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MONITORING PROGRAMES: PHONE SURVEY IN AZORES FOR MRF AS A COMPLEMENTARY TOOL

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1. Summary Executive

In this task a company was subcontracted to execute the phone survey. The designated company as high experience in the field and the data collected was of most importance. On the other hand, within this task was not foreseen the contracted of a human resource for the data analysis and production of a paper, which explain the delayed of the publication. The publication is now expected to be submitted in the beginning of 2024. The results of this task were important by giving the first participation rate on MRF for Azores. Also, this report contains the most important sociodemographic analysis ever done in Azores for MRF which can have positive implications for the management in the future. The results for the estimation of fishing effort and catch for shore angling from a regional level survey is also the first time ever. Even so, the catch estimation made only with data from this study has the problem of recall bias. For that reason, an interesting alternative method was implemented by adjusting the fishing effort using on-site surveys implemented in the past in the region. In conclusion, this work showed the potential of the phone survey method to be used as a screening survey coupled with a logbook scheme. On the other hand, the results point to MRF as a high relevant sector in Azores, with strong socioeconomic role, but also, with potential pressure on some commercial coastal species (e.g., *Sparisoma cretense*) that need to be accounted in stock assessment analysis.

2. Introduction

Fisheries managers around the world are starting to be increasingly alert to the need of implement systematic data collection on marine recreational fisheries (MRF) as coastal fish stocks show signs of pressure from commercial and recreational fisheries coupled with the increasing lobby pressure on the Governments by stakeholders (Coleman et al. 2004; Ihde et al. 2011). Implementing long-term systematic data collection for MRF is challenging due to the diverse and dispersed nature of the fishery. Also, it is difficult to access recreational fishers due to the absence of participants lists contacts (Hyder et al., 2020). Designing a survey on MRF is expensive and complex and ideally requires separate components of fishing effort and catch per unit of effort using a variety of off-site or on-site approaches (Jones and Pollock, 2012). The major concern when implementing a survey are the typical biases that depend on the survey designs used, as: recall, rounding, telescoping, non-response, and avidity (Pollock et al., 1994; ICES, 2010; Jones and Pollock, 2012). For large scale spatial areas, off-site methods are considered the most feasible and cost-effective methods to survey recreational fisheries (Hartill et al., 2012). Recreational fishing licenses are one of the most preferred sampling frames used in many surveys worldwide as Basque Country (Zarauz et al., 2015), Denmark (Sparrevohn and Storr-Paulsen, 2012), Germany (Strehlow et al., 2012), Canada (Fisheries and Oceans Canada, 2012) and Australia (Ryan et al., 2015). However, when some recreational fishing modes are excluded from licensing it is needed to implement a dual-frame approach (ICES, 2010). For unlicensed fishing modes (or populations) several probabilistic sampling approaches can be adopted as postal area mail-outs (Armstrong et al., 2013), or meshblock door-knocking approach (Wynne-Jones et al., 2014). Even so, many countries have used telephone directories as the sampling frame in recreational fishing surveys (Hartill et al., 2012; Teixeira et al., 2016; Hyder et al., 2018).

The volcanic islands of Azores are composed of nine islands spread in a distance of 600 km forming three islands' groups along a tectonic zone running WNW-ESE. The population of 236 thousand are distributed in an uneven way, with São Miguel islands encompassing 56.3% and Corvo only 0.16%. In the past Azorean MRF have been targets of limited time and space on-site studies (Diogo and Pereira, 2013a; 2013b; 2014). These studies provided catch and effort estimates for Faial and Pico islands. The only catch estimate of recreational fishing for the region was made by Pham et al., (2013), however based on the limited work of Diogo (2007). More recently (in 2018), a DCF Pilot Study was implemented based on off-site surveys, in particular, a recall survey integrated in the informatic platform system of Azorean MRF licenses. This survey also is used as recruitment for a panel, which is based on web, APP and phone logbooks (STECF report). Finally, in 2021 MRF have be integrated on the systematic data collection under the DCF in Azores. Despite this effort, the most popular fishing mode (i.e., shore angling) in the Azores are still not the target of DCF data collection (Diogo and Pereira, 2014; Report STECF). This fact is related to this fishing mode (including hand collecting) that do not have dedicated fishing licenses and do not target the mandatory DCF species (i.e., elasmobranchs and highly migratory species). However, there are recommendations that the DCF surveys should be multispecies and multigear. Tending that in account this study is important since gives the opportunity to fill some gaps of knowledge and simultaneously to test a potential complementary methodology that could be integrated in the systematic data Azorean collection in the future. The objective of this work is to test the methodology of phone survey at regional level, focusing on the estimation of the active number of residents in Azores and their sociodemographic, the identification of the main fishing modes. Moreover, the fishing effort and catch estimation will be done tending in attention the problematic of recall bias.

3. Methods

A telephone survey under the project Plasmar + was carried out between 16 of November of 2021 and 14 February of 2022 reaching a sample 1690 households telephone interviews. A structured questionnaire designed specifically for MRF was used, through Computer Assisted telephone interviews (CATI). The study was directed to Azorean resident population aged 18 and over. However, one adult member of the household provided the demographic information, including the number of recreational fishers (independently of the age) within the household. The survey team was composed by 32 interviewers, being the interviews distributed among several interviewers per island in order to avoid that the work was carried out by a small team of interviewers in each island. Telephone interviews (18.2%) were supervised through a new telephone contact with the interviewee. Supervision also covered 10% of refusals. Validation and consistency of the interviews data was checked electronically, detecting any filling errors or missing information. Validation of the consistency of the information was collected through: i) Validation of answer codes per question, ii) Validation of articulation between questions (jumps and filters).

The present study on MRF in the Azores region was focus on residents in Azores and aimed to estimate the participation rate in Azores (engaged at least once in recreational fishing during the past 12 months prior to the survey); the sociodemographic characterization of MRF per fishing mode, and to survey how the DCF survey is well establish (knowledge and participation). Moreover, this work aims to estimate fishing effort and catch for fishing modes with

representativeness in the interviews in all islands and evaluate this methodology as potential use for the future.

Accordingly, with the 2021 census the Azorean resident population is composed of 236413 (SREA, 2022). The sampling frame of the survey emerged from randomly selected landline phones with quotas in terms of distribution per island. The sampling was weighted based on island population, however, additional weighting of the sampled was applied to the smallest and less populated islands and established a minimum number of 30 interviews, otherwise the sampling would be negligible.

During the study, it was monitored the sampling distributions based on gender and age of the respondents. Also, it was registered the: contact attempts, number of households surveyed, number of total refusals, number of residents covered by the study, number of partial interviews, number of complete interviews, total number of households with fishermen, respondent fishermen, fishermen refuse. In case of failed contact attempt, a subsequent call was made at a different time and/or day. The subsequent call without answered, was replaced by another. The households that agreed to participate in the survey fall into the category “complete telephone interviews” following the methodology of Papapoulus et al. (2022).

The first stage of telephone interviews consisted of profiling the household (age and sex) and identify the number of MRF within the household. In cases of no MRF live in the household the interview was ended, otherwise the interview continued and started the second stage with 26 questions but only directed to recreational fishers with 18 years old and over. The questions were mainly closed questions and approach socio economic and MRF characterization of the fishers living in the household as: main (and secondary) fishing modes (shore angling, boat angling, spearfishing, hand collecting); Licenses (fishing mode and period); avidity (number of fishing trips for the last 1, 3 and 12 months); mean hours per fishing event; mean weight catch in the last 12 months. If the fishers operated in the last 30 days it was requested, information of the last fishing trip as: a) the catch composition (in weight), b) discards (in number), c) time spent fishing, d) number of fishers in the trip). Also, for fishers that operate in the last 12 months it was request: a) top five species captured; b) level of expertise, c) main fishing areas (parish level), d) the evaluation of the centrality of recreational fishing in fisher life with four statements (1- “recreational fishing is the most important leisure activity that I practice”, 2- “if I stop fishing I probably lose contact with many of my friends”, 3- “many of my friends and family say that I pass to much time fishing”, 4- my life is mainly organized around recreational fishing), and e) knowledge and engagement on Azorean DCF systematic data collection. The average duration of interviews was about 15 min. The survey procedures have in account the legislation of personal data protection, and all the collected data were anonymously analyzed.

The interviews indicated that the Azorean population practice shore angling between the ages of 5 and 87 years old, being the estimation of participation rate applied for these age ranges using age stratum adapted from 2021 census strata; REF. For the estimation of the participation rate, for each age stratum a correction factor was obtained which consisted of observing for each stratum what percentage was obtained in the 2021 census with the percentage observed in the sample of this study. Thus, a given stratum with a percentage of observations higher than that observed in the 2021 census would have a reduction factor, and vice versa when there was a deficit of observations in each stratum. This factor is multiplied by the estimated number of recreational fishermen in the population of each island, multiplied by the size of the population

of each island obtained in the 2021 census. Using this methodology, the following estimate of recreational fishermen per island and type of fishing was obtained.

The calculation of fishing effort and catch it was only carried out for shore angling, since was the fishing mode with more robust data collected (i.e., any gap per island) and the main fishing mode outside the scope of Azorean DCF. The number of fishing days in the previous 12 months was included in the avidity classes. The avidity classes were established as: 1 – 10: occasional; 11 – 30: regular; 31 – 60: frequent; >61: highly frequent (Figure A1).

Tending in consideration that the methodology used is prone to recall, digit, and multiply bias and to evaluate the methodology used for purposes of estimation of fishing effort and catch, the estimates were assessed through different scenarios, in particular:

Scenario 1 - Estimation without correction of the Effort and CPUE estimate: In this approach, fishing effort was not corrected. This is just the number of fishable days was limited to 160, but the average number of fishing days for each fisherman was estimated with Based on responses to this survey on the number of fishing days, practiced in the last 12 months. The CPUE was also estimated based on responses to the phone survey in this study on the number of kilos of fish caught in the last fishing trip, carried out in the last 30 days. In this approach, no correction for recall bias was made in the amount of capture.

Scenario 2 - Correction of fishing effort and CPUE estimates: To estimate fishing effort, we need the average number of fishing days per class of avidity (i.e. the average number of fishing days per fisherman and per island in the last 12 months and by avidity class, multiplied by the estimated number of fishermen). Furthermore, the number of days was also corrected based on the maximum number of fishable days (160, from according to the climatic conditions). As the number of fishing days has a recall bias problem, we used the onsite fishing effort estimated by Diogo and Pereira (2014) for Faial/Pico islands. However, since the estimation of on-site survey was made for daylight fishing and considering some existent diel differences including fishing effort (Diogo, 2007; Diogo and Pereira, 2016) and since the nocturnal fishing effort corresponded to 60% of the daylight fishing, the 18460 fishing daylight fishing trips were raised to 29536 fishing trips. After this value of effort was compared with this study (for the same islands) and reached a correction factor of 19.6%. Also, regarding the quantity fished per day, we chose to use data from the study by Diogo and Pereira (2014) as a baseline for the Pico/Faial CPUE. In this study relating to Pico/Faial it was observed a CPUE (Kg/day) of 1.7. In this present study, the CPUE (kg/day) estimated through the question asked to catch the “The last catch carried out in the last 30 days” was 2.47 kg/day. In this way, it is possible to obtain a correction factor through the study by Diogo & Pereira (2014) regarding this study. This factor took the value of 68.7%. The same correction factor was assumed for all islands, that is, to the CPUE values (kg/day) estimated per day, the correction factor of 68.7%. It should be noted that for some islands the number of responses to the quantity caught in the last fishing trip, presented a very small number of observations (Ilha do Corvo, Ilha de Graciosa, Ilha of Santa Maria). Therefore, due to the lack of information to obtain a reliable estimate of the CPUE, it was decided to consider the CPUE of the Western group (Corvo and Flores), of the Eastern group (São Miguel and Santa Maria) and aggregate information from the islands of São Jorge and Graciosa.

