

## Policies and Characteristics

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### ABSTRACT

Saltwater fishing tournaments have proliferated in number in recent years. Fishing tournaments in Texas are not regulated nor are there different fishing regulations for tournament and non-tournament anglers. As prize money and the number of events as well as their impacts have increased, some anglers have expressed the need for increased regulation of tournaments and their participants. The objectives of this study were to better understand the problems involved in saltwater fishing tournaments, to identify tournament and non-tournament angler preferences for possible fishing regulations, and to examine within group differences in attitudes, opinions, and preferences regarding salt water tournament issues. A stated preference choice approach, which uses hypothetical scenarios to derive individuals' preferences, provides an understanding of the relationships of multiple factors as they contribute to preferences or choice behavior. Using seven different management and expectation attributes (i.e., catch and release, bait restriction, tournament entrance fee, tournament type, trip cost, family event, and tournament size), we generated 56 choice sets. The mail survey was conducted with seven different versions of the questionnaire and each questionnaire had eight choice sets. From the conditional logit estimation, all primary attributes of angler preference were statistically significant. Not surprisingly, fishing participation was preferred to no participation in tournaments, but anglers strongly favored tournaments where catch and release behavior was promoted, where there were no bait restrictions, and tournaments were held by non-profit organizations rather than by other entities. Likewise, anglers showed a strong preference for tournaments with a greater variety of family events held, fewer numbers of tournament participants, and where a higher percentage of the tournament fee went to the management agency to support fishery management costs. We used scenario analysis to gain additional insights to angler behavior and preferences as a part of tournament management decision-making.

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KEY WORDS: Angling tournaments, angler preferences

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## **Entendiendo las Preferencias de los Pescadores Deportivos de Aguas Marinas por los Campeonatos de Pesca**

Los campeonatos de pesca en agua salada han proliferado en número en los últimos años. Las competiciones de pesca no están reguladas en Texas, ni existe una normativa de pesca pescadores de competición diferente de la del resto de pescadores. Ya que la cuantía de los premios y el número de eventos, así como sus impactos, se han incrementado, algunos pescadores han expresado la necesidad de incrementar la regulación de los campeonatos y sus participantes. Los objetivos del estudio fueron comprender mejor los problemas asociados a los campeonatos de pesca en agua marina, identificar las preferencias de los pescadores de competición y no competición por las posibles normas de pesca, y examinar las diferencias de actitud, opinión y preferencias dentro de cada grupo en lo relativo a los campeonatos en agua marina. Una aproximación establecida de selección preferente ('stated preference choice approach', SPA), que utiliza escenarios hipotéticos para derivar las preferencias individuales, permite comprender las relaciones entre múltiples factores según su contribución a las preferencias o los comportamientos de decisión. Utilizando siete atributos diferentes de manejo y de expectativa (es decir, captura y liberación, restricción de cebo, cuota de inscripción en el campeonato, tipo de competición, coste del viaje, actividades para la familia, y tamaño del campeonato), generamos 56 conjuntos de alternativas. El muestreo por correo se realizó con siete versiones diferentes del cuestionario con ocho conjuntos de alternativas cada uno. Según la estimación logit condicional todos los atributos primarios de las preferencias de los pescadores fueron estadísticamente significativas. Como era de esperar, la participación en los campeonatos de pesca se prefirió a la no participación, sin embargo los pescadores favorecieron fuertemente los campeonatos en los que se promoviera el comportamiento de captura y liberación, donde no hubiera restricciones de cebo, y aquellas competiciones organizadas por entidades sin ánimo de lucro más que por otro tipo de entidades. Del mismo modo, los pescadores mostraron fuertes preferencias por campeonatos con una mayor variedad de actividades para la familia, un menor número de participantes, y en los que un mayor porcentaje de la cuota de inscripción fuera destinada a la agencia de manejo para ayudar en los costes de manejo de la pesquería. Utilizamos análisis de escenarios para obtener una visión más profunda del comportamiento y las preferencias de los pescadores como una parte de toma de decisiones relativa al manejo de los campeonatos.

