



Economic Impact of Recreational Fishing for Bonefish, Permit and Tarpon in Belize for 2007

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The Economic Impact of Recreational Fishing for Bonefish, Permit and Tarpon in Belize

Introduction

Belize is renowned throughout the fly fishing world because of exceptional sport fishing opportunities for Bonefish, Permit and Tarpon. Belize is, in fact, one of the few places in the world offering fishermen (anglers) a chance for the “Grand Slam” of flats fishing – a Bonefish, Permit and Tarpon all caught in a single day. Belize’s sport fishing adventures have been featured on numerous television programs as well as in numerous magazine articles throughout the United States and Europe. One popular magazine, *Fly Fishing in Saltwater*, recently noted that three of the world’s top ten permit fishing destinations are located in Belize. This top-quality fishing draws fishermen from around the world.

Sport fishing for Bonefish, Permit and Tarpon is not concentrated in any one area of Belize, but rather extends the entire length of the country, from Ambergris Caye to Punta Gorda. Fishing for Bonefish and Permit is primarily done in the shallows or back reef flats throughout Belize, whereas Tarpon are mostly caught in creeks, channels and rivers. Similar sport fishing is found in several other locations including Mexico where several fishing lodges on the Yucatan Peninsula provide strong competition for these tourists. Other game fish such as snook, barracuda, jacks and snapper are also sought after by sport fishermen in Belize, but to a lesser extent.

The Belize fishery supports numerous independent fishing guides, fishing lodges and hotels in Belize. Some fishermen fly into Belize City and then transfer to a resort, hotel or guest house where they hire an independent fishing guide. Others make use of one of several fishing lodges scattered from Ambergris Caye to Punta Gorda. These lodges act as conduits linking fishing clients with employed fishing guides. Once at a fishing lodge, all accommodations, food, and fishing services are generally provided as a packaged price.

Several lodges cater exclusively to fishing clients while others focus primarily on fishing but also offer other tours such as snorkeling, scuba diving and eco-tours. Additionally, a number of hotels in Belize promote a variety of tours, one of which is sport fishing. Over the past several years, many Belizean hotels have become much more aggressive in marketing to sport fishermen by featuring fishing in their electronic and print advertising. This expanded focus on sport fishing has resulted from universal recognition that Belize offers world-class sport fishing.

International fishermen carry with them a very high conservation ethic. With rare exception, “catch and release” fishing, whereby fish caught are released unharmed, is practiced by both independent fishing guides and fishing lodges. This tradition results in a negligible impact on fish stocks ensuring that Bonefish, Permit and Tarpon fishing can be sustained indefinitely, as long as other activities do not reduce their numbers.

According to the Belize Tourism Board statistics for 2006, tourists accounted for \$398.8 million (BZ) in expenditures in the Belizean economy and supported more than 13,000 jobs. The tourism sector accounted for about 16.8% of the Gross Domestic Product (GDP) of Belize in 2006. Sport fishing contributes significantly to this. Estimating the economic importance of fishing-related tourism for Bonefish, Permit and Tarpon is an important step to understanding the importance of these species to the economy of Belize.

Economic Impact

Fishermen traveling to Belize to fish for Bonefish, Permit and Tarpon contribute to the Belizean economy in two important ways. Some fishermen hire independent guides and purchase lodging, meals, equipment, supplies, transportation, and other items separately. Others pay a “package price” to a fishing lodge which normally includes guided fishing, lodging, meals, and transportation in Belize. These packages generally do not include gratuities, bar or gift shop expenditures. Both independent fishing guides and fishing lodges generate income and jobs for Belize.

Estimating the total economic impact of sport fishing for Bonefish, Permit and Tarpon entails quantifying the relevant direct expenditures by fishermen and the “multiplier” or secondary

effects related to these direct expenditures. Total economic impact is comprised of three components: direct effects, indirect effects and induced effects. **Direct Effects** are the on-site or immediate expenditures such as lodging, fishing tackle, meals, guide fees and taxes. **Indirect Effects** refer to the increase in economic activity that occurs when a contractor, vendor or manufacturer receives payment for goods or services and in turn is able to pay others who support their business. This includes payments to bankers, accountants, grocery store owners, marina operators, fuel suppliers and others. **Induced Effects** are changes in spending patterns that are caused by the increased wealth and income of those persons directly and indirectly employed by fishing lodges, hotels, or as independent fishing guides. This includes spending on food, clothing, housing or transportation by those directly or indirectly employed by the fishing-related businesses, including retail sales, medical services, insurance services, income and sales taxes, and much more. These Indirect and Induced Effects together are often referred to as **Value Added** impacts. The sum of these three effects yields a **Total Economic Effect**.

Methods

For purposes of this study, expenditures and impacts of sport fishing for Bonefish, Permit and Tarpon fishing are estimated for the Independent Fishing Guide Sector and Fishing Lodge Sector separately because of differences in the way expenditures are made. With the Independent Fishing Guide Sector, economic effects are driven by customer expenditures. This not only includes guide fees, but also encompasses other expenditures made in the country during a fishing vacation.

