

Activities, Regulatory Preferences, and Regulatory Perceptions of Tennessee Anglers

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Abstract: A 1992 survey of Tennessee anglers was used to determine who is fishing and how often, the species they fish for, and how anglers perceive the regulatory structure. The results are based on telephone interviews with 450 active licensed anglers. Nearly 81% of the anglers visited a Tennessee reservoir in 1992, while 41% fished warm water streams, 28% farm ponds, and 22% trout streams. Over 60% preferred separate regulations for reservoirs. Active reservoir fishermen were more likely to support individual regulations. The participants were evenly split on whether a proposed regulation which has public support should be imposed even if the management agency does not feel the fishery would benefit. Eighty percent of the anglers indicated that existing fishing regulations were not complicated.

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Proper administration of fishery resources requires management authorities to have knowledge of the angler population served by the management agency. Specifically, authorities should be aware of the type and intensity of angler activities, and understand angler preferences concerning existing and proposed management alternatives. To the degree that certain types of fishermen are less likely to support management policies, authorities should target educational programs specifically at non-supportive anglers to gain greater public support for biologically viable management strategies.

This study uses data gathered from a survey of Tennessee anglers to determine who is fishing and how often, the species they are targeting and how anglers perceive the regulatory structure. We report the demographic factors of anglers which exhibit statistically significant relationships to angler support for the current

regulatory structure in place on Tennessee reservoirs, how complicated they perceive that structure to be, and angler support for publicly popular, but biologically non-beneficial, regulations.

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Methods

Data on angler attitudes were collected via a state-wide telephone interview conducted in November 1992. No master list of all annual license holders is maintained at a central location in Tennessee. The original sampling frame was constructed using a random sample of 10,000 of Tennessee's 542,000 annual fishing/hunting license holders (Tennessee does not have separate annual licenses for fishing and hunting). These names were drawn directly from license agents across the state at the end of the 1990 season. A sub-sample of 2,000 names was drawn for use in this study. A regional telephone company searched its listings and matched 949 names and addresses from the sample (47.5%). Of these, 78 were not usable (disconnected, wrong numbers, deceased, or moved) and contact was not made with 79 license holders after a minimum of 5 attempts. Contact was made with 792 people on the original license holder list (39.6%).

Only 67 people refused to be interviewed, yielding a response rate of 91.5%. Because 80 people hunted but did not fish, 645 interviews were completed with anglers who had held an annual license at some time in the recent past, representing an 81.4% completion rate. Because the source lists were 18–24 months out of date, 506 respondents held licenses at the time of the survey, of whom 450 had fished in 1992.

The purpose of the survey was to gauge the preferences of active, licensed anglers, so no data were collected from former license holders other than to ask why they no longer purchase a license. The most frequently cited reasons for not currently holding a license were not having enough time to fish, no longer interested in fishing, and fish more often on private land or in another state. If dissatisfaction with the quality of Tennessee's fishing resources were an important reason for not renewing one's license, then the analysis in this paper would be missing an important population; however, only 5 people (3.6%) specifically stated poor quality fishing as their reason for not renewing a license.

Angler Demographics and Activities

Analysis is based on the sample of 450 active licensed anglers (56.8% of the 792 contacts). The means of selected demographic variables for the sample are presented in Table 1. Anglers averaged 42 years of age, were high school graduates, and had incomes of \$36,500. Close to 90% owned their residence. Sixty-four percent owned a fishing boat, while almost 35% subscribe to at least 1 fishing magazine. Fewer than 10% belonged to a fishing club.

Table 1. Characteristics of active, licensed angler respondents.

		SD	N
Age	41.7 years	12.42	440
Education	12.8 years	2.75	437
Income	\$36,500	21,450	370
Home owners	88.1%	32.4	440
Boat owners	63.6%	48.2	450
Subscribe to			
fishing magazines	34.4%	47.6	450
Fishing club members	8.7%	28.2	450

Summary measures of angler activities appear in Table 2. Nearly 81% of year-long license holders visited a Tennessee reservoir in 1992. The mean number of trips to reservoirs was 26. Forty-one percent fished warm water streams, making an average of 16 trips in 1992. Twenty-eight percent fished in farm ponds and 22 percent fished in trout streams in 1992, making an average of 11 and 10 trips, respectively. The relatively high number of trips made by these anglers was expected given the nature of the sample. All respondents had purchased an annual license and needed to fish at least 7 different days to make the annual license more cost effective than a one day pass.

Reservoir anglers do not generally confine themselves to a single species of fish, with 24% targeting only 1 species. The modal number of species fished for was 2 (40.7% of anglers), while 22% did not fish for any particular species. Almost 66% specifically fished for bass at some time during the year, with 48%

Table 2. Fishing activities of licensed angler respondents.

