

Specialization and Sport Fishing: Angler Support for Rules and Regulations

DAVID K. LOOMIS¹ and STEPHEN HOLLAND²

¹ Department of Forestry and Wildlife Management

Holdsworth Natural Resources Center

University of Massachusetts

Amherst, MA 01003-4210 USA

² Department of Recreation, Parks and Tourism

University of Florida

Box 118208

Gainesville, FL 32611-8208 USA

ABSTRACT

Due to increased pressure on the fishery resource, there is a need for angling rules and regulations. These are intended to maintain the fishery resource while retaining quality fishing experiences. If regulations are not supported by anglers, the resource could be harmed, and the quality of fishing experiences degraded. This could result in the loss of economic and social benefits, as well as related tourism income. Not all anglers are likely to respond to regulations in the same fashion. Knowing the extent of support or opposition to angling rules and regulations in that support would be useful information to fisheries managers.

A sample of licensed (1995) Texas anglers was surveyed and asked if they supported or opposed various rules and regulations. These included length limits (maximum, minimum and slot), retention of fish caught, restricted waters, closed seasons and allowable use of various types of fishing gear and bait. The sample was segmented into four subgroups according to the concept of "Recreational Specialization". These groups represent a continuum of anglers ranging from the most specialized and the most likely to support angling rules and regulations, to the least specialized and potentially, less supportive of regulations.

Results were consistent with "Recreational Specialization" theory. On nearly all measures, the most specialized anglers were more supportive of regulations than were the less specialized anglers. There was a pattern of support for fisheries rules and regulations. These results suggest that although anglers support management measures, they differ in their degree of support. Understanding the segmentation of anglers in their level of support for regulations will assist fisheries managers.

KEY WORDS: recreational fishing, regulations

INTRODUCTION

Demand for recreational fishing in the Gulf and Caribbean region has grown considerably in recent years. This has led to increased pressure on the fishery resource, and the need for careful management via the implementation of various angling rules and regulations. These rules and regulations are intended to maintain the fishery resource while at the same time permitting anglers to obtain high quality fishing experiences. The former is important in that it will ensure the continued existence of the resource that recreational fishing requires, and the latter because quality angling experiences will result in economic and social benefits to the region. To the extent the rules and regulations pertaining to recreational fishing in the Gulf and Caribbean region are accepted and adhered to by anglers, quality resources and fishing experiences will be provided. If these rules and regulations are not supported and followed by anglers, the resource can be harmed and the quality of the fishing experience degraded. This could result in the loss of economic and social benefits that result from sport fishing and the related tourism industry activities. Therefore, the extent to which anglers in the Gulf and Caribbean region support or oppose various angling rules and regulations is an important issue to consider. The purpose of this study was to determine the extent to which the population of Texas saltwater anglers support or oppose various rules and regulations used to manage recreational saltwater fisheries.

Although the rules and regulations necessary for managing a recreational fishery resource are applied equally to all anglers, there is evidence that not all anglers are likely to support or oppose such rules and regulations equally. Some anglers are more likely to support them; others are less likely to do so. It is also known that the use of averages to describe a population of recreationists does not adequately describe that population. To paraphrase Shafer (1969), "the average angler does not exist." The use of averages only serves to cover or obscure the diversity known to exist among anglers, and as a result provides an inaccurate picture. This is due to the fact that anglers are not a single homogeneous group that can be represented by use of an average value. The angler described by such an "averages" often exists in small numbers, or does not exist at all. Therefore, to properly examine or represent a population of anglers, that population needs to be segmented into meaningful subgroups with each subgroup being as homogeneous as possible, yet different from the other subgroups. The conceptual method we use in this study for segmenting the population of Texas saltwater anglers is recreation specialization.