**PALABRAS CLAVES:** Campeonatos de pesca, las preferencias de los pescadores

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## INTRODUCTION

Although the number of saltwater fishing tournaments has exploded in recent years, the number of saltwater fishing tournaments in the U.S. is currently unknown. Various sources indicate their numbers are increasing in Texas. For example, a recent inventory by Texas Parks and Wildlife Department (TPWD) staff in 2003 revealed 183 tournaments or a 227% increase compared to the number in 1983 (personal communication, Robin Riechers, 2004).

Fishing tournaments have been and continue to be a controversial use of saltwater fishery resources (Williams 1984, Schmied 1994) for the following reasons. First, only a small minority (14% in Texas) of the angler population participated one or more days per year in competitive fishing events (Anderson and Ditton 2003). Nevertheless, in contrast to tournament participants, most anglers do not view recreational fishing in competitive terms and hence don't share the values held by tournament anglers (Loomis and Ditton 1987). Second, many tournament events, run by profit-making businesses, make use of public fishery resources at no cost to event organizers. Currently, tournaments are not generally licensed or charged any fees, in addition to the fishing licensing requirements of participants, in support of fishery management activities. Third, with an increasing number of tournaments, there has been pressure for the state fisheries management agency to establish a permit system for better management of tournament events in state waters. Accordingly, fishery managers want to know to what extent various tournament characteristics and policies are preferred by tournament anglers as well as by those who are not tournament participants.

Much is known about those that participate in particular fishing tournaments in terms of their fishing motivations, attitudes, and socio-demographic characteristics (Falk et al. 1989, Antia et al. 2002). However, there have been no studies at the angler population level to understand their overall preferences for tournament opportunities that are currently provided or that could be provided. Such a study, if undertaken, would likely use a traditional approach, called opinion measurement or revealed preference methods. This would yield inconsequential insight to the relative importance of each of the options or the tradeoffs anglers were willing to make when viewing tournament options jointly. Alternatively, a *Stated Preference Discrete Choice Model* (SPDCM) makes use of hypothetical scenarios to simulate participation choices and understand preferences. Thus, SPDCMs enable an understanding of the relationship of multiple factors as they contribute to preference or choice behavior (Louviere and Timmermans 1990, Louviere et al. 2000). SPDCMs have been used previously in fishery management as well as in natural resource management broadly to understand consumer preferences for a variety of new multi-attribute products and services; this approach has not been used to understand consumer preferences for various aspects of fishing tournaments.

The fisheries management agency in Texas has previously left the matter of tournament formats to private sector providers. Management officials have discussed these issues recently in response to constituent questions and as a result, they wanted to know the extent to which various event characteristics

and policies would be preferred by tournament participants as well as non-participants. The purpose of this paper was to understand the underlying rationale for anglers making trade-offs in tournament trips associated with various event characteristics and policies. We sought to help the state agency consider *pragmatic decisions* (Nielsen 1985) that maximize angler satisfaction consistent with more traditional fishery management responsibilities.

## METHODS

### Model

Originally developed in transportation choice research (McFadden 1974), the SPDCM is derived from a well-grounded random utility theory, which indicates that individuals make choices to maximize utility (Louviere 2000, 2001). Utilities, treated as random variables due to uncertainty factors, have two parts, a deterministic component and a random error component (Louviere 1988, Louviere et al. 2000). However, because utility cannot be observed directly, the probability of choice results should be used. Assuming the unobservable error component of utility is independently and identically distributed and Gumbel-distributed, the probability can result in the conditional (or multinomial) logit model (McFadden 1974, Ben-Akiva and Lerman 1985). However, the use of this model strictly requires the satisfaction of the independence of irrelevant alternatives (IIA) property (See Ben-Akiva and Lerman 1985 for more discussion of the IIA). One of the reasons for violations of the IIA property involves heterogeneous preferences among respondents (Morrison et al. 1999). Hence, one way to mitigate the IIA problem is to take into account the interaction effects of individual specific variables (e.g., socioeconomic characteristics, Hanley et al. 2001, Holmes and Adamowicz 2003).

Once the model has been estimated, willingness-to-pay values (WTP) can be used to evaluate the effectiveness of the proposals on the basis of diverse changes in attributes that reflect propose policies. WTP can be measured using

$$\frac{1}{\beta_{trip\ cost}}(V_0 - V_1)$$

where  $V_0$  indicates the utility acquired from the initial condition of a fishing trip and  $V_1$  is the utility from the new scenario with altered levels of attributes (Hanemann 1984).