Fishing lodges generally receive revenue based on all-inclusive packages ranging from three to seven days. Fishing lodges, in turn, spend this revenue on a variety of goods and services to operate their businesses. These expenditures by fishing lodges constitute the direct economic effects of their fishing-related activity. All monetary figures in this report are expressed in Belizean dollars.

The Independent Fishing Guide Sector

The economic impact of the Independent Fishing Guide Sector was developed based on fishing related expenditures of the independent fishing guides and the additional expenditures of their customers while fishing in Belize. Independent fishing guide data was collected through local in-person interviews. A two-page interview form (Appendix A) was used to collect information on fees charged, numbers of clients, business expenditures, and species targeted. Interviews were conducted with 24 independent guides, representing approximately 22% of the total of the independent guide population in Belize.

Based on conversations with guides and marina owners, the interviewer estimated the total number of fishing guides in the north, central and south regions of the country. A second estimate of guide numbers was constructed based on information from knowledgeable hotel and lodge managers in each of the three regions. From this information, the total number of independent fishing guides in Belize was estimated to be between 100 and 155. For purposes of this study, the calculation of economic impacts for the Independent Guide Sector was based on 111 guides. This estimate is discussed more fully in the results section.

Guide fees are only part of the overall trip expenditures by sport fishermen. Therefore, it was necessary to estimate the expenditures made by these fishermen for lodging, meals, transportation and other applicable items while in Belize. We were unable to interview guided fishermen to ascertain this information due to the resources available for the project. To capture these expenditures, the average dollars spent per day by Belizean tourists was used as a proxy. The 2006 Belize Tourism Board visitor survey showed that the daily per person tourist expenditure was BZ \$192 and the average tourist stay was 6.80 days. Interviews with hotel and resort operators that offered fishing through independent fishing guides indicated their fishing guests generally stayed six to seven days (one week was the typical response), which aligns well with the Tourism Board findings.

Fishing Lodge Sector

The Fishing Lodge Sector is comprised of 13 lodges, hotels and resorts that offer all-inclusive fishing packages. The size of these lodges ranges from very small businesses booking

fewer than 100 fishermen per year to larger enterprises hosting over 400 fishing guests per year. These lodges provide all-inclusive packages which generally include transportation in Belize, lodging, meals, and guided fishing for a single set price. These fishing guides are paid by the lodges and thus were excluded from the estimates in the Independent Fishing Guides Section.

Fishing Lodges were sent a survey in early 2008 (Appendix B) asking them to provide the number of guests they booked in 2007, the percentage of these guests who were sport fishing, and the percentage of these sport fishermen who targeted Bonefish, Permit and Tarpon. They were also asked to quantify their annual operational expenses for 2007. Approximately half of the lodges provided financial information. Four of the six remaining lodges provided only the number of fishermen they booked during the year and the percentage of fishermen targeting these three species. Expenditures for lodges that only provided fishermen numbers were estimated based on average per fisherman expenditures for the seven lodges providing expenditure information.

Early in the evaluation it became apparent that many fishermen spend additional days in Belize, either before or following their stay at a lodge. Lodge owners were asked to estimate the percentage of their guests staying additional days in Belize and the number of days they stayed in the country. Several lodges directly book mainland tours for their guests either before or after their stays. This additional spending by fishermen is a supplementary benefit derived from the primary activity of fishing and should be considered as part of the overall economic impact of fishing since the primary reason for traveling to Belize was to fish.

To capture these additional expenditures, which are not part of the fishing package, the average daily tourist expenditure from the Belize Tourism Board survey again was used as a proxy. This data was used in combination with the lodge owner estimates of the percentage of fishermen staying extra days and the estimated number of days they stayed in Belize to calculate these benefits.

Economic Multipliers

Estimating the indirect and induced effects of expenditures by fishermen in Belize is more difficult in the absence of economic input-output models developed from extensive econometric studies specifically for Belize. These types of studies have been performed in other countries to assess the economic effects of government policies, changes in economic activity, and private sector development. The values developed from such studies not only account for the direct effects of expenditures, but also can estimate the personal income and employment derived from the expenditures. In many countries, these values have been estimated through the use of modeling programs such as IMPLAN (Minnesota IMPAN Group 2007) and RIMS II (Bureau of Economic Analysis 1997).

Given the unavailability of such models for Belize, we approximated values for this study based on values derived from fishing-related and tourism studies in the United States and other countries, and from tourism statistics provided by the Belize Tourism Board. Table 1 summarizes the multipliers for the output (indirect and induced impacts), income and jobs effects calculated in several studies. The output coefficients for Bermuda and Seychelles are substantially lower than those for the U.S. while those for Sri Lanka are similar to the U.S. output multipliers. The main reason that output multipliers for Bermuda and Seychelles are lower than the others is due to their elevated dependence on imports, which is also the case in Belize. Imports cause leakages in the economy as capital flows to other countries to purchase goods and services not produced within that country, thus reducing the indirect and induced impacts of expenditures.