The concept of recreation specialization was first proposed by Bryan (1977) as a means for exploring the diversity of recreationists participating in an activity. Bryan (1977) conducted numerous on-site interviews with recreational anglers and, through a process of inductive reasoning, defined specialization as "a

continuum of behavior from the general to the particular reflected by equipment and skills used in the sport and activity setting preferences." He went on to identify four types of anglers, with each type being located at a unique place on the continuum. The least specialized angler was termed an occasional angler. This was followed by the generalist, the technique specialist, and finally, at the most specialized end of the continuum, the technique-setting specialist. The concept of specialization was tested and in some cases applied by a number of authors (Graefe, 1980; Kaufman, 1984, Donnelly *et al.*, 1986). However, this work failed to provide significant support for the concept, or to advance it to any great extent. This was partly due to the limitations of the concept as originally stated by Bryan (1977). In particular, the definition as stated was a tautology (Chafetz, 1978). As a result of these limitations, the concept of recreation specialization was revisited by Ditton *et al.* (1992).

Ditton *et al.* (1992) took as a starting point in their re-conceptualization of recreation specialization, the concept of social worlds. Unruh (1979) defines a social world as an "internally recognizable constellation of actors, organizations, events and practices which have coalesced into a perceived sphere of interest and involvement for participants." Eventually, every social world will segment into various subworlds (Strauss, 1978; 1984). These subworlds segment around characteristics such as spatial distinctions (such as shore fishing or open-water fishing), different types of objects (for example, different species of fish), technology (new types of fishing equipment) or ideology (beliefs that certain forms of fishing are more appropriate or acceptable than others). Unruh (1979; 1980) extended the notion of segmentation and subworlds by suggesting the existence of a continuum along which the subworlds could be classified and located. Participants in a social world could be located into one of the subworlds based on their proximity to knowledge about the social world and the activities occurring within the social world.

Based on the earlier work of Bryan (1977) and the social worlds literature, Ditton *et al.* (1992) formulated a new conceptualization of recreation specialization. They defined specialization as "(1) a process by which recreation social worlds and subworlds segment and intersect into new recreation subworlds, and (2) the subsequent ordered arrangement of these subworlds and their members along a continuum. At one end of the continuum is the least specialized subworld and its members, and at the other end of the continuum is the most specialized subworld and its members. Between these two extremes are any number of subworlds having intermediate levels of specialization." More specifically, Ditton *et al.* (1992) stated a total of eight propositions.

Ditton *et al.* (1992) tested three of these propositions. In their study, four near equal-sized groups of anglers were arranged along the specialization continuum according to annual frequency of participation in sport fishing.

Anglers who fished the greatest numbers of days annually were defined as being in the high specialization group, and anglers who fished the fewest days annually were placed in the low specialization group. Anglers who fished intermediate numbers of days were classified into the middle levels of specialization. Results of their research provided strong support for the three propositions, and the consequently for their reconceptualization of recreation specialization. High specialization anglers had a higher level of mediated interaction (made greater use of various sources of information, such as magazines, television, radio, etc.), were more resource dependent, and attached more importance to non-activity specific elements of the fishing experience and less importance to activity specific elements of the fishing experience (Ditton *et al.*, 1992).

Consequently, their initial effort at developing and testing a theory of recreation specialization was considered successful. However, the additional five propositions were not tested in their study, and their use of a unidimensional means for classifying anglers into the four specialization levels (annual frequency of participation) could be viewed as overly simplistic.

In this study, we examined one of the untested propositions, and developed a multi-item index for use in classifying anglers into four specialization groups. Ditton *et al.* (1992) state in Proposition Four that: "As level of specialization in a given recreation activity increases, acceptance and support for the rules, norms and procedures associated with the activity will likely increase." Based on this proposition, we state our hypothesis as:

- HO: There is no difference between anglers of different specialization levels on measures of angling rules and regulations.
- HA_a: Higher specialized anglers will be more supportive of angling rules and regulations than will lower specialized anglers.
- HA_b: Higher specialized anglers will be less supportive of angling rules and regulations than will lower specialized anglers.

METHODS

Specialization Index Development

The "Specialization Index" used in this study is a composite of five indicator variables. These five indicator variables include: 1) years of saltwater fishing experience, 2) total annual days of saltwater fishing in the past twelve months, 3) replacement value of all saltwater fishing equipment owned, 4) the sum of two motivational items identifying the importance attached to catching a trophy fish, and 5) the sum of two attitude measures that determine degree of angler feelings that might accompany not catching any fish on a particular trip. Angler responses to each individual indicator item were divided into 4 near-equal sized

groups. A total specialization score was then computed by summing the values of the above five indicator items. The total specialization score could therefore range from 5 - 25 (the actual range was 5 - 20). The total specialization score was then converted into four specialization groups.

