Understanding the Influence of Selected Variables on the Travel Patterns of Saltwater Anglers

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ABSTRACT

Understanding how often individuals fish and where they fish should be of concern for fishery managers, as well as those responsible for marketing particular destinations. This research examined location preferences of a statewide population of saltwater anglers in Texas, and how various aspects of angling behavior influenced their travel decisions. Using data collected from a sample of Texas saltwater anglers, angling behavior and attitudes were hypothesized to influence the location an individual fished most often in the previous 12 months. Using information concerning the locations where inshore anglers fished most often, and offshore anglers accessed the Gulf of Mexico, distance measures were calculated using a Geographic Information System (GIS) and used as a surrogate for distance traveled for a "typical" fishing trip for each angler. These measures were then used as the dependent variable in subsequent analysis.

KEYWORDS: Recreation specialization, saltwater anglers, travel behavior

Entendimiento de la Influencia de Variables Seleccionadas sobre los Patrones de Recorrido de los Pescadores de Agua Salada

Concierne a los responsables del manejo de la pesca y a los que comercializan los productos en lugares específicos, el entendimiento de la frecuencia y el sitio de pesca de los pescadores de agua salada. Si un área es sobreutilizada, pueden surgir varios problemas que incluyen el agotamiento del recurso y conflictos con otros usuarios del recurso. Esta investigación examina las preferencias de sitio de pesca de la población de pescadores de agua salada del estado de Texas y como varios aspectos del comportamiento de los pescadores pueden influir sobre esas preferencias. Usando datos de una muestra de pescadores de agua salada del estado de Texas, se relacionaron las actitudes y el comportamiento de los pescadores con el sitio en que pescaron mas frecuentemente en los últimos 12 meses. Con información de los sitios de pesca mas frecuentes de los pescadores de bahía y de aquellos por los cuáles los pescadores de mar abierto accesaron el Golfo de México, se obtuvieron medidas de distancia usando un Sistema de Información Geográfica (SIG) como indicador de las distancias recorridas en un viaje "típico" de cada tipo de pescador. Se calcularon ecuaciones de regresión para cada sitio de pesca usando como variables independientes varias medidas del comportamiento, tales como

motivaciones para la pesca y limitaciones para participar en la pesca. Enseguida, se hizo un esfuerzo para diferenciar sitos de pesca por las características de las personas que ahí pescan con mas frecuencia. Se obtuvieron conclusiones en relación con aspectos característicos de cada sitio y diferencias entre sitios.

PALABRAS CLAVES: Pescadores de agua salada, aspectos del comportamiento de los pescadores

INTRODUCTION

Studies of anglers have been conducted for a variety of purposes, which include providing information for fisheries managers, marketing, and general scholarly knowledge. Encompassing a wide range of topics, these studies generally focus on regional patterns of participation (U.S. Department of Interior and U.S. Department of Commerce 1997), demographic characteristics (Murdock et al. 1996), expenditure levels, angler attitudes, and angler preferences (Hunt and Ditton 1996). While these studies do provide insights into the behavior of anglers, they do little to provide information as to how this behavior affects real world phenomena such as traveling. Once an angler has made the decision to go fishing, the next logical choice that he/she must make is where to go fishing. While we may understand the rational thought process behind this decision, we do not understand how the previous behavior of an individual angler will affect the choice of a fishing destination.

One of the most often used concepts to explain angler behavior is that of recreation specialization. The classical definition of recreation specialization is "a continuum of behavior from the general to the particular, reflected by equipment and skills used in the sport and activity setting preferences" (Bryan 1977). An angler's specialization level is thought to be reflected by his or her avidity to the activity and fishing experience. Certain behaviors are thought to be influenced by an angler's specialization level, including catch preference and travel patterns.

Problems with the original concept of specialization led to a modification of the theory. Ditton et al. (1992) recognized that Bryan (1977) had defined specialization (a behavior) by observing the behavior of anglers. This led them to develop a new definition based upon the social worlds perspective. 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" (Ditton et al. 1992).

More importantly, they identified testable hypotheses based upon the concept, and empirically measured anglers behavior using the hypotheses in the study, thus strengthening the concept of specialization.

Specialization has been used to explain behavior in other outdoor recreation activities besides fishing; however, the results from these studies should be applicable to all outdoor recreations including fishing. Of particular interest is that specialization has been shown to influence the setting in which an activity takes place (Virden and Schreyer 1988, Schreyer and Beaulieu 1986).

Many different methods have been used to measure specialization. Among the variables that have been shown to influence a person's specialization level are resource-related motives, skill, and experience (Chipman and Helfrich (1988; Hammit et al. 1989; Fisher 1997).