Scenario 3 - Correction of the Fishing Effort estimate: In this approach, the corrected fishing effort was estimated, as explained in scenario 1. The CPUE was estimated based on responses

to this study regarding the weight of fish caught in the last fishing trip, carried out in the last 30 days. In this approach, no correction of recall bias in the capture amount.

Scenario 4 - CPUE Estimate Correction: In this approach, fishing effort was not corrected. This is just the number of fishable days was limited to 160, but the average number of fishing days for each fisherman was estimated with Based on responses to the Intercampus survey on the number of fishing days, practiced in the last 12 months. In turn, the CPUE was estimated based on the correction described in scenario 1.

Scenario 5 - Estimation using proposed global effort Hyder et al., 2018: In this approach, fishing effort is estimated based on the study carried out for Portugal, in which the global effort is estimated (Hyder et al., 2018). In this study it was estimated value per fisherman of 36.83 days. The CPUE was estimated based on responses to the Intercampus survey on the number of kilos of fish caught in the last fishing trip, carried out in the last 30 days. In this approach, it was not correction of recall bias in the amount of capture was made.

Finally, the estimate of total catch per island and avidity class was estimated by the product between the CPUE estimated in the different approaches by the number of fishing days to obtain the total capture. For the different approaches, it was always stratified by avidity class, so that the variance estimates were the smallest. Comparison of average catch estimates total per approach, as well as the standard deviation were applied.

From the previous scenarios, it is clear that recall bias correction has a huge effect in the final estimates. It is therefore essential to develop methods to find an appropriate correction factor for each region, so that estimates made by off-site method have the lowest possible bias. To show the importance of correctly estimating the recall bias correction factor, a sensitivity analysis, (i.e., the variation in the average estimates of total catches (in tons) per island, depending on the correction factor used) was carried out. The points without correction factor (when factor = 1) are also marked on the graph and using the correction factor adapted specifically for the Azores, proposed by Diogo & Pereira (2014) (factor = 0.20) and a factor suggested in the literature proposed by Connelly & Brown (1995) (factor = 0.69).

4. Results

The majority of respondents (for the different modalities) have Portuguese nationality (99.8%), are male (85.1%), are employed (91.6%), have secondary education or less (80.5%), with a household of 3.2 people on average and with an average age of 49.3 years (minimum equal to 18 years, maximum equal to 87 years and standard deviation equal to 11.48 years), (Table 1 and 2).

The most practiced type of fishing is shore angling (88.4%, n=536), boat angling (5.3%, n=32), spearfishing (4.3%, n=26) and hand collecting (2.0%, n=12). Only 24.9% of respondents claim to have a fishing license in force. Of these, 73.5% (n=111) are spearfishers licenses, 21.2% (n=32) boat angling licenses and 5.5% have another type of license or chose not to respond. The most common term for this license is the annual license (91.4%, n=138). Of the total number of respondents, only 55.6% (n=84) of respondents were asked to complete a survey at the time of

licensing, and of these 94% (n=79) responded to the survey. Only 16.0% of fishermen know the Data Collection Framework (DCF), with a smaller number of fishermen knowing the DCF in the shore angling (13.1%) and it is in boat angling that a greater number of fishermen know the DCF (43.8%). Of those who know about the DCF, only 41.2% (n=40) claim to be registered with it (Table 1 and 2).

There is no significant relationship ($p=0.054$) between the percentage of male fishermen and fishing methods. There is also no significant relationship between the percentage of fishermen with higher education ($p=0.246$), nor professional occupation ($p=0.226$) and the fishing mode. The average age of fishermen in shore angling is significantly higher than the average age of fishermen in hand collecting ($p=0.005$) and spearfishing ($p<0.001$) and the average age of fishermen in boat angling is marginally higher than the average age of spearfishing fishermen ($p=0.045$). There is a significant relationship between the percentage of fishermen with a fishing license and the type of fishing, ($p<0.001$), with a greater than expected number of fishing licenses for boat angling and spearfishing fishermen and lower than expected in the shore angling. The same applies to the percentage of fishermen who know the DCF ($p<0.001$).

When asked about their experience as a fisherman, 7.4% of fishermen consider themselves to be an experienced fisherman, 50.3% consider their experience to be average and 42.1% consider them to have poor experience (Figure A2). In spearfishing and boat angling, the highest percentage of experienced fishermen is observed and in shore angling the lowest (Figure A2). There is a relationship between experience and the type of modality ($p<0.001$), with boat angling and spearfishing having a higher number of experienced fishermen than expected and hand collecting having a lower number than expected.

The average number of kilograms for each fishing trip, in the last 12 months, according to the fisherman's experience. We observed that more experienced fishermen fish a greater quantity, both when compared to fishermen with a weak level of experience ($p<0.001$) and when compared to fishermen with an average level ($p=0.002$). Fishermen with average experience also fish larger quantities than fishermen with little experience ($p<0.001$).

Regarding the characterization of the main type of fishing, 79.9% of respondents reported that they fished in the last 30 days, having fished an average of 6.78 days (s.d.=6.21) and an average of 4.94 kg of fish (s.d.=9.27) (Table A1). By modality, shore angling fish significantly more days in the last 30 days than other modalities ($p<0.001$).

In the last 3 months, respondents said they fished an average of 21.05 days (s.d.=18.91) and in the last 12 months they said they fished an average of 61.21 (s.d.=54.87) (Table A1). By modality, shore angling fish significantly more days in the last 3 months and in the last 12 months than in other modalities ($p<0.001$). The quantity of catches, per fishing mode and in the last 12 months, transmitted by the fishermen interviewed, presented an average of 4.31 kg (s.d.= 5.11 kg), with the amount of land-based fishing being significantly lower than that captured in spearfishing ($p=0.001$) and boat angling ($p=0.001$). Per fishing trip they claim to have spent an average of 4.86 hours (s.d.=1.41). By modality, fishermen fishing on land and by boat angling fish significantly more hours per fishing trip than in spearfishing and catch fishing ($p<0.001$).

In the last fishing trip carried out, 80.8% stated that they fished alone and only 4.5% (n=22) of the fishermen stated that they returned some fish to the sea during this fishing trip (Table A2). There is no relationship between the percentage of times that discarded fish to the sea alive and the fishing mode ($p=0.09$), but there is a relationship between being a land-based fisherman and

fishing alone ($p=0.003$), with a greater than expected number of boat anglers and spearfishing who do not fish alone.

In the last fishing trip, spearfishing took significantly less time (in hours) than shore angling, boat angling and hand collecting ($p<0.001$). The quantity fished (in kg) was significantly higher in boat angling and spearfishing compared to shore angling ($p<0.002$).

The participation rate estimated for the Azores reach 9.1% (21443 recreational marine fishers) and shore angling was the most popular activity with 79% of the MRF in Azores followed by boat angling spearfishing and hand collecting (Figure 1 and Table 3). The islands with more MRF was São Miguel island with 50.9% of MRF. The values estimated for spearfishing were lower than the licenses (Figure A3).

In terms of catch estimation the scenario more conservative estimated total retained catch from shore angling reached 288 tons/year, which corresponds to 12.0% of small-scale fisheries and 3.0% of the deep-water and open water fisheries for the same year of study (Figure 2 and Table 4). The more conservative scenario is only 13.4% of scenario 1 with no correction factor which show the relevance of recall bias (Table 4). Also, it was found high values of catch share with commercial fishing for nine species, being the most important species in decreasing order of importance *Sphoeroides marmoratus*, *Thalassoma pavo*, *Coris julis*, *Muraena augusti*, *Labrus bergylta*, *Abudefduf luridus*, *Chelon labrosus*, *Diplodus sargus* and *Serranus atricauda* (Figure 4).

A total of 26 retained taxa were reported in weight, however from the catch composition reported seven species accounted with more than 90% of the shore angling catch, being the two most captured species *Sparisoma cretense* (30.0%) and *Diplodus sargus* (21%). The other important species were *Coris julis* (11%), *Chelon labrosus* (10%), *Labrus bergylta* (10%), *Serranus atricauda* (9%) and *Pagrus pagrus* (3%). In terms of discards only 4.1% of fishing operations reported discards with only 68 discarded fish composed by seven species in decreasing order of importance (*Trachurus picturatus*, 47.1%; *Diplodus sargus*, 29.4%; *Sparisoma cretense*, 10.3%; *Muraena helena*, 5.9%; *Muraena augusti*, 4.4%; *Coris julis*, 1.8%; and *Boops boops*, 1.8%)

In general, six islands present a relatively even distribution of fishing effort across the different parishes (Flores, Pico, Faial, Graciosa, São Jorge and Santa Maria) in comparison with São Miguel Island that present a marked uneven fishing effort distribution. In the north shore some parish did not present any record while other parishes showed high values of fishing effort. In the south of São Miguel despite present fishing effort hotspots, in general the coast is more used for this fishing mode. In Terceira Island despite an uneven fishing effort distribution in opposition to São Miguel almost all parishes are used for shore angling; however, some areas present high fishing effort, while others low fishing effort (Figure 5).

5. Discussion

The landline frame used in this work showed that it can be applied as a complementary methodology within the DCF (Azorean data collection) by allowing to fill some knowledge gaps such as the MRF participation rate, MRF socio economic importance and information on the most popular fishing mode (shore angling), at regional level, that have been outside of the scope of DCF- Azores Work Plan. However, this phone survey to be used needs to accomplish certain requirements on the level of population coverage and used as a complementary method. Could be used as a screening survey and engagement method to shore anglers participate in the established logbook (APP, on-line or phone), as already applied in many countries (Strehlow et

al., 2010; Hartill et al., 2012; Rocklin et al., 2014; Van der Hammen et al., 2015). This study showed that using exclusively phone surveys based on the landline frame to estimate the fishing effort presented strong indications of overestimation when compared to on-site progressive counts from Diogo and Pereira (2014). Overestimation of fishing effort overestimations were expected due to the typical 12-month recall bias already deeply detailed in the scientific literature (Connelly and Brown, 1995; Connelly and Brown 2011; Andrews et al., 2018). It was also detected an strong overestimation of the catch rate compared with on-site survey (Diogo and Pereira, 2014), which is probably related with recall bias, and other problems as digit preference that is the tendency to guess weight catch by rounding estimates to values that end in zero or five (Tarrant and Manfredo, 1993; Connelly and Brown, 1995) and for that reason it was corrected with the catch rate from on-site survey of Diogo and Pereira (2014). Despite the corrections applied from the available on-site survey these estimates have to be seen with some caution and it is not recommended to use these estimates on regional fisheries management processes.

