



**Food and Agriculture
Organization of the
United Nations**

WESTERN CENTRAL
ATLANTIC FISHERY
COMMISSION

SLC/FIAP/C1128 (En)

ISSN 2070-6065

RECREATIONAL FISHERIES ECONOMIC IMPACT ASSESSMENT MANUAL AND ITS APPLICATION IN TWO STUDY CASES IN THE CARIBBEAN: MARTINIQUE AND THE BAHAMAS



RECREATIONAL FISHERIES ECONOMIC IMPACT ASSESSMENT MANUAL AND ITS APPLICATION IN TWO STUDY CASES IN THE CARIBBEAN: MARTINIQUE AND THE BAHAMAS

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ISBN 978-92-5-109424-2

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PREPARATION OF THIS DOCUMENT

This document is part of a series of desk and field studies carried out under “Component 1. Generating value and conservation outcomes through innovative mechanisms” of the Caribbean Billfish Project GCP/ SLC/ 001/ WBK of the Ocean Partnership Program belonging to the Areas Beyond National Jurisdictions (ABNJ) program. The project is funded by the Global Environmental Facility (GEF) and The World Bank and executed by the Western Central Atlantic Fisheries Commission (WECAFC) of the Food and Agriculture Organization of the United Nations (FAO) based at the FAO Sub Regional Office in Bridgetown, Barbados.

Support and guidance were provided by Mr Raymon van Anrooy, Secretary of the Western Central Atlantic Fishery Commission (WECAFC) and Mr Manuel Perez Moreno, Regional Project Coordinator, during the elaboration of the report. The FAO TCP/BHA/3501 – Strengthening Fisheries and Aquaculture Governance in The Bahamas was the source of funds for application and testing of the manual in The Bahamas

The preliminary findings of the study were presented at the 2nd Regional Workshop on Caribbean Billfish Management and Conservation of the WECAFC Recreational Fisheries Working Group held in November, 2015 in Panama City, Panama. In addition, the document was also reviewed by the members of the Consortium on Billfish Management and Conservation (CBMC) established in the Caribbean Billfish project. The technical edition was in charge of Ms Magda Morales.

FAO. 2016.

Recreational fisheries economic impact assessment manual and its application in two study cases in the Caribbean: Martinique and The Bahamas, by Rob Southwick, D'Shan Maycock and Myriam Bouaziz. FAO Fisheries and Aquaculture Circular No. 1128. Bridgetown, Barbados.

ABSTRACT

The paper presents a manual to assess the economic impact of recreational fisheries and its application in two Caribbean countries: The Bahamas and Martinique. The manual was developed with the assistance from the Gertner Consulting Group and the WECAFC/ OPESCA/ CRFM/ CFMC working group on recreational fisheries. This manual is intended to help countries better understand the size and contributions from recreation fishing to their economies. The results are meant to explain the economic impacts at the national and regional level.

This manual represents a difficult task of packaging many years of economic training and experience into a simple manual that can be used by fisheries managers to reasonably estimate the economic impacts from recreational fishing within their country. As best as possible, technical terms have been avoided. When necessary, important and complex terms are explained in the easiest forms possible. As often as possible, rather than spending too much time explaining complex issues such as 'response bias', the manual leads users through processes that minimize such problems, often without the user necessarily being aware of having taken steps to avoid a complex issue. By avoiding lengthy discussions about various technical issues, and simply taking users through steps that reduce these problems, the authors and the supporting Working Group think this manual will receive greater use and be less demanding on its users.

This manual is intended to help countries within the wider Caribbean Region better understand the size and contributions from recreation fishing to their economies. The methods proposed within can be applied to other countries outside this region, too. The results are meant to explain the economic impacts at the national and regional level, not to the individual. Measures of recreational fishing's impacts upon individuals are a valid concern, and may represent a second or separate effort on the part of the countries using this document.

The authors and members of the Working Group strongly encourage users to consider the sustainability of their fisheries resources. Developing and promoting recreational fisheries in places where current or increased fishing pressure is not sustainable will lead to dire effects for local marine resources and for the people who depend on local marine resources for food and support. It is vital that any efforts related to measuring and developing recreational fisheries are complimented by policies and efforts ensuring sustainable practices within all fisheries.

ACKNOWLEDGEMENTS

This manual was authored by Southwick Associates, Inc. of Fernandina Beach, Florida, with assistance from the Gentner Consulting Group, Inc. of Silver Spring, MD., on behalf of a broad partnership of regional fishery management authorities including: the Western Central Atlantic Fishery Commission (WECAFC), the Central America Fisheries and Aquaculture Organization (OSPESCA), the Caribbean Regional Fisheries Mechanism (CRFM), and the Caribbean Fishery Management Council (CFMC) Working Group on Recreational Fisheries. Work proceeded under the direction of Mr Raymon Van Anrooy of the United Nation's Food and Agricultural Organization and Secretary of the WECAFC and Dr Ellen Peel, President of The Billfish Foundation. Dr Todd Gabe of the University of Maine, Orono also assisted with development.

The following individuals provided initial reviews and suggestions: Claudia Stella Beltrán Turriago, Dr Hazel A. Oxenford, Dr Sabrina Lovell, Elizabeth Mohammed, and Mario González Recinos and his staff. After the initial review, a formal presentation and discussion was conducted as part of an expert workshop held in Santa Marta, Colombia, 4 November 2012. The expert workshop included members of the working group on recreational fisheries, a joint body established in February 2012 by the 14th Session of WECAFC as a cooperative effort of the partnering organizations previously listed. Revisions were made based on the group's input, and also after initial drafts were tested in 2013/14 in Trinidad and Tobago plus Colombia, and in 2015 in Martinique and the Bahamas. Appreciation is extended to Elizabeth Mohammed, Dr Katia Freire, Myriam Bouaziz and d'Shan Maycock for feedback and suggestions from their testing efforts. The authors extend their gratitude and appreciation to all who assisted, but remain solely responsible for all materials and claims presented within this document.

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ABBREVIATIONS AND ACRONYMS

(All definitions are specific to recreational fishing)

Economic impacts: the financial and monetary impacts generated within an economy as a result of anglers' expenditures. Impacts can be divided into:

Direct impact: the jobs and income generated by anglers' initial expenditures.

Indirect effects: the impacts generated in the economy when businesses and workers re-spend anglers' dollars. See the "Multiplier Effect" discussion in Section I for more details.

Induced effects: the additional impacts created when employees of firms who benefit from anglers' dollars spend the portion of their paychecks attributable to anglers.

Total impact: the simple sum of the direct impact, indirect and induced effects.

Ecosystem approach to fisheries: an ecosystem approach to fisheries that strives to balance diverse societal objectives by taking into account the knowledge and uncertainties about biotic, abiotic and human components of ecosystems and their interactions, then applying an integrated approach to fisheries within ecologically meaningful boundaries.

Employment or jobs impact: the number of jobs created or supported as a result of the economic activity generated by anglers' expenditures. Employment can be divided into direct, indirect and induced impacts.

GDP contributions: the amount or percent of the country's Gross Domestic Product generated as a result of anglers' expenditures.

Multipliers: ratios that explain the level of jobs, tax revenues or other contributions generated for each unit of currency spent. For example, a sales multiplier of 1.1 reports that US\$1.10 in total sales occurs within the economy for every dollar spent by anglers.

Recreational fisheries sector: the entire network of stakeholders involved in or fully or partly dependent on recreational fisheries including amongst others: fisheries ministries and agencies, managers, non-governmental organizations (e.g., umbrella angling associations and clubs), anglers, non-angling recreational fishers, tackle shops and tackle manufacturers, bait suppliers, charter-boating industry, recreational boat builders and chandlery suppliers, marina operators and specialized angling and fishing media, recreational fishing tourism and other related businesses and organisations as well as all other enterprises supporting recreational fisheries including aquaculture operations that produce stocking material or commercial fishing enterprises that sell angling tickets on their waters. A range of other stakeholders and managerial regimes are not included in this definition although they may run or advocate activities and developments that have a direct impact on the recreational fishing quality and the recreational fisheries sector, the sector's viability, and growth potential (e.g., hydropower generation, water management, and irrigation).

Recreational fishing: fishing of aquatic animals that does not constitute the individual's primary resource to meet nutritional needs and are not generally sold or otherwise traded on export, domestic or black markets. The unambiguous demarcation between pure recreational fisheries and pure subsistence fisheries is often difficult. However, using fishing activity to generate resources for one's livelihood marks a clear tipping point between recreational fisheries and subsistence fisheries. Globally, angling is by far the most common recreational fishing technique, which is why recreational fishing is often used synonymously with (recreational) angling.

INTRODUCTION

Background

While many tourists and residents participate in recreational fishing throughout the Caribbean region, little is known about the economic importance of the sector. As a result of this information gap, recreational fisheries are not widely considered in development and management decisions by governments in the region.

This manual lays out a simple method for countries to assess the level of expenditures and associated economic impacts related to recreational fishing. Assessing the economic impacts of any activity can be complex. Most economists engaged in such practices have years of training and hands-on practical experience. Considering the complexity associated with economic studies, this manual provides a simplified methodology that can be employed by non-economists. To ensure the results are not misleading, users are encouraged to engage, when possible, with an experienced economist to review all efforts and results. People applying this manual are expected to have some analytical abilities, survey research experience and knowledge of the region to be examined. If complexities arise that cannot be addressed by this manual, it would be beneficial to consult economists experienced with recreational fisheries and/or the economy in the region being studied.

The definition of recreational fishing can vary from place to place. The presence of people who fish for food, but enjoy their fishing activities, can confuse the definition of fishing, as can anglers who sell their catch to help reduce their expenses. The definition of anglers as presented in the FAO's *Technical Guidelines for Responsible Fisheries* is adopted by this manual. This definition is presented in the *Glossary of Terms and Definitions* later in this manual.

Purpose and objectives

This manual provides a step-by-step process for estimating angler expenditures and using those expenditures to estimate the economic impacts within the region of study. The manual can be used to measure the returns from just tournaments, freshwater or saltwater fishing, or all types of fishing within an area. The results will report the amount of money spent by resident and non-resident anglers, and the economic effects on other sectors of the economy as anglers' money flows between businesses and workers. Results will be reported in GDP contributions, jobs, income, retail sales and sometimes tax revenues. Specific objectives of this manual are to a) increase awareness and understanding among decision makers and the general public about the economic importance of recreational fisheries to their countries and b) to help fisheries managers contribute to public policy discussions affecting fisheries management, conservation and economic policy.

Manual's organization

The plan of this report is as follows. Section I, provides a brief introduction to economic impact analyses and the associated concepts. Section II provides step-by-step instructions on how to conduct a survey on expenditures related to recreational fishing and to use survey results to assess economic impacts of recreational fisheries. This manual explains common problems, informational needs and other issues to be considered during the assessment study. When questions or problems arise, the authors may be contacted for assistance.¹

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SECTION I. BACKGROUND TO ECONOMIC IMPACTS AND SIMILAR CONCEPTS

What do economic impact studies tell us?

Economic impact studies are commonly used to determine the contributions of an activity such as recreational fishing, to a regional or national economy. The idea behind these studies is that the significance of an activity is bigger than the activity itself. That is, the total economic impact captures the revenue, jobs and income directly related to recreational fishing PLUS the impacts generated as angler dollars flow through the economy, benefitting many economic sectors such as restaurants, transportation, lodging and more.

Most economic impact studies focus on three to four core indicators: revenue or retail sales, employment (full and part-time jobs), income (jobs, salaries, rents and business profits) and output which is also known as the total economic activity resulting from anglers' original expenditures. An activity that does not generate revenue or economic activity, support jobs or provide income does not have an economic impact. Such activities that are not bought or sold, such as the satisfaction someone receives from time with friends, for example, still have a value.² While important, due to its complexity and difficulty to measure, the concept of non-market or economic valuations will not be discussed further in this manual.

“New money”

In its strictest interpretation, economic impact studies measure the amount of revenue, jobs and income that would be lost if an activity were no longer available. In the case of recreational fishing, the impact is “what would be lost” if recreational fishing did not exist. To meet this standard, economic impact assessments often focus on “new money”—thought of as the new revenue that recreational fishing brings into a country or region. Along with attracting new money, fishing may capture dollars that—in its absence—would have otherwise been spent elsewhere in the economy. For example, if fishing were no longer possible, many resident anglers would spend their dollars on boating, golf or other activities. Residents would still be spending locally and the economy would not suffer much by the loss of resident fishing activities. These anglers' monies were simply shifted from one activity to another.

In recreational fishing economic impact studies, visitor (tourist) spending is included as part of the economic impact, while not all of the expenditures made by local residents are included. To count the impacts of locals' spending, we need to know if all of their spending would have occurred if the activity did not exist. This might be the case if local residents would have left the region to fish elsewhere. If locals claim that an activity helps keep them in the region, their expenditures can be counted as a form of “new money” and are important to the nation's growth and economic health.

Because it is often difficult to know if local residents' spending truly represents new money, economists make a distinction between economic “impact” and “contribution”:

Economic contribution is a broader concept and counts all spending related to an activity such as recreational fishing, both new money brought into a country or region by visitors and resident spending.

Economic impact only reports new money and the impacts generated by new money.

² Economic value” is separate concept than economic impacts. Economic value essentially measures the increase in an individual's or community's well-being as result of using a product, or engaging in a new practice or policy - or not engaging. This concept is best used to allocate fisheries across competing users, or to measure if an individual's quality of life is improved. Jobs, sales, tax receipts and GDP are best used to help explain the size or significance of an activity to a community, such as recreational fishing.

Multiplier Effect

The basic concept underlying economic impact assessments is that money flows between businesses and workers. For example, fishing tackle retailers and charterboat captains who are paid by anglers spend their money on new supplies, fuel and employees; the businesses and people that received this money then spend it on other businesses and employees, and the process keeps repeating. Overall, anglers' spending has a total impact that exceeds the amount originally spent by anglers. "Multipliers" explain this impact. For example, a revenue multiplier of 1.4 suggests that every US\$1.00 of spending on an activity generates a total of US\$1.40 in revenue; that is, the "initial" US\$1.00 spent by an angler along with an additional US\$0.40 in economic activity created elsewhere in the regional economy as the angler's US\$1.00 changed hands between local businesses and their workers.

Economists often make a distinction between two types of impacts: indirect and induced. Indirect impacts occur when businesses spend anglers' monies, and induced impacts occur when employees of these businesses spend their paychecks.

Leakages

One of the biggest factors determining how big a multiplier is for a country or region is the concept known as "leakages". Leakages happen when money leaves an economy and cannot impact other sectors or employees any more. For example, when a resort has to purchase food from outside the country, the funds used to buy the food "leak" out of the country and no longer benefit businesses and workers within the country. Leakages tend to be higher and, thus, multipliers are lower in countries and regions that import a large percentage of supplies and services. This is common among nations within the Caribbean region.

Social issues, angler motivations and marketing considerations

In addition to economic information, it may be useful to also measure the social impacts of recreational fisheries, i.e. the effect fishing has on the social fabric of the community and the well-being or livelihoods of individuals and families. Social impact information often relates to local participation in recreational fishing, people's well-being, employment and income, culture, traditions and knowledge, human relationships, and how people interact with their environment. If any of these issues are important, you may want to add questions to your survey to help explain to others how recreational fishing interacts with your community.

Other common social issues relate to anglers' satisfaction rates and perception of recreational fishing's quality and benefits. These types of questions are also considered by many to provide important marketing insights. The results can be useful to help identify how to improve your fisheries to attract more anglers in a sustainable fashion, and how to better market and advertise your fishing opportunities to attract more anglers, if that is a goal. Examples of these marketing questions are included in the surveys in the annexes.

In the Caribbean region, the following social indicators may be useful:

Indicator	What to measure/data to collect	Source of data/information
1. Visitors to the area/country	<ul style="list-style-type: none"> - Annual number of tourists - Number of overnight stays 	<ul style="list-style-type: none"> - International visitors surveys - Tourism surveys
2. Cultural/sports events	<ul style="list-style-type: none"> - Number of recreational/game fishing tournaments and participation 	<ul style="list-style-type: none"> - Sportfishing and angler associations - Business associations - Fishing tackle retailers
3. Contribution of recreational fisheries to resource management/conservation	<ul style="list-style-type: none"> - Guidelines/regulations for catch-and-release, bag limits, fishing gears and methods - Collecting and reporting of recreational fisheries data and statistics - Participation in co-management and policy/decision making 	<ul style="list-style-type: none"> - Fisheries yearbooks and statistics - Fisheries annual reports, policies and management plans
4. Food/nutrition security of the population	<ul style="list-style-type: none"> - Fish landed/harvested - Fish donated to hospitals, schools, for special celebrations, raising awareness among youth etc. 	<ul style="list-style-type: none"> - Fisheries statistical yearbook - Reports of game fish/angling associations
5. Add to number of tourists / Visitors' potential activities in an area	<ul style="list-style-type: none"> - Choices for tourists/ variety of activities 	<ul style="list-style-type: none"> - Visitor surveys
6. Use of license fees/permits/taxes of recreational fisheries operators for infrastructure/maintenance of facilities	<ul style="list-style-type: none"> - State of infrastructure and maintenance received 	<ul style="list-style-type: none"> - Government tax reports

Not all indicators above are suitable for all circumstances. You should determine which issues are important to your region, and which questions to add to the survey, if any.

Bringing it all together and making decisions

By now, it is apparent that the two main components of a recreational fishing economic assessment are A) the amount of money spent by anglers, and B) the nation's economic multipliers. Expenditures are often obtained through angler surveys, while multipliers are generated by large-scale models of the economy developed by specialized studies and typically funded by governments or research institutions. This manual, will provide guidance on how to survey anglers in a country or region, and also will present multipliers. Multipliers are typically available for explaining employment (full and/or part-time jobs), income (salaries, wages, rents and business profits), tax revenues and total economic activity resulting from recreational fishing or other activities.

Users of this manual will need to make decisions about the best way to measure the economic impact or contribution of recreational fishing. Such decisions include the best methods available to survey anglers about their expenditures, the multipliers that best represent their region or nation, and if spending by residents should be included. Decisions will be driven by the requirements of the policy/decision makers and the objectives of the planned study. These decisions should be made on a case-by-case basis.

Other methodologies are available to assess the economics associated with recreational fishing. The method presented in this manual is relatively simple in order to be replicable by general practitioners.

SECTION II. CONDUCTING AN ECONOMIC IMPACT ANALYSIS: STEP BY STEP

Before beginning, it is very important to read this entire manual to fully understand the process you are about to engage. Then, use the check list below to track your progress. Within this section, you will find details and explanations for each task listed below. Some ‘tasks’ in the spreadsheet are not actual tasks, but are important notes to review to help ensure your analysis is accurate. For easy reference, the rest of the manual corresponds with the numbers assigned to each step in this check sheet.

Project check list

	Complete?
1. Select your project team	—
2. Define your study’s overall goals and objectives	—
3. Develop your objectives and plan tasks:	
3.1. Identify your target group	—
3.2. Identify existing data sources	—
3.3. Determine which information to collect and report	—
4. Collect data	
4.1. Determine the number of anglers in your target group	—
4.2. Design your survey	
4.2.1. How many people will you need to survey?	—
4.2.2. Select the survey that best fits your needs and resources	—
4.2.3. Is a hybrid survey your best option?	—
4.2.4. Review note about collecting quality data	—
4.2.5. Select which anglers to survey	—
4.3. Construct the questionnaire	
4.3.1. Expenditure categories to collect	
4.3.1.1. Travel expenditures	—
4.3.1.2. Equipment and non-travel expenditures	—
4.3.2. Identify how many anglers were served per expenditure	—
4.3.3. Total trip days vs. total days of fishing	—
4.4. Fielding your survey	
4.4.1. Pre-test your survey!	—
5. Data entry	—
6. Develop estimates of angler expenditures	—
7. Estimate the total economic impact of recreational fishing	—
8. Post-analysis stage: be sure to communicate the results	—

1. Select your project team

Your project will only succeed if you have the right people involved! You cannot do this alone. It is critical to enlist help from the recreational fishing community. Even if a contractor is hired to do this project, help from community leaders is absolutely vital. Securing help from the recreational fishing and tourism community may be the most important task in your project. You will have two types of people involved in your project: 1) project team members and 2) analysts. Select these two groups before you begin your economic assessment:

Project team members are individuals from the tourism and recreational fisheries community who will provide the resources you must have to complete your study. The people and organizations who can help you are those who will also benefit from your final results. These agencies and organizations frequently include:

- Fishing or business organizations who also need to explain how important fishing is to the region's economy. These people can help provide access to anglers within marinas and other closed areas, identify funding sources, encourage other businesses to assist, and encourage anglers to participate in your surveys;
- Media and community leaders, including elected officials: these people can help identify funding sources, recruit businesses to participate, grant access to restricted areas such as marinas and airports to administer surveys, and promote the results once the study is completed.

Lessons learned from this manual's testing phase showed it to be critical to have people from the recreational fishing and tourism communities supporting you or your contractor. In addition, time is needed to build trust with recreational fishing businesses and to win their support in collecting necessary data. Expect several months to build these relationships. To win support from these people, be sure to explain why the study is being conducted, and how the results will benefit them and the community. You may need to first win support from one or two leaders in the tourism and recreational fishing community and then have these people help you recruit others who have access to anglers and business leaders.

Members of your project team will help identify the information needed from this project to address recreational fishing, tourism, economic and conservation issues within your country or region. In some cases, members of the project team can provide information on the number of anglers (from their own projects and sources) and help secure access to anglers or locations where angler surveys can be conducted. If available, an economist familiar with your country's economy and tourism would be very helpful. Be sure to bring in the groups and organizations needed to provide the insights and support necessary to complete all tasks listed in this manual.

The information you ultimately produce will not be valuable unless it is shared with decision makers, policy officials and the public. Therefore, when your project is complete, you will need access to people who can provide the results to agencies, organizations and businesses that need to know the results. Many of these people will already be project team members described above, but you may want to consider adding others to the team. These people will be able to help identify key information you should develop if you are to effectively help improve fisheries management and tourism in your country. They should be recruited and involved in the beginning of the project, not at the end. Make sure they have a say in your efforts if you want their help in communicating the final results.

Most project team members are not expected to be actively involved in the day-to-day operations of the study, but should familiarize themselves with this manual and the process you are about to engage.

The second audience, analysts, includes all individuals who will carry out the study. These individuals will assist the project manager and team members. Analysts, who should also be members of the Project Team, will develop the questionnaire and assist with the logistics of data collection, including interviewing anglers if in-person surveys are used (versus online, mail and other types of surveys).

Analysts will enter the survey data into a computer program, perform basic calculations (e.g., average values) using a spreadsheet, and estimate the multiplier effects using the economic impact assessment tool (described below). Often, you might have need for expert analysts to assist with your survey design and survey activities. The author can assist in locating experts when needed. If you have access to survey experts experienced in your region, try to secure their help or recommendations.

Analysts should start by reading through the entire manual very carefully to understand the “big picture” of the project and how the various parts fit together. Plus, analysts should use the manual and the checklist provided earlier as a step-by-step guide for conducting the impact assessment.

Enough details are provided in this report, as well as sample questionnaires from studies conducted by The Billfish Foundation and Southwick Associates in Costa Rica and Panama (Appendix A), so that many tourism and fisheries agencies/organizations should be able to carry out economic assessments using existing staff. If the project team decides to contract expert analysts to collect the data, the details provided in the how-to manual can help the project team and consultants to develop common expectations for the study.

2. Define your study’s overall goals

Be sure to work with your project team to develop a clear description of what your project intends to accomplish, the types of information needed to accomplish your goal(s), and the basic tasks you will use to reach your goals. If the target group is non-residents, a goal might be “to examine the impact of visiting anglers on jobs, income, and overall economic activity in the country.” Similar goal statements can be developed for projects that target all anglers, or focus on slightly different indicators. Given the almost universal interest in jobs, the employment impact of recreational fishing is likely to be included in the goal statement of most projects.

Your objectives, which are the specific tasks you will accomplish to successfully complete the economic assessment, are developed in the next section. Without clearly defined goals and objectives, it is very easy to end up with a very long, complex survey that fails to reach your goals.

If you are not sure how to separate recreational anglers from commercial, artisanal and/or subsistence fishers, please refer to the definition of recreational fishing provided by the FAO in the *Glossary of Terms and Definitions* later in this manual.

3. Develop your objectives and plan tasks

The pre-analysis stage is crucially important to the overall success of the project, as well as the acceptance of study findings when the analysis is completed.

3.1 Identify your target group

The target group could include non-resident anglers, either freshwater or saltwater anglers, all anglers, people who fish in a particular region, or even those involved in specific types of fishing such as tournaments or billfishing. You or your project team must decide on the target group early in the process because it influences how the rest of the study is designed and conducted. Think of the factors that created the need for your study, or what you want to accomplish with the results of your study, when determining who is included in your target group.

This task is closely related to the task of assembling your project team and often takes place at the same time. This is because the target group for analysis determines the relevant stakeholders, while the stakeholder organizations can provide input into the exact scope of the project. It is prudent to discuss the target group and project goals with each prospective project team member before they commit to joining.

The most common decision made when selecting the target group is whether to focus on non-resident anglers (i.e., tourists) or all anglers, including locals. A key advantage of focusing on non-resident

anglers is that they are typically easier to reach in the data collection stage. In many regions, visiting anglers can be found when they are departing the country at airports, cruise ship terminals and other transportation hubs. Also, visiting anglers might be more apt to use the Internet—both general tourism and fishing-specific websites—when planning their trip. A challenge faced when examining ALL anglers in your country or region is the difficulty associated with estimating their numbers. Some strategies to help overcome this challenge, such as enlisting angler organizations or charterboat operators, are discussed in the section on data collection.

A second advantage of focusing on non-resident anglers is that their spending can be more readily interpreted as “new money” coming into the country/region. As discussed further in this handbook, often much of the monies spent by local residents on fishing would still be spent within your study region even if fishing was not possible, thus minimizing any economic loss.

The advantages and disadvantages of including resident anglers in your assessment are as follows:

Advantages include:	Disadvantages include:
Residents are often a major part of your fishing community.	Including residents can significantly increase the cost of your assessment.
Resident anglers help build and support a local fishing culture, which might be a factor in attracting non-residents.	In some places, residents can be scattered, and can be difficult to contact to complete surveys.
Including residents can allow for comparisons between locals and tourists.	Residents' fishing preferences and methods can vary more than non-residents, requiring more complex surveys.
Results can help you determine how anglers will react to proposed new regulations or if proposed regulations need to be modified.	Many residents' expenditures would have been spent within the region, even if the person could not fish. Including residents' expenditures can overstate the true new contributions from fishing.

The ultimate decision on whether to focus on non-residents or all anglers requires consideration of the costs and ease of acquiring data for the target group, study goals and objectives, whether or not the study is about economic impact (“new money” only) or economic contribution, and the desire to compare the attitudes of resident and non-resident anglers. Other decisions that are commonly made when selecting the target group are whether to focus on marine as well as freshwater fisheries, the choice of species to include in the study, and whether to conduct assessments for specific places within the country.

In most cases, a focus on marine, or saltwater, fishing is appropriate given the limited amount of freshwater recreational fishing in many nations throughout the Caribbean region. To produce an economic impact assessment with the broadest possible audience, it is advisable to include all species of fish that are caught in the region. An important survey question will ask anglers to select the specific species they pursued and caught. With this information, the impact assessment can be conducted for an individual species of fish (e.g., marlin, sailfish, tuna, etc.), and the types of species most important to your recreational fishing and tourism economy can be identified. Likewise, if the survey asks anglers to indicate the exact places where they fished, the analysis can help you identify how to improve or at least protect the places and services critical to your nation's recreational fishing and tourism economy.

3.2. *Identify existing data sources*

The less data you need to produce from a survey, the better off you are. Shorter surveys receive better responses from anglers, and existing surveys and data sources may have greater accuracy than the survey you are about to conduct. Your tourism agency may conduct visitor surveys. If this is the case, an influential member of the agency serving on your project team may be able to help include a few

fishing-related questions on the next survey conducted by the tourism agency. Although this option might limit the amount of information that is collected, a general tourism survey that asks how many times and where people fished along with related expenditures could provide all the information that is needed for a basic economic impact assessment of non-resident anglers. Similarly, some fisheries agencies or other organizations may conduct their own surveys or be able to assist in reaching the target group.³

Tourism/recreational fishing businesses and industry associations are worth having on your project team. These groups may have lists of customers/members, which could be used to identify potential survey respondents. Or, these groups can distribute your survey to anglers for you, whether it's a paper-based survey or a link to an online survey. If a group does not want to provide a mailing list of names and addresses, even collecting aggregate figures such as the percentages of resident and non-resident customers/members can be very helpful.