In light of no available output multiplier being available for Belize, an estimate was constructed based on the average of tourism output multipliers for Bermuda, Seychelles and Sri Lanka. Thus, the output multiplier for Belize was estimated at 1.22. This value is much lower than the U.S. values in Table 1 and is likely a conservative estimate. Developing a more precise estimate would require extensive data collection and the building of a detailed input-output model for the country which was beyond the scope of this project.

Income and jobs multipliers for Belize were available directly from the Belize Tourism Board's data on tourist related income, expenditures, and jobs in 2006. Both Belizean coefficients are comparable to those found in the U.S. studies. Table 1 summarizes the multipliers for the output (indirect and induced impacts), income and jobs effects calculated in several pertinent studies.

Table 1: Average output, income and jobs multipliers

Location (Country)	Study Type	Output Multiplier	Income Multiplier	Jobs Multiplier
Forest Service Lands (U.S.) ¹	Fishing	1.859	0.0448	0.000019
Marine Recreational Fishing (U.S.) ²	Fishing	2.18	0.761	0.000026
Lake Rayburn (U.S.) ³	Fishing	1.555	0.617	0.000035
North Carolina Offshore (U.S.) ⁴	Fishing	1.576	0.516	0.000076
Bermuda ⁵	Tourism	1.09	NA	NA
Seychelles ⁵	Tourism	1.03	NA	NA
Sri Lanka ⁵	Tourism	1.56	NA	NA
Belize ⁶	Tourism	NA	0.529	0.000033

¹American Sportfishing Association (2007).

²Steinback, Gentner and Castle (2004)

³Anderson, Ditton and Oh (2002)

⁴Thailing, Ditton, Anderson, Murray, Kirkley and Lucy (2001)

⁵Batta (2000)

⁶Belize Tourism Board (2007)

Results

The results of this project are divided into four sections. The first section focuses on the expenditures made by independent fishing guides. This entails estimating the number of independent fishing guides and their business related expenditures. The second section provides detailed business expenditures made by fishing lodges. The third section estimates expenditures in Belize by guests of both independent guides and lodges either before or after their days spent fishing. The final section provides a summary of direct expenditures, value added through multiplier effects, and income and job estimates associated with Bonefish, Permit and Tarpon fishing.

Independent Fishing Guide Impacts

The first step in estimating the economic impact of the Independent Fishing Guide Sector was to identify the total number of independent fishing guides targeting Bonefish, Permit and Tarpon in Belize. This was done by interviewing fishing guides, hotel and resort owners, and other knowledgeable individuals in the sport fishing industry in Belize. Separate estimates were made for the northern, central and southern regions of the country. Fishing guides working solely for lodges were excluded from these estimates. Table 2 shows the estimate range and mean number of independent guides for each region along with the number of individuals providing estimates. For purposes of calculating the impacts from this sector, the final estimate of 111 independent fishing guides was used.

The independent guide survey provided information important for estimating the economic impact of this sector’s fishing activity. The first significant information was the percentage of trips targeting Bonefish, Permit and Tarpon. This information was used to scale the number of trips and expenditures related to these three species. Over 90% of independent guides indicated that 100% of their trips targeted at least one of the three species. The percentage of trips targeting Bonefish, Permit and Tarpon ranged from 50% to 100% with a mean of 93.5%.

Region	Number of Estimators	Low Estimate	High Estimate	Final Estimate
Northern	12	40	65	45
Central	8	20	35	20
Southern	13	40	55	46
Total	33	100	155	111

Independent Fishing Guides provided information for 13 expenditure categories in the survey. Table 3 presents the expenditure information from independent guides. The minimum and maximum expenditures reported in the surveys show a wide range which reflects the wide distribution in the number of fishing trips per year (25 minimum, 250 maximum, mean = 90). To apportion each independent fishing guide’s expenditures to appropriately reflect their propensity to target Bonefish, Permit and Tarpon, each expenditure was multiplied by the guide’s target percentage. If, for instance, 80% of an independent fishing guide’s trips targeted these three species, then 80% of the expenditures should be allocated to the target species. For

example, if a guide spent \$2,500 on fuel, then \$2,000 (80%) would accrue to fishing for Bonefish, Permit and Tarpon.