Moreover, the use of landline telephone directories to estimate the participation rate of unlicensed fishing modes can have some problems that need to be further investigated. It is currently recognized that the large use of mobile phones-only tended to reduce the coverage by landline phones directories. In Portugal mobile phones listing exists at national level and is not possible to distinguish the lists between autonomous regions (Azores and Madeira) and mainland Portugal. For that reason, a dual-frame approach (i.e. incorporating both landline and mobile phone listings) is difficult to implement. In addition, this process is known to have costs and high logistics, making the approach difficult (Georgeson et al., 2015). This type of problematic occurs in many areas of the world where mobile phone listings are often scarce, unavailable, or cost-prohibitive (Ehlen and Ehlen, 2007; Link et al., 2007; Lee et al., 2010; Busse and Fuchs, 2012; Teixeira, et al., 2016). Also, the landline frame brings some concerns on “coverage bias” and differences (for some variables) between covered and non-covered populations (Blumberg and Luke, 2009; Lee et al., 2010; Teixeira et al., 2016). For example, in the United States the NOAA’s Marine Recreational Information Program made a transition from its historical Coastal Household Telephone Survey to postal surveys, due to the increasing low coverage from landline frames (Andrews et al., 2014; NOAA Fisheries, 2015). Several works have been warning that the coverage bias rates many times differ between socio-demographic groups implicating different attributes between covered and non-covered populations (Hu et al., 2011; Busse and Fuchs, 2012). Younger and urban people are more likely to be mobile-only (Dal Grande and Taylor, 2010; Teixeira et a., 2016). Even though the use of landline phone surveys continues to be used in many places of the world for recreational fishing surveys but is vital to detect changes in population coverage and if the covered population is being intrinsically biased towards certain population sectors and their characteristics (Teixeira et al., 2016; Hyder et al., 2022). It is necessary, therefore, that the biases associated with landline telephone surveys, including in terms of avidity, are appropriately identified, and adjusted during data analysis (Teixeira et al., 2016).

The participation rate (9.1%), given by this study is the most accurate so far, since it included all fishing modes and for that reason the value is much higher than the 2% given by Diogo et al. (2020). The participation rate in Azores is comparable to some of the highest participation rates found in European countries (Hyder et al., 2018). In Portugal mainland the participation rate is lower (around 2%), however, this is in part explained by Azorean populations have extreme easy access to the sea, in comparison with Portuguese mainland where the majority of the

participation is related with fishers that lived at less than 20 km from the coast (DGRM report; Diogo et al., 2020). For example, in Spain despite several coastal autonomous regions present important participation rates (e.g., Asturias, 7%; Cantabria, 5%), the autonomous regions without coast mainly explain the Spanish participation rate of 1.8% (Gordoa et al., 2019). Other factors can explain the high participation rate found in Azores, for example Arlinghaus et al. 2015 have shown that participation decline with increasing population density. In fact, Azores islands have low population density and islands with higher population (and density) as São Miguel and Terceira present lower participation rate than islands less populated. However, Corvo (the smallest island) is an outlier which explains the no negative correlation found between population and participation rate.

Unexpectedly 24.9% of the fishers interviewed responded that have in their possession a valid fishing license (for spearfishing or boat fishing). However, and for spearfishing 80.2% of these fishers did not refer to spearfishing as one of the fishing modes that they practiced in the last 12 months and for that reason they were not accounted for purposes of participation rate, which could also explain the low participation rate. Despite being expected that some fishers request fishing licenses but do not use it, the value reported is surprisingly high and some other reasons could explain this finding (e.g., expired licenses, fishing without license), even though this should be the target of attention for future works.

The MRF socioeconomic analysis presented in this study is the most complete in Azores until now (Diogo and Pereira, 2013a; 2013b; 2014). Some of the results presented here are in accordance with other works at regional and national level. Shore anglers are older than spearfishers, a fact related to spearfishing being a more physically demanding fishing mode (Diogo et al., 2020) which explanations are probably like hand collectors being also younger than shore anglers. One of the more unexpected results is the relative high participation of women in comparison with previous Azorean studies and other regions of Portugal (e.g., Rangel and Erzini, 2003; Veiga et al., 2013). Even though the work of Diogo and Pereira, (2014) already noticed some relatively higher participation of women in Azores for shore angling (6.8%) than north and south of mainland (Rangel and Erzini, 2003; Veiga et al., 2013), yet lower than in this work. This fact could be related with most women belonging to the class of less avid fishers, which could explain the higher presence of males in the on-site surveys with higher probability of being surveyed (Herfaut et al., 2013).

In terms of spatial data analysis, the use of a parish as a unit level as several constrains, like heterogeneity of the dimensions of the parish and the low number of parishes in some islands including some islands some parish reach the north and south which implicate several constrains to use this data for MSP purposes. For the future, the simple indication of the proximity of a locality can probably be a better solution.

This study also revealed that MRF is the most important leisure activity for most of the surveyed fishers (76.2%), yet this was mostly driven by shore angling, showing the high importance of this fishing mode in Azores. Pita et al. (2022) have recently presented indications that MRF has an important effect on health for people in older age groups but also by the higher rate of consumption by avid fishers, which managers need to consider when considering new management measures.

In conclusion this study brings new important knowledge for MRF in Azores and shows that this methodological tool can be used with complementary methods such as logbooks and onsite

surveys. The importance of shore angling was also shown by the socio importance but also the pressure that can create in some stocks. The results presented here showed that this methodology needs to be considered in the future and shore angling should be included in DCF data collection as are currently boat angling and spearfishing.

6. References

- Armstrong, M. P., Dean, M. J., Hoffman, W. S., Zemeckis, D. R., Nies, T. A., Pierce, D. E., ... & McKiernan, D. J. (2013). The application of small scale fishery closures to protect Atlantic cod spawning aggregations in the inshore Gulf of Maine. *Fisheries Research*, 141, 62-69.
- Blumberg, S. J., & Luke, J. V. (2007). Coverage bias in traditional telephone surveys of low-income and young adults. *Public Opinion Quarterly*, 71(5), 734-749.
- Busse, B., & Fuchs, M. (2012). The components of landline telephone survey coverage bias. The relative importance of no-phone and mobile-only populations. *Quality & quantity*, 46, 1209-1225.
- Coleman, F. C., Figueira, W. F., Ueland, J. S., & Crowder, L. B. (2004). The impact of United States recreational fisheries on marine fish populations. *science*, 305(5692), 1958-1960.
- Connelly, N. A., & Brown, T. L. (1995). Use of angler diaries to examine biases associated with 12-month recall on mail questionnaires. *Transactions of the American Fisheries Society*, 124(3), 413-422.
- Diogo, H., & Pereira, J. G. (2013a). Recreational boat fishing pressure on fish communities of the shelf and shelf break of Faial and Pico Islands (Azores Archipelago): implications for coastal resource management. *Acta Ichthyologica Et Piscatoria*, 43(4), 267-276.
- Diogo, H. M. C., & Pereira, J. G. (2013b). Impact evaluation of spear fishing on fish communities in an urban area of São Miguel Island (Azores Archipelago). *Fisheries Management and Ecology*, 20(6), 473-483.
- Diogo, H., & Pereira, J. G. (2014). Assessing the potential biological implications of recreational inshore fisheries on sub-tidal fish communities of Azores (north-east Atlantic Ocean) using catch and effort data. *Journal of Fish Biology*, 84(4), 952-970.
- Diogo, H., Veiga, P., Pita, C., Sousa, A., Lima, D., Pereira, J. G., ... & Rangel, M. (2020). Marine recreational fishing in Portugal: Current knowledge, challenges, and future perspectives. *Reviews in Fisheries Science & Aquaculture*, 28(4), 536-560.
- Ehlen, J., & Ehlen, P. (2007). Cellular-only substitution in the United States as lifestyle adoption: Implications for telephone survey coverage. *Public Opinion Quarterly*, 71(5), 717-733.
- Georgeson, L., Moore, A., Ward, P., Stenekes, N., Kancans, R., Mazur, K., ... & Stobutzki, I. (2015). A framework for regular national recreational fishing surveys.
- Gordoa, A., Dedeu, A. L., & Boada, J. (2019). Recreational fishing in Spain: first national estimates of fisher population size, fishing activity and fisher social profile. *Fisheries Research*, 211, 1-12.
- Grande, E. D., & Taylor, A. W. (2010). Sampling and coverage issues of telephone surveys used for collecting health information in Australia: results from a face-to-face survey from 1999 to 2008. *BMC medical research methodology*, 10(1), 1-11.

- Hartill, B. W., Cryer, M., Lyle, J. M., Rees, E. B., Ryan, K. L., Steffe, A. S., ... & Wise, B. S. (2012). Scale-and context-dependent selection of recreational harvest estimation methods: the Australasian experience. *North American Journal of Fisheries Management*, 32(1), 109-123.
- Herfaut, J., Levrel, H., Thébaud, O., & Véron, G. (2013). The nationwide assessment of marine recreational fishing: A French example. *Ocean & Coastal Management*, 78, 121-131.
- Hyder, K., Weltersbach, M. S., Armstrong, M., Ferter, K., Townhill, B., Ahvonen, A., ... & Strehlow, H. V. (2018). Recreational sea fishing in Europe in a global context—participation rates, fishing effort, expenditure, and implications for monitoring and assessment. *Fish and Fisheries*, 19(2), 225-243.
- Hyder, K., Maravelias, C. D., Kraan, M., Radford, Z., & Prellezo, R. (2020). Marine recreational fisheries—current state and future opportunities. *ICES Journal of Marine Science*, 77(6), 2171-2180.
- Ihde, T. F., Wilberg, M. J., Loewensteiner, D. A., Secor, D. H., & Miller, T. J. (2011). The increasing importance of marine recreational fishing in the US: challenges for management. *Fisheries Research*, 108(2-3), 268-276.
- Jones, C. M., & Pollock, K. H. (2012). Recreational angler survey methods: estimation of effort, harvest, and released catch. *Fisheries techniques*, 3, 883-916.
- Link, M. W., Battaglia, M. P., Frankel, M. R., Osborn, L., & Mokdad, A. H. (2007). Reaching the US cell phone generation: comparison of cell phone survey results with an ongoing landline telephone survey. *Public Opinion Quarterly*, 71(5), 814-839.
- Papadopoulos, A., Touloumis, K., Tziolas, E., Boulamatsis, D., & Koutrakis, E. (2022). Evaluation of marine recreational fisheries and their relation to sustainability of fisheries resources in Greece. *Sustainability*, 14(7), 3824.
- Pita, P., Ainsworth, G. B., Antelo, M., Gouveia, L., Martínez-Escauriza, R., Tubío, A., & Villasante, S. (2022). Economic contribution and social welfare of recreational charter boat fisheries in the northeast Atlantic: The cases of Galicia (Spain) and Madeira archipelago (Portugal). *Frontiers in Marine Science*, 9, 939533.
- Pham, C. K., Canha, A., Diogo, H., Pereira, J. G., Prieto, R., & Morato, T. (2013). Total marine fishery catch for the Azores (1950–2010). *ICES Journal of Marine Science*, 70(3), 564-577.
- Rangel, M. O., & Erzini, K. (2007). An assessment of catches and harvest of recreational shore angling in the north of Portugal. *Fisheries Management and Ecology*, 14(5), 343-352.
- Rocklin, D., Levrel, H., Drogou, M., Herfaut, J., & Veron, G. (2014). Combining telephone surveys and fishing catches self-report: The French sea bass recreational fishery assessment. *PLoS one*, 9(1), e87271.
- Ryan, K. L., Hall, N. G., Lai, E. K., Smallwood, C. B., Taylor, S. M., & Wise, B. S. (2015). *State-wide survey of boat-based recreational fishing in Western Australia 2013/14* (p. 208). Fisheries Research Division.
- Sparrevohn, C. R., & Storr-Paulsen, M. (2012). Using interview-based recall surveys to estimate cod *Gadus morhua* and eel *Anguilla anguilla* harvest in Danish recreational fishing. *ICES Journal of Marine Science*, 69(2), 323-330.
- Strehlow, H. V., Schultz, N., Zimmermann, C., & Hammer, C. (2012). Cod catches taken by the German recreational fishery in the western Baltic Sea, 2005–2010: implications for stock assessment and management. *ICES Journal of Marine Science*, 69(10), 1769-1780.