### Identification of attributes and levels

The study began with identification of appropriate attributes and the subsequent levels or range that may surround each particular attribute. For example, the attribute would be how proceeds for a tournament are used and the range of levels would be profit and non-profit. Attributes and levels were identified and developed on the basis of discussions with fishery managers and a review of the fishing tournament literature. Four different tournament

selection characteristics were identified as policy attributes:

- i) Promotion of catch and release,
- ii) Bait restrictions,
- iii) Whether a percentage of the tournament entrance fee goes to support fishery management activities, and
- iv) Whether a tournament is a non-profit or profit-making venture.

Three general expectation attributes were also inserted to help anglers' decision-making regarding their participation in fishing tournaments (Aas et al. 2000, Oh et al. In press). A detailed description for each attribute and consequent levels is presented in Table 1. Two or three levels were assigned to each attribute to describe the policy options involved.

**Table 1.** Proposed attributes and levels used for the choice experiments

	<b>Attribute</b>	<b>Description</b>	<b>Level and</b>
Site Selection Factors	Catch and Release	Catch and release encouraged	1. Catch and release behavior promoted 2. Catch and release behavior not promoted
	Bait Restriction	Nature of bait allowed	1. No bait restriction 2. Artificial bait only
	Tournament entrance fee	Part of the angler entrance fee should go to TPWD to support costs of fishery management	1. None of the tournament fee to go to TPWD 2. 10% of the tournament fee to go to TPWD 3. 20% of the tournament fee to go to TPWD
	Tournament Type	Type of tournament held by different organizations	1. Tournament held as profit-making business 2. Tournament held by non-profit organization
General Expectations	Trip cost / day	Trip cost that an angler spends for a fishing trip per day (including gas and other trip expenses)	1. \$120 2. \$150 (approximately current travel cost per day) 3. \$180
	Family Events	The number of events provided for spouse and children	1. No family events 2. Some family events 3. Lots of family events
	Tournament Size	The approximate number of participants in a tournament	1. 100 2. 200 3. 300

**Survey design**

A statewide survey was first conducted with a sample of 10,000 license holders (Anderson and Ditton 2003). After identifying anglers who have fished in saltwater in the previous 12 months, we conducted a follow-up survey using a choice experimental design (n = 1,633). A fractional factorial design was used to generate a manageable number of 56 choice sets. The choice sets were then divided into seven blocks of eight paired choice sets using blocking. An example of one choice profile is provided in Figure 1.

Suppose that you could only choose from the two tournament trips below.

Which would you prefer?

TRIP A	ATTRIBUTES	TRIP B
<i>Catch and release not promoted</i>	<b>CATCH &amp; RELEASE</b>	<i>Catch and release promoted</i>
<i>Artificial bait only</i>	<b>BAIT RESTRICTIONS</b>	<i>Artificial bait only</i>
<i>10% of tournament fee to go to TPWD</i>	<b>ENTRANCE FEE</b>	<i>None of tournament fee to go to TPWD</i>
<i>Tournament held by profit-making business</i>	<b>TOURNAMENT TYPE</b>	<i>Tournament held by profit-making business</i>
<i>\$150</i>	<b>TRIPCOST / DAY</b>	<i>\$150</i>
<i>No family events</i>	<b>FAMILY EVENTS</b>	<i>Some family events</i>
<i>100</i>	<b>TOURNAMENT SIZE</b>	<i>200</i>

I prefer...(check **one** box below)

<input type="checkbox"/> TRIP A	<input type="checkbox"/> I WOULD NOT TAKE	<input type="checkbox"/> TRIP B
EITHER TRIP		

**Figure 1.** Example of a choice set for the tournament fishing participation .

**RESULTS**

About 795 anglers responded for an effective response rate of 53% using a slightly-modified Dillman Total Design Survey Method (Dillman 1978). From non-response checks across socio-demographic and general fishing behavior variables, respondents were older, had higher incomes, and were more skilled than non-respondents. No significant differences were detected between these two groups for other important variables (e.g., total fishing days, total cost spent for a fishing trip). Nevertheless, caution should be exercised in generalizing study findings to the population of saltwater anglers.