3.3. *Determine which information to collect and report*

Once the target group and existing data are identified, the final step of the pre-analysis stage is to determine the data that needs to be collected. Be sure the project team has agreed to the study's goals by this point.

The types of information that are needed to estimate the economic impacts of recreational fishing include:

- An accurate count of anglers in the target group,
- The number of days fished per angler, and
- The amount of spending per day related to recreational fishing.

These three categories of information, to be discussed later in more detail, are crucial to any economic impact assessment. If these figures are available from reliable sources, the project can proceed without a survey. If a survey is required to collect expenditure and other fishing-related data, which is usually the case, the project team can decide whether to include additional questions about angler attitudes and opinions. The project team will have to balance the value gained from the extra questions added to a survey versus collecting fewer surveys. Longer surveys often result in fewer being completed.

4. *Collect data*

4.1. *Determine the number of anglers in your target group*

Your first step in the data collection and analysis stage is to determine the number of individuals in your target group. Reliable counts of anglers are crucial for determining how much anglers spend in your country. This information can be calculated several ways and, because of its importance to the study, it is often worth the effort of obtaining more than one estimate. If the angler counts are similar, they can help build confidence about the accuracy of the study. If they are substantially different, the two estimates can be used as end points (i.e., minimum and maximum) for reporting a range of impacts. Likewise, obtaining two very different estimates can help uncover problem related to data collection and analysis.⁴

Try to avoid common data problems. If you obtain different data that have conflicting estimates of the number of anglers in your area, let your project team decide which data is the most reliable and accurate. Please note that it is common for people to critique economic studies. Therefore, when deciding which numbers are best to use, the project team must consider the reliability of the estimates and their sources, and which estimates can be adequately defended or not.

³ If a government agency works primarily with commercial fisheries, they might be less able to assist with reaching the target population, but—depending on the organization—their perspective could be useful to the project.

⁴ For example, an approach that attempts to count anglers over an entire year would likely arrive at a lower total number than an approach that counts anglers over the busiest three-month quarter and then multiplies this amount by four.

As discussed earlier in the manual, project team members representing tourism or fisheries agencies and organizations might have access to information on the number of non-resident anglers, or the percentage of tourists leaving your country who fished. These figures should serve as your “official” count of non-resident anglers, provided that the tourism agency conducted a thorough study and that its figures are generally accepted by other stakeholder groups in the region. If fishing information is not collected on existing surveys, it might be fruitful to work with the agency to add these questions. This could provide opportunities for joint sponsorship of the survey effort and to enhance the credibility of your results.

Efforts to obtain angler count statistics from project team members should begin in the pre-analysis stage of the project. If such information is not available, or only available for a small geographic area or narrow segment of fisheries, maybe an existing survey can be expanded to count non-resident anglers. Although the primary purpose of these surveys is to ask questions about the number of days spent fishing and trip-related expenditures, it is common to add questions asking respondents to indicate the types of activities that he or she participated in. For example, non-residents can be asked if they participated in recreational fishing during their trip to your country along with other activities typically enjoyed by tourists. If they do not report fishing, their answers are recorded and the survey ends. By looking at the percentage of all tourists who fish, and matching this to the total number of tourists visiting your country or region, you will have determined the total number of non-resident anglers. Examples of how this has been done before are found in the sample surveys presented in Appendix A. These surveys were used in recent studies conducted by Southwick Associates for The Billfish Foundation in Panama and Costa Rica.

Your angler survey can be used in other ways to estimate the number of non-resident anglers. Suppose an organization on your project team has very reliable and generally accepted data on the number of non-resident anglers in a particular area. If the angler survey finds, for example, that one out of every six survey respondents fished in this specific area, the figure provided by the stakeholder organization can be multiplied by six to arrive at an estimate of the total number of non-resident anglers across the entire country.⁵

4.2. Design your survey

The next step of the data collection and analysis stage is to determine the amount of money spent by the typical angler. Per-person expenditure figures are used along with the count of anglers, discussed above, to estimate spending by all anglers. Your survey will be used to determine how much money anglers spend. Several aspects of the survey need to be considered, including its format (e.g., in-person, mail survey, etc.), the data collection plan (i.e., how to reach the target group), and the questions to ask.

4.2.1. How many people will you need to survey?

The number of people you will survey, known as your ‘sample size,’ is important. Too few, and your results will not be accurate and the assessment will fail to provide reliable estimates. Too many, and your assessment becomes unnecessarily costly and time-consuming. There is not an exact number or process to use when determining your sample size, and decent fisheries surveys will have completed anywhere from a couple hundred to thousands of surveys. The larger and more diverse a fishery, the greater number of surveys that will be needed. There are automatic calculators online that can help you determine the number of surveys you will need to achieve specific levels of accuracy. In many cases, you will be prompted to enter how many anglers there are in your country or region being examined. You may not have the information requested by the calculator. Enlisting the help of an economist or survey specialist is useful. Otherwise, in most cases, a good rule of thumb is to have approximately 400 completed angler surveys behind any number you want to report, such as total expenditures, where they fish, etc.

⁵ Similarly, information from members of the project team can be used to supplement the angler survey as a way to estimate the number of all (i.e., resident and non-resident) anglers. Suppose that a fisheries agency has found that 20 percent of all anglers are tourists. The survey can be used, as described above, to determine the number of non-resident anglers, which—in this case—can be multiplied by 5.0 (i.e., 1.0 divided by 20 percent) to estimate the total number of anglers.

Let us use an example. If we want to gain a general idea of a region's anglers who fish for the various species available, a sample size of 100 would help. Though at this low number we may be a bit uncertain about the percent of anglers who target seldom-fished species, we will understand the approximate percentage that target the most common species. If there are species that are commonly fished by less than 10 percent of anglers, then with a sample size of 100, there is a good chance you will not find any anglers who target these rarer species. If it is important to know how many anglers are targeting rarely fished species, you will want to boost your sample size to 400 or more. If you need to describe anglers who target rarely fished species (versus just knowing the percent of anglers who target these species), such as identifying how much money they spend, their demographic characteristics, or their opinions, you will need to have at least 50 of these anglers (more than 50 is definitely better). Therefore, if these specialized anglers only represent 1 percent of your total angler base, and you want to achieve a reliable sample size of 100 surveys, you will need to survey 10 000 anglers in total to find your 100 specialized anglers ($100/.01 = 10\,000$). Carefully consider the cost of your survey along with your detailed information needs when planning how many surveys you will need to collect.

4.2.2. *Selecting the survey that best fits your needs and resources*

The most appropriate options for the survey format are an in-person intercept survey, mail survey, or an on-line survey. Collecting the data in-person would involve people asking questions of anglers in one-on-one interviews and then writing the responses on a form or entering them into a computer or tablet device. If the target group is non-resident anglers, intercept surveys should be administered at tourism destinations and transportation hubs. Since the survey asks about fishing activities and expenditures over the entire trip, the best places to collect information are points where tourists exit the country; e.g., international airports, cruise ship terminals, etc. Do not survey them when they first arrive as they do not know how much they will be spending.

An advantage of intercept surveys is that you can collect spending and other data directly from anglers when the information is fresh in their minds. Also, if surveys are administered at points of exit, the survey administrators have access to large numbers of tourists who are often waiting in a confined space (i.e., people typically arrive at an airport or ship terminal in advance of the departure time) at predictable times of the day (i.e., airplane and cruise ship schedules are readily available). This means that the survey administrators will encounter large numbers of people, who will likely be willing to spend a few moments providing information about their stay. A disadvantage of intercept surveys is that the format limits the number of questions that you can ask. The longer your survey, the more likely people will quit in the middle of your survey. This is true for all surveys.

Intercept surveys are often not an effective way to collect information from resident anglers. It can be difficult to identify places where you could –on a regular basis—encounter enough anglers at specific times to efficiently collect data.⁶

A mail survey involves developing a paper questionnaire that is distributed to anglers in the target group, who complete the form and return it by mail. This approach, of course, is only effective if you have a reliable mail service in your country, and is difficult and not advisable to administer to non-resident anglers. Non-residents are likely to not return it once they return home due to uncertainty about postage and delivery, among other reasons. The questionnaires can be distributed by hand at places, described above, where tourists exit the region. Additionally, mail surveys can be distributed to non-residents at resorts, marinas and other tourist attractions. Although it is not recommended to conduct intercept surveys at these places because anglers have not finished their trip, distributing mail surveys at tourism attractions is fine because individuals can complete them later. Please note that many anglers will lose or throw away surveys handed to them, so you will need to give out many surveys to receive a few in return. How many you will receive back varies based on the greeting and message provided by the person handing out the surveys, the appearance of the survey, the inclusion

⁶ Places where you could find significant numbers of resident anglers include fishing shows and expeditions, but they are held infrequently. Intercept surveys require visiting fishing locations many times during a year to collect enough data for your study. If the goal of your study is to measure economic contributions of tournaments, then intercept surveys are often ideal.

of a mail envelope complete with postage, if the survey questions are clear and understandable, and more.

Mail surveys can be distributed by hand or sent to potential respondents. This data collection method is a good option if the project team has access to mailing lists of anglers/tourists from recreational fishing organizations, tourist destinations, or other sources. Mail surveys can reach resident anglers in instances where common gathering places do not exist. A key advantage of mail surveys is that, compared to intercept surveys, they can be used to collect more information—but they should be designed to require less than ten minutes to complete. Another advantage of distributing questionnaires by mail is survey administrators have a mail list that can be used to send follow-up reminders and replacement questionnaires to non-respondents. This practice, found to increase response rates, is recommended and usually not possible if the mail survey is distributed by hand.

When using a mail survey, consider the use of an incentive to encourage greater responses. Incentives can include a cash prize or a gift certificate, lotto tickets, free fishing tackle, etc. Winners can be randomly selected from the list of all respondents.

Another common data collection method is an on-line survey. This involves developing a project website where anglers can complete the questionnaire.⁷ Respondents would be asked to participate using an email message with a link to the on-line survey. This is typically a viable lower cost option, compared to mail and intercept surveys, if the project team has access to anglers' email addresses. Savings come from lower costs of printing and mailing, as well as data entry. Most on-line survey programs are designed to export responses into a computer format (e.g., spreadsheet file) that can be used in the data analysis stage.

A drawback of using on-line surveys is the difficulty of obtaining a comprehensive email list of anglers. Although the survey administrators could solicit on-line respondents through the use of a “paper form” (e.g., a mailing, brochure, or bookmark with the Internet address), on-line survey response rates can be low in cases where an electronic link is not provided through an email message or another website. Sometimes, resorts and businesses catering to anglers can provide email addresses of their customers, and some of them likely fished while visiting. Likewise, if internet access is limited, then online surveys may not be as effective as other survey options.

⁷ Several companies offer software and support for conducting on-line surveys. The authors of this report have on-line survey services in-house.

A partial list of the trade-offs between different survey methods include:

Survey Method:	Advantages:	Disadvantages:
In-person interviews	Anglers will have the freshest recollection of their expenditures and activities, when interviewed directly after their fishing trip.	Anglers may be difficult to reach if they depart and return from private marinas and docks, or fish on private lands.
	Ideal for when your target audience travels through common places, such as airports or a marina.	Can be costly to pay people to administer surveys. Long surveys can be a problem when people might be in a hurry at your survey locations.
Mail	Great for when mail lists of anglers are available.	Takes longer to administer, based on the number of days needed to send out and receive responses.
	Many businesses serving anglers will have customer lists available.	Difficult to send and receive surveys from other countries, if non-residents are in your target audience.
Phone	Great for when mail lists of anglers are available.	You may need to hire a costly professional phone center to administer surveys day and night. Volunteers are difficult to find to administer phone surveys.
Email	Lowest cost option, if email addresses for anglers are available.	Email surveys usually have very low response rates which lowers the quality of the responses, and may result in too few responses.
	Email surveys can be conducted rather quickly compared to other types of surveys.	You may need to acquire special complex software if you do not have access to a web specialist.

4.2.3. *Is a hybrid survey your best option?*

Often, there are tradeoffs to consider regarding costs, length of survey, ease of collecting the data, and obtaining a representative sample. If the target group is non-resident anglers, a hybrid approach that combines intercept and mail surveys could be used. The survey administrators could provide respondents an option of completing a short survey in person, and reply to the remaining questions in a mail survey that would be completed and returned later. If the target group is all anglers, a multi-pronged approach could include intercept surveys to reach non-residents, as well as an on-line survey for resident anglers. If an on-line survey is developed for locals, the survey administrators could provide tourists the option of completing an intercept survey or provide a letter and brochure with a link to the survey website. Another hybrid approach would be to combine or merge your survey with another ongoing survey, such as a tourism survey. By combining surveys, costs can be lowered and/or greater access to respondents can be achieved.

Economic impact studies can look at the contributions from a single event such as a tournament, or the economic impacts from the entire recreational fishery over a course of a year. Be sure the survey questions are properly worded to capture all expenditures within your specific time frame:

Single-event studies: If your study is reporting the economic impact from a single event such as a tournament, people do not have to recall expenditures made over a long time period. Angler expenditure questions need to ask how much anglers spent for items and services such as food,

fuel, lodging, food, crew, bait, transportation, etc. It helps to ask questions per item, such as how much was spent on food, then lodging, etc. The sample surveys in Appendix A can serve as your guide. Be sure that your questions discern between expenditures made within the study region, and only record equipment expenditures for items that were bought primarily for the event.

Annual studies: Anglers frequently have a difficult time recalling expenditures made over a 12 month period. To help minimize this problem, ask anglers how much is spent on average per trip and the total number of trips. During the analysis stage, as discussed later, the two numbers will be multiplied to quantify anglers' total annual travel-related expenditures. Equipment and durable items such as condos, boats, etc. can be used for many fishing trips. These items certainly are not multiplied by the number of trips taken. These items should be asked in separate questions. Only document equipment expenditures made within the study region.

4.2.4. *About collecting quality data*

Equally as important as the choice of survey format is making sure your results represent all anglers in your target group. A poor survey misses many of the people you need to include, and can under- or over- estimate results. Be careful of the following problems:

- As best as possible, your data collection method should not favor one type of angler over any other. For example, if you only survey non-residents in January and February, these anglers may prefer different species or spend less money than anglers who visit in September and October.
- If your target group is resident anglers and the selected method is an on-line survey, the sample should not rely on an email list from a single fishing organization—even if it has a large number of members. This is because members of a particular organization may typically spend more or less money than non-members. They may prefer one type of fishing compared to non-members. These differences could result in an over- or under- statement of average expenditures.
- Your survey should aim for collecting data across different times of the year, different places and regions of the country, types of fishing, different sources of anglers, etc.

If you will be using an in-person or phone survey, be sure your interviewers know the purpose and goals of your project. If they know the details of why you are conducting your project, they will be able to answer questions anglers may have, resulting in accurate and consistent responses.

4.2.5. *Selecting which anglers to survey*

When working with mailing lists or conducting a survey in person, the survey administrators can take two approaches of sampling. One way is to survey all members of a mailing list or all tourists that are encountered. This approach makes sense if the survey administrators are dealing with small numbers of anglers or if the data collection method is low cost. Another way, which is more common, is to select a limited number (i.e., sample) of people from a mailing list or intercept survey location. Participants should be selected at random, which means that everyone has an equal chance of being contacted to take your survey. A simple random survey can be done for mail surveys, by deciding how many surveys the project team would like to distribute (e.g., 500 surveys, based on your budget) and then dividing the size of the mailing list (e.g., 2 000 names) by this number. The value obtained, in this example 4.0, indicates that the survey administrators should select one out of every four names from the mailing list. For intercept surveys, a similar approach can be used to determine the frequency of tourists that should be approached. Other increasingly complex methods are available and can be designed with the help of a survey expert.

4.3. *Construct the questionnaire*

Once you have selected your preferred survey method, you will next construct your survey questionnaire. For a basic economic impact assessment—i.e., the project team is not interested in collecting information about angler attitudes and opinions—the most important information to collect is spending data and the number of days spent fishing.

4.3.1. Expenditure categories to collect

There are two types of expenditure data you will generate:

Travel expenditures include hotels, food from grocery stores and restaurants, travel (airfare, auto rental, gasoline for autos, etc), fishing guides, boat and gear rental, and similar expenditures made by anglers to travel to and from their destination and for services upon arriving at their fishing site. Travel expenditures also include souvenirs and items purchased on their trip within your country or the study's region.

Equipment and non-travel expenditures typically include fishing tackle, boats, trailers, clothing, regular boat maintenance and other goods and services not purchased as part of a specific fishing trip.

These two types of expenditures are calculated in different ways, as explained later in this manual.

When to exclude certain expenditures

Please refer back to Section I for a discussion about “new money.” “New money” is received from non-residents who bring their funds into your economy. As you construct your survey, please consider when certain monies, especially those spent by residents, should be included in your analysis.

This manual will assume you are including all equipment and resident expenditures. You must determine if any expenditures should be excluded or not. Basically, if fishing was not possible, but the angler would have spent his or her monies anyways within your study region, then those monies should be excluded from your assessment.

4.3.1.1. Travel expenditures

The following equation can be helpful in understanding the data you need to estimate anglers' travel dollars:

Angler-related travel expenditures = *Number of anglers x Average days fishing per angler x Average dollars spent per day per angler.*

Your analyst should estimate non-resident and resident expenditures separately. Per-day travel expenditures are likely to be higher for non-resident anglers. As discussed later, it is also important to determine if non-residents would have still visited your country or region, even if they could not fish. In cases where a non-resident would have still visited your country even if he could not fish, only his or her direct fishing-related expenses (charterboat, bait, supplies used while fishing, etc.) can be included in your economic impact estimates. The other dollars spent by these anglers would have been received by your country anyways and cannot be credited to fishing.

The formula above requires you estimate the average monies spent per angler. Sometimes, the angler who responds to your survey will have purchased services for several anglers. This is typical for families who travel together and share accommodations, meals, etc. It is important to adjust your estimates to reflect the average amount spent per person and not for the travel group IF those additional people would have visited even if fishing was not possible. Please see the Costa Rica survey in Appendix A where data are collected to make this simple adjustment in question 13.22 (“people included in this payment”).

4.3.1.2. Equipment and Non-Travel Expenditures

Along with their travel expenditures, spending on fishing equipment and gear by resident and non-resident anglers can have a large impact on the economy. The formula used to estimate the amount of this type of spending is:

Fishing-related equipment and non-travel expenditures = *Number of anglers x Average annual per-angler equipment purchases within the country*

When tracking equipment and non-travel expenditures for residents, there are a few additional issues to handle:

- Be sure to specify your study's time period. For example, if your study will report economic impacts for 2011, your survey should only inquire about equipment purchased in 2011, and not record purchases in 2012 or 2010.⁸
- Also, if your study does not cover all fishing activities, such as an economic impact study of tournaments or freshwater fishing, then be sure to ask respondents if they would have purchased their equipment even if they could not fish in tournaments or freshwater. If they would have still made these purchases, then their economic impacts cannot be solely attributed to tournaments or freshwater fishing. These equipment purchases should be removed from your analysis.
- Equipment expenditures made by non-residents cannot be included unless those expenditures were made in the study area.

The average annual equipment purchases (within the country) per angler are estimated using information from the survey. In the two sample surveys in Appendix A, equipment expenditures are captured in question 13.

Some of the anglers surveyed in the study will own boats that are used for recreational fishing. Spending to maintain these boats can be incorporated into the economic impact assessment in a manner similar to the equipment questions. In Appendix A, several types of expenditures related to maintaining a boat are covered in the Costa Rica survey in question 14. The Panama survey asks whether the respondent owns a boat in the country (question 14); however, spending to maintain the boat is captured in an "other expenditure" category (part 13.120) in the question about all types of spending. Either approach is acceptable. The decision of whether to include specific questions about spending to maintain a boat should be made based on the project team's knowledge about the likely number of anglers who own a boat, and based on survey responses indicating the boat expenditures would have occurred even if the boat could not be used for fishing.

Sample materials from recent surveys conducted in Costa Rica and Panama are presented in Appendix A. These letters follow the methodology presented in this manual, and can be used in developing your survey questionnaire. Also included on *The Billfish Foundation* letterhead is an example of a "request to participate" letter used for an intercept survey. This letter, to be handed to a respondent prior to conducting the survey or used as an introduction on an email survey, tells the potential participant who is conducting the study, why the information is being collected and how it will be used, the amount of time the survey will take to complete, and the study's benefit to anglers. A cover letter accompanying a mail survey would contain similar information along with instructions on how to return the questionnaire (e.g., "Please return the completed survey in the postage-paid envelope that is provided.").

Both of the sample questionnaires were used for intercept surveys of non-resident anglers. One of the first questions is whether the respondent participated in recreational fishing—along with other activities. As noted above, the percentage of all survey respondents who participated in recreational

⁸ In the case of boats, condos and other higher cost items frequently financed over years, it is simpler to ask respondents to report the full cost of item purchased, and only record those items purchased during the study's time period. Payments made for items purchased outside the time period would not be included. For example, if your study covers all of 2012, any purchases or payments for boats made in 2011 would not be included in your study.

fishing multiplied by the number of all tourists to the country (from another source) can be used to estimate the number of non-resident anglers (if this information is not already known).

Two other critical data elements—number of days fished and average expenditures—are obtained from later sections of the survey. Question 8 of the Costa Rica survey and question 9 of the Panama survey both ask about the number of days fished. The Panama survey covers multiple regions of the country, while the Costa Rica survey collects information on the total number of days fished without regard to location. Question 13 on both surveys solicits angler spending figures across a wide range of tourism-related categories.

4.3.2. Identify how many anglers were served per expenditure

When collecting information about angler spending, it is important to know how many people are covered by the expenditures. This information is needed so the figures can be converted, if necessary, into ‘spending per angler’ estimates. In the case of the Costa Rica survey, question 13.22 asks—after collecting information on expenditures—“how many people are included in this payment?” This number can be used to convert the expenditure figures in question 13 into per-angler values. In the Panama survey, the instructions for question 13 ask the respondents to not include “expenditures you made for others in your travel party” and to “only report your share, as best as possible.” Using this approach, the expenditure data collected in Panama can be used directly as it is reported to the survey administrators.

4.3.3. Total trip days vs. total days of fishing

As the survey data are analyzed, the expenditure figures (per angler) should be further converted into a value per day spent in the region. The calculation is simple: divide the ‘amount of spending per angler’ by the total ‘number of days the angler spent in the region’. Do not divide by the number of days spent fishing which are often fewer as anglers may not fish every day of their trip. It is reasonably easy for anglers to tell you how much they spent over the entire trip, but can be more difficult to report how much was spent just on their fishing days.

4.4. Fielding your survey

4.4.1. Pre-test your survey!

It is strongly recommended to pre-test the survey prior to its wide-scale implementation to make sure that the questions are appropriate, will provide the intended information, and that your respondents accurately understand your questions. A pre-test involves conducting a small number of surveys in the same setting that the main survey will use (in-person, internet, phone or mail). It is helpful to ask respondents after completing the survey if any questions were confusing or not clear. Then, the analysts review the pre-test results and comments received to determine if any questions need to be reworded and to ensure if questions are being interpreted as expected.

If using an in-person or phone survey, pre-testing helps to ensure your surveyors are ready and can answer questions anglers might have. Surveys of tournament anglers can receive greater response rates if anglers are required by the tournament organizers to complete a survey to remain eligible for prizes.

After the pre-test is completed and the survey questions are finalized, the full survey is then performed. Once complete, the data collected from the surveys should be entered into a computer program, such as a spreadsheet or other statistical software, for analysis. This allows for easy management of the data set and calculations of average values that can be used in the economic impact assessment.

5. Data entry

Most analysts will use a spreadsheet to enter their data. Use the software that works best for you. If you do not have experience with computer spreadsheets or statistical software, find assistance from

someone who does. You will want to enter all the responses to all questions, and can modify your spreadsheet as you conduct your analysis.

An important thing to consider when entering the data is to make a distinction between blank observations (questions that anglers did not respond to) and values that should be entered as zeros. Blank, or missing, values occur when a respondent does not answer a question or the question was not relevant. In some cases, for example, when an angler does not report boat-related spending because he does not own a boat, missing values should be converted into zeros and included in the calculations of average spending by all anglers. In other cases, such as an angler who does not provide any sort of expenditure information, missing values should not be converted into zeros and that angler should not be used in calculations of average expenditures. In this case, mistakenly counting all missing values as zeros will lower average expenditure figures and incorrectly reduce the size of the economic impact estimates. On the other hand, mistakenly removing zeroes from the analysis when they are needed will increase average expenditures and incorrectly inflate the overall economic impact. Attention must be paid to entering the survey data so that missing values are converted into zeros or removed from the analysis as appropriate.

6. Developing estimates of angler expenditures

At this point, your survey has been designed, your survey has been conducted, and you are now ready to develop your estimates of angler expenditures. The following is an example of how to use the angler surveys to estimate overall spending. Suppose that a member of the project team knows that the country welcomes one million visitors per year and the survey (questions 3 and 2 in the Panama and Costa Rica surveys, respectively) finds that 23 percent of the respondents participate in recreational fishing. Multiplying the number of visitors by the percentage that participates in recreational fishing, we arrive at a “number of anglers” estimate of 230 000 people. From the survey, we learn that one-third of these (or 76 590) visited for the primary reason of fishing, and others (153 410) would have still visited even if they could not fish. This is the first part of the equation.

For the 76 590 anglers who visited for the purpose of fishing, the survey tells us the average angler stay for 5 days (questions 8 in the Costa Rica and Panama surveys in Appendix A). Multiplying this number of anglers by the average number of days fished per angler, we arrive at an estimate of 382 950 fishing days by non-residents who visited for the main reason to fish. Suppose finally that anglers report spending an average of US\$250 per day on travel-related expenses over their entire trip. Multiplying this spending figure by the number of days visited, we arrive at US\$95 737 500 in new dollars.

For the other 153 410 people who fished, but would have visited even if they could not fish, we learn from the survey they fished an average of 2 days during their trip (questions 9 in the Costa Rica and Panama surveys), though they stayed in your country for 7 days. Multiplying this number of anglers by the average number of *days fished* per angler (2 days), we arrive at an estimate of 306 820 fishing days by non-resident anglers. Suppose finally that anglers report spending an average of US\$250 per day on travel-related expenses over their entire trip. Multiplying this spending figure by the number of days spent fishing, we arrive at US\$76 705 000 in expenditures by these non-residents.

The final step to determining the total expenditures made by visiting anglers would be to add in equipment and other purchases made by visitors. All expenditures made in your region or country by people who visited primarily for fishing can be included, and only fishing-related purchases should be included for the others.

Although the sample surveys and examples provided above apply to non-resident anglers, the same general approach can be used to collect trip-related spending figures for domestic anglers. In many places, non-residents spend more on trip-related items than residents; for example, residents can leave home, fish and return on the same day, without paying for a hotel and paying less for food and restaurants compared to overnight visitors. Another example is that non-resident anglers are more

likely to hire charterboats and other more relatively expensive forms of transportation compared to residents who might own their own boat or have access to a friend's boat or other lower cost options.

The example surveys provided in appendix A can be modified for use in most nations. Although the questions used in Panama and Costa Rica are different, they are meant to obtain similar types of information: whether a non-resident tourist participated in recreational fishing, the number of days an angler fished, spending data, and demographic characteristics (e.g., gender, income, and place of residence). The project team should review these questionnaires and revise the list of activities available to people in the country to present along with recreational fishing, as well as modify the listed fish species that are common to your area. You will likely find other edits and changes necessary to match your specific location and needs.

6.1. *Allowing for sponsorship funds (tournament studies)*

Many companies pay local organizers to have their name associated with the tournament. These sponsorship monies provide positive economic contributions to the area. Be sure your study captures the money brought into the region by these corporate donations. Tournament organizers can report the amount paid by companies outside your region. Simply add these to the total angler expenditures.

