

SPORT FISHING TRIPS TO THE SOUTHERN PANTANAL (BRAZIL)

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ABSTRACT - We report the results of a formal oral survey of 493 sport fishing visitors during the high fishing season of 1994 in the Pantanal of Brazil. In addition to requests for demographic information, visitors were polled regarding cost aspects of their vacation decision, travel history, reasons for choosing the Pantanal as a tourism destination, and other aspects of their experience. Survey responses indicate that recreational fishing in the southern Pantanal is overwhelmingly a married, wealthy, educated, middle aged male experience relative to Brazil. On average, respondents had visited the region 4 times. Sport fishers reported traveling 2,700 km, staying 6 days, spending US\$970, and catching 25 kg of fish each per trip, on average. We estimate a total direct expenditures of US\$36,453,340 on sport fishing visits to the southern Pantanal. The principal reason for sport fishers to visit the southern Pantanal is not to catch fish. Rather, the primary attraction is the unique natural environment. This revelation has policy relevance with regard to regional tourism development and marketing efforts as well as natural resource management objectives in the Pantanal.

Key words: Sport fishing, expenditures, natural resource management

INTRODUCTION

The Brazilian Pantanal is a 138,000 km² tropical seasonal wetland located in the center of South America. The Pantanal provides the flood

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plain for the 360,00 km² Upper Paraguay River Basin, which is comprised of land in Bolivia and Paraguay as well as Brazil. The Pantanal is known as a cradle of biological diversity and a unique global resource. More than 650 bird species, 260 fish species, 80 mammal species, 50 species of reptiles, and 2,000 floral species have been identified there. Among the most recognized species found in the region are the giant anteater, jaguar, giant river otter, blue hyacinth macaw, caiman, maned wolf, jaburu stork, piranha, capybara, and puma. The principal economic activities within the region are extensive cattle ranching, industrial and individual mining, recreational, subsistence and commercial fishing, and, most recently, ecological or rural tourism.

Recreational or sport fishing in the region's many rivers (Figure 1) provides an important source of employment and revenue to the people of the Pantanal. More than 46,000 recreational fishers visited the southern part of the Pantanal between May 1994 and April 1995, and 72% of fish landed were captured by sport fishers (Catella, et al. 1997). Little is known about the characteristics and expenditures of sport fishers in the Pantanal. The objective of this work is to present a profile of Pantanal sport fishers in order to provide a basic understanding of the industry, to improve the ability of local governmental planning and regional tourism organizations to make policy decisions, and to provide a basis for more detailed analysis in the future. Improved understanding of the sport fishing industry will aid in the management of this industry and its resources, improving the likelihood of maximizing the industry's benefit to local communities.

METHODOLOGY

Orally administered written surveys were taken of Pantanal sport fishers over a 3 month period in 1994. The months of August, September, and October constitute the yearly quarter of greatest sport fishing pressure and represent more than 60% of the total annual visits and catch by weight (Catella et al. 1996). Surveys were administered at the mandatory weigh stations near the towns of Miranda and Corumba in Mato Grosso do Sul, Brazil. Miranda and Corumba are the most popular sport fishing destinations in the southern Pantanal.

In the census report published by Catella et al. (1996), it was reported 47% of the fish taken from the southern Pantanal by sport fishers come from the Paraguay river (serviced by Corumba) and 27% come from the Miranda river (serviced by Miranda). This census information was based upon the System of Fish Control for Mato Grosso do Sul (SCPESCA).

Sampling was on a nonrandom "catch-as-catch can" basis. Visitors were polled regarding the cost aspects of their vacation decision, their reasons for choosing the Pantanal as a tourism destination, and other aspects of their experience, in addition to demographic information. Survey responses were analyzed and reported using traditional non-parametric descriptive statistics. In total, 493 useable questionnaires were derived from this effort.

RESULTS

Demographic Profile and Motivations for Visiting the Pantanal

Of the 493 useable responses, 99% were completed by Brazilian men who live outside of the Pantanal region. The mean respondent was a 43 year old man with 2 children and a monthly salary of about US\$4,400. More than ½ of respondents held university degrees, while more than 80% had completed secondary school. Only one respondent was unaccompanied. Sport fishers traveled to the Pantanal in groups averaging about 7 adults (Table 1). In sum, according to our sample, Pantanal sport fishing is a group activity that is decidedly more male, more educated, older, wealthier, and with a smaller family than is typical of Brazil as a whole.