Teixeira, D., Zischke, M. T., & Webley, J. A. (2016). Investigating bias in recreational fishing surveys: fishers listed in public telephone directories fish similarly to their unlisted counterparts. *Fisheries Research*, 181, 127-136.

Torres, P., i Figueras, D. M., Diogo, H., & Afonso, P. (2022). Risk assessment of coastal fisheries in the Azores (north-eastern Atlantic). *Fisheries Research*, 246, 106156.

van der Hammen, T., de Graaf, M., & Lyle, J. M. (2016). Estimating catches of marine and freshwater recreational fisheries in the Netherlands using an online panel survey. *ICES Journal of Marine Science*, 73(2), 441-450.

Veiga, P., Pita, C., Leite, L., Ribeiro, J., Ditton, R. B., Gonçalves, J. M. S., & Erzini, K. (2013). From a traditionally open access fishery to modern restrictions: Portuguese anglers' perceptions about newly implemented recreational fishing regulations. *Marine policy*, 40, 53-63.

Wynne-Jones, J., Gray, A., Hill, L., & Heinemann, A. (2014). National panel survey of marine recreational fishers 2011–12: harvest estimates. *New Zealand Fisheries Assessment Report*, 67(139), 24.

Zarauz, L., Ruiz, J., Urtizberea, A., Andonegi, E., Mugerza, E., & Artetxe, I. (2015). Comparing different survey methods to estimate European sea bass recreational catches in the Basque Country. *ICES Journal of Marine Science*, 72(4), 1181-1191.

Report Pilot Study 1.3 Ices Xa: Sampling Desing of Azorean Recreational Fishing Data Collection (Ices Xa).

https://www.dgrm.mm.gov.pt/documents/20143/124668/17_Azores_ICES_RecreationalSamp.pdf/7863f6bf-23ee-e6de-0425-d68403671742. [accessed 4 december 2023].

DGRM. 2016. Análise dos resultados do inquérito sobre a pesca lúdica 2015 Lisboa, Portugal. [[accessed 4 december 2023].

https://acessorereservado.dgrm.mm.gov.pt/xportal/xmain?xpid=dgrm&selectedmenu=1469973&xpgid=genericPageV2&conteudoDetalhe_v2=3435302.

7. Figures and Tables

Table 1. Sociodemographic characterization per fishing mode

	N	Male (%)	Average Age (s.d)	Average household (n)	Employed fishers (%)	Post secondary education (%)	Fishers with license (%)	Fishers that know DCF (%)
Shore angling	536	85.8	50.1±(11.2)	3.2	89.4	20.3	20.0	13.1
Boat	32	68.8	47.3±(12.8)	2.8	78.1	25.0	62.5	43.8
Hand	12	91.7	39.3±(9.3)	2.8	91.7	0.0	50.0	33.3
Spear	26	88.5	39.6±(10.4)	3.2	92.3	19.2	69.2	34.6
Total	606	85.1	49.3±(11.5)	3.2	91.6	19.5	24.9	16.0

Table 2. Sociodemographic characterization per avidity group

	n	Males (%)	Average age (s.d)	Post secondary education (%)	Employed (%)	Experient fishers (%)	Fishers with license (%)	Fishers that know DCF
Occasional	132	81.8	47.5±13.5	27.3	82.6	6.1	19.7	19.7
Regular	88	87.5	46.2±9.7	17.0	93.2	2.3	10.2	6.8
Frequent	91	82.4	52.6±6.2	22.0	96.7	5.5	19.8	4.4
Highly frequent	225	88.9	52.1±11.1	16.9	88.9	3.6	24.0	15.1

Table 3. Estimation of marine recreational fishers (MRF) and participation rate per fishing mode

Islands	Shore angling	Boat angling	Hand collecting	Spearfishing	Total
Flores	479	53	18	35	586
Santa Maria	348	209	70	0	627
São Jorge	612	98	49	98	857
São Miguel	9009	1257	239	419	10925
Corvo	24	9	0	0	33
Faial	1336	267	160	0	1763
Pico	1344	312	97	136	1890
Graciosa	156	93	0	62	312
Terceira	3751	371	124	206	4452
Total	17059	2670	757	957	21443

Table 4. Total catch estimation using several scenarios from standard correction factors applied (Scenario

Scenarios	Correction	Reference	% Effort correction	% "CPUE" correction	Total Azorean Catch (Ton)	s.e
Scenario 1	None	This study	-----	-----	1952.3	77.5
Scenario 2	"CPUE" & Effort - on-site survey	Diogo and Pereira, 2014	19.6%	68.7%	263.0	10.4
Scenario 3	Effort - on-site survey	Diogo and Pereira, 2014	19.6%	-----	382.6	15.2
Scenario 4	"CPUE" - on-site survey	Diogo and Pereira, 2014	-----	68.7%	1341.8	53.3
Scenario 5	Effort – at national level	Hyder et al., 2017	57.8%	-----	1286.7	86.4

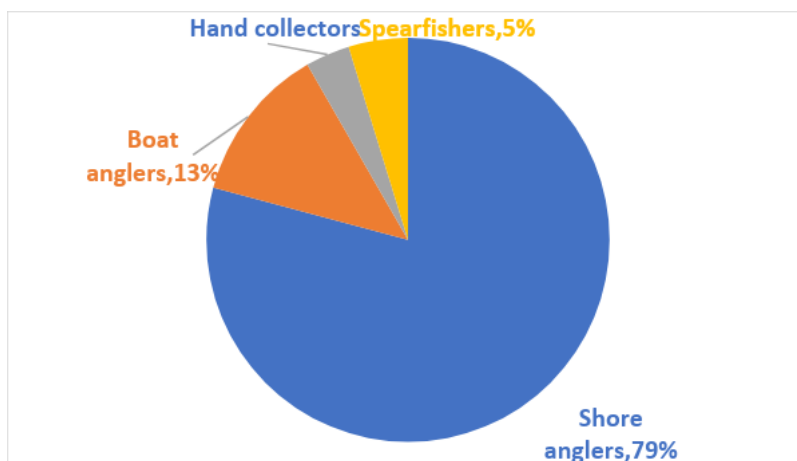


Figure 1. MRF number estimates per fishing mode

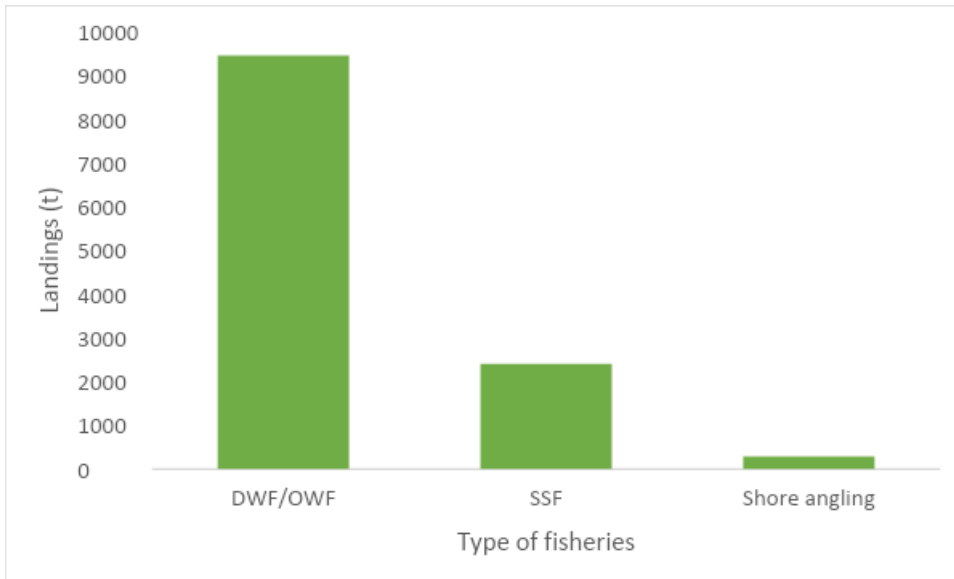


Figure 2. Landings from Azorean deep-water and open water fisheries (DWF/OWF), small scale fisheries (SSF) and estimates from shore angling.