7. Estimate the total economic impact of recreational fishing

The final step of the data collection and analysis stage is to estimate the total economic impact of recreational fishing. This involves matching your angler expenditure figures with the appropriate multipliers.⁹

To select the multipliers that best match your economy and situation, your project team could partner with someone who has experience in economic impact modeling such as the authors of this manual. When possible, it is recommended to enlist the help of a local economist who might know of multipliers available to your country or region under study. When a local economist or local multipliers are not available, please use the process offered next and the multipliers listed in Table 1. Further descriptions of multipliers and limitations are presented in Appendix B. If you do not have assistance from an experienced economist, use the procedures offered below.

Please note that multipliers are crafted for specific economies. Transferring one multiplier to another economy is not recommended unless there are no other options available. To decide which countries are similar to yours, the United Nation's Human Development Index is recommended (<http://hdr.undp.org/en/content/human-development-index-hdi>). This index rates countries on multiple factors including levels of economic development, and is a good way to identify countries similar to yours. More detail is provided in the following section.

If you do not have assistance from an experienced economist, please use the process presented in Section 7.2, along with multipliers available in Table 1 of the same section.

7.1. *Residents vs non-resident impacts*

If your target group of anglers includes non-residents and residents, spending figures should be analyzed separately. As noted earlier, the expenditures made by resident and non-resident anglers often have different interpretations in terms of their impact on the economy. By developing separate estimates for resident and non-resident impacts, you can better communicate the impacts to tourism (non-resident impacts only), and simply add the resident and non-resident impacts together to estimate fishing's overall economic contribution.

⁹ Multipliers are unique to a given region, sector of the economy and time period. This makes it difficult to apply a multiplier developed for other countries or region to your study. However, the cost of developing multipliers for countries or activities where none are already available can be very expensive and time consuming. The impact tool and multipliers presented in this report will help you apply the multipliers that best match your local economy, but may not perfectly represent the actual effects within your economy. Please note that the results must be considered rough estimates only.

7.2. *Estimating economic impacts – multiplier definitions and steps*

In general:

$$\text{Total impact} = \text{total expenditures} * \text{multiplier}$$

Instructions are presented here, followed by an example after Table 1:

- 1) Select the multipliers to use:
 - a) If multipliers are provided for your country in the table below, you will simply use those figures.
 - b) If multipliers are not provided for your country, refer to the “HDI Index Ranking” column for your country. This refers to the United Nations’ Human Development Index (HDI) (<http://hdr.undp.org/en/statistics/>) which serves as a good indicator of a nation’s relative level of economic development. Find another country in the table with an HDI index similar to yours. You may not necessarily choose the country with the number closest to yours, but pick one with a similar HDI index that is also similar to your country. For example, if your study region was an island, you would want to pick multipliers from Table 1 from an island with a similar HDI and a similar economy. It would be advisable to speak to someone familiar with your country’s economy and familiar with the economies in Table 1. In the selection process, pay particular attention to import patterns and choose a multiplier from a country with similar patterns. There is not an exact and precise way to pick a substitute country’s multiplier. Select the country you think is the best match.
- 2) Match your retail sales figure with each multiplier:
 - a) Output/Sales: the total amount of sales received by businesses and individuals within your country. Sales are generated as anglers spend their money, and then retailers and service companies re-spend these monies on more goods and production, plus they pay their employees who make further purchases. As businesses and people re-spend anglers’ monies within your economy, the impact of anglers’ expenditures grow. This figure tells you how much economic activity occurred in your economy as a result of spending by anglers. To generate this estimate, simply multiply the amount spent by anglers by the Output / Sales multiplier.
 - b) Income / GDP: the total amount of the nation’s Gross Domestic Product (GDP) generated as a result of anglers’ expenditures. Simply multiply the amount spent by anglers by this multiplier to learn how much of your country’s GDP is generated by sportfishing.
 - c) Employment: the number of jobs created or supported as a result of the economic activity generated by anglers’ expenditures. These multipliers express the number of jobs supported for every US\$1 million spent by anglers.
 - d) First, divide the total amount spent by anglers by 1 million.
 - e) Then, multiply the result by the employment multiplier.
 - f) Tax Revenues: the total amount of the nation’s tax revenues resulting from anglers’ expenditures. Simply multiply the amount spent by anglers by this multiplier to learn how much of your country’s tax revenues is generated by sportfishing.

Table 1

Economic multipliers by nation

Country	HDI Index Ranking 2011*	Output / Sales	Income / GDP	Employment per US\$1 million Spent by Anglers	Tax Revenues	Source
Alaska	4	1.16	0.39	11.46	-	Southwick Associates 2008
Antigua & Barbuda	60	0.87	0.88	-	-	Horvath 1981
Bahamas	53	1.02	-	35.80	-	Fedler 2010
Bahamas	53	0.87-1.25	0.78	-	-	Loufi, Miscardini and Lawler 2000, Horvath and Frechtling 1999
Barbados	47	1.41	-	-	-	Horvath 1981
Belize	93	1.11	-	-	-	Horvath and Frechtling 1999
Bermuda	N/A	1.09-1.66	1.10	-	-	Horvath and Frechtling 1999, Horvath 1981, Batta 2000
Brazil	84	1.87	-	91.76	-	Casimiro 2002
British Virgin Islands	N/A	0.98	-	-	-	Horvath and Frechtling 1999
Cayman Islands	N/A		0.65	-	-	Horvath 1981
Columbia	87	-	-	-	-	
Costa Rica	69	-	1.28	135.00	0.17	TBF/UCR/Southwick 2010
Cuba	51	1.50		59.48	-	Crespo 2007
Dominica	81	1.20	1.20	35.80	-	Horvath 1981
Eastern Caribbean	N/A	1.07	1.07	-	-	Horvath 1981
Guatemala	131	-	-	-	-	
Guyana	117	-	-	-	-	
Haiti	158	-	-	-	-	
Hawaii	4	1.03	0.34	9.35	-	Gentner and Steinback 2008
Honduras	121	-	-	-	-	
Jamaica	79	1.02-1.94	-	1.48	-	McCatty and Serju 2006
Mexico	57	1.78	-	55.07	0.39	TBF/Southwick 2008
Nicaragua	129	1.65	-	-	-	Rainforest Alliance 2009
Panama	58	1.74	0.50	97.00	0.03	TBF/Southwick 2013
Puerto Rico	4	1.08	-	-	-	Horvath and

Country	HDI Index Ranking 2011*	Output / Sales	Income / GDP	Employment per US\$1 million Spent by Anglers	Tax Revenues	Source
						Frechtling 1999
Suriname	104	-	-	-	-	
USA, National	4	2.62	0.76	16.98	-	Gentner and Steinback 2008
USA, Texas	4	1.32	0.42	10.92	-	Gentner and Steinback 2008
Venezuela	73	-	-	-	-	

7.3. Example of the calculation process

This example uses a fictitious country: Anglerland. The goal of our study was to determine the total US dollars brought into our country by visiting anglers. Therefore, our angler survey only looked at visiting anglers and determined they spend US\$25 million each year in Anglerland. We used the following steps to determine the economic impacts.

1. Select a country: Anglerland does not appear in the multipliers table (Table 1). Therefore, we must select a country that best compares with Anglerland. We select Antigua and Barbuda because its economy and other characteristics are similar to Anglerland.
2. Calculated impacts:
 - a) Output/sales: US\$25 million (annual angler spending) x .87 (from Table 1, for Antigua and Barbuda) = US\$21.75 million. This is the total business activity (output or sales) resulting from angler expenditures in Anglerland. This amount (US\$21.75 million) is less than the amount actually spent by anglers because many angler dollars immediately leave the country as a result of the high rate of imports (food, fuel, etc.) and foreign ownership of some hotels, marinas, etc.
 - b) Income / GDP: US\$25 million (annual angler spending) x .88 (from Table 1, for Antigua and Barbuda) = US\$22.0 million. This is recreational fishing's total contribution to Anglerland's Gross Domestic Product (GNP).
 - c) Employment: A multiplier is not available for Antigua & Barbuda for employment. We can either not produce an employment number, or use a multiplier for a different country. In this case, we decide to use Bahamas because it is also an island nation and has an HDI similar to Antigua's, which we already determined is similar to Anglerland.
 - 1) First, divide the total amount spent by anglers (US\$25 million) by 1 million = 25.
 - 2) Then, multiply the result (25) by the employment multiplier (35.8) to derive the total jobs supported by visiting anglers in Anglerland = 895 jobs.
 - d) Tax revenues: We determine that the tax structure in Anglerland is very different from other countries for which tax revenue multipliers are available. We skip this measurement.

Our analysis is now complete:

- Annual spending by visiting anglers = US\$25 million
- Annual economic activity generated by these anglers = US\$21.75 million
- Annual contribution to GDP = US\$22.0 million
- Total jobs supported by visiting anglers = 895 jobs

8. Post-analysis stage: be sure to communicate the results

The post-analysis stage involves interpreting the project results and disseminating the findings to all organizations, policy makers and others involved in fisheries, economic and tourism policy. The figures in the table generated by the economic impact assessment tool represent the economic impact (or contribution, depending on the study) of recreational fishing in the region of interest. The total revenue, employment and income numbers are indicators of the importance of recreational fishing to the economy. In the case of an economic impact study that focused on “new money” brought into your economy by recreational fishing, these figures are interpreted as “what would be lost” if recreational fishing were to no longer exist. In the case of an economic contribution study that also includes spending by local residents, the total revenue, employment and income figures are measures of the overall economic activity that is related to recreational fishing. In both types of studies, the direct revenue, employment and income are supported by angler spending, while the multiplier effects are supported by the spending of businesses and workers—across all sectors—that results from the flows of expenditures among the economy.

You will likely want to develop a report that explains how you developed your estimates, how and where you obtained your survey data, your source of multipliers, why your selected methods were the best methods possible, and the final results. The economic impact assessment results should be prominently featured in the project team’s final report along with comparisons of recreational fishing to other activities—if available—and the overall economy. The final report should also include summary tables and a discussion of other information that was collected in the survey. For example, the report could highlight the demographic characteristics of anglers—useful to businesses that sell goods and services to them—and other information about the activities of anglers or their opinions identified in your research. Be sure a summary of all key results is provided in the beginning of the report. Most readers will not want to read the supporting text, and just want to see the results. Make it easy for them to find a simple summary of the results.

Drafts of the report should be distributed to project team members for their input and comments. When the report is finalized, it should be distributed to tourism and fisheries stakeholders, and posted on the sponsoring organization’s website.

If you have completed all the steps in this manual and have communicated the results – Congratulations!! Please share your results with your neighbors. Best of success!

APPENDIX A**SAMPLE SURVEYS (COSTA RICA AND PANAMA)****COSTA RICA**

QUESTIONNAIRE AIRPORT

INSTITUTO COSTARRICENSE DE TURISMO / FUNDACION BILLFISH / SOUTHWICK
ASSOCIATES / UNIVERSIDAD DE COSTA RICA

SURVEYOR: Please enter the month when this survey was taken: _____

1. Prior to this trip, how many times have you visited Costa Rica? ___ # of times

2. Please mark which activities you participated in during this trip to Costa Rica:

1 Nature tours / wildlife viewing

2 Hiking

3 Horseback riding

4 Sport fishing

5 Sailing

6 Relaxed on a beach

7 Golf

OTHERS? _____

3. If you could not have fished, would you visit Costa Rica again?

1 Yes

2 No

3 Not sure

4. Before this trip, how many other trips have you taken to Costa Rica in which you fished?
__ trips

5. Who traveled with you, in your direct travel party, on this trip to Costa Rica?

1 I traveled alone: __

2 Spouse: __

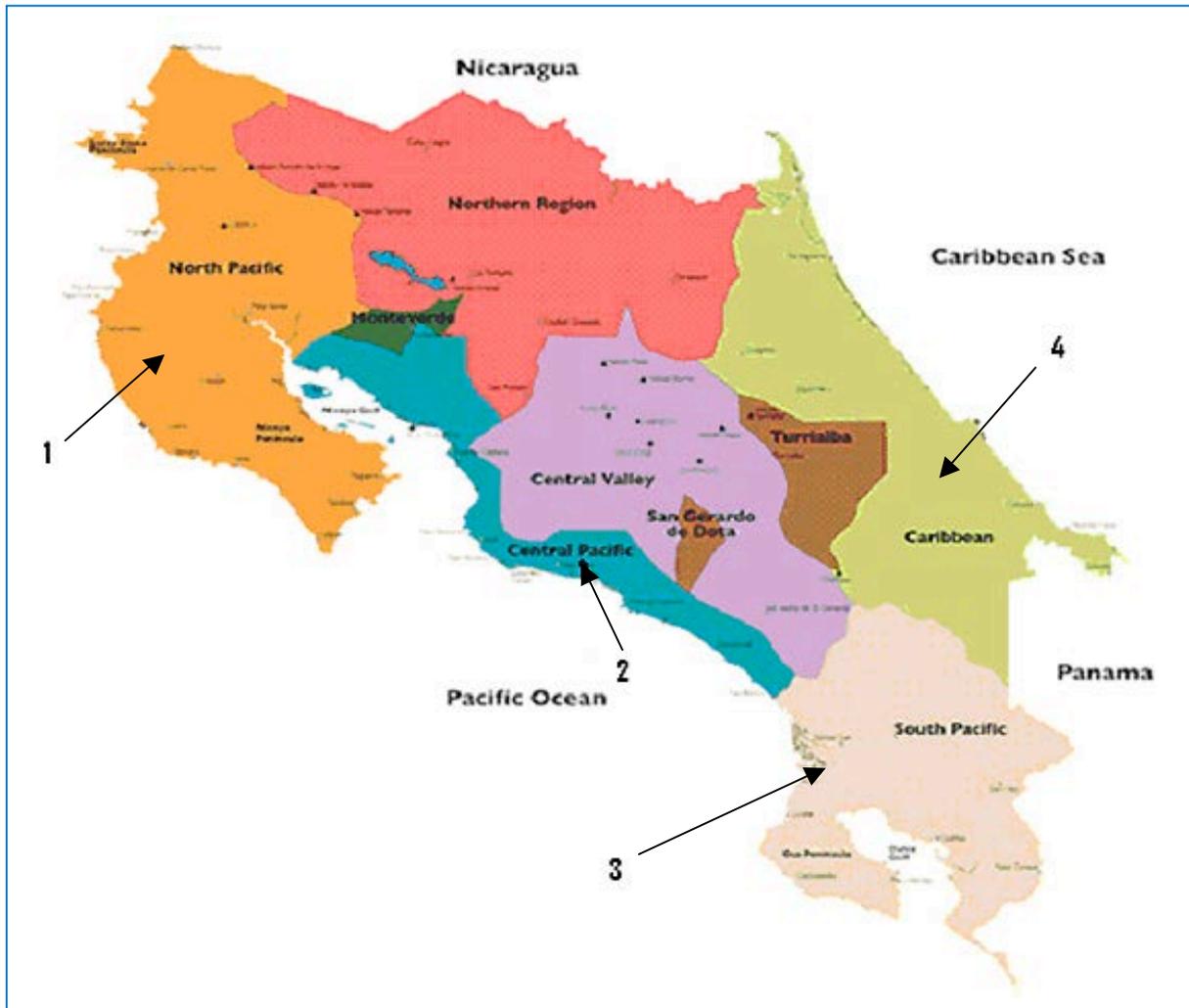
3 Kids, how many? ___ # of kids

4 Other family members: ___ # of other family members

- 5 Romantic partner: ____
- 6 Other friends, co-workers: ____ # of others
6. How many other members of your party also went sportfishing?
____ # of people in your travel party who fished in addition to yourself
7. How many days did you spend in Costa Rica area during this trip?
____ days in Costa Rica area
8. On your most recent trip, how many separate days did you fish? ____ # of days fished
9. Please indicate all modes of fishing you used during your most recent Costa Rica trip:
- 9.1 fished from a boat ____ # of days
- 9.2 fished from beach/shore/seawall ____ # of days fished
- 9.3 other ____ # of days fished “other”
10. Please mark which species you expected to catch when you were planning your most recent trip to the Costa Rica area, and the species you actually caught while fishing here:

N.	Name	Targeted:	Caught:
1	Marlin (any species of marlin)	1	1
2	Sailfish	2	2
3	Dorado / mahi-mahi / dolphin (fish)	3	3
4	Tuna (atún)	4	4
5	Wahoo	5	5
6	Tarpon (sábalo)	6	6
7	Sierra mackerel	7	7
8	Roosterfish	8	8
9	Yellowtail	9	9
10	Bottomfish (snapper, grouper)	10	10
11	Robalo / snook	11	11
12	Other	12	12
13	I didn't expect to catch any fish	13	13
14	I don't know/no opinion	14	14

11. Please mark the regions where you FISHED:



- 1 Region I
- 2 Region II
- 3 Region III
- 4 Region IV
- 9 I don't recall the region

The next questions inquire about how much you (and/or your travel group) spent in this trip to Costa Rica. Please report all expenditures in U.S. dollars. (Note: to convert colones into dollars, divide the colones by 500. For example, 1 000 colones would equal 2 dollars):

12. Please report expenditures you made prior to departing on your fishing trip to the Costa Rica area. SURVEYOR: If the person did not purchase one or more of the following items prior to arriving in Costa Rica, please leave the box blank.

12.1 Package trips or tours:	US\$
12.2 Airfare (commercial):	US\$

12.3 Charterboats paid for in the US or outside of Costa Rica	US\$
12.4 Other travel-related purchases made prior to departing home.	US\$

13. Please estimate as well as possible the expenditures made while in Costa Rica. Please do not report any expenditures made outside of Costa Rica. Please report in U.S. dollars (CHECK IF ENTERED AS COLONES)

13.1 Gasoline, fuel and oil for your vehicle	US\$	
13.2 Taxi's, shuttle vans, etc to get to hotels, marinas, restaurants, etc.	US\$	
13.3 Charterboat fees, fishing guides	US\$	
13.4 Car rental (not including any fuel purchased)	US\$	
13.5 Boat rentals	US\$	
13.6 Lodging: please report the type of lodging used and the cost:	US\$	
13.7 Hotels/ Motels /Resorts:	US\$	
13.8 Timeshare (please only report the cost associated with your trip and not any part of the purchase price):	US\$	
13.9 Campgrounds	US\$	
13.10 Other (please specify):	US\$	
13.11 Restaurants, bars, carry-out food	US\$	
13.12 Groceries, food, liquor bought in stores (not in restaurants or bars)	US\$	
13.13 Ice	US\$	
13.14 Bait (natural bait only, such as mackerel and bait bought at the launch of chartered trips. Please do not include lures)	US\$	
13.15 Gifts & souvenirs of any type	US\$	
13.16 Entertainment and amusement/admission fees	US\$	
13.17 Fish processing & shipping:	US\$	
13.18 Taxidermy (only taxidermy fees paid to Costa Rica businesses, not U.S. taxidermists)	US\$	
13.19 Personal items (toiletries, medicine, etc.)	US\$	
13.20 Rods, reels, fishing tackle & misc related items (line, leaders, lures, hooks, sinkers, coolers, gloves, etc.)	US\$	
13.21 Other (except fishing and boating equipment which is the next question): _____	US\$	
13.22 How many people included this payment (include yourself)	US\$	

14. Do you own or maintain a boat in Costa Rica? 1 Yes 0 No

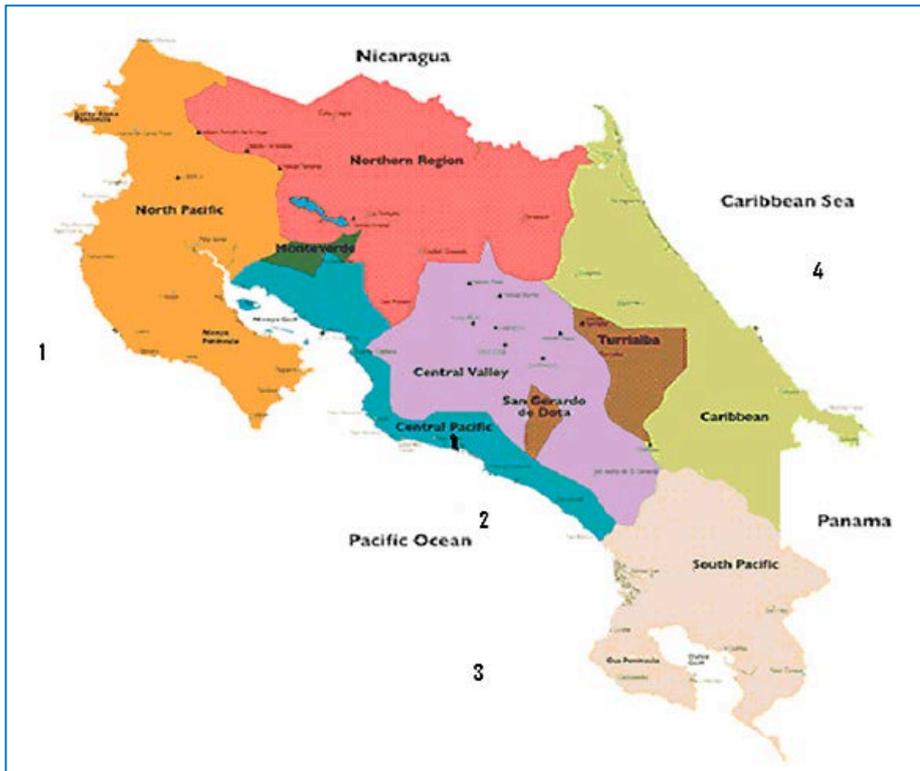
If YES, Please continue below.

If NO, continue question 15

Please estimate how much you spend annually to maintain your boat in Costa Rica. Please report in U.S. dollars (CHECK IF PUT COLONES AND RATE OF CONVERSION)

14.1 Fuel	US\$	
14.2 Repairing & maintenance	US\$	
14.3 Captain & crew	US\$	
14.4 Accessories, furnishings	US\$	
14.5 Insurances, taxes	US\$	
14.6 Marina expenses (slip fees & maintenance only. Parts and items purchased are covered in the next & final expenditure question)	US\$	
Other:		

15. Looking at this map, which regions did you visit?



16. SURVEYOR: Was the respondent a: 1 Male 2 Female

17. COUNTRY: 1 US State 2 Canadá 3 Other

18. What was your total household income before taxes for last year?

Less than US\$20 000

US\$20 000 - US\$40 000

US\$40 000 - US\$50 000

US\$50 000 - US\$75 000

US\$75 000 - US\$100 000

US\$100 000 - US\$150 000

US\$150 000 - US\$250 000

More than US\$250 000

PANAMA

March – June 2012

Dear Angler:

We sincerely hoped you enjoyed your visit to Panama. To help Panama protect its fabulous fishing, The Billfish Foundation (TBF) is conducting an economic impact survey of sportfishing tourism. The results will be used to help conserve Panama's fisheries and abundant sportfishing opportunities. Once complete, the results will be used to demonstrate to Panama business and government leaders how healthy and sustainable sportfisheries provide jobs, tax revenues and other benefits to Panama. Your help is vital! Please take a couple minutes to answer the surveyor's questions. Your response will remain anonymous and confidential. The reward will be outstanding fishing opportunities and healthy fisheries well into the future. Thank you.

Sincerely,

A handwritten signature in cursive script that reads "Ellen Peel".

Ellen M. Peel

President

TOCUMEN QUESTIONNAIRE
 SENACYT/ATP/The Billfish Foundation

SURVEY #: _____

SCREENER SURVEY

SURVEYOR: Please enter the date when this survey was taken:

Flight #:

Date:

1. What is your country or region of citizenship?

U.S. _____

Canada _____

Mexico _____

Central America (not including Panamanians) _____

Panama _____

South American _____

Europe _____

Caribbean: _____

Other (specify): _____

2. Prior to this trip, how many times have you visited Panama? _____ # of times

3. Please mark all activities you participated in during this trip to Panama.

1 Nature tours / wildlife viewing _____

2 Shopping _____

3 Horseback riding _____

4 Sport fishing _____

5 Sailing/boating (not fishing) _____

6 SCUBA diving _____

7 Surfing _____

8 Hiking _____

9 Relaxed on a beach / Enjoy sun & weather _____

10 Golf _____

11 Zip lining _____

12 Business _____

13 Family / Friends / Wedding__

12 Other: (please report)_____

4. On a future trip to Panama, would sport fishing be of interest to you?

Yes

No

Not sure

I do not plan to visit Panama again

[If "Sport fishing" was checked in question #3, continue with survey. If "Sportfishing was not checked in question #3, END SURVEY. Be sure to match the screener Qs to the completed full survey]

SURVEY #: _____

IN-PERSON SURVEY

5. If you could not have fished, would you have still visited Panama?

- 1 Yes
- 2 No
- 3 Not sure

6. Who traveled with you, in your direct travel party, on this trip to Panama?

- 1 I traveled alone: ___
- 2 Spouse: ___
- 3 Kids, how many? ___ # of kids
- 4 Other family members, how many?: ___ # of other family members
- 5 Girlfriend or boyfriend: ___
- 6 Other friends, co-workers, how many?: ___ # of others

7. How many other members of your party also went sportfishing?

___ # of people in your travel party who fished in addition to yourself

8. How many days did you spend in Panama during this trip?

___ days in Panama

9. Referring to our map, how many days did you fish in each region? [SHOW MAP TO RESPONDENT – ONLY MARK THOSE REGIONS WHERE PEOPLE ACTUALLY FISHED. ALL BLANKS WILL BE TREATED AS ZERO]:

Region I = ___ days

Region II = ___ days

Region III = ___ days

Region IV = ___ days

Region V = ___ days

Region VI = ____ days

Region VII = ____ days

Region VIII = ____ days

10. Which species did you target catching when you planned this trip to Panama, and which species did you actually catch while fishing here?

N.	NAME	Caught (just check if they caught these fish):
10.11	Marlin (any species of marlin)	
10.12	Sailfish	
10.13	Dorado / mahi-mahi / dolphin (fish)	
10.14	Tuna (atún: yellowfin, big eye, albacore)	
10.15	Wahoo	
10.16	Tarpon (sábalo)	
10.17	Sierra mackerel	
10.18	Roosterfish	
10.19	Grouper, amberjack	
10.20	Robalo / snook	
10.21	Shark	
10.22	I didn't expect to catch any fish	
10.23	Cubera snapper, mullet snapper	
10.24	Bonfish	
10.25	Peacock bass / cichlids / Oscars	
10.26	Freshwater trout	
10.27	Other	
10.28	I don't know/ do not remember	

11. Did you spend money at home, before you left for Panama, for travel packages, transportation, fishing or services while here?

__ Yes (go to #12)

__ No (go to #13)

12. How much was spent for the following items BEFORE you arrived in Panama. Please only report how much you spent for your share of travel expenses, and not the amount spent for any

others in your travel party. Please include any expenditures made by others for you: *SURVEYOR: If the person did not purchase one or more of the following items prior to arriving in Panama, please leave the box blank.*

12.11 Package trips or tours:	US\$
12.12 Airfare (commercial airlines, not including air taxis to your fishing site):	US\$
12.13 Charterboats paid for, before arriving in Panama	US\$
12.14 Other Panama-related purchases made prior to departing home. Please briefly describe: _____	US\$

13. Approximately how much did you spend for the following items while IN Panama, or others spent for you? Please do not report any expenditures made outside of Panama, or expenditures you made for others in your travel party. Only report your share, as best as possible:

13.111 Transportation (car rental, taxis, buses, gasoline, local flights, etc.)	US\$
13.112 Charterboat fees, fishing guides	US\$
13.113 Lodging: hotels, rental, camping, etc.	US\$
13.1131 If the person reports timeshare or house they own, check here, and do not record any dollars spent for timeshare or a private house.	Yes: _____
13.114 Restaurants, bars, carry-out food	US\$
13.115 Groceries, food, liquor bought in stores (not in restaurants or bars)	US\$
13.116 Gifts & souvenirs of any type	US\$
13.117 Entertainment and amusement/admission fees	US\$
13.118 Fishing expenses (except charters): tackle, ice, sun screen, bait, and any other expenses associated with your fishing trips:	US\$
13.119 Personal items (toiletries, clothes, medicine, etc.)	US\$
13.120 Any other expenses made in Panama. What was it for? (boating, maintenance for a private house, etc.) : _____	US\$

14. Do you own or maintain a boat in Panama?

Yes = _____

No = _____

15. How satisfied were you with your fishing experience in Panama?

Very satisfied Satisfied Unsatisfied Very unsatisfied

16. Which sources of information do you think influenced you the most to choose Panama as your destination. You can choose more than one:

- Friends or family recommendations
- Articles in outdoor or fishing media, including internet sites
- Articles in non-outdoor, non-fishing media and internet sites
- Travel agent
- Fishing club / other social or recreational group I belong to
- Other, please tell us: _____

17. Which category best describes your total household income before taxes for last year?

- Less than US\$20 000
- US\$20 000 - US\$50 000
- US\$50 000 - US\$75 000
- US\$75 000 - US\$100 000
- US\$100 000 - US\$150 000
- US\$150 000 - US\$250 000
- More than US\$250 000

[If the respondent does not earn in U.S. or Canadian dollars, report their income here in the currency of their choice] _____

18. Which category best describes your age?

- _ Under 21
- _ 21 to 39
- _ 40 to 55
- _ 55 to 65
- _ 65+

SURVEYOR: Was the respondent a: 1 Male 2 Female

APPENDIX B

A DISCUSSION ON MULTIPLIERS FOR CARIBBEAN REGIONAL NATIONS

The multiplier table contains the results of an exhaustive literature search for multipliers for WECAFC member countries. Multipliers are based on economic linkage within a particular study region, be that a city, state, country or group of countries as such a multiplier is completely unique to that study region. However, economists that study multipliers have found that multipliers vary by the development of a particular country and the country's dependence on imports for the basic goods and services purchased by tourists and the businesses supported by tourism.