Table 1 - Demographics of southern Pantanal sport fishers, 1994

Category	Mean or % of total	S.D.
Age (yr)	43.10	8.63
Monthly income (US\$)	4,408.30	2,492.40
Male	99%	
Size of group	7.42	5.24
Completed 5th grade	5%	
Completed primary school (8 yr)	6%	
Completed secondary school	30%	
Completed university degree	52%	
Completed masters degree or higher	4%	
Number in family over 16	2.01	1.79
Number in family under 16	0.95	1.06

Source: The authors, based on field research.

It would be logical that the primary reasons for sport fishers to visit the Pantanal region would be directly related to fishing. While direct aspects of sport fishing (catching many, large, or varied fish) were the most important reasons for about 1/3 of respondents, 2/3 of survey responses cited reasons associated with outdoor tourism of a more general nature. More than 1/2 of respondents indicated that their principal reason for visiting the Pantanal was due to the quality of the natural environment and 7% cited the possibility of seeing exotic wildlife as their primary motivation (Table 2).

Table 2 - Principal reason for sport fishers to travel to the southern Pantanal (n=483)

Reason	% of total
Quality of the environment (natural beauty, lack of pollution)	57%
Possibility of catching large fish	14%
Possibility of catching many different species of fish	8%
Possibility of seeing wild or exotic animals	7%
Possibility of catching many fish of whatever size	5%
Proximity to other regions for fishing	3%
Relaxation	2%
Get to know the Pantanal region	1%
Proximity and accessibility to where you live	<1%

Source: The authors, based on field research.

Trip Characteristics

The respondents to the sport fishing questionnaire had traveled to the Pantanal a total of 1,943 times and spent a cumulative total of more than 13,000 days visiting the region. On average, respondents had visited the Pantanal 3.9 times and had stayed 26.5 days in total. Repeat visitors had traveled to the Pantanal an average of 6 times. In the year previous to this survey, respondents visited the region 716 times (1.5 times each, on average) and stayed a total of 4,637 days (9.4 days each, on average) (Table 3).

Table 3 - Sport fishing visits to the southern Pantanal (n = 493 questionnaires)

Specification	Total	Mean	Standard dev.
Total visits	1,943	3.94	5.73
Visitor-days	13,069	26.51	47.21
First time visits	203		
Repeat visits	1,740	6.00	6.74
Visits in past year	716	1.45	1.37
Visitor-days in past year	4,637	9.41	11.05
Visitor-days per trip to Pantanal*		6.31	1.46

Source: The authors, based on field research.

(*) Time in the Pantanal exclusive of travel time (typically 2 days).

On average, sport fishing visitors report staying 6.3 days in the Pantanal per trip (Table 3). Catella et al. (1996) reports a stay of 4-6 days per sport fishing visit (median of 5). It is likely that the sample from which our mean of 6.3 days was derived and that from which Catella et al (1996) derived a median of 5 days are statistically equivalent by conventional standards. However, we cannot offer a formal test of their equivalence due to a lack of published data in the other account.

Approximately, 41% of respondents were visiting the Pantanal for the first time. Of first time visitors, 97% stated that they intended to return to the Pantanal. More than 94% of first time visitors indicated they intended to return within the next year and about 15% reported they planned to return more than once in the next year.

Respondents to this survey reported spending a total of US\$471,191, or US\$970 per person, on their fishing visits to the Pantanal. Average expenditures per day in the Pantanal were US\$163, US\$121 if a travel day to and from the region is included in the calculation (Table 4).

Fishing vacations in the Pantanal can be purchased as package in major Brazilian cities. These packages vary substantially in cost and content. Tracking package expenditures is important because these expenditures are less likely to find their way into the local economy

than those purchases actually made within the region. Fewer than 1/4 of respondents reported purchasing some sort of travel package. Expenditures on the package totaled US\$92,088 or 20% of total expenditures. The average package price was about US\$800. Those purchasing packages spent, on average, US\$1,046 on their visit or about US\$174 per day in the Pantanal. Total expenditures by visitors purchasing packages accounted for about 26% of total expenditures overall (Table 4).

