
The economic contributions of anglers to the Los Cabos economy: quantifying value in a sustainable fishery

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Abstract: In 2007 and 2008, a comprehensive study was conducted to estimate the dollars, jobs and tax revenues created by anglers in the Los Cabos region. In that period an estimated 354,013 people, most all of them international visitors, fished in Los Cabos. While in Los Cabos, they spent an estimated \$1,785 each for lodging, charter boats, food, transportation, tackle, fuel, and much more. These expenditures then started a series of economic effects rippling through the local economy, creating: US\$633.6 million in retail sales, 24,426 jobs, US\$245.5 million in local and federal tax revenues, and US\$1.125 billion in total economic activity. These results have been used to inform Mexican business and political leaders of the value of low-impact and sustainable sportfishing tourism as an attractive alternative to high risk exploitation by industrial fisheries.

Keywords: environmental economics; sportfishing; tourism; economic impacts; Los Cabos; sustainable resource use.

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1 Introduction

Over the past 20 years, the Los Cabos area of Baja California Sur (BCS), Mexico has undergone a major economic boom centred around tourism. Sportfishing was the first tourism sector to impact Los Cabos and most in the local business community attribute this growth to Los Cabos' world-class striped marlin fishery. The striped marlin stock that is available to visiting anglers in Los Cabos appears to have recovered from declines caused by historical overfishing with longlines and is in viable condition and being fished in a sustainable manner by a mostly recreational fishery that releases over 80% of the catch. (Jensen et al., in press). Many within the Los Cabos community consider sustainable fisheries to be a critical component of the region's economic health, and for over 20 years Mexico has provided a 50 mile coastal conservation zone to protect marlin, sailfish, dorado and other species important to the sportfishing industry from impacts from the high seas longline and drift gillnet commercial fisheries. High mortality associated with bycatch in these non-selective fisheries have been demonstrated to cause dramatic declines in marlin stocks and negative impacts on shark, sea turtles and marine mammal populations (Squire and Au 1990, Jensen et al., in press). In recent years this conservation zone has again come under debate with some sectors of industry and government seeking to increase opportunities for commercial fishing effort and the local Los Cabos tourism industry arguing that to do so will jeopardise the environment and their revenues. The relationship between sportfishing and jobs, tax revenues, and other economic contributions in Los Cabos and throughout Mexico has been poorly understood. This project measures and reports the economic impacts of non-resident anglers to the Los Cabos region of BCS, Mexico. When possible, the impacts to Mexico's national economy are also reported. Economic significance is defined as the total economic activity resulting from expenditures made by non-resident anglers. Economic 'impacts' are the effects from non-resident anglers whose expenditures within Mexico represent new dollars to the economy. The results of this study will allow resource managers and tourism officials to better evaluate the allocation and alternative uses of valuable marine resources.

2 Methods

The key data required to operate the economic model are estimates of angler expenditures. Angler expenditures were estimated using a combination of angler and general Los Cabos visitor surveys combined with existing reports and information sources.

The three primary data sources for this project were:

- 1 In-person interviews with sportfishing and tourism-related businesses in the Los Cabos area to identify existing data sources and information needed by the local business community, and to secure their participation in the various surveys.
- 2 Surveys of local businesses were conducted to provide the information needed to develop an economic model and to develop an understanding of how and when businesses receive and re-spend angler dollars. These surveys also identified when angler dollars leave the local economy.

- 3 Visitor surveys were conducted to collect expenditure data from anglers and non-angler visitors who have or could potentially visit BCS.

Once all data were obtained, the two principle analytical tasks were:

- 1 develop visitor and angler expenditure estimates based on the survey results and existing data sources regarding the number of annual visitors to Los Cabos and the percentage who fish while in Los Cabos
- 2 construct an ad hoc economic model of the Los Cabos economy.

3 Survey of existing data and in-person interviews

A substantial effort was made to identify existing data before investing resources into producing new data. A series of interviews were held in the Los Cabos region and in Mexico City with state and federal government representatives, business associations, private companies, sportfishing representatives, conservation organisations, and elected officials. The purpose of these interviews was to inquire about available studies and data of possible use to this project. At these interviews, each company was provided with a signed and notarised confidentiality agreement providing assurances of data security. Information obtained included passenger arrival data to the Los Cabos airport, information on the economic size and trends regarding the timeshare business, cruise ship passenger arrival counts, marina information, and more. All published sources are listed in the Bibliography.

4 Business surveys

Seven surveys were conducted with three of these focusing on Los Cabos business sectors. Business survey results were used to provide the information needed to develop the Los Cabos economic model, to assist in quantifying the dollars injected into the Los Cabos region by anglers, and to understand how expenditures move from anglers' pockets to the various businesses and governments within the Los Cabos regional economy. To maximise response rates, the surveys did not inquire about exact business revenues as initial input from regional business leaders revealed that direct questions about a business's revenues would likely reduce cooperation and survey completion. Therefore, the questions focused on 'percentage' terms, such as 'What percentage of your revenues come from anglers?'. This point was stressed in all pre-survey announcements and in-person interviews. Businesses were assured, backed by signed and notarised confidentiality agreements, that their individual responses would remain confidential and protected. Only aggregated, averaged results would be released.

Organisations and leaders were identified for three business sectors in Los Cabos: the general Los Cabos business community, led by the local chamber of commerce – CANACINTRA; hotel management identified by the Los Cabos Convention and Visitors Bureau (LCCVB); and the Los Cabos charter boat fleet. The three business surveys are described below.

4.1 General business survey

In cooperation with the local chapter of CANACINTRA, the national business association, surveys were conducted of area businesses. The goals of this survey were to: identify when dollars left the Los Cabos area's economy; for those dollars remaining, identify which sectors of the economy received and re-spent these dollars; and estimate the percentage of business expenditures that go to payroll or are taken home as business profits and dividends.

The general business surveys were conducted by CANACINTRA via in-person interviews with business managers and owners. In lieu of pretesting, a draft of the survey questions was reviewed and critiqued in person with volunteer CANACINTRA representatives who were also business owners.

