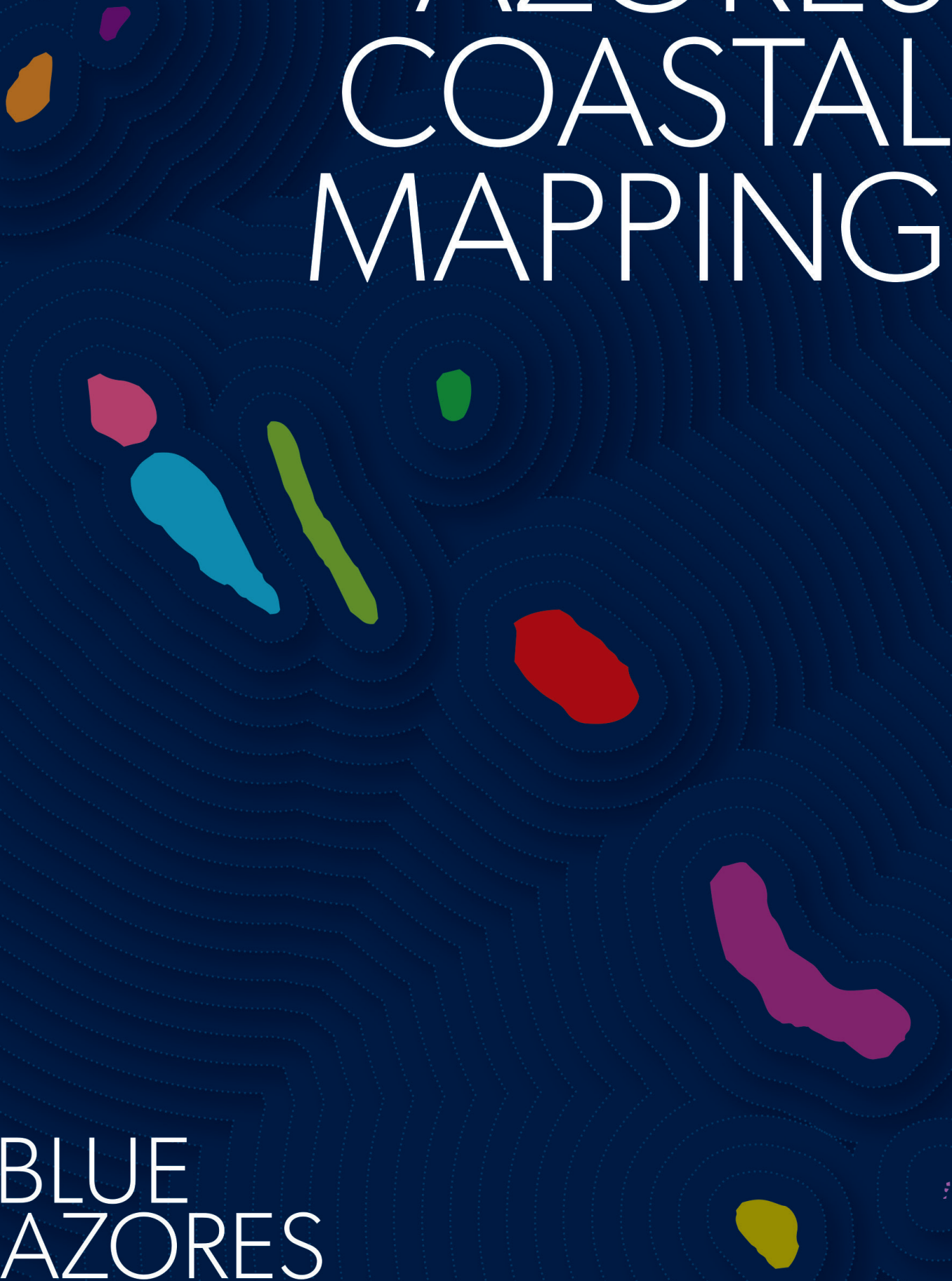
AZORES COASTAL MAPPING

COMPREHENSIVE REPORT 2023



BLUE AZORES

GOVERNO DOS AÇORES
OCEANO AZUL foundation
VAITT INSTITUTE

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1 Acknowledgements

BLUE AZORES

Focused on the conservation and sustainable use of the Azorean Sea, the Blue Azores Program (https://www.blueazores.org/) will contribute to protecting, promoting and valuing the rich marine resources of the archipelago. Blue Azores is the result of an international partnership between the Regional Government of the Azores, the Oceano Azul Foundation and the Waitt Institute, uniting in a single vision of a healthy Azorean Sea and a thriving maritime society. Blue Azores aims to create new avenues for the sustainable economic development of the archipelago, in direct cooperation with the program's stakeholders.

PROGRAM PARTNERS

Regional Government of the Azores

The XIII Government of the Azores (https://portal.azores.gov.pt/en/home), which took office on November 24, 2020 under the leadership of José Manuel Bolieiro, has at its core a commitment to defending Azorean marine and coastal ecosystems. A fundamental part of the value of the sea is its biodiversity and natural wealth. The challenges of the 21st century call for the international community to focus its concerns on the planet's environmental sustainability. The ocean is the space where this decisive battle for the planet's salvation will take place. The Azores will, therefore, be at the center of this battle.

Azores Regional Directorate for Fisheries (DRP)

The sea defines the uniqueness of the Autonomous Region of the Azores, not only for the extent and diversity of its ecosystems but also for its potential for discovery. The Regional Directorate for Fisheries (https://portal.azores.gov.pt/en/web/drp) has the mission of promoting the sustainable development of the fisheries sector and valuing the sea, a crucial resource in our collective identity as an outermost region.

Azores Regional Directorate for Maritime Policies (DRPM)

The central mission of the Regional Directorate for Maritime Affairs (https://portal.azores.gov.pt/web/drpm) is to enhance the value of the seas in the Azores by increasing their usefulness and ensuring their environmental quality. Activities related to the protection of the marine environment, including the implementation or strengthening of marine protected areas, and their biodiversity, deserve particular attention.

Oceano Azul Foundation

The Oceano Azul Foundation (https://www.oceanoazulfoundation.org/) was established in 2017, with the motivation to contribute to a healthier and more productive ocean. Under the motto "From the ocean's point of view", the Foundation works around three concepts: blue generation, blue natural capital and blue network. Using a science-based approach, the model of change of the Oceano Azul Foundation integrates these three concepts supporting projects on literacy, conservation, sustainable fisheries, campaigns, blue economy and capacity building namely working with governments, foundations and civil society organizations, within the UN and the EU systems, to advance the international ocean agenda.

Waitt Institute

The Waitt Institute (https://www.waittinstitute.org/) is a non-profit that partners with committed governments and local communities to create and implement sustainable ocean plans to benefit people, the economy, and the environment. The Waitt Institute brings a team of technical experts to help facilitate the policymaking process and capacity building for effective implementation and long-term success through expertise, funding, and tools focusing on marine spatial planning, blue economy, and sustainable fisheries. The Waitt Institute is the founding member and organizing body of the Blue Prosperity Coalition, which currently has Blue Prosperity partnerships with the Azores, Barbuda, Bermuda, Curaçao, the Federated States of Micronesia, Fiji the Maldives, Samoa, and Tonga. The Waitt Institute's sister organization, the Waitt Foundation, specializes in public-private partnership and supports high impact global ocean initiatives with the ultimate goal of sustainable, resilient and thriving seas that benefit all. These organizations were founded and are chaired by Ted Waitt, co-founder of Gateway, Inc.

1 Acknowledgements

SeaSketch

SeaSketch (www.seasketch.org) is a web-based tool developed by the McClintock Lab at the University of California Santa Barbara, National Center for Ecological Analysis and Synthesis. The SeaSketch survey tool is used to gather information from stakeholders on the distribution of valued ocean spaces from various sectoral perspectives. Users visualize a map interface, zoom to an area of interest and draw areas representing an area they value (e.g., for fishing, recreation, scientific research, cultural heritage, etc.). Survey results are summarized in the form of heatmaps that show the relative distribution of valued places for the sector as a whole, while obscuring individual responses. These heatmaps, combined with other authoritative map data, are used to identify prospective ocean zones in a collaborative process known as marine spatial planning.

University of the Azores (UAc)

Founded in 1976, the University of the Azores (https://novoportal.uac.pt/pt-pt) has consolidated itself over the decades as a reference institution within the archipelago, managing to build scientific and cultural ties within and between islands. But it has also established itself as an institution with a universalist character, enhancing the relevance that its Atlantic nature gives it: a true bridge between Europe, the Americas and other geographies of knowledge, confirming that, in it, Scientia Lucet.

QSP

Created in 2004, QSP – Marketing Management & Research (https://qspmarketing.pt/) operates in the area of Strategic Marketing Consulting, Branding and Consumption through studies and market research that guarantee a better performance of companies, their brands and their products and services. With the most recent and innovative methodologies, QSP presents solutions to the market based on rigorous analysis and with the help of techniques that offer creative and effective strategies. The constant search for solutions suited to the needs of its Customers to ensure the best orientation in their marketing decisions and the effective creation of value is the main focus.

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2 Summary

The Blue Azores program is a partnership between the Regional Government of the Azores, Oceano Azul Foundation, and the Waitt Institute to support the protection of 30% of the Azorean sea. It is the goal of Blue Azores to optimize the existing marine protected area (MPA) network while developing and implementing management plans for new MPA's. The planning process will utilize the best available science while considering the interests of stakeholders and their knowledge of the sea to enrich the process and optimize solutions for resource use and conservation. The Coastal Ocean Use Mapping project is a government-led initiative through the Blue Azores program, guided by in-country and international experts, designed to produce spatial data characterizing coastal ocean use.

The Coastal Ocean Use Mapping project is a participatory mapping survey that asks respondents to identify areas in the coastal marine environment that they value or use. Using the online SeaSketch mapping tool, community members select the ocean use sector they associate with, draw shapes in marine locations they utilize, and assign a relative point value for each shape. The responses collected from these surveys are used to produce heatmaps that will serve as a comprehensive baseline representation of sector-specific interest in the Azores.

This project took a phased approach to data collection. Phase 1 focused on implementation of the survey in the islands of Corvo, Flores, and Santa Maria. Data collection was conducted by local facilitation teams and an online access point over a 3-week period from 7 – 28 February 2022. Phase 2 focused on implementation of the survey in the islands of Faial, Pico, and Graciosa. Data collection was conducted by local facilitation teams and an online access point over an 8-week period from 18 April – 13 June 2022. Phase 3 focused on implementation of the survey in the islands of São Jorge, Terceira, and São Miguel. Data collection was conducted by local facilitation teams and an online access point over a 12-week period from 19 September – 12 December 2022.

This report summarizes responses collected during all phases of the Blue Azores Coastal Ocean Use Mapping project. Overall, 2,483 responses were collected which represent the ocean use patterns of 5,050 individuals across all sectors.

3 Methodology

This document provides a detailed account of the methodology used to design and implement the Coastal Ocean Use Mapping project and the process to produce heatmaps of sector-based ocean use and value.

3.1 Planning

The Coastal Ocean Use Mapping project survey design and implementation strategy was collaboratively developed by a working group with representation from the Regional Directorate of Maritime Policies, Regional Directorate of Fisheries, University of Azores, the Waitt Institute, and the McClintock Lab at the University of California, Santa Barbara. The working group terms of reference, including appointed members and associated roles, can be viewed in Appendix A. The Regional Directorate of Maritime Policies' 2021 Ocean Use Data Review provided a foundation for the working group to understand key stakeholder sectors and to highlight critical data gaps.

3.1.1 Stakeholder Sectors

Ocean use activities were broadly categorized into 10 sectors in accordance with the Regional Directorate of Maritime Policies' Ocean Use Data Review for respondents to select from when completing a survey:

1. Commercial Fishing
2. Recreational Fishing
3. Touristic Fishing
4. Recreation, Sports, and Tourism
5. Scientific Research, Technological Development, and Environmental Monitoring
6. Aquaculture
7. Underwater Cultural Heritage
8. Marine Biotechnology
9. Non-Metallic Mineral Resources
10. Security and Defense
11. Energy Development

3.1.2 Survey Targets

Survey targets (sample size) were calculated for the general population, all fishing sectors, and the recreation, sports, and tourism sector in each island (Table 1). The following best available population data was provided by the Regional Government of the Azores to calculate survey targets:

- Municipality Populations
- Commercial Fishing Vessels
- Commercial Invertebrate Hand Harvesting Licenses
- Recreational Fishing Licenses
- Touristic Fishing Operators
- Tourism Operators
- Nautical Centers

To yield high resolution maps suitable for coastal planning at the community and sector level, a 90% confidence interval and a 10% margin of error were used to calculate statistically rigorous survey targets based on the island community population and known sector populations per island community. The following sample size formula was used to calculate targets:

$$\text{Sample Size} = \frac{\frac{z^2 \times p\,(1 - p)}{e^2}}{1 + \left(\frac{z^2 \times p\,(1 - p)}{e^2 N}\right)}$$

Where N is the population size, e is the margin of error (0.10), and z is the z-score (1.65) which correlates with the desired confidence interval (0.9).

3 Methodology

Population				Sector					
				Recreation, Sports, and Tourism	Commercial Fishing		Recreational Fishing	Touristic Fishing	Totals
Island	*Municipality*	Population	Target: Population	Target: Tourism Operators and Nautical Centers	Target: Individual Harvesters	Target: Vessels	Target: Individual Fishers	Target: Operators	Target: Totals
Corvo	*Corvo*	**386**	**58**	**0**	**4**	**6**	**20**	**0**	**88**
Flores		**3,428**	**132**	**3**	**13**	**17**	**55**	**4**	**224**
	Santa Cruz das Flores	1,944	66	N/A	N/A	N/A	N/A	N/A	66
	Lajes das Flores	1,484	66	N/A	N/A	N/A	N/A	N/A	66
Santa Maria	*Vila do Porto*	**5,408**	**68**	**8**	**0**	**20**	**58**	**6**	**160**
Phase 1 Totals		**9,222**	**258**	**11**	**17**	**43**	**133**	**10**	**472**
Faial	*Horta*	**14,334**	**68**	**12**	**17**	**27**	**60**	**8**	**192**
Pico		**13,880**	**203**	**13**	**17**	**38**	**64**	**9**	**344**
	Madalena	6,320	68	N/A	N/A	N/A	N/A	N/A	68
	São Roque do Pico	3,220	67	N/A	N/A	N/A	N/A	N/A	67
	Lajes do Pico	4,340	68	N/A	N/A	N/A	N/A	N/A	68
Graciosa	*Santa Cruz da Graciosa*	**4,091**	**67**	**4**	**15**	**23**	**52**	**3**	**164**
Phase 2 Totals		**32,305**	**338**	**29**	**49**	**88**	**176**	**20**	**700**
São Jorge		8,373	135	2	20	22	60	6	245
	Velas	4,936	68	N/A	N/A	N/A	N/A	N/A	68
	Calheta	3,437	67	N/A	N/A	N/A	N/A	N/A	67
Terceira		**53,244**	**136**	**13**	**22**	**41**	**63**	**8**	**283**
	Angra do Heroísmo	33,779	68	N/A	N/A	N/A	N/A	N/A	68
	Vila da Praia da Vitória	19,465	68	N/A	N/A	N/A	N/A	N/A	68
São Miguel		**133,295**	**408**	**18**	**27**	**50**	**63**	**16**	**582**
	Ponta Delgada	67,233	68	N/A	N/A	N/A	N/A	N/A	68
	Ribeira Grande	31,388	68	N/A	N/A	N/A	N/A	N/A	68
	Lagoa	14,191	68	N/A	N/A	N/A	N/A	N/A	68
	Villa Franca do Campo	10,323	68	N/A	N/A	N/A	N/A	N/A	68
	Povoação	5,791	68	N/A	N/A	N/A	N/A	N/A	68
	Nordeste	4,369	68	N/A	N/A	N/A	N/A	N/A	68
Phase 3 Totals		**194,912**	**679**	**33**	**69**	**113**	**186**	**30**	**1,110**
Project Totals		**236,439**	**1,275**	**73**	**135**	**244**	**495**	**60**	**2,282**

Table 1: Survey Targets

3.1.3 Survey Design

To participate in the Coastal Ocean Use Mapping project, respondents were required to review an informed consent related to data treatment (Appendix B), provide a name, an island and parish of primary residence, identify which sector(s) they represent, and provide spatial data on areas they find important via shapes drawn on a map. Respondents were asked to assign a quantitative value to each shape relative to other shapes drawn via a sliding scale with "Low" representing least valuable areas and "High" representing most valuable areas. Optional demographic questions prompted the respondent to list their age and gender. Group responses, where multiple individuals contributed to a single response, were accepted, though demographic data could not be captured for more than 1 respondent per survey submission. Respondents could also choose to participate in a review process for draft heatmaps by indicating their interest in doing so and providing a valid email address. Appendix C contains an outline of the survey questionnaire.

3.2 Data Collection

This project took a phased approach to data collection:

- **Phase 1:** Implementation of the survey in the islands of Corvo, Flores, and Santa Maria
  - Data collection period: 7 – 28 February 2022
- **Phase 2:** Implementation of the survey in the islands of Faial, Pico, and Graciosa
  - Data collection period: 18 April – 13 June 2022
- **Phase 3:** Implementation of the survey in the islands of São Jorge, Terceira, and São Miguel
  - Data collection period: 19 September – 12 December 2022

Data collection was conducted by local facilitation teams and an online access point. Interviewers were contracted to administer facilitated surveys according to sector targets established in the detailed strategy using the web-based software service, SeaSketch. Facilitators were regionally allocated to ensure spatial distribution of the data collected. Prior to data collection, facilitation teams participated in group-based and one-on-one trainings on the Blue Azores program, using the SeaSketch software, and practicing engagement techniques through mock interview exercises.

The online survey questionnaire was also made publicly available on the Blue Azores website for users to submit responses independently should they choose. Survey responses were directly entered into the online survey questionnaire by survey facilitators or respondents. Individual and group responses were accepted, and respondents were permitted to record their use in multiple sectors.

3 Methodology

Interviewers utilized a variety of methods to garner participation in the survey, including reaching out to their personal networks, scheduling appointments with local businesses, knocking doors, and communicating directly with key persons, such as municipality and association presidents, to consider the most effective methods with which to engage their community. Flyers, radio interviews, and social media were utilized throughout data collection to inform the communities of the opportunity to participate in the project. When facilitators encountered an individual who did not wish to participate in the project, they logged the individual's stakeholder sector, reason for refusal, and contact information provided they were willing to provide it.

A weekly progress report was produced by the McClintock Lab and circulated among project managers during data collection to evaluate if facilitation teams were on track to achieve survey targets and determine if intervention was needed to meet project objectives.

3.3 Analytics and Review

Coastal Ocean Use Mapping data are visually represented in the form of heatmaps, which use color to represent different values identified by respondents. Heatmaps of ocean use and value were produced by the McClintock Lab at the University of California, Santa Barbara for each island community and individual use sectors following the data collection period in each phase of the project.

- **Phase 1:** Implementation of the survey in the islands of Corvo, Flores, and Santa Maria
    - Analytics and review period: 1 – 23 March 2022
- **Phase 2:** Implementation of the survey in the islands of Faial, Pico, and Graciosa
    - Analytics and review period: 14 June –26 July 2022
- **Phase 3:** Implementation of the survey in the islands of São Jorge, Terceira, and São Miguel
    - Analytics and review period: 12 December 2022 – 11 January 2023

The general steps of heatmap production involved aggregation of respondents' used areas and the application of spatial weighting based on respondents' assignment of value (Yates and Shoemen, 2013).[1] A detailed methodology for heatmap production can be referenced in Appendix D.

Draft heatmaps were made available to any respondent who opted into the review process when submitting the survey. Those who opted in and provided a valid email address received a link via email to view draft heatmaps for any sector(s) they responded in and were asked to indicate their satisfaction with the distribution of value depicted. Respondents who were less than satisfied were prompted to identify a reason for their dissatisfaction. Respondents were given 2 weeks to provide comments on the draft heatmaps. The purpose of collecting respondent feedback on draft heatmaps was to identify potential gaps or overrepresentation in sampling, and comments received were considered by the working group.

[1] Yates KL, Schoeman DS (2013) Spatial Access Priority Mapping (SAPM) with Fishers: A Quantitative GIS Method for Participatory Planning. PLoS ONE 8(7): e68424. doi:10.1371/journal.pone.0068424

4 Results

During implementation of the Coastal Ocean Use Mapping project, 1,977 individual respondents submitted 2,483 sector responses representing 5,050 individuals using the SeaSketch mapping tool.

- "Individual respondents" indicates the collective number of individuals who directly interacted with the survey tool.
- "Sector responses" indicates the total number of unique responses received in each sector of ocean use, as many respondents recorded use in multiple sectors.
- "Individuals represented" indicates the cumulative number of people represented, including those reflected through group responses.

Data collected in all phases is summarized below for each island.

4.1 Corvo

Corvo is located in the western group of the Azores archipelago. According to the 2021 census, it has a total population of 386 people residing in a single municipality. 3 locally based individuals were hired and trained to facilitate survey responses over a 3-week period of implementation from 7 – 28 February 2022. In total, 86 sector responses were collected from 73 respondents representing the ocean use patterns of 78 individuals in Corvo, which exceeded the population target of 58 individuals (Table 2).

	Island Population	Target: Population	Individual Respondents	Sector Responses	Individuals Represented
Total	386	58	73	86	78

Table 2: Total Progress - Corvo

4.1.1 Group Responses

- Recorded 2 group responses (more than one person)
- The average group size was 4
- The largest group surveyed represented 5 individuals

4.1.2 Sector-Based Responses

As participants were not limited to responding in a single sector of ocean use, 18% of total respondents recorded use in multiple sectors. 62 responses were received in the recreation, sports, and tourism sector, equating to 72% of total sector responses. Most responses collected in Corvo indicated recreational use activity as only 4 responses in this sector represented a tourism company or nautical center. Out of the 5 responses collected from commercial fishing vessels, 1 respondent participated in commercial invertebrate harvesting activity. 18 recreational fishers and 1 touristic fishing operator completed the survey.

4.1 Corvo

Sector	Subsector	Known Sector Population	Sector Target	Total Responses Submitted	Total Individuals Represented
Recreation, Sports, and Tourism	Cetacean Watching Operators	0			
	Scuba Diving Operators	0			
	Nautical Centers	0	0	4	4
Commercial Fishing	Invertebrate Harvesting Licenses	4	4	1	2
	Commercial Fishing- Vessels	6	6	5	6
Recreational Fishing	Leisure Fishing Licenses	10			
	Underwater Fishing - Licenses	18	20	18	18
Touristic Fishing	Touristic Fishing Operators	0	0	1	1

Table 3: Sector-Based Responses – Corvo

- **Recreation, Sports, and Tourism**
  - o Tourism Operators and Nautical Centers

    0 reflects the total number of known tourism operators and nautical centers in the island of Corvo. ***4*** responses collected represented a tourism company or nautical center.
- **Commercial Fishing**
  - o Invertebrate Harvesting Licenses

    4 reflects the number of known individuals with commercial harvesting licenses in the island of Corvo. ***2*** indicates the total number of Corvo residents represented in the survey for their commercial harvesting activity.
  - o Commercial Fishing Vessels

    6 reflects the number of known commercial fishing vessels in the island of Corvo. Responses were received from ***5*** different commercial fishing vessels.
- **Recreational Fishing**
  - o Leisure Fishing Licenses and Underwater Fishing Licenses

    28 reflects the number of known individuals with a recreational fishing license (leisure fishing license, underwater fishing license) in the island of Corvo. ***18*** indicates the total number of Corvo residents represented in the survey for their recreational fishing activity.
- **Touristic Fishing**
  - o Touristic Fishing Operators

    0 reflects the total number of known touristic fishing operators in the island of Corvo. ***1*** total response was received from a touristic fishing operator.

4.1 Corvo

4.1.3 Respondent Demographics

Out of 73 total respondents, 51 disclosed their age. Ages ranged from 7 to 68, with a mean age of 27. Of the 62 respondents who disclosed their gender, 40% identified as female and 60% identified as male (Figure 1).

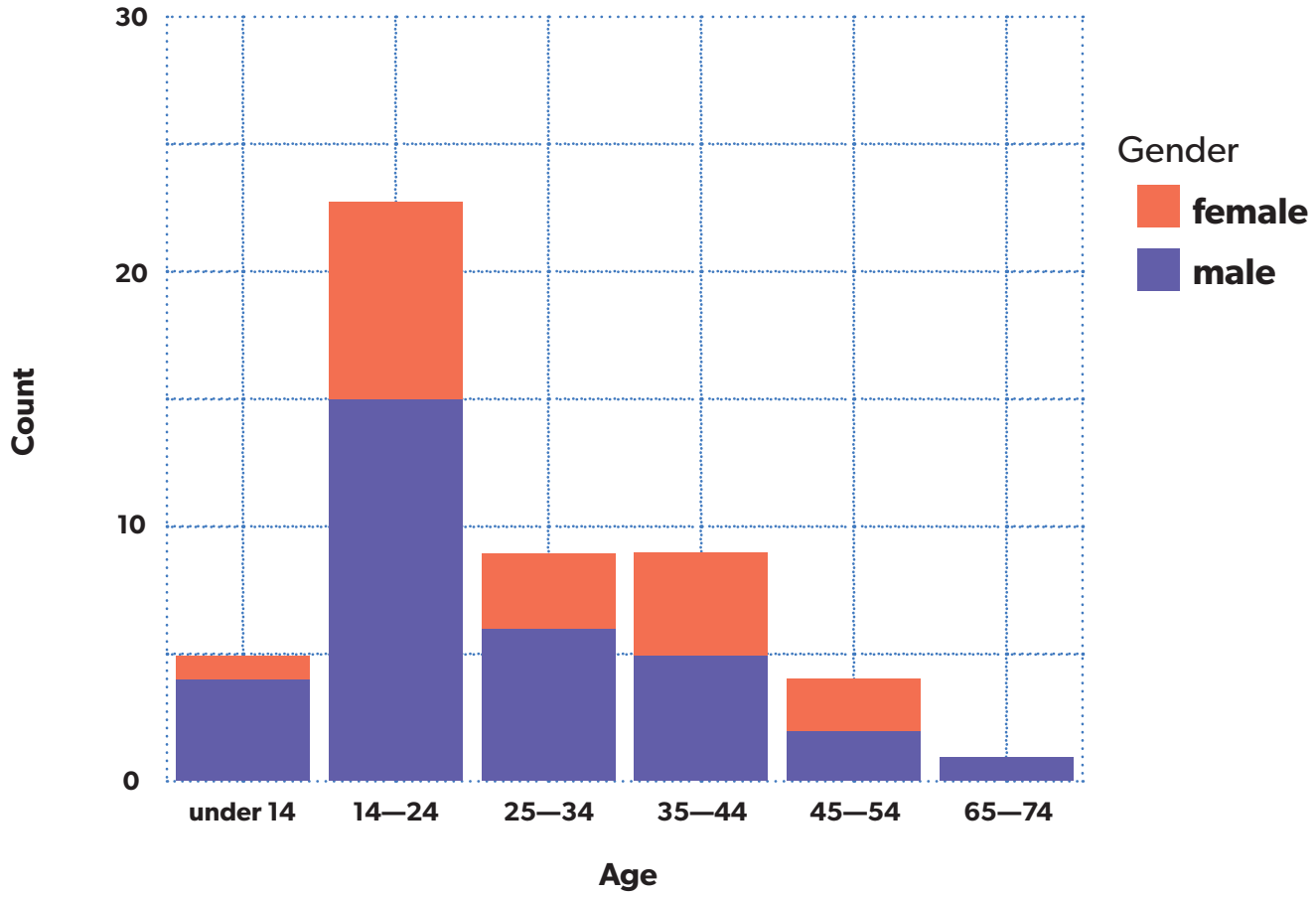

Figure 1: Respondent Demographics – Corvo

4.1.4 Heatmaps

Heatmaps which summarize survey responses collected in Corvo in each sector of ocean use with 3 or more shapes drawn are shown below. The number of shapes input into each heatmap are reported in the caption ("N").

4.1 Corvo

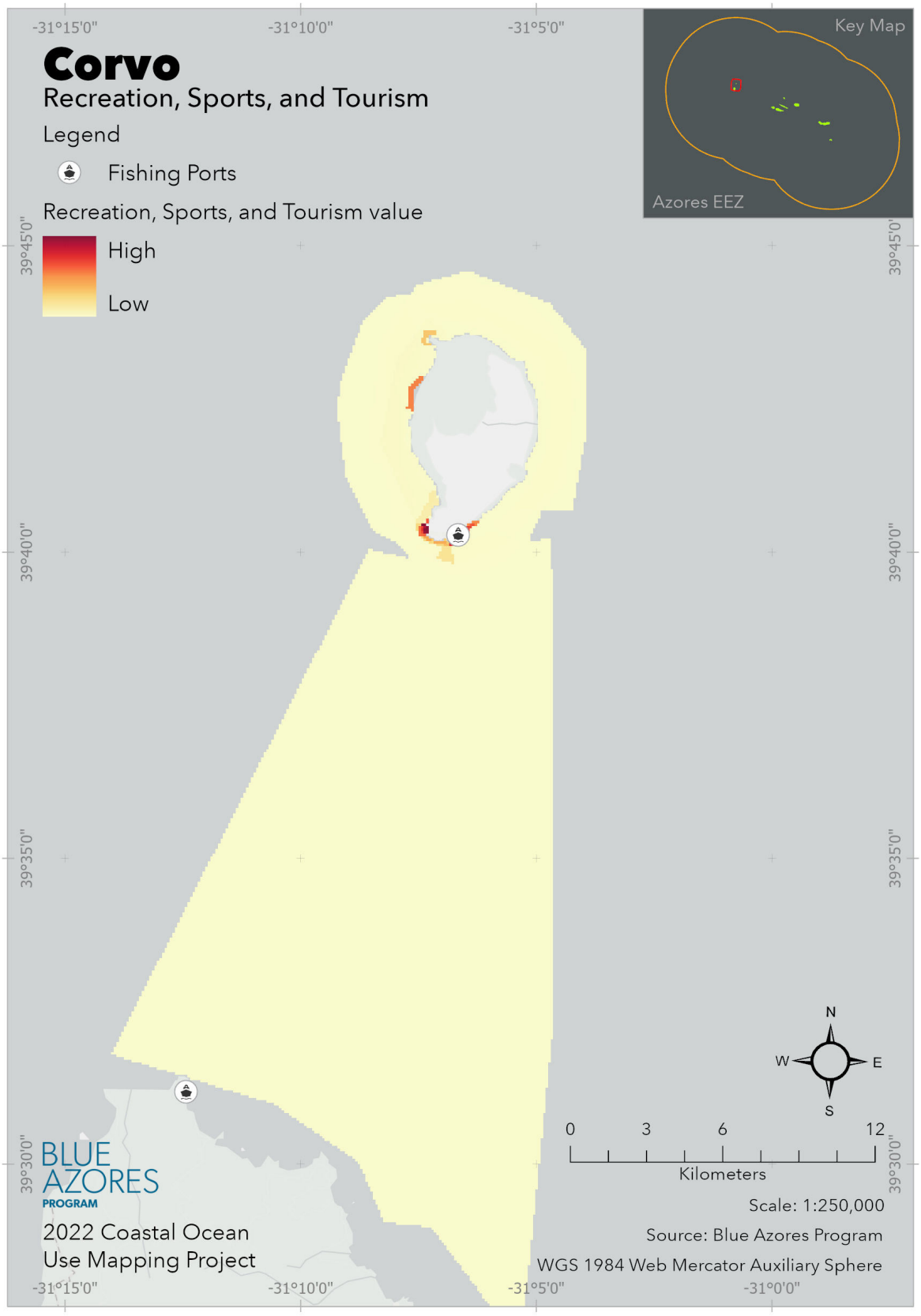

Figure 2: Recreation, Sports, and Tourism - Corvo (N = 160)

4.1 Corvo

Figure 3: Commercial Fishing - Corvo (N = 14)

4.1 Corvo

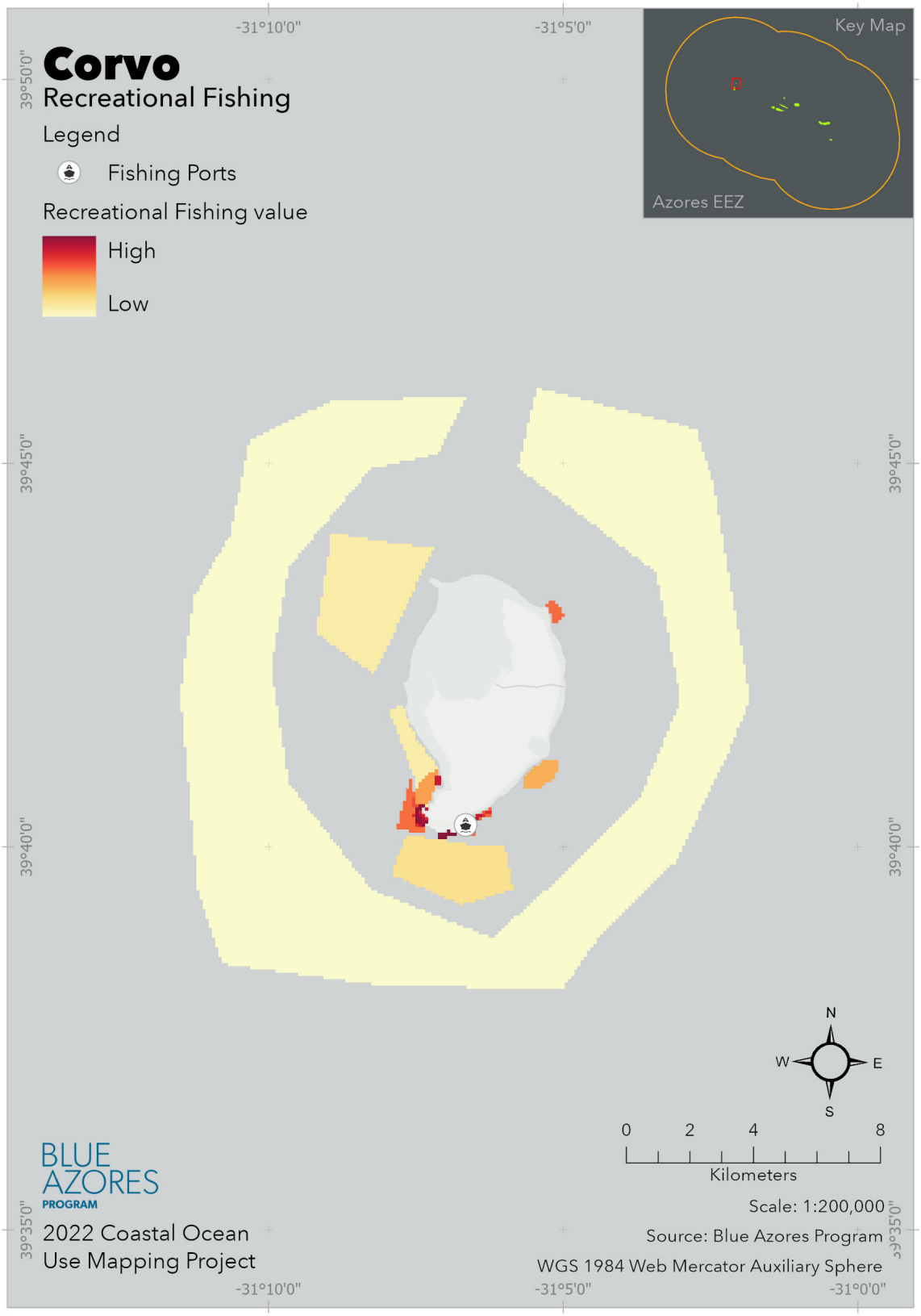

Figure 4: Recreational Fishing - Corvo (N = 53)

4.1 Corvo

4.1.5 Heatmap Review Results

Table 4 summarizes the total number of respondents by sector who indicated interest in reviewing Corvo's heatmaps (opted into the review process), and the number of individuals who submitted a review. The average rating represents the average score a heatmap was given on a scale of 1 to 5, with 1 indicating low satisfaction with the distribution of value represented on a given sector's heatmap and 5 indicating high satisfaction.