This research replicated the methods used by Fisher (1997) to group anglers according to six specialization variables. Once angler groups were formed, the groups were compared using their mean travel distance as the dependent variable. It is thought that as an angler's specialization level increases, the angler will travel greater distances to his or her fishing destination.

METHODS

The sampling frame consisted of 2,073 licensed Texas anglers who indicated they fished one or more days in saltwater in the 1998 statewide survey. Standard mail survey methodology (Salant and Dillman 1997) was used to collect additional data from these anglers on their saltwater fishing activity and preferences. 1,005 questionnaires were returned in a usable form providing an effective response rate of 56.5% (excluding nondeliverable mailings).

Six variables were used to determine specialization level:

i) Total years of saltwater fishing experience,
ii) Total days saltwater fishing in the previous year,
iii) Importance of number of fish caught,
iv) Importance of catching "something;"
v) Importance of size of fish caught, and
vi) Disposition of catch.

Total number of days fishing was skewed; therefore the data were transformed with the natural logarithm into a normal distribution. The last four items are measures of an angler's attitude towards keeping fish; a detailed explanation of the items used for these measures is available in Fedler and Ditton (1986) and Hunt (2000).

Four hierarchical clustering methods were used to determine the number of groups present in the data. All data were standardized to mean 0 and variance 1 before clustering took place. The purpose of using of four methods was to validate the findings of the number of clusters present in the data. The number of clusters is indicated by a plot of the cubic clustering criterion versus the number of clusters (Aldenderfer and Blashfield 1984). Once the number of groups was determined, nonhierarchical (k-means) cluster analysis was used to determine the size of each group. Clusters were then ranked according the sums of the standardized means of the six specialization variables.

Each angler was asked to identify the location where "they fished most often since this time last year" or "accessed the Gulf most often since this time last year" from a list of seven Texas bays (Sabine Lake, Galveston Bay, Matagorda Bay, San Antonio Bay, Aransas Bay, Corpus Christi Bay, Upper Laguna Madre, Lower Laguna Madre) or eight Texas ports (Port Arthur, Galveston, Freeport, Port O'Connor, Rockport, Port Aransas, Port Mansfield, Port Isabel/South Padre Island). Since the above items were crucial in this study, those anglers that did not indicate where they fished most often, or left out one of the items used to determine specialization level, were removed from the sample (n = 772).

The responses to the angler's fishing destination were linked to the angler's address where available or, if the address was not available, to the center of the respective ZIP code. A GIS was used to calculate the straight line distance from the angler's location to the geographic location of the response.

ANOVA was used to test for differences among angler groups and their respective travel distances. Fisher's LSD was used to test for differences between specific angler groups.

RESULTS

Statistics were calculated to check the reliability of each subdimension of the consumptive attitude scale (number of fish = 0.68, disposition of catch = 0.74, size of fish = 0.70; importance of catching "something" = 0.73). These scores indicated that each item is a reliable measure of the subdimension it was designed to measure (Cronbach 1951). For each subdimension, a high score indicates that the angler places high importance on that item. A high score on the "disposition of catch" subdimension indicates the importance an angler places on releasing fish.

Plots of the number of clusters versus the cubic clustering criterion indicated that seven groups were present in the data (See Figure 1). The value at the leftmost point is indicative of the number of clusters present in the data (Everitt 1977). All methods indicated that there were seven clusters, providing evidence that the true number of clusters is seven.

The mean characteristics of each angler group are presented in Table 1. Group 5 anglers had the greatest number of days fishing in the past 12 months, while group 4 anglers had the lowest days fished. However, group 4 anglers had the most experience of all groups, and group 2 had the least experience. Group 7 placed the most importance on the number of fish caught as well as the importance of catching "something." Group 1 anglers placed the least importance on the number of fish caught, size of fish caught, and catching "something." Group 6 anglers placed the most importance on releasing fish. Most surprising is that group 7 anglers placed the least importance on releasing fish. It appears that both group 6 and group 7 could be considered highly specialized, but differ on this one aspect of the recreational fishing experience.

