A COMPARISON OF ACTIVITY-SPECIFIC AND NONACTIVITY-SPECIFIC IMPORTANCE AND MANAGEMENT PREFERENCES AMONG THREE SPECIALIZATION GROUPS OF TROUT AND BASS ANGLERS

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Abstract: Recreation specialization describes the continuum of general to specific behavior of natural resource users and allows for the classification of these users into meaningful subgroups. An understanding of different specialization levels is useful to resource management in that it allows managers to distinguish between different interests and preferences among resources users when making resource allocation decisions. From a 1998 survey of licensed Massachusetts anglers, Salz et al. (2001) developed three subgroups of anglers based on their activity orientation, experiences, relationships, and commitment. Results from the 2001 study showed strong support for specialization theory, and suggested that managers consider differences in these three groups when making resource allocation decisions. Of further potential use to fisheries management would be to consider whether these differences are further explained by the type of fish anglers most prefer to catch. In this paper, angler attitudes toward specific aspects of the fishing experience and towards management regulations are examined based on species preference (trout or bass) as well as specialization level. Little difference was found in specialization levels between the two groups. However, there is a slight difference between trout and bass angler attitudes toward five out of seven activity-specific components of fishing and four out of 10 nonactivity-specific components. In each of these cases, bass anglers placed more importance on nonactivity-specific elements and less importance on activity-specific elements. Also, the two fishing groups showed slight differences in preferences for five out of 11 possible management regulations, with greater support varying by item between bass and trout anglers. Overall, more variation was found by specialization level than by species targeted.

Introduction

Guided by managers trained in the biological sciences, fisheries management has traditionally been dominated by a resource-oriented approach. Such an approach involves priorities of resource protection and management for biological and economic goals (Ditton, 1996). In recent years, managers in the field of fisheries have come to recognize a need to understand the interests of different resource users and to incorporate human dimensions research into management. Segmenting resource users into meaningful subgroups allows for better management for diverse interests. Ditton (1996, 79) suggests that managers have come to recognize several "fishing products" that they can provide for various fisheries stakeholder groups, namely "tournament fishing, fishing for trophy size fish, catch and release fishing, family recreation, and catching fish to eat." In order to adequately supply these 'products,' human dimensions research needs to properly identify and segment the interests of fisheries stakeholders. A number of techniques have been used in the past to segment anglers into meaningful subgroups.

The most common approach used by managers has been to segment anglers by species sought (Ditton, 1996). This offers managers an opportunity to understand what types of fish anglers would like to catch, perhaps aiding in stocking and catch-limit decisions for specific species. However, this uni-dimensional approach may not account for the fact that many anglers fish for more than one species. Anglers stating that they plan to target a certain type of trout one week may be searching for bass the next. An alternate technique has been to segment recreational anglers according to age and/or social group. For example, Loomis and Ditton (1988) suggested that recreational fishing demand varies by age cohort, predicting that as future demand is increasingly sought by individuals in older cohorts, management desires are likely to change. Analyzing population age structures in the

United States, Murdock et al. (1996) predict that future recreational anglers will be more diverse and comprised of older individuals.

Another useful tool is that provided by the theory of recreation specialization. Recreation specialization describes a continuum of general to specific behavior of natural resource users and allows for the classification of these users into meaningful subgroups. Recreation specialization can be used to predict the importance anglers place on activity-specific goals, nonactivity-specific goals, support for management regulation, investment in the activity, and frequency of participation. Ditton (1996) suggests that recreation specialization could be especially helpful in deciding how to allocate resources, as well as in defining reasonable management goals and helping to avoid user conflict. Additionally, segmenting users by specialization level may help managers predict support and opposition to prospective management decisions (Fisher, 1997).

In this paper, we consider two of these segmentation approaches-recreation specialization and species targeted-as ways in which fisheries managers can better meet angler needs.