	Recreation, Sports, and Tourism	Commercial Fishing
Total sector responses	62	5
Total respondents who opted into the review process	11	2
Total responses to heatmap review survey	1	1
Average heatmap rating	5	4
Indicated there are high value areas missing	0	0
Indicated there are high value areas that do not belong	0	0
Indicated 'Other' issue with the heatmap	0	0

Table 4: Heatmap Review Results - Corvo

4.2 Flores

Flores is located in the western group of the Azores archipelago. According to the 2021 census, it has a total population of 3,428 people residing in 2 municipalities. 3 locally based individuals were hired and trained to facilitate survey responses over a 3-week period of implementation from 7 – 28 February 2022. In total, 246 sector responses were collected from 164 respondents representing the ocean use patterns of 483 individuals in Flores, which exceeded the population target of 132 individuals (Table 5).

	Island Population	Target: Population	Individual Respondents	Sector Responses	Individuals Represented
Total	3,428	132	164	246	483

Table 5: Total Responses - Flores

4.2.1 Group Responses

- Recorded 140 group responses (more than one person)
- The average group size was 4
- The largest group surveyed represented 50 individuals

4.2 Flores

4.2.2 Sector-Based Responses

As participants were not limited to responding in a single sector of ocean use, 45% of total respondents recorded use in multiple sectors. 128 responses were received in the recreation, sports, and tourism sector, equating to 52% of total sector responses. Most responses collected in Flores indicated recreational use activity as only 10 responses in this sector represented a tourism company or nautical center. Out of the 30 responses collected from commercial fishing vessels, 5 respondents participated in commercial invertebrate harvesting activity. 188 recreational fishers and 3 touristic fishing operators are represented in the survey.

Sector	Subsector	Known Sector Population	Sector Target	Total Responses Submitted	Total Individuals Represented
Recreation, Sports, and Tourism	Cetacean Watching Operators	0			
	Scuba Diving Operators	2			
	Nautical Centers	1	3	10	26
Commercial Fishing	Invertebrate Harvesting Licenses	15	13	5	7
	Commercial Fishing- Vessels	22	17	28	52
Recreational Fishing	Leisure Fishing Licenses	90			
	Underwater Fishing - Licenses	186	55	77	188
Touristic Fishing	Touristic Fishing Operators	4	4	4	13

Table 6: Sector-Based Responses – Flores

- **Recreation, Sports, and Tourism**
  - o Tourism Operators and Nautical Centers

    3 reflects the total number of known tourism operators and nautical centers in the island of Flores. ***10*** responses collected represented a tourism company or nautical center.
- **Commercial Fishing**
  - o Invertebrate Harvesting Licenses

    15 reflects the number of known individuals with commercial harvesting licenses in the island of Flores. ***7*** indicates the total number of Flores residents represented in the survey for their commercial harvesting activity.
  - o Commercial Fishing Vessels

    22 reflects the number of known commercial fishing vessels in the island of Flores. Responses were received from ***28*** different commercial fishing vessels.
- **Recreational Fishing**
  - o Leisure Fishing Licenses and Underwater Fishing Licenses

    276 reflects the number of known individuals with a recreational fishing license (leisure fishing license, underwater fishing license) in the island of Flores. ***188*** indicates the total number of Flores residents represented in the survey for their recreational fishing activity.
- **Touristic Fishing**
  - o Touristic Fishing Operators

    4 reflects the total number of known touristic fishing operators in the island of Flores. Responses were received from ***4*** different touristic fishing operators.

4.2 Flores

4.2.3 Respondent Demographics

Out of 164 total respondents, 115 disclosed their age. Ages ranged from 14 to 78, with a mean age of 42. Of the 131 respondents who disclosed their gender, 32% identified as female and 68% identified as male (Figure 5).

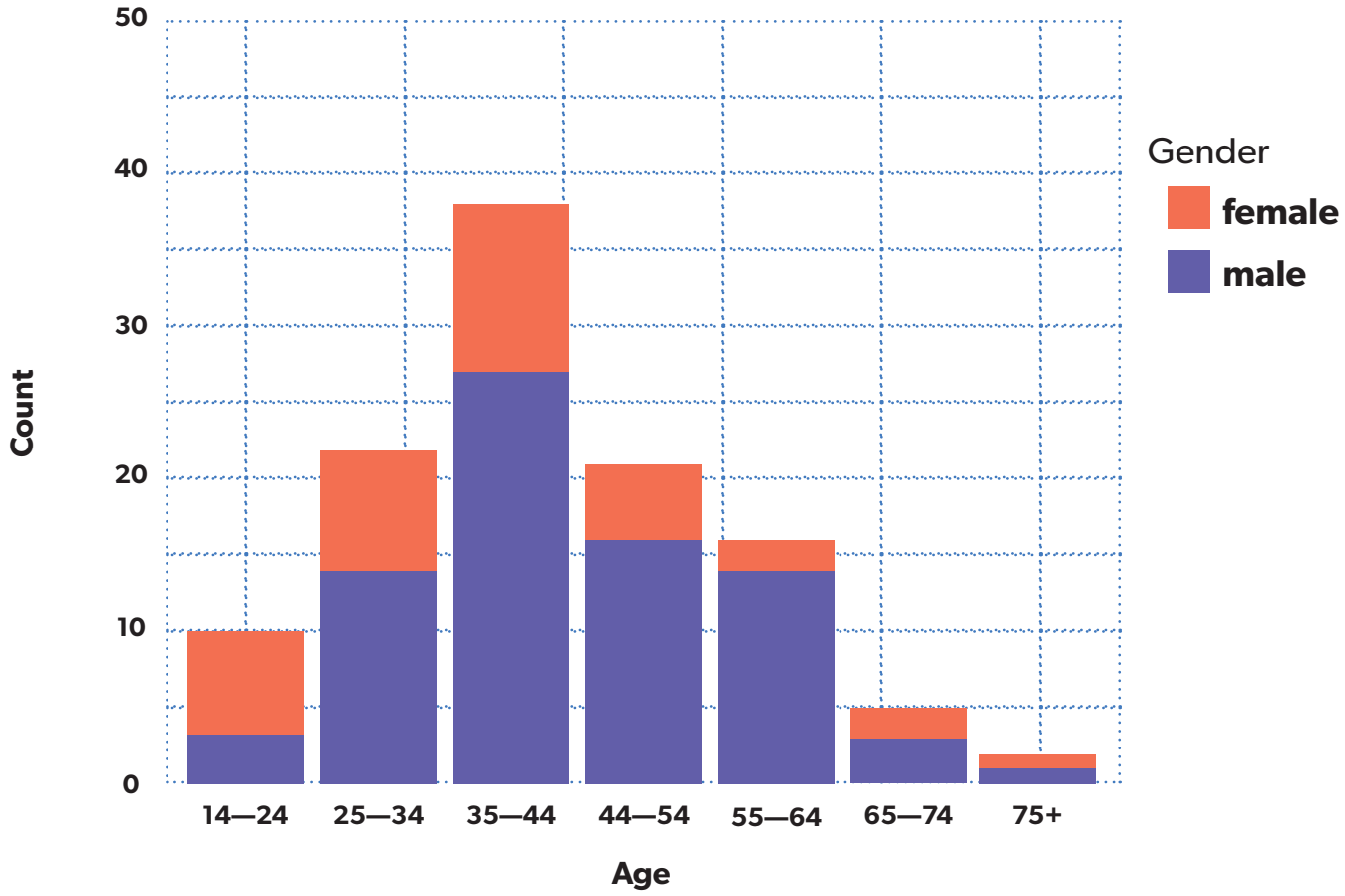

Figure 5: Respondent Demographics – Flores

4.2.4 Heatmaps

Heatmaps which summarize survey responses collected in Flores in each sector of ocean use with 3 or more shapes drawn are shown below. The number of shapes input into each heatmap are reported in the caption ("N").

4.2 Flores

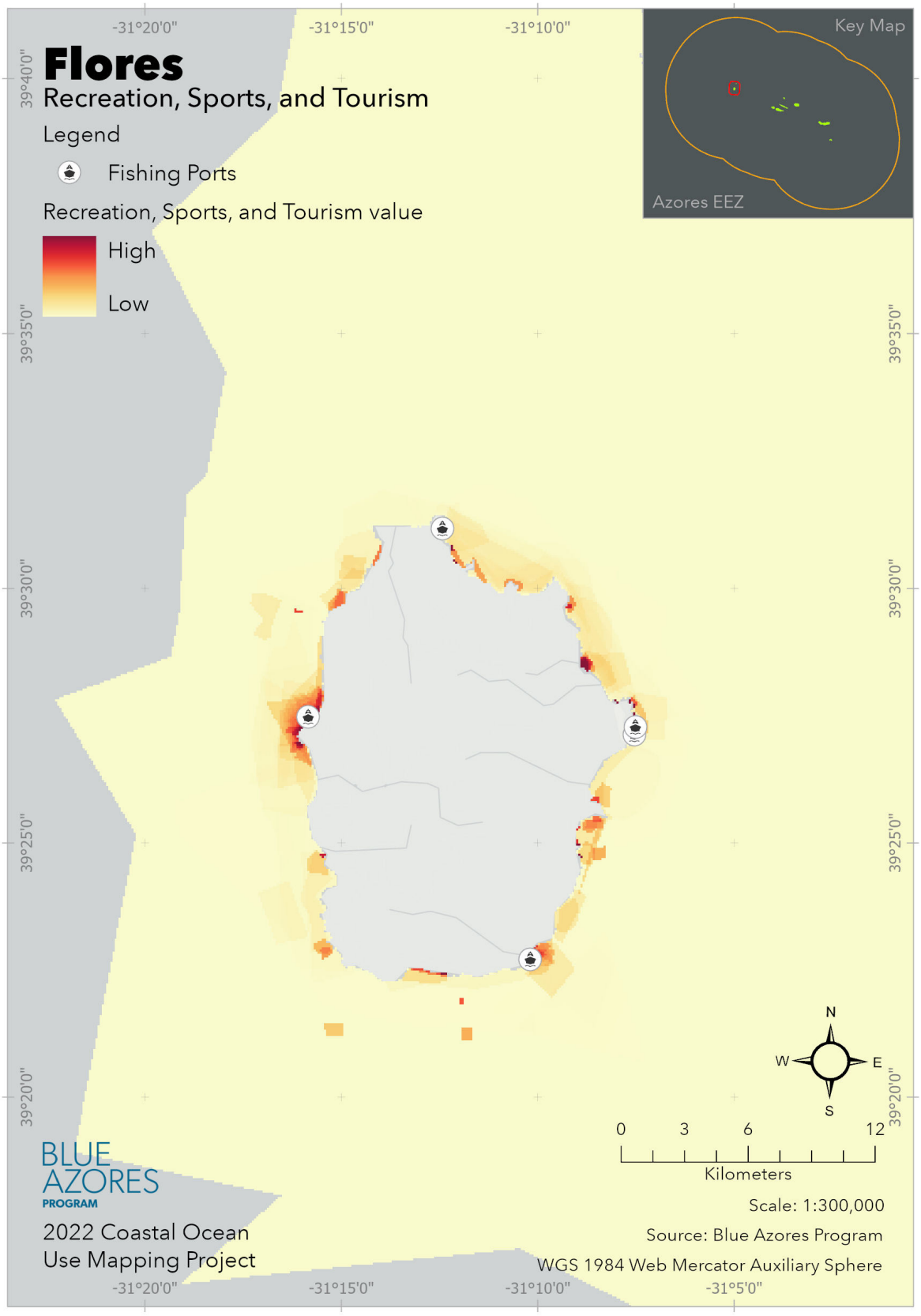

Figure 6: Recreation, Sports, and Tourism - Flores (N = 354)

4.2 Flores

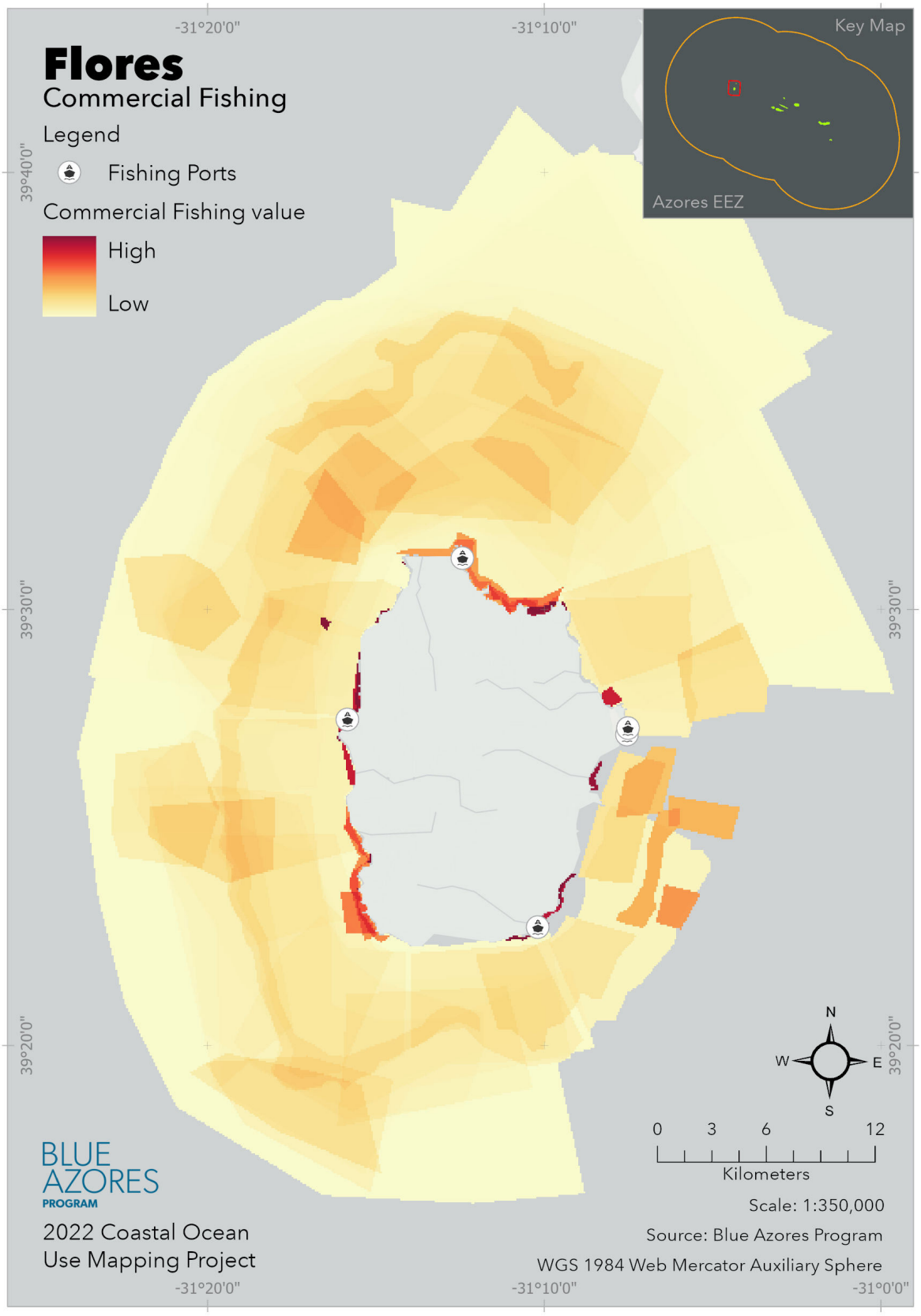

Figure 7: Commercial Fishing - Flores (N = 91)

4.2 Flores

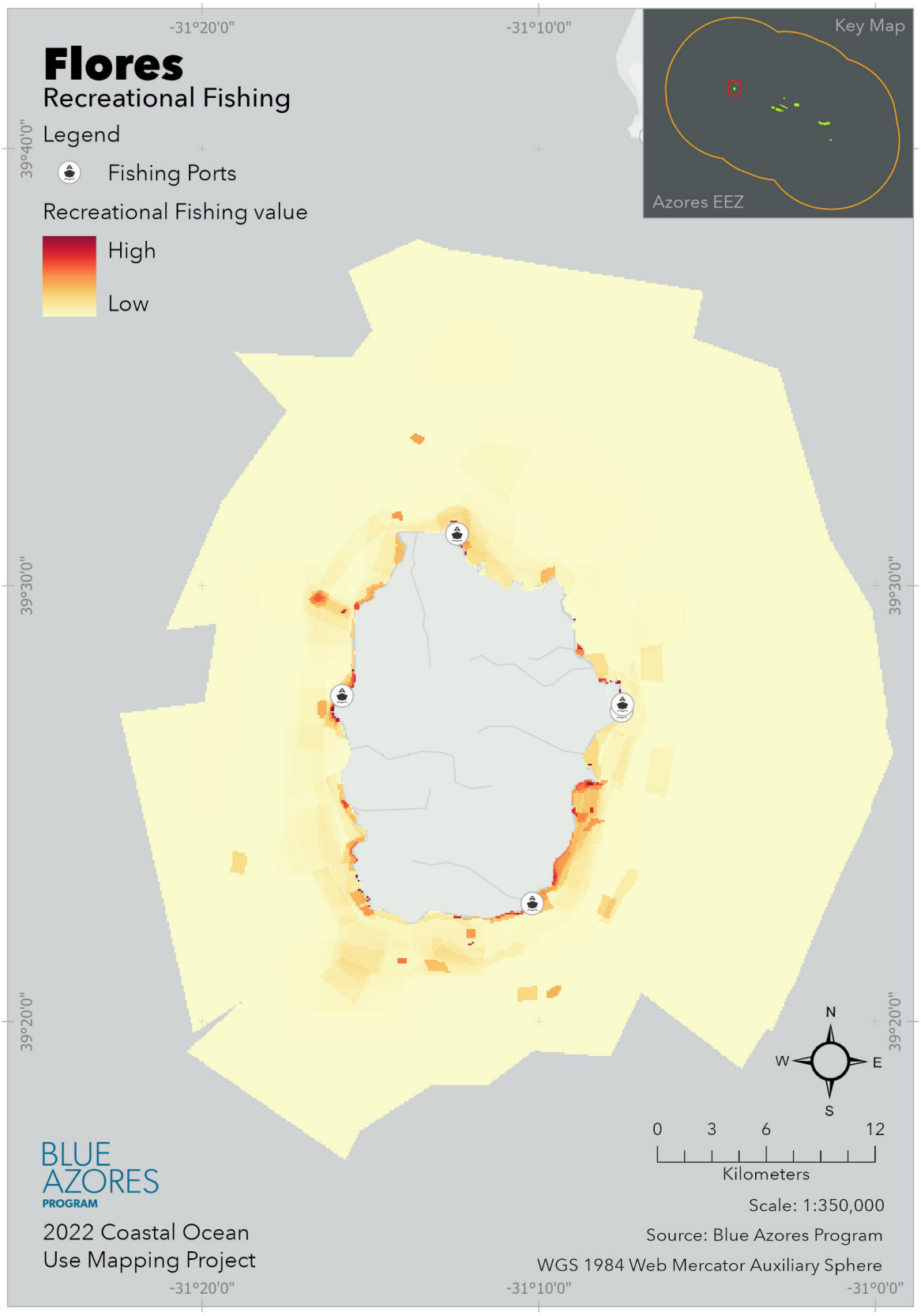

Figure 8: Recreational Fishing - Flores (N = 222)

4.2 Flores

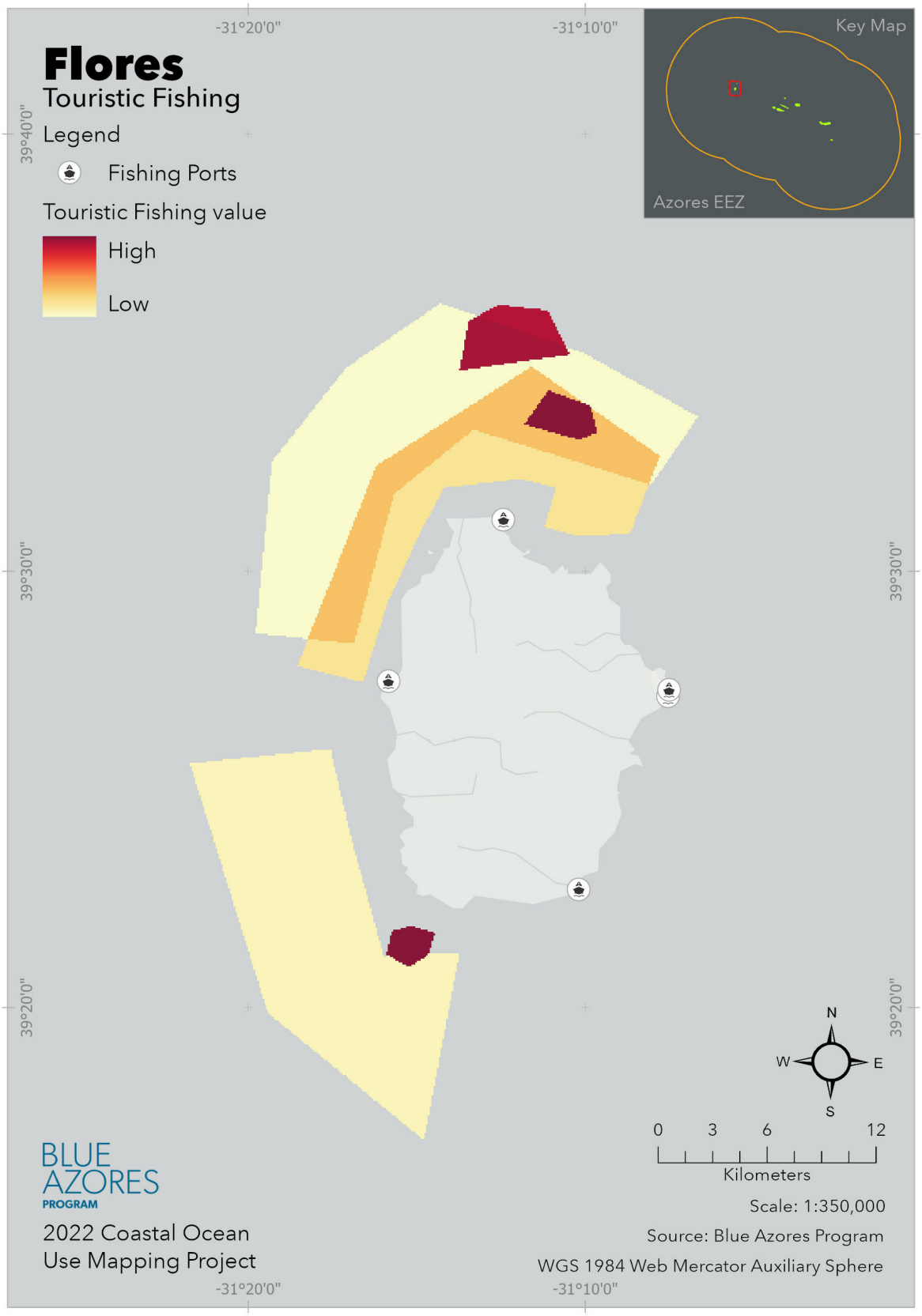

Figure 9: Touristic Fishing – Flores (N = 6)

4.2 Flores

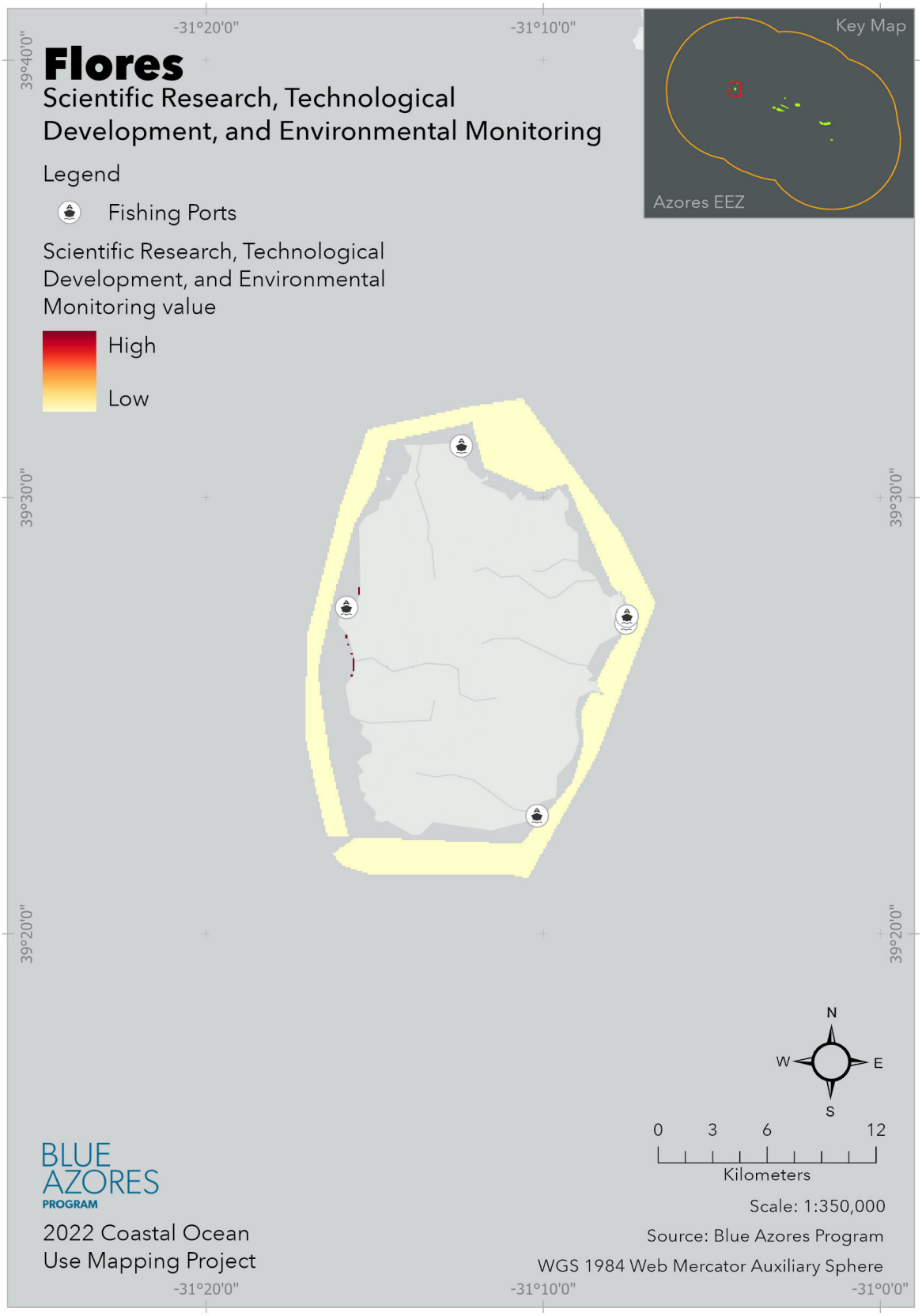

Figure 10: Scientific Research, Technological Development, and Environmental Monitoring – Flores (N = 3)

4.2 Flores

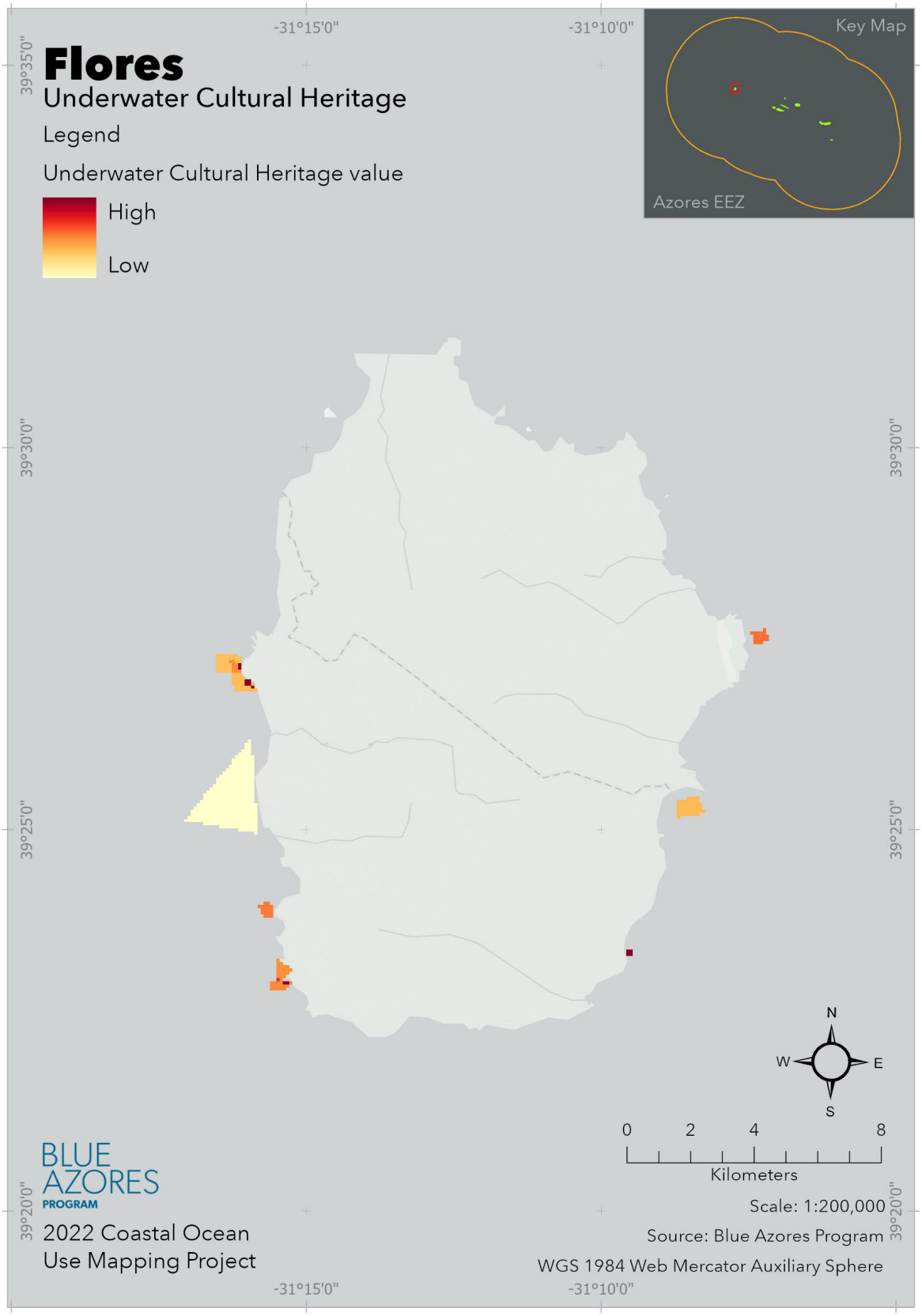

Figure 11: Underwater Cultural Heritage – Flores (N = 13)

4.2 Flores

4.2.5 Heatmap Review Results

Table 7 summarizes the total number of respondents by sector who indicated interest in reviewing Flores' heatmaps (opted into the review process), and the number of individuals who submitted a review. The average rating represents the average score a heatmap was given on a scale of 1 to 5, with 1 indicating low satisfaction with the distribution of value represented on a given sector's heatmap and 5 indicating high satisfaction.

	Recreation, Sports, and Tourism	Commercial Fishing	Underwater Cultural Heritage
Total sector responses	128	77	5
Total respondents who opted into the review process	77	56	3
Total responses to heatmap review survey	12	8	1
Average heatmap rating	4.25	3.38	5
Indicated there are high value areas missing	0	0	0
Indicated there are high value areas that do not belong	0	0	0
Indicated 'Other' issue with the heatmap	0	0	0

Table 7: Heatmap Review Results - Flores

4.3 Santa Maria

Santa Maria is an eastern island of the Azores archipelago.5,408 According to the 2021 census, it has a total population of 5,408 people residing in a single municipality. 4 locally based individuals were hired and trained to facilitate survey responses over a 3-week period of implementation from 7 – 28 February 2022. In total, 181 sector responses were collected from 153 respondents representing the ocean use patterns of 534 individuals in Santa Maria, which exceeded the population target of 68 individuals (Table 8).

	Island Population	Target: Population	Individual Respondents	Sector Responses	Individuals Represented
Total	5,408	58	73	86	78

Table 8: Total Responses - Santa Maria

4.3.1 Group Responses

- Recorded 96 group responses (more than one person)
- The average group size was 8
- The largest group surveyed represented 99 individuals

4.3 Santa Maria

4.3.2 Sector-Based Responses

As participants were not limited to responding in a single sector of ocean use, 14% of total respondents recorded use in multiple sectors. 80 responses were received in the recreation, sports, and tourism sector, equating to 44% of total sector responses. Most responses collected in Santa Maria indicated recreational use activity as only 12 responses in this sector represented a tourism company or nautical center. Out of the 21 responses collected from commercial fishing vessels, 10 respondents participated in commercial invertebrate harvesting activity. 284 recreational fishers and 7 touristic fishing operators are represented in the survey.

