

MARKET SEGMENTATION, MOTIVATIONS, ATTITUDES, AND PREFERENCES  
OF VIRGINIA RESIDENT FRESHWATER ANGLERS

by  
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(ABSTRACT)

For many years, the Virginia Department of Game and Inland Fisheries (VDGIF) has managed freshwater fisheries without fully understanding their stakeholders. To increase its knowledge and improve management, the VDGIF commissioned a market segmentation study to collect baseline information about its constituents and serve as a model for future studies. I developed a 16-page mail questionnaire that was sent to a stratified random sample of 5,378 Virginia resident freshwater fishing license holders. The questionnaire was used to collect information on characteristics, motivations, attitudes, and preferences of Virginia resident freshwater anglers. The response rate was 52%.

I examined the descriptive characteristics of resident freshwater anglers and anglers who purchased different types of licenses and anglers from different management regions. Differences in fishing behaviors, motivations for fishing, attitudes, and preferences for management existed among anglers based on license type and regions. Although satisfaction with freshwater fishing was high, in most cases, many anglers believed that fishing quality had declined. By adopting a marketing approach and providing the desired experiences to each segment of anglers, the Fisheries Division may improve its relationship with anglers, as well as increase participation and satisfaction.

I also segmented the Virginia anglers by species preference, specialization, and a multi-level approach that involved a combination of species preference and specialization. Anglers are not a homogenous group and they seek different experiences. Multi-level segmentation was the most useful method of segmentation because it identified within-species preference group differences. Within each species preference

group I found several segments of anglers. Segments differed in their orientations (trophy or consumptive), preferred methods of fishing and information sources, and support for regulations. Specialist anglers from each species preference group were trophy oriented and some were consumptive oriented as well. Specialists also were the most supportive of restrictive regulations. Less specialized anglers in each species preference group generally were less trophy oriented, more consumptive, and less supportive of regulations than specialist anglers. My results provide better understanding of the different segments of anglers within each species preference group, which will allow managers to provide a more satisfying experience for their stakeholders.

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## **Chapter 1: Introduction**

### INTRODUCTION AND JUSTIFICATION

Effective fisheries management involves manipulation of the three interacting elements of a fishery: habitat, biota, and people (Willis and Murphy 1996). Historically, the human aspect of fisheries has been overlooked as fishery managers have relied on biological information about fish populations and habitat to guide their management decisions. It is important for managers to gather information about the human aspect of fisheries, such as angler preferences, needs, and desires, as well as information about biological and physical aspects of the fishery. With information about the three elements of a fishery, managers can make sound management decisions and possibly increase angler satisfaction.

Once every two years, the Virginia Department of Game and Inland Fisheries' (VDGIF) fishery managers develop recommendations for fishing regulations. However, these recommendations rarely have incorporated information from formal human dimensions research. My research was conducted to increase VDGIF managers' knowledge of the characteristics, motivations, preferences, attitudes, and opinions of Virginia anglers through periodic surveys. Additional surveys will be conducted on a biennial basis, prior to development of recommendations for fishing regulations. The initial statewide survey of Virginia anglers described here will serve as the model to test questions and determine their usefulness for future surveys.

The statewide survey of Virginia anglers makes it possible to segment the angler market of Virginia into groups of managerial significance. Segmentation based on license type, angler characteristics, and level of specialization will provide the VDGIF with information about stakeholders and their desires. This information should increase angler enjoyment through better management of Virginia's fisheries.

The most useful way to manage the human aspect of a fishery is to satisfy the diverse "product needs" of the many groups, or market segments, of anglers (Pollock et al. 1994). Natural resource agencies serve the public, but they first must know what the public desires (Duttweiler 1976). Marketing provides the most cost-effective way for

natural resource agencies to identify the desires of the diverse groups of constituents that comprise the public (Duda et al. 1998).

Fisheries agencies should use a marketing approach to develop programs and services that address public desires, yet remain within the constraints of resource productivity (Duda et al. 1998). A marketing approach involves identifying the needs of user groups and developing programs based on those needs. This differs from a selling approach in which programs are “sold” to the public, i.e., they are developed first and then presented to the public in the hopes they will be used. A marketing approach should prove to be more effective than a selling approach because products and services will reflect needs perceived by the public opposed to needs perceived by the agency. A marketing approach allows for proactive management instead of reactive management of fisheries. Surveys are an effective way for managers to collect quantitative information required by the marketing approach, including the identification of angler groups and their needs (Duda et al. 1998).

## MARKET SEGMENTATION

Segmentation classifies people into groups based on shared characteristics (Sanyal and McLaughlin 1993). To fully understand anglers in an area, one should segment them into groups according to demographic and other characteristics, such as demographics, fishing behaviors, motivations, and attitudes. Market segmentation is useful because it gives managers an understanding of the behaviors, attitudes, and preferences for management of the people they serve, as well as insight into future uses of the fishery (Sanyal and McLaughlin 1993; Pollock et al. 1994).

Market segmentation has been divided into four distinct types: socioeconomic, geographic, product-related, and psychographic (Pollock et al. 1994). Socioeconomic market segmentation, (i.e., grouping anglers by factors such as age, education, and income), provides managers with demographic information about anglers and is useful for projecting changes in the angling public. However, the socioeconomic approach does not separate anglers into groups based on the experiences they desire (Pollock et al. 1994). Geographic segmentation determines where fishery users reside. A variation of

geographic segmentation divides the public based on media regions, which helps promote fisheries through media sources, such as television and newspapers (Pollock et al. 1994). Product-related market segmentation involves dividing the public based on angler behavior, fishing methods, preferred species, and water type preferences (Pollock et al. 1994). This type of segmentation is common in angler surveys and often is used with cluster analysis to group people of similar interests. Finally, psychographic market segmentation, which is a useful method for understanding peoples' feelings, divides the angler population into groups based on motivations, attitudes, preferences, and values (Pollock et al. 1994).

Ditton (1996) segmented largemouth bass *Micropterus salmoides* anglers based on fishing frequency, residence location, gender, and tournament participation. Of these segmentation methods, tournament participation was the only factor that demonstrated significant differences in angler characteristics, such as participation variables, motivations, attitudes, and preferences. However, Loomis and Ditton (1987) found that tournament and nontournament anglers differed in participation and catch related items, but had similar noncatch motives. Segmentation by fishing frequency showed that a small proportion of anglers fished most often. However, more research is needed to determine if the groups differ in characteristics such as motives, attitudes, and preferences (Ditton 1996). To segment by gender, female anglers must be oversampled to acquire a sample size large enough to produce valid results. Anglers have been segmented by residence location for economic analysis purposes, however, significant results of economic impacts and differences in angler characteristics require large samples (Ditton 1996).