Data Collection

Texas anglers purchased approximately 1.6 million recreational fishing licenses between September 1, 1991 and August 31, 1992. When buying a fishing license, Texas anglers are required to provide their drivers license or personal identification number. A computerized listing of anglers' names and addresses was then obtained by matching these numbers with Texas Department of Public Safety records. This listing provided the population of Texas anglers from which a computer generated random sample of 10,000 anglers was selected. To ensure that an adequate sample of saltwater anglers was obtained for analysis purposes, a stratified sampling design was employed. As a result, approximately 49% of the anglers selected into the sample were from Texas coastal counties.

Data were collected via a mail survey methodology. Questions included on the survey instrument were based on previous research efforts and on close consultation with agency personnel. Most questions had been pretested in several prior statewide saltwater and freshwater angler surveys (Ditton *et al.*, 1990, Ditton *et al.*, 1991; Hunt *et al.*, 1991). The survey instrument was a 12-page questionnaire with 45 questions, including a question containing 14 items that focused on angler support or opposition to various rules or regulations used to manage recreational saltwater fisheries. The survey was implemented using procedures outlined by Dillman (1978), and partly on experience gained from implementing numerous previous statewide angler surveys in Texas (Ditton and Holland, 1984; Ditton and Loomis, 1988; and Hunt *et al.*, 1991). A primary purpose of these procedures is to enhance response rate. For example, the survey was personalized whenever possible. Cover letters were personally addressed using "mailmerge" techniques and hand signed in blue ink with the name of the TPWD Director of Fisheries and Wildlife. Addresses were printed directly on the envelopes, and mailing labels eliminated to avoid the appearance of "junk" mail. The surveys were mailed with first class postage rather than with a metered stamp. Three personalized mailings of survey materials were sent to each license holder as necessary. One week after the first survey mailing, a postcard reminder-thank you was mailed. This was followed by a second mailing of the survey materials three weeks after the first mailing to those anglers who had not yet responded, and the third mailing was sent seven week after the first mailing, again to those anglers who had not yet responded.

RESULTS

Survey Response Rate

Of the 10,000 anglers in the original sample who were mailed questionnaires, 4,888 returned usable surveys. When total sample size is adjusted to correct for non-deliverables, a final response rate of 59.7% was obtained. Data were adjusted for non-response bias using a procedure developed by Fisher (1993).

Specialization Index

The five indicator scale proved successful in discriminating between anglers. When a stepwise regression was performed to see if any of the five variables were not contributing substantially to the r^2 , none of the five were found to be negligible in their contribution. Each variable contributed at least .08 to the r^2 , with the final r^2 with all five indicator variables included being .902.

The distribution of the five-item summed values (total specialization score) is presented in Table 1. Index scores ranged from 5 to 20 which means the empirical results covered nearly the full range of mathematically possible scores. There were only 6 individuals who were in the lowest quartile of each of the five criteria and 3 individuals who were in the highest quartile of the five criteria. The remaining 1,950 respondents were some combination of scores on the five criterion items.

In order to be consistent with previous conceptualizations of specialization, this continuous distribution was divided into four discrete groups: the lowest group (novices) comprised the lowest 15% of the scores; the next grouping consisted of about 36% of the sample (generalists); the third group consisted of the next 35% of the sample in index scores (specialists) and the final group consisted of the 14% (technique setting specialists). This provided a relatively symmetrical distribution of categories (Table 2).

Hypothesis Testing

Of the 14 management items, nine differed significantly in the level of support expressed for them by anglers across the four specialization groups (Table 3). The items are sorted in decreasing magnitude of differences in Table 3. Means not underscored by the same line are significantly different at the .05 level per Tukey's HSD statistic.

Proceedings of the 49th Gulf and Caribbean Fisheries Institute

Table 1. Frequency distribution and cumulative percents of total specialization score.

