale watchers can be classified as medium-high (Hanan and Karp, 1991; Pearce, 2006; **Table 3**). Within each group, no statistical difference was found regarding age classes or education level (For *Experienced*: Kruskal-Wallis $\chi^2 = 4.771$, df = 4, p-value = 0.3116 and Kruskal-Wallis $\chi^2 = 1.5197$, df = 3, p-value = 0.6777 for age and education, respectively, for *New* Kruskal-Wallis $\chi^2 = 2.7814$, df = 4, p-value = 0.595 and Kruskal-Wallis $\chi^2 = 1.1356$, df = 3, p-value = 0.7685, for age and education).

All tested factors resulted as significantly ($p < 0.05$) and positively correlated to satisfaction, apart from "*Absence of crowding by other boats during sightings*." For both *Experienced*

FIGURE 2 | Percentages of *Experienced* and *New* whale watchers, overall **(upper graph)** and considering the origin **(lower graph)**.

TABLE 1 | Awareness of the existence of Pelagos Sanctuary, Code of Good conduct for approaching cetaceans, HQWW®, and influence of the presence of a label in the choice of operator, for Experienced (blue) and New (orange) whale watchers.

	% of positive responses		Chi-square results			
	Experienced	**New**	χ^2 Pearson	df	p	n
Awareness of *Pelagos* sanctuary	67	44	37.76	1	< 0.001*	839
Awareness of code of conduct	44	25	31.30	1	< 0.001*	832
Awareness of HQWW	14	7	9.81	1	0.002*	830
Influence of a quality certification	60	58	0.30	1	0.585	788

*Chi-square results are also reported as well as the overall number of responses received (n). Statistically significative values (p < 0.05) are evidenced by *.*

TABLE 2 | Awareness of the existence of Pelagos Sanctuary, Code of Good conduct for approaching cetaceans, HQWW® and influence of the presence of a label in the choice of operator, separately for *Experienced* (blue) and *New* (orange) and for the sub-groups considering origin (A), age class (B), and education level (C).

(A)

Experienced whale watchers	% of positive responses		Chi-square results			
	Extra Pelagos	Pelagos	$\chi^2_{Pearson}$	df	p	n
Awareness of *Pelagos* sanctuary	61	83	10.41	1	0.001*	244
Awareness of code of conduct	42	51	1.94	1	0.163	243
Awareness of HQWW	12	18	1.25	1	0.263	241
Influence of a quality certification	60	58	0.11	1	0.737	230

New whale watchers	% of positive responses		Chi-square results			
	Extra Pelagos	Pelagos	$\chi^2_{Pearson}$	df	p	n
Awareness of *Pelagos* Sanctuary	38	65	28.34	1	< 0.001*	591
Awareness of code of conduct	24	27	0.29	1	0.593	585
Awareness of HQWW	6	11	4.60	1	0.032*	585
Influence of a quality certification	59	50	2.94	1	0.086	555

(B)

Experienced whale watchers	% of positive responses					Chi-square results			
	< 25	26–35	36–45	46–55	> 55	$\chi^2_{Pearson}$	df	p	n
Awareness of *Pelagos* Sanctuary	62	71	59	59	97	16.16	4	0.003*	209
Awareness of code of conduct	39	32	43	45	58	4.57	4	0.334	207
Awareness of HQWW	16	13	14	12	14	0.28	4	0.991	207
Influence of a quality certification	48	57	62	74	58	6.13	4	0.189	196

New whale watchers	% of positive responses					Chi-square results			
	< 25	26–35	36–45	46–55	> 55	$\chi^2_{Pearson}$	df	p	n
Awareness of *Pelagos* sanctuary	44	41	39	50	58	6.63	4	0.157	458
Awareness of code of conduct	25	22	20	29	30	3.66	4	0.454	453
Awareness of HQWW	9	6	7	6	2	2.66	4	0.616	456
Influence of a quality certification	53	57	59	62	46	3.64	4	0.457	436