Particular caution is warranted for island nations because of imports/leakages. Often much of what is sold to tourists is imported, sometimes including labor. Also, many businesses are foreign owned. This results in small output multipliers for island nations. There are two types of leakages for islands. First round leakages occur as foreign exchange earnings flow out of the tourist destination almost immediately after they are spent. Items subject to this type of leakage include food and liquor, particularly for islands with little agriculture. These types of leakages occur in any study area, but are particularly strong for islands. For example, the output multipliers near or below one in the table reflect these types of leakages. Second round leakages occur when foreign exchange earnings circulate at least once through the economy before flowing out. This occurs when tourist hotels or other businesses are owned by foreign interests or when employees are brought in from outside the study area.

The multipliers presented here represent spending from all types of tourists. Fishing tourism differs in that fishing tourists tend to spend more on average than beach or wildlife viewing tourists, particularly on for-hire recreational services, or the guided fishing sector. However, higher spending alone does not impact multipliers, but the mix of sectors where they spend their money does. For example, for-hire fishing is typically a sector with higher multipliers than most other tourism purchases because it is both labor intensive, and most of that labor is local. As a result, these multipliers are likely conservative, with the exception of fishing tourism multipliers from Gentner and Steinback (2008), TBF/Southwick (2008, 2010, and 2012) and Southwick Associates (2008). Fresh, locally procured bait is another sector with higher multipliers than the typical tourism multiplier.

Caution is warranted when using these multipliers outside of the country or region where they were developed. If transferred multipliers are to be used, it is important to select similar countries with similar economies. For output multipliers, most islands have multipliers less than or slightly higher than 1.0, while developed mainland countries have output multipliers between 1.5 and 2.0, and less developed countries have output multipliers less than 1.5. Regarding employment multipliers, more developed nations require less labor while less developed nation require more labor to produce the same goods or services. The United Nations Human Development Index (HDI) (<http://hdr.undp.org/en/statistics/>) can serve as a good indicator of a nation's relative development level and has been included in the table to help researchers select a multiplier from nations or economies with a similar ranking.

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APPENDIX C

**APPLICATION OF THE MANUAL ON THE ECONOMIC IMPACT ASSESSMENT OF
RECREATIONAL FISHERIES: THE MARTINIQUE CASE STUDY**

WECAFC/OSPESCA/CRFM/CFMC

Working group on recreational fisheries

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ACKNOWLEDGEMENTS

This report was written in the framework of the WECAFC/OSPESCA/CRFM/CFMC working group on recreational fisheries, with the supervision of:

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They contributed to the genesis of this report:

Mr Rob Southwick, President of Southwick Associates, for his methodological guidance, and

Mr Lionel Reynal, Fisheries Manager at the French West Indies delegation of the French Research Institute for Exploitation of the Sea (“IFREMER”), for his scientific guidance.

The first contributions to the framing of this study were provided by:

Mr Thomas Rostaing, Head of Department of Economic Affairs at the “Direction de la Mer de Martinique”, the Regional Office of the French Ministry in charge of the sea,

Mr Alexandre Arqué, Officer at the “AAMP”, the French Marine Protected Areas Agency,

Mr Fabien Védie, marine environmental Officer at the “DEAL Martinique”, the Regional Office of the French Ministry in charge of environment, and

Mr Hughes Francil, General Secretary at the “CRPMEM”, the Regional Fisheries and Aquaculture Comity.

The survey questionnaires, dedicated to resident anglers, have been tested and disseminated thanks to the following people and their staff:

Stéphane Piejos, General Secretary of the Karib Notik association,

Dominique Macé, « Madinina Plongée Services » manager,

Robert Maugée, « Littoral Pêche Plaisance » manager,

Cédric Rose-Eloïse, Yohann Rose-Eloïse, « Polymar » co-managers,

Steeve Michel, « Nautica Air Services » manager,

Patrick Bouché, « Akwaba Pêche Caraïbes » manager,

Ginette Duplan, General Secretary of the Martinique Billfish association,

Nicolas Lecerf and every spearfishers from the “bleu972.fr” forum who expressed their opinion.

This study was also able to be brought to term thanks to the involvement of all of the fishing charter boat captains who responded to the phone survey:

Benoît Godeau,

Philippe Eugénia,

the captain “O Fil de l’O”,

Raymond Iman,

Damien and Lionel Monplaisir,

Roger Delafargue,

Max Maugée,

the captain of “An D’lo”,

Guy Lanoix,

Jean Legelle known as “Titi”,

Thierry Marie-Claire,

the fishers from “Karaïb Pêche”,

Thierry Nicolas,

André Jean-Gilles,

Fabrice Goldalg, and

Axel Monlouis-Félicité.

Then, the author would like to thank:

Nicolas Benguigui and Lucie Abolivier, for their passionated pictures,

Mikele De Haas, translator and English teacher, for her English guidance,

Fouad Ben Sudrik, biostatistician, for his relevant advices in statistical sampling.

PREFACE

This report is the result of the application in Martinique of the WECAFC manual entitled “Measuring the economic contributions of recreational fishing: a how-to manual”, written by Southwick Associates in September of 2014. This manual is also part of the work promoted by to the WECAFC/OSPESCA/CRFM/CFMC working group on recreational fisheries in which the objective is to further implementation of the FAO's technical guidelines for responsible recreational fisheries in the Wider Caribbean Region.

In addition, this report was constructed using the following definition of recreational fishing given by the FAO: “Recreational fishing is defined as fishing of aquatic animals that do not constitute the individual's primary resource to meet nutritional needs and are not generally sold or otherwise traded on export, domestic or black markets. [...]”. Therefore, this study excludes all instances of subsistence fishing.

Carried out over the short period of four months, this study exists more as a methodological test in order to evaluate the economic contribution of recreational marine fishing in Martinique than as an exhaustive study. In light of the scarce bibliography that currently exists, these preliminary results allow for the beginning of a discussion about the role that recreational marine fishing plays in the development of sustainable fishing practices in Martinique.

The first version of this report was presented on the 9th of November, 2015 in Panama City at the second regional workshop on billfish management and conservation of the WECAFC/OSPESCA/CRFM/CFMC working group on recreational fisheries. This workshop addressed the question of the economic worth of commercial and recreational billfish fisheries in the Wider Caribbean Region. The comments of experts present at this workshop and additional data from the International Game Fish Association are included in this final version.

SUMMARY

With the support of the FAO and Southwick Associates, a study on the assessment of the 2014 total economic contribution of marine recreational fisheries in Martinique was carried out by Myriam Bouaziz, FAO consultant, from July to October of 2015. The study targeted marine anglers, including residents and non-residents, regardless of their fishing technique, whether they practiced angling (with rod and reel) or spearfishing, from land or from a boat. Only shore fishing, which tends to indicate subsistence fishing, was excluded from this study.

In order to estimate the total number of non-resident anglers in 2014 and evaluate their expenditures, phone surveys were conducted with sixteen charter boat captains. The number of non-resident anglers, who did not visit Martinique primarily for fishing, was estimated to be near 4 000. On average, they spend 171€ (\$188¹⁰) per day and their total expenditures

amount to 680 482€ (\$746 856). The other non-resident anglers, whose primary reason for visiting is fishing, are much less numerous; and estimated 200. On average, they spent 587€ (\$644) per day and in total, their expenditures rose to 121 631€ (\$113 495). As such, 802 113€ (\$880 350) has been spent in Martinique in 2014 by non-resident marine anglers.

Resident anglers represent the majority of anglers in Martinique. In order to estimate their total expenditures, a survey was distributed in six fishing tackle retailers who partnered with this study. In order to collect social data, questions relating to the anglers themselves and their fishing practices were also collected via this questionnaire. In total, 115 responses to the questionnaire were collected, mainly online (57 percent of respondents chose this way of response). In focusing upon different levels of expenditures; it was possible to divide the resident anglers into two categories: anglers from land and from a boat.

Based on a group from the first category of 15 000¹¹ anglers evaluated in 2005, including anglers and spearfishers, it was estimated that these anglers made, on average, 55 fishing trips per year with an average expenditure per trip of 9€ (\$10). The annual expenditures related to their fishing practice were around 423€ (\$464). The calculated total of their expenditures was estimated at 13.1 million euros (M\$ 143.8).

Those who fish from a boat, an estimated 9,300 anglers in 2005, made 42 fishing trips a year each and spent 53€ (\$58) per trip on average. This amounts to 800€ (\$878) a year in expenditures and 2 800€ (\$3 073) in boat maintenance and depreciation. Their total spending was valued at 54.1 million euros (M\$ 59.4).

Others results concerning resident anglers are as follow:

- Only 5 percent of anglers are women and nearly 67 percent of all anglers are between 20 and 40 years old;
- 31 percent of fishing trips are made from a boat: the South Atlantic coast of the island is the most frequently visited area for this method of fishing;
- The average engine of a boat used principally for recreational fishing was shown to be more recent and more powerful than those used in commercial fishing;
- 12 percent of anglers suspect at least one case of ciguatera poisoning by the consumption of a fish caught around Martinique;
- 7 percent of respondents have participated in a fishing tournament in Martinique;

¹⁰ All figures of this report have been converted into US dollars with a mid-market rate as of 07/24/2015 who corresponds to the survey launching.

¹¹ Source: the 2005 IFREMER/BVA study with an extrapolation of the 2005 INSEE data of the population aged over 15 years old.

- By number of occurrences, billfish only represent 2 percent of catches by anglers from a boat (anglers and spearfishers combined) and less than 1 percent of spearfishers' catches;
- Nearly 9 percent of respondents declared having sold a part of their catch: It is unclear whether this is an overestimation or underestimation in relation to the total population of anglers;
- Resident anglers seem to be concerned about the management of marine resources, their security, and the application of regulations but also the lack of infrastructures and impacts of commercial fishing on the marine environment.

In order to evaluate the total economic contribution of recreational fishing, economic multipliers are used in the following manner: total impact = total expenditures * multipliers. The resident and non-resident anglers are analysed in separate manners. The results obtained in 2014 are as follows:

- Resident anglers play a non-negligible role in the economy of Martinique: they contribute from 0.36 percent to 0.62 percent to the GDP of Martinique and through their expenditures, generate between 610 to 1 030 jobs (compared to 750 to 3 000 jobs created in the commercial fishing and aquaculture sector);
- Non-resident anglers do not play an important role in the tourism sector: only 12 jobs were created by their spending habits (compared to the hundred jobs created by scuba diving) which only represent 5 percent of annual tourist spending on leisure and excursions.

GLOSSARY AND DEFINITIONS

AAMP: the French Marine Protected Areas Agency.

Angling: fishing gear made with one or several hooks linked to a line and itself linked, or not, to a rod with a reel. Many fishing techniques can be done: trawling from a boat, surfcasting through waves from a beach, jigging, an active and vertical mode of fishing, and so on. Some anglers practice “catch and release” allowing resources conservation.

CFMC: Caribbean Fishery Management Council.

Charter boat: originally, it is a commercial vessel used for sportfishing trips. In Martinique, this notion can be extended to commercial fishing boats with a pescatourism licence.

Chlordecone: pesticide used in Martinique in bananas fields until 1990. The polluted soils have been leached and ultimately, contaminated coastal ecosystems. In 2012, this pollution has led the Martinique to close some fishing areas and to ban spiny lobsters’ catch in some other fishing areas.

CMT: the local tourism agency.

CRFM: Caribbean Regional Fisheries Mechanism.

CRPMEM: the regional fisheries and aquaculture Comity.

DEAL: the regional Office of the French Ministry in charge of environment.

DJSCS: the regional Office of Youth, Sports and Social Cohesion.

DM: the regional Office of the French Ministry in charge of the sea.

DPMA: the national Office of the French Ministry in charge of fisheries and agriculture.

HDI: Human Development Index. It allows quantifying the human development of a country by taking account three criteria: GNP per capita, life expectancy and the level of education.

IFREMER: the French Research Institute for Exploitation of the Sea.

IGFA: International Game Fish Association, especially in charge of collecting world records of fish catch.

INSEE: the national Institute of Statistics and Economic Studies.

OSPESCA: Central American Fisheries and Aquaculture Organization.

Spearfishing: in France, this mode of fishing is generally practiced thanks to a speargun or a multi-pronged spear. Only free diving is authorized, unless prefectural derogation, as in Martinique where scuba diving is authorized for lionfish spearfishing.

WECAFC: Western Central Atlantic Fishery Commission.

INTRODUCTION

Located in the arc of the Lesser Antilles, Martinique is an island territory connected to mainland France under the status of a territorial collectivity. Martinique possesses a coastline that stretches along 470 kilometres with varying sea conditions resulting from distinctly different continental shelves on the Caribbean and Atlantic sides of the island. This geomorphological peculiarity limits nautical activities to certain sites. Scuba diving is primarily accessible from the west coast of the island while the majority of sea excursions depart from the marinas on the east coast, on the high coral reef shores.

In comparison, recreational sea fishing does not seem to be restricted to specific areas: the angler is above all a sea enthusiast who relishes in the challenges presented by the sea's dangers. The ocean provides nourishment, but more importantly, a dose of the unexpected each time the angler goes out to sea. The angler does not consider his or her fishing trips in terms of cost efficiency as they do not regard the ocean as a source of economic wealth. And yet, their activity exists, their expenditures exist. They calculate, buy, leave and return, buy differently, and try again. The angler is motivated by the pleasure of being confronted by his or her prey, and for that, they do not hesitate to invest their time and money.

As such, this study seeks above all to enlighten political decision-makers, stakeholders of the recreational fishing sector in Martinique, and the general public about the profile and characteristics of this sector and its place in the local economy. Rarely studied, recreational sea fishing needs to be documented in order to allow fisheries managers to take this sector into account when making economic and conservation-related decisions.

With the Bahamas, Martinique is the first territory to test the methodology detailed in the manual by Southwick Associates on the assessment of the economic contribution of recreational fishing. After a situational analysis of Martinican fishing practices, current regulations and the pre-existing structures developing this activity, this report explains the process of the implementation of this methodology in the Martinican context. Based upon collaborative investigation with charter boat captains on the subject of non-resident anglers, and with resident anglers themselves, the results obtained give an estimate of the economic contribution made by this sector in Martinique through the calculation of expenditures by different categories of anglers. Contributions to the GDP and the number of jobs created are the two main indicators of economic development. A proposal has been drafted for a comparative economic analysis of commercial fishing and other tourism sectors. Finally, it is explained how the results will be disseminated.

1. Development of the different recreational marine fishing practices

This paragraph compiles all of the interviews conducted with professionals from the recreational fisheries sector in Martinique, and in particular, managers and employees of fishing tackle retail stores. Their analyses, which are based on up to 40 years of experience and their passion for the sea, are complemented by the analysis of the author.

i. Angling

In the large spectrum of nautical leisure practices, angling remains one of the last activities not requiring authorisation and which can be practiced year-long in Martinique. These qualities allow for free access to the sea. In the past few decades, a general increase in the number of anglers, with or without rods, has been noted. Neither a fishing permit nor a club or association affiliation is required of these anglers. Docks, dikes, and coastal rock fills have seen an onslaught of non-adventurous anglers. Others don't hesitate to take advantage of excursions in order to fish further from the coast. Having seen the differences in techniques, the profile of anglers has since been expanded to account for these variations. From "low-budget" fishing to sports fishing, sea angling represents more than one particular background and generation of participants.

The specific nature of a hobby which provides food such as sea angling raises questions about its own development: is it not the result of a host of local socio-economic problems such as the high

unemployment rate, rising prices, etc.? Should its new-found popularity not be attributed to subsistence fishing?

ii. Spearfishing

It is beyond the inevitable united assertion between anglers and commercial fishers that the overfishing of coastal resources in Martinique diminishes the appeal of spearfishing. Spearfishing accidents are known to be fatal, and when they happen in quick succession or when a minor is implicated, the entire fishing community is on alert. These unhappy occurrences are combined with a larger ecological awareness and especially an increase in the number of protected marine areas where spearfishing is, most of the time, forbidden. As a result, spearfishing has witnessed continually decreasing recruitment rates. But spearfishers are attempting to organise. Their efforts are aided by the invasion of the lionfish which has recently incited novice spearfishers into action on a fish whose catch is encouraged by public authorities.

2. What is the status of the local legislation?¹²

In Martinique, recreational maritime fishing is subjected to national regulations: ordinance number 90-618 (July 11th, 1990) defines recreational maritime fishing in France. It also lists the fishing gear authorized upon recreational vessels (trolling or bottom lines with a maximum of 12 hooks, longlines with a maximum of 30 hooks, landing nets and spears) and delineates the scope of spearfishing by prohibiting:

- To be aged under 16;
- To use respiratory equipment;
- Spearfishing by night;
- To be close within 150 meters from a commercial fishing boat or gear and catch marine resources from them;
- To use light;
- To load the speargun out of water.

The text anticipates that regulatory provisions on commercial fishing also apply to recreational maritime fishing (authorized species, use of fishing gears, fishing periods, etc.). Additionally, concerning the minimum weights and sizes of catches, recreational maritime fishing regulations are always more limited than those of commercial fishing.

Recreational maritime fishing also falls under the legal jurisdiction of a ministerial ruling on May 17th, 2011 which requires identification marking on certain species by removing the bottom part of the tail fin (article 5). In Martinique, this tagging especially concerns seven species:

- The dolphinfish: *Coryphaena hippurus*
- The Atlantic bonito: *Sarda sarda*
- The swordfish: *Xiphias gladius*
- The blue marlin: *Makaira nigricans*
- The wahoo: *Acanthocybium solandri*
- The yellowfin tuna: *Thunnus albacares*
- The Atlantic sailfish: *Istiophorus albicans*

Additionally, with the goal of reducing marine resources degradation (see the map in APPENDIX 1), several prefectural rulings regulate the catch of certain species via:

¹² All regulatory references can be found at the end of this report, in the literature cited section.

- Banned species:
 - Stony corals;
 - White sea urchin (*Tripneustes ventricosus*). There is a fishing season (few days a year) for commercial fishers;
- Restricted species:
 - Spiny lobsters by: fishing season (forbidden between January 1st and March 31st), the size of the catch (22 cm for the Caribbean spiny lobster and 14 cm for the spotted spiny lobster) and by fishing method (freediving and by hand only). There is no fishing season for commercial fishers who can also use traps and nets for catching
 - Queen conch (*Strombus gigas*) by: catch quantity (3 per angler per day), the shape and weight of the catch (a flared outer lip and 250 grams of flesh). There is no restriction of catch quantity for commercial fishers.

And define closed fishing areas:

- Five marine resources management areas;
- Six areas contaminated by chlordecone;
- The regional natural marine reserve of Le Prêcheur (with the exception of natural reserve areas where recreational non-motorized angling is permitted);
- In a 100 meter perimeter around each islet of the natural reserve of Sainte-Anne islets.

3. Existing structures and organized events

In 2014, more than 50 structures allow the practice of angling in Martinique. These structures are divided into several categories (see pictures in APPENDIX 2).

1 state-qualified educator

For practical training, it is possible to find sports teachers who are state-qualified in underwater diving. Only one teacher in Martinique works independently and leads spearfishing initiation dives as his main occupation.

10 commercial vessels charter boats?

These are pleasure boats whose main commercial activity is carrying passengers. There are a dozen active owners of these boats who propose fishing trips. They tend to concentrate on sport fishing. What's more, two among them offer spearfishing trips as their secondary activity.

39 "pescatourism" boats

Since March of 2012, commercial fishers who wish to allow passengers onto their ships are able to obtain a pescatourism navigation permit from the Antilles-Guyana Sea Management ship security center. Initially intended as a means to introduce the profession marine fishing, this authorisation has especially allowed commercial fishers to diversify their professional activities by proposing half-day fishing trips to tourists in which they can discover artisanal fishing practices and organized sport fishing trips. There are 39 ships operating under this permit in Martinique. Nearly a third of the applications for this permit come from the Atlantic city of Le François. The boats are generally yawls measuring less than 10 meters which can carry up to six passengers, and the demand is growing, evidenced by the additional six ships that were granted authorisation to practice pescatourism in Martinique in 2015.

2 sportfishing associations

Two associative structures also exist on the island. Each of them organises a sportfishing tournament, one of which is the only international sportfishing tournament in Martinique. This event had to be cancelled in 2015 due to an overlap with the international tournament in Sainte-Lucie.

A third sportfishing tournament is organized by a fishing tackle retailer which coordinated the first lionfish tournament in Martinique in 2013. As lionfish fishing is authorized for scuba divers since 2011, this type of contest has begun to become a common attraction at scuba diving clubs.

CHAPTER II. APPLICATION OF THE MANUAL: CHOICES AND IMPLEMENTATION

The economic contribution manual suggests following the next methodology:

1. Select Your Project Team
2. Define Your Study's Overall Goals and Objectives
3. Develop Your Objectives and Plan Tasks
 - 3.1. Identify Your Target Group
 - 3.2. Identify Existing Data Sources
 - 3.3. Determine Which Information to Collect and Report
4. Collect Data
 - 4.1. Determine the Number of Anglers in Your Target Group
 - 4.2. Design Your Survey
 - 4.2.1. How Many People Will You Need To Survey?
 - 4.2.2. Selecting the Survey That Best Fits Your Needs and Resources
 - 4.2.3. Is a Hybrid Survey Your Best Option?
 - 4.2.4. Review this note about collecting quality data
 - 4.2.5. Selecting Which Anglers to Survey
 - 4.3. Construct the Questionnaire
 - 4.3.1. Expenditure Categories to Collect
 - 4.3.1.1 Travel Expenditures
 - 4.3.1.2 Equipment and Non-Travel Expenditures
 - 4.3.2. Identify How Many Anglers Were Served Per Expenditure
 - 4.3.3. Total Trip Days vs. Total Days of Fishing
 - 4.4. Fielding Your Survey
 - 4.4.1. Pre-Test Your Survey!
5. Data Entry
6. Develop Estimates of Angler Expenditures
7. Estimate the Total Economic Impact of Recreational Fishing
8. Post-Analysis Stage: Be Sure to Communicate the Results

In this chapter, choices made to apply this methodology and the way on how they were implemented is described.

1. Constitution of a project team

A large number of recreational fishing participants were contacted in the first phase. After our initial discussions, a project team was established, based upon the interest of each participant in becoming involved in the construction and implementation of this study.

Two categories of participants according to their role in the project team could have been distinguished:

- **Establish the current inventory of knowledge and available data, identify any local needs that the study could address and disseminate the results:**

- A scientific institute: the French Research Institute for Exploitation of the Sea (“IFREMER”);
- Four public institutions:
 - The Regional Office of the French Ministry in charge of the sea (“la Direction de la Mer de Martinique”);
 - The French Marine Protected Areas Agency (“l’Agence des Aires Marines Protégées”);
 - The Regional Office of the French Ministry in charge of environment, (“la DEAL de Martinique”);
 - The Regional Fisheries and Aquaculture Comity (“le CRPMEM de Martinique”);
- Two media platforms:
 - The online forum on spearfishing “bleu972.fr”;
 - The environmental magazine “*Fey*”.
- **Create and distribute the surveys and encourage anglers to mobilize:**
 - Two sport fishing associations:
 - Karib Notik;
 - Martinique Billfish Association;
 - Six fishing tackle retail stores:
 - Polymar (two stores);
 - Madinina Plongée Services;
 - Nautica Air Services;
 - Littoral Pêche Plaisance;
 - Akwaba Pêche Caraïbes.

2. Defining objectives

In light of local angling practices, in the light of the conditions relating to the implementation of the study, and of the collective concerns of the project team, this study will assess:

The economic contribution – total expenditures, contribution to GDP and total jobs generated by these expenditures – resident and non-resident marine anglers, both recreational and sport fishers, including angling and spearfishing, from land and from a boat, in 2014.

One question was raised over whether the assessment would only include information about the economic impact of non-resident anglers. This kind of study is certainly less fastidious to conduct, considering the fairer interpretation of the economic flux brought to the territory by non-resident anglers and furthermore, data collection is reduced to tourist transit areas, simplifying the process. However, the local reality necessitates a larger objective since resident anglers attest that they constitute the majority of the fishing community practicing angling in Martinique. Thus, it is also preferable to consider the expenditures of resident anglers in order to create a more accurate representation of their economic impact on this sector in Martinique.

Locally, shore fishing of land crabs and mangrove crabs is widely practiced. However, this activity is more representative of subsistence fishing, and generates very few expenses for those involved. Therefore, shore fishing has been excluded from the scope of this study, along with freshwater fishing, which has already been depicted by a departmental federation of four fishing associations.

As such, in order to respond to the objective defined below, it was necessary to collect two types of data from each category of anglers, resident and non-resident:

- **Their number** which, if not already documented, can be calculated by a group of anglers over a certain period or in a given geographical area;
- **Their annual expenditures** which, if not already documented, can be calculated by multiplying the daily expenditures of an angler related to its trip and the average number of fishing trips he or she completes in a year (given that an angler makes a maximum of one trip per day) and then, adding any additional expenses related to the activity, including boat maintenance and depreciation if they are a boat owner.

3. Data collection

This is probably the first study of its kind to evaluate the economic contribution of recreational fisheries in Martinique. The local bibliography duly provided qualitative data. However, a study on recreational fisheries, carried out in 2005 by the National Office of the French Ministry in charge of fisheries and agriculture (“la DPMA”) and led by the French Research Institute for Exploitation of the Sea (“IFREMER”) and the survey institute BVA, *Enquête relative à la pêche de loisir (récréative et sportive) en mer en Métropole et dans les DOM*, has given an estimation of the number of anglers residing in Martinique. This study serves as a reference in the recreational fishing sector, having been cited in two editions of the national conferences on boating and recreational fishing, in 2013 and 2015. Additionally, the data given by this study was evaluated by relevant professionals in Martinique who confirmed the order of magnitude of the results. Nonetheless, the margin of error of the data produced and the fact that this study was completed ten years ago should be taken into account in the final analysis.

Missing data, relating to the evaluation of the economic contribution of recreational fisheries, should be obtained through a survey method.

i. Non-resident anglers: charter boat captains survey

A non-resident angler is a tourist who has come to Martinique to practice recreational fishing. This practice can:

- constitute the primary purpose of his or her visit, meaning that without the possibility of angling in Martinique; this tourist would have chosen another destination,
- or**
- be carried out opportunistically, meaning that without the possibility of angling, this tourist would still have chosen Martinique as his or her destination.

In the first case, the expenditures which can be attributed to recreational fishing correspond to the total on-site expenditures (lodging, food, transportation, leisure, etc.) and the expenditures specifically related to recreational fishing. In the second case, only those expenditures specifically related to recreational fishing are considered; all other expenditures would otherwise still have occurred in Martinique if recreational fishing had not been possible.