Other methods of market segmentation have been suggested, including segmentation based on membership in fishing or conservation groups, on consumptive orientation, and on degree of specialization. Segmentation by membership status may provide managers with useful information on angler attitudes toward management and regulations. However, this type of segmentation is not particularly useful for determining angler characteristics, such as motivations and satisfactions (Gigliotti and Peyton 1993). Segmentation by consumptive orientation divides anglers into groups based on strength of agreement or disagreement to statements about reasons for fishing and desired fishing

experiences (Fedler and Ditton 1986). Anglers who harvest large amounts of fish place a high degree of importance on catching and keeping fish. Anglers who rarely harvest fish consider the natural surroundings to be important, fish more often, and are more satisfied with fishing (Fedler and Ditton 1986). Segmentation by degree of specialization is one of the most effective methods of segmenting the angler market into groups with similar characteristics (Bryan 1977; Chipman and Helfrich 1988).

Fishery managers will develop more effective management programs when they understand different groups of anglers and the physical and biological aspects of a fishery. Market segmentation provides fishery managers with information necessary to better understand the public. However, to be effective, market segmentation must meet several criteria. First, the segments must be recognizable and accessible (identifiability). Second, each segment must have a substantial number of people in it (substantiality). Finally, segments must differ in their needs and desires (variation in market response) (Gigliotti 1996).

## STUDY OBJECTIVES

The goal of my study was to determine characteristics, motivations, preferences, attitudes, and opinions of Virginia anglers so that future fisheries management decisions can reflect their concerns and desires.

Specific objectives were to:

1. Determine the range of baseline information collected through statewide angler surveys by fisheries management agencies in the U. S.
2. Design a prototype survey instrument and use it to conduct an initial statewide survey of Virginia anglers.
3. Using results from the statewide survey of Virginia anglers, describe selected characteristics of freshwater anglers and develop a means to classify them into groups based on those characteristics.
4. Evaluate the survey process and recommend appropriate sample sizes and procedures for future surveys.

## Chapter 2: Descriptive Findings

### INTRODUCTION

#### Angler Characteristics and Behaviors

Many of the most basic and widely used survey questions deal with characteristics of the users of the resource and the ways in which they participate in the fishery. However, the importance of these questions often was overlooked as managers focused on questions about the fish the people were catching (Pollock et al. 1994). Anglers vary widely in demographic characteristics such as age, education, income, residence location, and ethnicity as well as in behaviors such as methods of fishing, bodies of water fished and species sought. Information about characteristics of anglers can help managers because anglers with similar characteristics and behaviors often share preferences for fishery types and the experiences provided by fisheries. For example, anglers who fish for the same species may be similar in terms of consumptive orientation and reasons for fishing. Also, information on residence location of anglers can tell fishery managers if the users of the fishery are from local areas or if they travel long distances for fishing. Developing an understanding of the fishing clientele in terms of their demographics and their preferred methods of fishing is important for marketing purposes (Pollock et al 1994). With knowledge of the characteristics and behaviors of fishery users, managers can direct management programs at specific groups of anglers and tailor fishery management to the needs and desires of anglers in specific geographic areas.

#### Angler Motivations

Angler motivations represent the underlying reasons for fishing and the satisfactions sought from the fishing experience. Historically, natural resource managers sought to increase the amount of fish or game harvested. This was believed to be the only way to increase user satisfaction because people were viewed as hunting or fishing solely to harvest game. Later, natural resource managers realized that recreationists sought multiple satisfactions when using the resource (Hendee 1974). Satisfaction with

the fishery resource can be increased by modifying many aspects of the fishery because people fish for a variety of reasons. Early studies found that, in addition to catching fish, people fished to enjoy nature, to escape, and to have fun (Moeller and Engelken 1972, Knopf et al. 1973, Ditton et al. 1978). Although catching fish is an important aspect of fishing, it is not the only satisfying part of the fishing experience, and it is not the only factor that motivates people to fish.

Identification of angler motivations for fishing is important because it helps managers understand why people fish and why they choose a particular location to fish. By identifying angler motivations, managers better understand the experiences desired by anglers. Recreational areas can be managed to address the motivations of anglers and angler satisfaction may be increased by providing desired experiences.

Angler motivations vary between members and nonmembers of fishing groups (Gigliotti and Peyton 1993), tournament and sport anglers (Loomis and Ditton 1987), specialized and unspecialized anglers (Chipman and Helfrich 1988; Hase 1996), and anglers of different consumptive orientation (Fedler and Ditton 1986). Catch-related motives are important to some groups, such as tournament anglers (Loomis and Ditton 1987) and anglers of high consumptive orientation (Fedler and Ditton 1986), but, more commonly, catching fish is just one motivation among many that leads them to the sport of fishing.

An extensive review by Fedler and Ditton (1994) examined 17 studies of angler motivations. They described five types of motivations: 1) psychological-physiological, 2) natural environment, 3) social, 4) fisheries resource and 5) skills and equipment. Psychological-physiological motives (i.e., relaxing and getting away from the daily routine) ranked high in all studies. Motives related to the natural environment, including being outdoors, ranked high in most studies. Getting away from other people was a popular social motive, but, it was important to most anglers to be with family or friends while fishing. The importance of fisheries resource motives varied widely for the various types of fishing that the studies observed. Among different groups of anglers examined, motives such as catching fish to eat, catching a trophy fish, and the challenge or sport varied in importance. Motives associated with skills and equipment ranked low in most

studies, with the exception being highly specialized groups of anglers (Fedler and Ditton 1994).

### Angler Attitudes, Opinions, and Preferences

Attitudes and opinions reflect feelings or dispositions toward a particular issue or object (Pollock et al. 1994; Duda et al. 1998). Attitudes can be directed at physical objects (fish species, type of water), social objects (other anglers, other recreationists, law enforcement officers), or institutional objects (fisheries agency, regulations) (Pollock et al. 1994). Attitudes and opinions vary among anglers. For example, trout Salmonidae and non-trout anglers in Michigan had different opinions on such things as agency budget allocation and future needs of anglers (McFadden et al. 1964).