Greater than 3/4 of the respondents did not purchase a vacation package. Their visits to the Pantanal cost about US\$946 on average, or US\$160 per day. In general, those purchasing packages tend to spend about US\$100 more per trip and about US\$15 per day more than those who do not purchase packages (Table 4). Per trip expenditures for those opting to purchase packages were statistically greater than those not choosing packages, but per day expenditures were not statistically distinct (t-test, $p < 0.05$). These results can be explained by the substantial variability in trip expenditures and by the observation that visitors purchasing packages take longer trips on average than visitors who do not.

Table 4 - Total, daily and by trip expenditures for a sport fishing visit to the Pantanal (US\$), with and without purchase of a package trip, 1994

Expenditures	Total (% of total)	Mean	Stand. Dev.
Per trip	471,191 (100%)	969.53	513.00
Per day in Pantanal		162.91	94.64
Per day inclusive of travel days		120.91	68.02
Packages (n=115) (% of total)	92,088 (20%)	800.77	347.89
Per trip for those using package	120,280 (26%)	1,045.91	458.58
Per day for those using package		173.53	80.16
Per day for those using package, inc. travel days		129.40	58.28
Per trip, no package purchased	350,911 (74%)	945.85	526.49
Per day in Pantanal, no package purchased		159.61	98.47
Per day, no package purchased, inc. travel days		118.27	70.56

Source: The authors, based on field research.

Typical costs incurred by sport fishing visitors to the Pantanal include those from boat-hotels, equipment, food, boat rental, bait, ice, boat fuel, and guide services. Not all visitors use all of these services, and some packages have some or all of them included. Almost 1/2 of the visitors reported additional boat-hotel expenses. Reported boat-hotels costs were, on average, US\$945 per trip, or US\$159 per day for those who reported expenditures. About 15% of respondents reported additional food expenditures of US\$76 each per trip or US\$11 per day. Boat rental costs were reported by 7% of respondents at a rate of US\$69 per visitor-trip or US\$10 per visitor-day. About 1/5 of respondents reported ice purchases of about US\$48 each per trip or US\$7 per day. About 1/3 of respondents reported purchasing fishing gear for the trip at an average of US\$37 per purchaser or US\$6 per day. Reported fishing gear expenditures were highly variable. Moreover, they may not actually reflect expenditures in the Pantanal as many fishermen bring their own fishing equipment. Boat fuel and river guide expenditures were similar at about US\$35 each per trip, reported by 14% and 12% of respondents, respectively (Table 5).

Table 5 - Principal expenditures for southern Pantanal sport fishing trips exclusive of packages, 1994 (US\$)

Expenditures	Observations (% of total)	Mean	Standard Deviation
Boat-hotels per visitor	236 (49%)	944.50	234.64
Boat-hotels per visitor-day	236 (49%)	158.75	47.01
Food per visitor	74 (15%)	76.24	82.18
Food per visitor-day	74 (15%)	11.23	10.28
Boat rental per visitor	36 (7%)	69.14	100.80
Boat rental per visitor-day	36 (7%)	10.16	14.40
Bait and ice per visitor	94 (19%)	47.76	62.45
Bait and ice per visitor-day	94 (19%)	7.22	9.00
Fishing gear per visitor	158 (33%)	37.07	70.99
Fishing gear per visitor-day	158 (33%)	6.06	11.87
Boat fuel per visitor	68 (14%)	35.63	39.97
Boat fuel per visitor-day	68 (14%)	5.45	6.22
River guide per visitor	56 (12%)	35.32	25.89
River guide per visitor-day	56 (12%)	5.35	4.01

Source: The authors, based on field research.

In sum, if repeat visits are any indication of enjoyment, sport fishing visitors to the Pantanal appear to enjoy their visits to the region. The observed rate is quite impressive. New visitors to the region continue to be pleased with their Pantanal experiences implying that it is not merely due to selection bias that these observed rates of return are so high. Expenditures on Pantanal sport fishing are rather variable and depend to some extent on the type of services used within the general category of sport fishing. Boat-hotels stand out as a costly housing option, for example, and those who purchase packages tend to spend more than those who do not.

Transportation Information

An unavoidable part of the Pantanal sport fishing experience is getting there. Approximately 400 km from the nearest population center and more than 1,500 km from Brazil's most populous regions, traveling to Pantanal can be an adventure in itself.

