

# STATUS OF ONGOING BILLFISH SOCIO-ECONOMIC STUDIES IN MEXICO AND COSTA RICA

ROBERT B. DITTON LESLIE FINKELSTEIN, AND SHEPHERD GRIMES,  
Department of Wildlife and Fisheries Sciences  
Texas A&M University  
College Station, TX

## ABSTRACT

Work is underway on social and economic studies of recreational billfish fisheries in Mexico and in Costa Rica. In contrast with our previous billfish angler studies, (which have sampled billfish tournament anglers in lieu of a complete sampling frame of billfish angler), these studies will sample anglers who utilize charter boats to gain access to billfish fishing. We expect to find wider diversity than seen previously among billfish fishing community in terms of fishing motivations, attitudes toward the catch-related aspects of fishing, management preferences, trip expenditures, and willingness to pay above current fishing trip expenses. The two billfish fisheries will be described (i.e., geographical distribution of charter operators, number of trips, etc.) and study design details (i.e., sample sizes, survey research design) presented. This paper will describe the conceptual and methodological aspects of each project in order to enhance human dimensions research understandings.

Key Words: Angler Survey, Billfish, Costa Rica, Human Dimensions, Mexico

## INTRODUCTION

Outside the United States, there is little social and economic information available on recreational billfish fisheries. This can be attributed to four factors. One, billfish anglers are viewed by governments as a small constituency. This translates politically into a low priority for action. Two, the usual motivation for social and economic research is missing. There is often no highly publicized resource allocation crisis. Instead billfish are often taken indirectly or on occasion directly by the commercial fishery. Three, integrated fisheries management is a new concept with social and economic research issues still rating below the traditional biological concerns. Four, data collection from billfish anglers is difficult as they are widely dispersed and not easily identifiable. Unfortunately, when taken together, the possibilities of government funding and support for social and economic research is extremely low. However, this type of research is necessary if social and economic benefits associated with recreational and commercial billfish fisheries are to be better understood and used in decisions involving tradeoffs for

## **Proceedings of the 47<sup>th</sup> Gulf and Caribbean Fisheries Institute**

individuals and adjacent communities.

Whereas we can not review all the possible outcomes from having social and economic data, two are particularly important. The most critical reason to promote social and economic data collection is the potential it has to affect fisheries management. This type of information can be used to influence decisions made regarding resource allocation, priority level for funding, and other management issues. For example, an economic impact statement played an important role in prohibiting commercial harvest of red drum in Texas (Christian 1986).

Similarly, economic impact information from Florida's red drum recreational anglers supported the change of status for red drum to game fish (Rockland 1988). In addition, this same type of evidence of benefit can lead to an increased priority level for billfish research. This means more time spent researching the biological issues of billfish in order to protect known benefits.

Social and economic information can demonstrate that billfish fisheries are not just an ocean resource, but rather recreational billfish anglers provide benefits to adjacent local communities. They have a disproportionately higher rate of expenditure per day compared to other anglers and hence a greater overall economic impact (Graefe and Ditton 1986). Therefore, the billfish fishery needs to be viewed as an important attraction for local tourism with a good potential for growth if conservation measures are implemented. This demonstrates the need for more research on billfish anglers and billfish fisheries as they represent an important addition to adjacent communities.

The information provided by social and economic data can influence decisions on the resource, demonstrate the extent of local and regional community gain, and help define billfish angler behavior. In the sections that follows we discuss specific project objectives for Costa Rica and Mexico, methodological considerations including angler survey methods, problems surrounding sample design, and problems acquiring a representative sample in further detail.

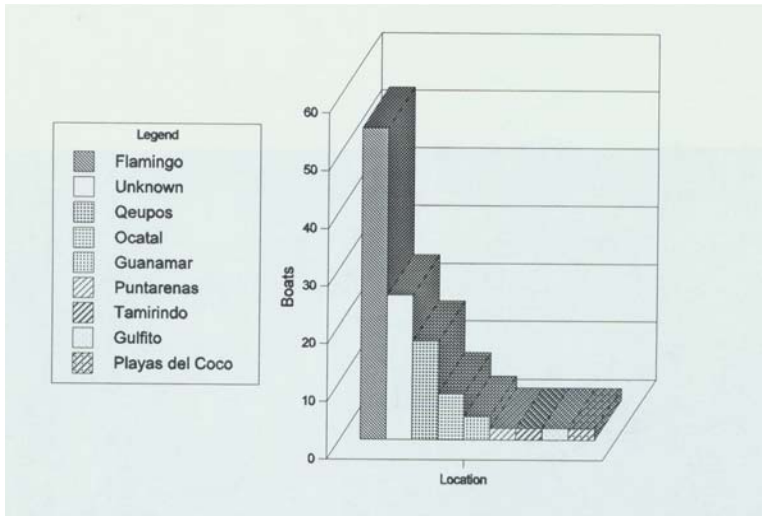


Figure 1: Distribution of boats in Costa Rica by geographic area.