INDEX SCORE	N	PCT	CUM PCT
5	6	.3	.3
6	21	1.1	1.4
7	50	2.6	3.9
8	81	4.1	8.1
9	144	7.4	15.4
10	181	9.2	24.7
11	239	12.2	36.9
12	279	14.2	51.1
13	253	12.9	64.0
14	237	12.1	76.1
15	192	9.8	85.9
16	131	6.7	92.6
17	79	4.0	96.6
18	44	2.2	98.9
19	19	1.0	99.8
20	3	.2	100.0

Table 2. Frequency distribution and cumulative percents of index categories.

Total Spec. Scores	Cum.	N	Pct.	Pct.Label
5-9	302	15.4%	15.4%	Novices
10-12	699	35.7%	51.1%	Generalists
13-15	682	34.8%	85.9%	Specialists
16-20	276	14.1%	100.0%	Tech.-Setting Specialists

First, it must be noted that anglers registered a mean level of support for one half (7) of the items. The scale scoring for these items was 3=neutral, 4=support and 5=strongly support the management item. Anglers indicated a mixture of support and opposition for the other half of the items. A second observation is that when there was a difference between mean scores of the subgroups, there was a consistent increase or decrease as one went from novice to technique-setting specialist. This was consistent with predictions from the concept of recreation specialization.

The management items that had the highest F scores, indicating the greatest difference between lower levels of specialization and higher levels of specialization, were: stocking fish in saltwater, implementing a maximum size limit, requiring a tag to retain a trophy fish, implementing a slot limit, implementing a minimum size limit, relying on a voluntary catch and release program and implementing a daily bag limit. These items all allow the keeping of some fish and retain the ability to fish at all times, even if all fish cannot be kept. Two management items distinguish the most specialized anglers from all other anglers: using closed seasons and creating restricted areas. These items are much more restrictive in that they prevent the retention of any fish. More specialized anglers are somewhat less likely to support these items, even though less specialized anglers do. Perhaps this is an indication of how "dependent and dedicated" higher specialized anglers are to their activity. It is more central to their leisure time focus, while less specialized anglers can substitute other recreation activities they have allegiance to besides fishing.

The five items that did not show any difference across angler specialization groups were: catch and release specific saltwater fish species, rules against keeping certain species in certain areas, prohibitions on use of some fishing gear, denial of being allowed to keep certain species during certain times of the year and a prohibition on use of certain types of bait. There were mixed feelings on these items, with the exception of prohibiting use of certain types of bait. The bait prohibition had a mean score of neutral. These items are apparently perceived as more restrictive than the other management options.

For the hypothesis tests, overall, the results were mixed. Five items did not provide enough evidence to reject the null hypothesis of no difference in level of support between specialization levels. Seven items provided enough evidence to reject the null hypothesis and directionally, they supported H_a , which stated that specialized anglers would be more supportive of management regulations. Two items provided enough evidence to reject the null hypothesis and directionally, they supported H_{Ab} , which stated that specialized anglers would be less supportive of management regulations.

Proceedings of the 49th Gulf and Caribbean Fisheries Institute

Table 3. ANOVA test for significant differences between specialization groups on measures of support for angling rules and regulations.

Variable	Nov.	Gen.	Tech.	TSSp	F	p
Stocking fish in saltwater	3.968	4.099	4.333	4.615	34.312	.000
Maximum size limit	3.275	3.322	3.541	3.837	14.832	.000
A tag to retain a trophy fish	3.010	3.098	3.288	3.597	12.408	.000
Slot limit	3.33	3.366	3.593	3.779	12.118	.000
Minimum size limit	4.061	3.996	4.230	4.296	10.608	.000
Voluntary catch and release	3.576	3.662	3.751	4.037	10.900	.000
Daily bag limit	3.865	3.930	4.092	4.21	8.643	.000
Closed season	3.386	3.274	3.210	3.052	4.174	.006
Restricted areas	3.525	3.393	3.353	3.269	2.602	.051
Catch and release for a specific saltwater fish	3.455	3.420	3.475	3.556	1.070	.361

Table 3 (continued). ANOVA test for significant differences between specialization groups on measures of support for angling rules and regulations

Variable	Nov.	Gen.	Tech.	TSSp	F	p
Can't keep certain species in certain areas	3.310	3.213	3.291	3.257	.803	.492
Prohibit some fishing gear	3.441	3.409	3.491	3.446	.621	.602
Can't keep certain species during certain times of year	3.343	3.272	3.301	3.256	.387	.762
Prohibit certain types of bait	2.966	2.952	2.939	2.926	.079	.971

Means not underscored by same line are significantly different at .05 level per Tukey's HSD.