Literature Review

Recreation Specialization

The concept of recreation specialization was first proposed by Bryan (1977). Defining recreation 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," Bryan classified anglers into four groups: "occasional fishermen," "generalists," "technique specialists," and "technique-setting specialists" (175). A criticism that came out of Bryan's work and those who attempted to test the specialization concept was the circular reasoning used to measure and define specialization. Measures of equipment, skills, and setting preferences were used both to define specialization and to measure specialization level (Ditton et al., 1992).

To address the problem posed by this circular logic, Ditton et al. (1992) incorporated ideas from the social world literature and Bryan's work to provide a re-conceptualized version of recreation specialization. This process yielded eight propositions. Namely, a person is likely to become more specialized in an activity over time. As specialization level increases, side bets, centrality of the activity to one's life, acceptance for rules, norms, and procedures related to the activity, importance of equipment and skill, resource dependence, and use of media sources related to the activity will increase. Also, with increased specialization, the importance of activity-specific elements will decrease relative to nonactivity-specific elements. The authors tested and found support for three of the propositions-resource dependency, mediated interaction, and activity-specific/nonactivity-specific elements. At the same time, Ditton et al. admitted the limitations presented by using the uni-dimensional measure of participation to classify anglers into specialization groups and suggested that multiple variables might be used in future studies to form a specialization index.

Specialization Index

Building on the work of Ditton et al. (1992), Salz et al. (2001) developed a multi-item specialization index using the social subworlds concept of Unruh (1979). Specifically, the authors used four variables to determine specialization level: orientation, experiences, relationships, and commitment. Based on questionnaire responses, anglers were divided into four specialization levels: "least specialized," "moderately specialized," "very specialized," and "highly specialized." Using the four variables derived from the social subworlds concept to determine specialization level appears to be especially useful, as the limits of using a single variable (Ditton et al., 1992) and the circular reasoning used originally by Bryan (1977) are avoided.

Salz et al. (2001) tested their specialization index on four statements predicted by specialization theory. Namely, high specialization anglers will 1) place less importance on activity-specific elements of the fishing experience and greater importance on nonactivity-specific elements, 2) have greater support for management tools and regulations, 3) generate a greater value of side-bets, and 4) have a greater frequency of participation than low-specialization anglers (243). They found strong support for all hypotheses, and thus for recreation specialization theory. This analysis was a consideration of all licensed Massachusetts anglers and did not separately consider species sought by the anglers.

Species Preference
There has been some suggestion that species preference could have an impact on the structure of angler specialization. Citing Wilde and Reichers (1994), Wilde et al. (1998) offer an example of different fishing methods for various species of catfish. Persons fishing for flathead and blue catfish were reported to be more specialized than channel catfish anglers. Understanding the relative specialization levels of trout versus bass anglers could be beneficial to managers in making management decisions about specific species. For example, if trout anglers placed less importance on actually catching a fish than bass anglers, managers might consider stocking fewer trout.

Before testing for differences in specialization level between trout and bass anglers, it is useful to consider potential variations in habits and culture between the two groups. In Massachusetts, numbers of wild trout are limited and the state stocks thousands of trout for the benefit of anglers. Bass, on the other hand, tend to reproduce naturally. The two fish provide a good basis for comparison, because they are the most commonly pursued species in the state and anglers are free to fish for either trout or bass once they have obtained a state fishing license. In other states, anglers may have to pay an additional fee to fish for stocked trout (Ross and Loomis, 2001). The difference between stocked trout and bass that mostly occur through natural reproduction could have implications for angler specialization. Many trout in the state are stocked for high catch rates (Ross and Loomis, 2001). Perhaps this practice reflects a strong desire by trout anglers to catch a fish (an activity-specific element) as part of their experience. Conversely, trout anglers may not be all that interested in catching fish, and the high levels of stocking could reflect manager misunderstanding of trout angler expectations. Likewise, knowing that bass populations occur naturally does not shed light on the importance of the catch to bass anglers.