	Yes		No	
	%	N	%	N
Did you fish in reservoirs in 1992?	80.7	363	19.3	87
Did you fish in warm water streams in 1992?	40.9	184	59.1	266
Did you fish in farm ponds in 1992?	28.2	127	71.8	323
Did you fish in trout streams in 1992?	22.2	100	77.8	350
If you fished in reservoirs, did you actively fish for . . .				
Bass	65.8	296	34.2	154
Crappie	47.6	214	52.4	236
Catfish	22.2	100	77.8	350
Striped bass	11.1	50	88.9	400
How many fishing trips did you take to . . . in 1992?				
	Mean trips	SD		N
Reservoirs	26.3	40.1		361
Warm water streams	15.8	24.1		181
Farm ponds	10.7	19.1		125
Trout streams	9.7	10.2		100

fishing for crappie. Twenty-two percent actively fished for catfish, while only 11% stated that they specifically sought striped bass on a fishing trip in 1992. No angler targeted all 4 species in 1992.

Analysis of Preferences and Perceptions

Respondents were asked a number of questions regarding their support for particular fishery management options, and about their perceptions of the existing management system (Table 3). Discrete choice response models were employed to analyze the people’s answers to these questions. When the response was a simple “yes” or “no,” probit analysis was used to statistically link respondent characteristics and experiences to their response (Maddala 1983, Greene 1990). The predicted dependent variable from a probit model is an estimate of the probability that a person with a given set of characteristics will respond in a certain way; the sign of the individual coefficients indicates whether a change in a characteristic will cause a person to be more likely or less likely to support a given proposition.

In measuring perceptions of the regulatory structure, respondents were asked to choose a point along a scale which most closely represented their feeling. These responses differ from those of a probit model in that there are more than 2 possible responses, and the coding of the responses reflects an inherent ordering of perceptions. Ordered probit analysis was used to account for the ordered nature of the dependent variable (Greene 1990). The model estimates the probability that an individual with a given set of characteristics would have a particular response.

Discussion

Regulatory Preferences

Reservoirs in Tennessee are currently managed as independent biological units, each having its own set of fishing regulations. This has sometimes led to

Table 3. Regulatory preferences of licensed anglers.

	%	N
Should regulations be the same for all reservoirs in the state or should regulations be established for each individual reservoir?		
Same for all reservoirs	26.9	121
Established for individual reservoirs	60.7	273
Unsure or don't know	12.4	56
If the public believes that a regulation would be beneficial to a fishery but TWRA believes it would not benefit, should the regulation be imposed by TWRA anyway?		
Yes	42.7	192
No	44.2	199
Unsure	13.1	59

calls for a simpler regulatory structure, where regulations are uniform across all reservoirs. The data in Table 3 suggest broad support for TWRA's individual reservoir management structure. Over 60% of annual license holders stated that they preferred that regulations be established individually for reservoirs. Twenty-seven percent stated they preferred a uniform regulatory structure, while 12% were unsure or did not know which they preferred.

Probit analysis of this question indicated that older anglers preferred uniform fishing regulations ($P = 0.03$), while more educated ($P = 0.005$) anglers preferred individual reservoir regulations. (The theoretical basis for the behavioral models and empirical results are detailed in Jakus et al. 1993.) The models suggest that higher income ($P = 0.14$) anglers support individual regulations. Anglers who fished reservoirs were more likely ($P = 0.005$) to support individual regulations than those who fished warm water streams, trout streams or farm ponds only. Measures of fishing activity (number of fishing trips to reservoirs [$P = 0.11$], number of different types of fishing [$P = 0.08$]) provided some indication that active anglers were more likely to support individual regulations than those who were less active.

Conflict between a regulatory agency and the public which it is supposed to serve often results in calls for an alternative reservoir management system. Such conflicts arise because of public pressure for population management schemes which a regulatory agency may deem biologically non-beneficial. To address this issue, respondents were asked if a proposed regulation which has public support should be imposed even if the management agency does not feel the fishery would benefit.

Respondents were almost evenly split on the issue. Just under 43% of licensed anglers said that the publicly popular measure should be imposed over TWRA objections, while 44% stated that the management agency's decision should be respected. Thirteen percent of the sample was unsure of their response. Probit analysis of the response to this question was mixed. Anglers who were older or who were more active (number of reservoir fishing trips) favored imposing the popular regulation. Both (older and more active) variables had P values of 0.10. No other explanatory variables were linked to the response at conventional significance levels.