Sector	Subsector	Known Sector Population	Sector Target	Total Responses Submitted	Total Individuals Represented
Recreation, Sports, and Tourism	Cetacean Watching Operators	1	8	12	157
	Scuba Diving Operators	6			
	Nautical Centers	1			
Commercial Fishing	Invertebrate Harvesting Licenses	0	0	10	14
	Commercial Fishing- Vessels	27	20	21	50
Recreational Fishing	Leisure Fishing Licenses	128	58	69	284
	Underwater Fishing - Licenses	235			
Touristic Fishing	Touristic Fishing Operators	6	6	7	132

Table 9: Sector-Based Responses - Santa Maria

- **Recreation, Sports, and Tourism**
  - o Tourism Operators and Nautical Centers

    8 reflects the total number of known tourism operators and nautical centers in the island of Santa Maria. ***12*** responses collected represented a tourism company or nautical center.
- **Commercial Fishing**
  - o Invertebrate Harvesting Licenses

    0 reflects the number of known individuals with commercial harvesting licenses in the island of Santa Maria. ***14*** indicates the total number of Santa Maria residents represented in the survey for their commercial harvesting activity.
  - o Commercial Fishing Vessels

    27 reflects the number of known commercial fishing vessels in the island of Santa Maria. Responses were received from ***20*** different commercial fishing vessels.
- **Recreational Fishing**
  - o Leisure Fishing Licenses and Underwater Fishing Licenses

    363 reflects the number of known individuals with a recreational fishing license (leisure fishing license, underwater fishing license) in the island of Santa Maria. ***284*** indicates the total number of Santa Maria residents represented in the survey for their recreational fishing activity.
- **Touristic Fishing**
  - o Touristic Fishing Operators

    6 reflects the total number of known touristic fishing operators in the island of Santa Maria. Responses were received from ***7*** different touristic fishing operators.

4.3 Santa Maria

4.3.3 Respondent Demographics

Out of 153 total respondents, 118 disclosed their age. Ages ranged from 17 to 79, with a mean age of 42. Of the 121 respondents who disclosed their gender, 30% identified as female and 70% identified as male (Figure 12).

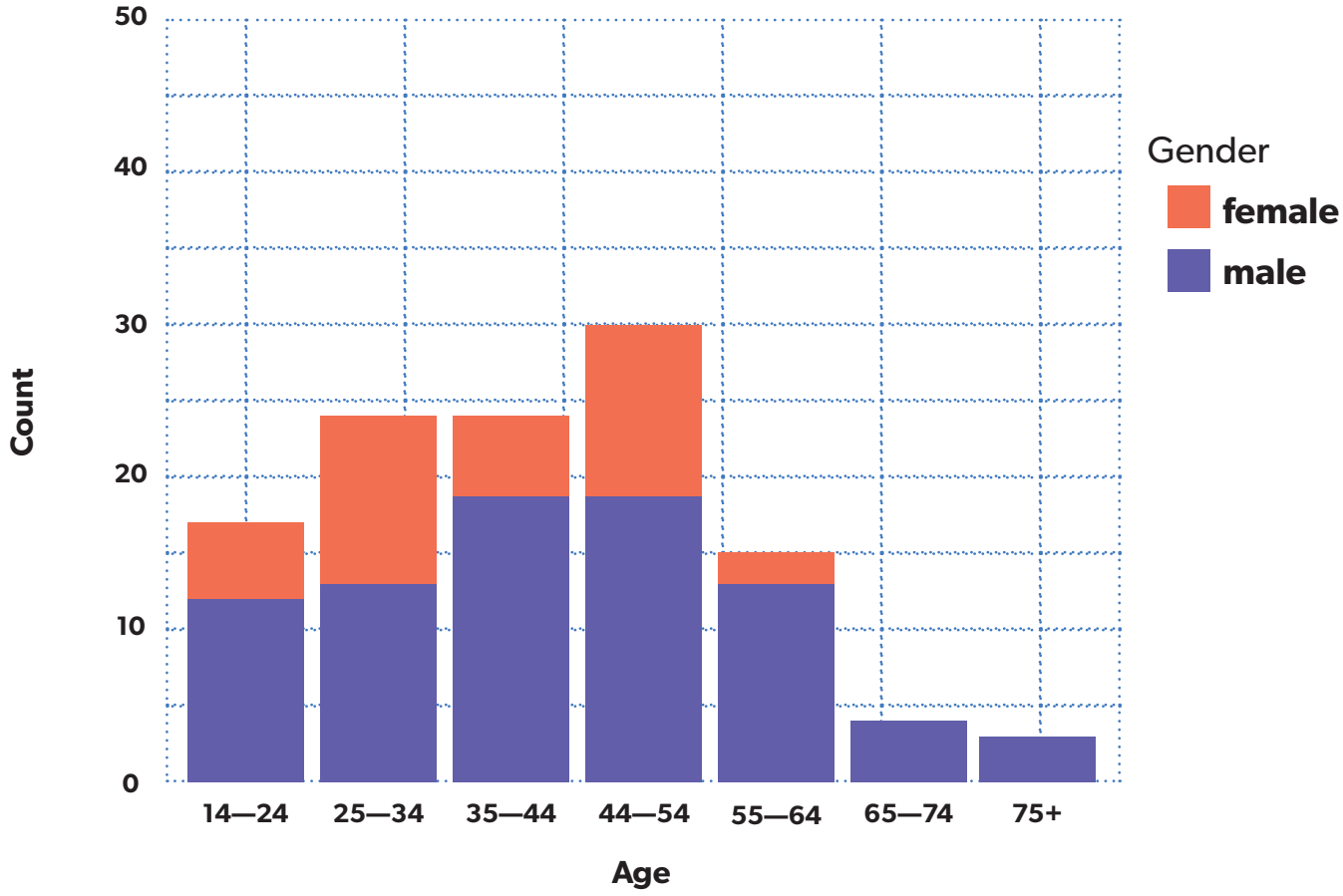

Figure 12: Respondent Demographics – Santa Maria

4.3.4 Heatmaps

Heatmaps which summarize survey responses collected in Santa Maria in each sector of ocean use with 3 or more shapes drawn are shown below. The number of shapes input into each heatmap are reported in the caption ("N").

4.3 Santa Maria

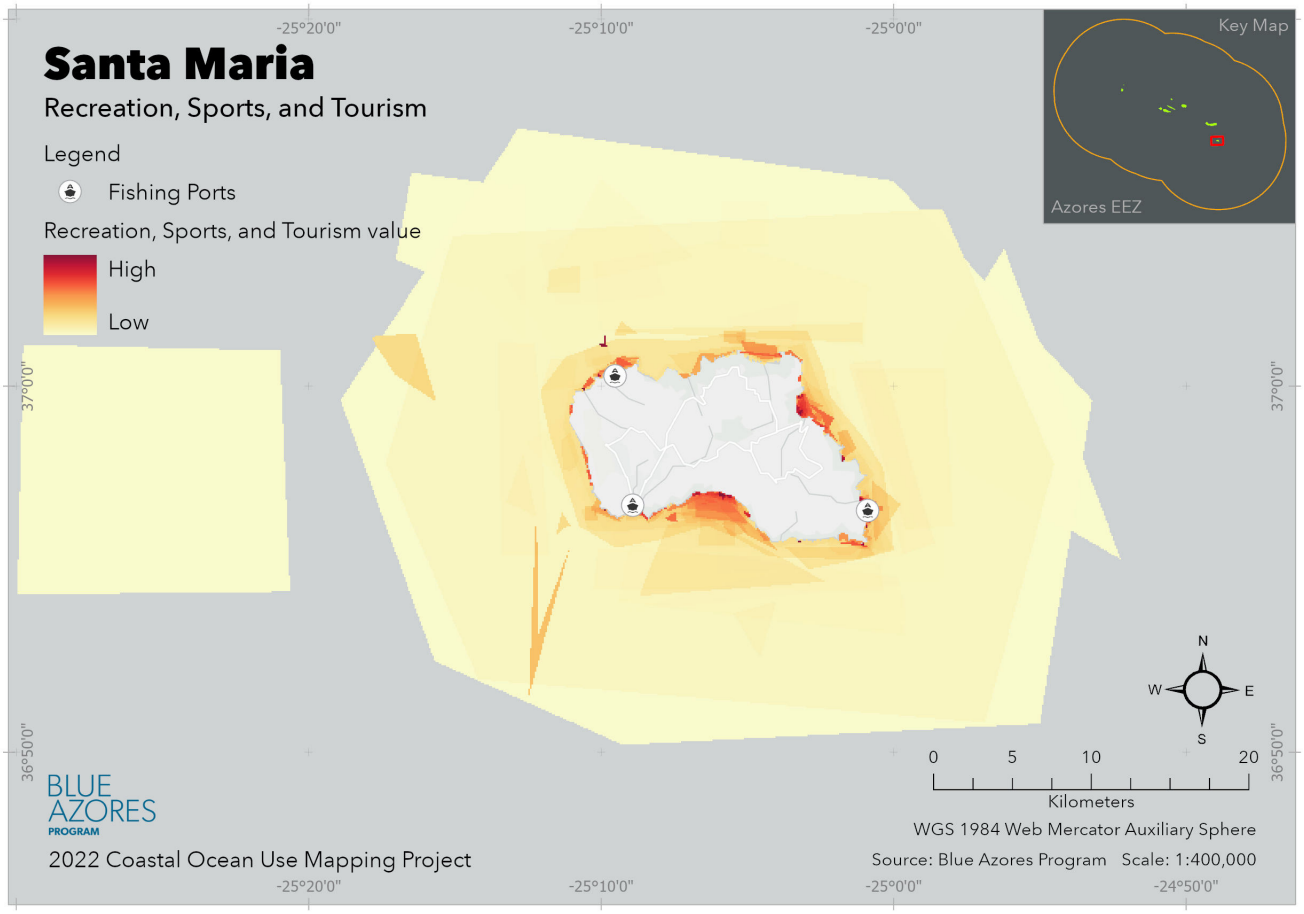

Figure 13: Recreation, Sports, and Tourism – Santa Maria (N = 263)

4.3 Santa Maria

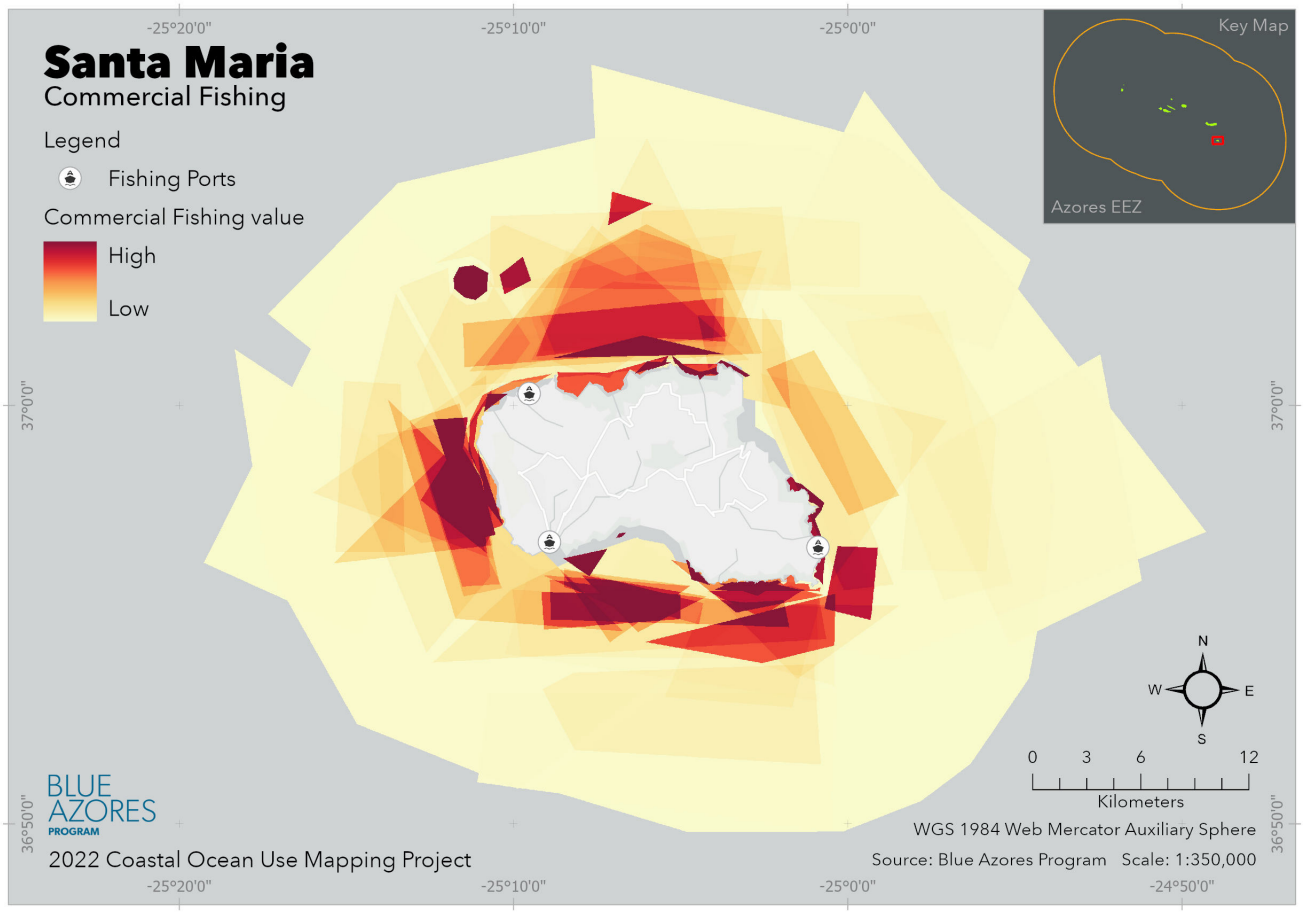

Figure 14: Commercial Fishing - Santa Maria (N = 72)

4.3 Santa Maria

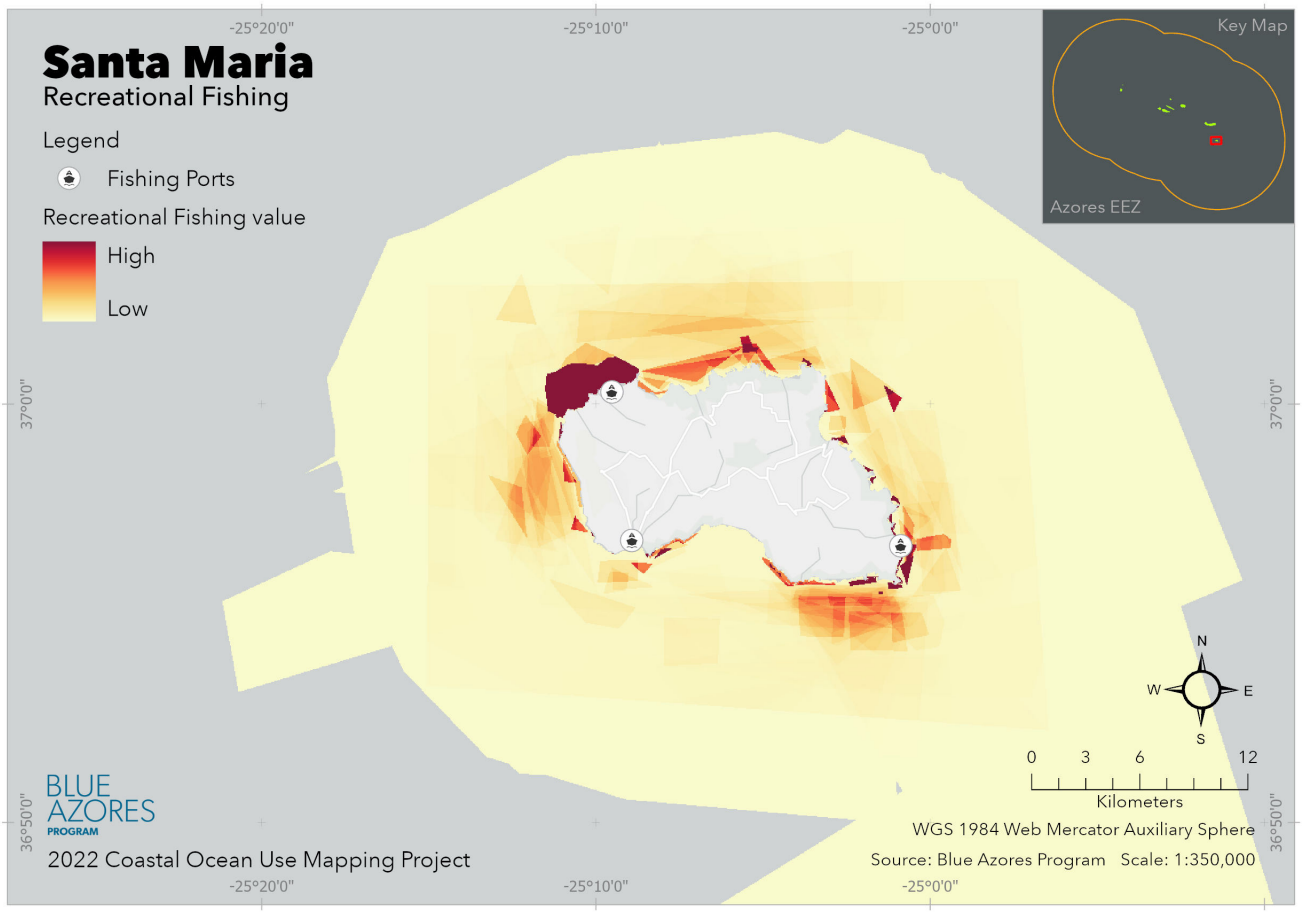

Figure 15: Recreational Fishing - Santa Maria (N = 208)

4.3 Santa Maria

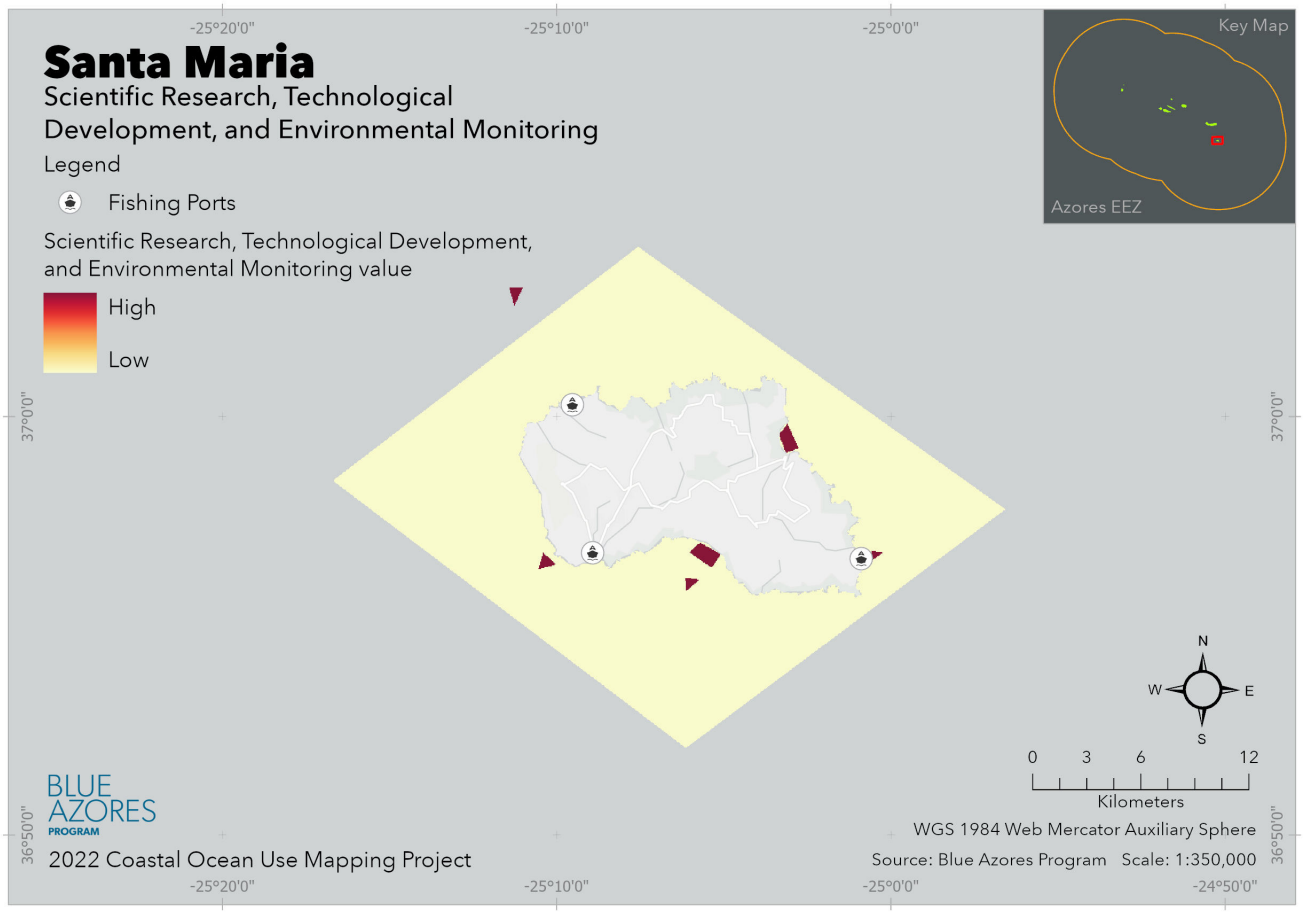

Figure 16: Scientific Research, Technological Development, and Environmental Monitoring – Santa Maria (N = 8)

4.3 Santa Maria

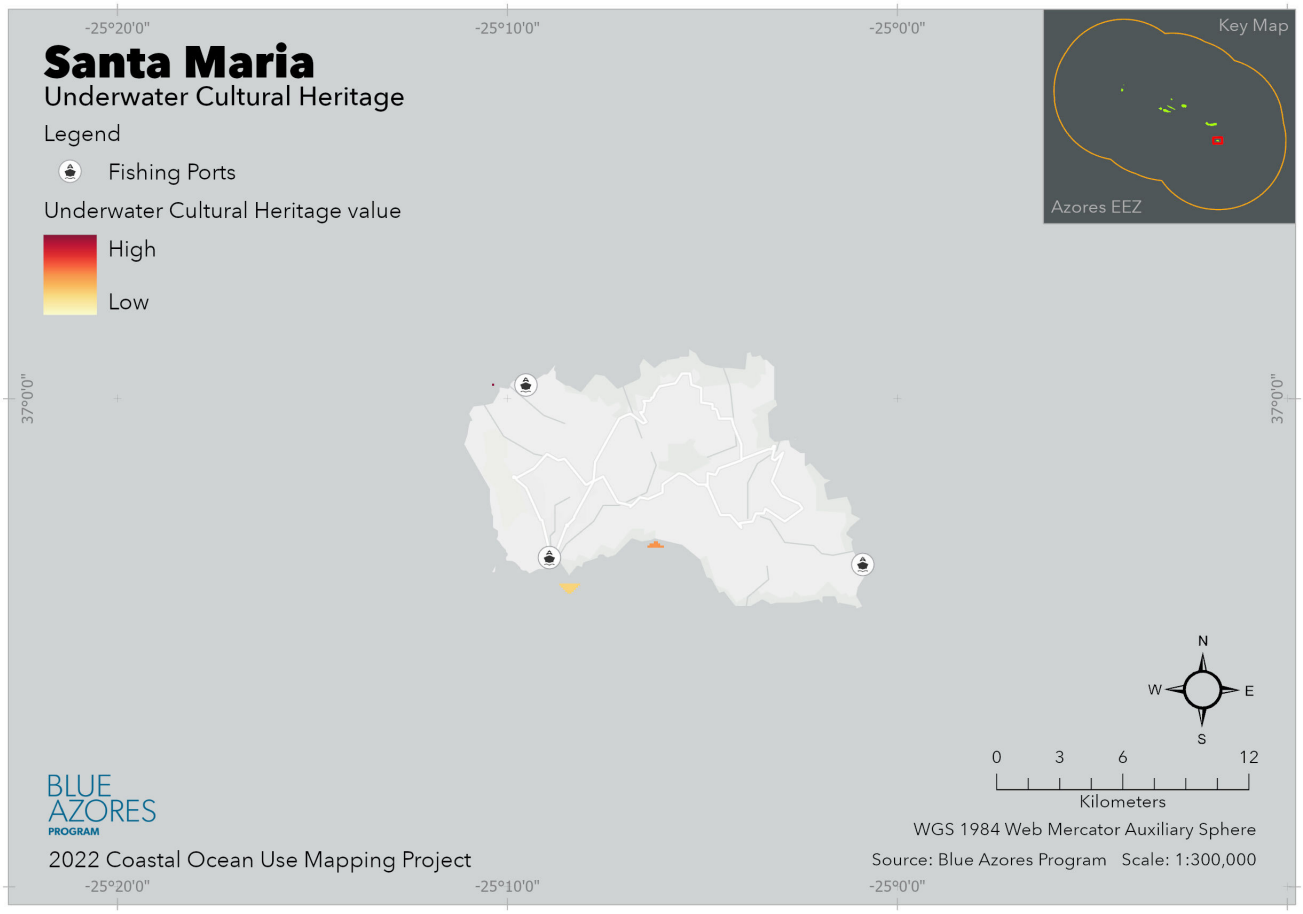

Figure 17: Underwater Cultural Heritage – Santa Maria (N = 4)

4.3 Santa Maria

4.3.5 Heatmap Review Results

Table 10 summarizes the total number of respondents by sector who indicated interest in reviewing Santa Maria's heatmaps (opted into the review process), and the number of individuals who submitted a review. The average rating represents the average score a heatmap was given on a scale of 1 to 5, with 1 indicating low satisfaction with the distribution of value represented on a given sector's heatmap and 5 indicating high satisfaction.

	Recreation, Sports, and Tourism	Commercial Fishing	Recreational Fishing	Touristic Fishing
Total sector responses	80	21	69	69
Total respondents who opted into the review process	46	13	44	44
Total responses to heatmap review survey	6	2	4	4
Average heatmap rating	4	4.5	4.25	4.25
Indicated there are high value areas missing	0	0	0	0
Indicated there are high value areas that do not belong	0	0	0	0
Indicated 'Other' issue with the heatmap	0	0	0	0

Table 10: Heatmap Review Results - Santa Maria

4.4 Pico

Pico is a central island of the Azores archipelago. According to the 2021 census, it has a total population of 13,880 people residing in 3 municipalities. 4 locally based individuals were hired and trained to facilitate survey responses over an 8-week period of implementation from 18 April – 13 June 2022. In total, 376 sector responses were collected from 333 respondents representing the ocean use patterns of 861 individuals in Pico, which exceeded the population target of 203 individuals (Table 11).

	Island Population	Target: Population	Individual Respondents	Sector Responses	Individuals Represented
Total	13,880	203	333	376	861

Table 11: Total Responses – Pico

4.4.1 Group Responses

- Recorded 137 group responses (more than one person)
- The average group size was 5
- The largest group surveyed represented 100 individuals

4.4 Pico

4.4.2 Sector-Based Responses

As participants were not limited to responding in a single sector of ocean use, 12% of total respondents recorded use in multiple sectors. 225 responses were received in the recreation, sports, and tourism sector, equating to 60% of total sector responses. Most responses collected in Pico indicated recreational use activity as only 15 responses in this sector represented a tourism company or nautical center. Out of the 41 responses collected from commercial fishing vessels, 18 respondents participated in commercial invertebrate harvesting activity. 220 recreational fishers and 5 touristic fishing operators are represented in the survey.

Sector	Subsector	Known Sector Population	Sector Target	Total Responses Submitted	Total Individuals Represented
Recreation, Sports, and Tourism	Cetacean Watching Operators	4	13	15	290
	Scuba Diving Operators	9			
	Nautical Centers	2			
Commercial Fishing	Invertebrate Harvesting Licenses	22	17	18	51
	Commercial Fishing- Vessels	84	38	41	91
Recreational Fishing	Leisure Fishing Licenses	226	64	101	220
	Underwater Fishing - Licenses	615			
Touristic Fishing	Touristic Fishing Operators	9	9	5	10

Table 12: Sector-Based Responses – Pico

- **Recreation, Sports, and Tourism**
  - o Tourism Operators and Nautical Centers

    15 reflects the total number of known tourism operators and nautical centers in the island of Pico. ***15*** responses collected represented a tourism company or nautical center.
- **Commercial Fishing**
  - o Invertebrate Harvesting Licenses

    22 reflects the number of known individuals with commercial harvesting licenses in the island of Pico. ***51*** indicates the total number of Pico residents represented in the survey for their commercial harvesting activity.
  - o Commercial Fishing Vessels

    84 reflects the number of known commercial fishing vessels in the island of Pico. Responses were received from ***41*** different commercial fishing vessels.
- **Recreational Fishing**
  - o Leisure Fishing Licenses and Underwater Fishing Licenses

    901 reflects the number of known individuals with a recreational fishing license (leisure fishing license, underwater fishing license) in the island of Pico. ***220*** indicates the total number of Pico residents represented in the survey for their recreational fishing activity.
- **Touristic Fishing**
  - o Touristic Fishing Operators

    9 reflects the total number of known touristic fishing operators in the island of Pico. Responses were received from ***5*** different touristic fishing operators.

4.4 Pico

4.4.3 Respondent Demographics

Out of 333 total respondents, 272 disclosed their age. Ages ranged from 5 to 68, with a mean age of 39. Of the 282 respondents who disclosed their gender, 33% identified as female and 66% identified as male (Figure 18).

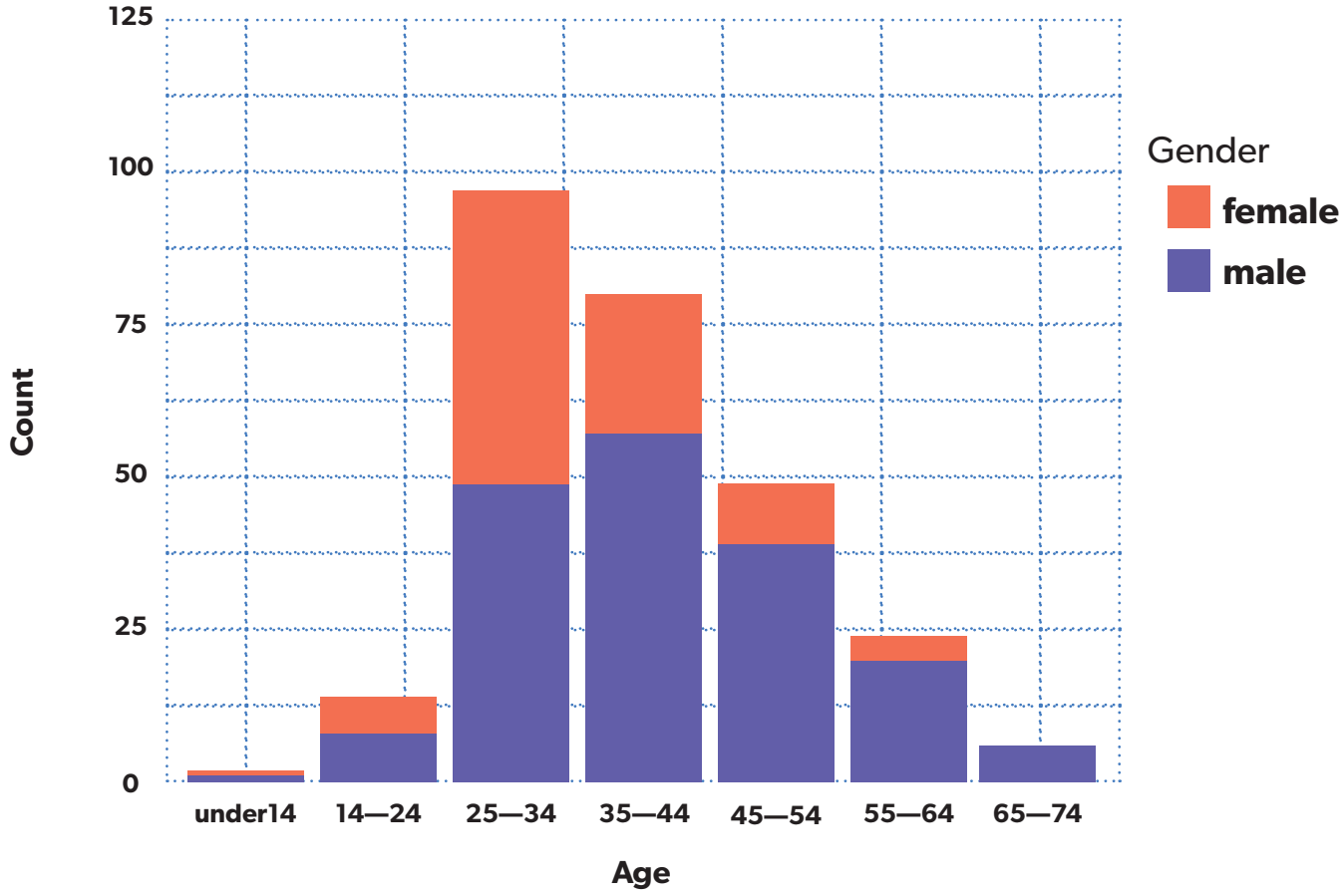

Figure 18: Respondent Demographics – Pico

4.4.4 Heatmaps

Heatmaps which summarize survey responses collected in Pico in each sector of ocean use with 3 or more shapes drawn are shown below. The number of shapes input into each heatmap are reported in the caption ("N").