(C)

Experienced whale watchers	% of positive responses				Chi-square results			
	Elementary school	Secondary school	High school	University	$\chi^2_{Pearson}$	df	p	n
Awareness of *Pelagos* Sanctuary	75	67	67	67	0.22	3	0.975	234
Awareness of code of conduct	62	53	42	43	1.84	3	0.606	232
Awareness of HQWW	38	36	12	12	9.61	3	0.022*	230
Influence of a quality certification	25	50	49	69	13.14	3	0.004*	220

New whale watchers	% of positive responses				Chi-square results			
	Elementary school	Secondary school	High school	University	$\chi^2_{Pearson}$	df	p	n
Awareness of *Pelagos* sanctuary	65	39	45	44	4.55	3	0.208	560
Awareness of code of conduct	36	31	28	21	6.01	3	0.111	554
Awareness of HQWW	9	8	9	4	4.74	3	0.192	554
Influence of a quality certification	32	45	54	63	12.95	3	0.005*	527

For each tested parameter, percentage of positive responses is reported, separately for groups and sub-groups. Chi-square results are also reported as well as the overall number of responses received (n). Statistically significative values (p < 0.05) are evidenced by *.

TABLE 3 | Overall satisfaction level of whale watchers and separately for the two groups.

Whale watchers	Pearce		HANAN-KRAP	
	Mean	Class	%	Class
Total	8.24	High	77.2	Medium
Experienced	8.34	High	77.5	Medium
New	8.22	High	78.1	Medium

and *New* whale-watchers, Trip Features had a major role in influencing final satisfaction. Least important category was Conservation/Awareness Features for *Experienced* and Service Features for *New* (**Table 4**). Looking at single factors within each category, the top two factors by importance among Trip features where "*See several cetacean species*" (ρ = 0.55 and ρ = 0.46 for *Experienced* and *New*, respectively) and "*See a fin whale or a sperm whale*" (ρ = 0.53 and ρ = 0.41, respectively) (**Table 4**). Strong difference among the two considered groups are found for the category Conservation/Awareness, as for *Experienced* whale watchers satisfaction toward "*Commitment to the environment by the operator*" had the stronger correlation with overall satisfaction (ρ = 0.42), followed by "*Collaboration with scientific research*" (ρ = 0.33), whereas "*See animals in a respectful manner*" was the least correlated factor (ρ = 0.27). For *New* whale watchers on

the contrary this factor was among the two most correlated with satisfaction (ρ = 0.32), while "Information on Pelagos Sanctuary provided on board" was the least correlated (ρ = 0.24) (**Table 4**). Concerning Service features, for Experienced the more correlated were "Professionalism for the crew on board" (ρ = 0.40) and "Good photo opportunities" (ρ = 0.38), while "Boat type was the most correlated for New (ρ = 0.35). Good weather condition was the less correlated feature for both groups (ρ = 0.28 and ρ = 0.16 for *Experienced* and *New*, respectively)."