Table 3: Independent Fishing Guide expenditures for Bonefish, Permit and Tarpon by category

Expense Category	Min	Max	Mean	Total
Fuel	\$ 2,400	\$ 27,500	\$ 12,285	\$ 1,363,681
Food	750	12,000	4,960	550,583
Maintenance & Repair	100	12,000	3,392	376,475
Boat Licenses	60	150	88	9,805
Tour Guide Licenses	100	415	175	19,448
Other Licenses	0	209	65	7,234
Transportation	0	4,800	540	59,940
Dockage	0	9,000	379	42,088
Goods & Services Tax	0	500	276	30,636
Income Tax & Social Security	0	6,000	250	27,750
Insurance	0	1,100	125	13,875
Boat Cost (amortized over 3 years)	1,200	5,400	2,258	250,675
Engine Cost (amortized over 3 years)	1,340	4,600	2,697	299,330
Total	\$ 5,950	\$ 83,674	\$ 27,491	\$ 3,051,520

To calculate the total expenditure for a category, the mean expenditure was multiplied by 111, the estimated number of independent fishing guides. As shown in Table 3, the largest expenditure made by independent guides was for fuel, followed by food, and boat maintenance and repair. Purchases of boats and outboards were also large expenditures. Overall, independent guides spent over \$3.0 million to provide guide services to their angling customers.

Independent Fishing Guide Customer Impacts

In addition to guide fees, which range from \$200 to \$700 per day, customers of independent guides spend money in the Belizean economy for lodging, food, transportation and other goods and services similar to other tourists. To estimate these expenditures the average daily tourist expenditure of \$192, as reported for 2006 by the Belize Tourism Board (Belize Tourism Board 2007), was used as a proxy.

Data from the independent guide survey was used to estimate the total number of fishermen per guided trip. Independent guides took from one to three people on their boats during a fishing

trip with the mean being 1.8 fishermen per trip. The average number of days sport fisherman spent fishing with an independent fishing guide was 3.5. The following procedure was used to estimate the total number of fishermen using guides.

Mean fishermen per trip (1.8) x Mean days fished by guides (90) x Number of guides (111) x Percentage of trips targeting Bonefish, Permit and Tarpon (93.5%) / Mean number of days fisherman spent fishing with an independent guide in Belize (3.5) = Total number of fishermen fishing with independent guides for Bonefish, Permit and Tarpon in 2007 = 4,804

To calculate the economic impact of guide customers, the total number of fishermen (4,804) was multiplied by the average days spent fishing (3.5) and the estimated expenditure per day (\$192). This yields \$3,228,288 in expenditures by fishing guide customers during the days they were fishing.

Customers of independent fishing guides generally stay for at least one week in Belize during their fishing vacation. The remaining time, beyond their three to four days of fishing, is spent in other recreational and eco-touring activities. The expenditures for these extra days in Belize should be credited to the overall impact of sport fishing because the principal reason for traveling to Belize was for fishing. The economic impact of these extra days is presented later in this report.

Fishing Lodge Impacts

Belizean fishing lodges are generally destinations for sport fishermen seeking unique, high quality fishing experiences. In Belize, there are 13 such fishing lodges that host from less than 100 to more than 400 fishing guests per year. The distinguishing feature of these lodges is that they charge one “package price” that generally includes all transfers in Belize, lodging, meals, and fishing services for a set period of time, usually one week. These fishing lodges can accommodate from six to twenty fishermen at any given time. Fishing package prices range from \$4,000 to \$8,000 per week. Fishermen are generally required to pay for fishing tackle, gift shop purchases, liquor and gratuities in addition to the package price.

A Lodge Survey (Appendix B) was sent to each of the 13 lodge owners. Seven completed surveys were returned while six lodges declined to provide their financial information. However, four of the latter six did provide the number of guests they hosted during 2007 and the percentage of their business that was fishing-related along with the percentage of fishermen targeting Bonefish, Permit and Tarpon. The size distribution of the non-responding lodge businesses was very similar to those responding.

Fishing lodges reported that their fishermen targeted Bonefish, Permit and Tarpon on about 98% of the fishing days. Virtually all of the guests fished for at least one of the three species during their trip. Thus, for the Fishing Lodge Sector, all fishing expenditures were credited to Bonefish, Permit and Tarpon, unlike the Independent Fishing Guide Sector.

To estimate lodge expenditures related to Bonefish, Permit and Tarpon fishing, expenditure profiles were created for each of the seven responding lodges. This process was necessary because not all lodges provided complete information. Two provided an overall expenditure figure, another lumped their expenditures into four general categories, while the remaining four lodges provided the detailed information asked for in the survey. The profiles were created by applying the average percentage expenditure by category from the four complete surveys to the three incomplete surveys with varying levels of aggregated expenses. Once full profiles for the seven lodges were created, a mean expenditure for each of the 13 expenditure categories was calculated. The mean expenditure for each category was then multiplied by 13 to create a total expenditure for the category. The result of these calculations for lodge expenditures is shown in Table 4.

The largest expenditure category for lodge operations was capital improvements. These expenditures reflect spending averaged over three years to more accurately reflect normal business activity. Labour and general operating expenses were the next largest areas of expenditures for lodge owners. Overall, Fishing Lodge Sector expenditures totaled slightly more than \$15 million. Lodge owners reported that 95% of these expenditures were made directly in Belize.