Here, only those non-resident anglers who applied for fishing charters during their stay were taken into account. In fact, charters have been established as being the first priority for non-resident anglers. The activity of other non-resident anglers, those who do not apply for fishing charters during their stay, is much more complicated to assess due to a lack of information on tourist recreational fishing practices. This decision is preferred due to the three criteria relative to charters:

- They have already been identified by the Regional Office of Youth, Sports and Social Cohesion (« la DRJSCS ») and the Regional Office of the French Ministry in charge of the sea (la « Direction de la Mer ») ;

- It is easy to survey them because they will directly benefit from the results to defend their economic sector ;
- They generate non-negligible revenue from the anglers who chose to use their services.

Unfortunately, this choice underestimates the total population of non-resident anglers. However, given the allocated time and with the means available, this report reflects a general trend of economic impact by non-resident anglers.

16 charter boat captains were surveyed in the following manner:

- An exhaustive survey was conducted with the 10 commercial boats captains;
- A non-exhaustive survey was conducted by random sampling of pescatourism captains: six out of the 18 concerned in 2013 (boats for which the pescatourism license was not accorded until 2014 have not been considered as their data is incomplete).
- The number of non-resident anglers will thus be calculated by adding the number of non-resident customers of commercial charter boats and by extrapolating the number of non-resident customers of pescatourism charters. The average expenditures directly relating to fishing activity corresponds to the average fee of a charter trip (the average cost of commercial charter boats and pescatourism charters) plus an estimated 5€ (\$5.5) increase to account for transportation to the boarding site. For the final analysis, it is estimated that a non-resident angler only effectuates one charter fishing trip during his or her stay.

ii. Resident anglers: anglers survey

The bibliography gives no indication of the precise and current annual expenditures of recreational fishers in Martinique. As such, they were collected through a survey targeting practitioners.

It is difficult to target specific sites which give access to them. Effectively, the diversity of angling methods and boarding sites make in-person data collection complicated and expensive. However, the concentration of anglers at tackle retail stores, at pre-existing associations and on social networks allows for inexpensive and simple survey distribution strategies.

Additionally, in order to obtain the most representative sample results possible, it is necessary to give each angler an equal opportunity to respond to the survey. The sampling effort should then be organized in a manner that considers the following parameters:

- The geographical distribution of anglers on the island;
- The method of angling practiced;
- The age of the anglers.

It should be noted that the study was only conducted during the period of July to October, and not throughout the entire year. In Martinique, school holidays, the “tour des Yoles Rondes” (an annual event involving a boat race around the island), and the start of the school year are important events in this period of the year. These events could disturb the collection of data but do not necessarily have an effect on the kind of angler responding to the survey.

The number of completed questionnaires needed is dependent upon the number of categories of anglers. It is presumed that anglers from land and anglers from a boat will each have expenditure amounts which vary significantly. The minimum sample size was determined to be 30 completed questionnaires per angler category. In order to refine the analysis, other categories of anglers could have been added, defined by the number of trips effectuated per year or by the fishing gear used. However, this would have required a larger number of completed questionnaires and a longer study period, or perhaps alternative survey methods such as in-person interview surveying.

Therefore, the distribution of the questionnaire was organized in accordance with the following plan:

- The questionnaire was in paper format and placed next to a ballot box and envelopes for completed surveys, which were placed in:
 - 2 stores specializing in angling gears: Polymar in Fort-de-France and in Le Robert;
 - 2 stores specializing in spearfishing gears: Nautica Air Services and Madinina Plongée Services;
 - 2 stores specializing in both, angling and spearfishing gears: Akwaba Pêche Caraïbes and Littoral Pêche Plaisance;
- Online, with the free online survey software « Google Form », by:
 - A selection of 12 Facebook pages with local ties: fishing tackle retailers, local sport fishing and marine environmental associations (Karib Notik, Martinique Billfish Association, the Martinican chapter of Surfrider Foundation Europe), the Regional Fisheries and Aquaculture Comity, spearfishing and free diving groups;
 - The local spearfishing forum “bleu972.fr”;
- A mailing which was sent to members of the sport fishing associations: Karib Notik and the Martinique Billfish Association;
- An article in the local environmental magazine *Fey*.

The data collection is outlined in the table below:

	Resident anglers		Non-resident anglers	
	Counting method	Annual expenditures	Counting method	Annual expenditures
Data sources	Literature: 2005 study IFREMER/BVA	Anglers survey	Charter boat captains survey	
Survey method	Phone survey with random selection of 896 households in Martinique	<ul style="list-style-type: none"> • Mailing to associations members • Paper form in stores • Online via Facebook pages and the local spearfishing forum • Local media 	Phone survey: total of non-residents customers	Phone survey: <ul style="list-style-type: none"> - <i>Opportunist anglers</i>: increased trip fees - <i>Anglers came for fishing</i>: daily expenditure + increased trip fees
Sampling size	89 interviews in which: <ul style="list-style-type: none"> • 35 anglers from land • 25 anglers from a boat 	At least 30 questionnaires for each of the 2 anglers categories	<ul style="list-style-type: none"> • 10 interviews of commercial charter boat captains • 6 interviews of pescatourism captains 	

	Resident anglers		Non-resident anglers
Data quality	<ul style="list-style-type: none"> • Considerable margins of error from data produced ⇒ Overvalued Data? • Old data ⇒ Undervalued Data? 	<ul style="list-style-type: none"> • Geographical distribution of stores • Several survey methods • Different groups targeted • A 4 months collection ⇒ Undervalued Data? 	<ul style="list-style-type: none"> • Exhaustive surveys of commercial charter boat captains • Target: non-resident anglers only seeking fishing charter ⇒ Undervalued Data?

4. Designing the survey questionnaires

The questions were written with the goal of:

- making the questionnaire easy to complete by reducing the time it takes to respond as much as possible,
- analysing the data (with a preference for quantitative variables),
- optimising the reliability of declared data by minimizing sources of any possible errors,
- being able to analyse declared data for only one angler and its own fishing practice.

i. Phone questionnaire for charter boat captains

Phone surveys are advantageous because, unlike the in-person interview survey, they are economical. On the other hand, it may hinder the ability to have an in-depth interview, which leads to the decision to limit the questionnaire to ten minutes maximum.

The number of non-resident customers

Generally, charter fishing captains do not count their clients, though it is rather simple to ask them about:

- the average number of trips they make per week, per month, and/or per tourist season and their operational period:** by multiplication, we can calculate their total annual activity by the number of trips made per year;
- the average number of clients per trip:** in multiplying by a., we obtain the total number of customers;
- the percentage of tourists among their customers:** in multiplying by b., we obtain the total number of non-resident customers;
- the percentage of tourists who have come to Martinique principally to fish:** in multiplying by c., we obtain the number of non-resident customers who have come principally to fish and by deduction, the number of non-resident customers who fished opportunistically.

The average fee of a fishing trip

The majority of charter boat captains apply different fees to fishing trips depending on the client type. As it stands, an observer, which is to say a client who has come onto the boat uniquely to observe the fishing, pays less than a client who has come to fish. Additionally, some captains offer more attractive prices to clients who have their own fishing gear. For the purposes of this paper, it is accepted that non-resident anglers who fish opportunistically do not come to Martinique with their fishing gear. For all other customers, the price of a fishing trip shall be adjusted to show the median price.

Other information

It is interesting to collect the feedback of charter boat captains on the evolution of the frequency of fishing trips by tourists. In this study, only commercial charter boat captains gave their opinions, pescatourism captains having started as recently as 2013.

ii. Questionnaire for resident anglers

In order to improve the chance of receiving responses, the questionnaire was anonymous: no personal data was requested. A short and catchy paragraph explains the objectives of the study and the potential uses of the results, which aims to encourage participants to respond to the questionnaire. With the allocated budget, a communication agency was able to aid in the composition of the questionnaire.

The questionnaire was pre-tested for a week, from 6 to 12 of July, by the project team, then modified and approved before its distribution (see the first version of the residents' questionnaire in APPENDIX 3).

The angler

No member of the project team advocated for the inclusion of personally identifying questions about the anglers themselves. However, for future comparative use with commercial fisheries and for fishing tackle retailers marketing purposes, typical demographic information such as the **age** and **gender** (male/female) of the angler was collected. Additionally, in order to assure a sufficient distribution of the questionnaire throughout the territory, **the town of residence** (only in Martinique) was solicited from resident anglers.

Its fishing practices

To calculate annual expenditures per angler, it is important to first know their fishing activity and so, **the number of fishing trips made per year**. This information is easily calculable for recreational anglers who can generally provide a monthly overview of their activity.

To then assign each angler to a category, one must determine **their method(s) of fishing** (fishing from land, from a boat, spearfishing, etc.). The question of **fishing area** must be thoroughly covered. By increasing the number of possible responses, this question tends to make the questionnaire more complex and should be rigorously inserted to avoid errors when inputting the data relating to the calculation of expenditures. Both a contingency table and a map of fishing areas in Martinique facilitate the inclusion of this question. The map of fishing areas that was chosen is used by the French Research Institute for Exploitation of the Sea which collects data on commercial fishing landings. This allows us to compare the geographical distribution of activity in these two fishing sectors.

Other data relating to fishing practices can also be collected at this level. Indeed, some members of the project team highlighted the need for data specific to:

- **The motorisation of the boat** used for recreational fishing (the year it began service, wear and tear, power and motor type): requested by the Regional Fisheries and Aquaculture Comity;
- **The participation in fishing tournaments in Martinique**: requested by sport fishing associations;
- **The groups of species caught**, endangered species and/or dangerous species such as sharks, lionfish, groupers, etc., the total of the catch as well as the percentage of pelagic and demersal fish: requested by the French Marine Protected Areas Agency, the Regional Office of the French Ministry in charge of the environment and the Regional Fisheries and Aquaculture Comity;
- **Cases of ciguatera intoxication** from consumption of fish caught in Martinique: requested by the Regional Office of the French Ministry in charge of the environment.

The question of **the sale of catches**, despite the elevated risk that it would discourage completion of the survey, can still be asked in the initial phase, in order to test the relevance of collected data. It is well-understood that some anglers sell their catches, either to compensate for the costs of their trip, or to provide supplemental income, or even as their sole income. As such, we will consider that if no respondents report having sold their catches, then we can attribute a considerable margin of error to all declared data. The choice was made to take into account the anglers who declare having sold a part of their catch, or those who chose not to respond to the question, in the analysis of the data.

Annual expenditures relating to fishing practices

Only expenditures which occurred in Martinique have been taken into account in this study. With each expense mentioned, the angler will be asked to specify if the cost was completely paid individually or if it was divided between several people, such as fishing partners.

Three types of expenditures, calculated differently by the anglers; can be distinguished:

- **The expenditures relating to fishing trips**, which are most easily calculated on a per trip basis: car fuel and boat fuel in order to arrive at the fishing site, food costs, lodging costs, and other possible expenditures to be specified;
- **The annual expenditures relating to the fishing practice**, more easily calculated monthly or by year: terminal tackle, baits and lures, fishing gear, clothes and accessories, subscription to fishing magazines, boat and/or fishing tackle rental, tournament fees and other possible expenditures to be specified;
- **The annual expenditures relating to the maintenance and operation of the boat**, for boat owners only, which are most easily calculated monthly or by year: equipment, maintenance and reparation, insurance, harbour/marina fees, registration fees, purchase price of the boat or payment on the boat loan and other possible expenditures to be specified. As the boat can be used for other activities besides fishing, the angler is asked to estimate the amount of time in which the boat is only being used for fishing.

A blank space for comments has been left at the bottom of the questionnaire in order to collect comments and suggestions from anglers in relation to the improvement of fishing conditions in Martinique.

CHAPTER III. RESULTS AND COMMUNICATION

1. Surveys' participation

i. By charter boat captains

In general, the charter boat captains were amenable to the invitation to participate in this study.

As for the commercial vessels, all of the captains were able to be questioned and each one responded to the questionnaire without difficulty. This study was perceived as a positive element for the development of their occupation.

Each of the pescatourism captains surveyed answered every question posed. Due to a lack of time, some of these captains could not be questioned. These professionals, who are commercial fishers first and foremost, had more mixed reactions to this study. As a matter of fact, they are regularly requested to declare their earnings from professional fishing and many among them are discouraged regarding the real impact such a study could have. For others, at the opposite extreme, this study could even be seen as a way to transition from the struggling industry of commercial fishing and to promote the development of pescatourism.

ii. By resident anglers

Despite a pre-testing period of one week within the project team, we found that some questions in the study had been poorly-worded (common errors in the responses) or avoided (responses were rare). It was thus decided that, over the course of the collection period, the questionnaire should be modified, simplified, and shortened, in order to focus on the questions which would inform our calculation of the economic contribution by angler category, i.e. the annual number of fishing trips, fishing techniques practiced, and expenses related to the practice (see the second version of the residents questionnaire in APPENDIX 4).

The calendar shown below describes the participation in the two versions of the residents questionnaire:

	Launch of the n°1 questionnaire	Launch of the n°2 questionnaire	End of data collection
Date	07/24/2015	10/16/2015	10/30/2015
Collection period	84 days	14 days	98 days
Total number of questionnaires collected	65	50	115
Questionnaires collected per day	< 1	3 to 4	> 1

In total, **115 questionnaires** were collected over a period of **98 days** (over three months), with 57 percent of responses collected on line and 43 percent in paper format.

2. Expenditures by anglers category

i. Non-resident anglers

By the declarations of charter boat captains, we estimate that the charter boat clientele in Martinique reached 4 749 customers: 1 755 for the 10 commercial vessels and 2 994 for the 18 authorized pescatourism boats in 2013. With an average of 89 percent of the clientele of pescatourism and 87 percent of the clientele of the commercial vessels, the number of tourists choosing fishing charters rose to 4 181.

Opportunist anglers

These anglers represent the majority of the non-resident customers of charter boats: 97 percent for the pescatourism vessels and 93 percent for the commercial vessels. We can therefore estimate that there were approximately **3 574 (a)** such anglers.

The average fee of a fishing trip on a commercial vessel is 225€ (\$247), whereas it costs 108€ (\$119) to take a trip on a pescatourism boat. The average expenditures for an opportunist angler, those which can be attributed to its fishing activity, is calculated by averaging these two fees, adding a 5€ (\$5.5) increase which accounts for the average cost of transportation in order to arrive at the boarding site. The final cost is therefore estimated at **171€ (\$188) (b)**.

The total expenditures of non-resident opportunist anglers is then calculated as:

$$(a) \times (b) = 680\,482\text{€} (\$746,856) (c).$$

Anglers came primarily for fishing

These anglers are less numerous than the previous category: they only represent 3 percent of the non-resident customers on pescatourism vessels and 7 percent of those on commercial vessels. The number of these anglers was estimated to be **207 (d)**.

The total expenditures related to the fishing activity is composed of the expenditures of fishing itself (such as the cost of the trip and transportation to the boarding site) as well as the rest of their running expenditures on the territory. Without being able to fish, these tourists would have chosen another destination. In 2014, a tourist spent on average **587€¹³ (\$644) (e)** per day in Martinique. This total includes the expenditures related to leisure and excursions. It is therefore not necessary to add the average fee of fishing trips.

Assuming that an angler in this category takes at least one fishing trip during his or her stay in Martinique, we would evaluate the total expenses of non-resident anglers whose primary incentive in visiting is fishing as: **(d) x (e) = 121 631€ (US\$133 495) (f)**.

⇒ The total expenditures of non-resident anglers amounts to:

$$(c) + (f) = 802\,113\text{€} (\$880\,350) (g).$$

ii. Resident anglers

Resident anglers are divided into two categories, as a function of their expenditures, beforehand estimated:

- ⇒ **anglers from land** who exclusively practice angling from land: line fishing (angling) or spearfishing or both;
- ⇒ **anglers from a boat** who practice at least angling, spearfishing or both from a boat.

Thanks to the collected results, we can further divide anglers from a boat into two categories as a function of their spending: those who own boats used for angling and those who do not. The French Federation of Marinas (“Fédération Française des Ports de Plaisance”) gives a moderate estimate of the number of boat owners who fish from their boats, with an estimated 500 in Martinique.

¹³ Source: CMT, 2014.

The expenditures of these different anglers' categories are presented in the following table:

	Anglers from land	Anglers from a boat	Non-boat owners	Boat owners
Respondents	36	78	32	44
Average number of trips per year	55	42	35	42
Average expenditure per trip	9€ (\$10)	53€ (\$58)	55€ (\$60)	53€ (\$58)
Annual expenditure practice related	423€ (\$464)	793€ (\$870)	613€ (\$673)	936€ (\$1 027)
Annual expenditure boat related	0€	2 806€ (\$3 080)	0€	4,997€ (\$5 484)
Angler annual expenditures	8 87€ (h) (\$974)	5 816€ (i) (\$6 383)	2 556€ (j) (\$2 805)	8 160€ (k) (\$8 956)

There are an estimated **14 755² (l)** anglers from land, their total expenditures amount to:
(h) x (l) = 13 093 657€ (\$14 370 801) (n).

As there are an estimated **9 302² (m)** anglers from a boat, their total expenditures are thought to be:
(i) x (m) = 54 099 378€ (\$59 376 184) (o).

⇒ The high estimate of resident anglers' total expenditures is:
(n) + (o) = 67 193 035€ (\$73 746 984) (p)

When taking into account the estimate of **500 (q)** boat-owning anglers, we arrive at:
(m) – (q) = 8 802 (r) non-boat owning anglers. The low estimate of the total expenditures of anglers from a boat is then found through the following equation:

((j) x (r)) + ((k) x (p))= 26 579 135€ (\$29 171 640) (s)

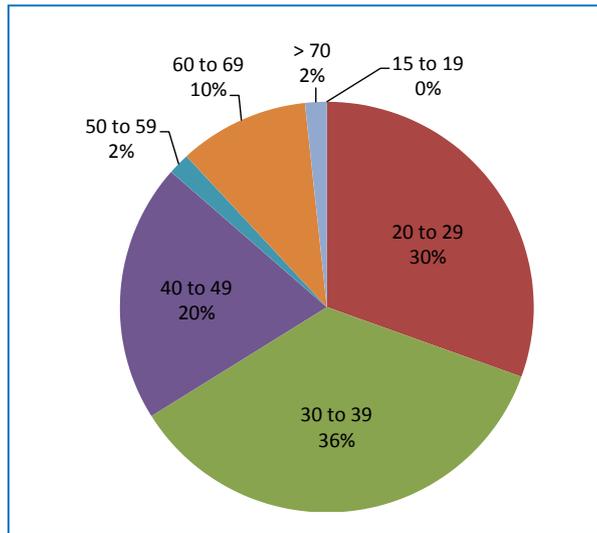
⇒ The high estimate of resident anglers' total expenditures is:
(n) + (s) = 39 672 791€ (\$43 542 440) (t).

3. Other results concerning resident anglers

i. Marine anglers' profile

Two-thirds of the resident anglers are between 20 and 40 years old. Seniors (aged 50 or older) barely represent 15 percent of anglers.

GRAPH 1
Age distribution, on a basis of 59 respondents

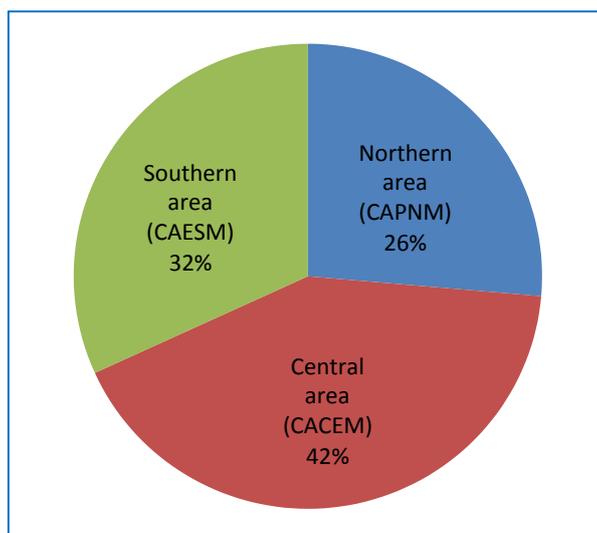


From a base of 114 respondents, **5 percent of resident anglers are women**. According to some fishing tackle retailers, this figure has risen in the past few years in Martinique.

The geographic distribution of respondents corresponds with the geographic distribution of the municipalities communities in Martinique:

- 28 percent of the population of Martinique lives in the Northern municipalities community (“CAPNM”);
- 42 percent of the population of Martinique lives in the Central municipalities community (“CACEM”);
- 30 percent of the population of Martinique lives in the Southern municipalities’ community (“CAESM”).

GRAPH 2
geographic distribution by municipalities’ community, on a basis of 110 respondents



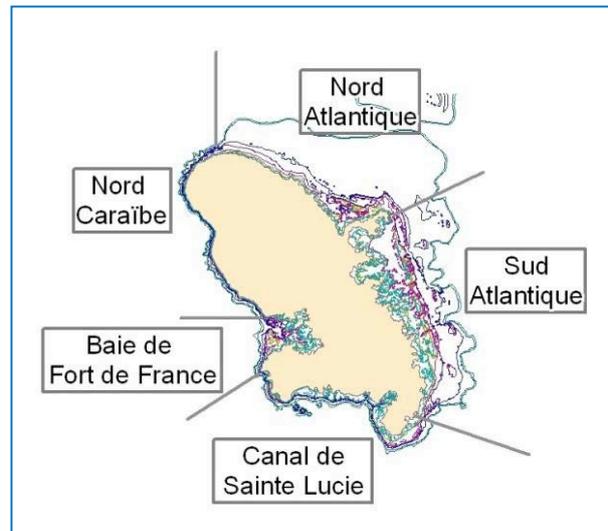
These results show a decent distribution of the questionnaire throughout the island's territory and a homogenous approach in regards to the population.

ii. Fishing modes and areas

In the questionnaire distributed, the following map indicates the designated fishing areas concerned by respondents. This map is also used by the French Research Institute for Exploitation of the Sea for commercial fishers.

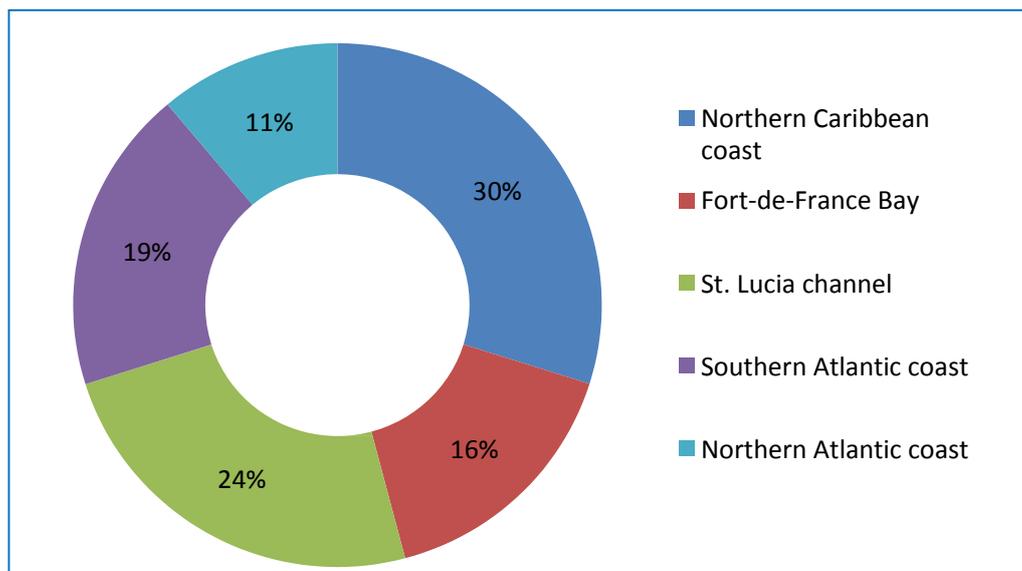
Nearly a third of the fishing trips are carried out by boat. The Southern Atlantic coast of the island is the main fishing area for this method: 1/3 of boat trips are done from here.

But measured on the basis of the number of fishing trips, the Atlantic coast only sees 30 percent of total fishing activity. **It is actually the Caribbean coast which undergoes the strongest fishing pressure.**



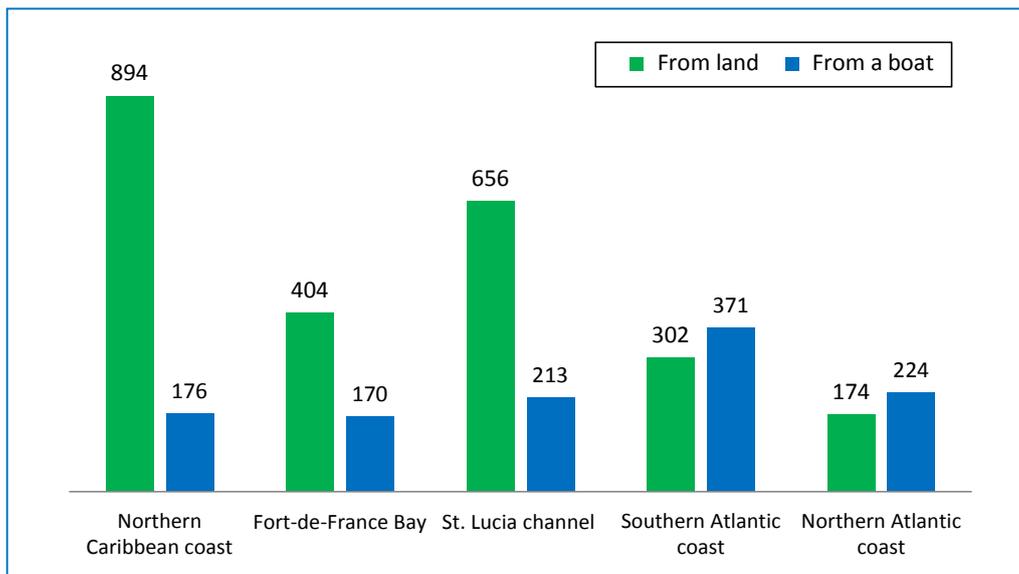
GRAPH 3

Fishing areas attendance, on a basis of 3,584 trips



In general, we can see a tendency towards different fishing methods depending on the fishing area chosen. Angling from land is more common along the Caribbean coast while the majority of angling from a boat is done from the Atlantic coast: **nearly 37 percent of fishing trips from land occur in the Northern Caribbean area.**

GRAPH 4
Fishing modes distribution by fishing area, on a basis of 3,584 trips



iii. Engine

The sample size of this study is too small to extrapolate upon the populations of boat-owning anglers who do not exclusively use their boat for angling. Only 15 participants responded to questions relating to their boat engine. The following comparative table nevertheless allows for a comparison of engines, drawn from these 15 responses, as well as the average engine of a commercial fishing vessel:

	Age (years)	Power (hp)	Wear (hours)	Category
Average engine of a recreational fishing boat (15 respondents)	14	169	670	67% of 4-stroke
Average engine of a commercial fishing boat ¹⁴	19	124	Unavailable data	Unavailable data

It seems that recreational fishing motors are generally stronger and more recent than commercial fishing motors. It shall be necessary to collect more data on the motorisation of fishing boats in order to confirm or refute our preliminary data.

iv. Cases of ciguatera

12 percent of anglers (65 respondents) suspect they have encountered at least one case, and up to ten cases, of ciguatera through the consumption of fish caught in Martinique. This figure, extrapolated for the entire Martinican population, probably overestimates the reality as we can easily assume that anglers consume more seafood than the general Martinican population, or are at least more frequently in contact with seafood consumers.

v. Participation in fishing tournaments

Less than **7 percent** of anglers (90 respondents) have participated in a fishing tournament in Martinique in 2014. Half of these respondents are the owners of boats uniquely used for angling and the majority are anglers who do not exclusively practice line fishing from a boat. This participation rate takes into account the 23rd international sport fishing tournament, organised by the Martinique Billfish Association (there were 12 participating boats in 2014, compared to 43 in 2013). However,

¹⁴ Source: IFREMER, 2013.

this tournament was cancelled in 2015. It is probable that, despite the simultaneous development of lionfish tournaments in the same year, the participation rate is generally down.

vi. Composition of catches¹⁵

Anglers from land

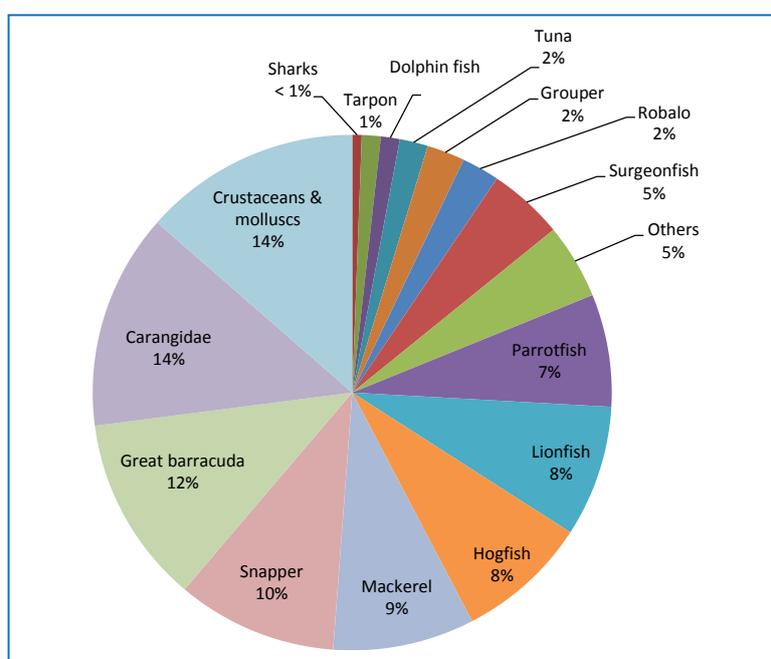
Anglers from land – both, line fishers and spearfishers – mainly catch three groups of species: crustaceans and molluscs, Carangidae and the great barracuda. Their average catch is 48 kg per year whose 59 percent of catches are ground species. They make an average of 55 fishing trips per year.