Figure 3 shows the importance of Trip (**Figures 3A,B**), Conservation/Awareness (**Figures 3C,D**) and Service (**Figures 3E,F**) related features based on the percentage of *Experienced* and *New* whale watchers that scored a feature as "important" (four in five-point Likert scale) or "very important" (five in five-point Likert scale). The highest expectations for the three categories were "*See at least one cetacean*," "*See animals in respectful manner*," and "*Professionalism of the crew on board*," for both *Experienced* and *New* whale watchers.
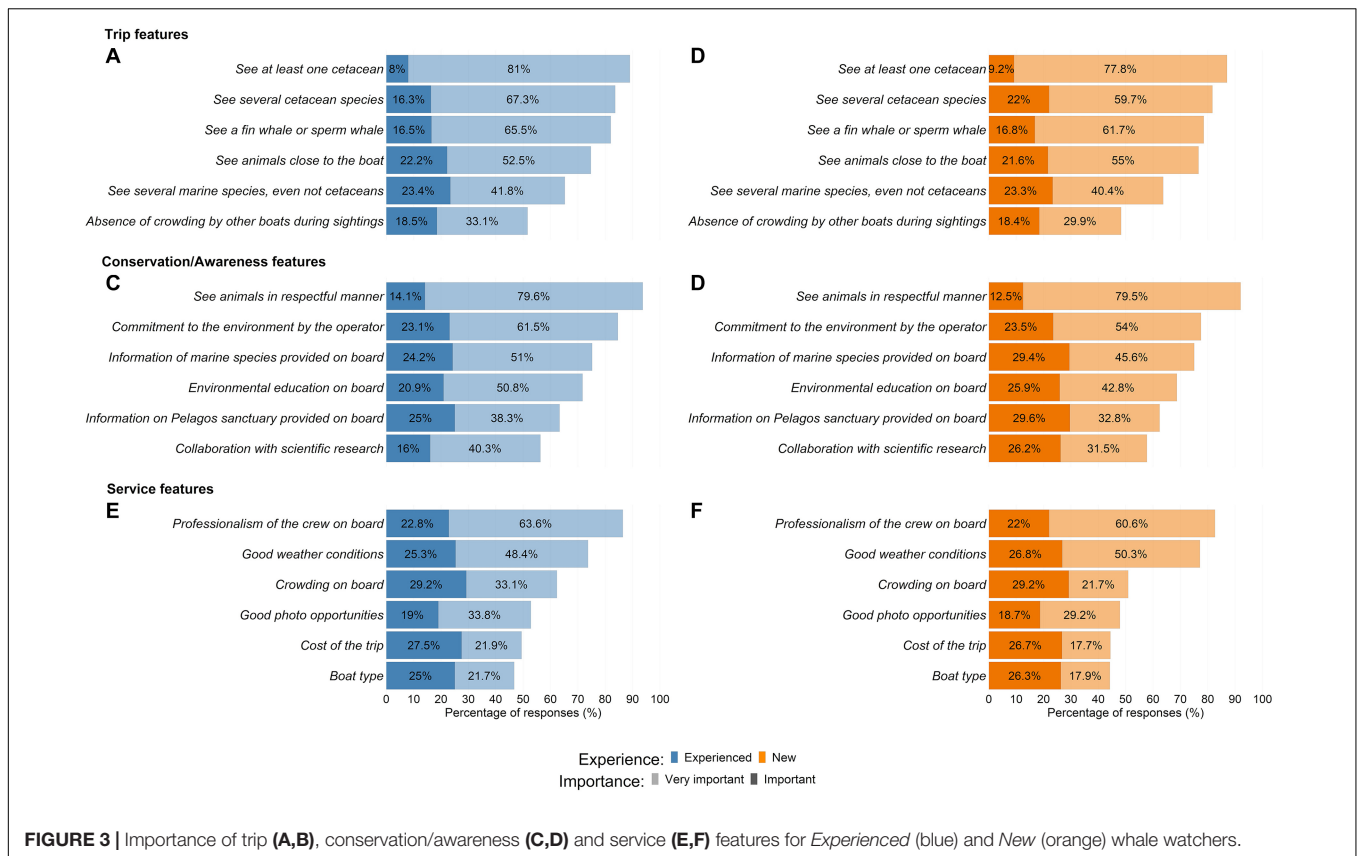
Figure 4 illustrates the satisfaction for Trip (**Figures 4A,B**), Conservation/Awareness (**Figures 4C,D**), and Service (**Figures 4E,F**) related features based on the percentage of *Experienced* and *New* whale watchers that scored a feature as "satisfied" (four in five-point Likert scale) or "very satisfied" (five in five-point Likert scale). For both *New* and *Experienced* whale watchers the most satisfying features where "*See at least one cetacean*" and "*See animals in respectful manner*," for the Trip and

TABLE 4 | Factors affecting satisfaction, separately for the two groups.