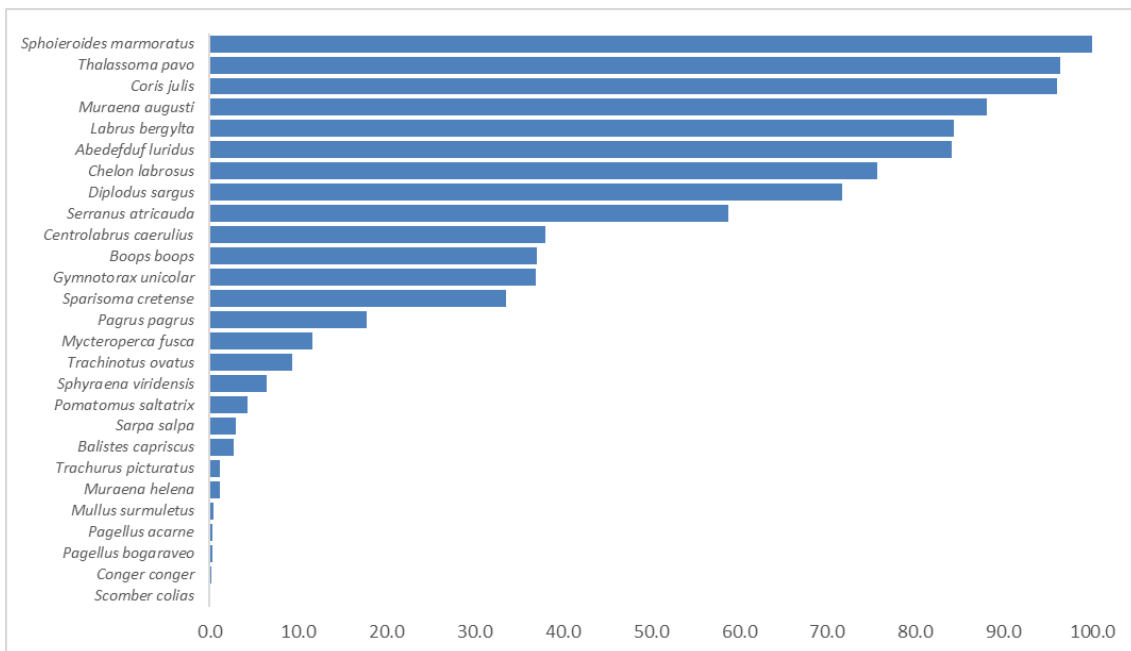


Figure 4. Catch share (%) between Azorean commercial landings in 2021 and estimated catch per species of shore angling using the catch composition from the last fishing trip

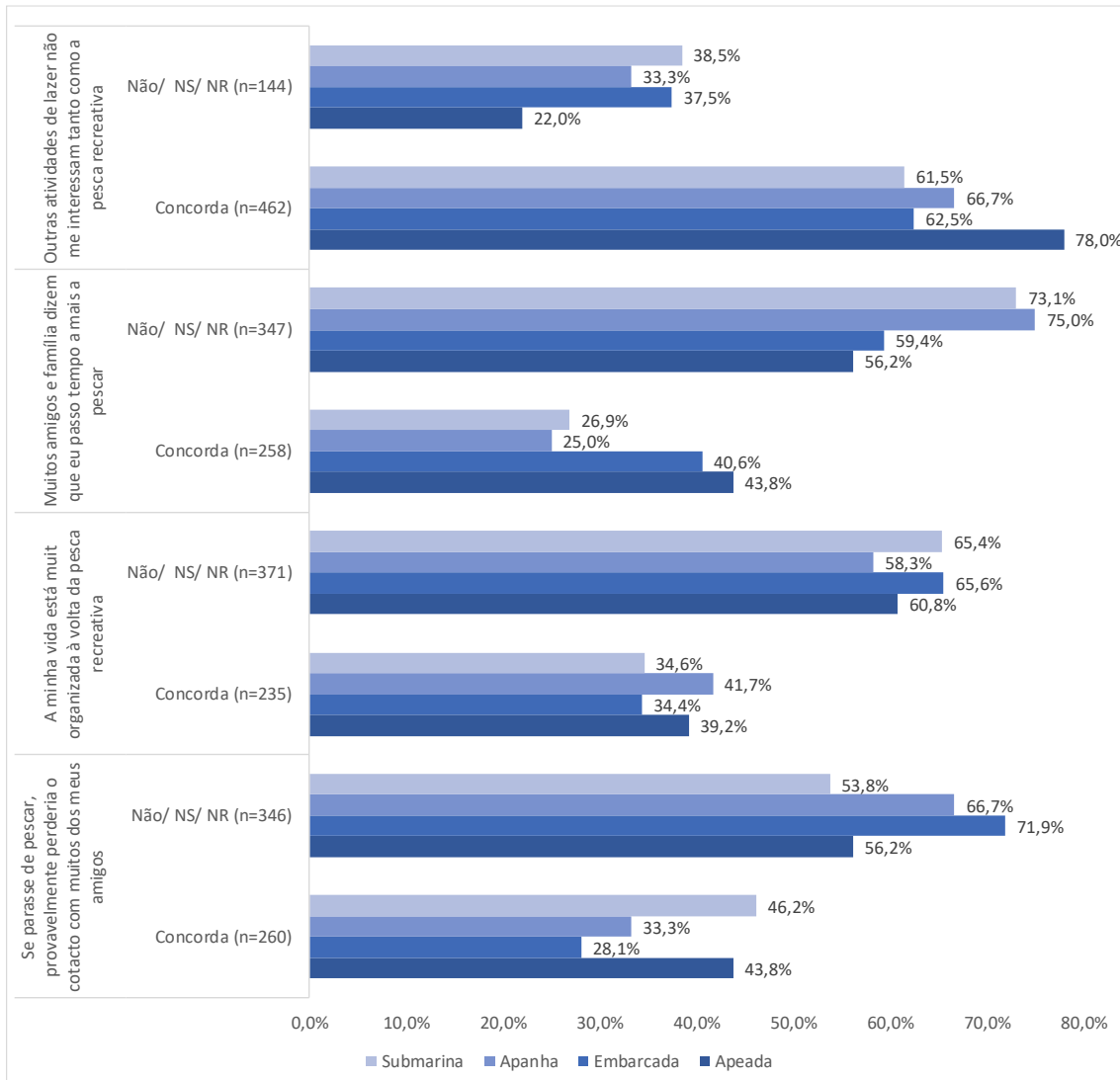


Figure 5. Four statements with closed responses (agree, do not agree or don't know or not answer; DK/NW) to evaluate the centrality of fishing to the fisher's lifestyle, in all fishing modes.

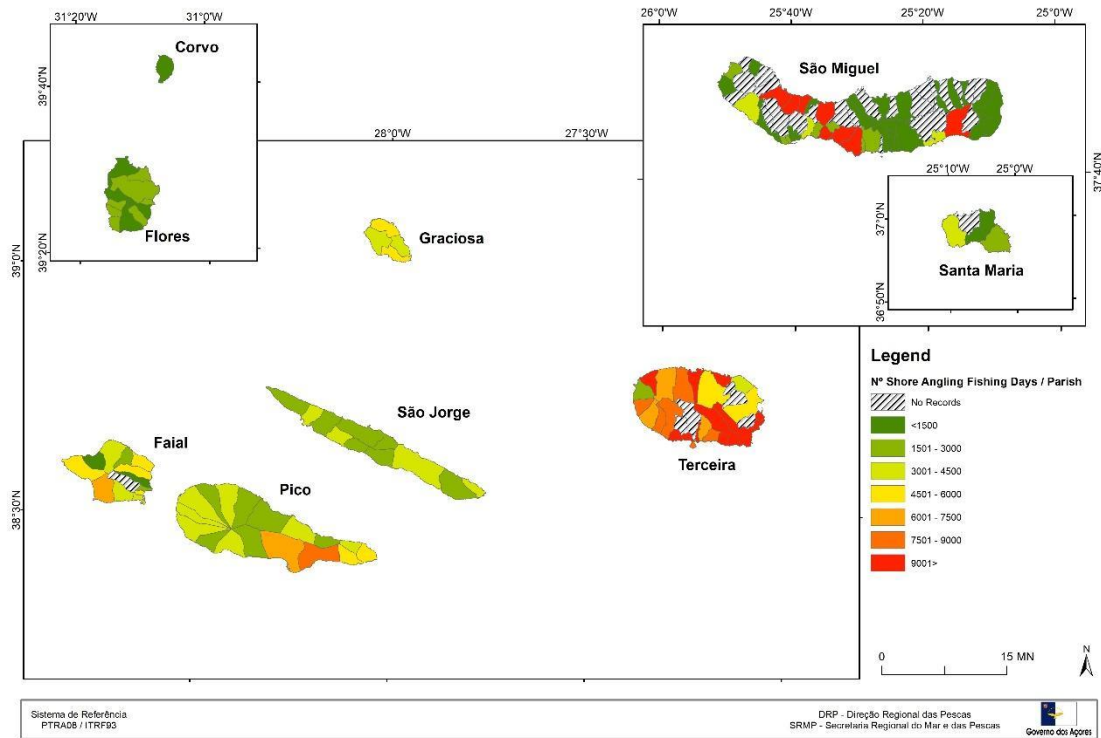


Figure 6. Map of fishing effort spatial distribution of shore angling using the three most important parish per fisher.

8. Annex

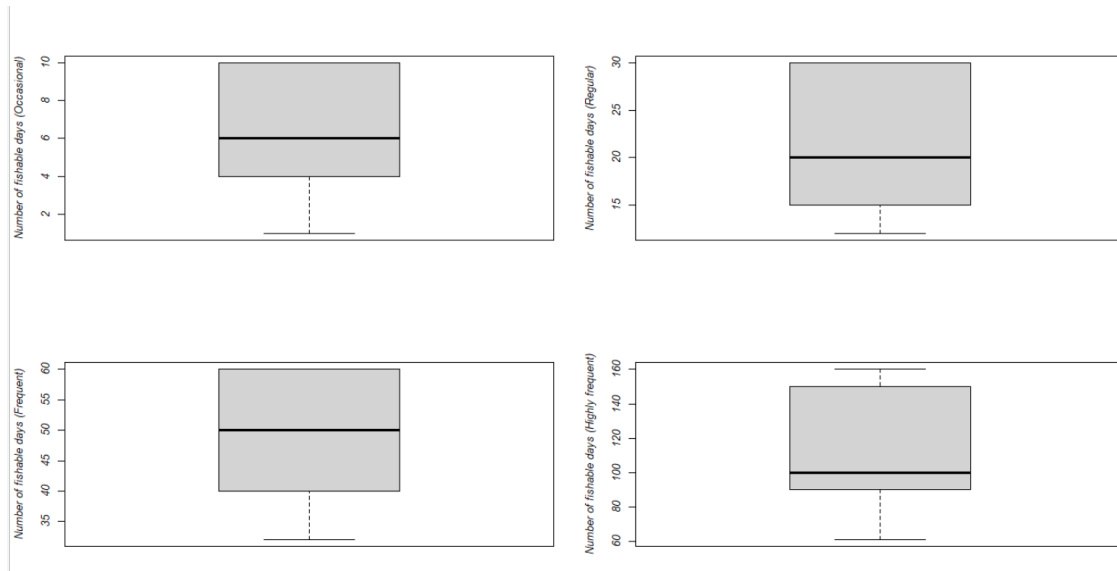


Figure A1. Avidity class analysis to reach high homogeneity groups.