DISCUSSION AND CONCLUSIONS

Specialization as concept to assist in explaining commitment diversity among recreationists and especially, anglers, has been undergoing refinement for 20 years (Bryan, 1977). Bryan conceptualized ten criteria (equipment, orientation to fish, species preference, water resource preference, management preference, angling history, social setting, distance traveled, vacation pattern, and leisure priority) that would contribute to discriminating between levels of commitment to recreational pursuits. A variety of criteria have been used to operationalize specialization: annual days of participation (Graefe, 1980), social worlds (Ditton *et al.*, 1992; Unruh, 1980), commitment, side bets and support for values (Buchanan, 1985; Kuntzel and McDonald, 1992). The search continues for the best combination of items that captures the range of diversity with the most accuracy and meaning.

This paper focused on understanding specialization diversity as applied to fisheries management options. Do anglers who are more committed or specialized in their sport have a greater degree of support for fisheries management options that frequently impose some constraint on their fishing activity? This follows from a contention of Bryan (1979:40) that anglers having different levels of specialization prefer different management options, with less

specialized anglers seeking options that allow more fish to be caught and more specialized anglers supporting management options that maintain the fishery resource and increase the size of the fish. It is also consistent with Proposition Four in the reconceptualization of recreation specialization, as outlined by Ditton *et al.* (1992).

Five concepts (years of saltwater fishing, value of fishing equipment, annual days of fishing, value placed on catching a trophy fish, rating of importance of catching a fish) using a total of seven variables, were constructed into an index and used to test diversity in level of support for 14 management options. The results indicate that a multi-dimensional index successfully dispersed anglers across a range of scores. Due to the complex conceptualization of specialization, it is likely that this index does a better job of classifying anglers according to their specialization level. It is almost certain to have improved validity over single item indicators; though, this is difficult to quantify since there is no "ideal," widely agreed on criterion with which to validate the index.

In regards to the association of specialization level with degree of support for fisheries management options, results were varied. The four angler specialization levels averaged either support or neutrality for all 14 management options. There were relatively few anglers who opposed the options. There was diversity in the degree of support for nine of the management options across specialization levels. For the seven options that received significantly more support among more specialized anglers, there is only one unexpected result. Most of the items are established management option strategies (size and bag limits, tags for trophy fish, etc.) that have a track record of success that more specialized anglers are likely to be familiar with. Also, most of these affect the number of fish that can be kept, and less specialized anglers are generally thought to be more "catch dependent." Thus, it is understandable that their level of support is lower. The one exception is the option "stocking fish in saltwater" which we would expect to be supported by or at least equally by less specialized anglers, as it presumably increases catch probability.

For the five management options (catch and release for specific fish, species restriction in certain areas, fishing gear and bait restrictions, and species closure during certain seasons) that did not yield significant differences in support across specialization levels, it is interesting to note that they were all "partial" restrictions; they leave a way around the management control option by using alternative bait, or targeting alternative species or fishing at an alternative time. Each angler probably envisions that he or she can live with these restrictions in that it still allows them alternate opportunities no matter what their specialization level is.

This issue of having an acceptable alternative seems to also be a factor in

the two items (closed season and restricted areas) that were found to be more supported by higher numbers of less specialized anglers than by those with higher specialization scores. These two items appear to be perceived as more Draconian by specialized anglers in that they prohibit fishing at a certain time of year or at a certain location, leaving no options. For less specialized anglers, not being able to fish is less problematic as they are not as dependent on fishing for their leisure time activity, thus they are not as opposed to these options. This provides an interesting example of how specific management options might have a different level of impact on different types of anglers.