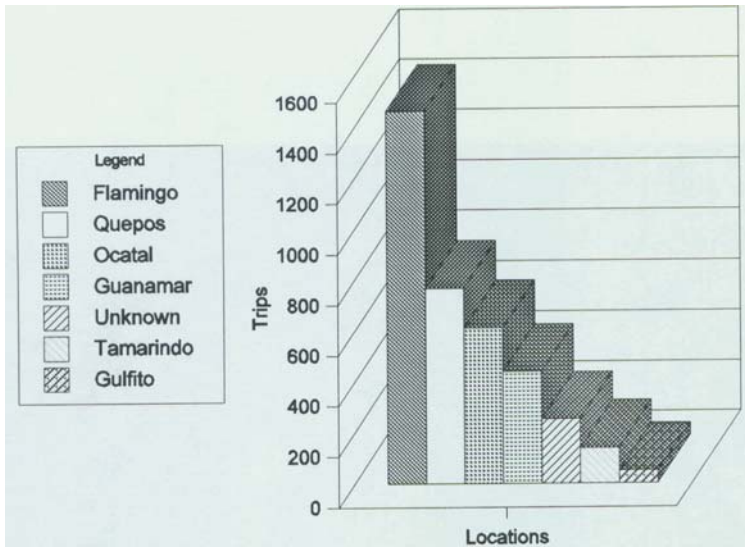
### Project Objectives

The research goal in Costa Rica and Mexico is to increase local understanding of the social and economic benefits associated with the billfish fishery in each respective country. This information can be viewed with similar commercial fishery data to provide a perspective for fisheries/tourism decision makers in order to encourage decisions that are in the public interest. In Costa Rica and Mexico, social and economic profiles will be completed for the charter boat billfish angler population, and the charter boat and tournament billfish angler populations, respectively. Additional attention will focus on fishing behavior, attitudes, catch and release levels, management preferences, trip expenditures, and consumer surplus. All data will be used in considering implications for current and proposed fishery management measures.

Current policy on the Costa Rican billfish fishery is under debate. Whereas Costa Rican officials have previously recognized the economic benefits in protecting their renewable and/or sustainable resources on land (Hill 1990), they have yet to reach this same conclusion for billfish fisheries. Ecotourism now flourishes in the country and represents the third greatest source of foreign income (Hill 1990). It is unclear why this conservation ethic ends at the water's edge;

**Proceedings of the 47<sup>th</sup> Gulf and Caribbean Fisheries Institute**

however, similar social and economic benefit information for the billfish fishery might lead policy in the same conservative direction. If data demonstrate angler support for regulations protecting billfish, government will have some justification for increased regulation. Also, social and economic data that demonstrate a possible loss of benefits to the country due to current fisheries management policies, could lead to a distinct change in current policy.



Fig

ure 2: Distribution of trips in Costa Rica by geographic area

Likewise, the study of the Mexican billfish fishery was spurred by commercial longlining activity for fear it threatens the value associated with sport fishing and related tourism activity. At present time there is a policy debate as to the benefits of commercial versus recreational fisheries and the possible social and economic benefits forgone by continued longlining. Once again, social and economic data collected in Mexico could led to a new conservation ethic and accordingly, an increase in enforcement of current fishery regulations.

Methodological Considerations of Angler Studies

## **Proceedings of the 47<sup>th</sup> Gulf and Caribbean Fisheries Institute**

The key to understanding the social and economic benefits associated with the billfish fishery and its management begins with knowledge of its social organization. Leisure research demonstrates the importance of social group in analysis of recreational participation (Burch 1973). Therefore, billfish anglers are examined within the context of the group they participate with most often. Next, there are concerns for what motivates anglers to pursue billfish since catching one in the U.S. is a rare event. Also, there is the concern for the level of commitment demonstrated by the angler. Finally, media and other influences are examined to determine why an angler has chosen a particular site and/or time of the year to visit. This information can be used to understand the social organization of billfish anglers (Burdge and Field 1972). All information is gathered usually by self-administered questionnaire according to established survey protocols.