Other evidence suggests that fly fishers may be more specialized than those who fish with bait (Manning, 1999). While popular myth may yield an image of the more sophisticated trout fly-fisher, a lack of empirical evidence comparing fishing methods of trout and bass anglers allows little more than speculation on whether or not trout anglers could be more specialized. Further, Wilde et al. (1998) suggest that black bass anglers are considered to be highly specialized. This group is known to practice and advocate catch-and-release fishing. On the Bassmaster website (2003)-and organization for bass anglers-an entire section is devoted to promoting this practice of catch and release. This might suggest high specialization for bass anglers, because of the reduced importance of the activity-specific element of keeping a fish that has been caught. But again, without evidence to suggest the catch-and-release practices of trout anglers, it is difficult to hypothesize about which angler is likely to be more specialized.

Ross and Loomis (2001) compared activity specific and nonactivity-specific items between trout and bass anglers outside of the concept of recreation specialization, finding few differences between the two groups. Since little substantial evidence supports greater specialization for either trout or bass anglers, hypotheses for specialization by species will be open ended in this analysis. However, understanding potential differences that may be related to stocked and naturally-reproduced fish, fly-fishing versus bait fishing, and promotion of catch-and-release practices may be useful in interpreting the results. These variables may be helpful in exploring species variation in future research studies.

Hypotheses
Ha1: Trout and bass anglers differ in overall specialization level
Ha2: Trout and bass anglers will differ in perceived importance of activity-specific elements
Ha3:Trout and bass anglers will differ in perceived importance of nonactivity-specific elements of the fishing experience
Ha4: Trout and bass anglers will differ in support for management tools and regulations
Ha5: High-specialization anglers will attach less importance to activity-specific elements of the fishing experience than will low-specialization anglers
Ha6: High-specialization anglers will attach more importance to nonactivity-specific elements of the fishing experience than will low-specialization anglers
Ha7:High-specialization anglers will have greater support for various management tools and regulations than will low-specialization anglers

Methods

Data Collection

Data for this analysis come from a 1998 survey of 2,930 Massachusetts anglers. Participants were randomly selected from a population of state licensed anglers to receive a 16 page questionnaire. Questionnaires were administered to study participants using the Salant and Dillman (1994) Total Design Method. The 2,930 prospective survey respondents were mailed a letter notifying them about the project. One week later, questionnaires accompanied by a cover letter describing the purpose of the study and a self-addressed stamped envelope were mailed to the same individuals. A week after mailing the questionnaire materials, a post card was mailed out to the same individuals reminding them to return their questionnaires and thanking them for their participation. Three weeks after mailing the reminder post card, an additional questionnaire, a letter describing the project and encouraging response, and a self-addressed envelope was mailed to sample individuals who had not yet responded with a completed questionnaire.

Specialization Index

Survey administrators developed the specialization index used in this analysis from four questionnaire items. Each of these items corresponded to one of the following characteristics: orientation, experiences, relationships, and commitment. These characteristics were first used by Unruh (1979) to place individuals into four social subworlds-strangers, tourists, regulars, and insiders. Survey respondents were asked to rate which of four descriptions for each characteristic best described them. Each description corresponded to a value from one to four. These values were then totaled across all four characteristics for each respondent, yielding a value between four and 16. This value was divided by four to determine the respondent's specialization level (1=least specialized (stranger), 2=moderately specialized (tourist), 3=very specialized (regular), 4=highly specialized (insider)).

Species Preference

Respondents were asked to list the freshwater fish that they "actually fish for" "most often," "second most often," and "third most often" in Massachusetts. Respondents listing any type of bass species as the fish actually sought "most often" (e.g. largemouthed bass, smallmouthed bass) were classified as bass anglers. Respondents listing a trout species (e.g. rainbow trout, brown trout) were classified as trout anglers. Those listing another type of fish were excluded from this analysis.