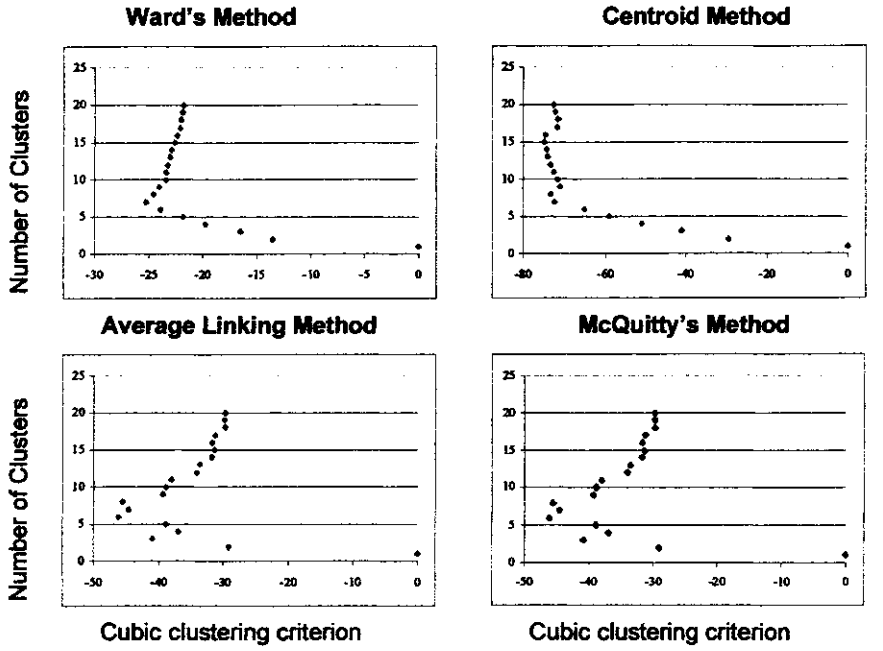

Figure 1. Results from cluster analysis. All methods indicated seven groups of anglers

Other behaviors that are thought to be indicative of an angler's specialization level include tournament participation and club membership. These variables were analyzed to see if the groups formed by the cluster analysis are consistent with specialization theory (Table 2). Group 5 had the highest participation in tournaments and club membership. The lowest participation rates were found in group 2 for fishing tournaments and group 3 for club membership.

There is little effect of an angler's specialization level on the location that they fished at most often. While group 6 anglers, considered to be more specialized, did have the greatest mean travel distance, group 2 anglers had the second highest mean travel distance (Table 3).

Table 1: Mean (SE) Values of the Six Variables Used In Cluster Analysis and Travel Distance by Angler Group

Angler Group	Days fishing In the past 12 months	Years of fishing	Number of fish	Size of fish	Disposition of catch	Catching "something"
1 (N = 119)	31.71 (2.58)	21.06 (1.14)	-1.27 (.06)	-0.99 (.07)	0.60 (.07)	-0.97 (.06)
2 (N = 115)	7.32 (0.49)	13.8 (0.70)	0.06 (.07)	-0.08 (.07)	-0.14 (.06)	0.08 (.08)
3 (N = 94)	40.63 (2.71)	25.54 (1.26)	0.15 (.08)	-0.89 (.07)	-0.93 (.06)	0.21 (.07)
4 (N = 106)	6.97 (0.46)	39.44 (0.77)	0.11 (.07)	-0.13 (.08)	-0.18 (.08)	0.03 (.07)
5 (N = 120)	52.83 (4.4)	35.25 (0.87)	-0.34 (.07)	0.51 (.06)	0.19 (.07)	-0.53 (.07)
6 (N = 120)	34.53 (2.91)	15.96 (0.92)	0.54 (.07)	0.79 (.07)	1.01 (.06)	0.17 (.08)
7 (N = 98)	29.57 (2.84)	30.14 (1.24)	0.97 (.06)	0.70 (.07)	-0.96 (.09)	1.29 (.08)

Table 2. Percentages of anglers participating in fishing tournaments and fishing clubs, by specialization group.

Angler Group	Participation in Fishing Tournaments (%)	Participation in Fishing Clubs (%)
1	17.7	16.1
2	13.2	14.8
3	15.1	10.6
4	16.2	12.3
5	35.0	29.7
6	19.3	24.8
7	19.0	11.3

Table 3. Mean distance traveled by angler group. Group means with the same letter are significantly different ($p < .05$).