Survey research is perhaps the most frequently utilized mode of observation in the social sciences (Babbie 1992). A first step in this process is deciding which measurement instrument should be used: personal interviews, telephone questionnaires, or self-administered questionnaires.

The instrument used varies according to several factors: cost, desired sample size, amount of data to be collected, type of data to be collected, and the capabilities (technical and logistical) of persons conducting the survey. Pros and cons of each method are explored in further detail by Bailey (1987), Babbie (1982), and Dillman (1978). Overall, mail questionnaires are least expensive where personal interviews are the most expensive to conduct (Bailey 1987).

In both projects, Mexico and Costa Rica (the Mexico project it is not a nationwide study and pertains only to Cabo San Lucas, La Paz, San Jose, Buena Vista, and Mazatlan on the west coast) personal interviews were simply unrealistic due to the geographic dispersion of the sample across many countries (although mainly within the U.S.). This method would not have been cost effective. Similarly, local intercepts of anglers at dockside would have been disruptive to their fishing experiences and too expensive to provide coverage throughout the year. Also, telephone interviews would prove expensive due to the amount of data to be collected, and some information needed could not be appropriately obtained by telephone. Thus, the instrument chosen was a self-administered mail questionnaire.

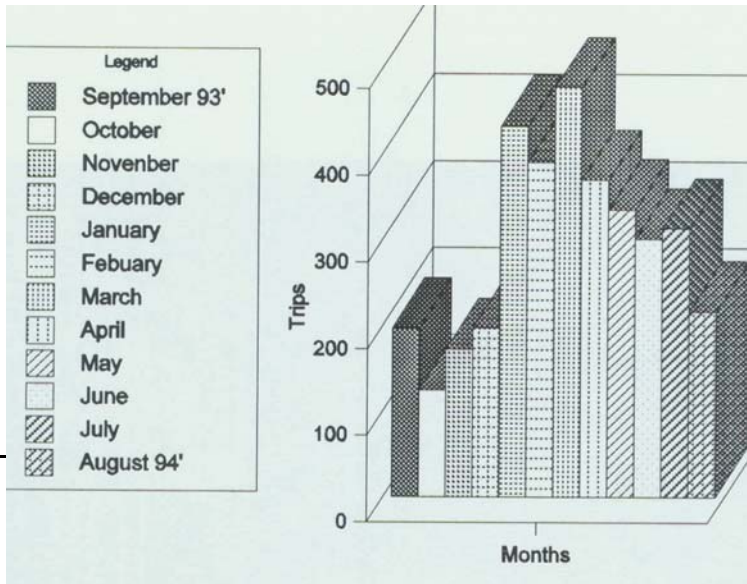


Figure 3: Distribution of trips in Costa Rica by season.

istribution of trips in Costa Rica by season.

The next step involved drawing a representative sample of anglers to receive the mail questionnaire. The first stage here involved building a sampling frame, defined by Babbie (1992) as the list or quasi-list of elements from which the sample is selected. In this case, a list of anglers who had fished for billfish in either the Mexico study area or Costa Rica within the previous twelve months. From this list, a random sample can be drawn.

Babbie (1992) discusses two basic types of sampling: probability sampling and non-probability sampling. Probability sampling will enhance the likelihood of selecting a set of elements from the population in such a way that descriptions of these elements accurately portray the parameters of the population from which the sample was drawn (random selection as the key process). Non-probability sampling will be used for projects in both Costa Rica and Mexico because these situations have characteristics which make probability sampling either impossible or not feasible (Babbie 1992). For example, the total population of billfish anglers was not

**Proceedings of the 47<sup>th</sup> Gulf and Caribbean Fisheries Institute**

known for either study, nor were these populations likely to be established prior to initiating research efforts or any time in the recent future. Thus, samples will be purposive; they will be selected on the basis of some knowledge of the population, its elements, and the nature of research aims (Babbie 1992). This will yield the best possible statistics and population parameter estimates. Since the sampling process is a potentially strong source of bias, it should be conducted as deliberately as possible.