4.4 Pico

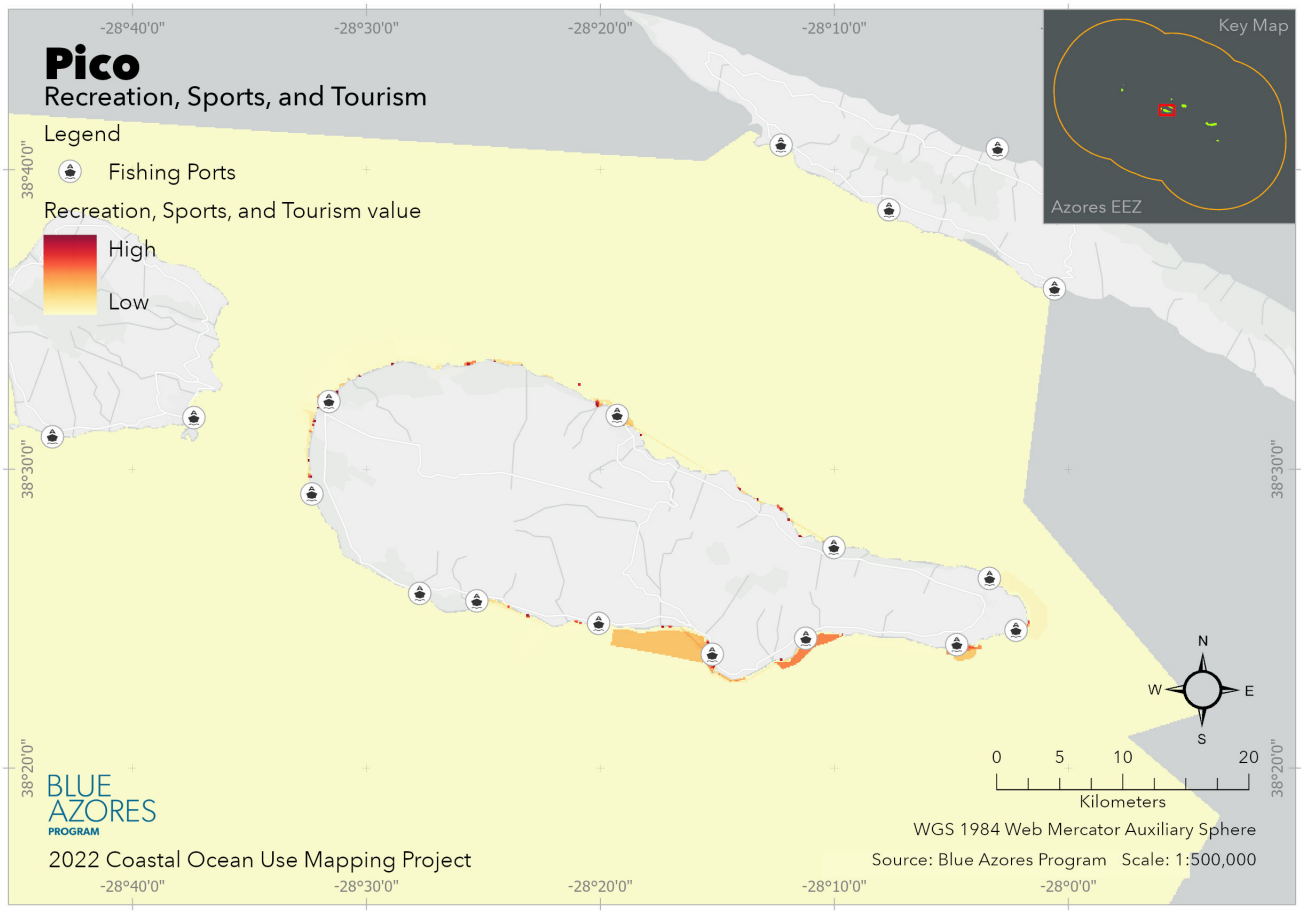

Figure 19: Recreation, Sports, and Tourism - Pico (N = 493)

4.4 Pico

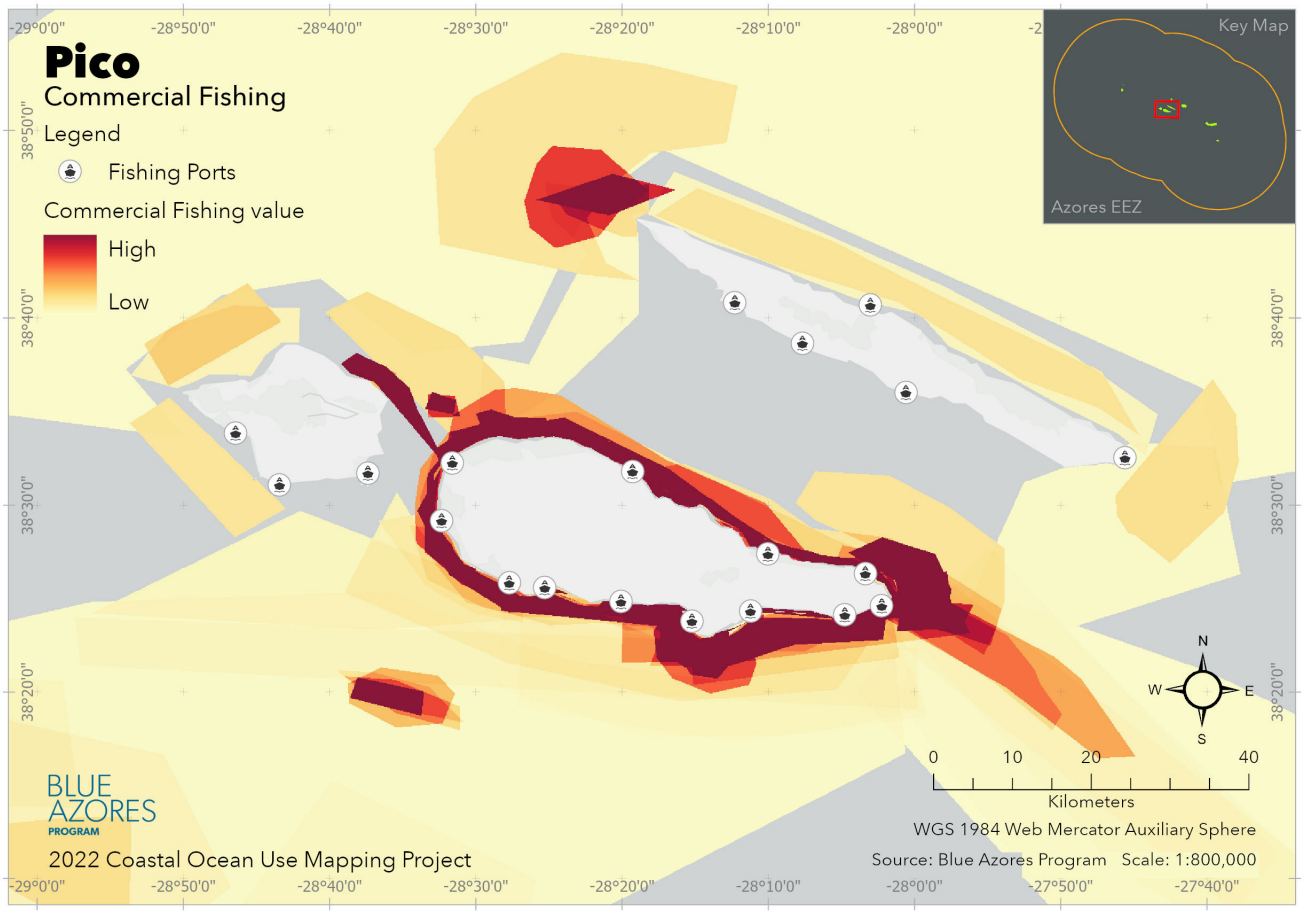

Figure 20: Commercial Fishing - Pico (N = 102)

4.4 Pico

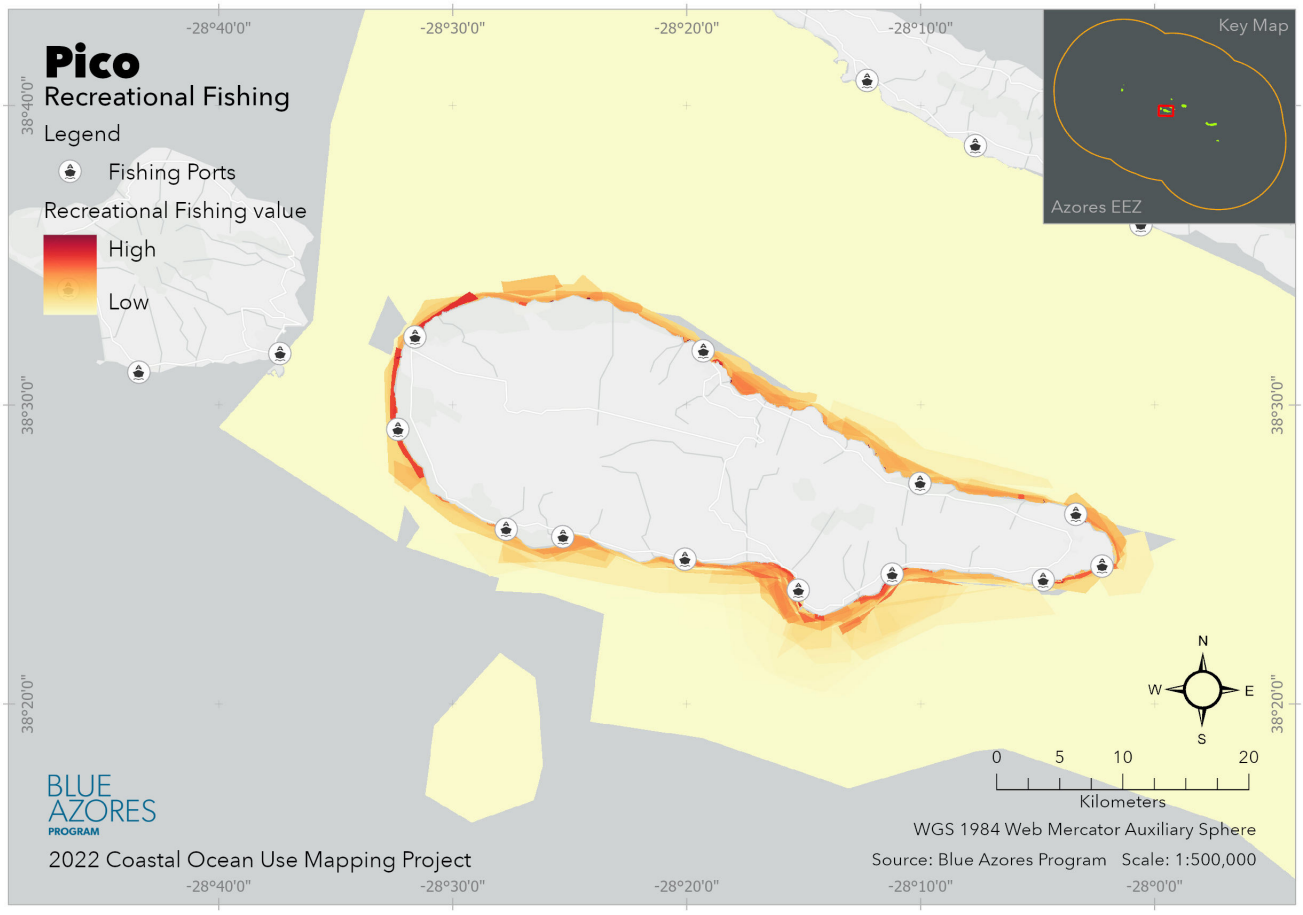

Figure 21: Recreational Fishing - Pico (N = 189)

4.4 Pico

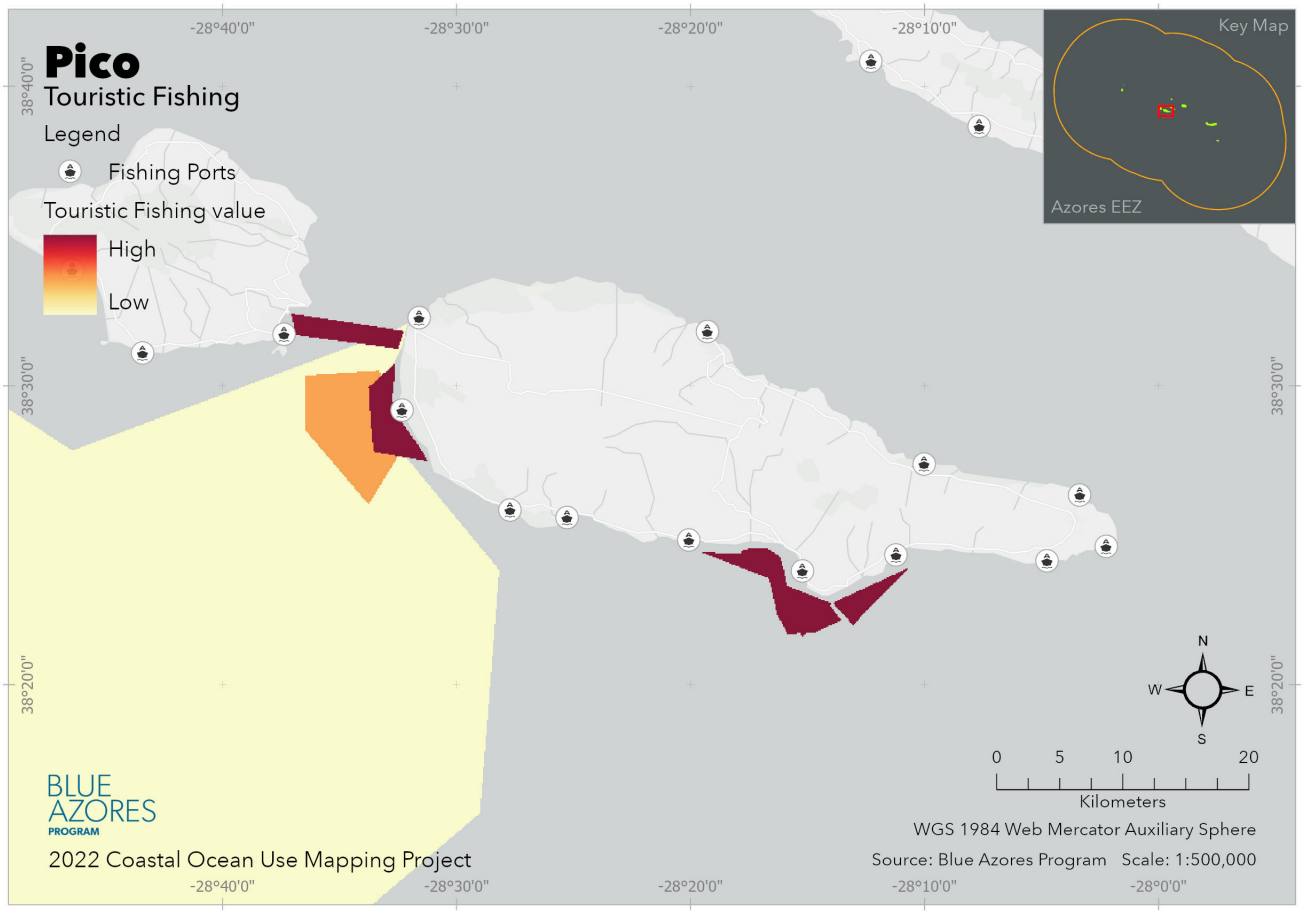

Figure 22: Touristic Fishing - Pico (N = 8)

4.4 Pico

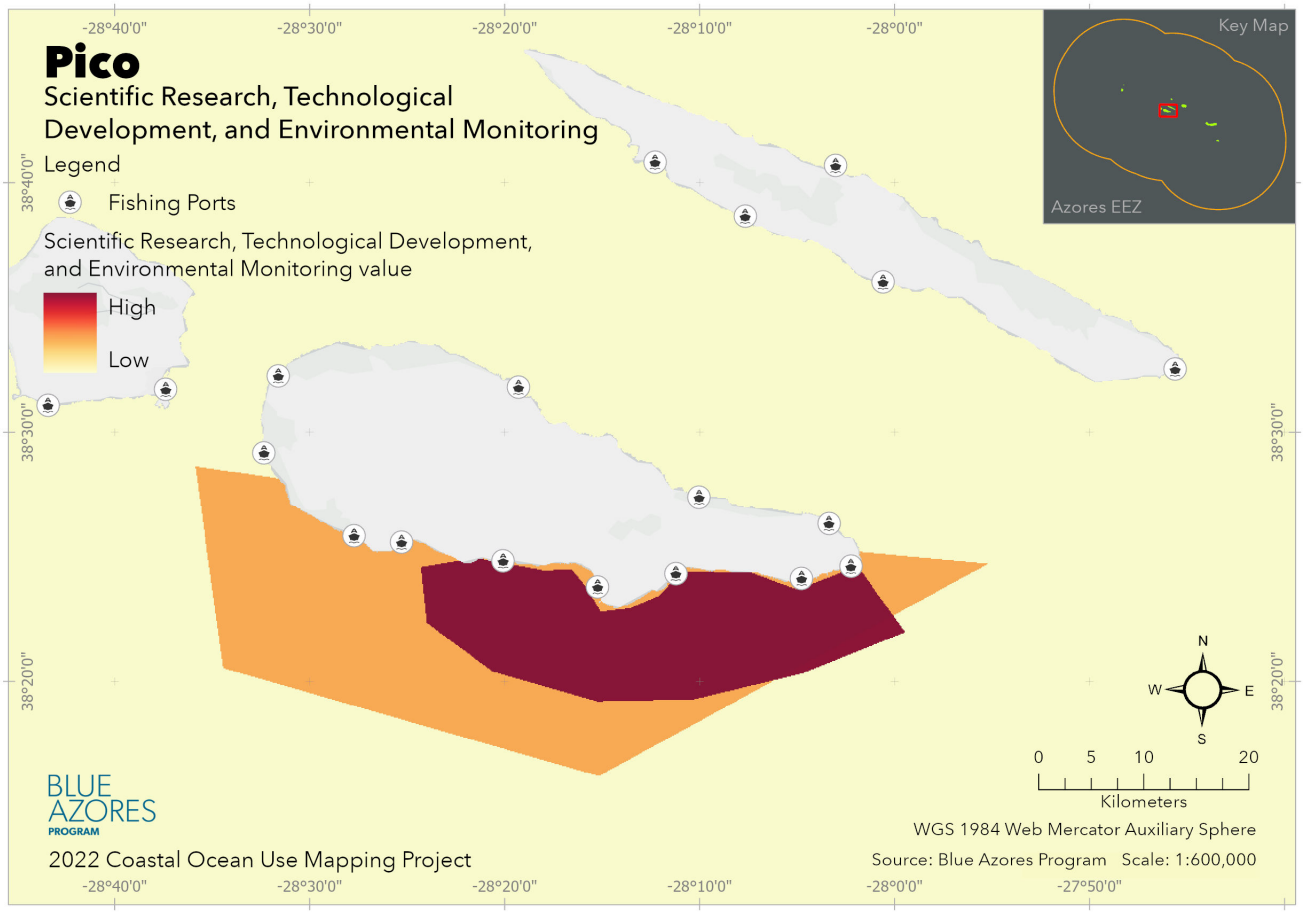

Figure 23: Scientific Research, Technological Development, and Environmental Monitoring – Pico (N = 4)

4.4 Pico

4.4.5 Heatmap Review Results

Table 10 summarizes the total number of respondents by sector who indicated interest in reviewing Santa Maria's heatmaps (opted into the review process), and the number of individuals who submitted a review. The average rating represents the average score a heatmap was given on a scale of 1 to 5, with 1 indicating low satisfaction with the distribution of value represented on a given sector's heatmap and 5 indicating high satisfaction.

	Recreation, Sports, and Tourism	Commercial Fishing	Recreational Fishing	Touristic Fishing	Scientific Research, Technological Development, and Environmental Monitoring
Total sector responses	225	41	101	5	4
Total respondents who opted into the review process	80	11	38	3	2
Total responses to heatmap review survey	3	2	4	2	1
Average heatmap rating	5	4.5	3.25	3	5
Indicated there are high value areas missing	0	0	1	1	0
Indicated there are high value areas that do not belong	0	1	1	0	0
Indicated 'Other' issue with the heatmap	0	0	0	0	0

Table 13: Heatmap Review Results - Pico

4.5 Faial

Santa Maria is an eastern island of the Azores archipelago.5,408 According to the 2021 census, it has a total population of 5,408 people residing in a single municipality. 4 locally based individuals were hired and trained to facilitate survey responses over a 3-week period of implementation from 7 – 28 February 2022. In total, 181 sector responses were collected from 153 respondents representing the ocean use patterns of 534 individuals in Santa Maria, which exceeded the population target of 68 individuals (Table 8).

	Island Population	Target: Population	Individual Respondents	Sector Responses	Individuals Represented
Total	14,334	68	111	163	485

Table 14: Total Responses – Faial

4.5.1 Group Responses

- Recorded 103 group responses (more than one person)
- The average group size was 5
- The largest group surveyed represented 56 individuals

4.5 Faial

4.5.2 Sector-Based Responses

As participants were not limited to responding in a single sector of ocean use, 41% of total respondents recorded use in multiple sectors. 313 responses were received in the recreation, sports, and tourism sector, equating to 40% of total sector responses. Most responses collected in Faial indicated recreational use activity as only 12 responses in this sector represented a tourism company or nautical center. All 38 responses collected from commercial fishing vessels responded that they also participate in commercial invertebrate harvesting activity. 112 recreational fishers and 3 touristic fishing operators are represented in the survey.

Sector	Subsector	Known Sector Population	Sector Target	Total Responses Submitted	Total Individuals Represented
Recreation, Sports, and Tourism	Cetacean Watching Operators	5			
	Scuba Diving Operators	7			
	Nautical Centers	1	12	12	100
Commercial Fishing	Invertebrate Harvesting Licenses	21	17	38	122
	Commercial Fishing- Vessels	49	27	38	126
Recreational Fishing	Leisure Fishing Licenses	161			
	Underwater Fishing - Licenses	286	60	41	112
Touristic Fishing	Touristic Fishing Operators	8	8	3	13

Table 15: Sector-Based Responses – Faial

- **Recreation, Sports, and Tourism**
  - o Tourism Operators and Nautical Centers

    13 reflects the total number of known tourism operators and nautical centers in the island of Faial. ***12*** responses collected represented a tourism company or nautical center.
- **Commercial Fishing**
  - o Invertebrate Harvesting Licenses

    21 reflects the number of known individuals with commercial harvesting licenses in the island of Faial. ***122*** indicates the total number of Faial residents represented in the survey for their commercial harvesting activity.
  - o Commercial Fishing Vessels

    49 reflects the number of known commercial fishing vessels in the island of Faial. Responses were received from ***38*** different commercial fishing vessels.
- **Recreational Fishing**
  - o Leisure Fishing Licenses and Underwater Fishing Licenses

    447 reflects the number of known individuals with a recreational fishing license (leisure fishing license, underwater fishing license) in the island of Faial. ***112*** indicates the total number of Faial residents represented in the survey for their recreational fishing activity.
- **Touristic Fishing**
  - o Touristic Fishing Operators

    8 reflects the total number of known touristic fishing operators in the island of Faial. Responses were received from ***3*** different touristic fishing operators.

4.5 Faial

4.5.3 Respondent Demographics

Out of 111 total respondents, 82 disclosed their age. Ages ranged from 20 to 80, with a mean age of 41. Of the 87 respondents who disclosed their gender, 24% identified as female and 76% identified as male (Figure 24).

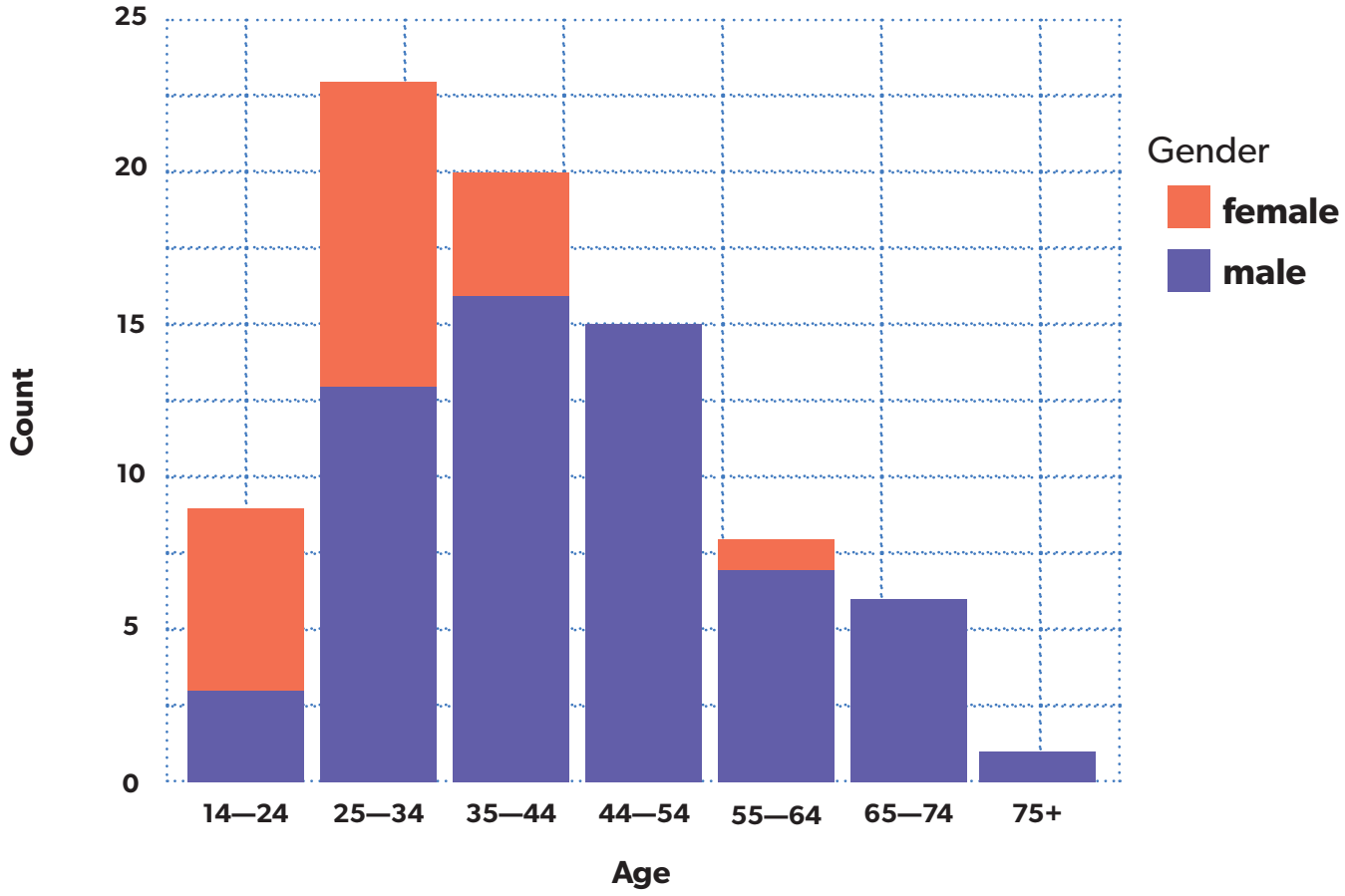

Figure 24: Respondent Demographics – Faial

4.5.4 Heatmaps

Heatmaps which summarize survey responses collected in Faial in each sector of ocean use with 3 or more shapes drawn are shown below. The number of shapes input into each heatmap are reported in the caption ("N").

4.5 Faial

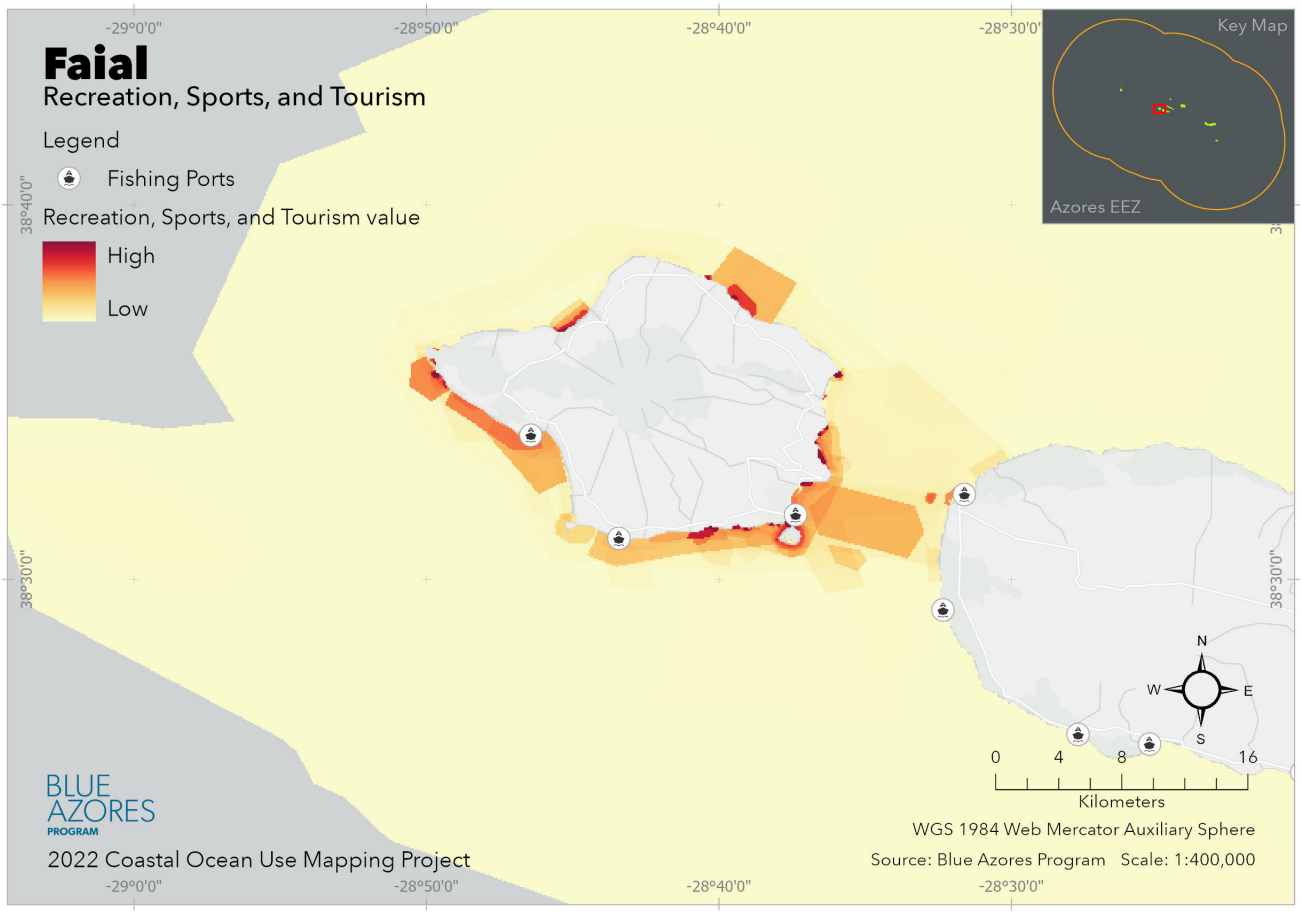

Figure 25: Recreation, Sports, and Tourism - Faial (N = 371)

4.5 Faial

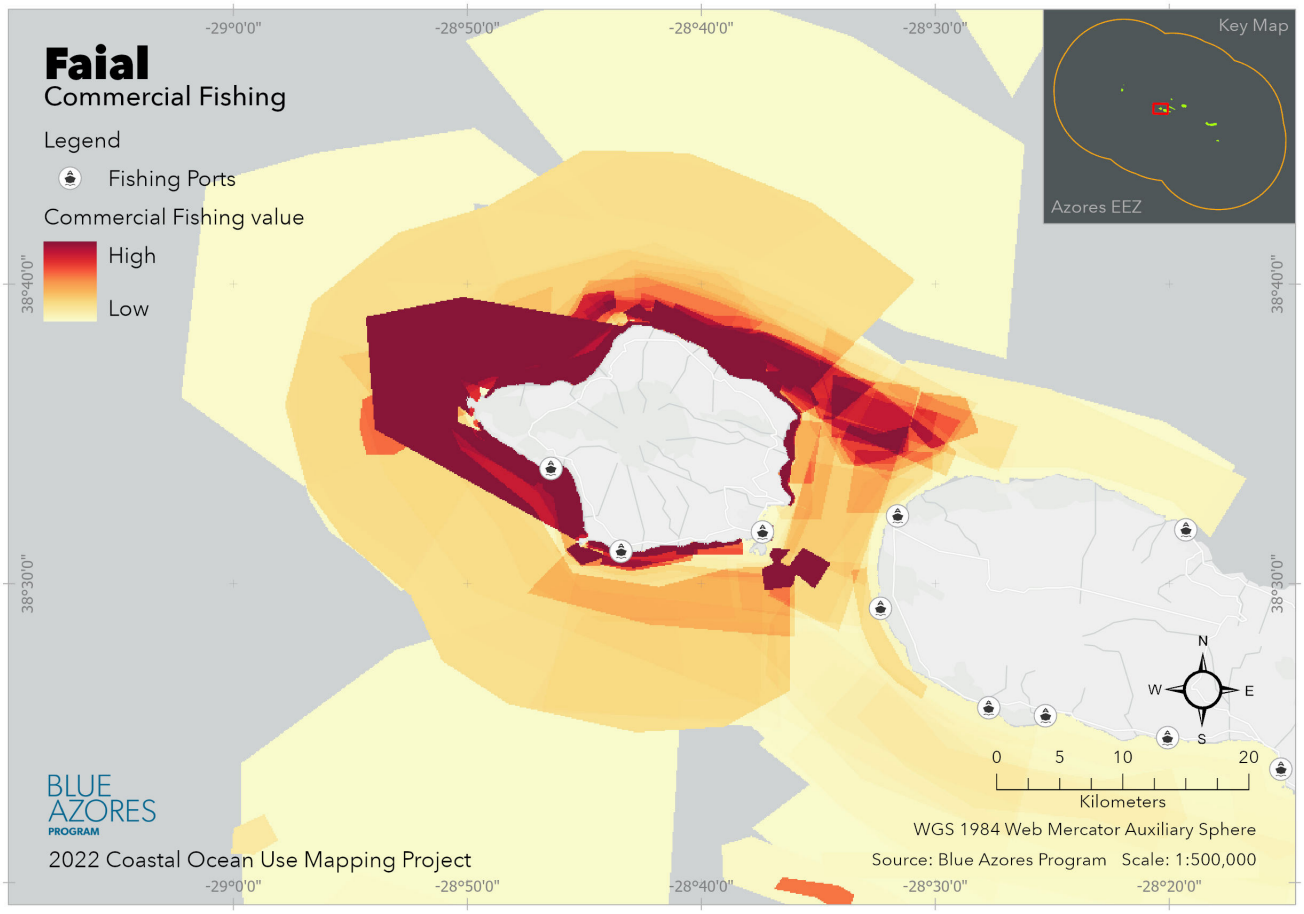

Figure 26: Commercial Fishing - Faial (N = 163)