Attitudes may reflect a lack of information, but they remain important indicators of how people feel about particular objects or issues (Pollock et al. 1994). Angler attitudes and opinions of fishery issues have several important implications for management. First, they indicate angler satisfaction with the agency and fishing overall. Second, they provide evidence of angler approval of agency programs and the importance they attach to various programs. Lastly, attitudes and opinions facilitate comparison of stakeholder interests with allocation of agency resources, and they indicate areas where agencies may wish to change policies and programs.

Anglers have preferences for the time, place, and circumstance in which their fishing activity occurs. Once understood, setting preferences can have implications for management. For example, areas can be managed to provide different types of environmental settings (wilderness, family recreation, urban). Recreationists desiring different experiences from their activity differ in their preferences for the setting of the activity (Manfredo et al. 1983). Preferences among backcountry hikers for environmental setting attributes (physical, social, and managerial) were related to degree of specialization (Virden and Schreyer 1988).

Managerial setting preferences also vary among recreationists. For example, Bryan (1977) demonstrated that management preferences varied among trout anglers of different levels of specialization. Occasional anglers preferred areas stocked with catchable size fish and areas with easy access, whereas generalists preferred areas where

they could harvest catchable size fish. Specialists were more likely to prefer areas with wild fish and restrictive regulations instead of areas with stocked fish (Bryan 1977).

In their study of Virginia river anglers, Chipman and Helfrich (1988) found that unspecialized anglers were more likely to favor liberal creel and size limits, whereas specialized anglers were more likely to favor more restrictive regulations. Similar results were discovered among trout anglers in Maryland (McGurrin 1986). Additionally, preferences for management varied between members of trout fishing organizations in Michigan and nonmembers (Gigliotti and Peyton 1993). A large proportion (74%) of members supported a catch and release regulation whereas only 41% of nonmembers supported the regulation.

### Market Segmentation of Virginia Anglers

Currently, resident anglers in Virginia must purchase one of four different types of licenses; Resident, Senior citizen, Five day, and County/City. Anglers who purchase each type of license may have different desires and satisfactions. Segmentation by license type may provide managers with information helpful to manage fisheries for anglers who purchase different licenses.

The Commonwealth of Virginia is divided into five management regions (Figure 2.1). Region one contains the eastern area of the Commonwealth including the cities of Chesapeake and Norfolk. Region two makes up the south central area of the Commonwealth from Dinwiddie to Roanoke. Region three contains all of southwestern Virginia. Region four contains the mountainous area between Alleghany County and Shenandoah County. Region five makes up the northeastern area of the Commonwealth and contains several densely populated areas including Fairfax County, and the cities of Charlottesville, and Richmond. The identification of differences that may exist among anglers from different regions may be useful to fishery managers in providing desired experiences to anglers in their region.



Figure 2.1. Fisheries management regions in the Commonwealth of Virginia.

## METHODS

### Collection of Statewide Angler Surveys

I collected other statewide angler surveys beginning in June 1999. I sent a letter to each state fisheries management agency requesting their most recent angler survey and the results of the survey (Appendix A). I telephoned agencies that did not respond to my mail request for surveys. I then reviewed the types of information collected in the surveys and classified it as angler characteristics, behaviors, motivations, preferences, and attitudes and opinions.

### Sample Selection

In June 1999, I drew a random sample from the 464,490 resident freshwater fishing licenses sold in Virginia in 1998. I sampled four types of resident freshwater fishing licenses. Budget constraints restricted the sample size to about 5,000. To meet this constraint, I drew a one percent sample from Resident licenses and two percent samples from Five-day, Senior Citizen, and County/City licenses (Table 2.1). I oversampled the Five-day, Senior Citizen, and County/City licenses to obtain a sufficient number of responses to characterize anglers from each license type. I gave the identification numbers from the 1998 fishing license sales receipts to the Virginia Department of Motor Vehicles to obtain names and addresses of anglers. The distribution of licenses in the sample closely matched the distribution of licenses sold in 1998.

Table 2.1. Resident license types included in the statewide survey of Virginia anglers conducted in 2000.

<b>License Type</b>	<b>Number sold in 1998</b>	<b>Percent of total sold</b>	<b>Number in sample</b>	<b>Percent of sample</b>
Full season	400,729	86%	4,417	82%
Senior citizen	29,511	6%	433	8%
County/city	21,849	5%	358	7%
Five day	12,401	3%	178	3%
<b>Total</b>	<b>464,490</b>	<b>100%</b>	<b>5,386</b>	<b>100%</b>

## Questionnaire Design

I used a self-administered mail questionnaire to collect information from anglers (Appendix B). Individual questions in the survey were adapted from other angler surveys (Chipman 1986; Ditton and Hunt 1996; Gigliotti 1996; Hase 1996), as well as from suggestions from VDGIF personnel and original questions I developed. Because the sample was based on 1998 license sales and the survey occurred early in 2000, anglers were asked first if they purchased a fishing license in 1999. Anglers who did not buy a 1999 license were asked to explain why they did not and then directed to the end of the survey to complete demographic questions. Anglers who purchased a 1999 license were directed to complete the entire questionnaire, including questions about fishing methods, frequency of fishing, location of fishing, and species sought.

Angler motivations were identified in the second section of the questionnaire. Motivational domains and indicator statements for each domain included in the questionnaire are listed in Table 2.2. General motive statements were measures of the following domains: achievement, equipment, family togetherness, being with people, learning-discovery, relationships with nature, exercise-physical fitness, physical rest, and escape personal-social pressures (Driver 1977). Five motive statements specific to fishing also were used (Ditton and Hunt 1996). All motive statements can be grouped into the following categories: natural, psychological, social, fishery resource, and skill/equipment (Fedler and Ditton 1994). The wording of motive statements was consistent with protocols developed by Fedler and Ditton (1994). However, unlike past studies, I used a balanced scale of importance (Table 2.3). Past studies have relied on an unbalanced scale with four levels of importance and just one level of unimportance. The unbalanced scale may make it difficult for respondents to differentiate between levels of importance. I determined the internal consistency of each of the five motive categories by computing Cronbach's Alpha for each category.