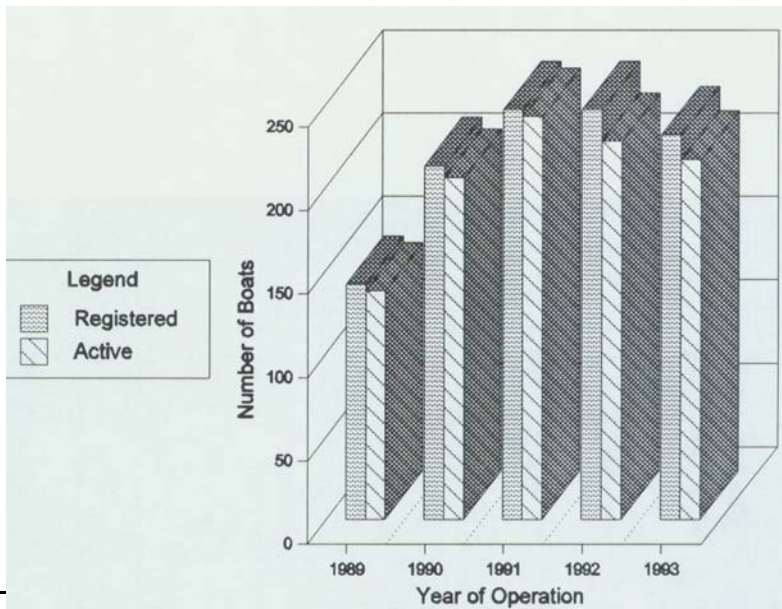


Figure 4: Number of boats in operation by year for Cabo San Lucas

Once a questionnaire has been developed to meet the objectives of the survey, and the sample drawn, the mailing process is ready to begin. Dillman (1978) presented the Total Design Method (TDM), which has been followed with few exceptions in the past and yielded good response; effective response rates for past studies have ranged from 61-72% (Hunt and Ditton 1994). The TDM works because of its attention to personalization, detail, and persistence

**Proceedings of the 47<sup>th</sup> Gulf and Caribbean Fisheries Institute**

(Hunt and Ditton 1994). Cover letters will be personalized to each individual in the sample rather than "Dear Angler" and hand signed. The process involves a series of mailings; the first includes a questionnaire, a cover letter, and a business reply envelope to return the completed questionnaire.

One week after this, a post card is sent reminding respondents they have not returned the questionnaire, and thanking them, if they have already done so. Two weeks later, a second mailing is sent which includes another questionnaire, business reply envelope, and a revised cover letter informing respondents that their completed questionnaire has not yet been received. Four weeks later, a third and final mailing is sent. It also includes a questionnaire, business reply envelope, and a revised cover letter urging the respondent one last time to return a completed questionnaire. For a more detailed discussion of this mail questionnaire methodology, see Dillman (1978).