Table 1. — Status of Sport Angler Questionnaire Response (adapted from Salz et al., 2001)

Type of response	N	%
Initial sample	2,930	—
Mortality	344	—
Deceased (3)		
Nondeliverable (312)		
Not-usable upon return (29)		
Effective original sample	2,586	100.0
Nonresponse	1,175	45.4
Useable returned surveys	1,411	54.6
Trout or bass preference indicated and specialization level = 2,3,or 4	1,076	41.6
Trout (440)		
Bass (636)		

Data Analysis

To consider overall differences in specialization level by species preference (Ha1), a comparison of the percentage of anglers falling into each specialization level was made between trout and bass anglers. A chi-square test was performed to determine if differences were significant. A series of two-way ANOVA tests were performed to test the remainder of the hypotheses (Ha2 through Ha7). Using a two-way ANOVA with specialization level and species preference as factors is one technique that differentiates this analysis from previous considerations of the data that looked at either specialization level (Salz et al., 2001) or species preference alone (Ross and Loomis, 2001).

Results

Response Rate

Out of the 2,930 questionnaires sent to Massachusetts anglers, 1,411 were returned in useable form, yielding a response rate of 54.6% (Table 1). Data considered here come from the 1,076 questionnaires in which respondents were in one of the three highest specialization levels and indicated that they most preferred to fish for either bass (n=636) or trout (n=440). This represents 41.6% of the effective original sample and 76.3% of the useable returned surveys.

Specialization Index
In the original sample of 1,411 anglers, 1.2% were in the "least specialized" category (Level 1), 32.5% in the "moderately specialized" category (Level 2) category, 42.3% in the "very specialized" category (Level 3), and 42.3% in the "highly specialized" category (Level 4) (Salz et al. 2001, 249). In that original analysis, the first level of specialization was dropped because of the low number of anglers falling into the category (See Salz et al., 2001 for full description of methods). Likewise, this analysis considers just the upper three levels of specialization-"moderately specialized," "very specialized," and "highly specialized." Out of 1,076 trout and bass anglers falling into these three upper levels of specialization, 278 (25.8%) were moderately specialized, 506 (47.0%) were very specialized, and 292 (27.1%) were highly specialized. Overall specialization levels for trout and bass anglers were very similar. Out of trout anglers, 120 (27.3%) were moderately specialized, 201 (45.7%) were very specialized, and 119 (27.0%) were highly specialized. Among bass anglers, 158 (24.8%) were moderately specialized, 305 (48.0%) were very specialized, and 173 (27.2%) were highly specialized (Table 2, Figure 1).

Table 2. — Number of Bass and Trout Anglers by Specialization Level

	Specialization Level			
Species Preference	M	V	H	Total
Trout	120	201	119	440
Bass	158	305	173	636
Total	278	506	292	1076

A Pearson Chi-square test revealed a probability of 0.643 that differences between trout and bass anglers are significant. Therefore, no significant difference is shown for overall specialization between trout and bass anglers and Ha1 is not supported.

Activity-specific Items
Out of seven items, significant differences were found between species in five cases. For these five items, bass anglers placed slightly less importance on activity-specific items of the fishing experience than trout anglers (Table 3). This provides support for Ha2, which predicted differences between trout and bass anglers in perceived importance of activity-specific items. Specialization theory is

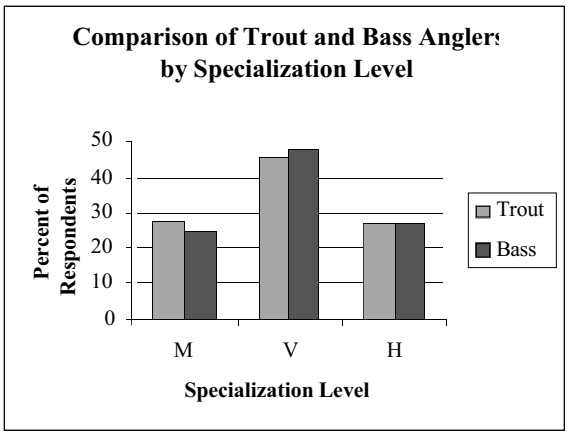

Figure 1. Comparison of Trout and Bass Anglers by Specialization Level. Differences between species are not statistically significant.

supported in five out of seven items as mean importance increases from moderately to highly specialized. We therefore support Ha5 as stated.