The section of the questionnaire on angler attitudes, opinions, and preferences, included questions regarding overall satisfaction with fishing, performance and function of the VDGIF, and preferences for such things as fishing regulations and characteristics of fishing locations. The final section of the questionnaire identified angler

Table 2.2. General motivation domains, activity-specific elements of recreational fishing, and indicator statements used in a survey of Virginia resident anglers conducted in 2000.

<b>General motivation domains (Driver 1977)</b>	<b>Statement</b>
Achievement	To develop my skills
Equipment	To test my equipment
Family togetherness	For family recreation
Being with people	To be with friends
Learning-discovery	To experience new and different things
Relationships with nature	To be outdoors To experience natural surroundings
Exercise-physical fitness	For physical exercise
Physical rest	For relaxation
Escape personal-social pressures	To get away from the daily routine To get away from the demands of other people
<b>Activity specific elements (Ditton and Hunt 1996)</b>	<b>Statement</b>
	To be close to the water
	To obtain fish for eating
	For the experience of the catch
	To obtain a trophy fish
	For the challenge/sport

Table 2.3. Comparison of unbalanced (conventional) and balanced scales of importance used in the questionnaire.

Scale	Levels of importance				
	1	2	3	4	5
Unbalanced	Not at all important	Slightly Important	Moderately Important	Very Important	Extremely Important
Balanced	Very Unimportant	Somewhat Unimportant	Neutral	Somewhat Important	Very Important

characteristics, including demographics (age, gender, ethnicity, education, and income). Demographic questions were placed at the end of the survey because respondents often find them to be the most objectionable questions (Dillman 1978).

I used a random subsample of 100 resident full-season license holders to pretest the questionnaire. The questionnaire was pretested to be sure questions were not confusing and to identify questions that should be eliminated. I requested that this subsample of anglers also help in designing the questionnaire. They were asked to fill out the questionnaire and identify any questions they did not understand. Minor changes were made to the questionnaire following the pretest.

### Mailing Procedures

The survey was implemented using a variation of the Total Design Method (Dillman 1978). I sent an initial mailing to all 5,386 anglers in the sample on January 18, 2000. This included a questionnaire, a cover letter, and a business reply return envelope. One week after the initial mailing, I sent a postcard reminder to all anglers in the sample. I sent follow-up mailings to nonrespondents four weeks and eight weeks after the initial mailing. These included a new cover letter, a replacement questionnaire, and a return envelope. Cover letters, the return envelope, and the postcard reminder are shown in Appendix C.

### Nonresponse Analysis

I checked for nonresponse bias by contacting a random subsample of 200 nonrespondents by phone. I used the internet to obtain phone numbers for nonrespondents. I contacted nonrespondents between 1900 and 2100 hours Monday through Friday and from 1300 to 1600 hours on Saturday and Sunday. If a nonrespondent was not contacted on the first attempt, I made four additional attempts. Nonrespondents who could not be reached in five attempts were eliminated from the sample of nonrespondents. I asked nonrespondents to verbally complete a shortened version of the survey administered over the phone (Appendix D). The shorter survey contained 20 questions from the original survey. Questions were chosen carefully to help identify differences that might exist between respondents and nonrespondents. Eleven

questions examined angler characteristics and behaviors, such as species fished for and type of water fished. I used five questions to identify angler motivations. One motive statement from each of the five motivation categories was chosen to represent that motive category. Finally, two questions identified angler attitudes toward the Fisheries Division and the quality of fishing and two questions identified angler demographics.

### Data Analysis

I analyzed descriptive characteristics by constructing frequency distributions for all questions with nominal or ordinal response categories and summary statistics (mean and median) for all continuous variables in the survey. Normality could not be assumed for continuous data, as the distributions of many variables were highly skewed, therefore, I used nonparametric statistical procedures. I cross-tabulated each characteristic with license type and management region. I used the Kruskal-Wallis test to compare management regions and license types when data were continuous. I used the chi-square test for homogeneity to test for differences among license types and management regions when cross tabulated against discrete data. A 0.05 level of statistical significance was used for all significance tests. However, large sample sizes were likely to result in statistically significant differences even if groups differed only slightly. Therefore, I used a conservative approach in which I considered results to be “managerially significant” if they were statistically significant ( $p < 0.05$ ) and if the relative difference in proportions was  $\geq 20\%$ . The term “managerially significant” is used to identify results that may be meaningful to the management agency, although the agency does not have the ability to affect all variables.

## RESULTS

### Review of Statewide Angler Surveys

Thirty-seven states conduct angler surveys (Table 2.4). Of those states, 25 conduct mail surveys and 12 conduct telephone surveys. Thirty-three of the states that conduct surveys include questions about angler attitudes and opinions, 32 include questions about angler characteristics and behaviors, 30 include questions about preferences, and 24 include questions about angler motivations.

### Descriptive Findings

#### *Response Rates and Nonresponse Analysis*

Overall response rate for my survey was 51.9% after adjustment for 377 undeliverable questionnaires, seven questionnaires delivered to deceased people, and 61 questionnaires delivered to people who claimed to have never bought a fishing license (Table 2.5). Response rate ranged from 36.1% for five-day license holders to 67.7% for senior citizen license holders. Follow-up phone calls to nonrespondents indicated that the sample of anglers who returned the questionnaire and anglers who did not return the questionnaire differed on several items (Table 2.6). Respondents fished more than twice as often as nonrespondents and fishing was more important to respondents than it was to nonrespondents. Therefore, avidity bias may be a problem with the sample of anglers who responded to the survey. Respondents were more likely than nonrespondents to fish to be with friends and to develop skills. Nonrespondents were not as interested in fishing. Also, a greater proportion of respondents indicated the overall performance of the Fisheries Division was fair or poor whereas most nonrespondents indicated the performance of the Fisheries Division was excellent or very good. Therefore, angler opinion of the Fisheries Division may not be as poor as indicated solely by respondents. Lastly, 100% of the nonrespondents were male while 84% of respondents were male; this may have been a result of the small sample size of nonrespondents.

Table 2.4. Status of statewide angler surveys in the United States and the types of questions asked on each survey, as of 1999.