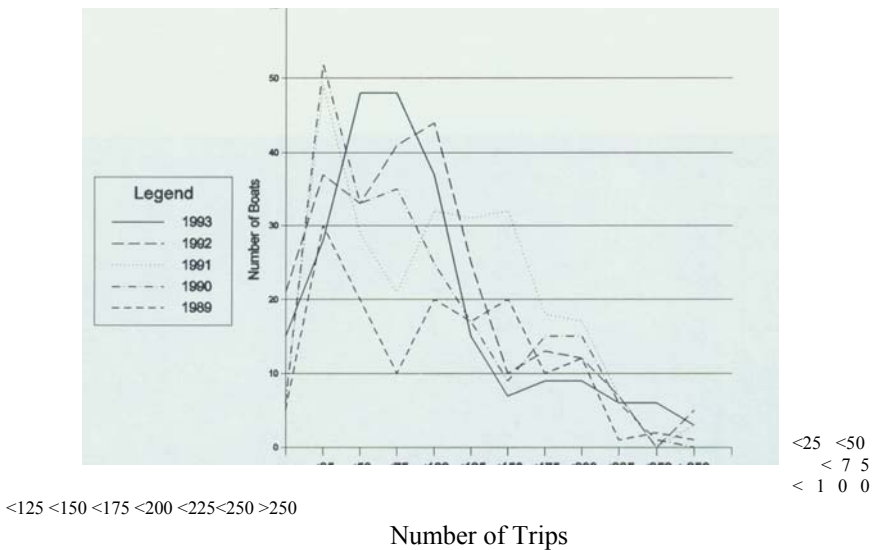


Figure 5: Number of trips per boat by year for Cabo San Lucas



## **Proceedings of the 47<sup>th</sup> Gulf and Caribbean Fisheries Institute**

### **Where We Currently Stand**

The first goal in both studies was to build a comprehensive list of boats chartering billfish fishing trips in the region. This occurred more expeditiously in Costa Rica, mainly because many boats were owned or operated by individuals who welcomed such a study in behalf of billfish conservation. An inventory identified approximately 120 boats in Costa Rica. In Cabo San Lucas, there were 231 boats and 45 in La Paz. Numbers of boats for three other locations in the Mexico study area remain incomplete at this time. Figure 1 shows the distribution of boats by geographical area for Costa Rica, and Figure 2 shows the distribution of trips by geographical area.

Once the boat inventory was complete, the next task was to obtain data on the number of billfish fishing trips each vessel took over each of the past twelve months. This would be used to estimate the total numbers of trips taken in each study area over the past year and used to extrapolate angler sample results to the general population of billfish anglers (i.e.- the total number of billfish caught and released, total number of billfish harvested, and total expenditure and economic value of billfish angling). This involved communicating with charter boat operators identified in the boat inventory. Operators were sent a flyer describing the project and a worksheet to complete regarding the number of billfish trips taken over the previous twelve months. English and Spanish versions were used as necessary. In Costa Rica, a total of 3,124 trips were reported from about one-third (32%) of the boats that were contacted. Assuming there is continuity among non-respondent charter boat operators the total number of billfish trips taken in Costa Rica would be approximately 10,000. Figure 3 shows the distribution of trips by season for Costa Rica as provided by one-third of the operators. Figures 4 and 5 demonstrate yearly trends for the number of boats in operation and their frequency of trips from Cabo San Lucas. In this effort, our main difficulty was that many smaller operators failed to keep detailed records, thus requiring additional time to formulate accurate responses.

The next and perhaps most difficult task was building the sampling frame, which entailed acquiring a confidential list of anglers' names and addresses from travel agents and charter boat operators. The reason for sampling two groups was based on feedback from boat operators that there were two types of anglers: those who simply walk on and fish and those who pre-plan their trips specifically to fish. A list of travel agencies (with a personal contact at each) who book charter fishing trips to the region was assembled for each country. This was accomplished primarily through communication with and the cooperation of influential actors in the respective areas, in addition to travel and fishing magazine advertisements.

## **Proceedings of the 47<sup>th</sup> Gulf and Caribbean Fisheries Institute**

Contact was made with the named individuals on the list (because of concerns for distribution, we tried to include travel agents from throughout the U.S.). The project was described to them and a packet of information sent describing past research, and dealing with confidentiality issues. Finally, requests were made for a list of names and addresses of clients.

Requests for names and addresses were also sent to charter boat operators. Operators were selected to achieve a balance in Costa Rica with regard to size of the operation and geographic location. An equal number of large and small operators were selected, so as not to over represent individuals who were most likely to use either size operation. Also, a balance was achieved with regard to geographic area, to prevent over representing a particular location.

Requests to charter operators were met with less hesitation than those to travel agents because of their prior knowledge of the study. Finally, a random sample of 1,200 was drawn with 600 from travel agents and 600 from charter boat operators. The sample size was derived from computations using the estimate of the total number of trips taken in the past year (Cochran 1977).

Next, a questionnaire was developed primarily from those used in two previous studies: 1) The 1993 Survey of Billfish Tournament Anglers in Puerto Rico and 2) The 1989-90 Atlantic Billfish Angler Survey. Questionnaire development is an ongoing process where an effort is made consistently to improve the questions used. Most questions have been thoroughly tested previously and proven effective. Modifications were made to make the questionnaire relative to each study location. With slightly differing objectives in the Mexico project, two questionnaires were designed; one for general billfish anglers and one for billfish tournament anglers. The questionnaire for general billfish anglers was essentially identical to that used in the Costa Rica project.

This is where we stand now. Mailings are set to begin in early January, 1995. This date was set to make use of a 'spring window', which is considered be an optimal time for survey research (Brown 1991).