Nonactivity-specific Items
Differences in perceived importance of nonactivity-specific aspects of the fishing experience were found between trout and bass anglers for four out of 10 items (Table 4). In all four cases, bass anglers rated nonactivity items as slightly more important than trout anglers. This finding offers only limited support for Ha3, since no significant differences were found for six out of the 10 items.

In nine out of 10 items, item values increased by specialization level, supporting Ha6. The one item that did not show this increase in value ("for family recreation") showed no significant difference according to specialization level.

Support and Opposition of Management Regulation Items
Support for management regulation items differed according to species preference on five out of 11 items (Table 5). Unlike items for activity-specific and nonactivity-specific elements of the fishing experience, greater support for management regulation items was not clearly found in one or the other of the two groups. Bass anglers indicated greater support for two of the five management items ("minimum size limit" and "voluntary catch and release"), while trout anglers indicated greater support for "restricted fishing area," "prohibit use

Table 3. — Two-way ANOVA Tests for Mean Differences in Importance of Activity-specific Items According to Specialization Level and Fish Preference

	Level of specialization					Fish Preference			
Items*	M	V	H	F	p	T	B	F	p
I'm just as happy if I don't keep the fish I catch***	4.127**	4.178	4.325	3.047	0.048	3.897	4.417	70.654	0.000
I'm just as happy if I release the fish I catch***	4.176	4.188	4.399	6.500	0.002	3.943	4.450	68.924	0.000
To obtain fish for eating, and not for sport***	1.413	1.460	1.526	1.732	0.178	1.697	1.306	44.650	0.000
For the sport of fishing, not to obtain food to eat***	3.655	3.924	4.203	13.840	0.000	3.632	4.137	38.307	0.000
For the experience of the catch	3.605	3.819	4.090	13.575	0.000	3.617	3.989	27.854	0.000
When I go fishing, I'm just as happy if I don't catch a fish	3.018	3.026	3.103	0.357	0.700	3.097	3.010	1.352	0.245
A fishing trip can be successful even if no fish are caught	3.799	3.809	4.031	5.457	0.004	3.854	3.875	0.102	0.749

* For items 3, 4, and 5 mean scores were based on responses to the following categories; 1 = Not at all important, 2 = Slightly important, 3 = Moderately important, 4 = Very important, 5 = Extremely important. For all other items, mean scores were based on responses to the following categories; 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree.

** Means underscored by same line are not significantly different (.10) using Tukey's test.

***Interaction between Specialization Level and Fish Preference is significant at 0.10.

Table 4. — Two-way ANOVA Tests for Mean Differences in Importance of Nonactivity-specific Items According to Specialization Level and Fish Preference

	Level of specialization					Fish Preference			
Items*	M	V	H	F	p	T	B	F	p
To be with friends	3.080**	3.173	3.561	13.644	0.000	3.064	3.387	15.901	0.000
To experience adventure and excitement	3.387	3.754	4.017	22.556	0.000	3.575	3.838	12.969	0.000
For family recreation	3.155	3.087	3.226	1.092	0.336	3.019	3.228	6.673	0.010
To get away from the regular routine	3.812	3.876	4.153	7.124	0.001	3.856	3.989	3.737	0.053
To be close to the water	3.254	3.564	3.887	18.293	0.000	3.501	3.621	1.286	0.257
To get away from the demands of other people	3.404	3.463	3.834	7.266	0.001	3.516	3.571	0.461	0.497
For relaxation***	4.226	4.365	4.550	11.280	0.000	4.380	4.379	0.379	0.538
To experience natural surroundings	4.084	4.262	4.419	10.023	0.000	4.259	4.258	0.351	0.554
To be outdoors	4.144	4.265	4.426	7.419	0.001	4.279	4.276	0.233	0.630
To experience new and different things	2.778	2.939	3.273	11.879	0.000	2.974	3.000	0.053	0.819

* Mean scores were based on responses to the following categories; 1 = Not at all important, 2 = Slightly important, 3 = Moderately important, 4 = Very important, 5 = Extremely important.