States that conduct surveys	Survey type	Question Types			
		Characteristics and Behaviors	Motivations	Attitudes and opinions	Preferences
Alaska	mail	X	X	X	X
Arizona	mail	X	X	X	X
Arkansas	mail	X	X	X	X
Colorado	mail	X	X	X	X
Connecticut	phone	X	X	X	X
Delaware	mail	X	X	X	X
Florida	phone	X		X	
Georgia	phone			X	X
Idaho	mail	X	X	X	X
Illinois	mail	X	X	X	X
Indiana	mail	X	X	X	X
Iowa	phone	X	X	X	X
Kansas	mail	X	X	X	X
Kentucky	phone	X	X	X	X
Louisiana	mail	X	X	X	X
Maryland	mail	X	X	X	X
Massachusetts	mail	X	X	X	X
Minnesota	mail				
Mississippi	mail	X		X	X
Missouri	phone	X		X	X
Montana	mail				
Nebraska	phone	X	X	X	
New Hampshire	phone	X		X	X
New Jersey	mail	X	X	X	X
New Mexico	mail				
New York	mail	X	X	X	X
North Dakota	mail	X		X	X
Oklahoma	phone	X		X	X
Pennsylvania	phone	X	X	X	X
Rhode Island	phone	X		X	
South Carolina	phone	X	X	X	X
South Dakota	mail	X	X	X	X
Texas	mail	X	X	X	X
Utah	mail	X	X	X	X
Vermont	mail	X		X	X
Washington	mail				
Wyoming	mail	X	X	X	X

Table 2.5. Sample size, number of returned surveys, and response rates by license type from a survey of Virginia resident freshwater anglers conducted in 2000.

	License Type				Survey Totals
	Full Season	Senior Citizen	Five Day	County/City	
Initial sample size	4412	432	177	357	5378
Undeliverables	313	14	19	38	384
Denials/Never fished	42	15	0	4	61
Final sample size	4057	403	158	315	4933
Returns	2096	273	57	136	2562
Response rate	51.7%	67.7%	36.1%	43.2%	51.9%

Table 2.6. Comparison of responses between respondents (mailed) and nonrespondents (phone) derived from a survey of freshwater anglers in Virginia during 2000.

<b>Question</b>	<b>Mailed (N=2,559)</b>	<b>Phone (N=41)</b>	<b>Chi-Square</b>	<b>P value</b>	
Did you buy a Virginia freshwater fishing license in 1999? <sup>a</sup>	80.7	68.3	3.95	0.0500	
In 1999, how many days did you fish in freshwater in Virginia? <sup>B</sup>	32.0	14.3	10.46**	0.0012	*
To be outdoors <sup>c</sup>	91.8	85.7	14.95	<.0001	
To be with friends <sup>c</sup>	74.6	50.0	14.11	0.0100	*
For relaxation <sup>c</sup>	90.0	89.3	1.96	0.7400	
To develop my skills <sup>c</sup>	57.8	25.0	18.93	<.0001	*
To obtain fish for eating <sup>c</sup>	39.0	32.2	3.37	0.5000	
Overall, how satisfied were you with freshwater fishing in Virginia in 1999? <sup>d</sup>	28.8	44.5	7.7	0.2600	
How would you rate the overall performance of the Fisheries Division of the VDGIF in managing freshwater fisheries in Virginia? <sup>e</sup>	22.4	7.1	28.26	<.0001	
How many years of fishing experience do you have? <sup>b</sup>	29.7	32.1	1.42**	0.2333	
How important is freshwater fishing as a source of satisfaction in your life? <sup>f</sup>	28.1	17.1	12.33	0.2000	
What is your age? <sup>g</sup>	26.7	19.5	14.25	0.2900	
What is your gender? <sup>h</sup>	84.0	100.0	7.81	0.0100	

a=Percent indicating "Yes"

b=Mean

c=Percent indicating "Important"

d=Percent indicating "6" or "7" on a scale of 1 to 7

e=Percent indicating "Fair" or "Poor"

f=Percent indicating "9" or "10" on a scale of 1 to 10

g=Percent between the ages of 16 and 34

h=Percent male

\*\*=Kruskal-Wallis test

\* = most likely to be managerially significant

## Angler Attitudes and Opinions

Overall satisfaction with freshwater fishing in Virginia in 1999 was high (Table 2.7). Over 60% of anglers indicated a satisfaction of five or higher on a scale of one to seven. The individual freshwater fishing success of respondents also was rated high. However, 31% of anglers believed the quality of freshwater fishing in Virginia had declined over the past five years (Table 2.8). Nineteen percent of anglers believed the quality had improved and 30% stated it had stayed the same over the past five years.

Opinions of the Fisheries Division of the VDGIF generally were good, although large numbers of anglers indicated “Neutral” and “Don’t know” for all statements about the Fisheries Division (Table 2.9) and over 65% of anglers indicated they know “Little” or “Nothing” about the Fisheries Division (Figure 2.2). Seventeen percent of anglers disagreed that the Fisheries Division of the VDGIF provides adequate opportunities for public participation in decisions regarding fisheries-related issues, which indicates this may be an area of concern for the Division. Also, nearly 15% of anglers indicated that they disagreed that the Fisheries Division makes a good attempt to explain its fishing programs to the public. About 55% of anglers indicated the overall performance of the Fisheries Division was “Good”, “Very good”, or “Excellent,” whereas 21% of anglers rated the Division’s performance as “Fair” or “Poor” (Figure 2.3). Again, a large number (22%) of anglers did not know enough about the Fisheries Division to express an opinion.

A majority of anglers expressed support for minimum size limits and a high percentage of anglers expressed support for regulations such as slot limits and maximum size limits (Table 2.10). However, opposition to all regulations was high as over 20% of anglers expressed opposition to five of the six the proposed regulations. Opposition was greatest for the prohibition of bait, with over 70% of anglers indicating they opposed that regulation. About 61% of anglers agreed that freshwater fishing regulations in Virginia are easy to understand (Figure 2.4).