Surveyors were hired and managed by CANACINTRA. An attempt was made to cover the range of businesses common to the Los Cabos area, including restaurants, wholesalers, retailers, various hospitality and construction supply businesses, and other goods and services producers.

It was not possible to randomise the surveys due to the voluntary nature of participation. The interviews were conducted and recorded in Spanish. Questions were designed to be matched with other surveys and existing trade data from various sources to help construct the economic models. During the development of the surveys, content was reviewed with CANACINTRA representatives to ensure that the questions asked could be answered, to help CANACINTRA explain the intent of each question to the surveyors, and to identify how to word questions to maximise response rates.¹ The survey instrument is presented in Southwick Associates et al. (2008). Eighty surveys were targeted, and 58 were received.

4.2 Hotel management survey

The survey instrument was designed based on the project's information needs and draft questions were reviewed with CVB staff prior to launching the surveys and interviews. With the support of the LCCVB, hotel managers were contacted four times via a series of e-mail announcements and personal requests. Responding hotels were then followed up in-person with scheduled in-person interviews with each hotel's general manager. Based on the LCCVB's report of total hotel/timeshare properties, the data obtained by the hotel management survey represents 33% of all rooms available in Los Cabos. The full survey instrument is presented in Southwick Associates et al. (2008).

4.3 Charter fleet survey

To understand how angler dollars are distributed through the local economy, a separate survey of charter boat businesses was conducted. With nearly all fishing activity in Los Cabos taking place offshore, the largest single sportfishing-specific expense was expected to be charter boat fees. Due to Los Cabos's remote location, most anglers do not or cannot bring their own boats with them, the exception being a few large boats able to make the long run from Southern California. Charter operations are labour-intensive and serve as one of the key channels for transferring US dollars to local residents.

The survey was designed to provide information for use in development of the economic models discussed later. In cooperation with area charter boat associations, the

surveys were distributed to owners at meetings and in person. Surveys were distributed in Spanish. The exact number of charter boats, owners, and fleets could not be ascertained as lists of licensed boats were not available. Surveys were distributed to charter boat associations and owners. The survey inquired about staffing levels and included questions related to changes in revenues, sources of supplies, and more. In all, 11 charter boat companies returned their surveys. The survey instrument is presented in Southwick Associates et al. (2008).

5 Tourist angler surveys

Three economic surveys were conducted of anglers and visitors to Los Cabos: US anglers who visited Cabo; Hotel and resort guests (not just anglers); and owners of private boats in the Marina Cabo San Lucas (MCSL). These surveys were designed to: quantify the typical expenditures made in Los Cabos per angler and visitor, including estimates for specific items such as travel, lodging, tackle, boats, vehicles, meals, souvenirs, etc. The information collected focused on:

5.1 Survey methods

Angler and visitor surveys were conducted online. E-mail addresses of Los Cabos anglers and visitors were obtained from resorts, charter businesses, and fishing tournament organisers. In most cases, to protect the security of their customer lists, participating businesses preferred to send e-mails directly to their guests explaining the purpose of the survey and inviting them to click an embedded link connecting to the online surveys. In other cases, businesses provided lists of customers, who were then sent identical e-mails. To prevent abuse, each e-mail was embedded with a unique link that allowed the recipient to take the survey only once. In the case of one hotel, operators asked their guests to take the online survey while their check-out paperwork was being prepared. For convenience, a computer terminal was provided on the check-out counter linked directly to the survey website. Specific details about each survey are presented in Southwick Associates et al. (2008).

Though survey respondents were restricted from taking the survey more than once, during the data analysis stages, the responses were carefully reviewed to identify possible multiple responses. Scans for multiple responses were based on an analysis of the time of the person's visit, timing of when surveys were received, activities participated in, and similar data variables. Only two possible multiple responses were identified and eliminated. Multiple responses were naturally discouraged by the length of the survey questionnaires, the lack of offered incentives, and the qualitative nature of the questions, which did not ask about specific issues or activities to be influenced by the survey results.

5.2 Los Cabos angler survey

The purpose of this survey was to quantify the average amount spent in Mexico per Los Cabos angler. This survey was developed based on the project's economic modelling needs and input from the project's early interviews with Los Cabos representatives

regarding the issues facing sportfishing and tourism. The survey instrument is presented in Southwick Associates et al. (2008).

The survey was administered online. The survey was pretested by administering the survey to a group of anglers ($N = 5$) who previously had fished outside the USA. The feedback was gained and modifications made, including better explanations of expenses made in the USA before departure, and modifications to the list of species pursued, as well as other countries fished. With some businesses distributing the survey invitation to their customers, it was not possible to identify the number of surveys successfully received by anglers. Overall, 634 anglers responded to the survey.

Note that the results of the angler survey were not used to estimate the total number of anglers visiting Los Cabos. Instead, the results were used to determine the typical amount of money spent per angler in Los Cabos.

It is still important to understand possible sources of bias to the results, even though it is not possible to identify who did not respond. For this survey, bias issues were addressed by using qualifier questions to identify when certain questions should be presented or skipped, and asking the respondents' age, sex, and income levels. These variables from both the hotel/timeshare guest surveys and angler surveys were compared to see if the profiles of responding anglers matched those of resort and hotel guests who fished. Table 1 compared the ages of hotel guests who indicated they fished to the ages of the angler survey respondents. Table 2 compares the income levels of the two groups.

Table 1 Age comparisons for respondents to the hotel/timeshare and angler surveys

	<i>Age</i>		
	<i>Hotel guests who fished</i>	<i>Respondents to angler surveys</i>	<i>Statistically different between the two surveys?</i>
Under 18	0.2%	6.8%	No
18–29	1.2%	1.2%	No
30–39	9.7%	10.4%	No
40–49	27.4%	23.7%	Yes
50–59	37.1%	32.9%	Yes
60–69	20.6%	20.9%	No
70–79	3.7%	2.8%	No
80+	0.0%	1.2%	No

Two-tailed Z-test was applied to determine if the proportions of the two angler groups were statistically significant. The results are presented in the last columns of Tables 1 and 2. The results show that, overall, there was very little difference between the two surveys, with statistical differences measured only between two of the age cohorts and none in any of the income cohorts. Without the ability to determine which survey is closer to correct, adjustments to any of the results were not practical. Also, with income expected to be a greater determinant of expenditures than age, and considering the differences in the two age cohorts between the two surveys, adjustments were not deemed necessary.