4.5 Faial

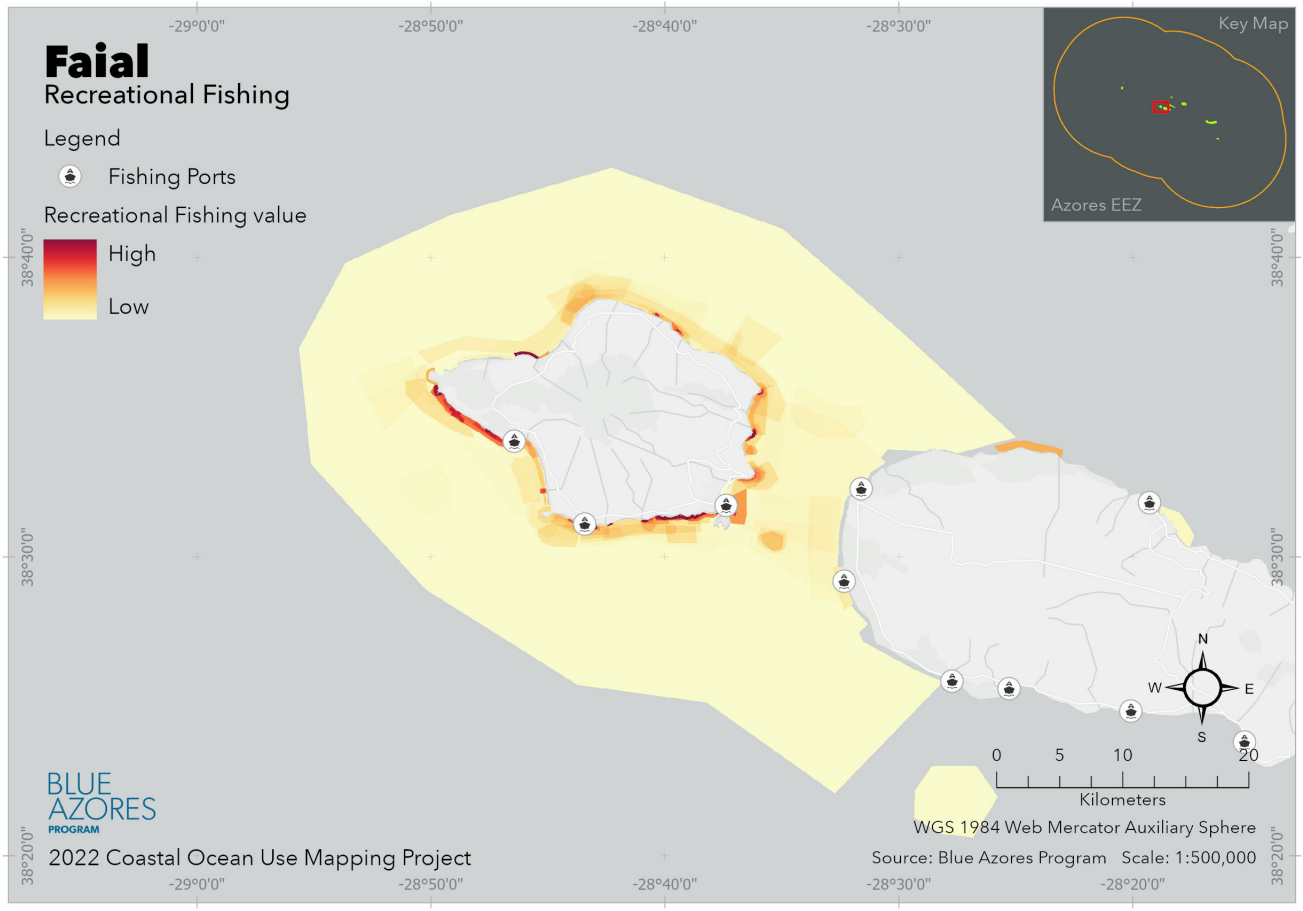

Figure 27: Recreational Fishing - Faial (N = 185)

4.5 Faial

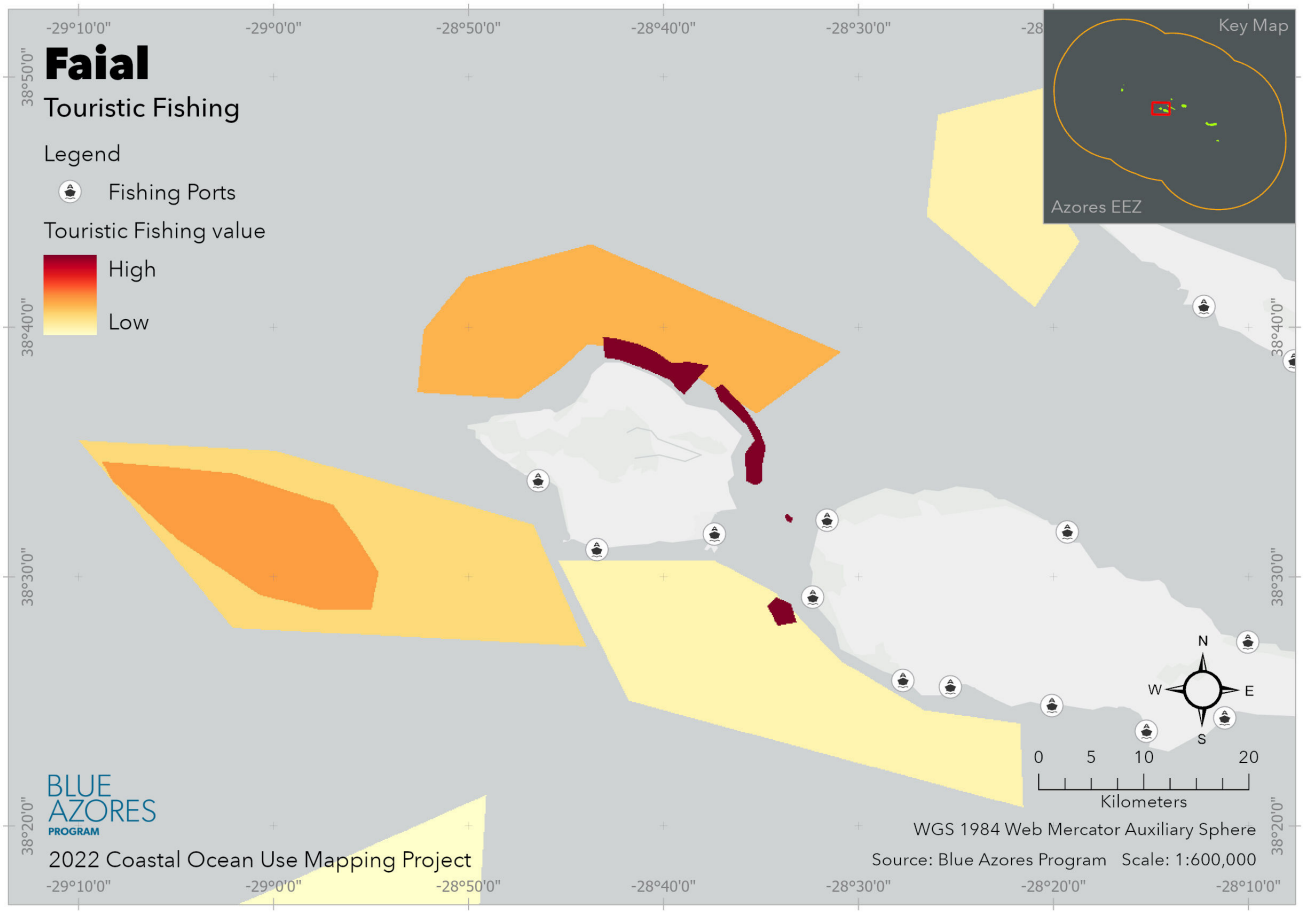

Figure 28: Touristic Fishing - Faial (N = 10)

4.5 Faial

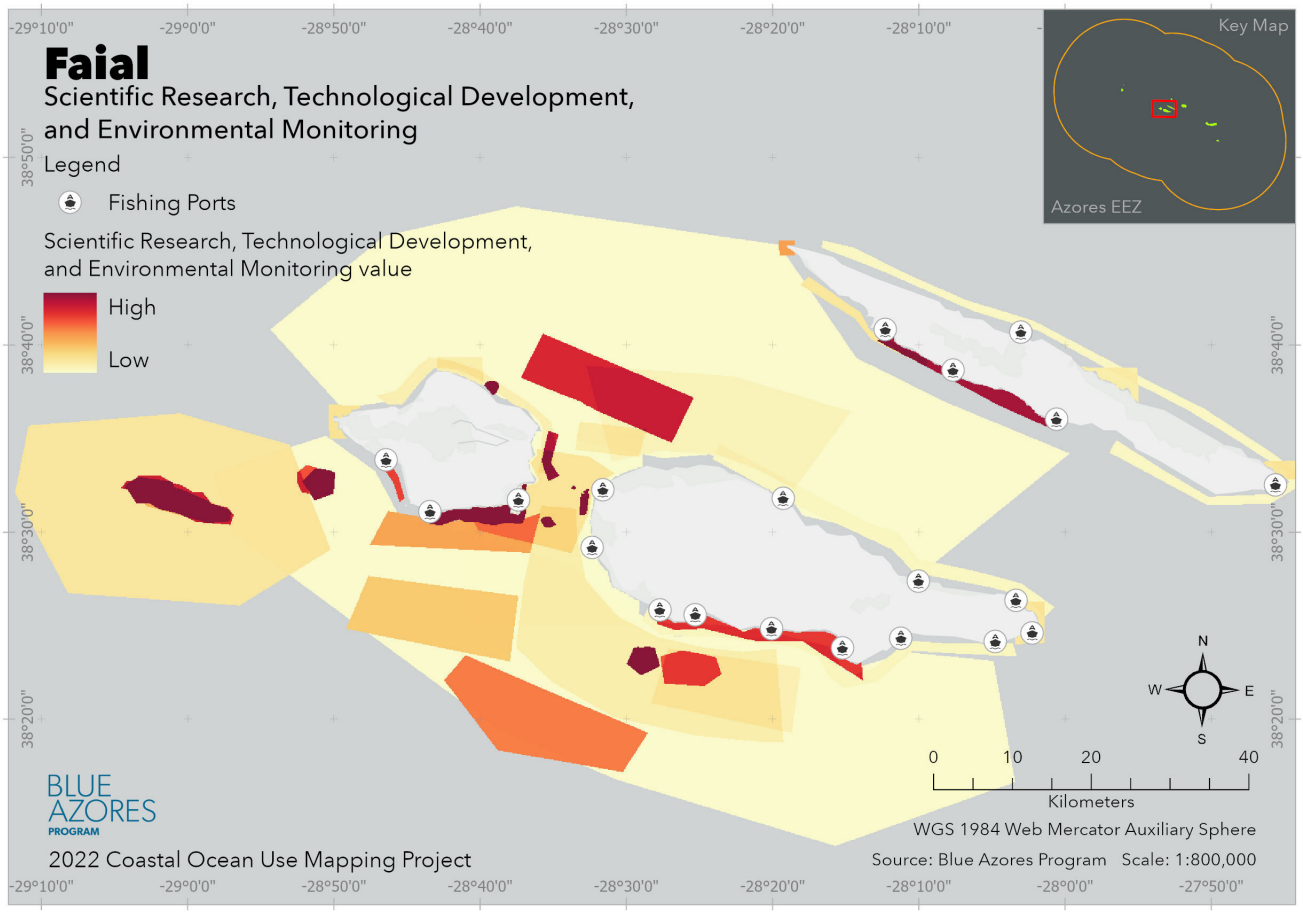

Figure 29: Scientific Research, Technological Development, and Environmental Monitoring – Faial (N = 65)

4.5 Faial

4.5.5 Heatmap Review Results

Table 16 summarizes the total number of respondents by sector who indicated interest in reviewing Faial's heatmaps (opted into the review process), and the number of individuals who submitted a review. The average rating represents the average score a heatmap was given on a scale of 1 to 5, with 1 indicating low satisfaction with the distribution of value represented on a given sector's heatmap and 5 indicating high satisfaction.

	Recreation, Sports, and Tourism	Commercial Fishing	Recreational Fishing	Touristic Fishing	Scientific Research, Technological Development, and Environmental Monitoring
Total sector responses	66	38	41	3	13
Total respondents who opted into the review process	47	20	27	2	11
Total responses to heatmap review survey	1	7	2	1	2
Average heatmap rating	4	4.43	4	3	4.5
Indicated there are high value areas missing	0	2	0	1	1
Indicated there are high value areas that do not belong	1	2	0	0	0
Indicated 'Other' issue with the heatmap	0	0	2	0	0

Table 16: Heatmap Review Results - Faial

4.6 Graciosa

Graciosa is a central island of the Azores archipelago. According to the 2021 census, it has a total population of 4,091 people residing in a single municipality. 4 locally based individuals were hired and trained to facilitate survey responses over an 8-week period of implementation from 18 April – 13 June 2022. In total, 168 sector responses were collected from 134 respondents representing the ocean use patterns of 225 individuals in Graciosa, which exceeded the population target of 67 individuals (Table 17).

	Island Population	Target: Population	Individual Respondents	Sector Responses	Individuals Represented
Total	4,091	67	134	168	225

Table 17: Total Responses - Graciosa

4.6.1 Group Responses

- Recorded 52 group responses (more than one person)
- The average group size was 3
- The largest group surveyed represented 10 individuals

4.6 Graciosa

4.6.2 Sector-Based Responses

As participants were not limited to responding in a single sector of ocean use, 24% of total respondents recorded use in multiple sectors. 75 responses were received in the recreation, sports, and tourism sector, equating to 45% of total sector responses. Most responses collected in Graciosa indicated recreational use activity as only 4 responses in this sector represented a tourism company or nautical center. All 33 responses collected from commercial fishing vessels responded that they also participate in commercial invertebrate harvesting activity. 86 recreational fishers and 2 touristic fishing operators are represented in the survey.

Sector	Subsector	Known Sector Population	Sector Target	Total Responses Submitted	Total Individuals Represented
Recreation, Sports, and Tourism	Cetacean Watching Operators	0	4	4	9
	Scuba Diving Operators	3			
	Nautical Centers	1			
Commercial Fishing	Invertebrate Harvesting Licenses	18	15	33	44
	Commercial Fishing- Vessels	33	23	33	44
Recreational Fishing	Leisure Fishing Licenses	83	52	56	86
	Underwater Fishing - Licenses	133			
Touristic Fishing	Touristic Fishing Operators	3	3	2	7

Table 18: Sector-Based Responses – Graciosa

- **Recreation, Sports, and Tourism**
  - o Tourism Operators and Nautical Centers

    4 reflects the total number of known tourism operators and nautical centers in the island of Graciosa. ***4*** responses collected represented a tourism company or nautical center.
- **Commercial Fishing**
  - o Invertebrate Harvesting Licenses

    18 reflects the number of known individuals with commercial harvesting licenses in the island of Graciosa. ***44*** indicates the total number of Graciosa residents represented in the survey for their commercial harvesting activity.
  - o Commercial Fishing Vessels

    33 reflects the number of known commercial fishing vessels in the island of Graciosa. Responses were received from ***33*** different commercial fishing vessels.
- **Recreational Fishing**
  - o Leisure Fishing Licenses and Underwater Fishing Licenses

    216 reflects the number of known individuals with a recreational fishing license (leisure fishing license, underwater fishing license) in the island of Graciosa. ***86*** indicates the total number of Graciosa residents represented in the survey for their recreational fishing activity.
- **Touristic Fishing**
  - o Touristic Fishing Operators

    3 reflects the total number of known touristic fishing operators in the island of Graciosa. Responses were received from ***2*** different touristic fishing operators.

4.6 Graciosa

4.6.3 Respondent Demographics

Out of 134 total respondents, 92 disclosed their age. Ages ranged from 17 to 83, with a mean age of 39. Of the 99 respondents who disclosed their gender, 35% identified as female and 65% identified as male (Figure 30).

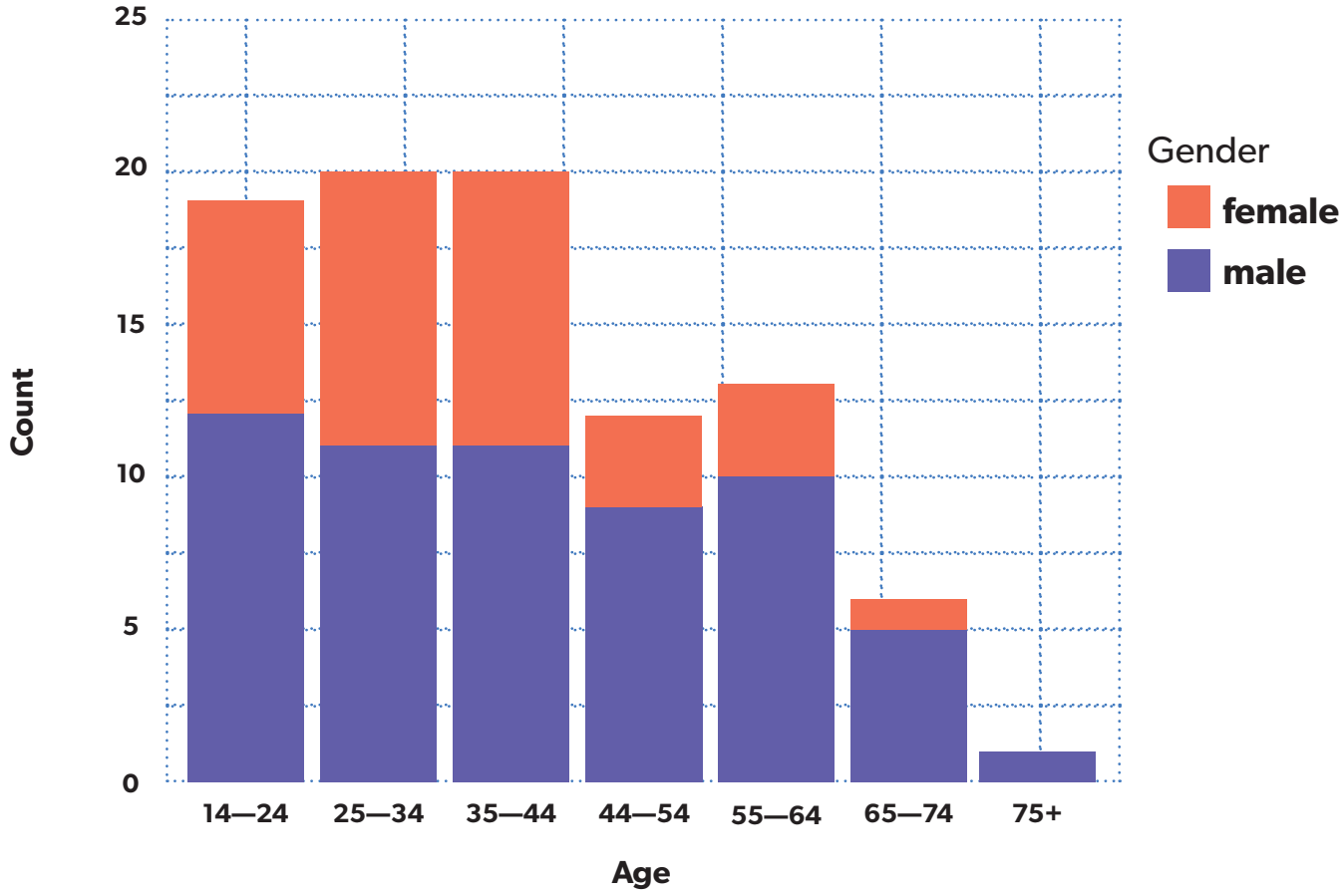

Figure 30: Respondent Demographics – Graciosa

4.6.4 Heatmaps

Heatmaps which summarize survey responses collected in Graciosa in each sector of ocean use with 3 or more shapes drawn are shown below. The number of shapes input into each heatmap are reported in the caption ("N").

4.6 Graciosa

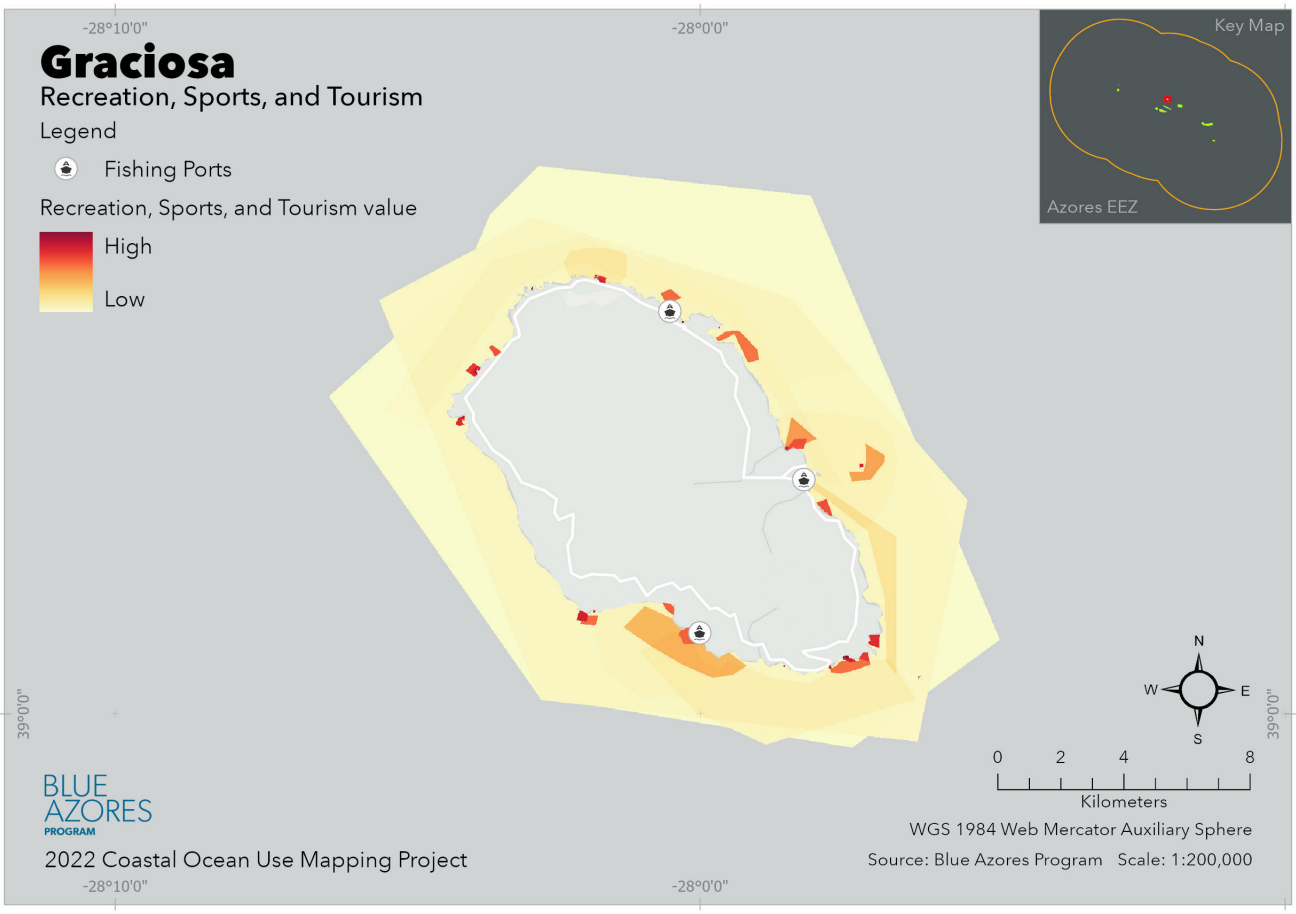

Figure 31: Recreation, Sports, and Tourism - Graciosa (N = 136)

4.6 Graciosa

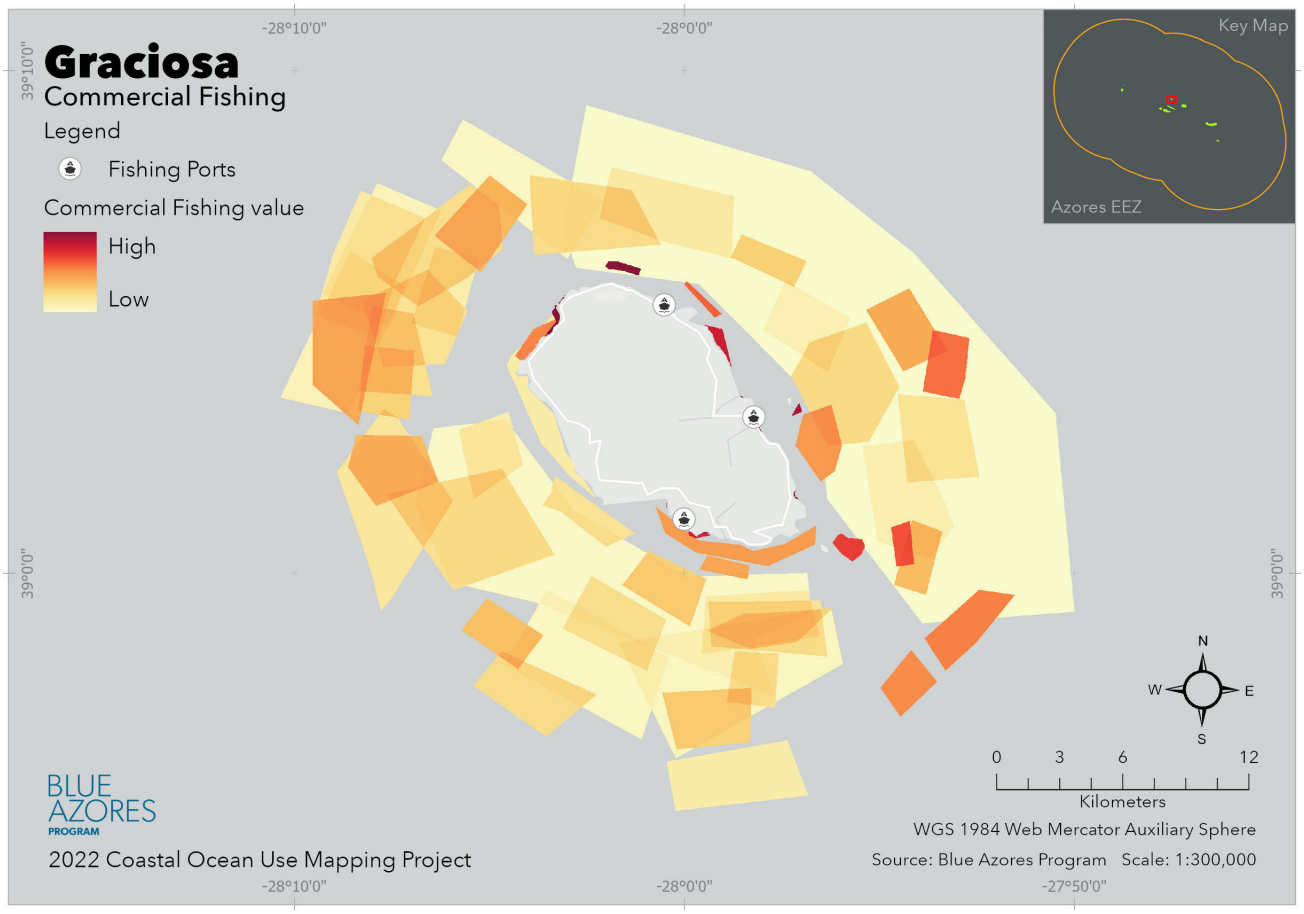

Figure 32: Commercial Fishing - Graciosa (N = 68)

4.6 Graciosa

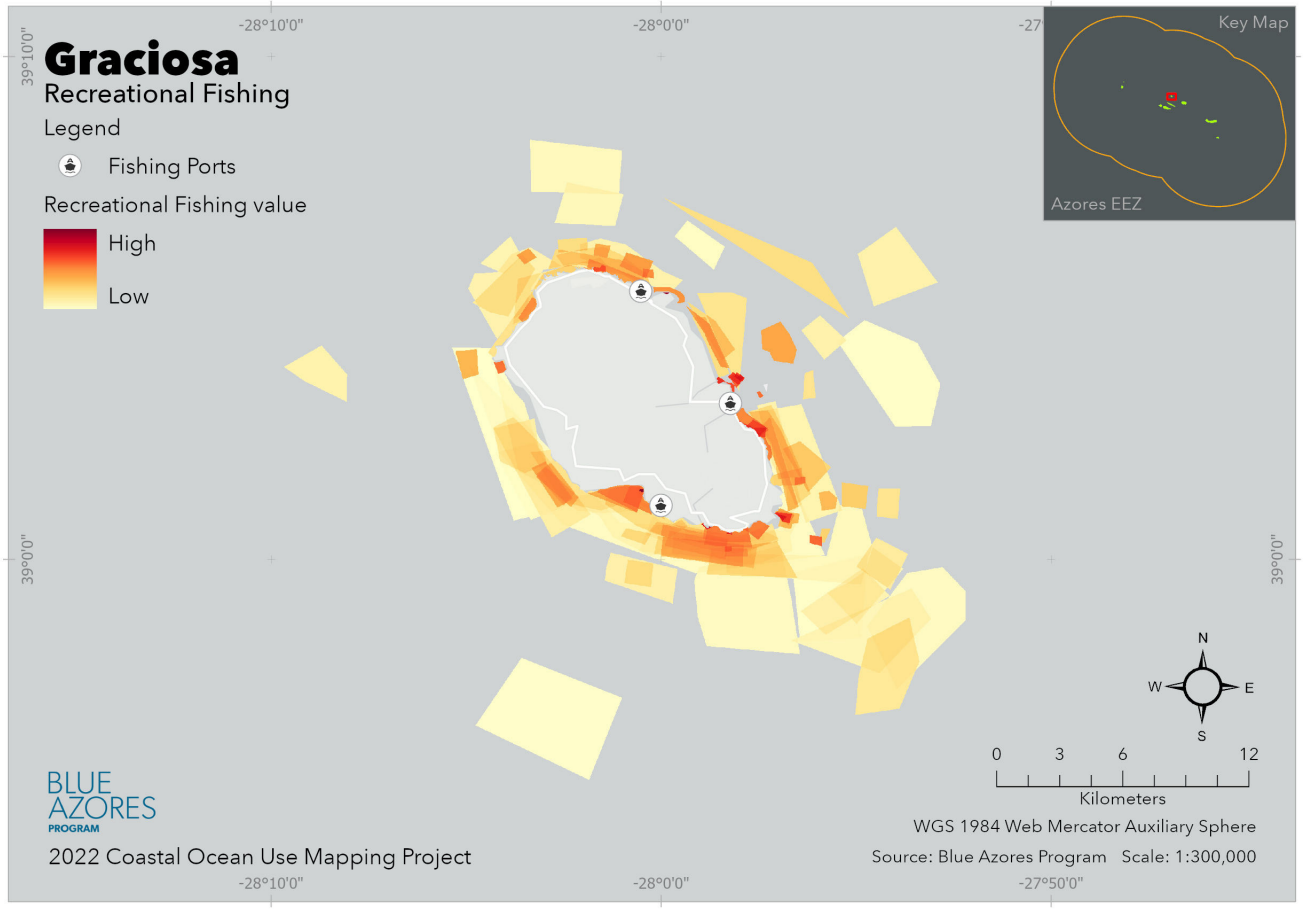

Figure 33: Recreational Fishing - Graciosa (N = 116)

4.6 Graciosa

4.6.5 Heatmap Review Results

Table 19 summarizes the total number of respondents by sector who indicated interest in reviewing Graciosa's heatmaps (opted into the review process), and the number of individuals who submitted a review. The average rating represents the average score a heatmap was given on a scale of 1 to 5, with 1 indicating low satisfaction with the distribution of value represented on a given sector's heatmap and 5 indicating high satisfaction.

	Recreation, Sports, and Tourism	Commercial Fishing	Recreational Fishing	Touristic Fishing
Total sector responses	75	33	56	2
Total respondents who opted into the review process	33	10	23	2
Total responses to heatmap review survey	3	2	2	1
Average heatmap rating	3.33	3.5	4.5	3
Indicated there are high value areas missing	1	0	0	0
Indicated there are high value areas that do not belong	0	2	1	1
Indicated 'Other' issue with the heatmap	2	0	0	0

Table 19: Heatmap Review Results - Graciosa

4.7 São Jorge

São Jorge is a central island of the Azores archipelago. According to the 2021 census, it has a total population of 8,373 people residing in 2 municipalities. 5 locally based individuals were hired and trained to facilitate survey responses over a 12-week period of implementation from 19 September – 12 December 2022. In total, 259 sector responses were collected from 174 respondents representing the ocean use patterns of 441 individuals in São Jorge, which exceeded the population target of 135 individuals (Table 20).

	Island Population	Target: Population	Individual Respondents	Sector Responses	Individuals Represented
Total	8,373	135	174	259	441

Table 20: Total Responses - São Jorge

4.7.1 Group Responses

- Recorded 138 group responses (more than one person)
- The average group size was 3
- The largest group surveyed represented 30 individuals

4.7 São Jorge

4.7.2 Sector-Based Responses

As participants were not limited to responding in a single sector of ocean use, 40% of total respondents recorded use in multiple sectors. 146 responses were received in the recreation, sports, and tourism sector, equating to 56% of total sector responses. Most responses collected in São Jorge indicated recreational use activity as only 14 responses in this sector represented a tourism company or nautical center. Out of the 31 responses collected from commercial fishing vessels, 20 respondents participated in commercial invertebrate harvesting activity. 122 recreational fishers and 6 touristic fishing operators are represented in the survey.

Sector	Subsector	Known Sector Population	Sector Target	Total Responses Submitted	Total Individuals Represented
Recreation, Sports, and Tourism	Cetacean Watching Operators	0	2	14	48
	Scuba Diving Operators	2			
	Nautical Centers	0			
Commercial Fishing	Invertebrate Harvesting Licenses	26	20	20	33
	Commercial Fishing- Vessels	30	22	31	63
Recreational Fishing	Leisure Fishing Licenses	160	60	75	122
	Underwater Fishing - Licenses	277			
Touristic Fishing	Touristic Fishing Operators	6	6	6	14

Table 21: Sector-Based Responses São Jorge

- **Recreation, Sports, and Tourism**
  - o Tourism Operators and Nautical Centers

    2 reflects the total number of known tourism operators and nautical centers in the island of São Jorge. ***14*** responses collected represented a tourism company or nautical center.
- **Commercial Fishing**
  - o Invertebrate Harvesting Licenses

    26 reflects the number of known individuals with commercial harvesting licenses in the island of São Jorge. ***33*** indicates the total number of São Jorge residents represented in the survey for their commercial harvesting activity.
  - o Commercial Fishing Vessels

    30 reflects the number of known commercial fishing vessels in the island of São Jorge. Responses were received from ***30*** different commercial fishing vessels.
- **Recreational Fishing**
  - o Leisure Fishing Licenses and Underwater Fishing Licenses

    437 reflects the number of known individuals with a recreational fishing license (leisure fishing license, underwater fishing license) in the island of São Jorge. ***122*** indicates the total number of São Jorge residents represented in the survey for their recreational fishing activity.
- **Touristic Fishing**
  - o Touristic Fishing Operators

    6 reflects the total number of known touristic fishing operators in the island of São Jorge. Responses were received from ***6*** different touristic fishing operators.

4.7 São Jorge

4.7.3 Respondent Demographics

Out of 174 total respondents, 138 disclosed their age. Ages ranged from 17 to 75, with a mean age of 39. Of the 138 respondents who disclosed their gender, 29% identified as female and 71% identified as male (Figure 34).