Anglers indicated that the most important functions of the Fisheries Division are those relating to fish habitat (Table 2.11). “Habitat improvement” and “Habitat and water quality protection” were rated as two of the most important functions of the Division. “Encouraging fishing among youth” also was rated as an important function. Of the 16 Fisheries Division functions listed in the questionnaire, a majority of anglers

Table 2.7. Angler satisfaction with freshwater fishing and fishing success in Virginia in 1999, as reported by respondents to a statewide survey conducted in 2000. (Numbers represent the percent of anglers responding, N=2,056)

Question	Rating						
	1	2	3	4	5	6	7
Overall, how satisfied were you with freshwater fishing in Virginia in 1999?	2.3	3.3	9.3	21.1	35.2	17.1	11.7
How would you rate your individual freshwater fishing success in Virginia in 1999?	4.2	5.7	13.7	30.0	29.6	11.2	5.6

Table 2.8. Angler opinion of the quality of freshwater fishing in Virginia from 1996 to 2000, as reported by respondents to a statewide survey conducted in 2000. (Numbers represent the percent of anglers responding, N=2,056)

<b>Question</b>	<b>Rating</b>			
	<b>Declined</b>	<b>Stayed the same</b>	<b>Improved</b>	<b>Don't know</b>
Over the past 5 years, the quality of freshwater fishing in Virginia has...	30.8	30.2	18.8	20.1

Table 2.9. Opinions of the Fisheries Division of the Virginia Department of Game and Inland Fisheries, as reported by respondents to a statewide survey conducted in 2000. (Numbers represent the percent of anglers responding, N=2,056. Don't know answers excluded from mean score)

Opinion of Fisheries Division	Value*						Mean
	1	2	3	4	5	6	
The Fisheries Division of the VDGIF does a good job of making anglers aware of current fishing regulations	1.2	6.4	22.6	52.1	10.1	7.6	3.7
The management policies of the Fisheries Division of the VDGIF are biologically sound	1.0	3.8	31.8	36.3	6.1	21.1	3.5
The Fisheries Division of the VDGIF makes a good attempt to explain its fishing programs to the public	2.0	12.7	30.6	36.5	5.9	12.3	3.4
The staff of the Fisheries Division of the VDGIF provides knowledgeable service to their customers	1.3	6.7	33.8	34.3	6.1	17.7	3.5
The Fisheries Division of the VDGIF provides adequate opportunities for public participation in decisions regarding fisheries related issues	3.8	13.1	36.1	20.5	3.7	22.9	3.1
The Fisheries Division of the VDGIF provides good solutions to fisheries problems	2.3	6.2	38.7	25.9	4.1	22.9	3.3

\* 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree, 6=Don't know

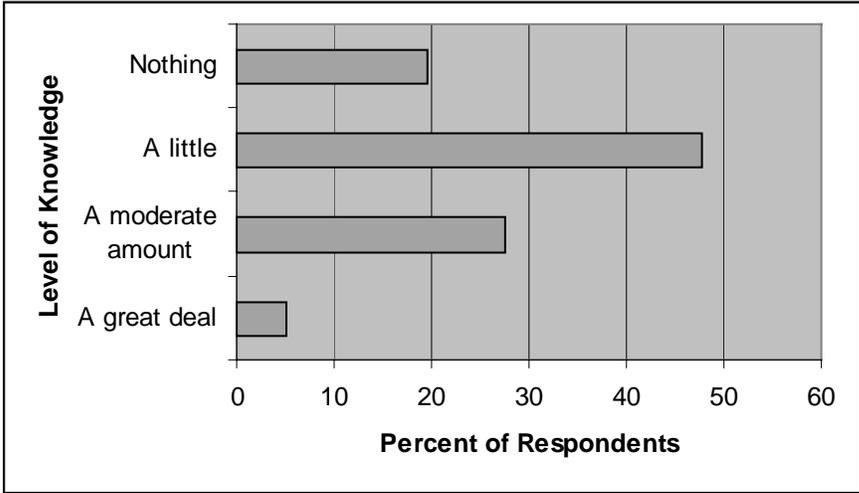


Figure 2.2. Angler knowledge of the Fisheries Division of the VDGIF, as reported by respondents to a statewide survey of Virginia resident freshwater anglers in 2000.

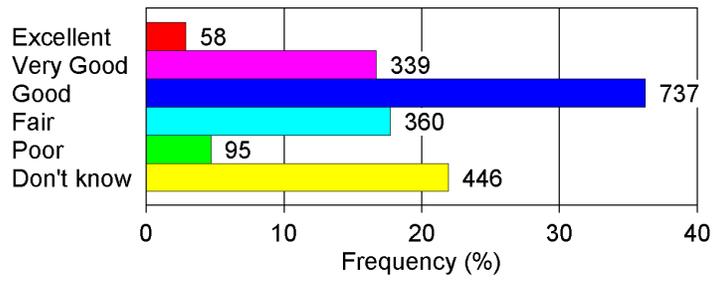


Figure 2.3. Angler opinion of the performance of the Fisheries Division of the VDGIF in managing freshwater fisheries in Virginia, as reported by respondents to a statewide survey of Virginia resident freshwater anglers in 2000.

Table 2.10. Support for regulations on the body of water fished most often, as reported by respondents to a statewide survey of Virginia anglers conducted in 2000. (Numbers represent the percent of anglers responding, N=2,056. Don't know answers excluded from mean score)

Regulations	Value*						Mean
	1	2	3	4	5	6	
Increased minimum size limits	3.6	10.7	22.4	38.8	20.3	4.2	3.6
Maximum size limits	7.0	22.3	27.3	25.8	13.1	4.4	3.2
Slot limits	5.9	14.1	31.0	31.9	10.8	6.4	3.3
Reduced daily bag limits	8.3	19.5	30.5	22.6	13.3	5.8	3.1
Prohibiting the use of bait	41.4	32.4	15.1	4.6	3.7	2.8	1.9
Catch and release only areas	13.6	18.8	24.4	23.3	16.0	4.0	3.1

\* 1=Strongly Oppose, 2=Oppose, 3=Neutral, 4=Support, 5=Strongly Support, 6=Don't know

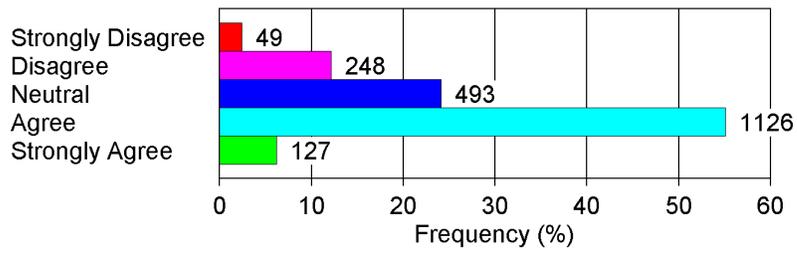


Figure 2.4. Angler opinion of the statement, “Freshwater fishing regulations in Virginia are easy to understand,” as reported by respondents to a statewide survey of Virginia resident freshwater anglers in 2000.