Experienced whale watchers		New whale watchers	
Factors satisfaction with	Rhoρ	Factors satisfaction with	RHOρ
Trip features	**0.41170**	**Trip features**	**0.32751**
See several cetacean species	0.54906	See several cetacean species	0.46575
See a fin whale or sperm whale	0.53496	See a fin whale or sperm whale	0.40951
See animals close to the boat	0.48815	See at least one cetacean	0.38740
See at least one cetacean	0.43866	See several marine species, even not cetaceans	0.38113
See several marine species, even not cetaceans	0.39384	See animals close to the boat	0.32968
Absence of crowding by other boats during sightings	0.13789	Absence of crowding by other boats during sightings	0.07767
Conservation/awareness features	**0.30959**	**Conservation/awareness features**	**0.30389**
Commitment to the environment by the operator	0.42577	Collaboration with scientific research	0.34569
Collaboration with scientific research	0.33168	See animals in respectful manner	0.32339
Environmental education on board	0.32128	Commitment to the environment by the operator	0.32336
Information of marine species provided on board	0.27682	Environmental education on board	0.32295
Information on *Pelagos* sanctuary provided on board	0.27337	Information of marine species provided on board	0.31858
See animals in respectful manner	0.26907	Information on *Pelagos* sanctuary provided on board	0.24348
Service features	**0.31025**	**Service features**	**0.25191**
Professionalism of the crew on board	0.40513	Boat type	0.35574
Good photo opportunities	0.38716	Professionalism of the crew on board	0.33465
Cost of the trip	0.36923	Good photo opportunities	0.31870
Crowding on board	0.31229	Cost of the trip	0.31446
Boat type	0.30200	Crowding on board	0.18793
Good weather conditions	0.28143	Good weather conditions	0.15908

Non-significant factors ($p > 0.05$) are indicated by the gray background. For all significant factors, significance was $p < 0.001$.

FIGURE 3 | Importance of trip **(A,B)**, conservation/awareness **(C,D)** and service **(E,F)** features for *Experienced* (blue) and *New* (orange) whale watchers.