Many travel expenditures are spent at the group versus individual level. Examples would include a family's restaurant or hotel bill, and fuel for transportation. Economic research by the US Forest Service (Stynes and White, 2006) showed that people often will report group expenditures when asked for their individual shares. Therefore,

questions were asked about the number of people in the travel party. The average group size was 3.89 people. Expenditures commonly attributed to a group, such as lodging and charter fees, were then divided by the average group size to address double-counting issues.

Table 2 Income comparisons for respondents to the hotel/timeshare and angler surveys

	<i>Income</i>		
	<i>Hotel guests who fished</i>	<i>Respondents to angler surveys</i>	<i>Statistically different between the two surveys?</i>
Under \$20K	0.3%	0.0%	No
20K–\$40K	1.4%	1.4%	No
40K–\$50K	1.1%	3.4%	No
50K–\$75K	7.5%	5.8%	No
75K–\$100K	17.1%	14.2%	No
100K–\$150K	29.3%	26.1%	No
150K–\$250K	25.7%	20.7%	No
Over \$250K	17.7%	28.4%	No

Table 3 Outlier limits

<i>Variable</i>	<i>Maximum observed value in the raw data set</i>	<i>Values capped at</i>	<i>Number of observations removed</i>
Package trips or tours	69,900	20,000	1
Airfare (commercial airlines, not including air taxis to your fishing site)	200,000	4,000	6
Other travel-related purchases made prior to departing home. Please specify:	150,077	50,000	1
Gasoline, fuel, and oil for your vehicle and boats (rental or personal, not including charter boats)	1,200,000	50,000	1
Charter boat fees, fishing guides	6,360,000	36,000	4
Marina expenses (Slip fees and maintenance only. Parts and items purchased are covered in the next and final expenditure question.)	700,000	7,500	5
Other (except fishing and boating equipment, which is the next question)	300,000	2,500	2
Fishing tackle (line, leaders, lures, hooks, sinkers, etc.)	10,000	2,500	4
Boat-related purchases (engine parts, rope, anchors, fenders, etc.)	25,000	2,500	3
Fishing-related electronics not reported earlier (GPS, depth and fish finders, radios, and other electronics)	80,000	5,000	2
All other miscellaneous fishing and marine equipment (coolers, pliers, gloves, storage, outriggers, etc.)	100,000	10,000	3

A number of observations were seen as unreasonable. Some appeared to represent expenditures by organisations running tournaments or large group events such as business conferences and corporate retreats. Recognising that such expenditures are not for one individual, and the subjectivity involved with adjusting these observations, limits were set and outliers were removed. A few large private yachts are maintained in MCSL and expend considerable sums for fuel, equipment, and other sportfishing expenses. While these expenditures are legitimate, building in responses from these boats into averages meant to represent all anglers was regarded as unreasonable, and they were removed. Table 3 lists the variables with observed outliers and the number of observations removed from each.

Results of the angler surveys are presented in the results section.

5.3 *Hotel guest survey*

A survey was conducted of hotel guests to quantify the percentage of Los Cabos visitors who fish. The results were combined with the results of the angler survey to help estimate total sportfishing expenditures.

The survey was developed with input from the LCCVB and hotel managers. Questions regarding sportfishing activities were designed in coordination with the needs of the economic modelling process. Hotels were asked to distribute the survey to their guests as part of the hotel management survey discussed earlier in the business surveys section.

Eleven hotel and resort owners, representing approximately 16 resorts and lodging properties, were interviewed in person and six businesses indicated they could send e-mail invitations directly to their guests. Six hotels sent e-mails to their guests inviting them to take the online hotel guest survey. These six hotels were located in San Jose del Cabo, Cabo San Lucas, and the 'corridor' between the two towns, plus a lower-end hotel, thus providing a good representation of the types and locations of lodging available to Cabo guests. Each guest received the unique link to the online survey. Hotels did not report how many guests were sent the e-mail invitation, but in all, 1,206 hotel guest surveys were completed. A copy of the survey instrument is presented in Southwick Associates et al. (2008).

An initial analysis of the hotel guest survey showed that 70% of the respondents were timeshare guests. Personal communications with the LCCVB show that timeshare guests represent only one-third of all visitors. Recognising their investment in Los Cabos, it is not surprising that timeshare guests were more likely to respond to the survey. Therefore, the hotel guest survey results were analysed twice: once for timeshare guests and again for traditional hotel guests who pay per night. When the overall guest survey results were quantified, they were weighted to represent 33.3% for timeshare guests and 66.7% for traditional hotel guests.

Of the hotels that sent e-mail invitations, 96.8% of the rooms represented by the properties were from the higher-rated facilities. This reflects the limited capability of lower-end properties to communicate with previous guests.

In terms of the economic impact estimates generated by this study, the bias toward guests from higher-end resorts is expected to reduce the final numbers. Based on discussions with hotels (both higher- and lower-end) and charter businesses, many avid anglers come to Cabo just to fish, are less desirous of the amenities provided by higher-priced resorts, and the lower-priced properties better fit their needs and budgets.

These anglers often stay at lower-priced properties within Cabo San Lucas and within walking distance of the marina. These anglers are poorly represented in the survey results. Their inclusion would have been expected to increase the estimated percentage of Los Cabos visitors who fish. These avid anglers are expected to be fairly represented in the angler surveys used to estimate angler expenditures. We anticipate that the underrepresentation of this angling sector tends to reduce estimates of total expenditures.

5.4 Private boat survey

In the heart of Cabo San Lucas, MCSL was the primary point of departure for nearly all fishing trips in 2007.² Many anglers and non-fishing Cabo guests stay on boats in the marina. As these guests would not be contacted by this project's other Cabo visitor surveys, a separate survey was conducted of private boat owners and guests in the MCSL.