8 percent of their catch is composed by lionfish. Spearfishing is the only fishing mode for this species. Species which are considered to be “sensitive”, such as sharks or some of groupers, only represent a small percentage of catches.

There is no record of billfish catches by this category of anglers.

GRAPH 5

Catches frequency of anglers from land, on a basis of 30 respondents



Anglers from a boat

Anglers from a boat – both, line fishers and spearfishers – mainly catch four different groups of species: Carangidae, the great barracuda, snappers and mackerels. Their fishing yield is clearly superior to that of anglers from land: they reported an annual average of 77 kg for 42 fishing trips per year. Additionally, ground species are less impacted as pelagic species represent 53 percent of their catches.

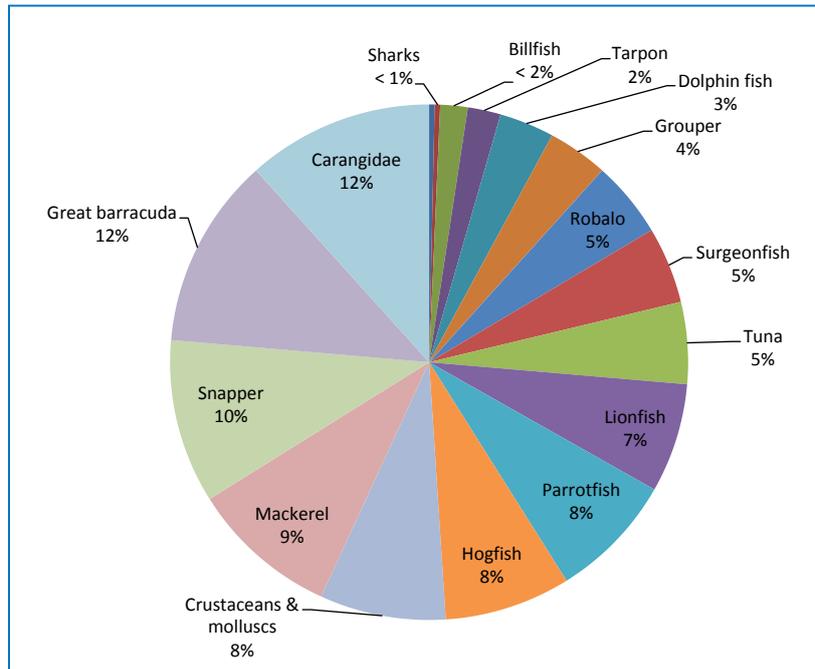
Lionfish composes 7 percent of their catch. “Sensitive” species are caught more frequently here, particularly groupers which account for 4 percent of catches.

Billfish are caught by this anglers’ category but only represent a minority of their catches (less than 2 percent). However, in terms of biomass, it is possible that some anglers catch more billfish than any other species combined.

¹⁵ The catch data concerning groups of species are to be considered by frequency, i.e. number of occurrences, and not by weight.

GRAPH 6

Catches frequency of anglers from a boat, on a basis of 40 respondents



Some of these anglers use the “catch and release” technique for billfish, a fishing practice which consists of releasing their prey once it has been caught, for the purpose of resource conservation. Certain fish are even tagged before being released. The IGFA, which establishes fishing tournament rules and keeps an inventory of tagged fish, recorded 101 tags, from 1993 to 2010, of fish caught in Martinican waters during fishing tournaments (see focus on IGFA catches in APPENDIX 5).

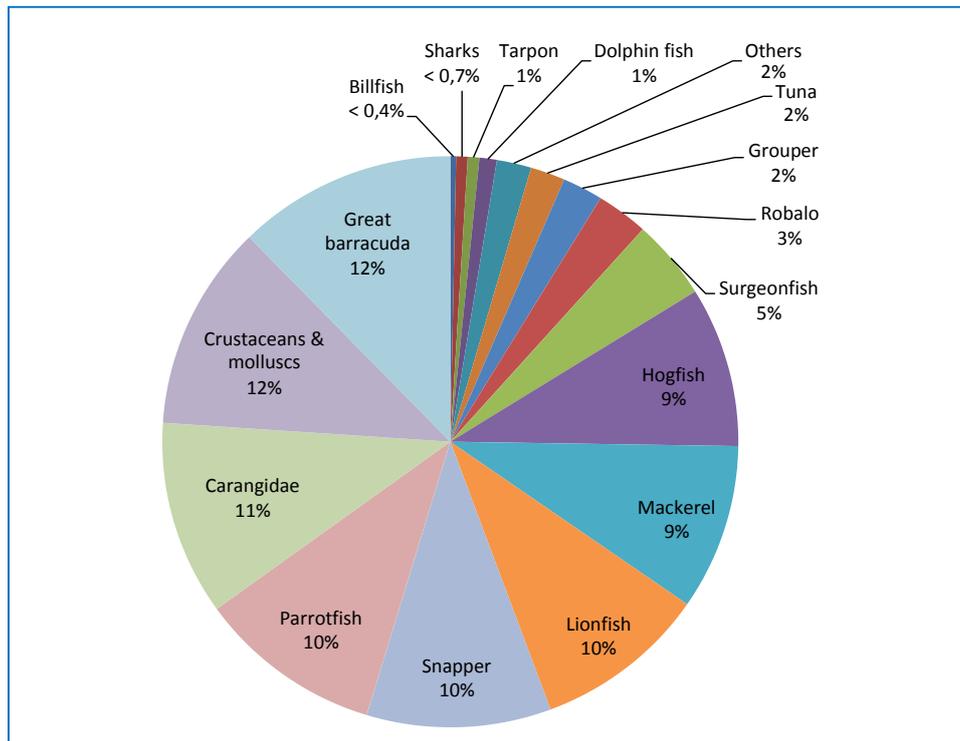
Spearfishers

Anglers who exclusively spearfish – whether from land or from a boat – have been widely involved in this study. This allowed for insight into their catch declarations. In this case, **these anglers wield a more homogenous pressure on the fisheries resources than the other categories of anglers studied.** As it stands, they nearly equally catch up to **8 different groups of species:** the great barracuda, crustaceans and molluscs, Carangidae, parrotfishes, snappers, lionfish, mackerels and hogfish. This is largely explained by the ability of the spearfisher to have a **precise degree of selection** to the narrowest taxonomic rank, the species. Their yield is intermediate: with an average of **56 kg of catch per year**, spearfishers make an average of **57 fishings trips per year**. 52 percent of their catches are groundfish species.

Lionfish is heavily caught (10 percent of catches) and is considered an integral part of the average spearfishers catch. Some spearfishers specialize in catching lionfish and do so exclusively. “Sensitive” species are as rarely caught by spearfishers as they are for all kind of anglers from land.

Billfish are scarcely caught by this category of anglers (< 0.4 percent of catches).

GRAPH 7
Catches frequency of spearfishers, on a basis of 44 respondents



The available bibliography does not precisely count the number of spearfishers in Martinique. However, two existing methods allow for an estimate of their number and so, deducing their total landing:

N°1 The partnered fishing supply stores estimate that 5 to 10 percent of recreational fishers practice spearfishing. From the total of 39,822 recreational fishers, there are an estimated from 1,991 to 3,982 spearfishers.

➤ **The total spearfishing landing is therefore estimated to be between 112.2 and 224.3 tons.**

N°2 Spearfishers from the web forum “bleu972.fr” believe that spearfishers can be divided into three categories: the majority (around 2,500) who go on trips once every two weeks, those who go on trips between once and twice a week (around 1,000), and the group of intensive spearfishers who go on more than two trips a week (around 300).

➤ **The total spearfishing landing is estimated at 119.9 tons.**

Recreational spearfishers therefore land ten times more than their commercial equivalents whose average overall landing is an estimated 15 tons in 2014¹⁶. Though there are only 80 commercial spearfishers in Martinique, their yield is much better than the recreational one: 6.67 kg per spearfisher per trip compared to 1 kg by recreational fishing.

¹⁶ Source: IFREMER, SIH, 2014.

The following table recapitulates the catch characteristics of each group of recreational fishers analysed:

	Annual catch (kg)	Ratio of ground species	Number of trips per year	Catch per trip (kg)
Anglers from land	48	59%	55	0,89 to 0,96
Anglers from a boat	77	47%	42	1,45 to 1,85
Spearfishers	56	52	57	0,99 to 1,02

(N.B. : blue data mean that at least 30 recreational fishers answered to this question ; pink data means that they were less than 30 to answer and so, that these data are not statistically significant)

vii. Reselling

Nearly 9 percent of respondents (10 respondents) declared having sold or chose not to answer the question about selling a part of their catch. This result speaks to the validity of the question: despite the misgivings that could arise from the sensitive nature of the question in the eyes of some anglers, it remains justifiable thanks to these ten respondents. This result also demonstrates difficulty of quantifying the reality of the situation in the field.

However, the sample size is too small to extrapolate this result for the larger recreational fishing community in Martinique. The profile of these ten anglers is described as follows:

- 60 percent are younger than 40;
- 80 percent practice fishing from a boat (angling and/or spearfishing) and at least 50 percent are boat-owners;
- They make an average of 194 fishing trips per year (5 respondents) and have an annual catch of 107 kg (5 respondents). Those who count the number of trips they made did not record their annual catch, and conversely;
- They spent an average of 65€ (\$71) per trip (6 respondents), 1 081€ (\$1,186) annually for their practice (8 respondents) and 4 763€ (\$5,228) for maintenance and operation of their boat (6 respondents);
- Three among them left comments relating to the need for an improvement in the communication of knowledge on Fish Aggregating Devices and also a need for greater organisation of the recreational fishing sector.

vii. Feedback

48 percent of recreational fishers surveyed (33 respondents), with the first version of the questionnaire, left a free-form comment. The following four themes were recurrent. They are referred to here in order of priority according to the recreational fishers:

- **Resource management** – some excerpts: “There is a need to establish minimum size regulations for more species”; “Need to organize monitoring of the closed fishing areas”; “Overfishing on the coastal resources”; “It should be illegal to catch endangered species”;
- **Security and regulation** – some excerpts: “Improve regulation communication”; “Increase the number of controls for poachers”; “Organize the 300 meter coastal strip for greater safety”;
- **Equipment and infrastructure** – some excerpts: “There is a lack of harbour infrastructure”; “Boat renting is too expensive”;
- **Commercial fishing** – some excerpts: “Ban the use of traps and nets”; “What happens to the lost traps?”; “There is a large impact on the sea floor”.

4. The total economic contribution of marine recreational fisheries in Martinique

The total economic contribution is calculated with the help of economic multipliers. By multiplying each of these multipliers by the total expenditures of anglers, it is possible to distinguish two main indicators: the contribution of fishing to the Martinican GDP and the number of full-time jobs created by these expenditures.

For **resident** anglers, the analysis answers the question: “What part of the Martinican economy is **supported** by the possibility of recreational fishing?”

For **non-resident** anglers, the analysis answers the question: “What part of the Martinican economy is **provided** by the possibility of recreational fishing?”

i. Choice of economic multipliers

The assessment manual provides a list of economic multipliers. None of which are available for Martinique. It is therefore necessary to select another country whose economic situation is close to the Martinican one. Thus, thanks to Southwick Associates for their economic impact modelling expertise, the economic multipliers of the Bahamas were chosen for the following reasons:

- Their HDI¹⁷, a good indicator of the economic development of a country, are nearly similar: 0.792 for the Bahamas / 0.814 for Martinique;
- They are both island territories in the Wider Caribbean Region;
- The data available for the Bahamas is relatively recent (2000).

This choice suggests that the results obtained will only be approximate estimates and that specific multipliers should be developed for Martinique for 2014 in order to refine these estimates.

ii. Calculation of the contribution to the GDP

In 2014, the GDP of Martinique amounted to 8.5 billion euros¹⁸ (9.3 billion dollars). The part of the Martinican GDP generated by recreational fishing was estimated to be:

- By non-resident anglers: $(g) \times 0.78 = 625\,648\text{€} (\$686\,673)$ (u), or **0.007 percent** of the GDP;
- By resident anglers:
 - Low estimate: $(t) \times 0.78 = 30\,944\,777\text{€} (\$33\,963\,103)$ (v), or **0.364 percent** of the GDP;
 - High estimate: $(p) \times 0.78 = 52\,410\,567\text{€} (\$57\,522\,648)$ (w), or **0.617 percent** of the GDP.

⇒ The part of the Martinican GDP generated by recreational fishers, residents and non-residents, is estimated to be between 0.371 and 0.624

iii. Calculation of jobs generated by expenditures

There is no economic multiplier available from the same year for this indicator. It is not preferable to use the multiplier from another year which would further bias estimates. But dividing the GDP by the active population, we can obtain the contribution per job to the GDP: 50 721€ (\$55 668) (y). We can therefore estimate the number of jobs created by:

- The expenditures of non-resident anglers: $(u) / (y) = 12$ jobs.
- The expenditures of resident anglers:

¹⁷ Source: <http://hdr.undp.org/en/statistics/>

¹⁸ Source: INSEE, 2015.

- Low estimate: $(v) / (y) = 610$ jobs;
- High estimate: $(w) / (y) = 1\,033$ jobs.

⇒ The number of jobs created by recreational fishers' expenditures, residents and non-residents, is estimated to be between 622 and 1 046 jobs.

The following table compiles the results of the economic contribution of angling in Martinique for the year 2014:

2014	Non-resident anglers	Resident anglers	TOTAL ANGLERS
Total expenditures	802,113€ (\$880,350)	39.7M€ to 67.2M€ (M\$43.6 to M\$73.7)	40.5M€ to 68M€ (M\$44.4 to M\$74.6)
Contribution to the GDP	625,648€ (\$686,673) 0.007 percent	30.9M€ to 52.4M€ (M\$33.9 to M\$57.5) 0.364 percent to 0.617 percent	31.6M€ to 53M€ (M\$34.7 to M\$58.2) 0.371 percent to 0.624 percent
Jobs generated by their expenditures	12	610 to 1,033	622 to 1,046

5. Revised and comparative data analysis

i. Identified biases

Despite the careful preparation of the sampling, there were some uncontrollable factors that ought to be pointed out in order to better interpret the results:

- **The context bias** influenced the groups of anglers who responded: the social and regulatory contexts play a role in the mobilisation of one group of anglers over another;
- **Survey method bias** which influences the “age” factor: we can assume that younger anglers are more inclined to respond to online surveys;
- **Distribution method bias** which influences the groups of anglers targeted: the questionnaires were distributed voluntarily by on-site store staff and therefore indirectly targeted one group of anglers over another according to the store's speciality (spearfishing material and/or angling material).

ii. *Comparison of the results with other sectors*

The economic contribution of non-resident anglers

Out of the 523 912 long-stay tourists¹⁹, non-resident anglers, estimated by (a) + (d) = 3 781 tourists, only represent 0.72 percent.

Contrary to preconceptions, with only 4 percent of the total value added²⁰, tourism only occupies a moderate place in the Martinican economy. Angling, which only contributes 0.007 percent to the GDP of Martinique, represents an insignificant part.

In 2013, the total expenditures carried out in Martinique by long-stay tourists amounted to 289M€¹¹ but only 6 percent of these expenditures were allocated to leisure/excursions. Recreational fishing represents only 5 percent of tourists' expenditures towards leisure/excursions.

The subcategory of guided activities, in terms of jobs, more closely resembles that of the negligible economic stimulation of cockfighting (7 jobs) than ever-popular scuba diving (99 jobs).

⇒ **In general, marine recreational fishing by non-residents does not have a notable impact on the Martinican economy. This situation could be explained by the strong competition with neighbouring Caribbean islands (Saint Luca, Barbados) which offer cheaper services (accommodations, fuel, etc.) and port services better accustomed to welcoming anglers.**

The economic contribution of resident anglers

It is well-known that the commercial fishing and aquaculture sector play an essential role in the economy of Martinique. Indeed, it represents the second source of added value to the primary sector, between 0.2 and 0.3 percent of the GDP of Martinique. With a contribution of nearly 0.4 to 0.6 percent of the Martinican GDP, the marine recreational fishing, practiced by residents, can claim a serious economic concurrency with this sector.

From a social point of view, this concurrency can also be confirmed by the 724²¹ jobs and 3 000²² jobs directly and indirectly created, according to different estimates, compared to the 610 to 1 033 jobs generated by the expenditures of resident anglers.

Recognized as large consumers of seafood, with an average annual consumption of 48 kg per inhabitant (compared to 35 in France), Martinicans spent 68 million euros (M\$74.6) on seafood in 2006. This total and that of their expenditures associated with angling, estimated between 39.7 and 67.2 million euros (M\$ 43.6 and M\$73.7), approach the same order of magnitude. When the geographic homogeneity of anglers is also considered, this comparison speaks to a certain cultural role anglers occupy in the Martinican way of life.

In terms of fisheries resources, commercial fishers land between 1 500 and 2 000 tons²³ per year. In comparison, the catches of the only recreational spearfishers in Martinique corresponds to 8 percent of the total production of the commercial fishing sector. Nevertheless, 10 percent of their catches are lionfish: one fish out of ten captured is a lionfish. As such, within professional circles, it is regarded as “an economic development inhibitor”, without even taking into account the ecological impact on the area and the other halieutic species, the lionfish plays a rather positive role in the economic development in the angling sector. Through its presence along the coast and in shallow areas, the

¹⁹ Source: CMT, 2014. Here, cruise passengers are not included because of the low probability they have to practice fishing trips during their less-than-one-day stay in Martinique.

²⁰ Source: IEDOM, 2015.

²¹ Source: the “ACTeon / Créocéan” study on maritime economy, 2015. To get the right meaning of this figure, it is necessary to take account of the uncertainty of calculation in commercial fishers full-time jobs due to a lack of data. Moreover, some full-time jobs were not be included in this figure like jobs from the next sectors: studies and research, administrative and naval maintenance/operation.

²² Source: CEP Mer, 2013.

²³ Source: IFREMER, SIH, 2015.

lionfish serves as a recruiting incentive for new spearfishers, and as a diversification of activities for seasoned spearfishers. Its capture is encouraged as an ecological precaution, allowing anglers a way to give back to the environment.

⇒ **Marine recreational fishing, practiced by resident anglers, has maintained a considerable place in the economy of Martinique. It even approaches the economic dimension of commercial fishing. Also, the social role of angling is demonstrated by the number of jobs generated as well as the cultural role made evident by the homogenous presence of anglers in the general population. This activity plays an integral part in the lives of Martinicans.**

6. Results dissemination

This report can serve as a tool for reflexion and way to open up the debate about the economic value of angling in Martinique, a theme which has often been avoided due to its informal and unknown characteristics. Translated in two languages, French and English, it is intended for wide distribution on several different scales:

- At the Caribbean level (English version) by the WECAFC and its working group on recreational fisheries;
- At the Martinican level (French version) by:
 - All of the members of the project team: scientific institution, public institutions, medias, sport fishing associations and fishing supply stores;
 - Some charter boat captains who responded to the questionnaire and requested a copy of the report;
- To participants (French version) through the media and social networks: the spearfishing forum “bleu972.fr”, the environmental magazine “Fey” and some Facebook pages concerned with local involvement.

The provisional and final results of this report were also presented to steering committees on the “blue economy” in Martinique, carried out in 2015 on behalf of the prefecture of Martinique.

CONCLUSION

Despite a lucrative geographic location and hundreds of kilometres of coastline, Martinique is not known as a fishing destination: its reputation speaks more to its coconut tree-studded beaches. In reality, angling is deeply entrenched into the economic landscape of the territory. There are still many contrasts within the practice. Recreational sea fishing is not equally practiced by residents, numerous and with varied fishing techniques, and non-residents, attracted by the possibility of sport fishing trips but have little incentive to choose Martinique to practice this activity. And yet, the assessment of the economic contribution of angling practiced by residents shows that this pastime, often regarded as a passion, is probably more lucrative and generates more jobs than we could have think. This assertion serves as a reminder that beyond being a simple hobby, it is also a source of economic growth which continues thanks to the freedom Martinicans enjoy to fish along their coasts.

On the other hand, this report also demonstrates the complexity of reaching anglers. Because of a lack of a local federation, data concerning them, and a confidence in policy makers and fishing managers, anglers have a difficult time opening up about a traditionally close-guarded activity. But through their active participation in the survey portion of this study, they demonstrated their capacity to mobilize in order to have their opinions heard and taken into account in political decisions which would impact the practice of their activity.

In addition, the problems relating to angling are considerable. Indeed, an angler is at once a fisher extracting a resource, a sportsman who organises and participates in fishing tournaments and a citizen who enjoys relaxing and taking advantage of the many benefits of the sea. Better integration of this sector into projects and regulations also means sustainably managing shared halieutic resources, developing a well-performing line of business, and better organizing coastal spaces.

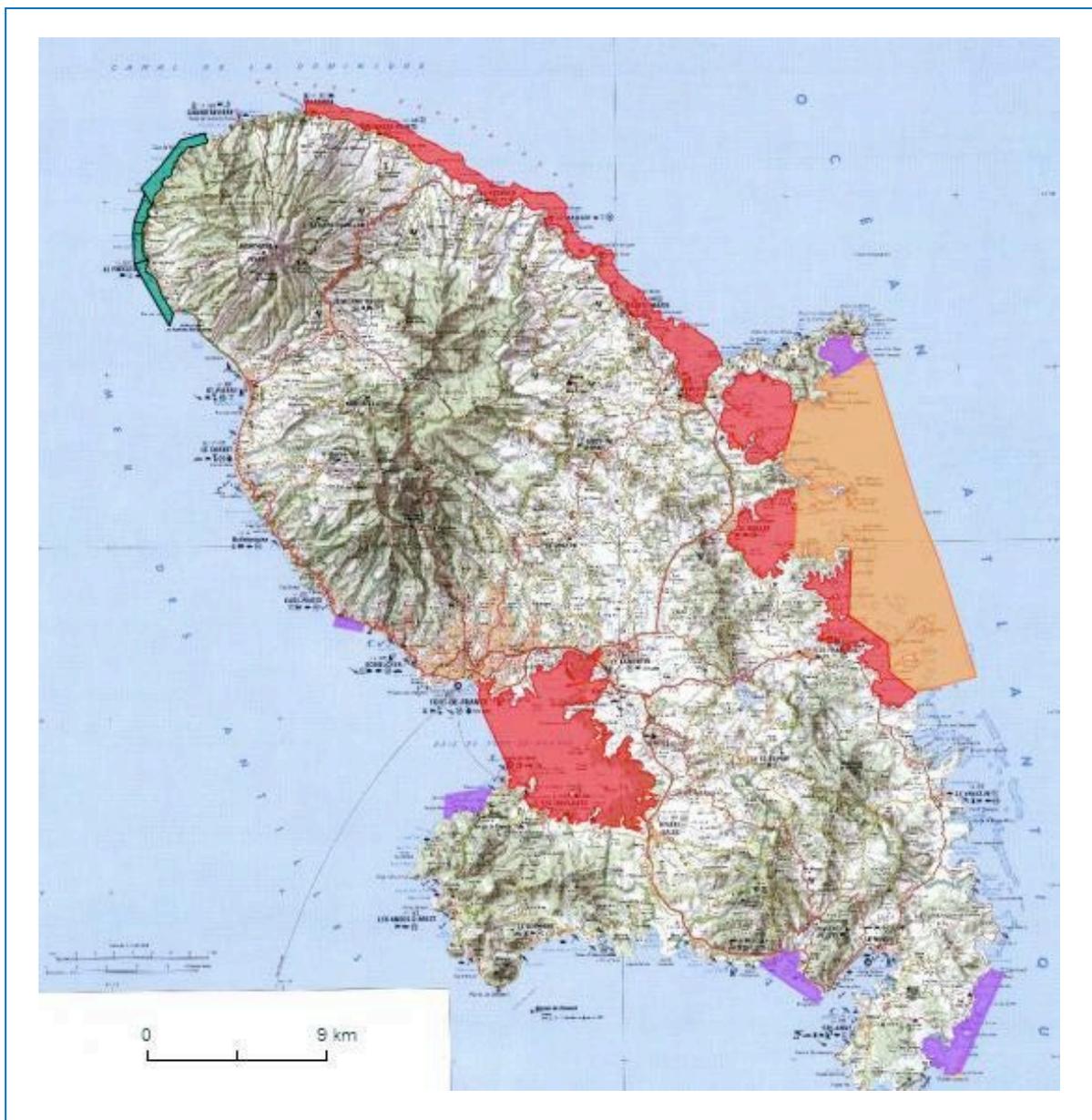
It should then be necessary to continue this preliminary work by conducting a more thorough study, by further dividing the groups of anglers studied, with homogenized data over the course of a year. Further field surveys could complement these first results. To this purpose, we must find a common willpower amongst anglers and public authorities to describe together what the angling of tomorrow will look like, a sustainable practice in its full value.

APPENDICES**APPENDIX 1 MAP OF THE CLOSED SEA FISHING AREAS AROUND MARTINIQUE**

(available at: http://cartes.observatoire-eau-martinique.fr/interdiction_peche_martinique/flash/).

Legend:

- The red areas are the closed fishing areas due to the chlordecone pollution;
- The orange area is the closed fishing area due to the chlordecone pollution for spiny lobsters only;
- The purple areas are the marine resources management areas;
- The green area is the regional natural marine reserve of Le Prêcheur.



APPENDIX 2 PICTURES

(Photo credits: Nicolas Benguigui, Lucie Abolivier).

FIGURE 1

Kind of boats used by commercial charter boat captains



FIGURE 2

Kind of boats used by commercial fishers for their pescatourism trips

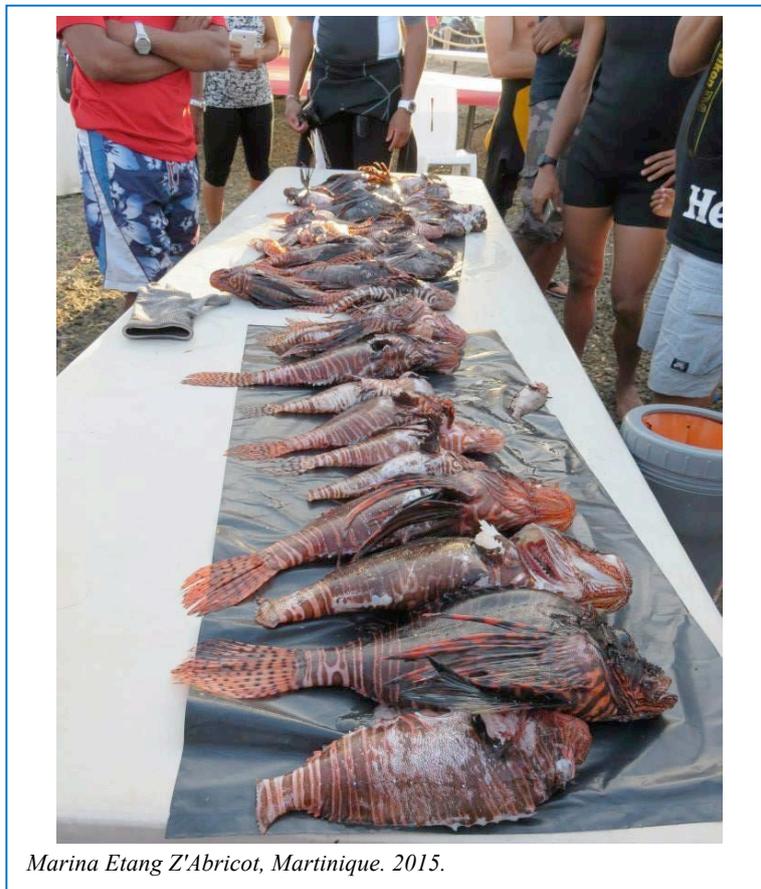


FIGURE 3
Karib Notik sport fishing tournament



Marina Etang Z'Abricot, Martinique. 2015.