### **DISCUSSION**

Understanding why anglers choose to travel to a specific site is a major concern for any community where the billfish fishery is an integral part of tourism infrastructure. Data from Mexico and Costa Rica demonstrates that charter fishing businesses are unevenly distributed geographically. This could be due either to angler preference for these areas (i.e. better services) or the availability of the necessary complementary infrastructure. It is important to recognize that if the current character of the billfish fishery were to change and expectations were no longer met, anglers could substitute other sites elsewhere. This study obtains

## **Proceedings of the 47<sup>th</sup> Gulf and Caribbean Fisheries Institute**

information on the characteristics and qualities sought by billfish anglers on their billfishing trip. In addition, it uncovers what areas would represent the most likely place an angler would go as a substitute.

When the goal is to maintain or increase billfish fishery participation, understanding why an angler chooses to fish at the site is critical. This not only enables management to supply the preferred setting, but provides information to help improve upon conditions that increase participation. In addition, local recognition that anglers have billfish fishery substitutes available to them is important. Threat of substitution is a prime reason for protecting the fishery. A fishery managed according to a conservation ethic has less to fear from substitution decisions and subsequent declines in social and economic benefits.

Most social and economic studies of billfish anglers have focused on tournament participants. This study will contain data gathered from samples of charter boat customers and tournament participants. This does not mean there is no overlap between samples as some individuals participate in both. However, anglers identified through a sample of tournament anglers should differ from charter boat customers. Some of the expected differences would include the following: tournament anglers place more importance on catch-related motivations; they have a higher level of commitment to the sport, and spend more days fishing. Results for charter boat anglers will provide a more accurate picture of the billfish fishery than previously available.

A dimension that arises, perhaps due to the relatively small size of the billfish constituency discussed previously, is that of building partnerships in support of billfish conservation efforts.

Much the same as with all special interests, the future of billfish conservation may lie in the incorporation of groups with related concerns. The mobilization of political and financial support for research and change is vital in any such effort. The Costa Rica project is a prime example of this. Local participation in the study was encouraged to prevent the perception of outsiders coming in to conduct research and then leaving with no long term concern for the area. Efforts need to encourage a feeling of ownership of the resource, a resource that must be protected if social and economic benefits are to be sustained. This was visible in the list of the groups who aided in funding the study. Game Conservation International, Costa Rica Ecology Watch, and various local charter boat operators all provided tax deductible funds through The Billfish Foundation to support the project, an obvious indicator of increased awareness of the need for more comprehensive understanding of the fishery. Forming such coalitions in support of a goal is the first step in the accomplishment of that goal.

**Proceedings of the 47<sup>th</sup> Gulf and Caribbean Fisheries Institute**

LITERATURE CITED

- Babbie, Earl. 1982. *Social Research for Consumers*. Wadsworth Publishing, Belmont, CA. 345pp.
- \_\_\_\_\_. 1992. *The Practice of Social Research*. Wadsworth Publishing, Belmont, CA. 493pp.
- Bailey, Kenneth D. 1982. *Methods of Social Research*. Collier and Macmillan, New York, NY. 475pp.
- Brown, T.L. 1991. Use and abuse of mail surveys in fisheries management. *American Fisheries Society Symposium*. 12: 255-261
- Burch, W.R. 1969. The social circles of leisure: Competing explanations. *Journal of Leisure Research*. 9: 174-187.
- Burdge, R. J. and D. R. Field. 1972. Methodological perspectives for the study of outdoor recreation. *Journal of Leisure Research*. 4: 63-72.
- Christian, R. T. 1986. Decisionmaking in coastal fisheries conflict: the case of red drum and spotted seatrout legislation in Texas. Master of Science thesis, Texas A&M University, College Station. ?pp.
- Cochran, W. G. 1977. *Sampling Techniques*. John Wiley and Sons, New York, NY. 399pp.
- Dillman, Don A. 1978. *Mail and Telephone Surveys: the Total Design Method*. John Wiley and Sons, New York, NY. 399pp.
- Graefe, A. R. and R. B. Ditton. 1986. Bay and offshore fishing in the Galveston Bay area: A comparative study of fishing patterns, fishing characteristics, and expenditures. *North American Journal of Fisheries Management*. 6:192-199.
- Hill, C. 1990. The paradox of tourism in Costa Rica. *Cultural Survival Quarterly*. 14: 14-19.
- Hunt, Kevin H. and Robert B. Ditton. The 1994 Statewide Angler Survey: A Human Dimensions Tutorial. In prep. Rockland, D. B. 1988. Statement of the sport fishing institute on economic considerations for Florida redfish management before the Florida marine fisheries commission. Sport Fishing Institute, Washington, D.C. 13pp. Unpubl. MS.