The survey was distributed to boats by the management of the MCSL. MCSL is operated by a private marina management company leasing approximately half of the 635 slips in the city-owned marina. MCSL services most private yachts in the marina, with the exception of a small 25-slip private boat section at the marina's entrance. The rest of the marina is primarily for charter boats and tourism/sightseeing operations. Therefore, the MCSL-distributed survey covered most private boats in the MCSL. The surveys were distributed in the fall of 2007. Recognising that many private boats are managed by caretakers for absentee US owners, response rates were limited. Despite this problem, 38 private boat surveys were completed and provided a relative understanding of private boat owners' expenses and opinions. Only aggregated results necessary for the economic analysis are reported here. Detailed results are presented in Southwick Associates et al. (2008).

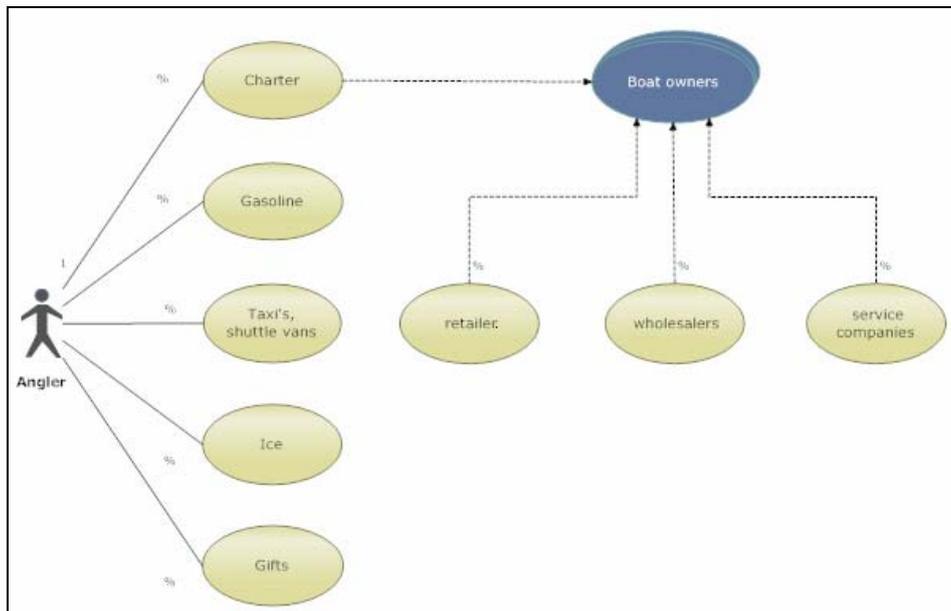
6 Economic modelling

Economic input-output models (I-O models) are statistical simulations of a regional or national economy. Using information regarding the flow of products and dollars from consumers to businesses, I-O models help explain the increase or decrease in economic activity occurring as a result of dollars being injected into an economy, a change in employment, and more. I-O models applicable to sportfishing were not available for Mexico, the State of Baja California Sur, or the Los Cabos region. Currently, there are no models or sources of economic multipliers available for the region under study, so it was necessary to develop an ad hoc model to estimate the economic contribution of sportfishing to the Los Cabos economy. Detailed model description is given in Southwick Associates et al. (2008) and the modelled expenditure flow is depicted in Figure 1. This methodology can be applied in other locations in Latin America where detailed economic information and data are also scarce.

Input to the economic model was developed by the multiple angler and visitor surveys described earlier. Data used by the model to report the economic impacts resulting from angler expenditures were obtained from the various specifically designed surveys of charter boat companies, hotels and resorts, and the general business

community conducted in 2007 and 2008. The expenditures, or input, used in the economic model were estimated from the survey of people who fished in Los Cabos. The model first divides angler expenditures into two types of expenses: dollars that remain in the Los Cabos economy, and dollars that immediately leave the area for suppliers of products located outside the Los Cabos area, such as airlines, companies exporting supplies to the isolated Los Cabos area, and more. When estimating the jobs and tax revenues generated in Los Cabos, only the dollars remaining in the local economy were considered.

Figure 1 Schematic depiction of expenditures flow (see online version for colours)



The economic model was designed to follow the dollars spent by anglers as they move through the different layers of the Los Cabos economy. The model starts by allocating anglers' dollars to the products reported in the survey such as charter boats, lodging, food, transportation, tackle, souvenirs, etc. The portion of these dollars that then immediately leave the Los Cabos economy is subtracted. The remaining dollars are assigned to different economic sectors based on the results of the business surveys. The business surveys identified the proportion of business expenditures sent to other economic sectors, the portions spent in the form of household payments (wages, salaries, and business profits), and taxes. The businesses receiving the dollars then re-spend them, creating an additional wave of impacts. At each level, only the dollars remaining in the Los Cabos community are considered. These rounds of economic activity, when tallied together, constitute the 'economic effect' of anglers' dollars.

The sum of expenses made by businesses in the supply chain is called the indirect effect, while the sum of the expenditures by employees, business owners, and their families is the induced effect. The direct effect is the amount spent by anglers that starts the whole process. The direct effect, indirect effect, and induced effect add up in order to obtain the total multiplier effect:

$$\text{Multiplier} = \frac{\text{Direct Effect} + \text{Indirect Effect} + \text{Induced Effect}}{\text{Direct Effect}}$$

The multiplier depends on the number of rounds in the economy, and the number of rounds is optimal when the indirect and induced effects are too small to reasonably measure. In this project, the number of rounds of spending was capped at four, meaning that the economic analysis ended after anglers' dollars changed hands four times, with very little remaining in the Los Cabos economy at that point.

Economic multipliers for Los Cabos are relative compared to what one might find elsewhere in Mexico. Despite Mexico's higher level of reliance on labour compared to the USA and other countries, the multiplier effect in Los Cabos is limited, as the economy behaves like an island economy. Manufacturing activities are practically absent, and most of the investment and consumer goods are imported from outside the region. This was confirmed through information obtained from the Ministry of Communications and Transportation (SCT), which reports that the Los Cabos region gets most of its supplies via highway and maritime transport from the city and port of La Paz.³ If the Los Cabos economy was more vertically integrated, with more of the economic benefits remaining in the region, the current economic multiplier of 1.78, as determined in this study, would rise closer to 2.7, a figure that is not distant from similar analyses of greater integrated continental economies in other countries.