Angler Group	Mean Distance Traveled
1	86.5 (7.7) [A,B]
2	113.6 (9.4) [A,C,D,E]
3	80.2 (8.9) [C,F]
4	85.2 (8.8) [D,G]
5	81.6 (8.0) [E,H]
6	117.2 (11.3) [B,F,G,H,I]
7	91.2 (9.0) [I]

DISCUSSION

These results may be consistent with specialization theory. It was originally hypothesized that as an angler's specialization level increases, their travel distance will increase also. While Bryan (1977) did originally relate the effect of specialization on travel, the relationship was twofold. First, he thought that an angler's vacation patterns are a result of their specialization level, i.e. a highly specialized angler will plan vacations specifically to fish in a prime location. He also thought that highly specialized anglers may choose to alter their lifestyle to be in proximity to prime fishing locations. This may be what is shown by the results of this study. Groups 6 and 7, the most specialized of the angler groups, differed from the overall mean of the entire population. It could be that these groups are

exhibiting this difference in lifestyles. Group 7 anglers could have altered there lifestyles to be closer to the fishing experiences they are seeking, i.e. they have moved closer to the coast. Unfortunately, the wording of the question regarding their "most often used fishing destination" does not indicate differences on this aspect of an angler's travel patterns. It may be possible that anglers fished as a collateral activity on a vacation to the coast of Texas and identified this location as the area where they fished most often since this time last year.

The management implications from this study are many. First, the results support the conclusions that Fisher (1997) reached regarding the heterogeneity of the angling population. Different anglers seek different experiences, and managers are able to control many aspects of the fishing experience. Second, fishing destinations can use the results as a tool for planning strategies to increase the angling clientele that visits their location. Furthermore, an area can market itself with particular characteristics to attract the specific clientele that they feel would be most interested in their destination. For instance, an area can market particular aspects of the fishing experience to attract certain anglers, i.e. marketing a "trophy" fishery will attract anglers in groups 5, 6, and 7.

In the future, this sort of research should be replicated with data on an angler's complete travel record for the previous 12 months, i.e. both their fishing destination as well as the number of trips to this location. This will provide a more complete picture of an angler's travel patterns. Furthermore, the variables in this research considered to represent an angler's specialization level may have no effect on the decision of where to fish. Future research could be directed at identifying those aspects of recreation specialization that do influence an angler's decision of where to fish.

LITERATURE CITED

Aldenderfer, M.S., and R.K. Blashfield. 1984. *Cluster Analysis*. Sage Publications. Newbury Park, California USA. 87 pp.

Bryan, H. 1977. Leisure value systems and recreational specialization: The case of trout fishermen. *Journal of Leisure Research* **9**:174-187.

Cronbach, L.J. 1951. Coefficient alpha and the internal structure of tests. *Psychometrika* **16**: 297-334.

Chipman, B. D. and L. A. Helfrich. 1988. Recreational specializations and motivations of Virginia river anglers. *North American Journal of Fisheries Management* **8**:390-398.

Ditton, R. B., D. K. Loomis and S. Choi. 1992. Recreation specialization: Re-conceptualization from a social worlds perspective. *Journal of Leisure Research* 24(1):33-51.

Everitt, B. 1980. *Cluster Analysis*, 2nd Ed. Halsted Press: New York. 136 pp.

Fedler, A.J. and R.B. Ditton. A framework for understanding the consumptive orientation of recreational fisherman. *Environmental Management* **10**(2):221-227.

Fisher, M.R. 1997. Segmentation of the angler population by catch preference, participation, and experience: A management-oriented application of recreation specialization. *North American Journal of Fisheries Management* **17**:1-10.

Hammitt, W.E., L.R. Knauf, and F.P. Noe. 1989. A comparison of user vs researcher determined level of past experience on recreation preference. *Journal of Leisure Research* **21**(2):202-213.

Hunt, K.M. *Understanding racial and ethnic difference in angler behavior*. Ph.D. Dissertation, Texas A&M University. College Station, Texas USA. 152 pp.

Hunt, K.M. and R.B. Ditton. 1996. *A Social and Economic Study of the Lake Fork Reservoir Recreational Fishery*. Human Dimensions of Fisheries Research Laboratory, HD-608. College Station, Texas USA. 52 pp.

Murdock, S.H., D.K. Loomis, R.B. Ditton, and M.N. Hoque. 1996. The implications of demographic change for recreational fisheries management in the United States. *Human Dimensions of Wildlife* **1**(4):14-37.

U.S. Department of Interior and U.S. Department of Commerce. 1997. *1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation*. FHW/96 NAT, Washington, D.C. USA. 115 pp.

Salant, P. and D.A. Dillman. 1994. *How To Conduct Your Own Survey*. John Wiley and Sons. New York, New York USA. 232 pp.

Schreyer, R. and J.T. Beaulieu. 1986. Attribute preferences for wildland recreation settings. *Journal of Leisure Research* **18**(4):231-247.

Virden, R.J. and R. Schreyer. 1988. Recreation specialization as an indicator of environmental preference. *Environment and Behavior* **20**(6):721-739.