Table 4: Lodge Sector expenditures for Bonefish, Permit and Tarpon fishing by category

Expenditure	Minimum	Maximum	Mean	Total
Labour	31,686	630,884	226,178	\$2,940,310
Food	13,414	226,154	94,958	1,234,457
Operating	26,240	450,760	185,924	2,417,015
Fuel	15,422	526,736	114,313	1,486,075
Maintenance & Repair	7,980	273,256	59,164	769,138
Licenses	395	9,169	2,842	36,952
Capital Improvements	48,710	1,000,000	337,925	4,393,023
Business Taxes	2,129	49,439	15,335	199,354
Goods & Services Taxes	4,054	148,979	35,790	465,267
Employment Taxes	4,252	84,000	29,572	384,431
Hotel Taxes	4,610	73,387	32,555	423,211
Property Taxes	162	2,588	1,070	13,913
Insurance	3,362	90,201	24,446	317,794
Total	162,417	2,983,479	1,160,072	\$15,080,941

Economic Impact of Non-Fishing Days

Many customers of independent fishing guides and fishing lodges stay extra days before or after the days they spend fishing. The expenditures associated with these extra days in Belize are part of the overall economic impact of fishing for Bonefish, Permit and Tarpon. Since we did not quantify, precisely, how many total days customers of independent guides stay in Belize, we assumed that they stayed in Belize an average of seven days. This estimate corresponds closely with data collected from the hotel and resort managers contacted during the independent guide evaluation process. Hotel and resort managers whose establishments offer sport fishing indicated that their sport fishing guests generally stayed at least one week and often more at their property. Further, the Belize Tourism Board estimated that the average tourist spent 6.8 days in the country during 2006 (Belize Tourism Board 2007). If this was the case, then independent guide customers stayed 3.5 days in addition to their 3.5 fishing days.

The lodge survey collected information on the percentage of fishermen staying extra days in Belize either before or after their lodge stay, and number of extra days they spent (Table 5). Lodge operators estimated that about 40% of their angling guests spent extra days in Belize beyond their lodge stay. They also estimated that their guests stayed slightly more than three extra days in the country.

Table 5: Summary of lodge guests, percent staying extra days, and number of extra days spent in Belize before or after lodge visit

	Minimum	Maximum	Mean	Total
Lodge Fishermen	79	463	189	2,457
Percent spending extra days	25%	60%	40%	--
Number of extra days spent	2	7	3.22	--

Table 6 shows the calculations for estimating expenditures of customers of independent fishing guides and lodges related to extra days vacationing in Belize either before or after their fishing. The number of fishermen for each sector was multiplied by the extra days spent in Belize and the daily expenditure of \$192 to produce total expenditures. These expenditures amounted to \$3,228,288 for independent guide customers and \$607,730 for lodge guests during 2007. These sport fishermen spent nearly \$3.8 million in addition to their fishing costs in Belize.

Table 6: Economic effects of fishing lodge and independent guide fishermen guest spending

	Number of Fishermen	Days Spent	Expenditure Per Day	Total Expenditure
Independent Guide Customers	4,804	3.50	\$192	\$ 3,228,288
Lodge Guests	983	3.22	\$192	\$607,730
Total				\$ 3,836,018

Total Economic Impacts

Total economic impacts of sport fishing for Bonefish, Permit and Tarpon are not only reflected in the expenditures made in the Belizean economy by independent fishing guides, fishing lodges, and their guests, but also income and jobs created by the sport fishing industry. The Independent Fishing Guide and Fishing Lodge Sectors accounted for nearly \$21.3 million in direct expenditures in the Belizean economy (Table 7). These expenditures in turn resulted in the indirect and induced impacts (Value Added) that rippled through the economy. In this study

we used a multiplier of 1.22 to estimate these Value Added benefits. As seen in Table 7, these Value Added benefits totaled \$26.6 million in secondary expenditures to the economy bringing the total direct economic impact of fishing for Bonefish, Permit and Tarpon to \$47.9 million.

The spending by customers of both independent guides and lodges on activities in Belize either before or after their fishing days is also substantial (Table 7). Sport fishermen, through their non-fishing activities, contributed \$3.8 million directly to the economy. With the addition of the Value Added expenditures of nearly \$4.7 million, the total impact of this extra spending by fishermen was \$8.5 million. The combined direct expenditures totaled \$25.2 million (Table 7). Coupled with the \$31.3 million Value Added expenditures the total economic impact of fishing for Bonefish, Permit and Tarpon in Belize in 2007 was estimated to be \$56.5 million.

Using the income and employment coefficients derived from Belize Tourism Board statistics in Table 1, the wages and salaries, and jobs resulting from sport fishing were also estimated. As shown at the bottom of Table 7, fishing activity associated with Bonefish, Permit and Tarpon generated slightly less than \$30 million in wages and salaries and this sport fishing activity supported 1,864 full-time equivalent jobs.