7 Employment considerations

The business surveys collected information that allowed the estimation of the additional jobs that respondent companies would hire if their revenues increased by a certain amount (including sportfishing-related companies). However, these data reported the marginal increase in jobs expected from revenue increases and not the total jobs from all revenues, which could be quite different. Therefore, other sources were consulted to estimate the jobs supported by Los Cabos sportfishing. Employment, in general, is a function of total economic activity. Any specific level of economic activity requires some corresponding level of employees to provide the goods and services demanded. Data from the Instituto Nacional de Estadística Geografía e Informática (INEGI) reports the gross state product for BCS in 2004 was 9.209 billion pesos.

In March 2004, an economic study of the region's timeshare market was commissioned by ASUDESTICO, an association of timeshare providers. This study, conducted by Ragatz Associates (2004) (part of RCI) with assistance from ECONorthwest, used the Michigan Model of World Production and Trade to estimate jobs in Los Cabos resulting from the timeshare customers. While the report indicates that it estimates jobs in the Los Cabos region, it appears the results actually report jobs created in all of Mexico. The jobs created by local activity are generally greater at the national level than the local level. The results indicate that every \$15,753.42 spent in 2002 supported one job. In 2007, based on Mexico's inflation rates, this amount would equate to \$18,156.45. Therefore, to estimate total jobs at the national level, anglers' expenditures in Los Cabos are divided by \$18,156.45. The result is 34,895 jobs. To

generate an estimate of the jobs supported locally, the national figure needed to be revised downward. Based on similar economic studies of state- and national-level sportfishing impacts in the USA of 30%, and considering the similar difference between the Los Cabos multiplier of 1.78 (as found in this study) and a typical national level multiplier of 2.4, the national employment figure was reduced by 30% to arrive at the estimated sportfishing-related jobs in Los Cabos of 24,426.

8 Tax revenues

The government benefits from higher tax revenues arising from the sportfishing industry in different ways at federal and local levels: federal income tax of 28% of earnings; federal value added tax of 15%; a local tax on payroll of 2.5% of wages and taxes paid; and a local tax on hotel services of 3%.

9 How the model works

- Step 1 Determine how much anglers spent in Los Cabos. This is a function of the number of anglers multiplied by the total amount spent, on average, per angler for each item commonly purchased in Los Cabos. Items purchased outside Los Cabos are excluded. The result is the total amount spent in Los Cabos by anglers.
- Step 2 Identify how anglers' dollars are divided throughout the economy. This is done by taking the total dollars determined in Step 1 and multiplying them by ratios that explain how much goes to each major sector of the economy (retail, wholesale, manufacturers, service companies, professional services (accounting, legal, etc.), other businesses, and employees and business owners (payments to households). These apportionments were determined by the hotel management, charter boat, and general business surveys. The results tell us, for example, that \$3.48 of the \$48.66 spent on taxis is spent by the taxi company on manufacturers.
- Step 3 Determine how many of those dollars are exported outside of Los Cabos. The model starts with angler expenditures made within the Los Cabos economy. Once a business receives these dollars, much of the money is immediately sent to suppliers and vendors outside the area. From 4% to 83% of business expenses remain in the local economy, with an approximate average of 40% remaining. This step multiplies each apportionment identified in Step 2 by a ratio that reports how much remains in Los Cabos. These ratios were developed by the hotel management, charter boat, and general business surveys. This step is also applied to household expenditures, recognising that households often must purchase common items outside their area.⁴ The amount left after this step is the net economic activity, or indirect effect, accruing to the Los Cabos economy after the first round of spending. This amount equals 38.4% of anglers' original expenditure (the direct effect). Only the dollars found to remain in the local economy move on to the next step.

- Step 4 Estimate the effects of the additional rounds of spending. Once the taxi driver spends his angler dollar, each successive round of spending injects 38.4% of the previous round of spending into the economy. For example, for each dollar spent by anglers, the first round of spending was worth 38.4 cents. The second round contributed 38.4% of the first round's value, which is an additional 15 cents. The third and fourth rounds contributed 6 cents and 2 cents, respectively. At this point, based on the diminishing level of returns, the impact analysis ceased. Therefore, the total economic activity is \$1.78, which includes the \$1 direct effect (or angler expenditure) plus the indirect and induced effect of \$0.78.⁵ This amount is also known as the 'total multiplier effect', sometimes referred to as 'economic output' or the 'ripple' effect.
- Step 5 Estimate jobs and tax revenues. Jobs and tax revenues are based on the total multiplier effect as calculated at the end of Step 4. The employment ratios reported earlier were matched with the corresponding amount of revenue to estimate the total number of jobs. Business tax revenues were estimated by multiplying the tax rates reported earlier with the total economic effect and the expected mark-up applied by each sector. The VAT, or sales tax was applied directly only to anglers' expenditures. The VAT estimates capture only the revenues from anglers (the direct effect) and do not capture the revenues generated as part of the indirect effect (business and household expenditures). The payroll tax was applied to the mark-up assigned to each stage, and the hotel tax was applied only to anglers' reported expenditures for lodging.

10 Estimating national impacts

Estimated impacts to the national economy were based on the jobs estimate. Using data from the ASUDESTICO report, it is estimated that 34,895 jobs are supported across Mexico by Los Cabos angler expenditures, as described earlier. A national I-O model was not available. Therefore, it was not possible to develop estimates of the output generated by Los Cabos sportfishing at the national level. Instead, using gross domestic production (GDP)⁶ and national employment data from the INEGI, it was possible to estimate the contributions of Los Cabos sportfishing to the national economy.

Using 2007 GDP data from INEGI, Mexico's GDP was 8.659 trillion pesos. Employment was 42.906 million. Therefore, each job on average provided 201,818 pesos to the national GDP. With 34,895 jobs nationally supported by Los Cabos anglers, this translates into a contribution to GDP of 7.042 billion pesos, or \$US652.078 million.