FIGURE 4
Lionfish tournament



Marina Etang Z'Abricot, Martinique. 2015.

8. In 2014, please estimate **your average catch** : kg
 What percentage of your catch was : groundfish% / pelagics% (total 100%)
9. What percentage of your catch do you **sell** ? %
 If you sell any portion of your catch and if you couldn't sell your fish, would you have fished?
 Yes No. Please tell us why :
10. Do you suspect **cases of ciguatera**, with either fish you caught directly or in others' fish caught in Martinique?
 No Yes. How much people did you think were infected ?

YOUR EXPENDITURES

Here, please report **your 2014 expenditures made exclusively in Martinique** for your recreational fishing activity. Do not include your Internet purchases. In the right column, report how many people were covered by these expenditures. For instance, if an expense covered you and your fishing partner, mark « 2 ».

11. Please estimate **your expenditures made for an average fishing trip** in 2014 :

Car fuel	€	
Boat fuel (if it is <u>your</u> boat or a boat you hired/rented)	€	
Food	€	
Lodging	€	
Other. Please tell us :	€	

12. Please provide an estimate of **the total amount spent in 2014 for the following** :

Terminal tackle (lines, sinkers, swivels, etc.)	€	
Baits & lures	€	
Fishing gear (reel, rod, speargun, spear shaft, etc.)	€	
Clothes & accessories (wetsuits, gloves, etc.)	€	
Subscription to fishing magazines	€	
Boat and/or fishing tackle rental	€	
Tournament fees	€	
Other. Please tell us :	€	

13. If you own a boat, please report **your total expenditures in 2014 for maintenance and operation** :

Equipment	€	
Repair & maintenance	€	
Insurance	€	
Harbor/marina fees	€	
Registration fee	€	
Purchase price of your boat (purchased only in 2014) or payment on your boat loan	€	
Other. Please tell us :	€	

14. Do you use **your boat exclusively** for your recreational fishing activity ?
 Yes No. Please tell us how much of your boating time is spent fishing :%

Thank you for taking the time to complete this survey !

APPENDIX 4 THE SECOND VERSION OF THE RESIDENTS QUESTIONNAIRE

(originally in French)

RESIDENTS SURVEY

« How much does the recreational fishing provide to Martinique's economy ? »

This study is conducted on behalf of the Food and Agriculture Organization of the United Nations, in collaboration with governments and other local stakeholders. By completing this anonymous questionnaire, you are helping to improve knowledge about the economic importance of this activity, thus providing quality fishing well into the future.

On behalf of the angler community, thank you for your help !



TELL US ABOUT YOU AND YOUR FISHING PRACTICES

Q1/10 Your **age** :

Q2/10 Your **gender** : Male Female

Q3/10 Your **town** of residence :

Q4/10 Please estimate **your 2014 fishing activity** : trips/year

Q5/10 What kind of **fishing mode(s)** did you practice that year ?

Angling from land Angling from a boat
Spearfishing from land Spearfishing from a boat
Other fishing mode. Please tell us :

YOUR EXPENDITURES

Q6/10 Please estimate **your expenditures made for an average fishing trip in 2014**.

Car fuel	€	How much people were covered by these expenditures : person(s)
Boat fuel (if it is <i>your boat or a boat you hired/rented</i>)	€	
Food	€	
Other (expected fishing tackle)	€	

Q7/10 Please provide an estimate of **the total amount spent in 2014 for the following** :

Terminal tackle (lines, sinkers, etc.)	€
Baits & lures	€
Fishing gear (reel, rod, speargun, spear shaft, etc.)	€
Clothes & accessories (wetsuit, gloves, etc.)	€
Other (subscription to fishing magazines, tournament fees, etc.)	€

Q8/10 In 2014, did you **rent** a boat or fishing gear ? Yes No

If yes, please report the total amount spent :€

How people were covered by this rental : person(s)

Q9/10 If you own a boat, please report **your total expenditures boat related**.

Equipment	€	How much people were covered by these expenditures ? person(s)
Repair & maintenance	€	
Insurance	€	
Harbor/marina fees	€	
Purchase price of your boat (purchased only in 2014) or payment on your boat loan	€	
Other (registration fee, etc.)	€	

Q10/10 Do you use **your boat exclusively for your recreational fishing activity** ?

Yes No. Please tell us how much of your boating time is spent fishing :%

APPENDIX 5 FOCUS ON IGFA CATCHES

- Focus on IGFA catches, caught or recatched between 1993 and 2010, in Martinique, and from sport fishing tournaments.

	Blue marlin <i>Makaira nigricans</i>	Sailfish <i>Istiophorus albicans</i>	Spearfish <i>Tetrapturus pfluegeri</i>	White marlin <i>Tetrapturus albidus</i>
Number of tags	85	7	4	5
Ratio of catches	84%	7%	4%	5%
Average weight (kg)	72 (81 measures)	20 (5 measures)	19 (4 measures)	10 (5 measures)
Maximum weight (kg)	227	25	23	14
Average length (cm)	174 (35 measures)	176 (4 measures)	125 (4 measures)	122 (1 measure)
Maximum length (cm)	305	216	132	122

- Focus on IGFA catches, caught in Martinique and from the sole 2002 Martinique Billfish tournament.

	White marlin <i>Tetrapturus albidus</i>	Blue marlin <i>Makaira nigricans</i>
Number of catches	4	2
Average weight (kg)	9,5	52
Max. weight (kg)	11	68
Average length (cm)	No data	No data

The out-of-tournaments catches and recatches are not reported here because they can also be attributed to the commercial fishing.

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PREFECTURE DE LA MARTINIQUE *Arrêté préfectoral n°2013198-0013 du 17 juillet 2013 portant approbation d'une délibération du Comité Régional des pêches et des élevages marins de la Martinique et interdiction de la pêche dans le secteur de Case-Pilote dans les eaux du département de la Martinique*.

PREFECTURE DE LA MARTINIQUE *Arrêté préfectoral n°11-00938 du 22 mars 2011 portant approbation d'une délibération du Comité Régional des pêches maritimes et des élevages marins de la Martinique et portant interdiction de la pêche dans le secteur de Sainte-Luce dans les eaux du département de la Martinique*.

PREFECTURE DE LA MARTINIQUE *Arrêté préfectoral n°11-00939 du 22 mars 2011 portant approbation d'une délibération du Comité Régional des pêches maritimes et des élevages marins de la Martinique et portant interdiction de la pêche dans le secteur de Cap Chevalier (Sainte-Anne) dans les eaux du département de la Martinique*.

PREFECTURE DE LA MARTINIQUE *Arrêté préfectoral n°99-22Bis du 8 janvier 1999 portant interdiction de la pêche dans la baie du Trésor dans les eaux du département de la Martinique*.

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APPENDIX D

ECONOMIC IMPACTS OF RECREATIONAL FISHING TOURISM IN THE BAHAMAS

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TCP/BHA/3501 – Strengthening Fisheries and Aquaculture Governance in The Bahamas

PROJECT BACKGROUND

The Food and Agriculture Organization (FAO) of the United Nations in collaboration with the Government of The Bahamas has embarked on a project to “*Strengthen Fisheries and Aquaculture Governance in The Bahamas*”. Through this project, an assessment has been undertaken to determine the economic impacts of the recreational fishing sector. This assessment takes into consideration the economic impacts of this sector derived through tourism and targets the two groups of anglers in this sector: 1) offshore anglers and 2) flats anglers who have visited The Bahamas recently. To help put the findings into perspective, the results are then compared to The Bahamas’ important commercial fisheries sector. This study is being implemented with collaboration from the International Game Fish Association (IGFA) and the Western Central Atlantic Fishery Commission (WECAFC). Results from the assessment will be used to conserve fishery resources in The Bahamas and to demonstrate to business and government leaders in The Bahamas how a healthy and sustainable recreational fisheries sector provides jobs, livelihoods, tax revenues and other benefits to the country.

In 2014, Southwick Associates Inc. of Fernandina Beach, Florida produced a manual as part of the WECAFC Working Group on Recreational Fisheries titled “*Measuring the Economic Contributions of Recreational Fishing: A How to Manual*”. This assessment uses this manual as a guide for determining the impacts of recreational fishing in The Bahamas and as a test to identify improvements to the manual. As part of the assessment, an online survey instrument was designed that took into account direct and indirect expenditures of anglers during their visits and looked at the impacts of ‘new money’ being generated by this sector.

2. EXECUTIVE SUMMARY

Recreational fishing in The Bahamas has a heightened season and peak season that fluctuates with the tourist season. Anglers either visit to participate in high energy offshore billfish tournaments that take place in the open ocean or participate in the more serene, quiet fishing in the flats in which anglers target bonefish, permit and other fish species common to flats. Some reef fish such as red snapper, grouper, permit and tuna are also targets in the recreational fishing sector. Fishing is banned in protected areas managed by the Department of Marine Resources, but in some national parks managed by the Bahamas National Trust²⁴, catch and release fishing such as bonefishing is permitted as it is considered a sustainable fishery.

The peak of the billfish and wahoo season in The Bahamas occurs from April to June annually, when tournaments are held on the islands of Abaco, Grand Bahama and Cat Island. Tournaments also take place during various periods of the year, with most occurring during winter months.

Flats fishing takes place during the year with a voluntary closed season from August to October. Bonefish is the preferred target species with fishing occurring on several islands; the islands of Abaco, Andros, Bimini and Grand Bahama are the top four preferred destinations for flats fishing.

To complete this assessment a research project was implemented that applied the principles outlined in “*Measuring the Economic Contributions of Recreational Fishing: A How to Manual*” produced by Southwick Associates for the WECAFC Working Group on Recreational Fisheries. Visiting billfish and bonefish anglers were the target audience for this assessment. The research instrument used in the analysis was an online survey that was shared via email and social media. A copy of the survey instrument is presented in this report’s Appendix.

Results from this study show that the economic impacts of tourism in the recreational fishing sector are of great significance. It is estimated that on average 36 886 persons visit The Bahamas annually to participate in the recreational fishing sector. These visitors spend about US\$527 million a year on expenditures, such as restaurants, local transportation, lodging and fishing, recreational activities and

²⁴ The Bahamas National Trust is a non-governmental environmental organization established by an Act of Parliament in 1959 that has the responsibility of managing national parks throughout The Bahamas.

more. The sector provides more than eighteen thousand jobs directly and indirectly. In comparison, the commercial fisheries²⁵ and aquaculture sector employs an estimated 9 300 persons and has an estimated export value of US\$94 million (Waugh, 2010).

This report outlines the contributions of the recreational fishing sector and is not designed to be a comparison of the recreational and commercial fishing sector. Information is included here as a point of reference and to assist policy makers in making management decisions.

3. PROJECT OBJECTIVES

- Implement the manual on “Measuring the Economic Contributions of Recreational Fisheries: A How-to Manual” in The Bahamas.
- Survey 500 anglers who have fished in The Bahamas recently to determine their expenditure patterns and demographic profile.
- Determine the economic impacts from visiting angler expenditures on their fishing trip to The Bahamas and their estimated overall contribution to The Bahamas’ GDP and output sales.

4. THE PROJECT TEAM

The project team consisted of:

1. The National Project Consultant
2. The Department of Marine Resources
3. The National Project Coordinator
4. Ministry of Tourism

Oversight and direction of the project was provided by the FAO Representative for Jamaica, The Bahamas and Belize, Mr Raymon VanAnrooy, Rob Southwick of Southwick Associates, Inc. and input from the Abaco Fly Fishing Guides Association.

5. FISHERIES REGULATIONS

The Fisheries (Resources Jurisdiction and Conservation) Act was established in 1977. It established the Exclusive Fishery Zone (EFZ) in which The Bahamas has sovereign rights and exclusive authority for the purpose of exploring and exploiting, conserving and managing the fishery resources of the seabed, subsoil and superjacent waters²⁶.

Sport fishing regulations:

- Foreign fishing vessels must apply for a license to fish for non-commercial fishing purposes.
- It is an offense for a non-Bahamian to fish for fishery resources for commercial purposes within the EFZ²⁷ even if on a registered Bahamian vessel.

Maximum catch per vessel at any time:

- 18 migratory fish (kingfish, tuna, dolphin, wahoo)
- 6 conch

²⁵ The fisheries sector in The Bahamas is categorized as the commercial fishing sector of scale fish, lobster and conch which is mainly derived through commercial exports.

²⁶ Chapter 244, Section 6 (1) Fisheries Resources (Jurisdiction and Conservation) Act of the Statute Laws of The Bahamas.

²⁷ Exceptions to this law is for foreigners who hold a valid work permit or a shareholder in a Bahamian registered business within The Commonwealth of The Bahamas

- 10 spiny lobster
- 20 fish or 60 pounds of demersal fish (groupers, snappers, etc.)

Restrictions on gear type:

- Gear type is restricted to hook and line only unless a permit is obtained for spearfishing
- The possession or use of apparatus for long-line fishing is prohibited on any vessel
- Only six rods or reels are permitted for use at each time
- The sale of fishery resources caught during tournaments is prohibited
- Billfish (marlins, sailfish, swordfish, etc.) are to be returned to the sea unharmed unless permitted under the terms of a fishing tournament

6. RESEARCH METHODOLOGY

6.1. Online survey

To complete this assessment a research project was implemented that targeted the two groups of visiting anglers- offshore and flats. The research instrument used in the analysis was an online survey titled “Economic Impacts of Recreational Fishing in The Bahamas”. The survey was launched in May, 2015 and the link was shared with stakeholders via email. In August, 2015 a Facebook page was also created to further promote the survey and boost the responses to the survey. The link was shared by various stakeholders in the recreational fishing industry on their Facebook pages.

A total of 522 surveys were successfully completed²⁸.

6.2 Multipliers and their origin

There are a number of indicators that can be used to measure economic impacts. These indicators can include the number of visitors to an area/country and the number of tourists/visitors and potential activities in an area (Southwick Associates, 2014).

To determine the recreational fishing economic impacts for this sector, the following indicators were used:

- 1) Total visitor arrivals of those who went fishing
- 2) Employment generated from this sector
- 3) Total visitor expenditure (output sales) per trip during their visit

A number of multipliers were used to calculate the total impacts of recreational fisheries. These multipliers were then used to calculate estimated economic impacts including income/GDP, output sales, and employment. These multipliers were derived from a number of sources outlined in Table 1 and were used by economists to determine the economic impacts in a country.

Primary data derived from the online survey was used to determine total expenditure by anglers in the recreational fishing sector in The Bahamas. Secondary data from The Bahamas Department of Statistics and the Ministry of Tourism are used as a reference point to determine the validity of the data collected and fill the data gaps not captured in the online survey.

The following formula was used to calculate total impacts:

$$\text{Total impacts} = \text{total expenditures} * \text{multiplier}$$

²⁸ A total of 798 responses were collected during the survey period, however only 522 were usable for analysis.

Table 1
Economic Multipliers (BAHAMAS)²⁹

Country	Output sales	Employment per US\$1 million Spent by Anglers	Income/ GDP	Source
Bahamas	1.02	35.80		Fedler, 2010
Bahamas	0.87- 1.25	-	0.78	Loutfi, Miscardini and Lawler 2000, Horvath and Frechtling 1999

Calculation Process

The following steps were employed to calculate economic impacts derived from angler expenditures:

a) Employment:

The number of jobs created or supported as a result of the economic activity derived as a result of angler expenditures. These multipliers express the number of jobs supported for every US\$1 million spent by anglers.

- i. First, the total amount spent by anglers is divided by 1 million.
- ii. The result was then multiplied by the employment multiplier of 35.80 (Table 1) to derive the total jobs supplied in The Bahamas through the recreational fishing sector.

b) Output, or Sales Effect:

Output, or the total rounds of sales and spending occurring throughout the Bahamian economy as a result of angler spending, is derived by multiplying total angler spending by the appropriate multiplier (1.25) per Table 1. It is less than the amount actually spent by anglers because many angler dollars immediately leave the country as a result of a high rate of imports (food, fuel, etc.) and foreign ownership of some hotels, marinas, etc.

c) Income/ Gross Domestic Product (GDP):

The total amount of The Bahamas' GDP generated as a result of anglers expenditures. The GDP calculation rate for The Bahamas is 0.78. This rate is then multiplied by the total angler expenditures in order to arrive at the GDP contribution for the recreational fishing sector.

7. MEASURING ECONOMIC IMPACTS

This section will look at the economic impacts of their expenditures on the recreational fishing sector. The economic impact measures the amount of revenue, jobs and income that would be lost if an activity was no longer available (Southwick Associates, 2014)³⁰. These expenditures will be used to determine the monies generated into this sector.

²⁹ Source: Measuring the Economic Contributions of Recreational Fisheries: A How-To Manual, Southwick Associates

³⁰ Measuring the Economic Contributions of Recreational Fisheries: A How to Manual.

7.1 Angler Expenditures

Two groups of angler expenditures were considered to determine the overall economic impact:

- 1) **Travel expenditures:** hotels, lodges, food from grocery stores and restaurants, travel (airfare, auto rental, gasoline for autos, etc.), fishing guides, boat and gear rental, and similar expenditures made by anglers to travel to and from their destination and for services once at their fishing site. Travel expenditures also include souvenirs and items purchased on their trip while visiting.
- 2) **Equipment and non-travel expenditures:** fishing tackle, boats, trailers, clothing, regular boat maintenance and other goods and services not purchased as part of a specific fishing trip.

As suggested by the manual, the following formula will be used to calculate total angler expenditure:

$$\text{Number of anglers} \times \text{Average days fishing per angler} \times \text{Average dollars spent per day per angler.}$$

For the purposes of this assessment, data gathered through the online surveys will be used in calculations. Secondary data gathered from external sources such as the Ministry of Tourism and Department of Statistics will be used for comparison, verification of sector accuracy and to fill any gaps in data in the primary data collection efforts.

Trip Expenditures Prior to Visits

When planning for their trips, anglers spend money in their home countries on a variety of activities for their trip prior to their scheduled visit. Money is spent on items such as tours, airfare, charter boats, hotels, and fishing lodges³¹.

While visiting The Bahamas, anglers had expenditures in several areas, which included payment for transportation, such as taxis, shuttles, vans, ferries, boat rental, fuel, lodging, local airfare, groceries, food, fishing tackle, charitable donations, real estate, guide fees, personal expenses, dock fees, and souvenirs. This survey question was left open-ended with too few responses received to produce statistically reliable results.³² Therefore, it was not possible to determine averages for these category areas, and secondary data such as average room rates and stopover visitor arrivals provided by Ministry of Tourism, were used to calculate these expenditures when possible.

Based on responses from the angler survey for this report, recreational fishing influences expenditures in other economic sectors as well. The anglers' main reason for visiting The Bahamas is for fishing. If they were not allowed to fish, 91 percent of the anglers responded that they would not have traveled to The Bahamas and made these expenditures. Only 5 percent said they would have still visited The Bahamas and 4 percent were 'Unsure'. Therefore, fishing is the main force that encourages other expenditures on an angler's visit.

As seen from responses from anglers (Table 2), the total expenditure for anglers³³ for an average three day fishing trip to The Bahamas is estimated at US\$4 608 per angler or US\$1 536 per day.

³¹ Data from this question on the survey was not statistically significant for reporting purposes.

³² Data derived from survey: Economic Impacts of Recreational Fishing in The Bahamas.

³³ The estimated number of anglers is based on total visitor arrivals provided by the Ministry of Tourism (Figure 9)

Table 2
Total Angler Expenditures

Expenditure category	Average expenditure (per three day trip)	Flats anglers total expenditure per category (per year, n=50,852)	Offshore anglers total expenditure per category (per year, n=63,565)
Taxi's, shuttle vans, limos, rental car (Not including fuel)	US\$399.00	US\$20 289 908.10	US\$25 362 407.07
Boat rental	US\$163.00	US\$8 288 859.70	US\$10 361 083.59
Fuel	US\$406.00	US\$20 645 871.40	US\$25 807 361.58
Hotels or resorts	US\$285.00	US\$14 492 791.50	US\$18 116 005.05
Fishing lodges, guest houses, bed & breakfast	US\$262.00	US\$13 323 197.80	US\$16 654 011.66
Local airfare	US\$234.00	US\$11 899 344.60	US\$14 874 193.62
Groceries, food & liquor (bought in stores, not restaurants)	US\$439.00	US\$22 323 984.10	US\$27 905 004.27
Restaurants, bars, carryout	US\$464.00	US\$23 595 281.60	US\$29 494 127.52
Gifts & souvenirs	US\$321.00	US\$16 323 459.90	US\$20 404 342.53
Entertainment	US\$178.00	US\$9 051 638.20	US\$11 314 557.54
Fishing tackle related expenses (except charter & guide fees): tackle, ice, bait, etc.	US\$293.00	US\$14 899 606.70	US\$18 624 524.49
Clothing	US\$185.00	US\$9 407 601.50	US\$11 759 512.05
Dock fees including utility and marina amenities	US\$252.00	US\$12 814 678.80	US\$16 018 362.36
Donations, charitable gifts to local organizations	US\$140.00	US\$7 119 266.00	US\$8 899 090.20
Real estate	US\$100.00	US\$5 085 190.00	US\$6 356 493.00
Vehicles purchased (not rented)	US\$106.00	US\$5 390 301.40	US\$6 737 882.58
Boat maintenance	US\$134.00	US\$6 814 154.60	US\$8 517 700.62
Personal items (sunscreen, toiletries, etc.)	US\$247.00	US\$12 560 419.30	US\$15 700 537.71
Total expenditure:	US\$4 608.00	US\$234 325 555.20	US\$292 907 197.44

8. RESULTS

Economic impacts for recreational fishing in The Bahamas are calculated based on two groups of visiting anglers:

1. Deep Sea Fishing Anglers (commonly referred to as Billfish anglers)
2. Flats Anglers (commonly referred to as Bonefish Anglers)

Data sources used include primary data collected through the online survey tool for this assessment and data provided by secondary sources such as The Bahamas Ministry of Tourism or The Bahamas Department of Statistics.

The online survey instrument did not specifically ask if the respondent was a Deep Sea Angler vs. a Flats Fishing Angler, so it was difficult to segment the two groups and the percentages they represented. However, Table 3 provides an indication of the preferred targeted species by anglers which gives some indication of the angler type. Secondary data gathered from the Tour and Media Exit Survey produced by the Department of Statistics (Table 5) and the stopover visitor arrival report presented in Table 6 helped to determine the number of visitors who came to participate in offshore fishing and flats fishing per year. This data was further used to determine the number of tourists who visited specifically to fish. These results are presented further in this section.

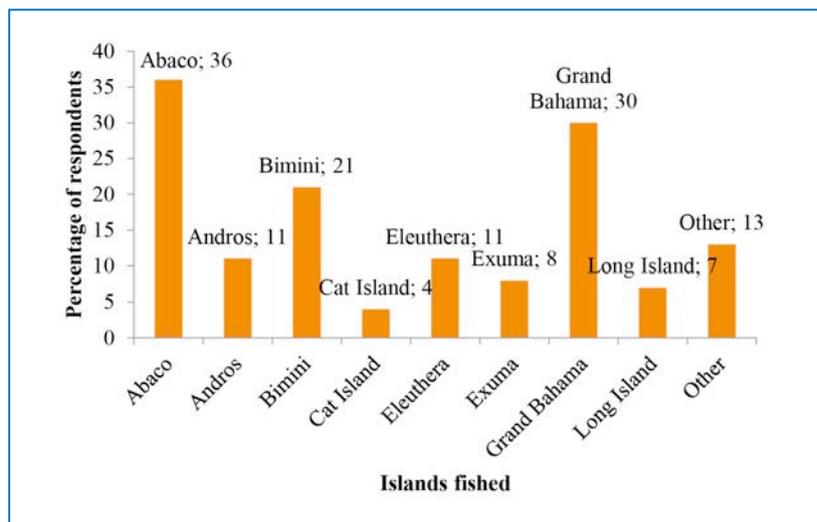
8.1 Online Survey Results

The recreational fishing survey was designed to determine overall expenditure by anglers. It was also used to assist in gathering additional information from visiting anglers to determine who comes to fish in The Bahamas and what motivates them to visit. This type of information is useful in further research and marketing for this sector. This section highlights some of the key results of the survey.

8.1.1 Where do recreational fishers fish?

Results from the online survey (n=486) indicate that recreational fishing occurs in several islands in The Bahamas. The top three visited islands for recreational fishing included Abaco (36 percent), Grand Bahama (30 percent), and Bimini (21 percent). Eleuthera, Andros, Exuma and Long Island were the next four most frequently visited; and the less frequently visited islands included Inagua, Acklins, Crooked Island and Berry Islands.

FIGURE 1
Islands fished by recreational anglers in The Bahamas³⁴



8.1.2 Frequency of visits

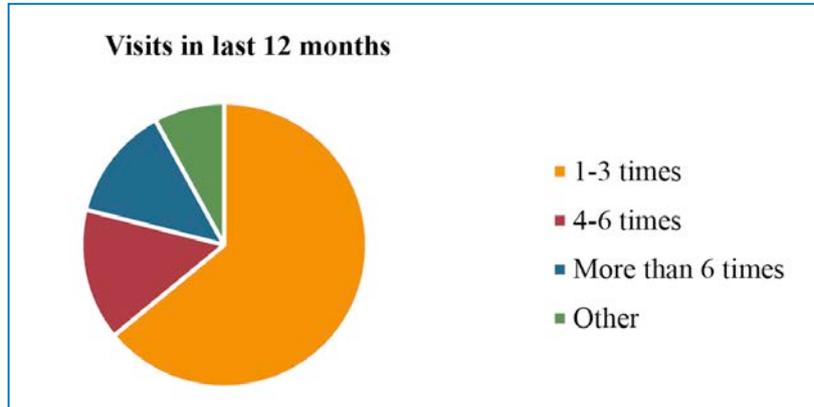
In some cases, anglers indicated that they visited more than once to fish. Out of the 521 persons who responded to this survey question, 64 percent of respondents answered that they have visited The Bahamas 1-3 times in the last year. 15 percent visited 4-6 times per year, 13 percent visited more than 6 times per year and 8 percent checked having for “other” periods of time, and most likely include seasonal or long-term visitors. The average times an angler visited to fish was at least 2 times per year.

Less than 1 percent had not visited at all and less than 1 percent had visited 12-15 times per year.

³⁴ New Providence Island is included in the group of ‘other’.

8.1.3 *Figure 2. Frequency of angler visits in the last 12 months.*

FIGURE 2
Frequency of angler visits in the last 12 months

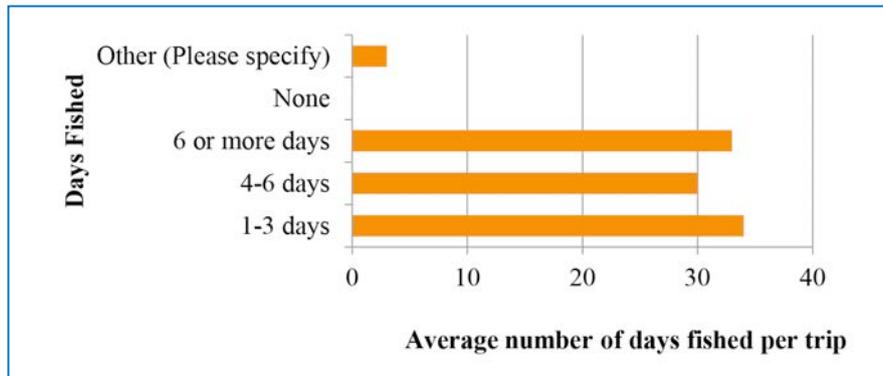


8.1.4 *Days fished*

Anglers who visit The Bahamas fish anywhere from 1-6 days on their visits (see Figure 3). The highest frequency of days fished are: 1-3 days (33.9 percent), 6 or more days (32.5 percent), and 4-6 days (30.4 percent) (n=520). The average amount of days fished was 3.6 days.