While its remoteness is considered among the region's positive characteristics, traveling to the Pantanal poses a substantial investment in time, money, or both. Respondents had traveled a total of almost 4 million km, about 3 thousand km per trip, to visit the Pantanal. Within the most recent year, respondents had traveled almost 2 million km (2,699 km per trip) to visit the region. On average, visitors traveled 468 km per day spent in the Pantanal or 347 km per day including travel days to and from the region (Table 6).

Table 6 - Distance traveled for sport fishing visits in the southern Pantanal, 1994 (km) (n=493)

Specification	Total	Mean	St. Dev
Total distance traveled to visit Pantanal	3,847,830	2,803 per trip	648
Distance traveled last year	1,932,140	2,699 per trip	645
Distance traveled per visitor-day in Pantanal		468	163
Distance traveled per trip-day inclusive of travel days		347	98

Source: The authors, based on field research.

Practically all.(96%) sport fishing visitors to the Pantanal came from the principal population centers of Brazil's Southeast and South. A relative few visitors (3%) came from the Central-West states where the Pantanal region is located. Fewer still originated in the Northeast region (2%) and none came from the Northern region of the country.

More specifically, 75% of all respondents traveled from the state of Sao Paulo, 12% from Parana, 3% from Minas Gerais, and 2% each from Santa Catarina, Mato Grosso do Sul, and Rio de Janeiro. About 1% or fewer visitors traveled from the states of Rio Grande do Sul, Espirito Santo, Ceara, Bahia, Goias and the Capitol District. Catella et al. (1996) reported that 72% of visitors came from Sao Paulo, 11% from Parana, and 6% from Minas Gerais.

Visitors have the option of flying, taking a regional bus, chartering a bus or plane, or driving their own vehicles. Due to data restrictions and potential errors in interpretation, responses were divided between those who arrived by air (31%) and those who arrived by roadway (69%) for their most recent trip to the region. The only commercial airport within the southern Pantanal is located in Corumba. In Catella et al. (1996), 32% of the visitors to Corumba traveled by air, but only 12% of the visitors to Corumba and Miranda together. Our data may have been skewed toward Corumba visitors.

Those visitors arriving by roadway traveled 2,718 km on average, while those arriving by air traveled 2,991 km round trip to visit the Pantanal. Via roadway, the trip took an average of 34 hr (6 hrs per day stayed) at a cost of US\$65 (US\$0.03 per km, US\$11 per day stayed) versus 4 hr (<1 hr per day stayed) and US\$764 (US\$0.26 per km, US\$132 per day stayed) by air (Table 7). Tests reveal that roadway

travel and travel air travel differ significantly in terms of distance (per days stayed and per trip), cost (per trip, day stayed, and km), and time (per trip and day) at conventional levels (t-test, $p < 0.05$). A substantial tradeoff between time and money exists in the selection of mode of travel for a visit to the Pantanal.

Table 7 - Mode, cost, time, and distance of travel for southern Pantanal sport fishing visits, 1994

Specification	Roadway (n=339)		Air (n=153)		Total (n=492)	
	Total(% of total)	Mean (s.d.)	Total(% of total)	Mean (s.d.)	Total (% of total)	Mean (s.d.)
Distance/trip (km)	921,280 (67%)	2,718 (700)	457,560 (33%)	2,991 (466)	1,378,840 (100%)	2,802 (648)
Distance/trip-day (km)		453 (179)		501 (114)		468 (163)
Time/trip (hr)	10,481 (94%)	34.48 (9.41)	652 (6%)	4.37 (1.82)	11,133 (100%)	24.54 (16.12)
Time/trip-day (hr)		5.69 (2.51)		0.72 (0.29)		4.05 (3.11)
Transport cost/trip (US\$)	14,448 (15%)	64.50 (55.79)	80,974 (85%)	764 (157.69)	95,422 (100%)	291.81 (342.91)
Transport cost/km (US\$)		0.03 (0.02)		0.26 (0.05)		0.10 (0.11)
Transport cost/day in Pantanal (US\$)		10.59 (8.52)		131.85 (39.13)		49.99 (61.45)
Transport cost/day whit travel days (US\$)		7.87 (6.31)		48.75 (13.05)		37.00 (44.86)

Source: The authors, based on filed research.

s.d. = standard deviation

Fishing Success

Although sport fishing visits to the Pantanal are not principally motivated by expectations of the fish to be caught, catching fish (number, weight or variety) remains among the motivations for sport fishers to travel to the region. Respondents provided information about

their success in capturing 8 popular fish species. Clearly, not all fishers attempted to catch or caught all species; however, our data did not allow us to distinguish fishing effort from success.