Likewise, tax revenues can also be calculated. According to the Secretaria de Hacienda y Credito Publico (2008), Mexico's 2007 federal tax revenues were 1.002 trillion pesos. With 42.907 million jobs in Mexico, this translates into an average of 23,376 pesos of tax revenues contributed per job. The authors recognise the problems associated with assuming a perfect relationship between jobs and tax revenues, however, no other reliable form of estimating tax revenues was possible. With 34,895 jobs nationally as a result of Los Cabos sportfishing, this translates into 815.706 million pesos in tax revenues in 2007 from Los Cabos sportfishing.

11 Results and discussion

11.1 *Los Cabos tourists*

Annual passenger loads to the Los Cabos airport have increased significantly in recent years. Total arrivals increased 150% from 1997 through 2007 (Figure 1). Two sources of data were available regarding the number of arriving passengers: the Mexican federal government's INEGI's National Statistics Institute, or NSI and the DataTur program, managed by Mexico's Department of Tourism (Sector/Base de datos DataTur, 2008). The numbers of visitors reported by each are similar, with the DataTur numbers on average only 1.3% to 1.5% higher each year (2005 through 2007) compared to NSI. These two sources may be based on the same data collection effort, but details could not be located about the original, raw data sources. NSI data provided arrivals data back to 1997, while DataTur only reported back to 2005. Therefore, the NSI data is used as the source of visitor data for this project. Other data sources were identified, including arrival data reported in a 2003 Los Cabos marketing study and 2004–2005 data from the firm managing the airport, but these sources did not report 2006 or 2007 passenger information. In 2007, 1,426,983 passengers arrived at the Los Cabos International Airport.

11.2 *Number of hotel and timeshare guests who fish annually*

The number of anglers was estimated by multiplying the percentage of hotel and timeshare guests who fished by the total number of arriving airport passengers. Of hotel guests, 31.25% indicated they fished. In a later question, only the individuals who reported fishing were asked to rate the quality of fishing. Of these individuals, 22.3% reported that they did not fish. This would indicate an additional 6.9% of guests did not fish. Overall, these two questions indicate 24.3% of hotel guests fished during their visits to Los Cabos.

Of visitors using timeshares, 45.2% indicated they fished. In a later question, only those individuals who reported fishing were asked to rate the quality of fishing. Of these individuals, 22.2% reported that they did not fish. This would indicate an additional 10.0% of guests did not fish. Overall, these two questions indicate that 35.2% of timeshare guests fished during their visit to Los Cabos.

Timeshare guests represent one-third of all visitors, with the other two-thirds using traditional hotel accommodations.⁷ Using a weighted average of hotel and timeshare guests, 27.9% of all guests fished in 2007 during their visits to Los Cabos.

This estimate agrees with a study by SECTUR (2006), or the Mexico Ministry of Tourism, which reported that 26.9% of Los Cabos visitors fished. While the source of this estimate could not be located, based on conversations with area hospitality business, it is believed to have been gained from a survey of departing airport passengers in the mid-2000s.⁸ Another tourism study was conducted in 2003 by Marketing Consultants for the Convention and Visitors Bureau. This study reported that 18.6% of travel *groups* who visited Los Cabos fished, with the average group having 2.5 people. Descriptions of who was included in the study were not located. The study reported that, of all tours and trips purchased by visitors in Cabo, 20.5% were fishing

trips. Fishing was tied with snorkelling for the number one choice of groups' trips and tours.

Several possible biases are identified that might affect these results. First, it is possible that the surveys conducted as part of this project were more likely to be distributed by hotels with a greater interest in fishing, and therefore possibly with a greater percentage of guests who fish. While steps were taken to ameliorate this concern by encouraging all resorts and hotels to participate, and by wording communications to minimise biases toward fishing, such a bias may still exist in the results. To help minimise any possible bias, the estimated percentage of visitors who fish, as determined by the project's surveys, are averaged with the estimates found by the Ministry of Tourism and Marketing Consultants.⁹ Using a straight average, it is estimated that 24.5% of Los Cabos hotel and timeshare visitors fish. Based on the number of visitors presented in Table 2, 349,611 hotel and timeshare visitors fished in Los Cabos in 2007.

The second possible bias may affect the estimated percentage of visitors fishing in Los Cabos and is described in the methods section. The results are skewed toward guests of higher-end resorts. Many visitors who come just to fish are not as interested in the amenities provided by higher-priced resorts. Lower-priced properties fit their needs and budgets. These anglers often stay at the lower-priced properties within walking distance of the MCSL. These anglers are poorly represented in the survey results. Their inclusion would be expected to have increased the estimated percentage of Los Cabos visitors who fish.

11.3 Number of anglers using marinas

Additional anglers arrive by private boat, and most stay in the MCSL. They may motor from the USA to Cabo, or keep their boats year-round in Cabo and fly in occasionally with guests for visits of varying lengths. All these anglers/boaters would not be included in the estimate of hotel and timeshare guests who fish. Estimates of the number of anglers staying in the marina were developed using data from the private boat survey (see the survey methods section for a discussion) along with information provided by the Marina.

Table 4 presents the estimated number of boats using MCSL. Counts were taken using aerial photography provided by the marina. MCSL leases just a portion of the marina from the city, with the rest occupied by the various charter boat unions. Tours of the marina with marina officials and charter boat owners showed which docks were leased by which organisations, and how each organisation uses their docks. Along with a small private boat marina at the entrance of the marina, MCSL is the only operation providing slips to private boats. The rest of the marina is largely used for charter operations catering to visitors of the hotels and timeshare properties.

In a personal communication with the MCSL manager, it was reported that, while many of the boats in the marina are part of charter boat operations, 60% of the boats are privately run and not used for charter boat operations. These individuals responded to a survey distributed by the Marina. 97% of responding boat owners used their boats to fish while in Los Cabos. The average party per boat was 7.8 individuals. The typical length of visit for survey respondents was 20 days, of which 4.8 days were spent fishing. The

average total days spent in Los Cabos annually was 57, indicating that the typical boat owner makes about 2.85 trips per year. With 7.8 individuals per party, 2.85 trips per year, and with approximately 198 private boats in the marina (both MCSL and the private marina at the harbour mouth), this translates into 4,402 visitors aboard private boats in the marina in 2007.¹⁰

Table 4 Number of boats in the MCSL

<i>Number of boats</i>		<i># of boats[^]</i>	<i>Avg. length</i>	<i>Total length</i>
MCSL		305	33	10,065
East union docks		60	28	1,680
West union docks	Panga	50	19	950
	All others	180	24	4,320
Entrance marina	Panga	25	19	475
	All others	15	24	360
		635		17,850

Notes: [^] Number of boats, not slips. Many slips have multiple boats. A number of pangas are kept outside the marina and are not part of these estimates.