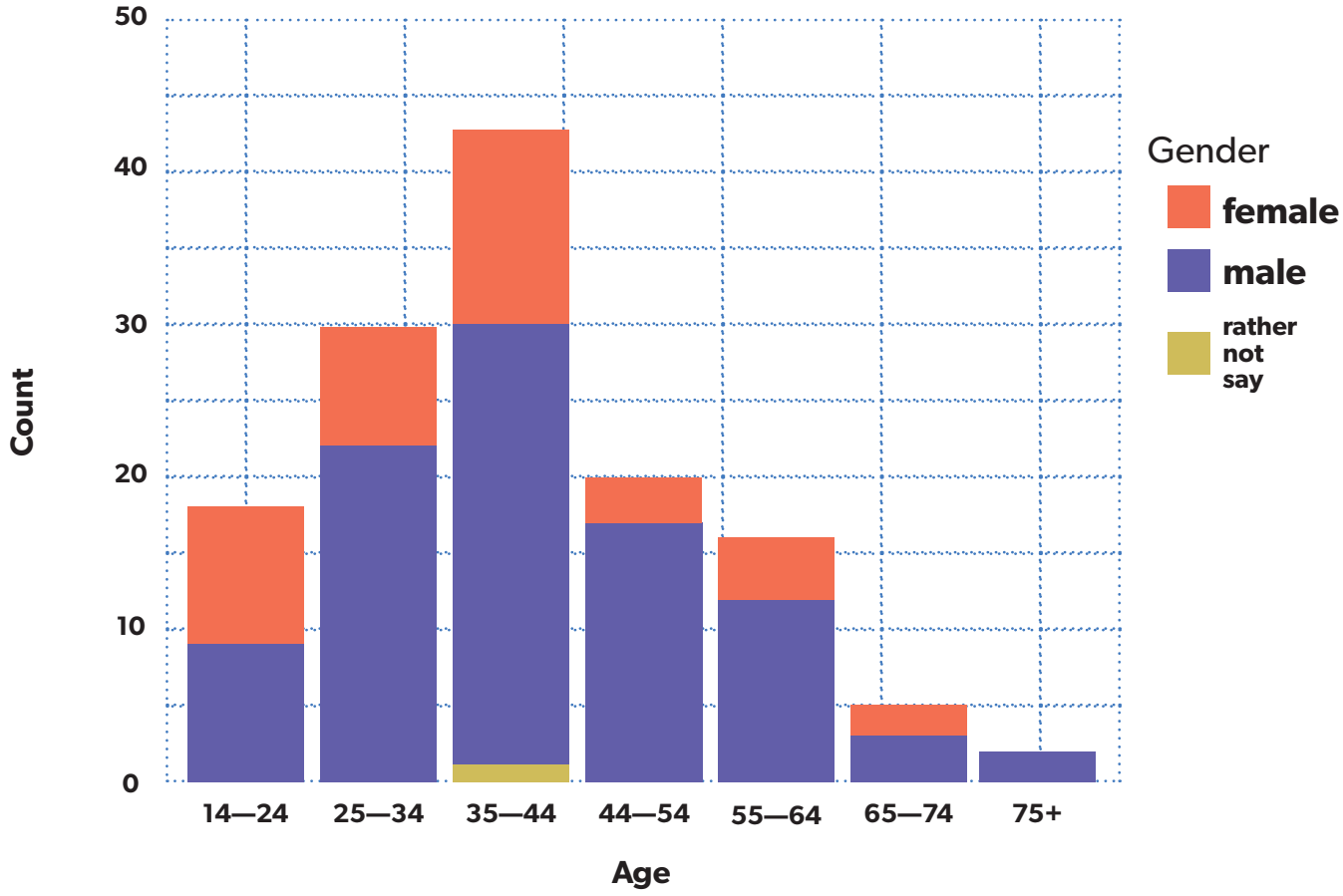

Figure 34: Respondent Demographics – São Jorge

4.7.4 Heatmaps

Heatmaps which summarize survey responses collected in São Jorge in each sector of ocean use with 3 or more shapes drawn are shown below. The number of shapes input into each heatmap are reported in the caption ("N").

4.7 São Jorge

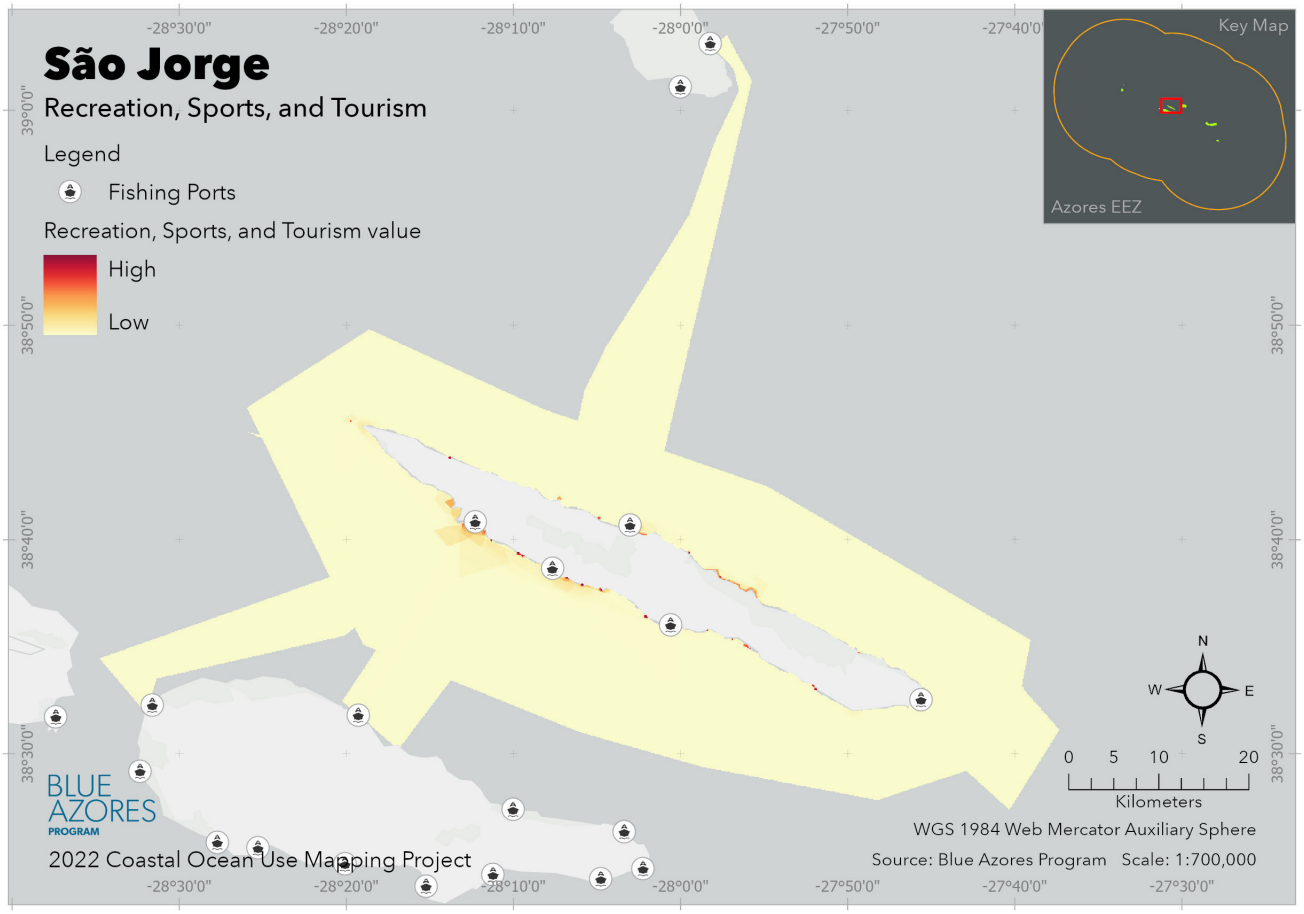

Figure 35: Recreation, Sports, and Tourism – São Jorge (N = 353)

4.7 São Jorge

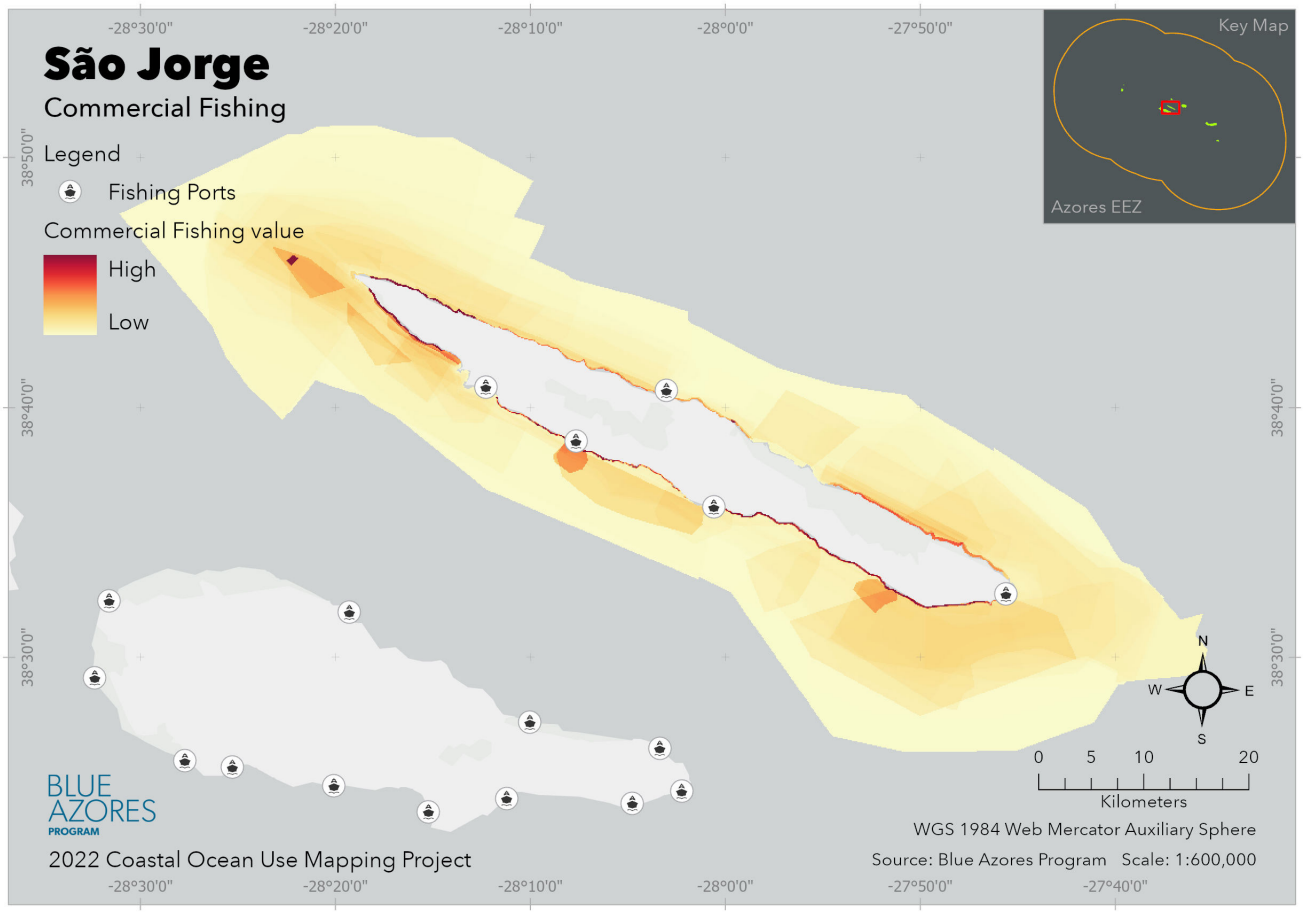

Figure 36: Commercial Fishing - São Jorge (N = 71)

4.7 São Jorge

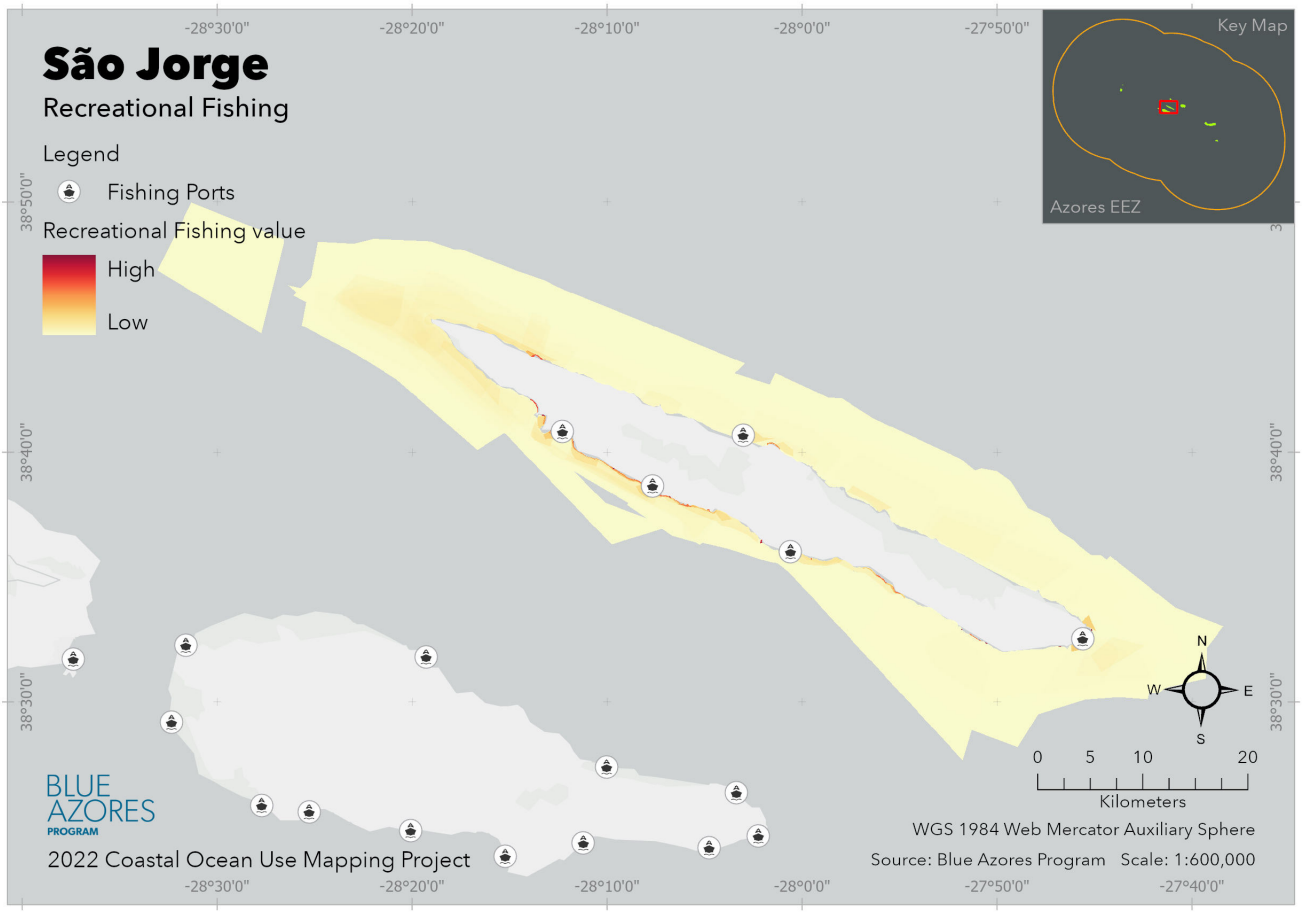

Figure 37: Recreational Fishing - São Jorge (N = 136)

4.7 São Jorge

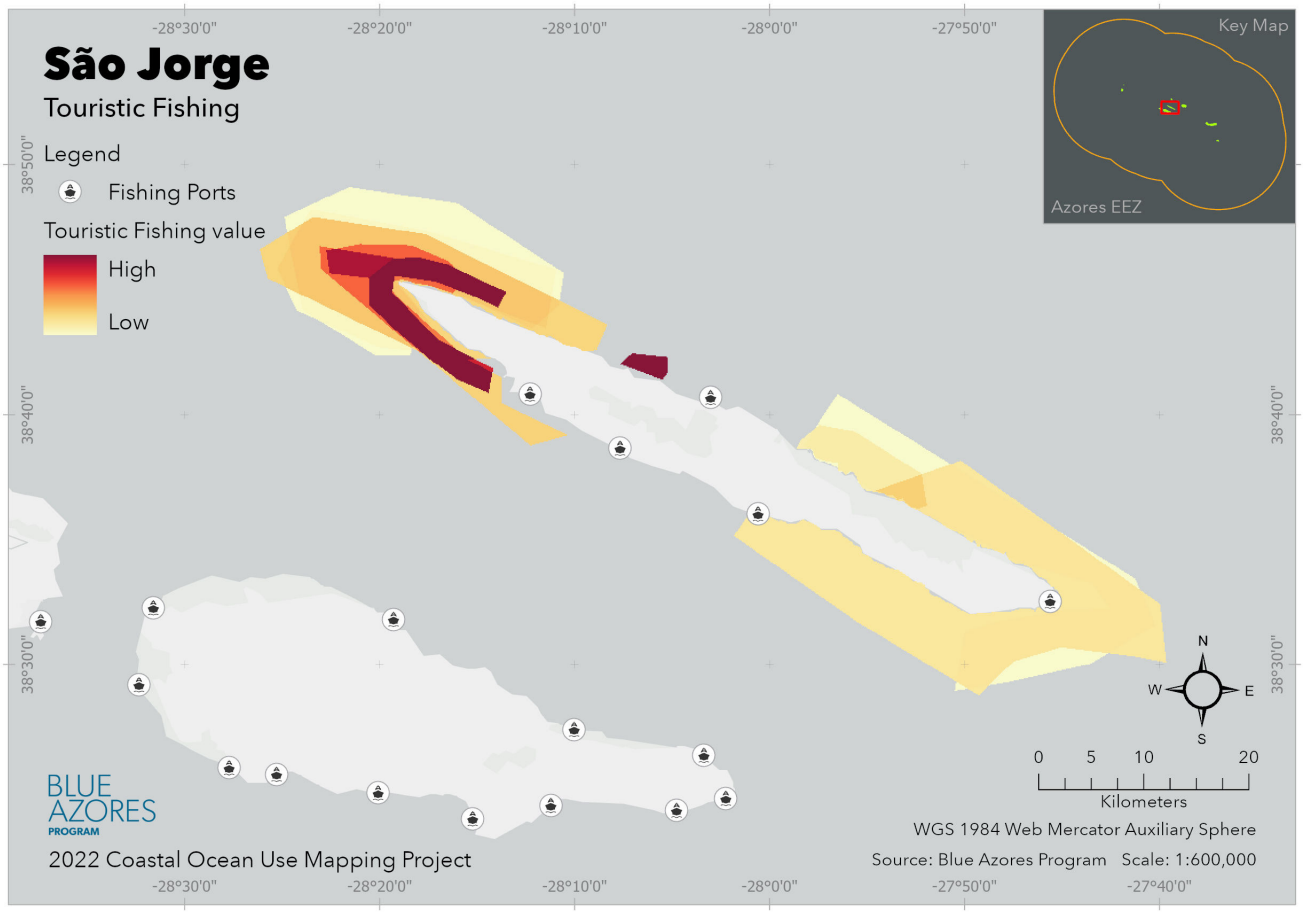

Figure 38: Touristic Fishing - São Jorge (N = 10)

4.7 São Jorge

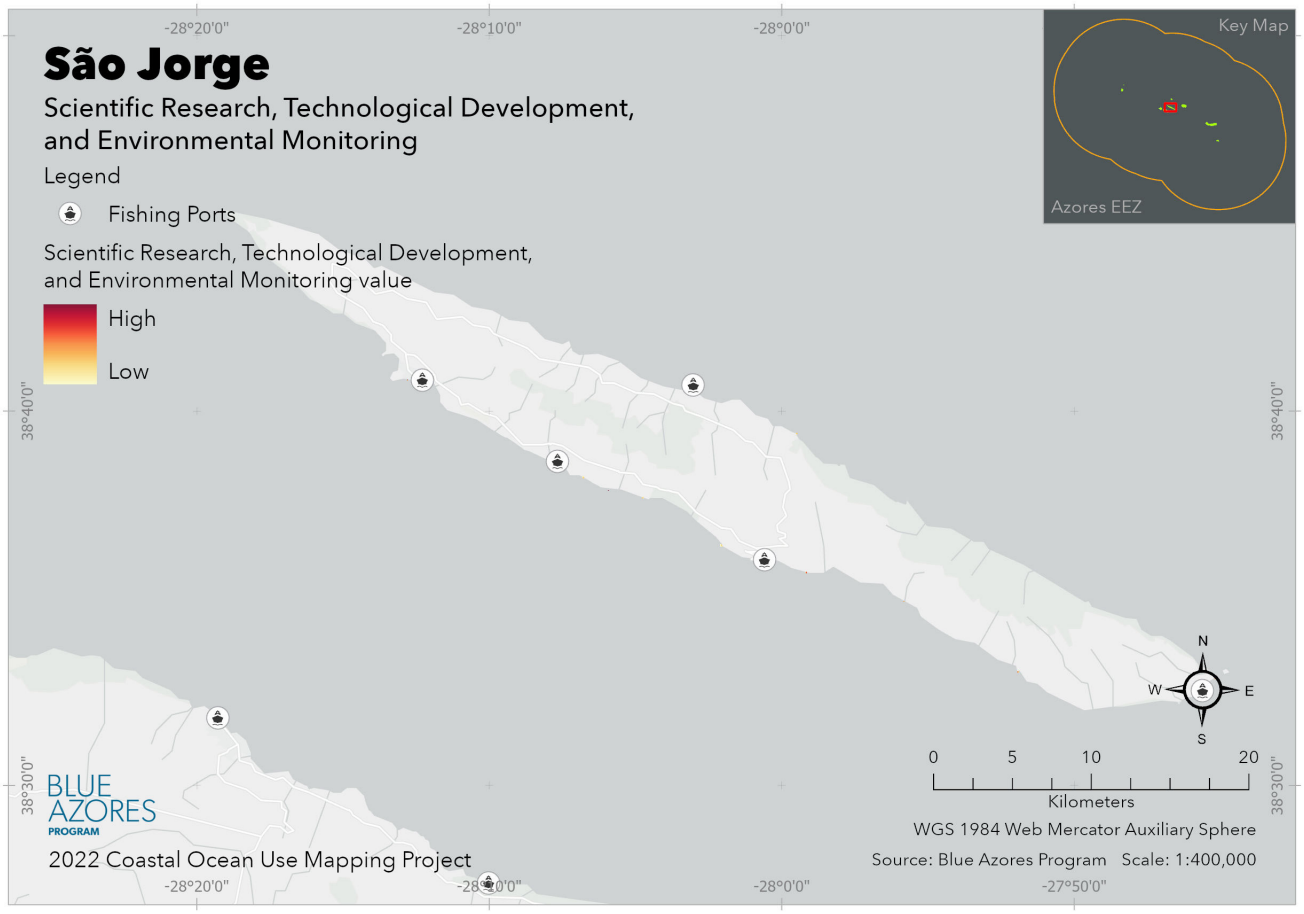

Figure 39: Scientific Research, Technological Development, and Environmental Monitoring – São Jorge (N = 16)

4.7 São Jorge

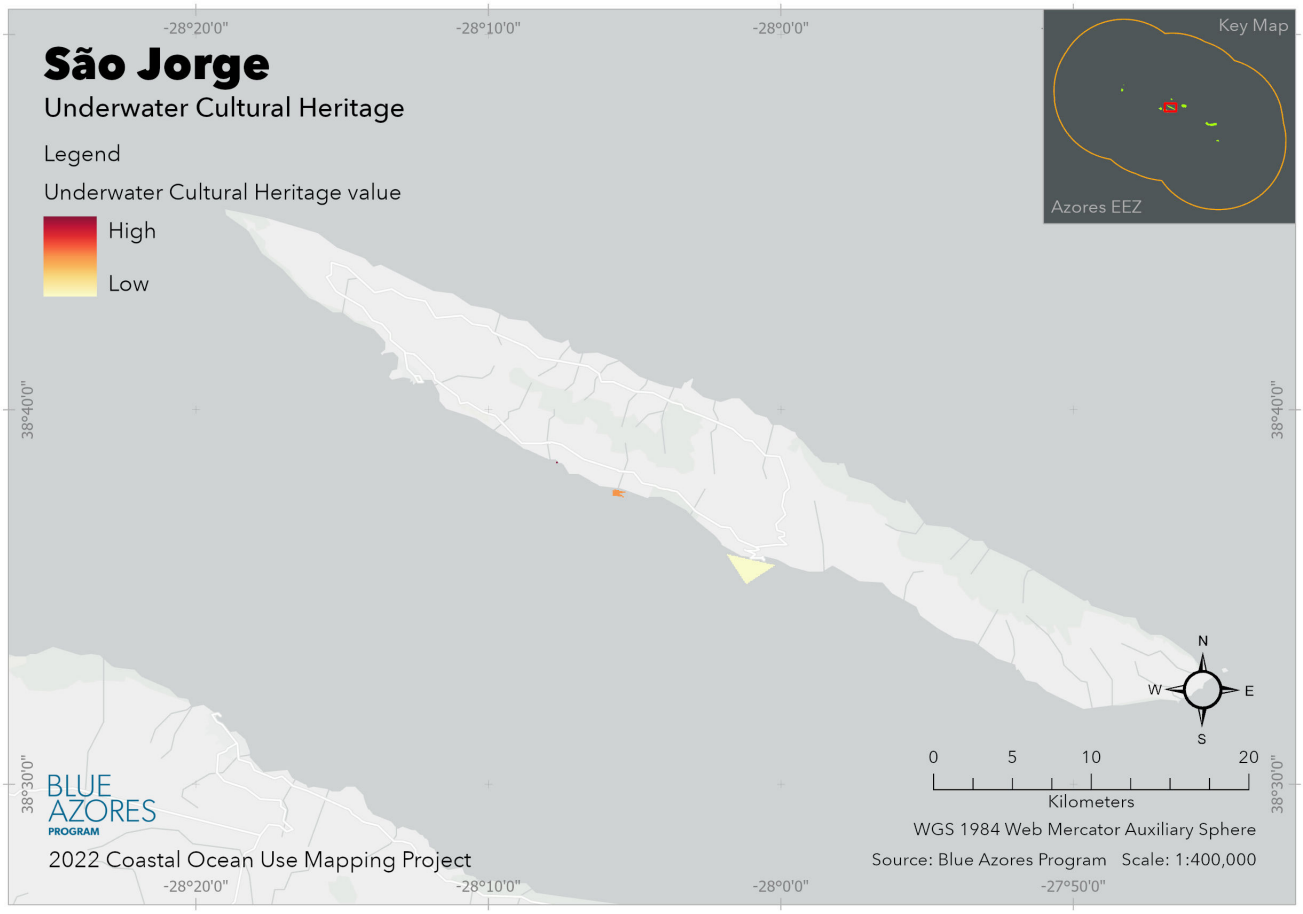

Figure 40: Underwater Cultural Heritage – São Jorge (N = 3)

4.7 São Jorge

4.7.5 Heatmap Review Results

Table 22 summarizes the total number of respondents by sector who indicated interest in reviewing São Jorge's heatmaps (opted into the review process), and the number of individuals who submitted a review. The average rating represents the average score a heatmap was given on a scale of 1 to 5, with 1 indicating low satisfaction with the distribution of value represented on a given sector's heatmap and 5 indicating high satisfaction.

	Recreation, Sports, and Tourism	Commercial Fishing	Recreational Fishing	Touristic Fishing
Total sector responses	145	31	75	6
Total respondents who opted into the review process	78	20	41	4
Total responses to heatmap review survey	11	4	3	2
Average heatmap rating	4.18	4	4	3
Indicated there are high value areas missing	0	0	0	0
Indicated there are high value areas that do not belong	0	0	0	0
Indicated 'Other' issue with the heatmap	1	0	0	0

Table 22: Heatmap Review Results - São Jorge

4.8 Terceira

Terceira is a central island of the Azores archipelago. According to the 2021 census, it has a total population of 53,244 people residing in 2 municipalities. 4 locally based individuals were hired and trained to facilitate survey responses over a 12-week period of implementation from 19 September – 12 December 2022. In total, 317 sector responses were collected from 247 respondents representing the ocean use patterns of 368 individuals in Terceira, which exceeded the population target of 136 individuals (Table 23).

	Island Population	Target: Population	Individual Respondents	Sector Responses	Individuals Represented
Total	53,244	136	247	317	368

Table 23: Total Responses – Terceira

4.7.1 Group Responses

- Recorded 62 group responses (more than one person)
- The average group size was 3
- The largest group surveyed represented 6 individuals

4.8 Terceira

4.8.2 Sector-Based Responses

As participants were not limited to responding in a single sector of ocean use, 26% of total respondents recorded use in multiple sectors. 178 responses were received in the recreation, sports, and tourism sector, equating to 56% of total sector responses. Most responses collected in Terceira indicated recreational use activity as only 13 responses in this sector represented a tourism company or nautical center. Out of the 50 responses collected from commercial fishing vessels, 31 respondents participated in commercial invertebrate harvesting activity. 93 recreational fishers and 9 touristic fishing operators are represented in the survey.

Sector	Subsector	Known Sector Population	Sector Target	Total Responses Submitted	Total Individuals Represented
Recreation, Sports, and Tourism	Cetacean Watching Operators	7			
	Scuba Diving Operators	6			
	Nautical Centers	2	13	13	26
Commercial Fishing	Invertebrate Harvesting Licenses	30	22	31	43
	Commercial Fishing- Vessels	97	41	50	92
Recreational Fishing	Leisure Fishing Licenses	247			
	Underwater Fishing - Licenses	551	63	72	93
Touristic Fishing	Touristic Fishing Operators	8	8	9	15

Table 24: Sector-Based Responses – Terceira

- **Recreation, Sports, and Tourism**
  - o Tourism Operators and Nautical Centers

    15 reflects the total number of known tourism operators and nautical centers in the island of Terceira. ***13*** responses collected represented a tourism company or nautical center.
- **Commercial Fishing**
  - o Invertebrate Harvesting Licenses

    30 reflects the number of known individuals with commercial harvesting licenses in the island of Terceira. ***43*** indicates the total number of Terceira residents represented in the survey for their commercial harvesting activity.
  - o Commercial Fishing Vessels

    97 reflects the number of known commercial fishing vessels in the island of Terceira. Responses were received from ***49*** different commercial fishing vessels.
- **Recreational Fishing**
  - o Leisure Fishing Licenses and Underwater Fishing Licenses

    798 reflects the number of known individuals with a recreational fishing license (leisure fishing license, underwater fishing license) in the island of Terceira. ***93*** indicates the total number of Terceira residents represented in the survey for their recreational fishing activity.
- **Touristic Fishing**
  - o Touristic Fishing Operators

    8 reflects the total number of known touristic fishing operators in the island of Terceira. Responses were received from ***9*** different touristic fishing operators.

4.8 Terceira

4.8.3 Respondent Demographics

Out of 247 total respondents, 229 disclosed their age. Ages ranged from 3 to 72, with a mean age of 40. Of the 230 respondents who disclosed their gender, 29% identified as female and 71% identified as male (Figure 41).

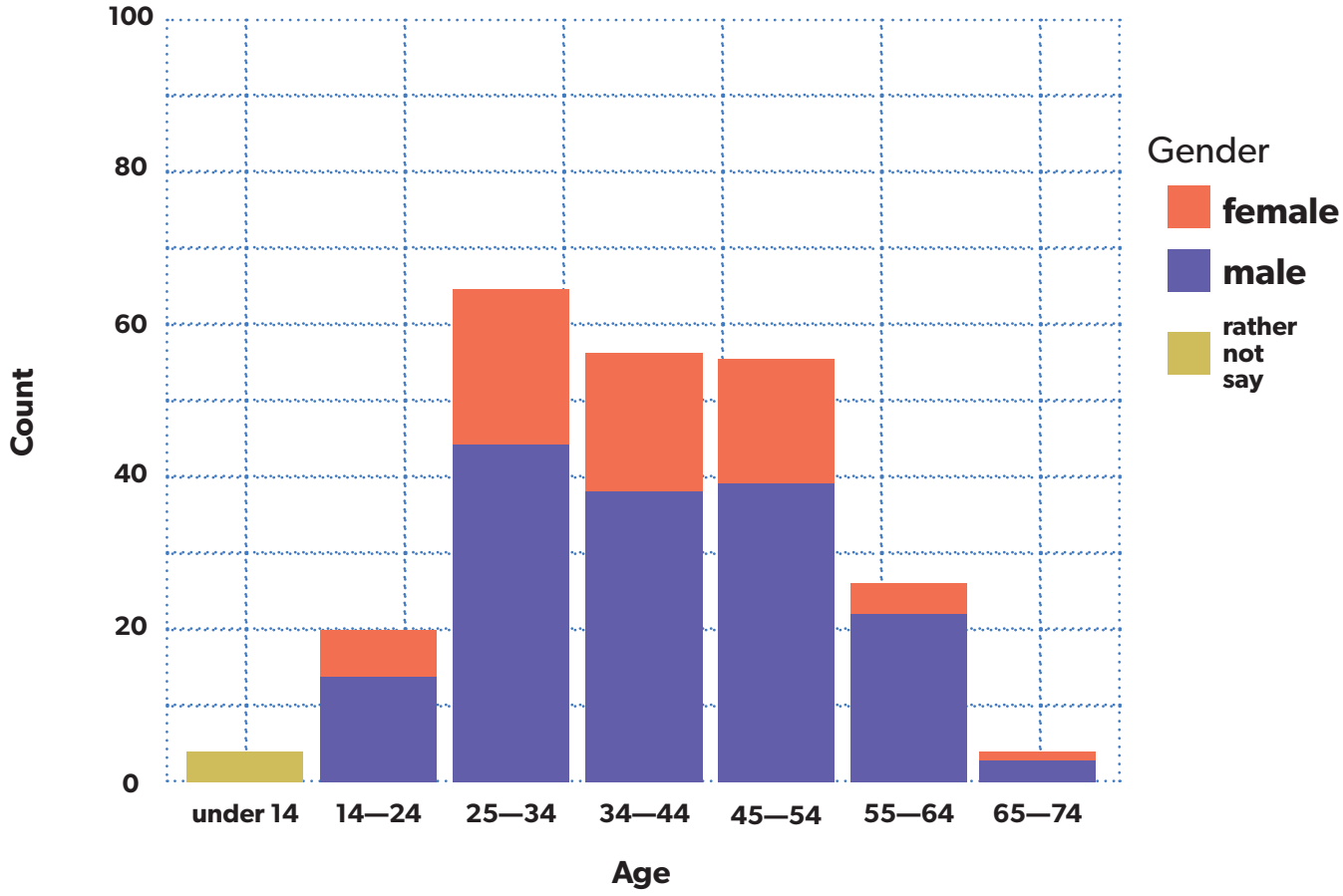

Figure 41: Respondent Demographics – Terceira

4.8.4 Heatmaps

Heatmaps which summarize survey responses collected in Terceira in each sector of ocean use with 3 or more shapes drawn are shown below. The number of shapes input into each heatmap are reported in the caption ("N").