** Means underscored by same line are not significantly different (.10) using Tukey's test.

***Interaction between Specialization Level and Fish Preference is significant at 0.10.

of certain gear," and "no stocking allowed." This finding yields little support for Ha4.

Nine items showed increasing ratings by specialization level, showing support for Ha7. Two items ("voluntary catch and release" and "prohibit use of certain gear") showed no difference in support by specialization level. One item ("restricted fishing area") ran counter to the prediction in Ha7, showing greater support by moderately specialized anglers than highly specialized anglers.

Discussion

Results yielded greater differences by specialization level than by species targeted, suggesting that the former is a stronger predictor of the importance of activity-specific and nonactivity-specific items to

Table 5. — Two-way ANOVA Tests for Mean Differences in Support and Opposition of Management Regulation Items According to Specialization Level and Fish Preference

	Level of specialization					Fish Preference			
Items*	M	V	H	F	p	T	B	F	p
Minimum size limit***	4.134**	4.226	4.454	7.870	0.000	4.043	4.417	20.779	0.000
Voluntary catch and release	3.942	3.998	4.007	0.325	0.723	3.844	4.084	12.854	0.000
Restricted fishing area***	3.360	3.233	3.055	2.463	0.086	3.371	3.111	11.770	0.001
Prohibit use of certain gear***	3.657	3.522	3.603	2.182	0.113	3.683	3.506	10.197	0.001
No stocking allowed	3.599	3.681	3.924	9.601	0.000	3.806	3.670	6.085	0.014
Mandatory catch and release	3.117	3.200	3.474	6.612	0.001	3.147	3.326	3.584	0.059
Maximum size	3.285	3.574	3.745	10.736	0.000	3.459	3.607	2.497	0.114
Stock native fish***	4.260	4.320	4.406	3.095	0.046	4.329	4.326	0.502	0.479
Slot limit	3.078	3.173	3.399	6.211	0.002	3.231	3.197	0.477	0.490
Creel limit	4.171	4.270	4.476	8.821	0.000	4.307	4.296	0.456	0.500
Stock non-native fish	3.073	3.274	3.360	5.208	0.006	3.230	3.256	0.134	0.715

* Mean scores were based on responses to the following categories; 1 = Strongly oppose, 2 = Oppose, 3 = Neutral, 4 = Support, 5 = Strongly support.

** Means underscored by same line are not significantly different (.10) using Tukey's test.

***Interaction between Specialization Level and Fish Preference is significant at 0.10

anglers and angler support for management practices. For example, nine out of 10 nonactivity-specific items were more important to anglers as their specialization levels increased. Conversely, importance of nonactivity-specific items differed by species targeted for only four out of 10 items. Recreation specialization theory was strongly supported for all three propositions tested, while testing the same items based on species targeted yielded only limited differences. This finding suggests that understanding the specialization levels of users could be more useful to managers than understanding species targeted-which has been the more traditional angler segmentation approach (Ditton, 1996).

A second finding indicates that highly specialized trout anglers may differ somewhat from highly specialized bass anglers. While little difference was found in overall specialization levels between the two species target groups (Figure 1), there were slight variations between trout and bass anglers in the importance placed on activity-specific and nonactivity-specific items and support for management options. While keeping fish and catching fish for food were not especially important to either trout or bass anglers, these activity-specific items were slightly less important to bass anglers (Table 3). Likewise, nonactivity-specific items, such as being with friends and family and experiencing excitement, were slightly more important to bass anglers than trout anglers (Table 4). There was also mixed support for management items, with bass anglers indicating greater support for mandatory and voluntary catch-and-release programs. The finding that bass anglers were slightly less catch retention-oriented may run contrary to the stereotype of the more sophisticated trout fly angler. Future research efforts could focus on testing and explaining this difference. Finally, while specialization level appears to be the better predictor of the three propositions tested in this paper, an understanding of differences by species targeted could still be useful in providing managers with a more complete picture of angler needs.

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