Sector	Direct Expenditures	Value Added	Total
Independent Fishing Guide Impact	\$ 3,051,520	\$ 3,722,854	\$ 6,774,374
Independent Fishing Guide Customer Impact	3,228,288	4,501,156	7,729,444
Lodge Impact	15,080,941	18,398,748	33,479,689
Subtotal	\$ 21,360,749	\$ 26,622,758	\$ 47,983,507
Independent Guide Customer Extra Day Impact	\$ 3,228,288	\$ 3,938,511	\$ 7,166,799
Lodge Guest Extra Day Impact	607,730	741,431	1,349,161
Subtotal	\$ 3,836,018	\$ 4,679,942	\$ 8,515,960
Total Economic Impact	\$ 25,196,767	\$ 31,302,700	\$ 56,499,467
Income Impacts (Wages and Salaries)	\$ 13,329,090	\$ 16,559,128	\$ 29,888,218
Jobs Impacts	831	1,033	1,864

Tax Revenues Generated

Tax revenues generated by sport fishing industry in Belize are substantial. Hotel Tax, Business Tax, , Property Tax, Employment Taxes and GST are listed in Table 3 and 4, but fuel taxes, which are part of the fuel expenditures, are not separated out. Fuel taxes, however, can be estimated by applying the percentage of the fuel price that is tax to the overall expenditures for fuel. The airport departure tax, included in the \$192 daily expenditure of fishermen, should also be included in tax revenues generated by sport fishing.

Fuel taxes related to operating boats and vehicles as well as for running power generators, where public power is unavailable, are included in the expenditures for fuel in Tables 3 and 4. The price breakdown for gasoline and diesel (Table 8) show that 29.2% of the price of a gallon of gasoline and 13.2% of diesel are comprised of taxes. Virtually all of the Independent Fishing Guide expenditures for fuel are for gasoline. Multiplying their fuel expenditures of \$1,363,681 by 29.2% yields \$397,575 in taxes. About 30% of the Lodge Sector's fuel expenditures are for diesel fuel to operate generators and 70% are for gasoline to operate boats and vehicles. To calculate fuel taxes for this sector, expenditures of \$1,486,075 were multiplied by 24.4%, the weighted gasoline and diesel percentage. This calculation results in an estimated \$362,751 in fuel taxes being paid by the Lodge Sector for activities related to Bonefish, Permit and Tarpon. Overall, both Independent Fishing Guide and Fishing Lodge Sectors paid \$760,533 in fuel taxes in 2007 based on the April 2008 fuel tax.

Independent fishing guides and fishing lodges paid an estimated \$2.3 million in taxes during 2007 in Belize (Table 9). Fuel taxes comprised about one-third of all taxes paid, while the GST constituted the next

	Regular	Diesel
Cost of Fuel	\$5.64	\$6.64
Import Duty	\$0.45	\$0.27
Revenue Replacement Duty	\$1.45	\$0.00
Environ Tax	\$0.11	\$0.13
Freight	\$0.07	\$0.07
Additive	\$0.00	\$0.00
GST	\$0.81	\$0.74
Belize City Pump Price	\$9.90	\$9.08
Total Tax	\$2.89	\$1.20
Percentage of Fuel that is Tax	29.2%	13.2%

Source: Belize Ministry of Finance

largest tax category followed closely by Hotel Tax and Employment Taxes. Overall, taxes constituted approximately 13% of all business expenditures made by independent fishing guides and lodge owners.

Finally, Airport Exit Taxes generate \$75.00 per fishermen. Using our estimates of 4,804 visitors fishing with Independent Guides and 983 fishermen visiting local lodges, this generates an additional \$434,025 in exit tax revenue.

Table 9: Taxes paid by independent fishing guides and fishing lodge operators during 2007

Type of Tax	Guide Tax Expenditures	Lodge Tax Expenditures	Total Taxes
Business Tax	\$ 199,354	--	\$ 199,354
GST	465,267	\$ 30,636	495,903
Employment Taxes	384,431	27,750	412,181
Hotel Tax	423,211	--	423,211
Property Tax	13,913	--	13,913
Fuel Tax	362,751	397,782	760,533
Airport Exit Taxes			434,025
Total	\$ 1,848,927	\$ 456,168	\$ 2,739,120

Discussion and Conclusions

Bonefish, Permit and Tarpon are the overwhelming target for a very high percentage of sport fishermen in Belize and it is very clear that most fishing lodges and guides are heavily dependent upon these three species. Sport fishing for Bonefish, Permit and Tarpon accounted for more than \$25 million in direct expenditures within the Belizean economy in 2007. With the Belize Tourism Board reporting total tourist expenditures in 2006 of \$398 million, sport fishing for Bonefish, Permit and Tarpon accounts for approximately 6.3% of these expenditures. Similarly, the number of jobs supported by direct expenditures is also approximately 6.3% of 13,200 tourism related jobs.