Adding the number of Los Cabos hotel and timeshare guests to the number of marina-based anglers provides the overall estimate of 2007 Los Cabos anglers (Table 5).

Table 5 Total Los Cabos anglers in 2007

Hotel and timeshare anglers	349,611
Marina-based anglers	4,402
Total Los Cabos anglers	354,013

With 1,426,983 visitors arriving each year at the Los Cabos airport, anglers represent nearly 25% of all Los Cabos visitors who fly in annually. Considering the additional 675,101 day visitors who arrive by cruise ship annually, anglers represent approximately 17% of all visitors.

11.4 Angler expenditures

Expenditure estimates were generated for anglers who stayed at hotels and timeshares, and for anglers who used the marina. Separate considerations necessary for each estimate are explained as follows.

11.5 Expenditures for hotel- and timeshare-based anglers

The results from surveys of visiting anglers are presented in Appendix 1. The total spent per angler per trip is \$1,801.27. Considering there were 349,611 anglers in Los Cabos in 2007 who stayed at hotels and timeshares, the total spent was \$629,743,806. Please note that only expenditures typically made in Los Cabos are included.

11.6 Expenditures for marina-based anglers

Expenditures for marina-based anglers were calculated slightly differently. Expenditures were based per boat and not per angler. This was done because there is a solid accounting of the number of boats and access to the boat owner, who is the one expected to handle most expenditures, was available. It was not feasible to survey guests of the boat owner. Based on results of the private boat owner survey, the average amount spent per boat trip to Los Cabos is \$6,779.09; each boat hosts 2.85 trips per year (57 days total) and remains idle the remainder of the year (Appendix 2). With 198 private boats using the marina, and with each boat hosting 2.85 trips per year, the total annual expenditures by private boats using the marina is estimated to be \$3,825,440.¹¹

11.7 Total angler expenditures for 2007

Adding the total spent by Los Cabos hotel and timeshare anglers to the amounts spent by private boat users provides an overall estimate of 2007 Los Cabos anglers: hotel and timeshare anglers totalled \$629,743,806; marina-based anglers totalled \$3,825,440; and the total of all expenditures was \$633,569,246. For all hotel/timeshare and marina-based anglers combined, the average amount spent was \$1,789.68.

12 I-O modelling results

12.1 Impacts to the Los Cabos economy

The economic model reports that when anglers spend money in Los Cabos, the local economy responds with: \$1.776 in total economic activity (output or ripple effect) for each dollar spent by anglers; one job for every \$18,156.45 spent; and \$721.99 in local and federal tax revenues per visiting angler. With \$633,569,246 spent by 354,013 anglers locally in 2007, the Los Cabos economy responded with \$1,125,218,980 in total economic output; 24,426 jobs; and \$245,516,186 in local and federal tax revenues.

12.2 Impacts to the Mexico national economy

The total economic contributions to the national economy are greater. When dollars move out of the Los Cabos economy to La Paz and other regions, the benefits to Mexico's national economy continue to grow. As a result of the \$633.6 million spent by Los Cabos anglers, the following impacts are estimated to accrue to Mexico's national economy: US\$652.078 million, in GDP; 34,895 jobs; and eight US\$75.53 million in federal tax revenues (income, VAT, food and beverage, imports, and other tax revenues).

12.3 Discussion

While the Mexican national fisheries institute has collected data on the magnitude and value of commercial catches there had been no effort to evaluate the value of the

sportfishery that accesses the same resources. Additionally, the national tourism sector has never specifically looked at the direct contributions of sportfishing to tourism revenues. The international market for sportfishing tourism is highly competitive with potential markets being strongly affected by reports of fishing success and the impacts of commercial fishing operations on species targeted by anglers (Southwick Associates et al., 2008). The results of this study allow for a quantitative and objective appraisal of the allocation of marine resources and evaluation of environmental impacts across industrial sectors competing for access to marine resources. The economic success of sustainable sportfishing development in the Los Cabos area can serve as a model for other less developed coastal communities in Mexico.