4.8 Terceira

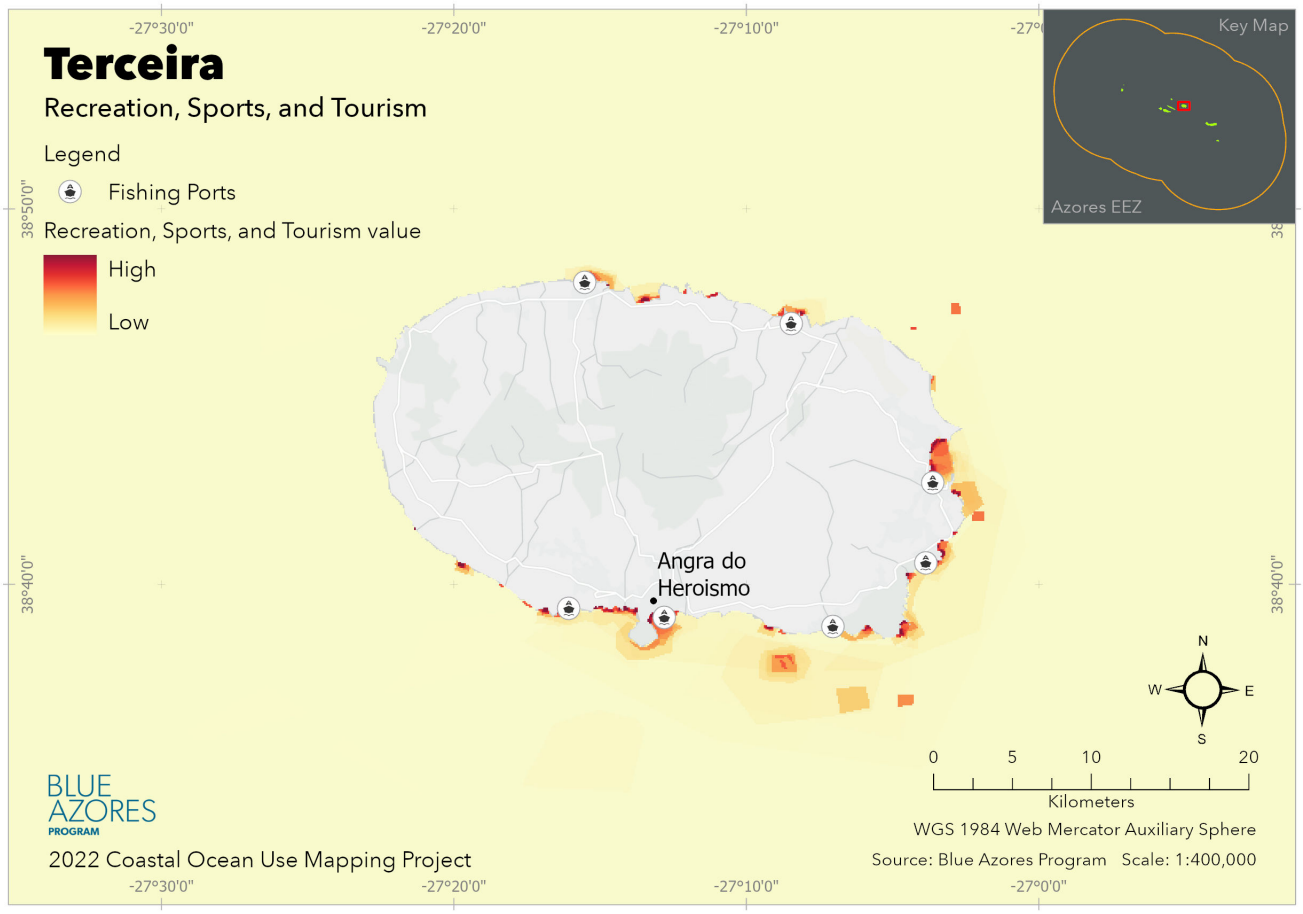

Figure 42: Recreation, Sports, and Tourism - Terceira (N = 746)

4.8 Terceira

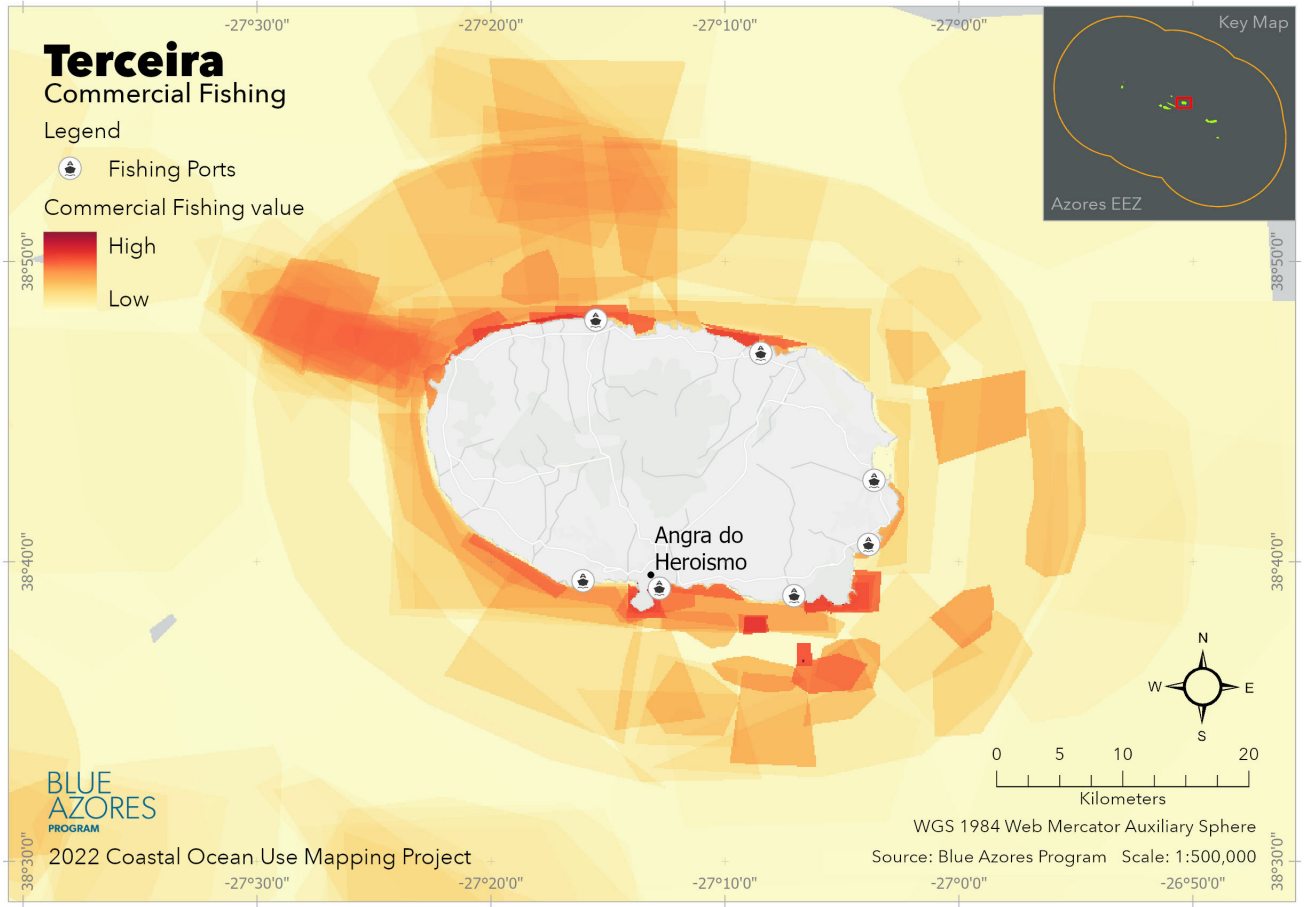

Figure 43: Commercial Fishing - Terceira (N = 171)

4.8 Terceira

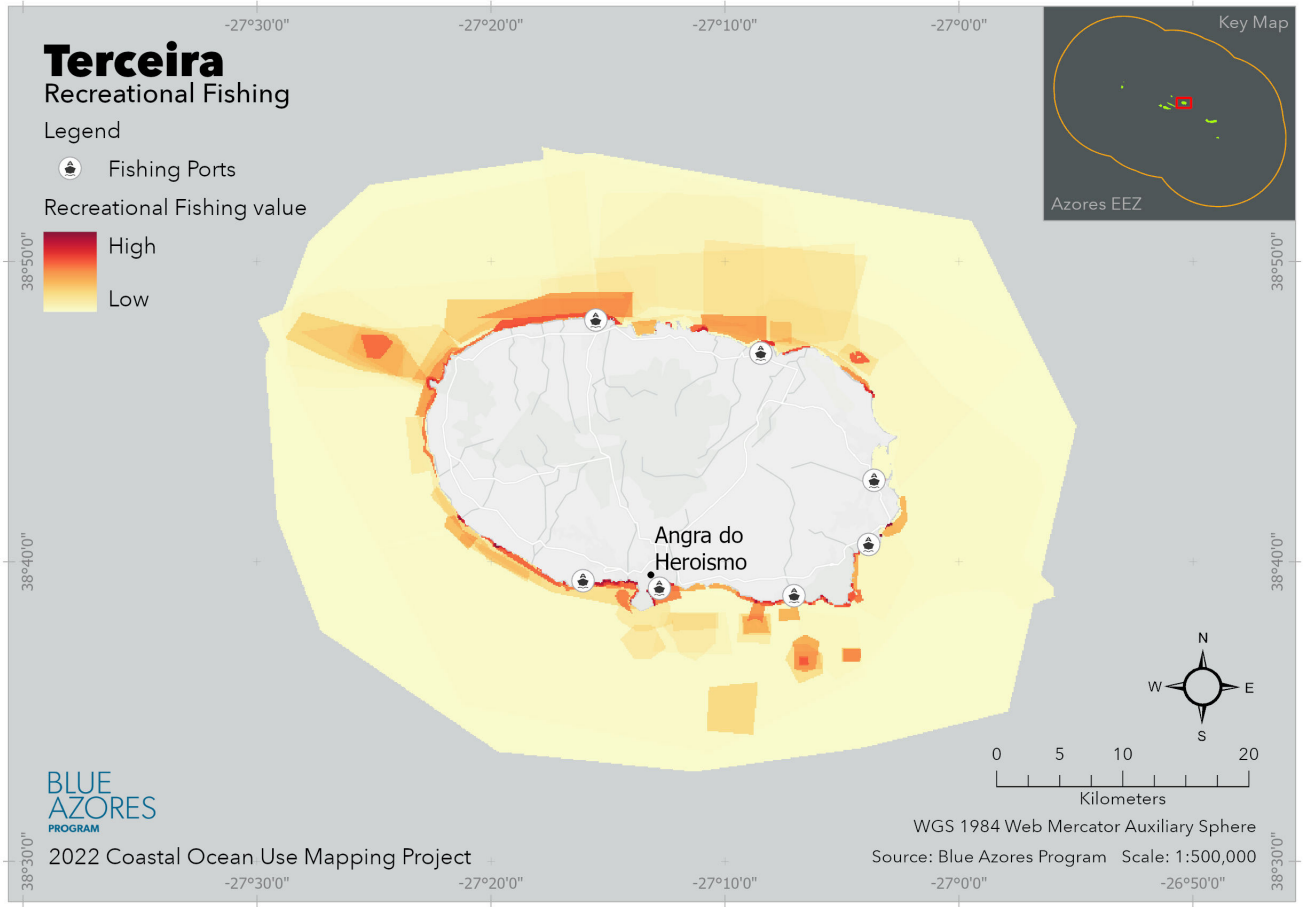

Figure 44: Recreational Fishing - Terceira (N = 225)

4.8 Terceira

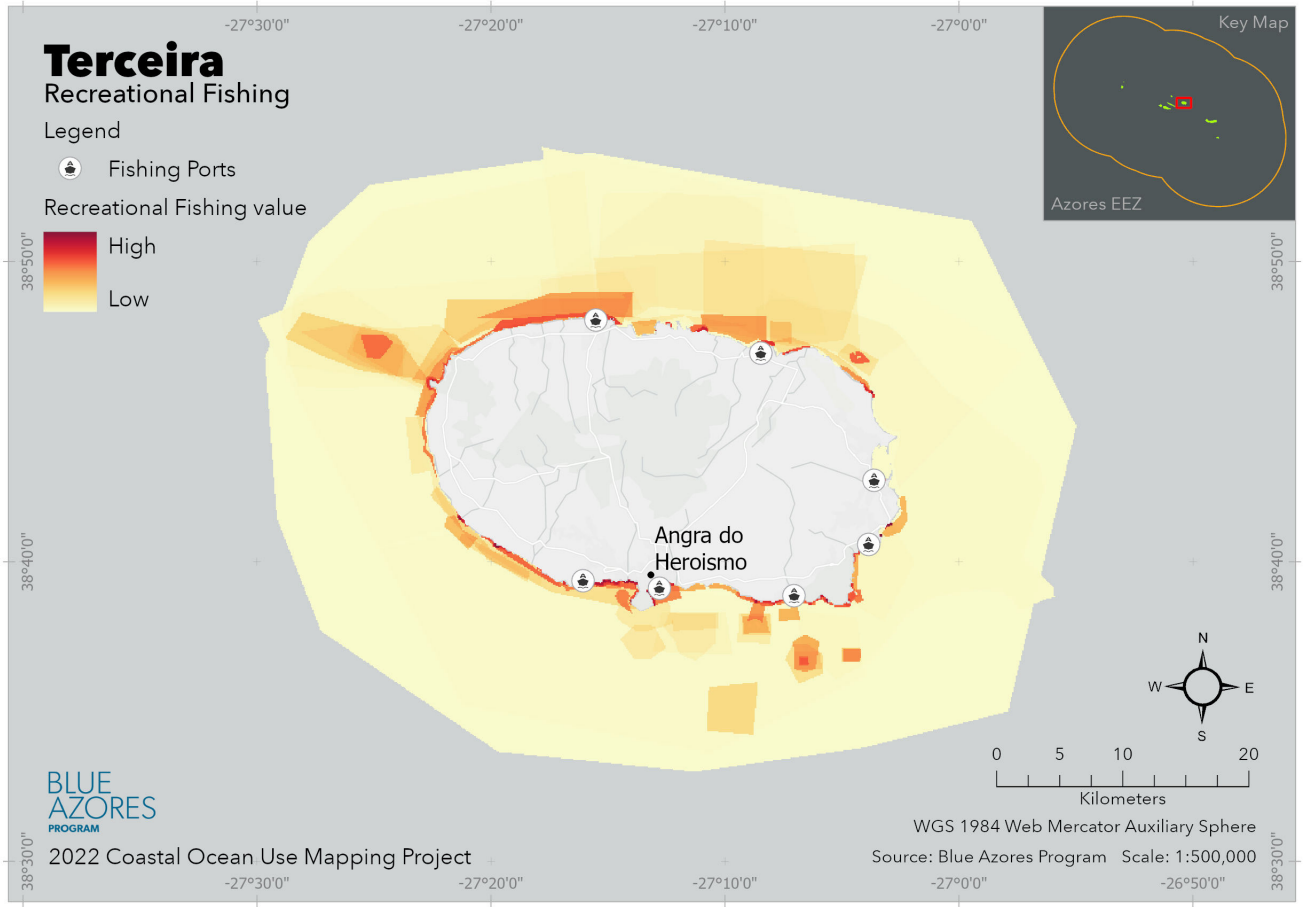

Figure 45: Touristic Fishing - Terceira (N = 21)

4.8 Terceira

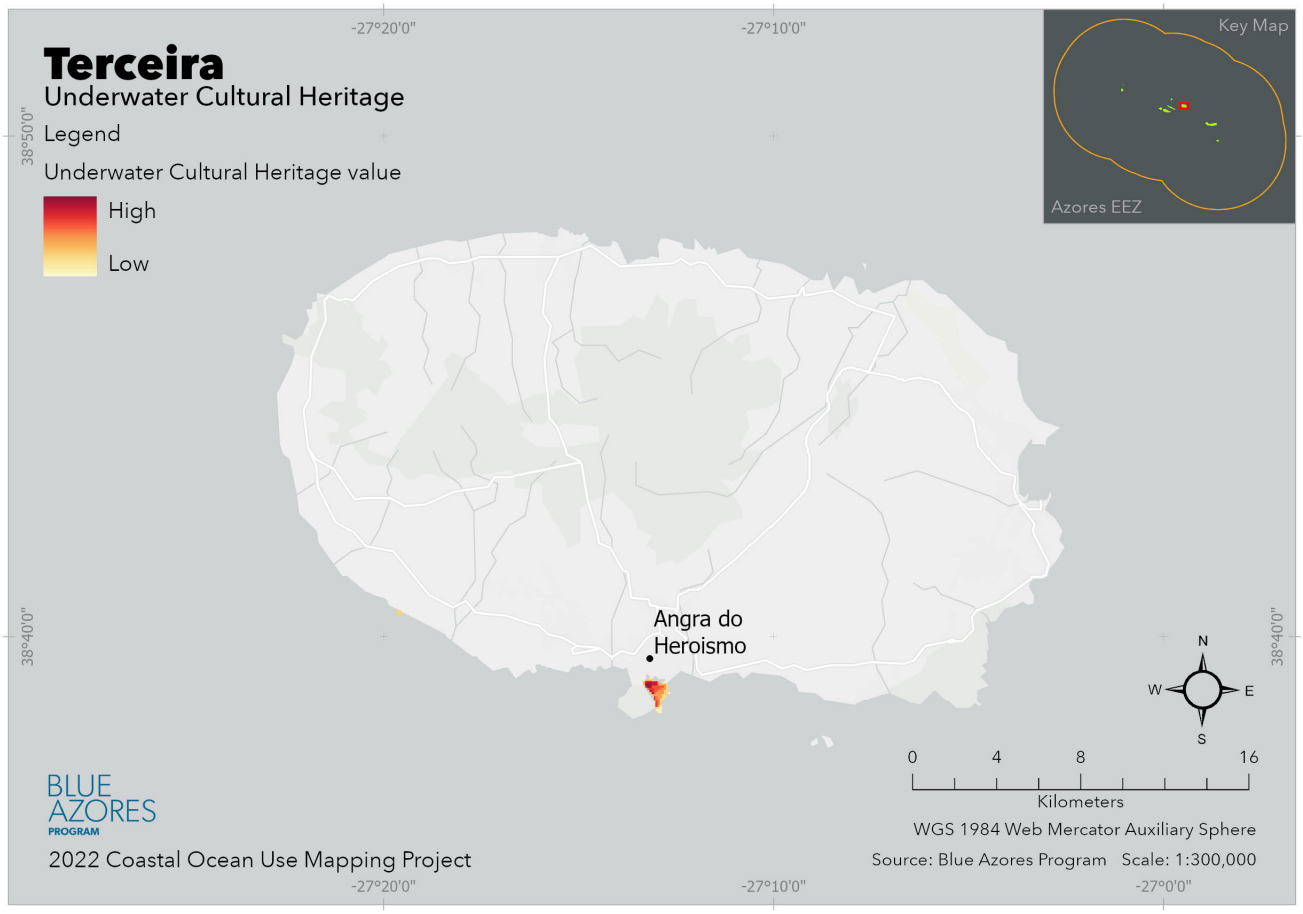

Figure 46: Underwater Cultural Heritage – Terceira (N = 11)

4.8 Terceira

4.8.5 Heatmap Review Results

Table 25 summarizes the total number of respondents by sector who indicated interest in reviewing Terceira's heatmaps (opted into the review process), and the number of individuals who submitted a review. The average rating represents the average score a heatmap was given on a scale of 1 to 5, with 1 indicating low satisfaction with the distribution of value represented on a given sector's heatmap and 5 indicating high satisfaction.

	Recreation, Sports, and Tourism	Recreational Fishing
Total sector responses	178	72
Total respondents who opted into the review process	172	65
Total responses to heatmap review survey	10	4
Average heatmap rating	4.3	4.25
Indicated there are high value areas missing	1	0
Indicated there are high value areas that do not belong	0	0
Indicated 'Other' issue with the heatmap	0	0

Table 25: Heatmap Review Results - Terceira

4.9 São Miguel

São Miguel is an eastern island of the Azores archipelago. According to the 2021 census, it has a total population of 133,295 people residing in a single municipality. 10 locally based individuals were hired and trained to facilitate survey responses over a 12-week period of implementation from 19 September – 12 December 2022. In total, 687 sector responses were collected from 588 respondents representing the ocean use patterns of 1,575 individuals in São Miguel, which exceeded the population target of 408 individuals (Table 26).

	Island Population	Target: Population	Individual Respondents	Sector Responses	Individuals Represented
Total	133,295	408	588	687	1,575

Table 26: Total Responses - São Miguel

4.9.1 Group Responses

- Recorded 258 group responses (more than one person)
- The average group size was 5
- The largest group surveyed represented 40 individuals

4.9 São Miguel

4.9.2 Sector-Based Responses

As participants were not limited to responding in a single sector of ocean use, 16% of total respondents recorded use in multiple sectors. 425 responses were received in the recreation, sports, and tourism sector, equating to 62% of total sector responses. Most responses collected in São Miguel indicated recreational use activity as only 30 responses in this sector represented a tourism company or nautical center. Out of the 73 responses collected from commercial fishing vessels, 60 respondents participated in commercial invertebrate harvesting activity. 243 recreational fishers and 14 touristic fishing operators are represented in the survey.

Sector	Subsector	Known Sector Population	Sector Target	Total Responses Submitted	Total Individuals Represented
Recreation, Sports, and Tourism	Cetacean Watching Operators	8	18	30	159
	Scuba Diving Operators	11			
	Nautical Centers	4			
Commercial Fishing	Invertebrate Harvesting Licenses	44	27	60	271
	Commercial Fishing- Vessels	173	50	73	318
Recreational Fishing	Leisure Fishing Licenses	237	63	153	243
	Underwater Fishing - Licenses	571			
Touristic Fishing	Touristic Fishing Operators	20	16	14	45

Table 27: Sector-Based Responses - São Miguel

- **Recreation, Sports, and Tourism**
  - o Tourism Operators and Nautical Centers

    23 reflects the total number of known tourism operators and nautical centers in the island of São Miguel. ***30*** responses collected represented a tourism company or nautical center.
- **Commercial Fishing**
  - o Invertebrate Harvesting Licenses

    44 reflects the number of known individuals with commercial harvesting licenses in the island of São Miguel. ***271*** indicates the total number of São Miguel residents represented in the survey for their commercial harvesting activity.
  - o Commercial Fishing Vessels

    173 reflects the number of known commercial fishing vessels in the island of São Miguel. Responses were received from ***73*** different commercial fishing vessels.
- **Recreational Fishing**
  - o Leisure Fishing Licenses and Underwater Fishing Licenses

    808 reflects the number of known individuals with a recreational fishing license (leisure fishing license, underwater fishing license) in the island of São Miguel. ***243*** indicates the total number of São Miguel residents represented in the survey for their recreational fishing activity.
- **Touristic Fishing**
  - o Touristic Fishing Operators

    20 reflects the total number of known touristic fishing operators in the island of São Miguel. Responses were received from ***14*** different touristic fishing operators.

4.9 São Miguel

4.9.3 Respondent Demographics

Out of 588 total respondents, 411 disclosed their age. Ages ranged from 15 to 78, with a mean age of 39. Of the 465 respondents who disclosed their gender, 32% identified as female and 68% identified as male (Figure 47).

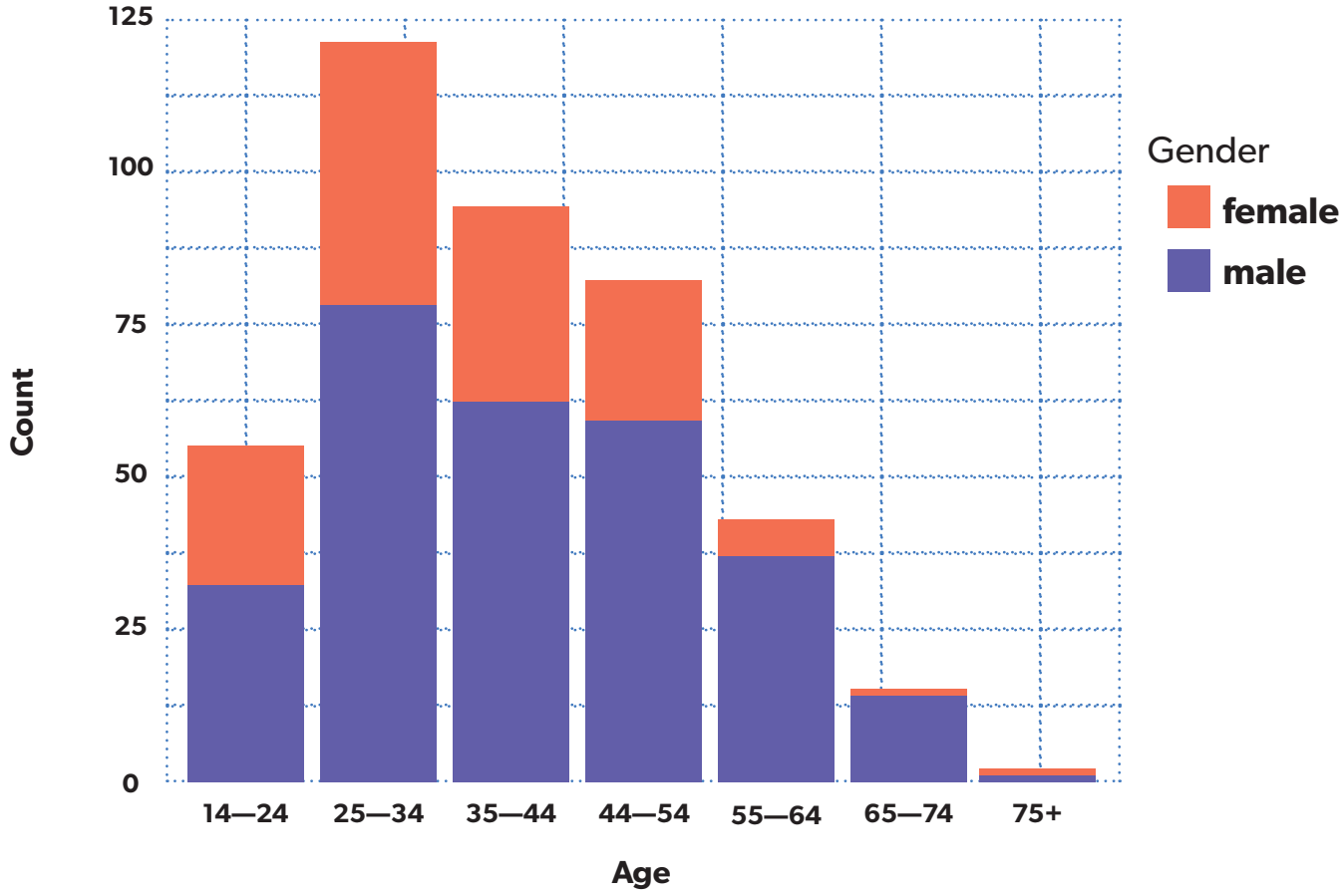

Figure 47: Respondent Demographics – São Miguel

4.9.4 Heatmaps

Heatmaps which summarize survey responses collected in São Miguel in each sector of ocean use with 3 or more shapes drawn are shown below. The number of shapes input into each heatmap are reported in the caption ("N").

4.9 São Miguel

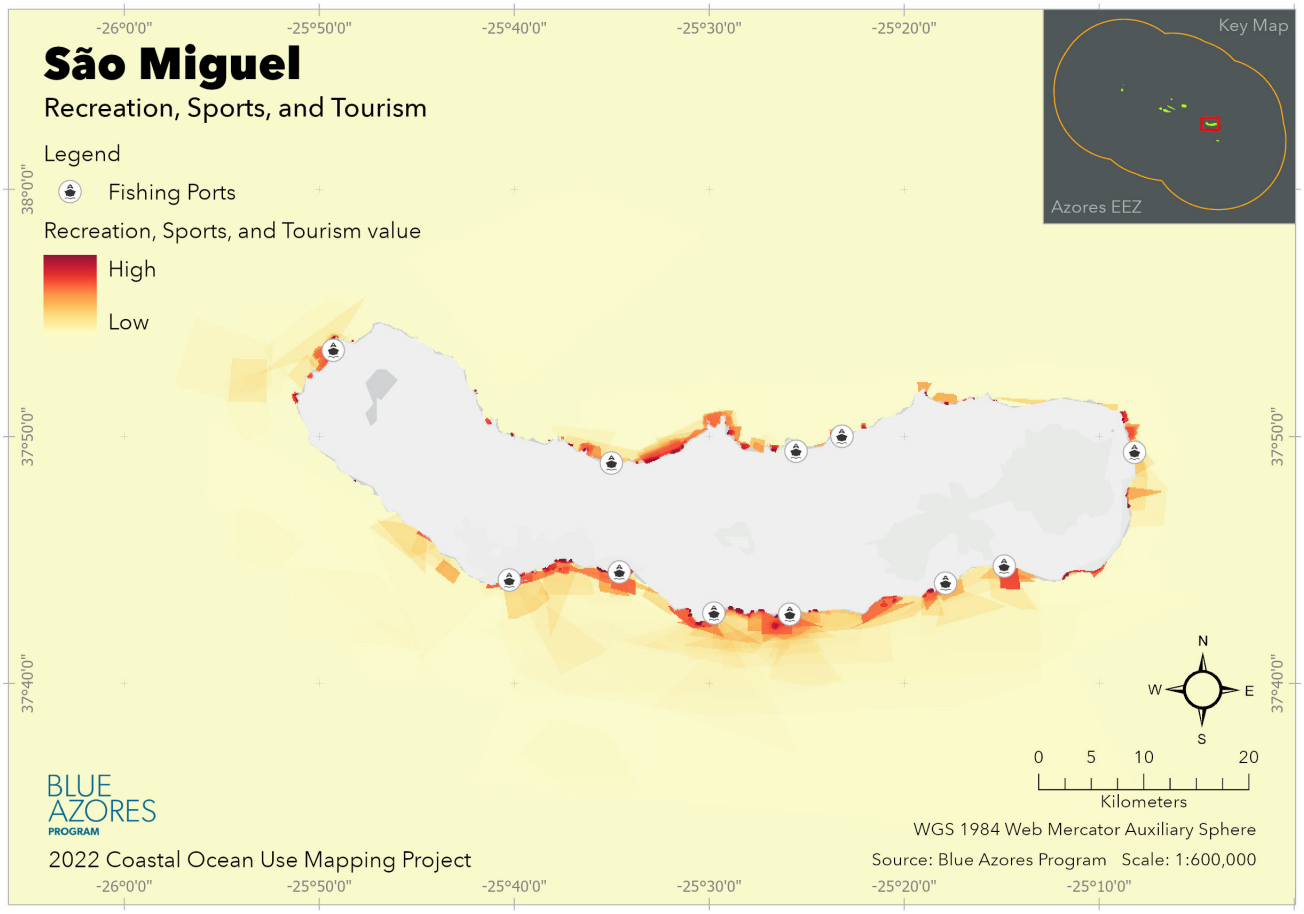

Figure 48: Recreation, Sports, and Tourism - São Miguel (N = 1,292)

4.9 São Miguel

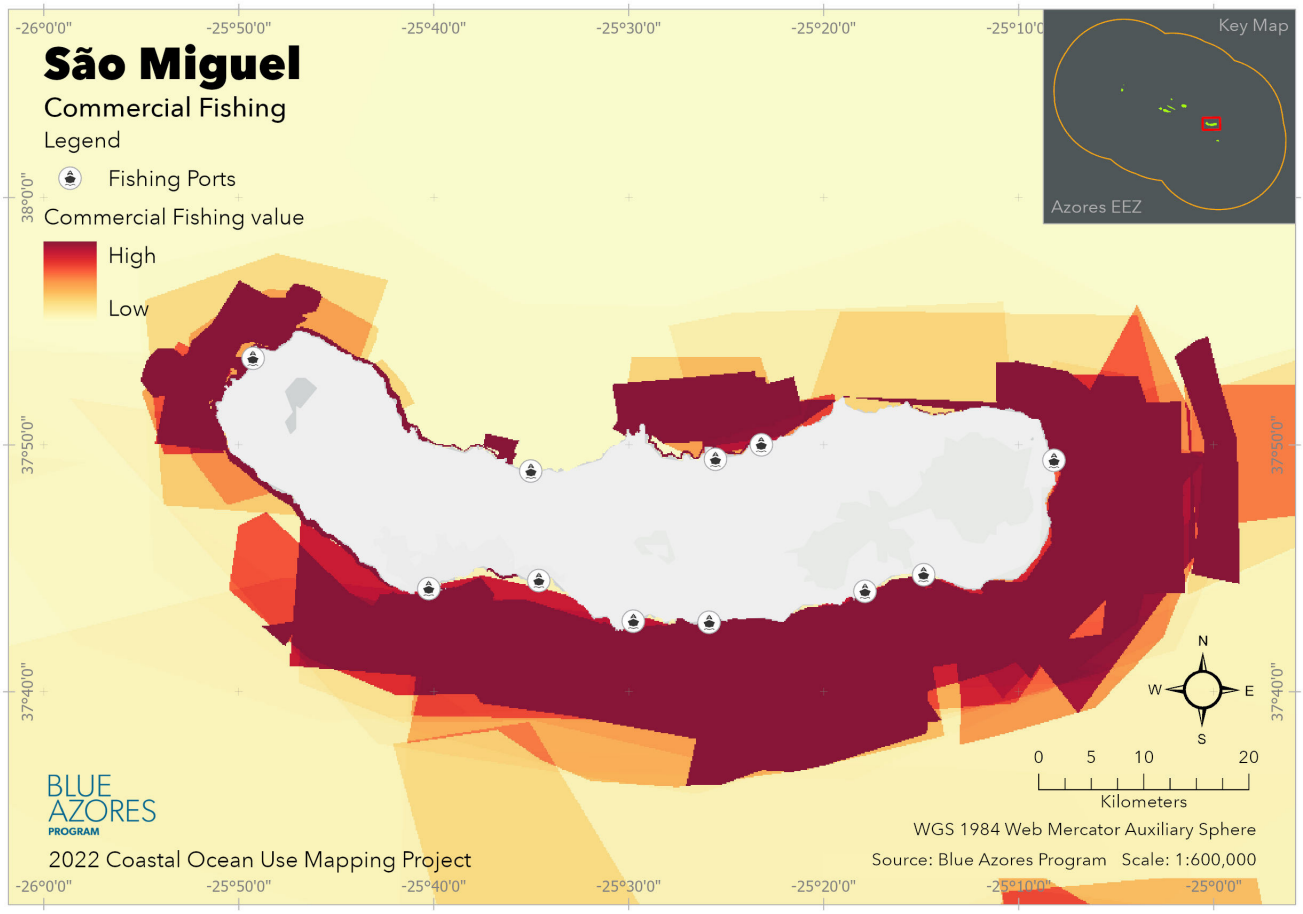

Figure 49: Commercial Fishing - São Miguel (N = 168)