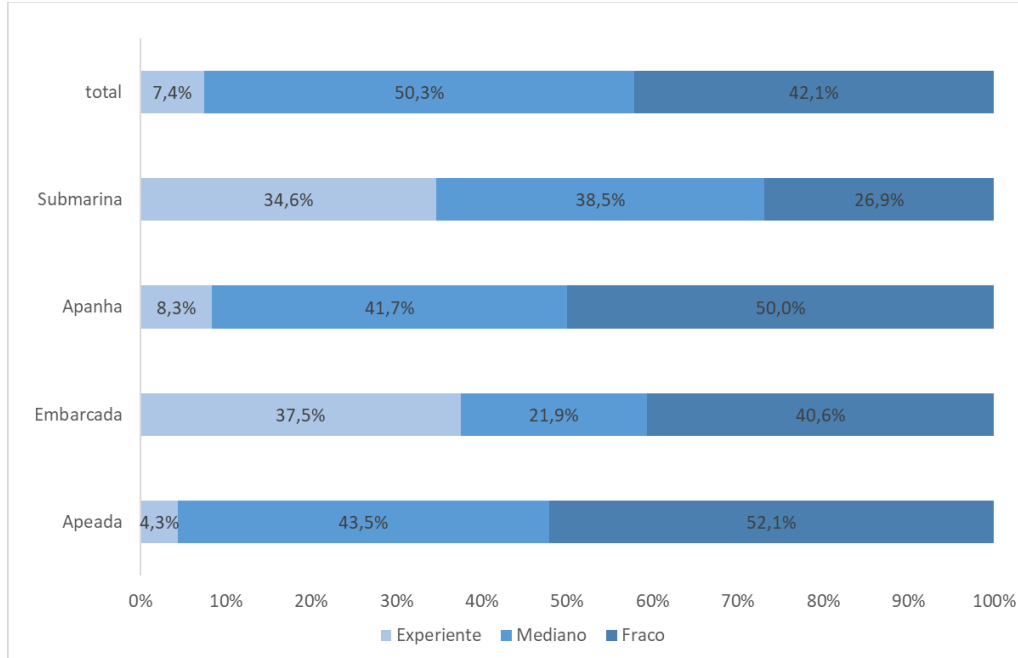


Figure A1. Experience of the fishers, in general and by main fishing mode.

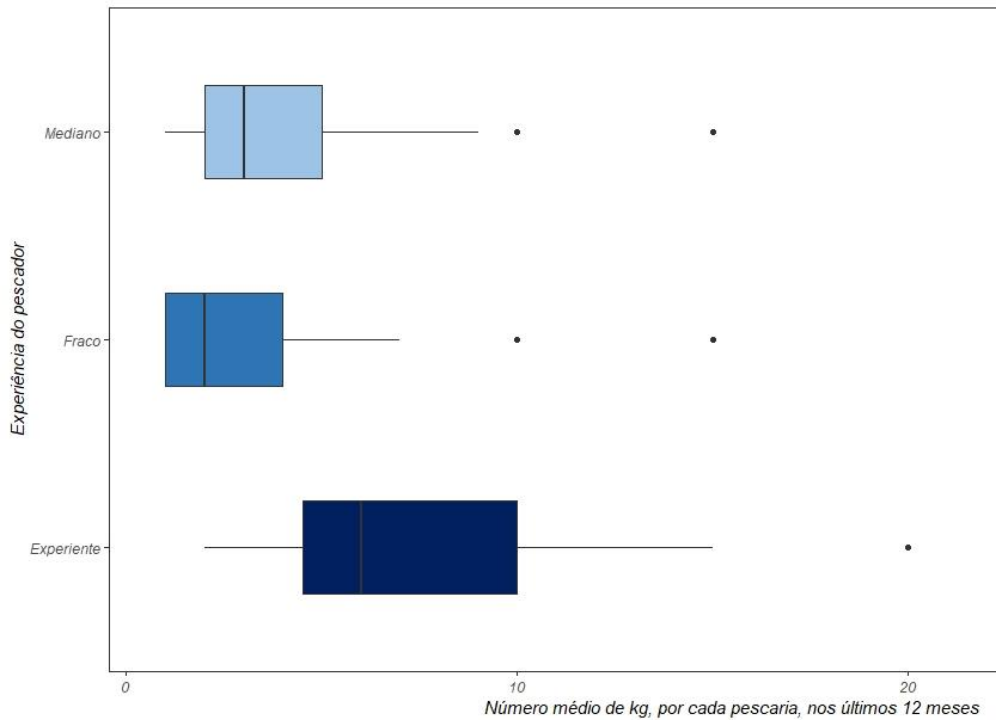


Figure A2. Average number of weight catch per fishing trip in the last 12 months by level of experience e of the shore angler.

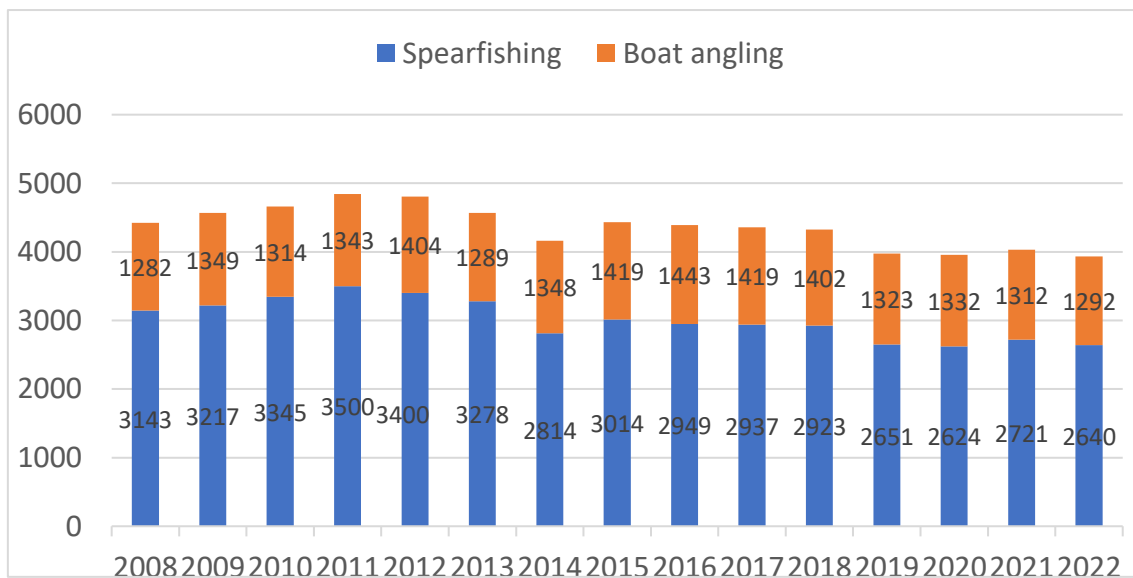


Figure A3. Number of issue licenses between 2008-2022 per island for spearfishers and boat angling. *Licenses for boat angling are issue per boat

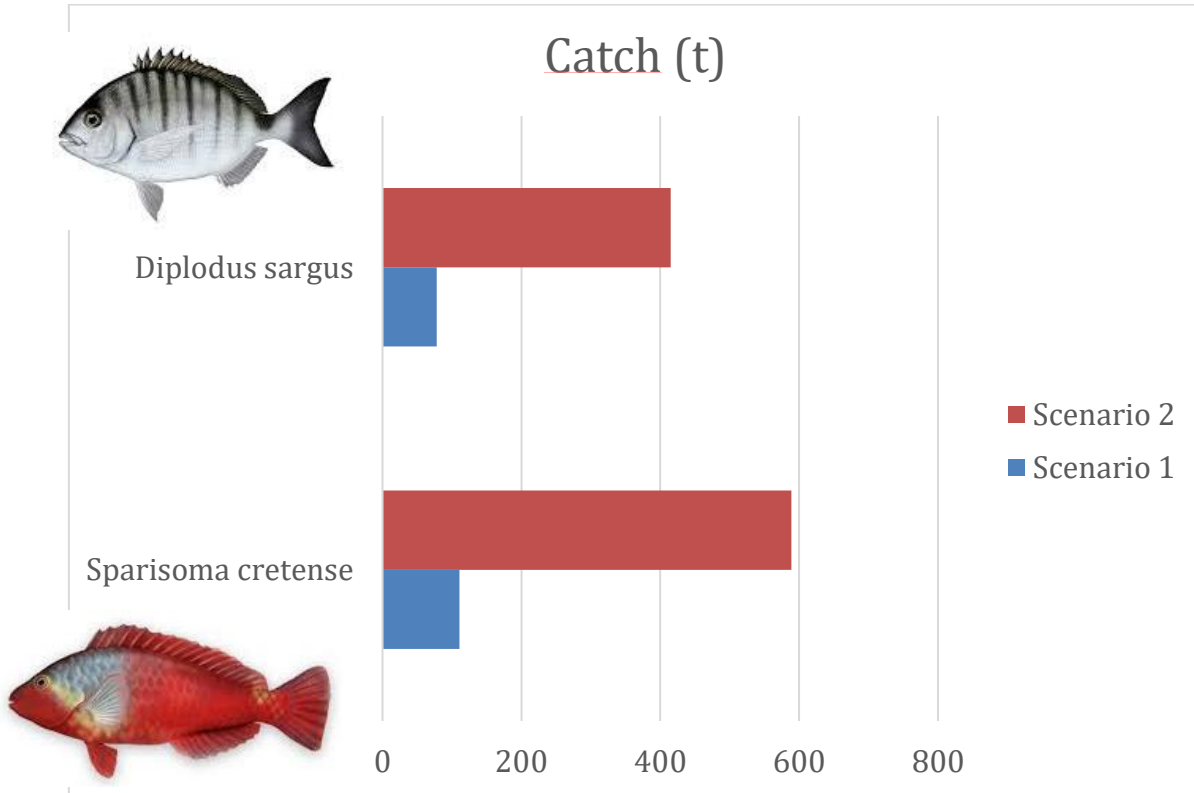


Figure A4. Comparison of the estimated catch for the main captured species (ton) between scenario 1 and 2.

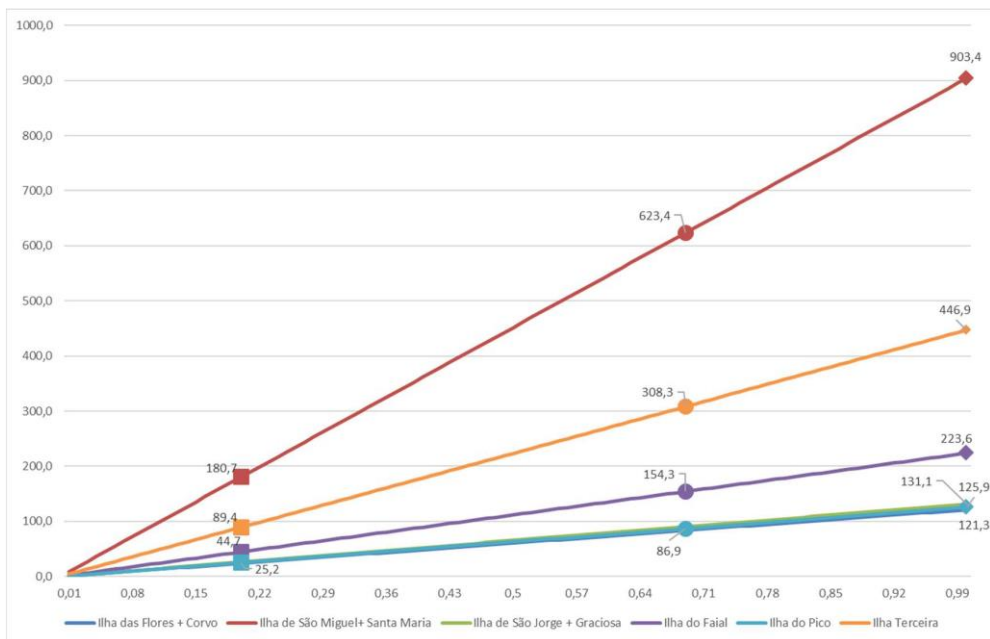


Figure A5. Sensitive analysis per islands showing the effect of correction factors applied.