Research into identifying and refining the most effective variables to include in a specialization index should continue. This paper provides a basis on which to build a multi-dimensional specialization index. The results indicate there is diversity in the level of support anglers express for specific management items. Similar surveys should be conducted on anglers who target specific species (e.g., billfish, shark, redfish, tarpon, etc.) to assist managers in understanding how anglers who target the species they manage might react to proposed regulations. There is increasing evidence that treating anglers as subgroups with mutual interests will yield better understanding and results for managers than treating all anglers as "average" in their reaction to fishery management techniques.

REFERENCES

- Bryan, H. 1977. Leisure value systems and recreational specialization: the case of trout fishermen. *Journal of Leisure Research*. 9:174 - 187.
- Bryan, H. 1979. Conflict in the great outdoors. Sociological Studies No. 4, Bureau of Public Administration, University of Alabama.
- Buchanan, T. 1985. Commitment and leisure behavior: a theoretical perspective. *Leisure Sciences*. 7:401 - 420.
- Chafetz, J. 1978. *A primer on the construction and testing of theories in sociology*. Peacock Publishers, Inc., Itasca, IL.
- Dillman, D. 1978. *Mail and telephone surveys*. John Wiley and Sons, New York.
- Ditton, R. B. and D. K. Loomis. 1988. 1985 Southeast Texas Sportfishing Tournament: An analysis of participants characteristics, attitudes, and expenditures. TAMU-SG-88-201. Texas A&M University Sea Grant College Program. College Station, Texas.
- Ditton, R. B. and S. M. Holland. 1984. Understanding involved fishermen: A survey of members of the Gulf Coast Conservation Association. TAMU-SG-84-623. Texas A&M University Sea Grant College Program. College Station, Texas.
- Ditton, R. B., D. K. Loomis and S. Choi. 1992. Recreation specialization: Re-conceptualization from a social worlds perspective. *Journal of*

Proceedings of the 49th Gulf and Caribbean Fisheries Institute

- Leisure Research*. 24(1):33 - 51.
- Ditton, R. B., D. K. Loomis, A. D. Risenhoover, S. Choi, M. F. Osborn, J. Clark, R. Riechers, and G. C. Matlock. 1990. Demographics, participation, attitudes, expenditures and management preferences of Texas saltwater anglers, 1986. Management Data Series No. 18, Coastal Fisheries Branch, Texas Parks and Wildlife Department, Austin, Texas.
- Donnelly, M., J. Vaske, and A. Graefe. 1986. Degree and range of specialization: toward a typology of boating related activities. *Journal of Leisure Research*. 18:81 - 95.
- Fisher, M. R. 1993. *The relationship between nonresponse bias and angler specialization*. Ph.D. Dissertation, Texas A&M University, College Station, Texas.
- Graefe, A. 1980. *The relationship between level of participation and selected aspects of specialization in recreational fishing*. Ph.D. dissertation, Texas A&M University, College Station, Texas.
- Hunt, K. M., R. B. Ditton, R. Riechers, S. Gutreuter, M. Osborn, and G. C. Matlock. 1991. Demographics, participation, attitudes, and management preferences of Texas anglers, 1989. Technical Report #HD-603. Human Dimensions of Fisheries Research Laboratory. Texas A&M University, College Station, Texas
- Kaufman, R. B. 1984. *The relationship between activity specialization and resource related attitudes and expected rewards for canoeists*. Ph.D. Dissertation, University of Maryland, College Park, Maryland.
- Kuntzel, W. F. and C. D. McDonald. 1992. Differential effects of past experience, commitment, and lifestyle dimensions of river use specialization. *Journal of Leisure Research*. 24(3):269 - 287.
- Shafer, E. L., Jr. 1969. The average camper who doesn't exist. Research Paper NE-142, USDA Forest Services, Northeast Forest Experiment Station, Upper Darby, Pennsylvania.
- Strauss, A. 1978. A social world perspective. *Studies in Symbolic Interaction*. 1:119 - 128.
- Strauss, A. 1984. Social worlds and their segmentation processes. *Studies in Symbolic Interaction*. 5:123 - 139.
- Unruh, D. R. 1979. Characteristics and types of participation in social worlds. *Symbolic Interaction*. 2:115 - 130.
- Unruh, D. R. 1980. The nature of social worlds. *Pacific Sociological Review*. 23:271 - 296.