8.1.5 *Figure 3. Average number of days fished per trip.*

FIGURE 3
Average number of days fished per tip

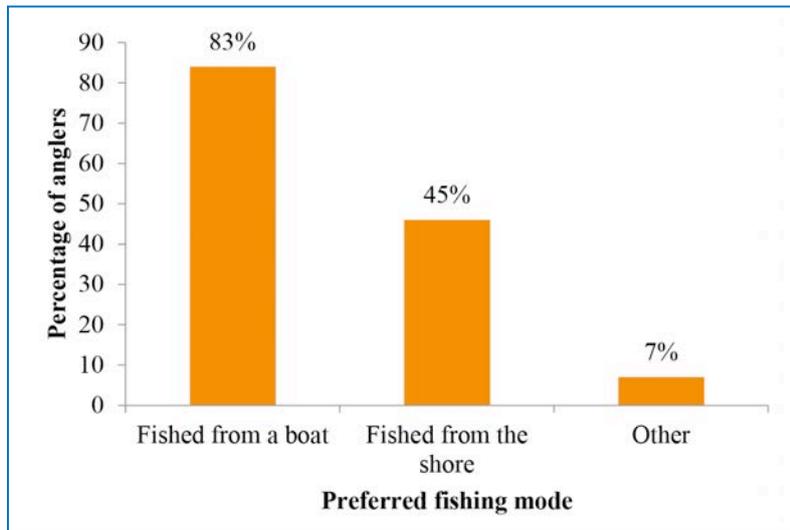


8.1.6 *Fishing mode*

Anglers use several modes of fishing (n=229). They either fish from the shore (45 percent) or fish from a boat (83 percent) or in some cases, they participate in both types of fishing modes and other fishing mode types as well. The survey did not take into account Do It Yourself (DIY) fishers, who are anglers who fish on their own without a guide. It is assumed that those who fish from the shore include DIY fishers.

8.1.7 Figure 4. Preferred fishing mode.

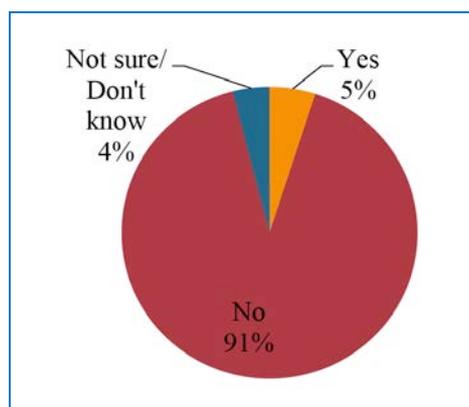
FIGURE 4
Preferred fishing mode³⁵



Visitors travel to The Bahamas for a number of reasons. However, results from the survey indicate that those who visit to fish, come for the primary purpose of fishing, not for other tourism activities. Figure 5 gives an indication that if these visitors would have visited The Bahamas or not if they were not allowed to fish. Based on their responses, 91 percent said if they were not allowed to fish, they would not have made the trip, while 5 percent said they still would have made the trip and another 4 percent was unsure.

8.1.8 Figure 5. Influence of fishing on anglers visit or not.

FIGURE 5
Influence of fishing on anglers visit or not



“If you were not allowed to fish, would you have made this trip?”

³⁵ Respondents were able to answer twice to this question. Therefore the responses total to more than 100 percent.

8.1.9 Preferred species

Recreational fishing in The Bahamas includes several preferred species targeted by anglers. These fish include those found in the pelagic zone as well as those found in the flats or nearshore wetland zones. Pelagic species targeted include those found within the Atlantic zone such as: billfish, tuna, dorado/mahi mahi, wahoo, barracuda, permit and amberjack. Flats species include: permit, bonefish and tarpon.

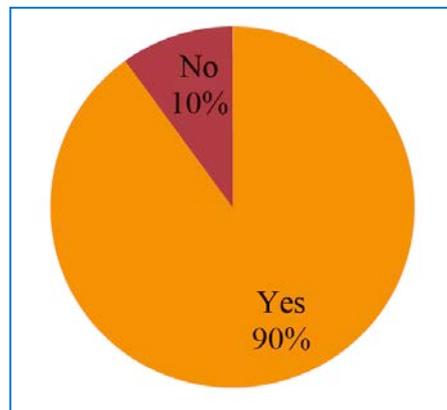
Table 3
Preferred fish of target by anglers

Pelagic fish	Targeted rate
Billfish (Sword fish, Sail fish, Marlin)	95%
Wahoo	94%
Tuna	93%
Dorado/ Mahi Mahi	89%
Bottom fish (Grouper, snapper)	88%
Barracuda	46%
Mackarel	40%
Amberjack	39%
Nearshore/flats fish	
Permit	98%
Bonefish	97%
Tarpon	95%

8.1.10 Fishing influence

Fishing has a great influence on whether anglers visit or not. When people visit to fish, and would not have visited other, this is a reliable indicator that their expenditures represent “new money” for The Bahamas. As indicated from the survey responses, 90 percent of anglers responded that they only chose to visit The Bahamas in order to fish. Only 10 percent of these anglers said that if they were not allowed to fish that they still would have made the trip (Figure 6).

FIGURE 6
Main purpose of visit

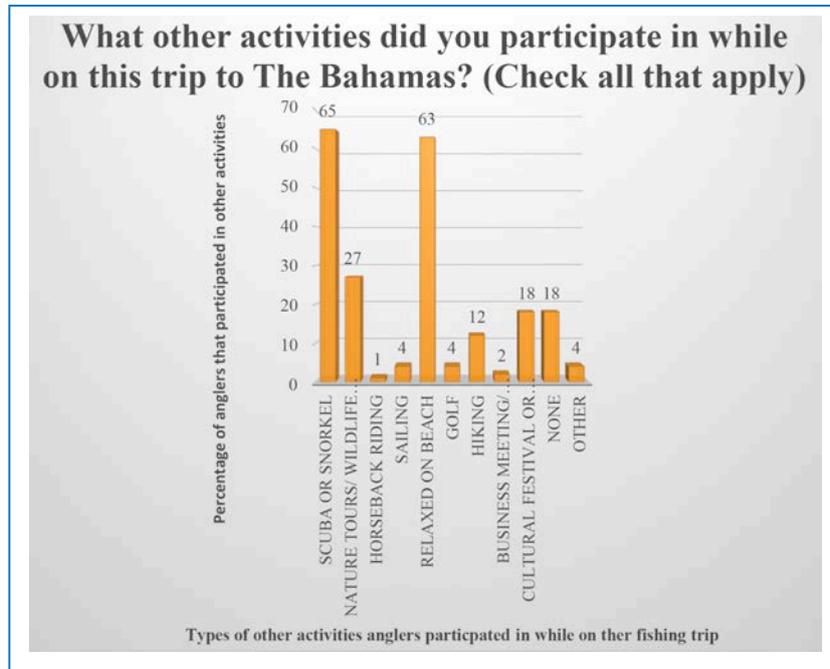


“Was fishing the main reason for your trip?”

8.1.11 Visitor Activities

Besides fishing, anglers also participated in other activities during their visit, such as scuba diving or snorkeling (65 percent), relaxing on the beach (63 percent), nature tours (27 percent), attending cultural festivals or events (18 percent) and other activities outlined in Figure 7. Therefore, recreational fishing generated additional economic returns from other activities outside the fishing sector.

FIGURE 7
Additional activities of recreational fishers



According to the 2012 Tour Operator and Media Exit Survey (Table 4) published by the Department of Statistics, 4.4 percent of the visitors answered that they intended to go bonefishing while visiting and 5.5 percent answered that they intended to go deep sea fishing. For the purposes of this assessment, it is assumed that recreational deep sea anglers such as billfish anglers and those who participate in tournaments are included among this group of deep sea anglers. Those who said they came to participate in bonefishing includes the group of anglers that participate in flats fishing. Out of this group, 12.5 percent intended to fish in the out islands³⁶, whilst 3.4 percent said they would fish for bonefish in Grand Bahama and 2.4 percent said they would fish in Nassau.

8.1.12 Table 4: What activities did you intend to do on this visit to The Bahamas?

Table 4

What activities did you intend to do on this visit to The Bahamas?

	All Bahamas		Nassau		Grand Bahama		Out Islands	
	Count	Col %	Count	Col %	Count	Col %	Count	Col %
Enjoy Beaches	8 097	86.8%	5 590	87.5%	1 040	87.4%	1467	83.7%
Rest and Relax	7 046	75.5%	4 900	76.7%	906	76.1%	1240	70.7%
Shop	3 290	35.3%	2 441	38.2%	543	45.6%	306	17.5%
Go Snorkeling	3 281	35.2%	2 002	31.4%	438	36.8%	842	48.0%

³⁶ Out islands are all other islands outside of New Providence and Grand Bahama Island.

	All Bahamas		Nassau		Grand Bahama		Out Islands	
	Count	Col %	Count	Col %	Count	Col %	Count	Col %
Go to Casinos	1 969	21.1%	1 711	26.8%	242	20.4%	15	0.9%
Go on Island Tour	1 482	15.9%	915	14.3%	236	19.8%	331	18.9%
Go Diving	852	9.1%	471	7.4%	112	9.5%	268	15.3%
Go Sailing	735	7.9%	379	5.9%	76	6.4%	280	16.0%
Other Activities	567	6.1%	395	6.2%	81	6.8%	91	5.2%
Go Deep Sea Fishing	509	5.5%	263	4.1%	82	6.9%	163	9.3%
Go Golfing	498	5.3%	261	4.1%	60	5.0%	177	10.1%
Go Bonefishing	412	4.4%	152	2.4%	40	3.4%	220	12.5%
Go Birdwatching	215	2.3%	98	1.5%	47	3.9%	71	4.0%
Non Response	256	2.7%	176	2.8%	40	3.4%	40	2.3%

Visitors were allowed to select as many activities as they desired.

Source: Tour Operator and Media Exit Survey 2012

Tour and Media Exit Survey. Source: Ministry of Tourism

8.1.13 Average room rates per night

According to information provided by Ministry of Finance to the Nassau Guardian in 2014, average room rates rose to their highest level in at least the last seven years reaching US\$227.72 per night up from US\$197.68 per night in 2007 which indicates a higher cost for stopover visitors (Lowe, 2014). This average is consistent with primary data collected for this assessment in the online surveys as anglers (n=522) who successfully participated in the online survey indicated that they spend on average US\$262 per night for lodging at fishing lodges and up to US\$285 per night for rooms at hotels or resorts.

8.1.14 Visitor arrivals

Visitor arrivals in 2014 were up 1.1 percent in April to 2.32 million from 2.29 million over the same period in 2013. In the key high value stopover segment, visitor arrivals overall were up by 3.1 percent to 476 367 in the period. Based on the 2015 preliminary results compiled by the Ministry of Tourism, a total of 1 155 726 stopover visitors traveled to The Bahamas in 2015- a percent change of 2.7 percent from 2014 (Table 5).

Table 5

Stop over visitor arrivals by year

Islands Of The Bahamas

Preliminary

2015

Month	All Bahamas			Nassau/P.I			Grand Bahama			Out Islands		
	2015	2014	% Chg	2015	2014	% Chg	2015	2014	% Chg	2015	2014	% Chg
Jan	100 728	91 874	9.6%	65 392	61 381	6.5%	13 901	13 683	1.6%	21 435	16 810	27.5%
Feb	122 144	113 195	7.9%	78 155	73 494	6.3%	19 487	16 994	14.7%	24 502	22 707	7.9%
Mar	168 159	158 663	6.0%	101 857	103 359	-1.5%	27 234	22 549	20.8%	39 068	32 755	19.3%
Apr	146 614	140 910	4.0%	89 861	87 476	2.7%	24 253	21 370	13.5%	32 500	32 064	1.4%
May	130 444	130 184	0.2%	76 451	76 491	-0.1%	21 798	19 891	9.6%	32 195	33 802	-4.8%
Jun	133 665	145 084	-7.9%	79 078	88 360	10.5%	27 077	22 119	22.4%	27 510	34 605	-20.5%
Jul	163 299	156 078	4.6%	99 174	96 349	2.9%	29 360	24 974	17.6%	34 765	34 755	0.0%
Aug	123 820	129 709	-4.5%	79 252	84 580	-6.3%	23 664	20 459	15.7%	20 904	24 670	-15.3%

Sep	66 853	59 462	12.4%	47 849	42 104	13.6%	13 005	8 651	50.3%	5 999	8 707	-31.1%
Total	1 155 726	1 125 159	2.7%	717 069	713 594	0.5%	199 779	170 690	17.0%	238 878	240 875	-0.8%

Source: Ministry of Tourism

9. DEMOGRAPHIC INFORMATION

FIGURE 8
Residency status of anglers

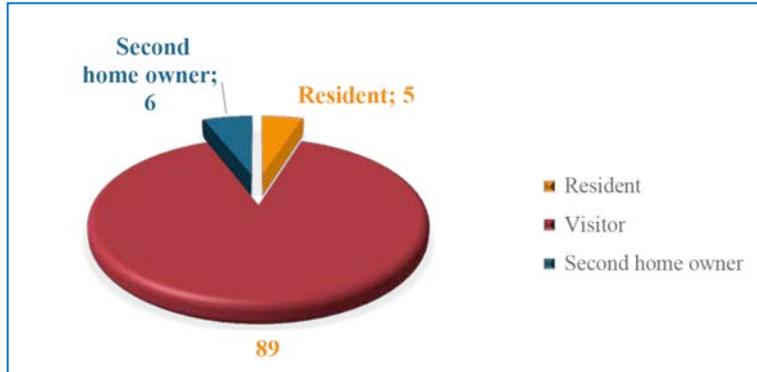


FIGURE 9
Country of residence of anglers

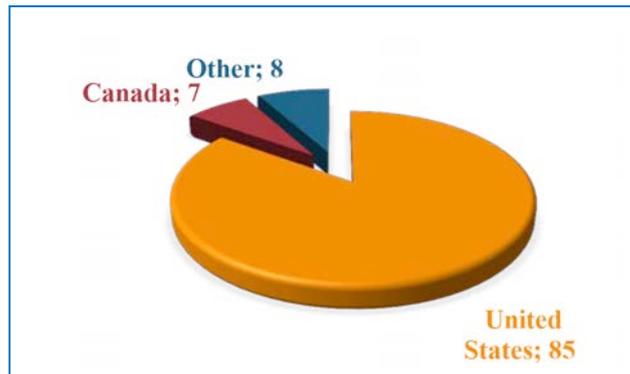


FIGURE 10
Gender of respondents

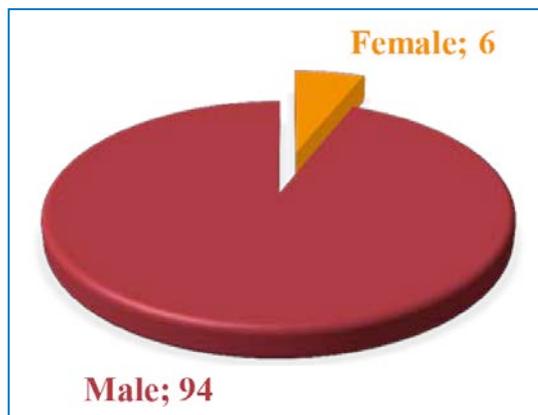


FIGURE 11

Age of respondents

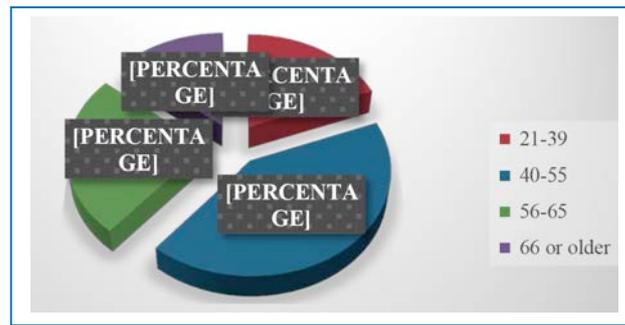


Table 6

Location of online respondents

Value	%	Count
Australia	0.2%	1
Bahamas	1.7%	9
Barbados	0.2%	1
Canada	6.2%	32
France	0.4%	2
Ireland	0.4%	2
Italy	0.4%	2
Korea, Republic of	0.4%	2
Mexico	0.2%	1
Norway	0.8%	4
Portugal	0.2%	1
South Africa	0.2%	1
Spain	0.2%	1
United Kingdom	4.6%	24
United States	84.0%	436
Total		519

10. ESTIMATED ECONOMIC IMPACTS

This section gives an estimate of the economic impacts from the recreational fishing sector based on information provided through primary data collection and external data sources. It is further divided into the two groups of anglers in order to determine the overall contribution this sector provides to the tourism industry and overall fishing industry in The Bahamas.

The economic impacts derived from anglers were measured using the multipliers outlined in Section 7.2. It is estimated that the recreational fishing sector employs a total of 18 875 persons (8 389 in flats fishing and 10 486 in offshore fishing).

The flats fishing sector contributes an estimated total of US\$182.7 million and offshore fishing contributes US\$228 million to the recreational fishing sector to the overall GDP of The Bahamas.

An estimated total of US\$292 million is derived in output sales from the flats fishing sector and US\$366 million from offshore fishing for a combined total of US\$659 million in output sales.

Table 7

Estimated Economic Impacts

Estimated Economic Impacts			
	Flats Fishing	Offshore Fishing	Total Impact
Employment (# of jobs)	8 389	10 486	18 875
GDP (USD)	US\$182 773 933.06	US\$228 467 614.00	US\$411 241 547.06
Output sales (USD)	US\$292 906 944.00	US\$366 133 996.80	US\$659 040 940.80

11. COMPARISON WITH THE COMMERCIAL FISHERIES SECTOR

The commercial fishery sector of The Bahamas is reserved for Bahamian citizens only. It is commercial comprised of the landings, sale and export of mainly reef species such as snapper, grouper, spiny lobster, conch and sponge.

The economic value of commercial fisheries is calculated based on commercial landings and total exports per year.

Table 8

Export value of commercial fishery resources

Fishery Resource	Commercial value (USD\$)- 2013	Commercial value (USD\$)- 2014
Spiny lobster tails	60 221 466.00	60 338 463.00
Scale fish	498 149.00	504 489.00
Conch meat	3 310 971.00	3 266 577.50
Stone crab claws	2 436 802.00	3 891 012.10
Total sponge	566 893.00	437 800.68
Conch Shells	41 000.00	82 840.00

The overall commercial export value of fishery resources totaled US\$68 001 177.00 in 2013 and US\$69 727 402.53 in 2014 (Department of Marine Resources, 2013). Deep sea species such as bill fish, marlin and tuna are not fished commercially in The Bahamas.

The following table compares the economic impact of the recreational fishing industry with the economic impact of the commercial fishing sector:

Table 9

Comparison in figures of recreational fishing and commercial fishing

Activity	Recreational fishing	Commercial fishing
Number of jobs	18 875	9 300
GDP impact (USD)	US\$411 241 547.06	US\$80 114
Output sales	US\$659 040 940.80	US\$69 727 402.53 ³⁷

12. LIMITATIONS

Data across various sources varied and in some cases only preliminary data from external sources was available to be used for this assessment. For instance, there is no data available for actual expenditure of anglers while on their fishing trip as data on total expenditures are not accounted for in visitor exit

³⁷ Export value 2014

surveys or upon arrival into the country. In order to determine total expenditures, data collected in the online survey tool had to be used, but it only gave an indication of expenses as in some cases anglers refused to answer questions related to individual expenses or commented that all their expenses were 'all inclusive'. It was therefore difficult or in some cases impossible to determine the total expenses for some expenditure categories.

13. DISCUSSION AND CONCLUSION

Anglers tend to be largely a tourist group accounting for just under 10 percent of the annual stopover visitors to The Bahamas (Ministry of Tourism, 2012). Out of those that fish in The Bahamas, 89 percent are visitors, 6 percent are second home owners and 5 percent are residents of The Bahamas. With 85 percent of anglers coming from the United States, 7 percent from Canada and 8 percent from other countries outside of North America, North Americans tend to be the largest group of fishers. Anglers' ages range from 21 to 66 and older with the largest age group being those aged 40-55 (42 percent), followed by those aged 56-65 (25 percent). Anglers are predominately male (94 percent) and fish anywhere from 1-6 days per trip each time they visit. Although the main purpose for their visit is to fish, they also participate in other activities such as scuba diving (65 percent), relaxing on the beach (63 percent), nature tours (27 percent), and other touristic activities.

It is evident from this study that the recreational fishing sector in The Bahamas is of great economic significance, generating annual expenditures of US\$527 million and contributing more than US\$411 million to the overall country's GDP. The sector provides more than 18 000 jobs either directly or indirectly. It is mainly a tourism driven industry in which anglers said they would have not visited if they were not allowed to fish (91 percent). Recreational fishing and other related activities assist in generating 'new money' into the Bahamian economy. This 'new money' is the "amount of revenue, jobs and income that would be lost if an activity were no longer available" (Southwick Associates, 2014). Although the recreation fishing sector only accounts for just under 10 percent of the overall tourism sector, its economic impact is of major significance.

Creative entrepreneurs, the government, policy makers and existing businesses can take advantage of the economic opportunities that exist from the recreational fishing sector. This can include revenue generated from taxi fares, lodging, restaurants, other recreational activities, fishing, etc. If lost, this would have a significant impact on the country's economy and the sector as it is estimated to contribute more than US\$411 million to the country's GDP.

It is recommended that this sector be recognized as separate and apart of the overall tourism sector for future management, decision making and policy updates. Currently recreational fishing is categorized as an activity under tourism. Department of Marine Resources only issues licenses for tournaments and boats used in the sector. For the most part Ministry of Tourism only collects data for arrivals of stopover visitors to determine what activities they intend to participate in while visiting. However, no information is collected on overall expenditure by these guests. It is unclear if there is any data collection efforts in place by any government agency to determine expenditure at lodges, to guides, boat rentals and other income generating activities produced by this sector.

By not clumping it as a mere activity in the tourism industry, recreational fishing both offshore and flats fishing should be categorized as a separate industry for proper accountability and monitoring of this sector to determine growth rates, patterns, actors involved and its economic value and impact. Future studies should also look at the two groups of anglers separately and compare the two groups of anglers to determine what makes them have a preference for offshore or flats fishing. Information gathered in future studies should also assist with research and marketing efforts that will help to improve the sector for optimal benefit to the recreational fishing industry and Bahamian economy.

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APPENDIX

ONLINE SURVEY INSTRUMENT

Economic Impacts of Recreational Fisheries in The Bahamas

Introduction

This survey is designed to determine the economic impacts of recreational fisheries in The Bahamas. Participation in this survey is voluntary and your responses are anonymous. Your willingness to participate is appreciated as your responses will be used to determine the value and economic impacts of the Bahamas recreational fishing industry.

This survey is to be completed by individual anglers who have fished for pelagic or bone-fish in The Commonwealth of The Bahamas in the last 12 months. One survey is to be completed per individual and all questions are to be answered.

Section 1

1) Which island did you fish on during your most recent visit to The Bahamas in the last 12 months? (Check all that apply)*

- Abaco
- Andros
- Bimini
- Cat Island

- Eleuthera
- Exuma
- Grand Bahama
- Long Island
- Other: _____
- (untitled)

2) Prior to this trip, how many times have you visited The Bahamas in the last 12 months?*

- 1-3 times
- 4-6 times
- More than 6 times
- Other: _____

3) How many days did you fish?*

- 1-3 days
- 4-6 days
- 6 or more days
- None
- Other (Please specify): _____

4) Please indicate all modes of fishing used during your trip. (Check all that apply)*

- Fished from a boat
- Fished from the shore
- Other: _____

5) If you were not allowed to fish, would you have made this trip?*

- Yes
- No
- Not applicable

6) Which species did you target for fishing and which species did you end up catching while fishing on this trip to The Bahamas?*

Please tick all that apply

Targeted	Caught
Bill fish species (Sword fish/ King fish/ Marlin) []	[]
Dorado/ mahi mahi/ dolphin (fish) []	[]
Tuna (yellow fin. big eye, albacore) []	[]
Wahoo []	[]
Barracuda []	[]
Tarpon []	[]
Bottom fish (Grouper, snapper) []	[]
Bonefish []	[]
I didn't expect to catch any fish []	[]
Don't know, don't remember []	[]

Section 2

Please tell us about your expenses for this fishing trip to The Bahamas

7) Prior to your trip to The Bahamas, how much money did you spend at your home location in preparation for this trip?

Only report your portion of the expenses

US\$

Package trips or tours _____

Airfare (commercial airlines) _____

Charter boats, paid for before your arrival in The Bahamas _____

Hotels or resorts _____

Fishing lodges, guest house, bed & breakfast _____

Cruise ship _____

8) Approximately, how much did you spend or will spend on the following while fishing on this trip?

If you are travelling in a group, only report your portion of the expenses.*

US\$

Taxis, shuttle vans, limos, rental car (Not including fuel) _____

Ferries _____

Boat rental _____

Fuel _____

Hotels or resorts _____

Fishing lodges, guest houses, bed & breakfast _____

Local airfare _____

Groceries, food & liquor (bought in stores, not restaurants) _____

Restaurants, bars, carryout _____

Gifts & souvenirs _____

Entertainment _____

Fishing related expenses (except charter): tackle, ice, sun screen, bait, etc. _____

Gear including clothing or equipment _____

Dock fees including utility and marina amenities _____

Donations, charitable gifts to local organizations _____

Real estate _____

Vehicles _____

Taxes _____

Boat maintenance _____

9) If you were not allowed to fish, would you have still made these expenses?*

- Yes
- No
- Not sure
- Not applicable

10) What other activities did you participate in while on this fishing trip?

- Scuba or snorkel
- Nature tours/ wildlife viewing
- Horseback riding
- Sailing
- Relaxed on beach
- Golf

- Hiking
- Business meeting/ workshop/ seminar
- Cultural festival or event
- None
- Other: _____

Logic: Hidden unless: Question "What other activities did you participate in while on this fishing trip?" #10 is one of the following answers ("Scuba or snorkel", "Nature tours/ wildlife viewing", "Horseback riding", "Sailing", "Relaxed on beach", "Golf", "Hiking", "Business meeting/ workshop/ seminar", "Cultural festival or event")

11) How much money did you spend on these additional activities? (Only report your portion of the expense)

12) How satisfied were you about this fishing trip to The Bahamas?*

- Somewhat satisfied Very satisfied Extremely satisfied Somewhat dissatisfied ()
Very dissatisfied Extremely dissatisfied Not sure/ don't know

13) Was fishing the main reason for your trip?*

- Yes
- No

14) Can you please tell us your approximate annual household income?*

15) Are you a resident of non-resident?*

- Resident
- Visitor
- Second home owner

Logic: Hidden unless: Question "Are you a resident of non-resident?" #15 is one of the following answers ("Visitor", "Second home owner")

16) If you answered 'visitor' above, which country are you visiting from?*

- United States
- Canada

Other: _____

17) Are you male or female?*

Female

Male

18) What age category do you fall in?*

Under 21

21-39

40-55

56-65

66 plus

Thank You!

Thank you for taking our survey. Your response is very important to us.

This circular includes a manual to assess the economic impact of recreational fisheries and its application in two Caribbean countries: The Bahamas and Martinique. The manual was developed within the framework of the WECAFC/ OPESCA/ CRFM/ CFMC Working Group on recreational fisheries. This manual is intended to help countries better understand the size and contributions from recreational fishing to their economies. The results are meant to increase awareness on the economic impacts of recreational fisheries at the national and regional level.

The economic impact studies were supported by the GEF/ World Bank Caribbean Billfish Project, for which the Western Central Atlantic Fishery Commission is the executing agency, and the FAO Technical Cooperation Programme.



ISBN 978-92-5-109424-2 ISSN 2070-6065



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I6148E/1/09.16