Conservation/Awareness categories, respectively. For the Service features, *Experienced* whale watchers were very satisfied with "*Professionalism of the crew*," while *New* whale watchers where more satisfied with "*Good weather conditions*." The features that were less satisfying for *Experienced* whale watchers were "*See several marine species, even not cetaceans*," "*Collaboration with scientific research*" and "*Cost of the trip*." These last two satisfied less *New* whale watchers as well, while for Trip related features the less satisfying one was "*See a fin whale or a sperm whale*."
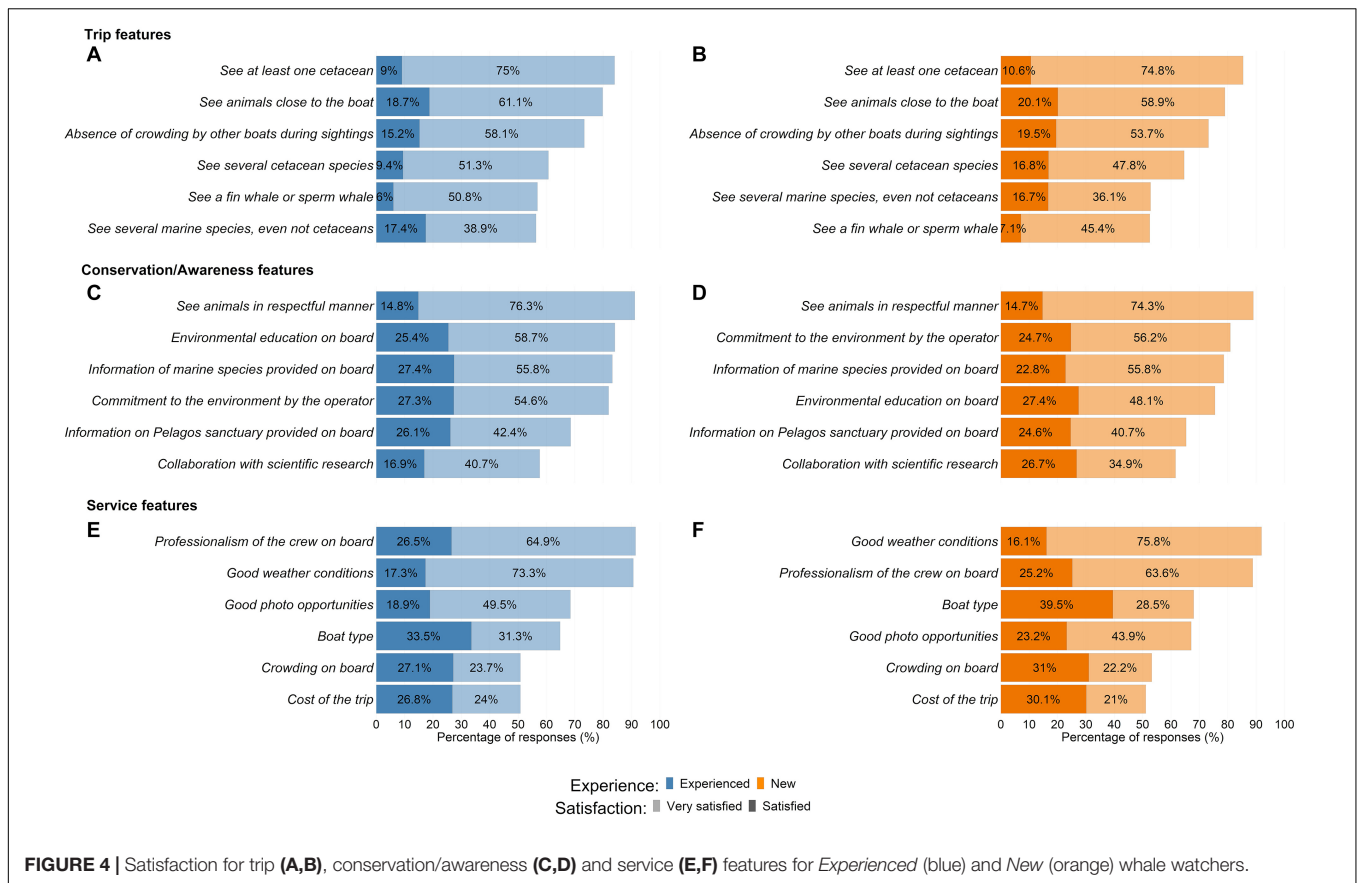
IP Analysis

Results of the IP Analysis for *Experienced* and *New* whale watchers are reported in **Table 5**. *Experienced* whale watchers rated important and satisfaction equally for the three categories (G = 0), while a higher satisfaction than expectation (G < 0) was reached in the Conservation/Awareness Category for *New*. Looking at single factors, four out of 18 factors for *Experienced*, and five factors for *New* were rated G < 0. Most of the positively evaluated factors were Service related. Specifically, "*boat type*" and "*cost of the trip*" were appreciated by both groups. *Experienced* positively evaluated "*weather conditions*," while *New* appreciated "*good photo opportunities*." "*Absence of crowding by other boats*" was the only feature among Trip related that satisfied both groups. Satisfaction did not exceeded Importance for none of the Conservation/Awareness features for *Experienced*, while "*information on marine species provided on board*" was rated G < 0 for *New*. Regarding negative results

(G > 0), "*environmental information provided onboard*" did not meet the *Experienced*'s expectations. *New* whale watchers were disappointed by the opportunity to "*see a fin whale or a sperm whale*" and to "*see several cetacean species*": for both these parameters the expectation value exceeded the satisfaction (G > 0) (**Table 5**).