Regulatory Perceptions

The key to success of any regulatory policy is public support and understanding of the regulations under which fishing activities occur. The previous section determined that, by and large, anglers who fish reservoirs support the individual reservoir regulations currently in effect in Tennessee. This conclusion is tempered by results suggesting that a substantial segment of the angler population believes that publicly popular changes in regulations should be imposed over management authority objections. What remains is to judge public understanding of the existing regulatory structure.

This was done by asking respondents their perception of the regulations currently in effect in Tennessee fishing areas. Two percent of the respondents perceive

Table 4. Regulatory perceptions of licensed angler respondents.

Do you think that Tennessee fishing regulations are . . .		
	%	N
Very complicated	2.0	9
Somewhat complicated	17.6	79
Neither complicated nor simple	14.9	67
Somewhat simple	37.8	170
Very Simple	22.7	102
Unsure or don't know	5.0	23

the regulations to be very complicated, 18% stated the regulations were somewhat complicated, 15% said neither complicated nor simple, 38% said they were somewhat simple, and 23% stated that the existing regulatory structure was very simple (Table 4). Five percent were unsure of their response.

Ordered probit analysis indicates that individuals' responses are statistically related to their education, income, fishing club membership, and their satisfaction with TWRA, the management authority. People who are more satisfied with TWRA are more likely to find the regulations simple ($P = 0.001$), as are those who belong to fishing clubs ($P = 0.003$). Interestingly, the more income ($P = 0.06$) and education ($P = 0.02$) an individual has, the less likely he or she is to find the regulations simple. This result is difficult to explain. One hypothesis is that those people with greater education and income have relatively more alternative uses of their time and therefore do not fish as often as those with fewer opportunities. Consequently, they have less experience with the fishing regulations. Analysis of fishing trip frequency supports this hypothesis for income (negatively related to trip frequency), but not education (positively related to trip frequency).

An alternative hypothesis is that those with greater education and income are more diverse in their fishing activities and are therefore affected by more regulations. For example, they may be more likely to fish in several reservoirs, each with its own set of regulations. Analysis of the number of different fishing activities in which people engage (number of different reservoirs visited, whether they fished in warmwater streams, trout streams, and farm ponds) indicates that anglers with greater educational levels are positively related to the number of activities. Income was not statistically correlated with the number of activities. Anglers with higher educations are more diverse in their activities (and take more fishing trips) than those with lower levels of education, and are therefore subject to a more diverse set of regulations. This result is consistent with the results of the ordered probit models.

Policy Implications

The application of probit and ordered probit analysis to angler responses results in clear policy implications for management authorities. Because probit analysis indicated that older fishermen were less likely to support a system of dif-

ferent regulations for different reservoirs, the management agency can target these individuals for a specific educational program. Further, older anglers were more likely to support the imposition of publicly popular regulations over agency objections. Since an angler's age and address are known as part of the licensing process, older anglers should be relatively easy to identify and contact with educational material justifying the agency's position.

Another important set of factors in determining angler attitudes were measures of fishing intensity. Anglers who were less active were less likely to support individual reservoir regulations, while more active anglers thought popular regulations should be imposed. While identifying and targeting the group of active fishermen would be difficult under current licensing practice, management authorities could obtain this information by simply adding a question to the license application: "How many times did you fish last year?" This simple measure of angling intensity permits the agency to quickly identify the anglers to whom educational efforts should be targeted.

While targeting individual anglers with educational programs seems simple enough in principle, in practice regulatory agencies may find themselves constrained in their ability to target these people. The constraints arise from the decentralized licensing process. Licensing agents across the state regularly report to TWRA the number (and type) of licenses sold, but report little additional information. At a minimum, the angler's name, address, age and fishing intensity is needed in the central office so that authorities may take advantage of the statistical relationship between angler attitudes and angler characteristics. While such a system may prove costly in the short run, the agency stands to benefit from increased public support and understanding of regulatory policies.

Conclusion

This study has reported on angler activities, regulatory preferences, and regulatory perceptions. Reservoir fishermen were the most active anglers in terms of the number of fishing trips, followed by fishers of warm water streams, farm ponds, and trout streams. With the exception of older anglers, broad support for individual reservoir regulations was found. The more active or educated the angler, the more likely he or she was to support individual regulations. Anglers were divided equally in their opinion of publicly popular, but biologically non-beneficial management measures. Older, more active anglers were supportive of these measures, indicating that experienced anglers may feel themselves as well-informed as the management authority. Tennessee reservoir regulations were generally found to be quite simple, suggesting that the existing regulatory structure was both supported and understood by Tennessee anglers.

Probit and ordered probit analysis of angler preferences and perceptions suggest statistical links between angler attitudes and angler characteristics. Agencies can take advantage of these relationships by employing a licensing system which enables the agencies to target educational programs to anglers fitting a particular statistical profile.

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