**Conditional Logit Results**

To alleviate the IIA problem, a conditional logit model with eight interaction effects of individual specific variables was estimated. The parameter estimates of the conditional logit model are presented in Table 2. The positive value for ASC indicated that anglers were favorable toward

tournament participation with current tournament characteristics. Regardless of whether they had participated in tournament fishing or not previously, it appeared that anglers were in favor of tournament fishing events. Effects codes were used for the qualitative attributes of catch and release, bait restriction, tournament type, and availability of family events.

**Table 2.** The results from conditional logit models.

	Conditional Logit Model	
	Coefficient	Z-value
ASC	1.298*	5.35
Catch and Release		
<i>promoted</i>	0.272*	12.24
<i>not promoted</i>	-0.272*	
Bait Restriction		
<i>Artificial bait only</i>	-0.164*	-7.05
<i>No bait restriction</i>	0.164*	
Tournament Fee	0.031*	9.12
Tournament Type		
<i>profit-making business</i>	-0.351*	
<i>non-profit organization</i>	0.351*	12.58
Trip Cost/ Day	-0.008*	-8.52
Family Event		
<i>no events</i>	-0.496*	
<i>some events</i>	0.295*	3.50
<i>lots of event</i>	0.201*	2.25
Tournament Size	-0.002*	-4.48
age*ASC	-0.021*	-7.22
income*ASC	0.063*	5.96
gender*ASC	0.255*	2.87
participate*ASC	0.765*	5.23
gender*some events	-0.192*	-2.13
gender*lots of events	0.069	0.72
participate*tournament size	-0.001	-0.98
participate*tournament fee	-0.312*	-5.68
Log Likelihood	-5234.23	

\* indicates statistical significant at the 5% significance level. The alternative specific constant is coded 1 for Trip A and Trip B in the choice sets and 0 for No Trip.

All effects of the primary attributes were statistically significant ( $p < 0.05$ ). In general, most attributes had the expected signs except for promotion of catch and release and the one where part of the tournament entrance fee was to go to the agency to support fishery management costs (Tournament Fee). Contrary to initial expectations, anglers preferred the option of having catch and release promoted in tournaments. Similarly, the positive coefficient on Tournament Fee indicated that anglers were in favor of an increase in the percentage of tournament fee available to the agency for fishery management. The options of artificial bait only and of tournaments held as profit-making businesses were less preferred compared to the no bait restriction and tournaments held only by non-profit organizations, respectively. Likewise, while the number of family events held during tournaments was likely to increase choice probability for tournament fishing participation, there was a strong preference revealed for having fewer participants in tournaments. Finally, the negative coefficient of travel cost implies that anglers with higher expenditures were less likely to participate in tournament fishing, coinciding with consumer demand theory.

For interaction effects, male anglers and younger anglers were more likely to participate in fishing tournaments compared to female and older anglers. Additionally, anglers with higher household incomes were more likely to indicate that they participate in fishing tournaments. Likewise, anglers who have participated in tournament fishing previously were more likely to be enthusiastic about tournament fishing participation. The inserted interaction variables with selected attributes provided further insight such as that male anglers were likely to be less interested in the number of family events provided in tournaments (gender \* some events).

### **Assessing the Management Options**

The SPDCM permits researchers and decision-makers to determine whether anglers will be better or worse off depending on various changes in tournament options. A set of five tournament scenarios along with the changes in expectation variables for tournament fishing trips were developed in conjunction with fisheries managers. The results of the scenario analyses are presented with predicted probabilities and overall WTP values in Table 3. Scenario 1 was the base option (status quo) with no management interventions in the currently popular saltwater fishing tournaments, and Scenario 3 was an approach that included management options that are more conservation oriented. Scenario 5 was proposed as a conservation plus option with the most restrictive (conservation oriented) management measures. Two additional scenarios were added to provide slightly different management insights to the three aforementioned scenarios. Results were somewhat surprising in that Scenario 1 with no management interventions (status quo), which was a priori expected to be most preferred, was not most preferred (a predicted probability of 8.4%). Anglers most preferred Scenario 3 (the conservation-oriented option) with a predicted probability of 31.3% and WTP of \$162. This scenario included some management interventions such as promotion of catch and release and 10% of the angler's tournament fee to go to the state agency to support fishery management. Furthermore, Scenario 5 (the conservation plus



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option) was also highly preferred with the predicted probability of 28.2% and WTP of \$150 compared to Scenario 1. Overall, management scenarios with certain degrees of management intervention were generally more favored than the status quo situation with no management interventions.