Finally, 91% of whale watchers would go whale-watching again after this experience (*n* = 721). Among them, 70% declare to be choosing the same operator for the next whale watching trip (*n* = 659), while 28% declared having no intentions of going whale-watching again in Liguria.

DISCUSSION

Our assessment accounted for a total of 29 operators organizing whale watching tours in the Pelagos Sanctuary. The last available assessment in Italy counted 10 operators in total operating in Pelagos (four COM, four ECO, and two RES) (Fortuna et al., 2004). Along the French coasts, a total of 31 operators were counted, working almost only in the *Pelagos* Sanctuary area or adjacent waters (Mayol et al., 2014). Overall, at least 59 operators are currently organizing whale watching tours in Pelagos. Whale watching in the *Pelagos* Sanctuary has then increased in approximately 180% during the last 15 years. This growth regards particularly COM operators, whose number jumped from four to 17 within the considered period. COM

FIGURE 4 | Satisfaction for trip **(A,B)**, conservation/awareness **(C,D)** and service **(E,F)** features for *Experienced* (blue) and *New* (orange) whale watchers.

Whale watching has spread over other Italian regions of the *Pelagos* Sanctuary, while in 2004 it was concentrated only in one area (Fortuna et al., 2004). A similar growth and expansion has been observed in the French area, where an average yearly increase of 3.5% in the number of operators has been observed since late 1980–2014 (Mayol et al., 2014). The type and duration of trips has also changed over time. It is important to note that a high percentage of COM operators are nowadays offering on request-trips. While pre-planned trips allow for an overview of the potential impact of whale watching on cetacean populations, by allowing a prediction of the number and type of operators conducting trips in the area, on request trips cannot be monitored in advance, thus they can lead, during certain periods, to an over-exploitation of cetacean populations. The type of vessel used has also changed, as only big motorboats where used 15 years ago, while nowadays a variety of vessels can be chosen by whale watchers, including small motorboats, sailing vessels, catamarans and RHIBs. Results show that 65% of COM operators have a biologist or a specialized guide on board and 24% declare to be actively collaborating with research institutions. These percentages were higher in 2004, when 75% of COM operators did public awareness through biologists on board, and 50% where actively collaborating with research institutions. This could be the signal of the fact that the whale watching activity is becoming more appealing and while first the aid of researchers was considered as crucial for the activity,

nowadays watching whales is becoming more and more a "solely leisure" activity.

Only 46% of COM operators have received a certification, declaring compliance with codes of conduct for approaching the animals. Compliance with code of conduct is foreseen as mandatory within the certification process, with periodical checks from the institutions in charge of the certification. For the non-certified operators, no real measurement of the level of compliance to the code of conduct has ever been made. It was not possible to check the activity of non-certified operators, but the absence of any mention to the application of a code of conduct on the web sites of operators could already indicate a lack of knowledge. These results should trigger more action from both international agreements both national authorities toward an effective control among all existing operators and to further enhance the certification process.

Despite the low rate of knowledge about the HQWW® label and of the Code of Good Conduct, "*See animals in respectful manner*" has been widely recognized as an important factor for whale watchers. It has already been demonstrated that customers play a crucial role in driving tour operators to comply with existing codes of conduct (Filby et al., 2015). As a consequence, awareness actions aimed to more widely advertise both the HQWW® and the Code of good conduct, could indirectly lead to a quality-check of the whale watching activity in the area. Moreover, this tourists-driven quality check could help filling the

TABLE 5 | IP analysis for *Experienced* and *New* whale watchers.