Table A1. Recall fishery data (1, 3 and 12 months) and number of hours and kg of the last trip per fishing mode.

	nº days last 30 days		nº days last 3 months		nº days last 12 months		N.º hours		N.º kg per trip	
	mean	s.d	mean	s.d	mean	s.d	mean	s.d	mean	s.d
Shore	7.38	6.30	22.90	19.13	66.33	55.68	4.94	1.25	4.51	9.41
Boat	1.61	2.47	5.65	7.20	24.13	29.61	5.50	2.54	10.78	9.28
Hand	2.67	1.87	8.00	10.27	19.17	23.30	3.33	0.78	4.25	6.57
Spear	2.50	2.53	7.04	6.04	20.81	18.16	2.96	0.96	6.81	3.51
Total	6.78	6.21	21.05	18.91	61.21	54.87	4.86	1.41	4.94	9.28

Table A2. Fishery characterization of the last trip per fishing mode.

	Fishers that fish alone (%)	Fishers that discarded fish (%)	Weight (average \pm s.d)	Nº hours last Fishing trip (average \pm s.d)
Shore	82.2%	4.3%	2,95 \pm 2,29	4,86 \pm 1,31
Boat	46.7%	13.3%	13,67 \pm 28,03	5,47 \pm 2,07
Hand	100.0%	0.0%	5,75 \pm 9,43	4,00 \pm 01,67
Spear	66.7%	11.1%	11,84 \pm 22,38	2,67 \pm 0,84
Total	80.8%	95.2%	3,61 \pm 7,22	4,78 \pm 1,39

Table A3. Number of shore anglers per avidity class per island

Avidity class	Flores	Santa Maria	São Jorge	São Miguel	Corvo	Faial	Pico	Graciosa	Terceira
1-10	124	139	253	1434	14	290	168	0	584
11-30	18	70	213	1340	5	290	273	0	625
31-60	71	70	160	2369	0	348	399	0	792
>61	266	70	186	3866	5	406	504	156	1751

8.1 Annex – technical report (in Portuguese)



INTERCAMPUS



Pesca Lúdica nos Açores

**Secretaria Regional do Mar, Ciências e Tecnologia
Governo dos Açores**

DOCUMENTO METODOLÓGICO

Enquadramento e Objetivos

3

O presente estudo é realizado para a Secretaria Regional do Mar, Ciências e Tecnologia, do Governo dos Açores, e tem como principal objetivo a recolha de informação sobre a pesca recreativa de mar nos Açores.

Esta ação está enquadrada no projeto INTERREG MAC PLASMAR + que tem como objetivos gerais contribuir para o processo de Ordenamento do Espaço Marítimo nos arquipélagos da Macaronésia.

Os principais objetivos do estudo são:

- i) estimar o número de pescadores lúdicos apeados, por ilha;
- ii) caracterização sociodemográfica dos pescadores lúdicos (apeados, embarcados, de apanha e submarina), por ilha;
- iii) estimar o número de pescadores lúdicos (submarinos, embarcados e de apanha) que pescaram nos últimos 12 meses sem licença de pesca, por ilha;
- iv) estimar o número de falsas recusas ao inquérito de licenciamento por parte dos emissores de licenças de pesca submarina, de apanha e embarcada, por ilha.

Metodologia

4

Universo

População com 18 e mais anos, residente na Região Autónoma dos Açores.

Amostra

A amostra teórica é de **n=1240 entrevistas**, com uma distribuição não proporcional por ilha, de forma a poder haver uma amostra robusta para cada ilha per si.

Para a dimensão proposta, a margem de erro máximo será de $\pm 2,8$ p.p. para um intervalo de confiança de 95%.

Apresentamos no diapositivo seguinte a amostra teórica e a distribuição proposta.

Metodologia

Amostra

5

	Ilha de Sta Maria	São Miguel	Terceira	Graciosa	São Jorge	Pico	Faial	Flores	Corvo	
População Residente Censos 2011	4330	104501	45149	3591	7521	11712	12060	3136	357	
Amostra não proporcional com posterior ponderação dos dados para o Universo, de modo a que cada ilha tenha o seu peso real do universo	30	650	270	30	50	75	75	30	30	1240

No total da amostra, deve ser garantida a caracterização de **n=600 pescadores lúdicos**, para um erro amostral de 4%, com um intervalo de confiança de 95%.

Metodologia

Questionário

6

O questionário será elaborado pela INTERCAMPUS e previamente aprovado pelo cliente tendo em conta os seguintes itens:

i) Em cada habitação registar:

- número total de residentes, idade, sexo, nacionalidade e os que pescaram ludicamente nos últimos 12 meses e em que modalidade(s).

ii) Para cada pescador lúdico nessa habitação registar:

- Idade, Sexo, Nacionalidade, Localidade de residência atual, nível de Escolaridade, Situação Profissional.
- Na sua habitação existe algum proprietário de embarcação de recreio?
- Tem uma licença de pesca (submarina, embarcada) em vigor e tipo de licença (mensal, anual ou trianual)? No caso de pescadores submarinos ou embarcados, questionar: Aquando do licenciamento perguntaram se estava disponível para responder a um inquérito? E respondeu ao inquérito?
- Modalidade que mais praticou nos últimos 12 meses. Que outra(s) modalidade(s) de pesca lúdica tem praticado nos últimos 12 meses?

Metodologia

Questionário

7

- Quantos dias de pesca praticou nos últimos 30 dias?
- Quantos dias de pesca praticou nos últimos 3 meses?
- Quantos dias de pesca praticou nos últimos 12 meses?
- Número médio de horas de pesca nos últimos 12 meses?
- Estimativa média de captura em peso (kg) por saída nos últimos 12 meses?
- Se pescou nos últimos 30 dias indique o que capturou na última pescaria (espécie, peso (kg), rejeição (número total), tempo efetivo de pesca e a captura). Questionar a quantos pescadores é respeitante a captura atrás indicada.
- Considera-se um pescador: experiente, mediano ou fraco (inexperiente)?
- As 5 espécies mais capturadas nos últimos 12 meses por ordem decrescente (indicando a percentagem da captura),
- Localidade ou localização aproximada onde mais pescou nos últimos 12 meses?

Metodologia

Questionário

8

- Responda se concorda ou não com as seguintes frases:
 - i) Se parasse de pescar, provavelmente perderia o contacto com muitos dos meus amigos.
 - ii) A minha vida está muito organizada à volta da pesca lúdica.
 - iii) Muitos amigos e família dizem que eu passo tempo a mais a pescar.
 - iv) Outras atividades de lazer não me interessam tanto como a pesca lúdica.

- Aferir a notoriedade e participação no Programa Nacional de Recolha de Dados da Pesca (PNRD)

Metodologia

Recolha de dados

9

A recolha de dados será realizada através de entrevista telefónica no sistema CATI (Computer Assisted Telephone Interviewing) através de números de telefone fixo.

Os números de telefone serão gerados de forma aleatória e no lar o interlocutor será selecionado com base em perguntas de elegibilidade no questionário (idade, 18 e mais anos). Após o levantamento dos residentes no lar e, caso exista algum pescador lúdico, será este o respondente ao inquérito.

- Caso o mesmo seja menor de idade será solicitada a autorização parental para continuação da entrevista.
- Poderá haver casos em que os pais possam responder caracterizando a atividade de filhos menores (p.ex. menos de 15 anos)

No caso de habitações em que não residem pescadores lúdicos ativos para o inquérito ser considerado válido, apenas é necessário o registo de todas as respostas às questões levantadas respeitante aos residentes na habitação. No caso de habitações em que residem pescadores lúdicos, considera-se um inquérito completo se em determinada habitação inquirida todos os pescadores lúdicos ativos forem caracterizados. Para tal poderá ser necessário recorrer ao agendamento de entrevistas. Prevemos até 3 contactos com o lar para a recolha de caracterização de todos os pescadores lúdicos nos últimos 12 meses.

Metodologia

Recolha de dados

10

O trabalho de campo será realizado por uma equipa de entrevistadores com experiência em projetos similares e experiência em recolha de dados através de entrevistas telefónicas no sistema CATI.

A **INTERCAMPUS** conta com uma equipa de profissionais experimentados que conhecem e respeitam as normas de qualidade da empresa.

- Todos os entrevistadores terão experiência prévia. A incorporação de novos entrevistadores não será superior, em nenhum caso, em mais de 25% do total de entrevistadores;
- As amostras de cada grupo serão distribuídas entre os entrevistadores, de forma a evitar o domínio de qualquer deles em qualquer coletivo, com a finalidade de evitar o vício / desvio potencial do entrevistador.
- Todos os entrevistadores participarão nas reuniões de formação para o estudo (briefings), comprovando-se a completa compreensão das instruções.

As entrevistas serão realizadas, em regra, nos dias de semana, entre as 17h00 e as 21h00 e aos fins de semana, durante o dia.

Controlos de Qualidade

11

Na **INTERCAMPUS**, temos estabelecido uma série de programas de controlo para certificar a qualidade dos estudos que realizamos. Para obter o máximo de qualidade, seguimos determinados procedimentos de controlo que aplicamos a todas as fases de desenvolvimento dos estudos que realizamos, nomeadamente:

- Elaboração e programação do questionário
- Seleção da amostra
- Seleção e preparação dos entrevistadores
- Recolha de dados
- Supervisão
- Tratamento e processamento dos dados
- Entrega de resultados

Para que a Qualidade seja garantida, a **INTERCAMPUS** subscreve as normas existentes do sector, como por exemplo: o CODEMO (Código Português para Estudos de Mercado e Opinião, o código de qualidade do sector da APODEMO), as normas ICC/ESOMAR, bem como as normas EMRQS da EFAMRO.

Garantimos a proteção de dados pessoais de acordo com as normas instituídas pelo Regulamento Geral de Proteção de Dados.

Controlos de Qualidade

12

Será realizado um controlo de qualidade, respeitando-se as seguintes etapas:

1. Em relação ao desenho do questionário, será verificado o correto ajustamento entre os objetivos do projeto e o questionário, bem como identificadas as perguntas que respondem a cada um dos objetivos. Será igualmente feita uma revisão da consistência entre as perguntas e as categorias de resposta, da sequência lógica das respostas e dos filtros.
2. Sendo a recolha da informação realizada através do sistema CATI (Computer Assisted Telephone Interviewing), o ficheiro de dados é automaticamente validado a dois níveis: validação dos códigos de resposta, pergunta a pergunta e uma validação da articulação entre as perguntas (saltos e filtros), respeitando-se a estrutura do questionário utilizado.
3. Durante o decorrer da recolha, o trabalho dos entrevistadores será sempre acompanhado por um Técnico de Campo da INTERCAMPUS, que garantirá o respeito das indicações apresentadas em relação ao método de seleção dos entrevistados. Este controlará também quais as condições de realização da entrevista e tempo de duração da mesma, sendo realizada **in loco** uma supervisão direta do trabalho dos entrevistadores.