Direct expenditures by guides, lodges and sport fishermen result in significant tax revenues for Belize. These include Hotel Tax, Property Tax, Business Tax, GST, Employee (income and social security) Taxes, and Airport Exit Taxes. These taxes amount to about 13% of the direct

expenditures made by lodges and it is likely that a similar percentage is generated by guides and fisherman, either directly or indirectly. If this is the case, then direct expenditures for Bonefish, Permit and Tarpon fishing generated about \$2.3 million in tax revenues for Belize in 2007. Additional tax revenues also accrue to the government from the indirect and induced expenditures associated with sport fishing. While the percentages may change slightly with 2007 Belize Tourism data, it is clear sport fishing for Bonefish, Permit and Tarpon are an integral and important part of Belize's tourism economy and the Belizean economy as a whole.

The Value Added expenditures identified in this study further underscore the contribution of Bonefish, Permit and Tarpon fishing to the economy of Belize. Slightly more than \$31 million in indirect and induced impacts further supports the Belizean economy in a variety of different sectors.

It is important to note that this annual economic impact is fully sustainable and reproducible over time. As noted earlier, virtually all fishermen targeting Bonefish, Permit and Tarpon in Belize practice catch and release fishing, whereby caught fish are returned to the sea unharmed. If the quality of the fishery is maintained over time, it is highly likely that international anglers will continue to view Belize as a premier fishing destination.

There are several limitations to this study that need to be acknowledged. Often, family or friends accompany fishermen when they visit Belize adding further economic benefits to Belize. This is certainly a sizable economic impact which was not reflected in this evaluation.

The number of fishing lodges may be underestimated. The 13 lodges in this study were those that offered fishing packages to their guests. There may well be other lodges, resorts or hotels with their own staff of guides which would expand the impact of the Lodge Sector. Likewise, the procedures for estimating the total number of independent fishing guides could have been more comprehensive and improved upon. However, conducting a census of guides was beyond the scope of this project.

The number of tourists fishing without a guide for Bonefish, Permit and Tarpon is generally unknown. Many resorts and hotels advertise the opportunity to fish in the waters near their properties without the need for a guide. This activity should be included in the economic impacts in this study but was also beyond the scope of the project.

An important element of this study was the additional expenditures made by fishermen using independent guides and staying additional days before or after their lodge fishing. Surveys of these fishermen would have provided better estimates of their activities and expenditures. The average tourist expenditure of \$192 used in this study likely undervalues actual expenditures made by fishermen as room rates at hotels where sport fishermen commonly stay range from \$200 - \$500 per night. This would be \$100 - \$250 per person (assuming a party size of two) and when coupled with meals, transportation, entertainment, gratuities and other spending would likely exceed the average tourist expenditure substantially.

The magnitude of the gratuities for independent fishing guides, lodge guides and lodge staff is substantial but it was not included in this study. Independent fishing guides usually receive a tip from their clients at the conclusion of their fishing. Although this was not studied, these tips could easily be as high as 10% of the guide fee. With independent fishing guide fees averaging \$500 per day, the normal tip would be \$50 per day of fishing. With 16,814 fisherman-days of fishing with independent guides (4,804 fishermen x 3.5 days fishing, Table 6), the total of these gratuities could be as high as \$840,700. This is in addition to any other gratuities given to employees of restaurants, hotels or other service providers.

Similarly fishermen staying at lodges probably tip guides and lodge staff around 10% of the package price. Weekly lodge rates for their fishing packages range from about \$4,000 to \$8,000. If the average package price for the 983 (Table 6) lodge fishing guests was \$6,000, then lodge staffs would receive \$589,800 in gratuities over the course of 2007.

Finally, the value added multiplier for indirect and induced impacts likely results in a conservative estimate of these benefits. The value used in this study (1.22) is considerably less than those in other fishing-related studies in other countries. Researchers involved in future

economic impact studies should work closely with the Belize Tourism Board and other government agencies to develop more accurate coefficients reflecting the flow of expenditures through the Belizean economy.

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Appendix A: Independent Guide Survey

Economic Impact of Bonefish, Permit and Tarpon Fishing to Belize

Independent Fishing Guide Survey

The information you are asked to provide below is needed to calculate the economic impact of sport fishing for bonefish, permit and tarpon in Belize. This information is needed to show the importance of your expenditures in different sectors of the Belizean economy and taxes paid to the government. Some of the expenditure or tax categories may not apply to your business. Please mark "N/A" or "0" in these categories so I will know there are no expenses for that category.

Finally, your information will be sent directly to me. I will be the only one to see the information after it is collected. I will combine the information from each guide and report the data in summary form so that your individual business data will not be identifiable. Upon completion of the project, I will destroy the forms you send me and retain only the summary data with no guide identifiers in order to protect the confidentiality of the information you provide.

Thank you for your involvement in our project and for your dedication to the conservation of bonefish, permit and tarpon in Belize.

Fishing Activity

The total number of fishing days you booked during 2007 is a key piece of information in calculating the impact of guided fishing in Belize. Please provide the total number of fishing trips you booked during 2007 below.