## DISCUSSION

The aim of this paper was to enhance comprehensive understanding of anglers' preferences (regardless of their previous experience with tournament fishing) for various management attributes of tournament fishing trips and their willingness to make tradeoffs among attributes by using the SPDCM. Fortunately, we had a sufficient mix of tournament anglers ( $n = 235$ ) and non-tournament anglers ( $n = 409$ ) to reflect diverse preferences for tournament fishing management from these two groups. One of our major concerns at the start of the project was whether the mail survey would be salient enough to the latter group of anglers for them to respond.

Study results generally indicated a certain degree of support for management interventions (e.g., promotion of catch and release and an increase in the tournament fee available to the management agency) mainly due to concerns with possible tournament-induced negative impacts. Although respondents also showed their reluctance to adopt other management-related options (e.g., bait restriction and tournament type), these results confirmed that anglers were concerned with sustainability of fish stocks and potential conflicts between tournament and non-tournament users (Jacob and Schreyer 1980, Aas et al. 2000, Gillis and Ditton 2002). The high predicted probabilities and WTP for Scenarios 3 and 5 indicated their willingness to accept stricter management interventions (Gillis and Ditton 2002, Oh et al. In press). Support for the conservation option (Scenario 3) exceeded that for the status quo option (Scenario 1) which is likely a result of having both tournament and non-tournament anglers in the analysis. It can be argued that non-tournament anglers want more conservation-based tournament offerings whether they plan to participate in them or not. Some study limitations need to be kept in mind. First, this is a hypothetical contingent model and accordingly, it is not known whether or not people's stated behavior will match their actual or revealed behavior. Nevertheless, the model is useful for providing informed hypotheses for testing and application elsewhere. Second, there is a concern for strategic behavior on the part of some anglers who perhaps wanted to perpetuate the status quo and discourage *any* form of change. Other anglers may have provided socially desirable responses and even if positive changes are made in tournaments, may still choose not to participate. Third, compared to only 14% of tournament participants in the statewide angler survey (Anderson and Ditton 2003), a greater percentage of tournament participants (36%) in this study eagerly responded with their opinions and preferences. Thus, because of a concern with over-representation of tournament anglers, further adjustments will be needed will be needed to avoid developing policies based on an angler group that over represents tournament anglers or conversely under represents non-tournament anglers.

**Table 3.** The predicted probabilities and WTP of proposed scenarios with constraints on expectation attributes

Conditional Logit									
Catch and Re-lease	Bait Restriction	Fee	Type	Trip Cost	# of Events	Size	Prob. (%)	WTP (\$)	
S.1	Not promoted	No restriction	0%	Business	120	Some events	200	8.4	
S.2	Not promoted	No restriction	10%	Business	120	Some events	200	11.5	38.7
S.3	Promoted	No restriction	10%	Non-profit	150	Some events	200	31.3	162.1
S.4	Promoted	Artificial only	10%	Non-profit	180	Some events	100	20.6	110.9
S.5	Promoted	Artificial only	20%	Non-profit	180	Some events	100	28.2	149.6

Finally, there is the matter of the extent to which natural resources agencies should get involved in matters beyond traditional natural resources management concerns. At a recent meeting of the Texas Parks and Wildlife Commission, a constituent accused the agency of engaging in *social engineering*, or in other words, promulgating rules and regulations that sought to produce particular recreational experiences for particular angler segments. It was argued that this was above and beyond resource conservation concerns. The mission of the TPWD is clear in its support for managing and conserving natural resources but also in providing “outdoor recreation opportunities for the use and enjoyment of present and future generations”. In addition to the issue of over fishing in the recreational fishery, there would appear to be a clear rationale for the state agency to be involved in promulgating rules and regulations that create additional fishing “products” or experiences for anglers to maximize angler satisfaction. In this case, the task would be to reconfigure fishing tournaments to make them attractive to more anglers and conservation friendly.

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