Controlos de Qualidade

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4. No caso das perguntas abertas, será feita uma transcrição de 100% das respostas (automaticamente, através do software de CATI), de forma a fazerem-se os planos de codificação respetivos (para cada pergunta deste tipo).
5. Após a codificação das perguntas abertas e validação total do ficheiro informático, este ficará apto a ser tabulado e tratado com base em software concebido para o efeito.
6. O ficheiro final a entregar ao Cliente será revisto pelo técnico responsável pelo estudo e pelo respetivo diretor de departamento.

Análise e Apresentação de Resultados

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Será produzido um relatório final com a caracterização metodológica e resultados obtidos incluindo a identificação por ilha do número de habitações inquiridas, número de residentes cobertos pelo estudo, número de inquéritos completos, incompletos (realizados por modalidade de pesca) e taxas de recusa.

Será também entregue o ficheiro final de resultados, devidamente anonimizado, em Excel ou SPSS.

Serão identificadas todas as dificuldades/limitações encontradas bem como as medidas tomadas para salvaguardar a informação, de natureza confidencial.

Será entregue um relatório intercalar, ao fim do primeiro mês de realização dos inquéritos telefónicos, em que se resume quantitativamente o número amostrado de habitações, habitantes, inquéritos completos, incompletos e taxas de recusa associados.

Bom dia / boa tarde. O meu nome é e trabalho para a INTERCAMPUS, uma empresa de estudos de mercado. Posso contar com a sua disponibilidade para responder a um questionário de cerca de 15 minutos?

SIM Agradecer e CONTINUAR
NÃO Agradecer e TERMINAR

F1 - Anotar a ilha de residência

Ilha de Santa Maria	1
Ilha de São Miguel	2
Ilha Terceira	3
Ilha Graciosa	4
Ilha de São Jorge	5
Ilha do Pico	6
Ilha do Faial	7
Ilha das Flores	8
Ilha do Corvo	9

F2 - Pode dizer-me quantas pessoas vivem no seu agregado familiar, incluindo a sua pessoa?
REGISTAR |__|__|

F3 - Pode dizer-me se no seu agregado familiar existe alguém que se dedique à pesca recreativa, ou seja, como passatempo e não como profissão? **(SE SIM, PERGUNTAR)** Quantas pessoas que vivem no seu agregado familiar se dedicaram a esse tipo de pesca nos últimos 12 meses? **REGISTAR** |__|__|

F4 - No seu agregado familiar existe algum barco de recreio ou alguém proprietário de um barco de recreio?

SIM	1
NÃO	2
NS/NR	9

ENTREVISTADOR: PREENCHER, PEDINDO À PESSOA PARA COMEÇAR PELO INDIVÍDUO MAIS VELHO:

(Masculino 1; Feminino 2) (Português 1; Outra nacionalidade 2) (Sim 1; Não 2)

	Idade	Sexo	Nacionalidade	Pescador
PESSOA 1	_	_	_	_
PESSOA 2	_	_	_	_
PESSOA 3	_	_	_	_
PESSOA 4	_	_	_	_
PESSOA 5	_	_	_	_
PESSOA 6	_	_	_	_
PESSOA 7	_	_	_	_
PESSOA 8	_	_	_	_
PESSOA 9	_	_	_	_
PESSOA 10	_	_	_	_
PESSOA 11	_	_	_	_
PESSOA 12	_	_	_	_

ENTREVISTADOR: CONFIRME QUE O NÚMERO DE PESCADORES É IGUAL AO ANOTADO EM F3 E MARQUE ENTREVISTA COM OS DIVERSOS MEMBROS DO AGREGADO PRATICANTES DE PESCA LÚDICA.

PRATICANTE PESSOA |__| |__|

P.1. Em primeiro lugar, gostaria de lhe perguntar qual o nível de instrução mais elevado que o(a) Sr(a). concluiu?

LICENCIATURA / ENSINO SUPERIOR	1
ENSINO SECUNDÁRIO (12º ANO)	2
3º CICLO DO ENSINO BÁSICO (9º ANO)	3
2º CICLO DO ENSINO BÁSICO (6º ANO)	4
1º CICLO DO ENSINO BÁSICO (INSTRUÇÃO PRIMÁRIA COMPLETA / 4ª CLASSE)	5
INSTRUÇÃO PRIMÁRIA INCOMPLETA	6
NÃO SABE LER / ESCREVER	7

P.2. Qual é exactamente a sua ocupação ou atividade profissional principal?

Indicar ocupação/profissão o mais detalhado possível. Exemplos:

- **Funcionário público ou bancário, indicar a função que exerce**
- **Se for professor indicar se professor primário, se professor do liceu, se professor de faculdade**
- **Se for militar indicar a patente, etc. ...**
- **SE NÃO ESTIVER A TRABALHAR, ANOTAR EM BAIXO**

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ESTUDANTE	91
REFORMADO(A)	92
DESEMPREGADO(A)	93
SEM ATIVIDADE	94

P.3. Qual a modalidade de pesca lúdica que praticou nos últimos 12 meses? (**LER; PODE ANOTAR MAIS DO QUE UMA RESPOSTA**)

Pesca à linha a partir de terra	1
Pesca à linha embarcada	2
Pesca de apanha (de lapas, polvos, algas ou crustáceos, por exemplo)	3
Pesca submarina	4

ENTREVISTADOR: SE MAIS DE UMA RESPOSTA CONTINUAR, SE NÃO, PASSAR A P.5.

P.4. Qual a modalidade de pesca lúdica que praticou mais? (UMA SÓ RESPOSTA)

Pesca à linha a partir de terra	1
Pesca à linha embarcada	2
Pesca de apanha (de lapas, polvos, algas ou crustáceos, por exemplo)	3
Pesca submarina	4

P.5. Tem alguma licença de pesca em vigor? (ESPONTÂNEO / NÃO LER)

SIM	1	→ PASSAR PARA P.6
NÃO	2	→ PASSAR PARA P.10
NS/NR	9	→ PASSAR PARA P.10

P.6. Qual o tipo de licença que tem? (LER; PODE ANOTAR MAIS DO QUE UMA RESPOSTA)

Submarina	1
Embarcada	2
NS/NR	9

P.7. E que prazo tem? (LER; UMA SÓ RESPOSTA)

Licença diária	1
Mensal	2
Anual	3
Triannual	4
NS/NR	9

P.8. Aquando do licenciamento, pediram-lhe para responder a um inquérito?

SIM	1	→ PASSAR PARA P.9
NÃO	2	→ PASSAR PARA P.10
NS/NR	9	→ PASSAR PARA P.10

P.9. E respondeu a esse inquérito?

SIM	1
NÃO	2
NS/NR	9

P.10. Vamos agora abordar algumas das características de sua atividade de pesca. Para tal, pedimos-lhe que se refira sempre à sua modalidade de pesca lúdica principal. Assim, importa-se de me dizer quantos dias dessa modalidade de pesca praticou nos últimos 30 dias? REGISTAR |__|__|

P.11. Quantos dias dessa pesca praticou nos últimos 3 meses? REGISTAR |__|__|

P.12. E quantos dias dessa pesca praticou nos últimos 12 meses? **REGISTAR** |_|_|_|

P.13. Quando vai praticar essa modalidade de pesca, qual é o número médio de horas que demora a sua pescaria? **REGISTAR** |_|_|

P.14. E qual é a média de kilos de peixe que tem apanhado, por cada pescaria, nos últimos 12 meses? **REGISTAR** |_|_|_|

P.15. Pescou nessa modalidade nos últimos 30 dias?

SIM	1	→ PASSAR PARA P.16
NÃO	2	→ PASSAR PARA P.21
NS/NR	9	→ PASSAR PARA P.21

P.16. Quantos kilos de peixe apanhou na última pescaria que fez nos últimos 30 dias? **REGISTAR** |_|_|_|

P.17. O que é que foi capturado nessa pescaria? (**LER; VÁRIAS RESPOSTAS POSSÍVEIS**)

Espécie	Kilos
	_ _
	_ _
NS/NR	99

P.18. Excetuando o caso da pesca submarina, devolveu algum peixe ao mar nessa pescaria? (**SE SIM**) Quantos peixes? **LER; VÁRIAS RESPOSTAS POSSÍVEIS**)

Espécie	Número
	_ _
	_ _
NÃO	98
NS/NR	99

P.19. Esses kilos de peixe foram apanhados por quantas pessoas? **REGISTAR** |_|_|_|

P.20. Quantas horas demorou essa pescaria? **REGISTAR** |_|_|_|

P.21. Pensando agora no total das pescarias dos últimos 12 meses, faça uma estimativa de quais foram as 5 espécies que mais capturou e qual foi a percentagem da captura de cada uma dessas espécies em relação ao total, indo por ordem decrescente, ou seja começando pela mais importante.

Espécie	%
	_ _
	_ _
	_ _
	_ _
	_ _
NS/NR	999

P.22. Considera-se um pescador experiente, mediano ou fraco?

Experiente	1
Mediano	2
Fraco	3
NS/NR	9

P.23. Quais foram as 3 principais freguesias (por ordem decrescente de importância) onde mais pescou nos últimos 12 meses?

1. _____ |_||_|
2. _____ |_||_|
3. _____ |_||_|

P.24. Diga-me, por favor, se concorda ou não, com cada uma das seguintes frases (**LER E ANOTAR UMA RESPOSTA PARA CADA FRASE**)

	CONCORDA	NÃO CONCORDA	NS/NR
SE PARASSE DE PESCAR, PROVAVELMENTE PERDERIA O CONTACTO COM MUITOS DOS MEUS AMIGOS	1	2	9
A MINHA VIDA ESTÁ MUITO ORGANIZADA À VOLTA DA PESCA RECREATIVA	1	2	9
MUITOS AMIGOS E FAMÍLIA DIZEM QUE EU PASSO TEMPO DE MAIS A PESCAR	1	2	9
OUTRAS ATIVIDADES DE LAZER NÃO ME INTERESSAM TANTO COMO A PESCA RECREATIVA	1	2	9

P.25. Conhece o diário de pesca lúdica on-line (ou APP) do Programa Nacional de Recolha de Dados?

SIM	1	→ PASSAR PARA P.26
NÃO	2	→ TERMINAR
NS/NR	9	→ TERMINAR

P.26. Já está inscrito no diário de pesca lúdica on-line (ou APP) do Programa Nacional de Recolha de Dados?

SIM	1
NÃO	2
NS/NR	9

TERMINAMOS O QUESTIONÁRIO, AGRADEÇO A SUA COLABORAÇÃO