4.9 São Miguel

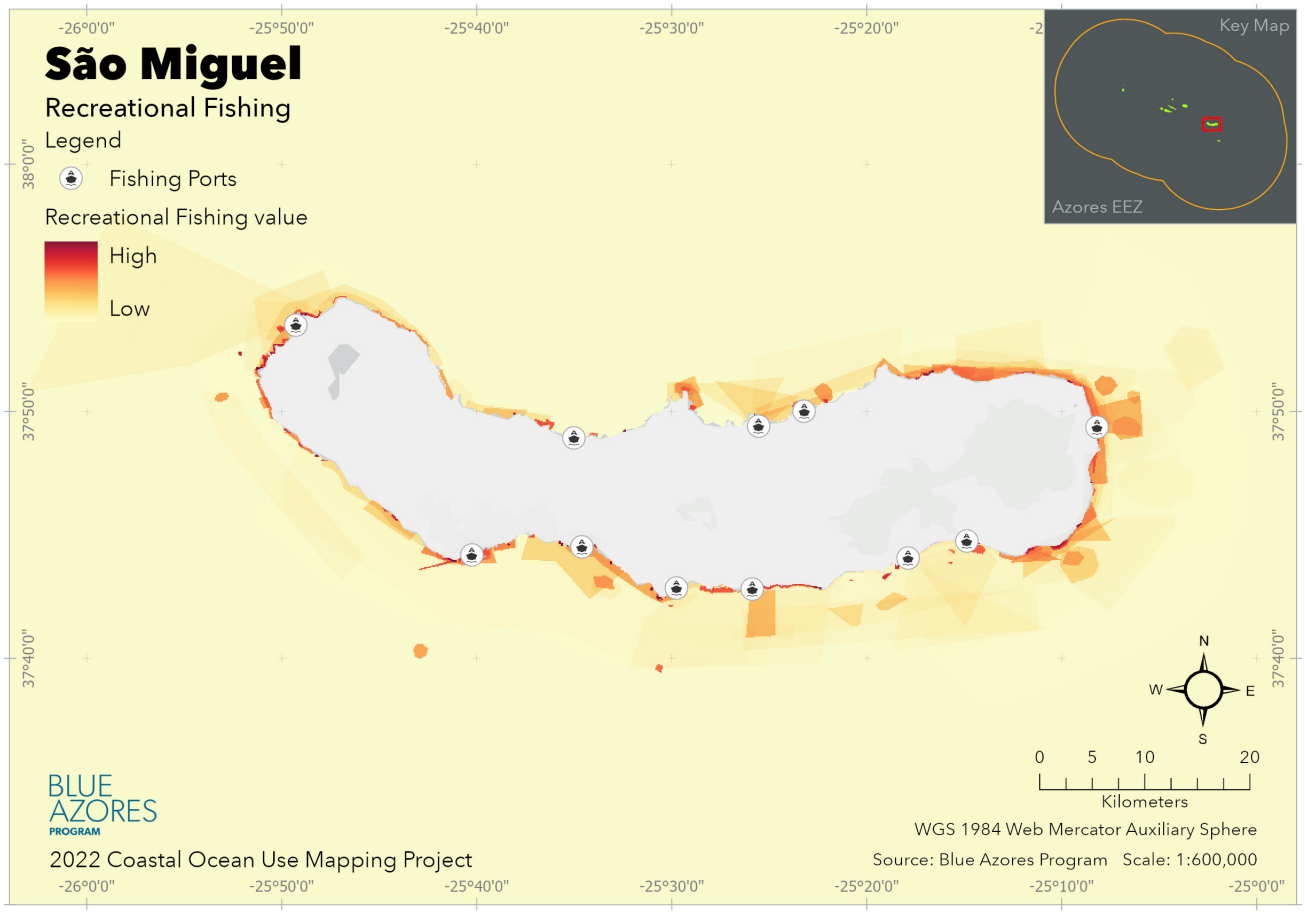

Figure 50: Recreational Fishing - São Miguel (N = 301)

4.9 São Miguel

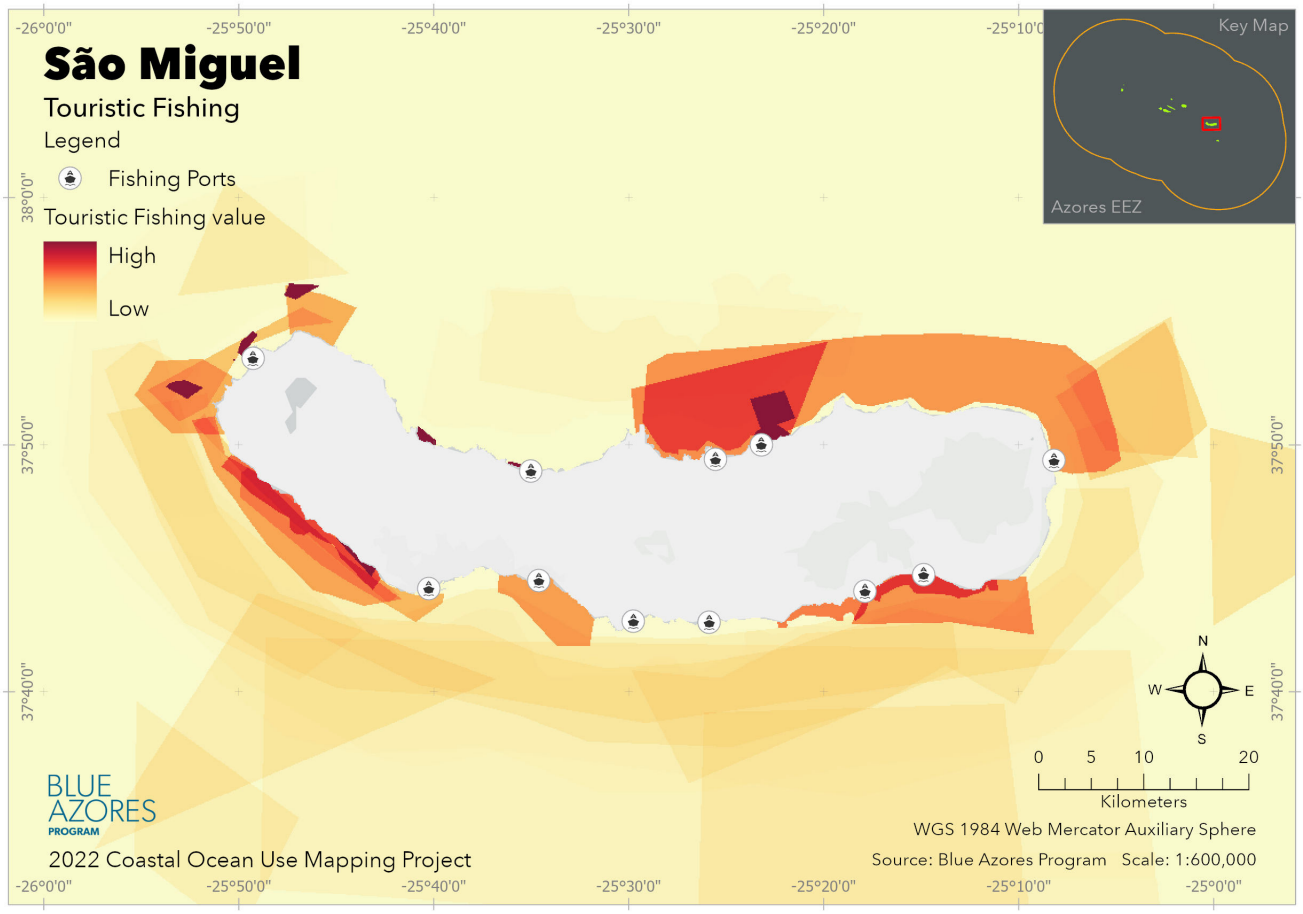

Figure 51: Touristic Fishing - São Miguel (N = 49)

4.9 São Miguel

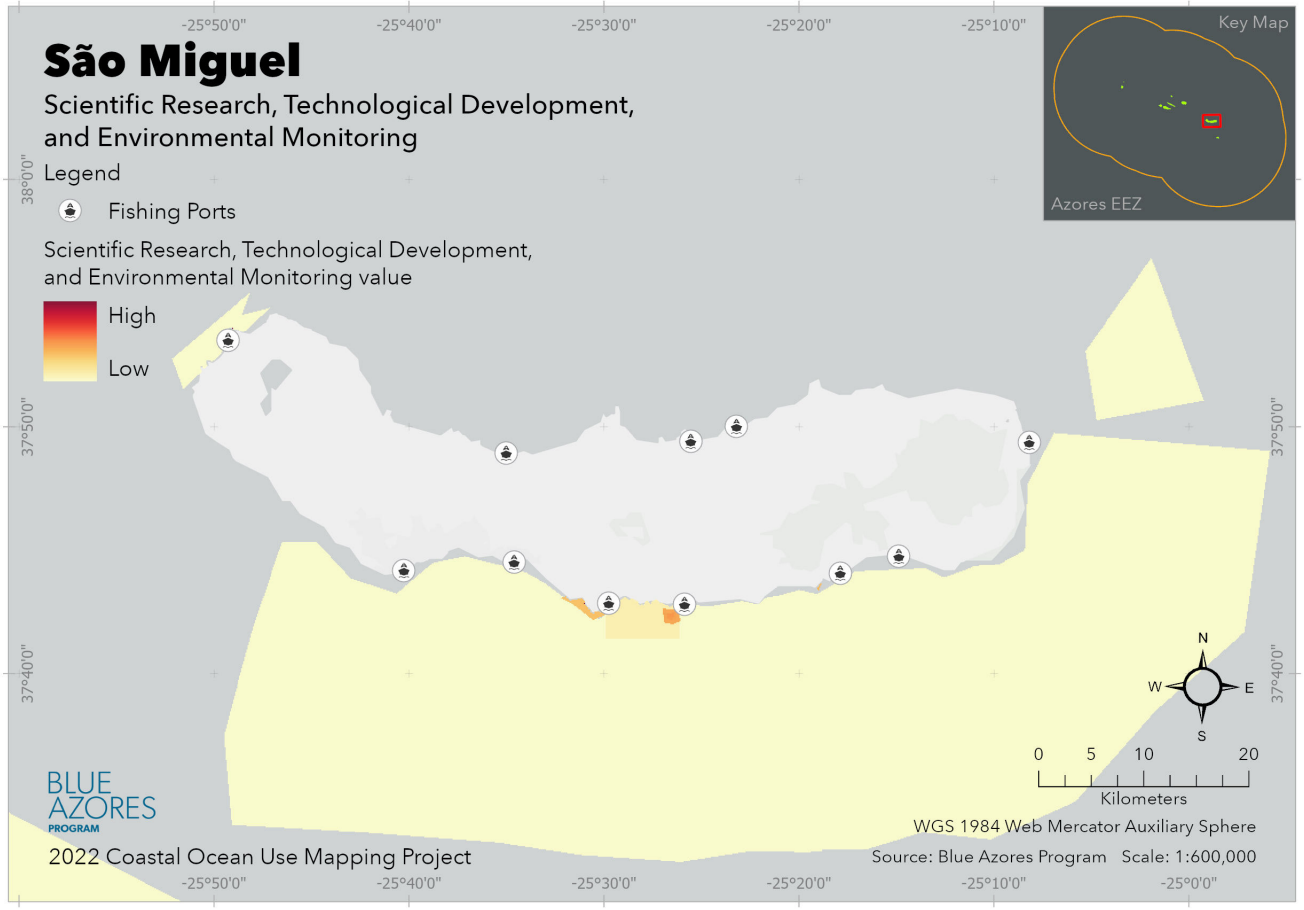

Figure 52: Scientific Research, Technological Development, and Environmental Monitoring – São Miguel (N = 22)

4.9 São Miguel

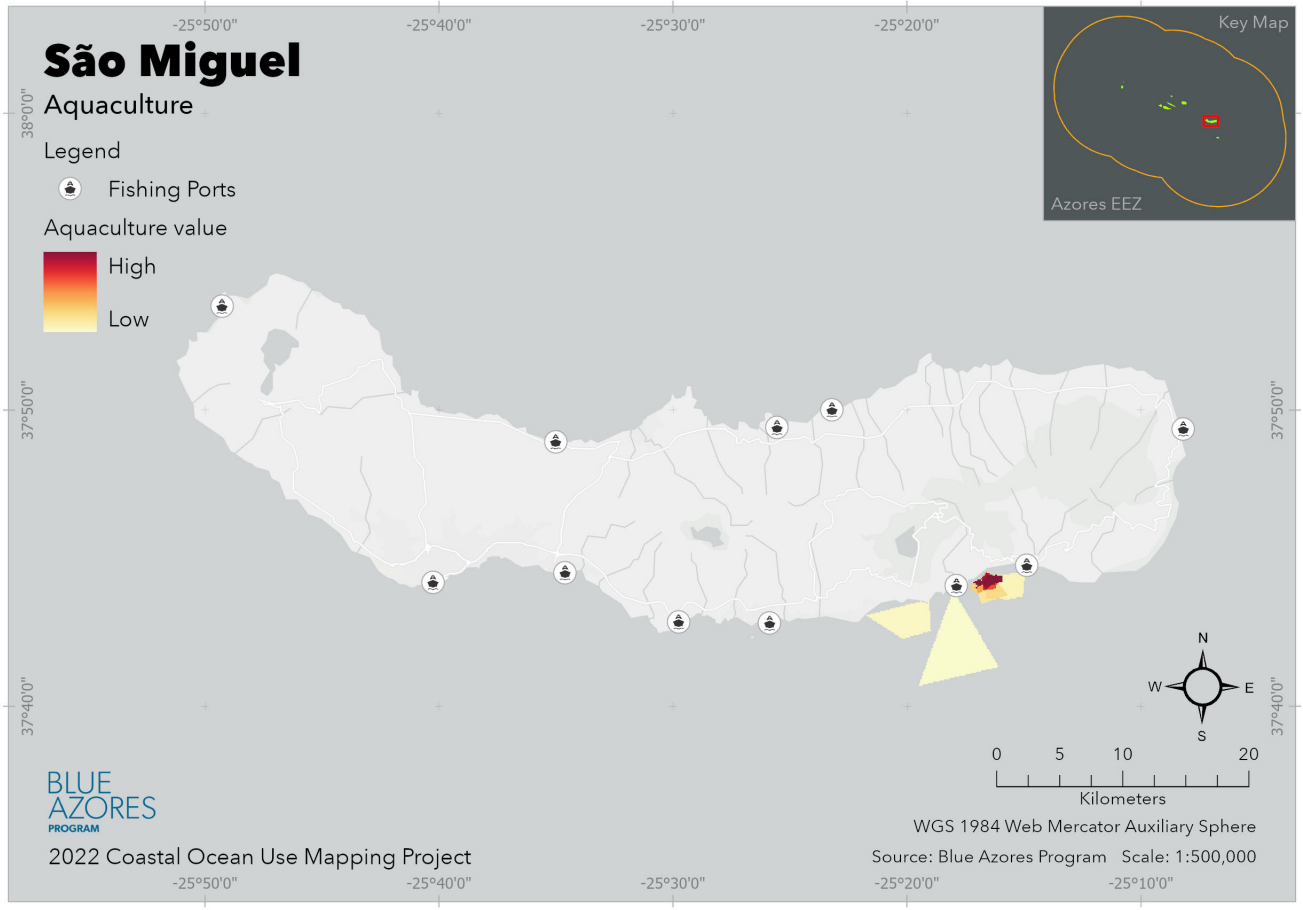

Figure 53: Aquaculture – São Miguel (N = 11)

4.9 São Miguel

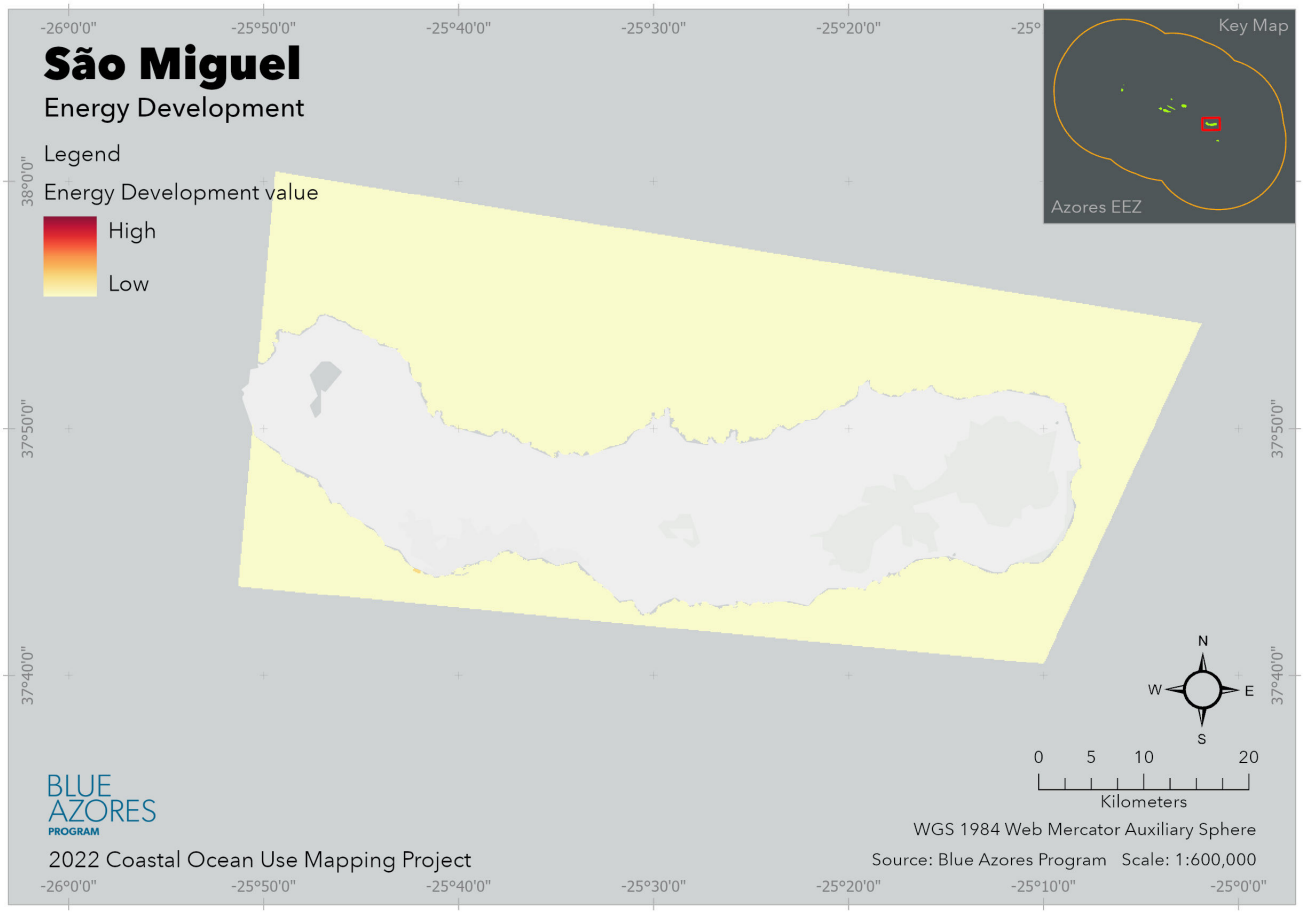

Figure 54: Energy Development – São Miguel (N= 8)

4.9 São Miguel

4.9.5 Heatmap Review Results

Table 28 summarizes the total number of respondents by sector who indicated interest in reviewing São Miguel's heatmaps (opted into the review process), and the number of individuals who submitted a review. The average rating represents the average score a heatmap was given on a scale of 1 to 5, with 1 indicating low satisfaction with the distribution of value represented on a given sector's heatmap and 5 indicating high satisfaction.

	Recreation, Sports, and Tourism	Recreational Fishing	Scientific Research, Technological Development, and Environmental Monitoring
Total sector responses	425	153	8
Total respondents who opted into the review process	145	51	7
Total responses to heatmap review survey	10	4	2
Average heatmap rating	4	2.75	3.5
Indicated there are high value areas missing	1	1	0
Indicated there are high value areas that do not belong	0	1	0
Indicated 'Other' issue with the heatmap	0	0	1

Table 28: Heatmap Review Results - São Miguel

5 Discussion

Responses collected during the Coastal Ocean Use Mapping Project will help fill gaps in data on the distribution of ocean activities in the Azores. The heatmaps produced will be utilized to weigh tradeoffs and cultivate solutions which meet planning objectives and minimize disruption to livelihoods.

Participation in this project is voluntary, thus, the interviewer team was met with occasional resistance or refusal to respond to the survey. Refusals were minimal and occurred primarily within the fishing sectors. Much of the stakeholder feedback noted during the implementation process related to frustration with existing protected area enforcement structures, and many respondents expressed a desire to use the survey tool to provide additional information relating to their concerns about compliance violations, overfishing, and presence of foreign fishing vessels.

6 Appendix A: Working Group Terms of Reference

Overview and Objective
These Terms of Reference describe the structure and rules of engagement for the Coastal Ocean Use Mapping project working group. The government-led working group will participate in a collaborative process to design a project to produce maps of coastal ocean use for use in MPA network planning as well as during the stakeholder engagement process.

Roles and Responsibilities
The working group will meet at established intervals throughout the development, implementation, and reporting phases of this project. The working group facilitator will coordinate the execution of the established work plan.

It is the role of the working group facilitator to:

- Schedule and facilitate working group meetings
- Set the agenda for each meeting, identifying if agenda items are for information, discussion, recommendation, or approval
- Ensure that agendas and supporting materials are delivered to members in advance of meetings
- Produce draft outputs as outlined in the work plan and based on working group recommendations
- Provide updates on any events or obstacles that may delay the established timeline or jeopardize the completion of program objectives
- Encourage broad participation from members in discussion

It is the role of all working group members to:

- Understand the goals, objectives, and desired outcome of the project
- Support and guide the execution of the agreed-upon work plan to the best of their ability
- Actively participate in WG discussions
- Review and provide feedback on draft outputs by the agreed-upon deadlines

Working Group Membership

- Alexandra Guerreiro, Regional Fisheries Director
- Gilberto Carreira, Regional Directorate of Maritime Policies (DRPM), Head of Biodiversity Department
- Aida Silva, DRPM Technician
- Hugo Diogo, DRP Technician
- Helena Calado, University of Azores, Professor
- Pedro Afonso, University of Azores, Researcher
- Vanessa Dick, Blue Azores Program Director, Waitt Institute
- Andy Estep, Science Director, Waitt Institute
- Brooke Dixon, Science Manager, Waitt Institute – Working Group Facilitator
- Will McClintock, SeaSketch Director, McClintock Lab, UCSB
- Maddie Berger, SeaSketch Analyst, McClintock Lab, UCSB

Document Review and Decision-Making
The development of the Coastal Ocean Use Mapping project is a collaborative process and relies on input provided from each working group member. Standing meetings will be utilized as a forum for discussion, recommendations, and final authorization of project outputs. Draft outputs will be prepared by the facilitator and shared via email with working group members for review and feedback in advance of scheduled meetings. The facilitator will synthesize feedback and present outputs for working group consensus and approval during scheduled meetings.

7 Appendix B: Data Privacy Informed Consent

Coastal Ocean Use Mapping Project:
The Blue Azores Program is a partnership between the Regional Government of the Azores, Oceano Azul Foundation, and the Waitt Institute to support the protection of 30% of the Azores Sea. QSP Marketing is implementing a Blue Azores Survey Project on Coastal Ocean Use Mapping, also known as an Ocean Use Survey, that aims to fill data gaps about ocean activities and ensure the knowledge of local ocean users in the Azores is integrated in the upcoming Marine Spatial Planning process by asking respondents to indicate where they use and how they value ocean space.

Your Participation and Privacy:
Participation in this survey for the Mapping of Coastal Ocean Use is voluntary. For the purposes of quality control, the entity that processes the data and the quality of the information may access the following personal data: name, email, or telephone contact. This data is only accessed by those entities listed below. In this sense, you may be contacted to confirm the conclusion of this interview. This data will only be used for this purpose, never being associated with the answers you provided and subsequently deleted.

Recipients of Personal Data (survey controllers and entities responsible for data treatment):
Waitt Institute I La Jolla, CA I United States I +1 858 551 4443 I Controller
McClintock Lab, UCSB I Santa Barbara, CA I United States I +1 805 893 8782 I Controller
Environmental Markets Lab, UCSB I Santa Barbara, CA I United States I +1 805 893 4058
QSP Marketing I Porto, Portugal I +351 22 610 8552

Project Partners:
DRAM- Regional Directorate for Sea Affairs
DRP- Regional Directorate for Fisheries
OA- Oceano Azul Foundation

Data Protection Officer (DPO):
Will McClintock: will@ucsb.edu
In accordance with the Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016, relative to the protection of individuals with regard to the processing of personal data and the free movement of data, I declare that:

- I was informed about the Project entitled Coastal Ocean Use Mapping/Ocean Use Survey
- I was informed about the objectives of this Project, which aims to collect information about ocean use and value in the Azores
- I understood the information given to me
- I was assured that all data relating to my identification in this study are confidential and that their anonymity will be maintained
- I am aware that I can refuse to participate, interrupt participation, or withdraw my consent in the study at any time, without any kind of penalty
- I freely agree to participate in the aforementioned study
- I authorize the use of my contacts for the purposes of confirmation and/or validation of the data collected.

8 Appendix C: Survey Questionnaire

Introduction:
The Blue Azores initiative is interested in learning from you about how you use and value ocean space in the Azores. This survey will ask you to identify areas of importance within the coastal ocean by drawing on the map and indicating the relative value of those areas to you.

Your individual responses will be kept confidential. We will summarize and generalize information across multiple respondents to protect your privacy. The information will be used to create data to be used in an upcoming ocean planning process.

Click here to view an example summary heat map depicting valued fishing areas in Montserrat.

Need help? Contact Adriano Quintela.

Required Questions [non sector-specific]:

1. Informed Consent: The decision to participate in the Coastal Ocean Use Mapping Project is voluntary. Only for reasons of quality control of the work carried out will we request the following personal data: name, email, or telephone contact. These data are only accessed by Survey Controllers and entities responsible for data treatment (listed below). You may be contacted to confirm the completion of this interview. These data will only be used for this purpose, never being associated with the answers you have provided and subsequently deleted. [Disagree, Agree] Read Full Agreement
2. What is your name? [open-ended]
3. Facilitator name (if facilitated) [open-ended]
4. Which island do you reside on? [Flores, Corvo, Santa Maria, Faial, Pico, Graciosa, São Jorge, Terceira, São Miguel]
5. Which municipality do you reside in? [Selection generated by island]
6. Which parish do you reside in? [Selection generated by municipality]
7. What sector(s) do you represent?
    a. Commercial Fishing
    b. Recreational Fishing
    c. Touristic Fishing
    d. Recreation, Sports, and Tourism
    e. Scientific Research, Technological Development, and Environmental Monitoring
    f. Aquaculture
    g. Underwater cultural heritage
    h. Marine Biotechnology
    i. Non-Metallic Mineral Resources
    j. Energy Development
    k. Security and Defense
8. Please indicate how many people are reflected in this response (If this response reflects ocean use for multiple people, please indicate the number of people represented)
9. Would you like to be a part of the map review process? We are creating maps from information provided by you and other participants and will ask for your appreciation before completion. If you would like to be contacted to participate in this process, please indicate "Yes" and input your email address.

Optional Questions:

Demographic

1. In what year were you born [1914-2019, rather not say]
2. Gender [Male Female, Rather not to say]

All Fishing Sector Respondents

1. On average, how many days do you spend at sea per fishing trip? [open-ended]
2. Do you have a harvesting license? [Yes/No]
3. Please estimate the percent of time you used the following gear types in the last 12 months [Assign an increment: 0%, 1-20%, 21-40%, 41-60%, 61-80%, 81-100% for each gear type: Hook and line, Shoreline, Hook and line - Bottom longline, Hook and line – Handlines, Pole and line, Pots and traps, Lift nets, Purse seines, Squid jigging, Gillnets and trammel nets, Frame Trap]

Commercial Fishing Respondents

1. Vessel Name [open-ended]
2. Vessel Marking [open-ended]
3. What is your function? [Owner/Captain/Crew]

Recreation, Sports, & Tourism Respondents

1. Are you representing a tourism operator or nautical center? [Yes/No]

Risk Perception

1. In your opinion, what are the top 3 sectors causing the main ecological impacts in your island? (Select 3) [Sand Extraction, Agriculture, Aquaculture, Coastal Infrastructure, Fishing, Harvesting/Collecting, Military, Research, Shipping, Telecommunications, Tourism/Recreation, Wastewater]
2. In your opinion, what are the top 3 impacts threatening marine ecosystems in your island? (Select 3) [Noise, Litter, Sealing, Changes in siltation/Smothering, Abrasion, Introduction of Contaminating Compounds, Input of Organic Matter (including N&P), Invasive Species, Species Extraction, Collisions, Light, Disturbance]
3. How do you learn about and form opinions on environmental topics? (Select 1-3 top information sources) [Television/Radio, Social Media, Press, Personal experience, Professional activity, Family and friends, Scientific publication]

Sector	Initial Prompt(s)	Required prompt(s) for each shape drawn	Optional prompt(s) for each shape drawn:
Commercial Fishing	Use the map to indicate the most valued locations for this sector. You can draw multiple areas and prioritize them individually. Add as many polygons as needed to represent the areas that have value for this activity in this industry, then adjust their relative priority below. This information will be added to all other responses to create a heat map of the assessed areas. [New Shape]	How important is this area? [Low, Average, High] What type of fishing do you do here? Harvesting (hand collecting) Hook and line - from shoreline Hook and line - Bottom longline Hook and line- Drift longline Hook and line - Handlines Pole and Line Pots and traps Lift nets Purse seines Squid jigging Gillnets and trammel nets Frame Trap FAD Do you also participate in "Pesca Turismo" in this location? [Yes/No]	What species are you fishing for here? Patellid limpet Common octopus Spiny lobster Giant barnacle Slipper lobster Crab Swordfish Alfonsino Splendid alfonsino European conger Bulls-eye Tope shak Black belly rosefish Silver scabbardfish Lings Common more Mediterreanean moray Blackspot seabream Common seabream Greater forkbeard Forkbeard Wreckfish Offshore rockfish Thornback ray Largescaled scorpionfish Blue jack mackerel Chub mackerel European pilchard Bogue Boarfish Longspine snipefish
Recreational Fishing		How important is this area? [Low, Average, High] What type of fishing do you do here? Harvesting (Hand collecting) Leisure fishing (Boat angling) Leisure fishing (Shore angling) Leisure fishing (Spearfishing) Sport fishing	
Touristic Fishing		How important is this area? [Low, Average, High] What type of fishing do you do here? Coastal fishing (Bottom fishing) Coastal fishing (Jigging/"Zagaia") Coastal fishing (Trawling) Big Game fishing Spearfishing	
Recreation, Sports, and Tourism		How important is this area? [Low, Average, High] Please indicate which activity or activities you use this space for Boat tours Whale watching Diving (For Tourism) Submersible tours Associated services: (i.e. taxi services, watercraft rental) Coasteering Cruise tourism Sailing Paddle surfing (SUP) Surfing Windsurfing Diving (Recreational) Snorkeling Bodyboarding Canoeing Kayaking Kitesurfing Longboarding Open water swimming Skimboarding Jet Skiing Water-skiing Rowing Other	

Sector	Initial Prompt(s)	Required prompt(s) for each shape drawn	Optional prompt(s) for each shape drawn:
Scientific Research, Technological Development, and Environmental Monitoring	Use the map to indicate the most valued locations for this sector. You can draw multiple areas and prioritize them individually. Add as many polygons as needed to represent the areas that have value for this activity in this industry, then adjust their relative priority below. This information will be added to all other responses to create a heat map of the assessed areas. [New Shape]	How important is this area? [Low, Average, High] What activity do you value this space for? Environmental monitoring programmes Environmental recovery and nature conservation actions Relevant areas for scientific research Other	
Aquaculture		How important is this area? [Low, Average, High]	
Underwater Cultural Heritage		How important is this area? [Low, Average, High]	If applicable, what type of artifacts can be found here? Shipwreck Canon Anchor Other
Marine Biotechnology		How important is this area? [Low, Average, High]	What activity do you use or value this space for? Bioprospecting (sampling) Relevant areas for marine biotechnology Other
Non-Metallic Mineral Resources		How important is this area? [Low, Average, High]	What activity do you use or value this space for? Rolled pebble Dredging in port areas and around streams and lagoon entrances Immersion of dredged material Other
Security and Defense		How important is this area? [Low, Average, High]	
Energy Development		How important is this area? [Low, Average, High]	

9 Appendix D: Heatmap Methodology

A weighted method[2] is used to create the maps which summarize the responses for each sector of ocean use. The values respondents assign to each mapped shape are divided by the area of the shape in km2. This weighs small areas that have a high value more than large areas and highlights "hotspots". Responses are then summed by pixel to find the total value of a given area. This method produces gridded heatmaps where higher values indicate places of higher importance. The weighted method can be summarized with the equation:

$$Vp = \sum_{i=1}^{n} \frac{VSi}{ASi}$$

Where Vp is the pixel value, Vs is the value assigned to the shape drawn and As is the area of shape in km2.

[2] Yates KL, Schoeman DS (2013) Spatial Access Priority Mapping (SAPM) with Fishers: A Quantitative GIS Method for Participatory Planning. PLoS ONE 8(7): e68424. doi:10.1371/journal.pone.0068424

AZORES COASTAL MAPPING

COMPREHENSIVE REPORT 2023

BLUE AZORES

GOVERNO DOS AÇORES

OCEANO AZUL foundation

WAITT INSTITUTE