The great majority of fishers caught Pacu (*Piaractus mesopotamicus*), Pintado/Cachara (*Pseudoplatystoma corruscans/P. fasciatum*), Piranha (*Pygocentrus nattereri* or *Serrasalmus sp.*), and Barbado (*Pimampus pirinampu*) species (92%, 84%, 84%, and 73%, respectively). The least captured species were Curimbata (*Prochilodus lineatus*), Jau (*Paulicea luetkeni*), Piraputanga (*Brycon microlepis*), and Dourado (*Salminus maxillosus*) (4%, 18%, 22%, and 22%, respectively) (Table 8).

Table 8 - Fish landed by southern Pantanal sport fishers: number, size, and proportion, 1994

Species	Fishers	Number of fish landed			Weight of fish landed (kg)		
		Total (% of total)	Mean per visitor (s.d.)	Mean per visitor-day (s.d.)	Total (% of total)	Mean per visitor (s.d.)	Mean per visitor-day (s.d.)
Total	486 (100%)	41,056 (100%)	11.56 (7.37)	1.93 (1.32)	89,002 (100%)	24.89 (15.11)	4.15 (2.71)
Pintado/Cachara	409 (84%)	3,009 (7%)	1.11 (0.95)	0.18 (0.16)	15,533 (17%)	5.71 (4.91)	0.95 (0.85)
Dourado	106 (22%)	275 (<1%)	0.50 (0.61)	0.08 (0.11)	1,194 (1%)	2.05 (2.46)	0.33 (0.41)
Jau	88 (18%)	206 (<1%)	0.31 (0.27)	0.05 (0.04)	2,877 (3%)	4.28 (3.76)	0.70 (0.60)
Pacu	449 (92%)	17,113 (42%)	4.83 (4.10)	0.81 (0.70)	49,873 (56%)	14.01 (11.82)	2.34 (2.04)
Curimbata	21 (4%)	438 (1%)	2.39 (5.90)	0.36 (0.84)	25	3.57	0.51
Piranha	409 (84%)	16,208 (39%)	5.55 (5.24)	0.93 (0.92)	11,893 (13%)	4.08 (3.85)	0.68 (0.68)
Piraputanga	106 (22%)	450 (1%)	0.66 (0.79)	0.11 (0.13)	353 (<1%)	0.56 (0.61)	0.09 (0.11)
Barbado	355 (73%)	3,391 (8%)	1.26 (1.30)	0.21 (0.21)	7,360 (8%)	2.73 (2.77)	0.45 (0.46)

Note: Respondents provided either the number of fish caught, the weight of their catch, or both. A mean weight per species was calculated based upon those respondents who provided both measures. This mean was used to estimate the missing information for those respondents who only provided either one or the other measure. In the case of Curimbata, no respondents provided both an estimate of the weight and number of their catch. Only one individual provided the weight of Curimbata, and a mean estimate of the weight of Curimbata caught was not possible to calculate.

Source: The authors, based on field research.

s.d. = standard deviation

Respondents reported catching more than 41 thousand fish (mean: 12 per visitor-visit, 2 per visitor-day) weighing more than 89 thousand kg (mean = 25 kg per visitor-visit, 4 kg per visitor-day) on this trip. Catella et al. (1996) reported a median of 20 to 27 kg per visitor-trip, or 3.7-5.4 kg per visitor-day. The Catella study used a median of 5 days per visit, while we use a mean of 6.3 days per visit in our calculations. This accounts for the reported difference in weight of catch per visit between the two studies.

The four species caught by the most visitors accounted for about 95% of fishing success both in terms of number and weight of fish caught. Pacu accounted for 42% of the fish caught and 56% of the total weight. Piranha comprised 39% of the fish caught, but only 13% of the total weight. Pintado/Cachara were only 7% of the fish caught, but 17% of the total weight. Barbado made up 8% of both the number of fish and the total weight captured (Table 8). Catella et al. (1996) reported that Pacu represented 44% of the weight of fish landed by sport fishers, Pintado/Cachara 22%, Piranha 6% and Barbado 5%, or a total of 77% of the catch.