Tour features	Experienced whale watchers			New whale watchers		
	Importance of expectation	Satisfaction	Gap-value G	Importance of expectation	Satisfaction	Gap-value G
Trip features	**5**	**5**	**0**	**5**	**5**	**0**
See at least one cetacean	5	5	0	5	5	0
See a fin whale or sperm whale	5	5	0	5	4	1
See several cetacean species	5	5	0	5	4	1
See several marine species, even not cetaceans	4	4	0	4	4	0
See animals close to the boat	5	5	0	5	5	0
Absence of crowding by other boats during sightings	4	5	−1	3	5	−2
Conservation/awareness features	**5**	**5**	**0**	**4**	**5**	**−1**
See animals in respectful manner	5	5	0	5	5	0
Information of marine species provided on board	5	5	0	4	5	−1
Information on Pelagos sanctuary provided on board	4	4	0	4	4	0
Environmental education on board	5	4	1	4	4	0
Collaboration with scientific research	4	4	0	4	4	0
Commitment to the environment by the operator	5	5	0	5	5	0
Service features	**4**	**4**	**0**	**4**	**4**	**0**
Good photo opportunities	4	4	0	3	4	−1
Professionalism of the crew on board	5	5	0	5	5	0
Boat type	3	4	−1	3	4	−1
Good weather conditions	4	5	−1	5	5	0
Crowding on board	4	4	0	4	4	0
Cost of the trip	3	4	−1	3	4	−1

Strengths of service (G < 0) are indicated with gray background, while weakness (G > 0) are indicated by framed values.

gaps previously evidenced, both considering the low percentage of certified operators both the apparent lack of code of conduct among non-certified operators.

The role of whale watching operators in transmitting conservation messages to tourists has already been demonstrated (Lopez and Pearson, 2016; García-Cegarra and Pacheco, 2017; La Manna et al., 2020). Our results confirm this, as the *Experienced* group demonstrated to be more aware of conservation measures, such as the existence of the *Pelagos* Sanctuary, of the code of good conduct, and of the HQWW® label, compared to *New*. Considering that 63% of the *Experienced* had already gone whale watching in Liguria, the higher knowledge of the *Experienced* could also be related to the awareness message spread onboard COM whale watching vessels in the Sanctuary. It is interesting to note how among both *Experienced* and *New* whale watchers, being from a region overlooking Pelagos plays a crucial role in awareness, regarding both the existence of *Pelagos* Sanctuary and the HQWW® label. This result stresses the importance, on one hand, of regional initiatives and, on the other hand, of the need of more national and international initiatives in spreading this information. This is further stressed by the fact that less than 50% of *New* whale watchers and one third of the *Experienced* still did not know about the existence of the *Pelagos* Sanctuary, almost 20 years after its institution. Similarly, a very low percentage of whale watchers were aware of the existence of HQWW and Code of Good Conduct, regardless of age class or education

level. More educated people would be more influenced in the choice of an operator by the presence of a quality label. Quality of whale watching in the *Pelagos* Sanctuary was medium-high, slightly lower than what observed by Bentz et al. (2016) in the Azores. Indeed, differences in geography, climate, and presence of marine megafauna between our study area and the Azores must be evidenced. These differences make it impossible to directly compare the obtained results. At the same time, Azores represent one of the world best known places for the whale watching activity and was used as a benchmark for our analysis. The beforehand mentioned differences where taken into account in the analysis of the questionnaires. As an example, authors in Bentz et al. (2016) indicated the high probability of seeing whales as the factor majorly contribution to high satisfaction level. Among the species regularly sighted in the area, fin whale, and sperm whale are the most charismatic, and their presence is one of the main factors contributing to satisfaction for both *Experienced* and *New*. The presence and distribution of fin whales and sperm whales in the area is known to vary annually (Azzellino et al., 2012; Morgado et al., 2017). For the whale watching trips considered in this study, sighting success for fin whale and sperm whale has been 20% (17 trips with at least one fin whale sighting out of 85) and 13% (11 trips with at least one sperm whale sightings out of 85), respectively. It is important to stress how despite this low sighting rates of the two main target species, averaged satisfaction level is medium-high for this area.