Total number of days fishing in 2007: _____ Days

Fishing days with one (1) angler: _____ Days

Fishing days with two (2) anglers: _____ Days

Fishing days with three (3) or more anglers: _____ Days

Fish Targeted

Percentage of anglers targeting bonefish, permit or tarpon: _____ %

Percentage of anglers targeting other species: _____ %

Other Guest Tourism Activity

We would like to get a rough idea of the number of your guests that stay additional days in Belize prior to or following their fishing with you. Please estimate the percentage of your guests that stay additional days in Belize and the average number of days they stay.

Estimated percentage of guests that stay additional days in Belize: _____ %

Estimated average number of additional days each guest stays on their trip to Belize: _____ Days

Guide Fees

We need to know your daily guide fee in order to calculate some of the economic effects of guided fishing businesses.

Daily Guide Fee for one (1) angler: \$ _____

Daily Guide Fee for two (2) anglers: \$ _____

Daily Guide Fee for three (3) anglers: \$ _____

Business Information

Expenditure Category	Annual Expenditure in Belizean Dollars	Percent in Belize
Fuel		
Food		
Boat and Engine Maintenance & Repair		
Licenses		
Boat License		
Tour Guide		
Other		
Transportation to and from work		
Dockage		
Taxes		
GST		
Income Tax and Social Security		
Cost of Boat		
Cost of Engine		
Other Expenses (specify)		

Thank you for providing the above information in support of fisheries conservation in Belize. Be assured that the information you provide will be kept confidential. Only data in combined, summary form will be presented in the project report.

Appendix B: Lodge Owner Survey Form

Economic Impact of Bonefish, Permit and Tarpon Fishing to Belize

Fishing Lodge Survey:

_____ **Name of your lodge**

The information you are asked to provide below is needed to calculate the economic impact of sport fishing for bonefish, permit and tarpon in Belize. This information is needed to show the importance of your expenditures in different sectors of the Belizean economy and taxes paid to the government. Some of the expenditure or tax categories may not apply to your business. Please mark "N/A" or "0" in these categories so I will know there are no expenses for that category.

Along with the expenditure information you are asked to estimate the percentage of the expenses made within Belize. This information will allow us to apportion your expenditures to Belize.

You are also asked to provide the number of guests involved in fishing, diving and eco-touring that stay with you. For some of you there will be all fishing and others will have trips that involve all three activities. Again, this information will help me allocate your expenditures to the fishing sector.

Finally, you will be submitting the information directly to me by fax or e-mail. I will be the only one to see the information. I will combine the information from each lodge and report the data in summary form so that individual business data will not be identifiable. Upon completion of the project, I will destroy the forms you send me and retain only the summary data with no lodge identifiers retained to protect the confidentiality of the information you provide.

Thank you for your involvement in our project and for your dedication to the conservation of bonefish, permit and tarpon in Belize.

Guest Activity

Your lodge may offer diving and eco-touring activities in addition to fishing. It is important to know the percentage of your guests that are involved in each activity in order to apportion the percentage of your business to fishing. We also want to be able to show the government that lodge businesses are also important to the diving and eco-tourism industries as well.

Total number of guests in 2007: _____ guests

Percentage of guests involved in fishing: _____ %

Percentage of guests involved in diving: _____ %

Percentage of guests involved in eco-touring: _____ %

(Total may add to more than 100%)

Percentage of guests staying more than one week: _____ %

Percentage of guests staying one week: _____ %

Percentage of guests staying less than one week: _____ %

(Total should add to 100%)

Fishing Activity

Percentage of guests targeting bonefish, permit or tarpon: _____ %
 Percentage of guests targeting other species: _____ %

Other Guest Tourism Activity

We would like to get a rough idea of the number of your guests that stay additional days in Belize prior to or following their stay at your lodge. Please estimate the percentage of your guests that stay additional days in Belize and the average number of days they stay.

Percentage of guests that stay additional days in Belize: _____ %
 Average number of additional days each guest stays on their trip to Belize: _____ Estimated Days
 Do you book tours and other activities for your guests that are away from your lodge? ____ No ___ Yes

Business Information

Expenditure Category	Annual Expenditure in Belizean Dollars	Percent in Belize
Labour Expenses including guide fees		
Food		
Operating Supplies		
Fuel & Butane		
Maintenance & Repair		
Licenses		
Business		
Boats		
Radio		
Tour Guides		
Liquor		
Capital Improvements (average for last five years)		
Transportation		
Dues and Subscriptions		
Cost of Sales (liquor, beer, cigarettes, cigars, gift shop, fishing tackle, other)		
Taxes		
Business Tax		
GST		
Employee (income & social security) Taxes		
Hotel Tax		
Property Tax		
Insurance		
Other Expenses (telephone, office expense, professional fees)		
Other (specify)		

Thank you for supporting fisheries conservation in Belize. Be assured that the information you provide will be kept confidential. Only data in combined, summary form will be presented in the project report.