Acknowledgements

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Notes

- 1 The authors were sensitive to the fact that many local businesses may be hesitant to share information with foreign researchers about profitability and business operations for fear of inviting new competition. Therefore, some questions normally considered a part of input-output model development were excluded, such as questions that would tie revenues and expenditures back to specific business sectors such as wholesale, food and beverage, construction materials, etc. How these data gaps were overcome is explained in the economic model section of this report.
- 2 In 2007, a new marina was under construction in San Jose del Cabo, but was not expected to open for business until 2008. Along with MCSL, these are the only two marinas in the Los Cabos region. Fishing trips depart out of the East Cape area, but very few of these boats are privately owned. Most are owned by resorts and used as charter boats. Without a marina, East Cape boats anchor off the beach. A couple of boutique resorts along the coast were noticed to have boats anchored for use by guests, but based on observation, these are very few. Their exclusion is not expected to impact the overall results and interpretations of this study.
- 3 Annual statistics of Maritime Transport 2005–2006, Coordination of Ports and Maritime Transport, Ministry of Communications and Transportation.
- 4 The ratio reporting the amount of household expenditures sent outside the economy is taken from the business survey. While the proportion of household expenditures sent outside the local economy is expected to be less than businesses expenditures, no other source of information was available. The use of the business ratio is expected to reduce the overall economic impacts reported in this study.
- 5 Input-output analysis typically addresses induced effects separately. Based on the limited information available on personal consumption patterns, such separations were not possible. Payments to households via wages, salaries, and business profits are treated as a separate economic sector, as mentioned in Step 3.
- 6 GDP is the value of goods and services produced domestically, whether by domestic or foreign-owned firms, and is the primary tool to measure the size and strength of national economies. Output, as measured by I-O models, is the total output of all sectors, whether those outputs turn into inputs used by another sector or go to satisfy final demand. In that respect, output double-counts a portion of final production and by nature is reported in greater dollar figures compared to GDP.
- 7 Personal Communications (2007) with officials of the Los Cabos Convention and Visitors Bureau.
- 8 Behaviour and trends of recreational sports fishing in Mexico, executive summary. Under contract by Investigacion Estadistica Y Demografica, S.A. de C.V. (IED) for SECTUR (Ministry of Tourism). Date unknown (but post-2001, based on report content).
- 9 The methods section describes a bias that likely reduces the estimated percentage of visitors fishing in Los Cabos. The survey was biased toward guests of higher-end resorts. Many visitors who come just to fish are not as interested in the amenities provided by higher-priced resorts. Lower-priced properties fit their needs and budgets. These anglers often stay at the lower-priced properties within walking distance of the MCSL. These anglers are poorly represented in the survey results. Their inclusion is expected to increase the estimated percentage of Los Cabos visitors who fish.
- 10 Marina officials reported that during the peak months, the number of boats wanting to use the facility exceeds the slips available. These boats typically anchor outside the harbour and use launches to access the shore. Many of these boats are expected to fish while in Los Cabos, but without data regarding the number of boats anchoring outside, it is not possible to develop estimates with any reliability.
- 11 The authors consider this estimate to be low, based on other data. For example, the cost to rent a slip is \$1.25 per foot (length of slip) per day. With the average boat approximately 33 feet, and with 198 boats, and with 90% annual occupancy (70% summer, 100% rest of the year), this equates to \$2.7 million just in slip fees.

Appendix 1

Table A1 Average expenditures per angler

<i>Item</i>	<i>N</i>	<i>Mean (adjusted for the number of people per group and outliers eliminated)</i>	<i>Minimum (not adjusted for number of family in group, outliers eliminated)</i>	<i>Maximum (not adjusted for number of family in group, outliers eliminated)</i>
Gasoline, fuel and oil for your vehicle and boats (rental or personal, not including charter boats)	633	\$129.96	0	20,000
Taxis, shuttle vans, etc to get to hotels, marinas, restaurants, etc.	634	\$47.68	0	2,500
Charter boat fees, fishing guides	630	\$393.42	0	14,000
Car rental (not including any fuel purchased)	634	\$38.78	0	2,500
Boat rentals	634	\$56.03	0	9,000
Marina expenses (Slip fees and maintenance only. Parts and items purchased are covered in the next and final expenditure question.)	629	\$38.44	0	6,000
Hotels/motels/resorts	634	\$456.67	0	80,000
Restaurants, bars, carry-out food	634	\$224.73	0	40,000
Groceries, food, liquor bought in stores (not in restaurants or bars)	634	\$87.85	0	14,400
Ice	634	\$4.94	0	400
Bait (Natural bait only, such as mackerel and bait bought at the launch for chartered trips. Please do not include lures.)	634	\$43.42	0	5,000
Gifts and souvenirs of any type	634	\$80.55	0	30,000
Entertainment (nightclubs, attractions, tours, etc.)	634	\$86.88	0	25,000
Fish processing and shipping	634	\$23.12	0	5,000
Taxidermy (only taxidermy fees paid to Mexico businesses, not US taxidermists)	634	\$0.93	0	1,400
Personal items (toiletries, medicine, etc.)	634	\$10.13	0	2,000
Other (except fishing and boating equipment, which is the next question)	632	\$9.92	0	2,500
Fishing tackle (line, leaders, lures, hooks, sinkers, etc.)	630	\$28.23	0	2,500
Boat-related purchases (engine parts, rope, anchors, fenders, etc.)	630	\$11.35	0	2,500
Fishing-related electronics not reported earlier (GPS, depth and fish finders, radios, and other electronics)	632	\$7.85	0	5,000
All other miscellaneous fishing and marine equipment (coolers, pliers, gloves, storage, outriggers, etc.)	631	\$20.42	0	10,000
Total		\$1,801.27		

Appendix 2

Table A2 Average amount spent per boat per trip

<i>Item</i>	<i>Avg. per boat</i>
Gasoline, fuel, and oil for your vehicle and boats (rental or personal, not including charter boats)	\$1,636.58
Taxi's, shuttle vans, etc to get to hotels, marinas, restaurants, etc.	\$126.58
Charter boat fees, fishing guides	\$172.37
Car rental (not including any fuel purchased)	\$43.95
Boat rentals	\$0.39
Marina expenses (Slip fees and maintenance only. Parts and items purchased are covered separately.)	\$1,185.05
Lodging: please report the type of lodging used and the cost	
Hotels/motels/resorts	\$52.63
Timeshare (please only report the cost associated with your trip and not any part of the purchase price)	\$26.32
Campgrounds	\$0
Restaurants, bars, carry-out food	\$869.74
Groceries, food, liquor bought in stores (not in restaurants or bars)	\$601.58
Ice	\$22.50
Bait (Natural bait only, such as mackerel and bait bought at the launch for chartered trips. Please do not include lures.)	\$138.84
Gifts and souvenirs of any type	\$84.21
Entertainment and amusement admission fees	\$50.00
Fish processing and shipping	\$21.13
Taxidermy (only taxidermy fees paid to Mexico businesses, not USA taxidermists)	\$26.32
Personal items (toiletries, medicine, etc.)	\$81.58
Other (except fishing/boating equipment, which is the next question)	\$60.53
Rods and reels	\$155.53
Fishing tackle (line, leaders, lures, hooks, sinkers, etc.)	\$176.97
Boat-related purchases (engine parts, rope, anchors, fenders, etc.)	\$1,034.87
Fishing-related electronics not reported earlier (GPS, depth and fish finders, radios, and other electronics)	\$60.53
All other miscellaneous fishing and marine equipment (coolers, pliers, gloves, storage, outriggers, etc.)	\$226.84
Total	\$6,776.09

Note: Each boat averages 2.85 trips per year.