Finally, based on survey information, respondents spent US\$69.87 (s.d. 165.01) per kilo or US\$148.91 (s.d. 331.10) per fish captured. Clearly, for the majority of visitors, there is more to the sport fishing experience than providing an additional source of protein for his family.

DISCUSSION

Since our observations appear to support the findings of Catella et al. (1996), we may consider our results a relatively representative sample of all sport fishing visitation to the southern Pantanal from May of 1994 to April of 1995. If so, it is appropriate and useful to combine our expenditure data with their visitation data in order to gain an estimate of the total expenditures of sport fishers in the southern Pantanal over a year's time.

As Catella et al. (1996) report that 98% of air travel into the southern Pantanal went to Corumba, we will use the overall mean (US\$ 969.53) for visits to Corumba and only include estimated road travel expenditures for sport fishing visits outside of that city. Catella et al. (1996) report 9,642 visitors to Corumba for sport fishing for the

year. Total expenditures of US\$ 9,348,208 can be derived for these visitors over the year. If all of the other 36,519 visitors can be presumed to have arrived by roadway, total expenditures of US\$ 27,105,132 can be calculated for these visitors by recalculating mean expenditures per visitor excluding air travelers (US\$ 742.22). Total expenditures of US\$ 36,453,340 can be considered a very rough estimate of the annual direct financial infusion to the southern Pantanal from sport fishing visits. This is not an estimate of industry profits, as it does not include the costs of operation. It is also not the regional economic impact of the industry, as it includes neither local multipliers nor leakages (funds that are spent to purchase the goods and services provided by the region which never reach the region; common examples are packages purchased in major metropolitan areas representing 20% of total expenditures in our survey and the absentee ownership of tourism ventures).

CONCLUSIONS

Recreational or sport fishing provides an important source of employment and revenue to the people of the Pantanal. More than 46,000 recreational fishers visited the southern Pantanal between May of 1994 and April of 1995 accounting for 72% of all fish landed (Catella, et al. 1997). It is in the interest of the industry and of regional and local governments to know the characteristics of their clientele and their recreation habits, which correlate most strongly with their expenditures. In this work, we provided a profile of southern Pantanal sport fishers in order to provide a basic understanding of the industry and a basis for more in-depth inquiry in the future.

This study reveals at least two issues of debate for the future of the sport fishing industry and natural resource policy in the southern Pantanal. Heretofore, the sport fishing industry was considered distinct from the region's broader, nature oriented tourism industry. Although our conventional wisdom says when the fishing is better more fishers will be willing to pay for fish, our study reveals that the individuals who are paying the most and arrive in greatest numbers for sport fishing in the region are not principally interested in catching fish. This suggests a substantial change in the types of services that the sport fishing industry

might offer and in local perspectives on the management of fisheries; it also casts new light on the competition between the sport fishing industry and commercial and subsistence fishing. For example, fishing in the Pantanal is prohibited for 3 months (November-January) during “piracema” (the spawning period), at which time the sport fishing infrastructure remains unused. This period coincides with school holidays, Christmas and New Year’s festivals, and the most popular travel period in the country. If the sport fishing industry’s infrastructure were oriented to provide services to nature-oriented tourists, if only during the piracema period, it should expect substantial returns for little additional investment. It is necessary to recognize the market niche for ecological tourism in the Pantanal—likely the fastest growing portion of the tourism sector—and utilize the existing sport fishing infrastructure to attend to the demands of this market segment.

If the sport fishers are not principally motivated by catching fish, but rather to experience the unique natural resources of the Pantanal, then the principal fisheries management objective should not necessarily be to produce more or larger fish for sport fishing. Regional efforts at fisheries management should then be integrated into public and private administration at an ecosystem level to provide the types of services and experiences which visitors are interested in purchasing. In addition, if sport fishers are not principally motivated to capturing fish, then offering alternative and preferred experiences for tourists may act to increase tourist receipts per visit through greater willingness-to-pay, while decreasing the pressure on existing fish stocks, leaving more fish for commercial and subsistence fishers.

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