Table 2.11. Opinion of the importance of functions of the Fisheries Division of the VDGIF, as reported by respondents to a statewide survey of Virginia anglers conducted in 2000. (Numbers represent the percent of anglers responding, N=2,056)

Functions	Value*					Mean
	1	2	3	4	5	
Habitat and water quality protection	2.8	1.4	8.5	21.8	65.5	4.5
Encouraging fishing among youth	3.2	1.8	8.5	23.2	63.3	4.4
Habitat improvement	2.7	1.8	12.6	33.7	49.1	4.3
Warmwater river and stream management	2.9	3.4	15.1	37.3	41.3	4.1
Informing the public about fishing	2.4	2.9	16.0	39.2	39.5	4.1
Developing more access to bodies of water	5.6	5.5	13.6	31.0	44.3	4.0
Warmwater fish stocking programs	3.2	3.7	19.1	36.5	37.5	4.0
Coldwater fish stocking programs	4.5	3.3	22.2	29.5	40.4	4.0
Lake and pond management	2.8	4.1	23.4	35.3	34.4	3.9
Coldwater river and stream management	3.9	3.4	26.5	30.3	35.9	3.9
Aquatic resource education	2.4	3.4	35.4	36.0	22.7	3.7
Sport fishing education	2.9	5.2	32.4	38.1	21.4	3.7
Citation/angler recognition program	3.9	6.8	33.4	31.8	24.0	3.7
Encouraging private land owners to open access	10.0	8.0	23.8	25.4	32.8	3.6
Management of fee fishing areas	6.5	8.5	42.4	26.4	16.4	3.4
Private pond management assistance	7.9	10.8	40.4	26.5	14.4	3.3

\* 1=Very Unimportant, 2=Somewhat Unimportant, 3=Neutral, 4=Somewhat Important, 5=Very Important

indicated 14 of them were important. These functions ranged from education programs to increasing access and stocking fish. “Management of fee fishing areas” and “Private pond management assistance” were rated as the least important functions of the Fisheries Division.

### *Angler Motivations*

The most important reasons for fishing involved enjoying nature and escaping social pressures (Table 2.12). “To be outdoors” and “For relaxation” were the most important motives, followed by “To experience natural surroundings” and “To get away from the regular routine.” The least important reason for fishing was “To test my equipment.” “To obtain fish for eating” was rated low overall, however, nearly 39% of anglers felt that it was a “somewhat important” or “very important” reason for fishing. Reliability analysis indicated that statements within four of the five motive categories consistently measured the same motivation (Table 2.13). The motive statements within the Natural Environment, Psychological and Physiological, Fisheries Resource, and Skill and Equipment categories reliably measured the same concept, whereas those in the social category were less reliable. Reliability of the importance of motivations measured with a balanced scale was higher than reliability of an unbalanced scale (from previous studies) for three of the five motive categories (K. Hunt, Texas A&M University, personal communication).

Most (>75%) anglers agreed or strongly agreed with the following statements about fishing: “I like to fish where there are several kinds of fish to catch,” “A fishing trip can be successful even if I catch no fish,” and “I am just as happy if I don’t keep the fish I catch” (Table 2.14). A majority of anglers expressed disagreement with the following statements: “When I go fishing, I am not satisfied unless I catch something,” “A full stringer is the best indication of a good fishing trip,” “Bringing fish home to the table is an important outcome of fishing” and “Keeping the fish I catch is more enjoyable than releasing them.” Although the statements “Bringing fish home to the table is an important outcome of fishing,” and “A full stringer is the best indication of a good fishing trip” were rated low, with only approximately 20% of anglers expressing agreement with these statements.

Table 2.12. Importance of reasons for fishing to Virginia anglers, as reported by respondents to a statewide survey conducted in 2000. (Numbers represent the percent of anglers responding, N=2,056)

Reasons for fishing (Motivations)	Value*					Mean
	1	2	3	4	5	
To be outdoors	4.0	1.5	2.7	15.7	76.1	4.6
For relaxation	3.6	1.4	5.0	20.0	70.0	4.5
To experience natural surroundings	3.2	2.5	9.9	31.6	52.7	4.3
To get away from the regular routine	4.1	3.6	10.2	33.6	48.6	4.2
For the experience of the catch	4.3	4.4	10.3	32.9	48.2	4.2
For family recreation	5.3	4.8	14.9	31.0	44.1	4.0
To be close to the water	4.2	4.2	18.7	31.7	41.2	4.0
To be with friends	4.7	5.8	15.0	36.6	38.0	4.0
To get away from the demands of other people	7.4	6.3	19.1	26.9	40.3	3.9
To experience adventure and excitement	6.2	4.6	19.3	36.7	33.1	3.9
For the challenge/sport	7.5	5.4	17.5	34.9	34.7	3.8
To develop my skills	7.6	8.5	26.2	32.7	25.1	3.6
To experience new and different things	7.8	7.0	30.4	31.1	23.7	3.6
To share my knowledge of fishing with others	13.5	10.6	34.8	26.2	14.9	3.2
To catch a trophy fish	18.7	11.1	25.9	23.3	21.0	3.2
For physical exercise	15.5	10.2	35.6	24.6	14.2	3.1
To obtain fish for eating	24.5	14.8	21.7	25.2	13.7	2.9
To test my equipment	18.0	14.7	36.9	21.8	8.6	2.9

\* 1=Very Unimportant, 2=Somewhat Unimportant, 3=Neutral, 4=Somewhat Important, 5=Very Important

Table 2.13. Importance of motivation categories and internal consistency of motivation categories when measured on a balanced scale versus an unbalanced scale, as reported by respondents to a statewide survey conducted in 2000.