Origin, Age, and Education level had no influence on overall satisfaction. While tourists' satisfaction is usually used a measure of operators' performance, it can also be used as a key driver for the management and development of touristic activities. Specifically for wildlife tourism, measuring factors mainly affecting satisfaction can directly provide effective insights for a sustainable planning of the activities. Informing operators on which factors influences tourists' satisfaction could help diminishing the possible negative impact of the activity itself on the exploited natural resource.

IP Analysis evidenced that generally, both new and experienced whale watchers where satisfied with trip settings, being cost and boat type identified as strengths factors. For both groups, being in an area not crowded by other boats was indicated as a strength of the service offered. This is in contrast with what observed elsewhere, especially in famous whale watching destination, where crowding has a negative impact (Bentz et al., 2015). Respecting the indications gave by the Code of Good conduct, where a maximum of two vessel is allowed in the same area of the animals, and only one at a time in the vigilance area, can be seen as a strengthen factor from operators, rather than a limitation. At the same time, respecting this rule helps in diminish possible negative effect on cetaceans in the area. *Experienced* whale watchers do expect a better environmental message on board COM whale watching operators in the *Pelagos* Sanctuary, while *New* whale watchers were disappointed by the number of cetacean species observed and by the possibility to see fin whale or a sperm whale. Being *New* the highest proportion of whale watchers, whale watching operators should better advertise the offered tours, focusing on the overall ensemble of marine species that can be sighted (including marine birds and sea turtles as an example). Quality of the educational and awareness message spread on board can drive and adjust tourists expectations during wildlife tours (Orams, 2000; La Manna et al., 2020). Rising the quality of the information provided onboard is also one of the aims of the HQWW® label, which foreseen a specific training program for both guides and vessels crews. Ensuring the spreading of this label as well as tourists' awareness, can then directly help in booster a more sustainable attitude toward both tourists and operator. Similarly, proximity to the animals, while seen as an important factor, is also known to be potentially risky for animals. Our results demonstrate that respectful approach are as or even more important to tourists than proximity. This indication reinforces the need for responsible and environmentally sustainable whale-watching practice (Cornejo-Ortega et al., 2018). Further analysis then will be needed for effectively check operators compliance with the Code of Good Conduct. With this research, we aimed at providing a baseline for a future comparisons of tourist satisfactions including different operators (RES and ECO) as well as expanding the analysis to other regions. Specifically considering the *Pelagos* Sanctuary area, it would be important to assess intra-national as well as inter-national differences among signing regions and countries, in order to assess a benchmark level that could then be exported also outside the protected area. As a matter of fact, our results suggest the whale-watching sector has the potential to further grow over the next years, not only in the *Pelagos* Sanctuary region but also spreading into other regions, has already evidenced by our census (see **Supplementary Material**). Monitoring the whale watching activity and its potential impact on the cetacean population is then becoming crucial, especially looking at the lower involvement of research activities measured in 2019, compared with the past. This need is further enhanced by the change in the type of offer, as on-request trips could make it difficult to assess effective presence of boats in the same area. Moreover, some whale-watching activities are focused primarily on bottlenose dolphin population (La Manna et al., 2020), a species listed as "Vulnerable" and needing conservation actions in the Mediterranean (Bearzi et al., 2008, 2012).

The analysis of the whale watching activity in the *Pelagos* Sanctuary, being the first available for this protected area, can be considered as the base for developing and reinforce better management strategy that would support the economic benefits, improving the service satisfaction, and at the same time minimizing negative impacts and enhance the positive impact of this activity on cetacean populations in the area.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

AUTHOR CONTRIBUTIONS

PT, MZ, and AM conceived the study and prepared the questionnaires. MZ was responsible for the data collection on board. PT and MZ were responsible for building the final database and for the data entry. PT and AB conducted the analysis. MR and AM supervised the overall work. All authors contributed in the writing of the manuscript.

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SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fmars.2020.596848/full#supplementary-material

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.