<b>Motivation Category</b>	<b>Mean</b>	<b>Cronbach Alpha</b>	<b>Cronbach Alpha if Item Deleted</b>	<b>Cronbach Alpha when measured on unbalanced scale*</b>
1 Natural Environment	4.3	0.8		0.62
To be outdoors	4.6		0.7	
To experience natural surroundings	4.3		0.67	
To be close to the water	4.0		0.79	
2 Psychological and Physiological	3.8	0.64		0.55**
For relaxation	4.5		0.54	
To get away from the regular routine	4.2		0.51	
To experience new and different things	3.6		0.59	
For physical exercise	3.1		0.65	
3 Fishery Resource	3.5	0.62		0.50
For the experience of the catch	4.1		0.53	
For the challenge/sport	3.8		0.46	
To catch a trophy fish	3.2		0.48	
To obtain fish for eating	2.9		0.74	
4 Social	3.4	-0.37		0.36
For family recreation	4.0		-1.11	
To be with friends	3.9		-0.43	
To get away from the demands of other people	2.2		0.38	
5 Skill and Equipment	3.2	0.68		0.71
To develop my skills	3.6		na	
To test my equipment	2.9		na	

\* Results from the 1993 Texas Statewide Angler Survey, K. Hunt, Texas A&M University, personal communication

\*\* Category did not include "For physical exercise"

Table 2.14. Virginia angler attitudes about statements regarding catching and keeping fish, as reported by respondents to a statewide survey conducted in 2000. (Numbers represent the percent of anglers responding, N=2,056)

Statements	Value*					Mean
	1	2	3	4	5	
I like to fish where there are several kinds of fish to catch	1.3	2.6	16.3	51.0	28.7	4.0
A fishing trip can be successful even if I catch no fish	2.1	7.1	10.9	48.1	31.8	4.0
I am just as happy if I don't keep the fish I catch	3.2	7.9	12.2	42.4	34.3	4.0
I am happiest with a fishing trip if I catch a challenging game fish	4.7	11.5	27.6	40.1	16.1	3.5
The bigger the fish I catch, the better the fishing trip	6.2	18.1	24.9	36.1	14.7	3.4
When I go fishing, I am just as happy if I don't catch a fish	5.4	25.7	27.3	29.0	12.6	3.2
The more fish I catch the happier I am	11.6	23.0	26.1	30.2	9.2	3.0
Catching a trophy fish is the biggest reward to me	14.7	23.6	27.9	19.7	14.1	3.0
A successful fishing trip is one in which I catch many fish	10.6	29.9	26.4	25.6	7.5	2.9
When I go fishing, I am not satisfied unless I catch something	15.2	36.2	23.2	20.1	5.3	2.6
A full stringer is the best indication of a good fishing trip	20.5	36.8	23.8	13.2	5.7	2.5
Bringing fish home to the table is an important outcome of fishing	25.0	31.3	22.7	15.9	5.0	2.5
Keeping the fish I catch is more enjoyable than releasing them	34.1	32.9	20.4	9.5	3.2	2.2

\* 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

## Angler Characteristics and Behaviors

Anglers fished an average of 32 days in 1999 (Table 2.15). A few very avid anglers probably inflated the mean days fished as the median days fished (20) was only 60% of the mean. Freshwater fishing was rated as an important source of satisfaction to many anglers (Figure 2.5). Nearly 45% of respondents rated the importance of freshwater fishing as eight or higher on a scale of one (Not important) to 10 (Extremely important). Anglers fished most frequently on warmwater rivers and large lakes and reservoirs (Table 2.16). Most often, anglers used artificial lures or bait while fishing (Table 2.17) and most frequently fished from shore or from a boat or canoe with a gas motor (Table 2.18). The two species of fish anglers fished for the most in 1999 were largemouth bass and smallmouth bass *Micropterus dolomieu* (Table 2.19). Fifty-seven percent of respondents indicated they fished for largemouth bass and 48% of anglers fished for smallmouth bass. More than one-third of Virginia anglers fished for panfish *Lepomis* spp, catfish Ictaluridae, and crappie *Pomoxis* spp.. Of the anglers who fished for trout, over 85% fished stocked trout areas, 38% fished wild/native trout areas, and 30% fished special regulation areas (Figure 2.6).

Approximately 15% of anglers indicated they never keep freshwater fish, whereas nearly 25% of anglers keep freshwater fish often or always (Figure 2.7). Over 60% of anglers indicated they fish in waters with slot limits (Table 2.20) and over 75% of those anglers never keep fish under the minimum slot limit. Most anglers (75%) do not keep fish under the minimum slot limit because they do not believe in keeping small fish or because they release everything. About four percent of anglers expressed some confusion over the definition of a slot limit, as they do not keep fish under the minimum slot limit because they believe it is against the law.

Many characteristics of fishing locations were very important to anglers. The most important characteristics factoring into choice of a fishing location included “If the area is clean,” “If the area is not crowded with jetskiers (or recreational boaters),” and “The natural beauty of the area” (Table 2.21). Although the most important reasons involved the natural beauty and serenity of the area, anglers also placed a great deal of importance on access and the fish present in the body of water. Characteristics of fishing

Table 2.15. Average, minimum, and maximum days fished and standard deviation of the number of days fished, as reported by respondents to a statewide survey conducted in 2000. N=2,056

Mean days fished	32.0
Median days fished	20
Stand deviation	41
Minimum	0
Maximum	365

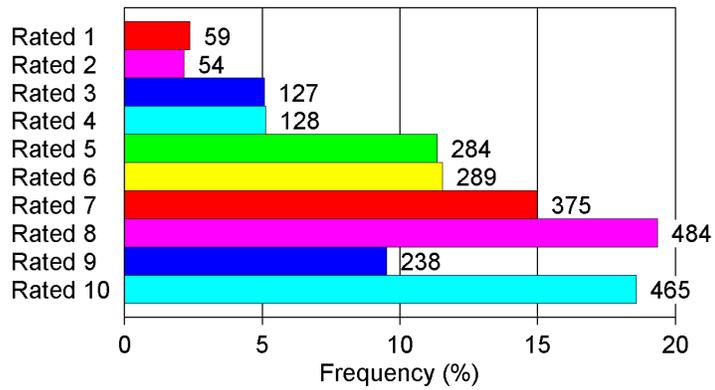


Figure 2.5. Importance of fishing as a source of satisfaction, as reported by respondents to a statewide survey of Virginia resident freshwater anglers in 2000. Based on a scale of 1=Not Important at all to 10=Extremely Important.

Table 2.16. Selection of water type and average fishing effort on that type of water, as reported by respondents to a statewide survey conducted in 2000. N=2,056

<b>Type of water</b>	<b>Percent of anglers</b>	<b>Mean % of fishing time</b>	<b>Median % of fishing time</b>
Large lakes and reservoirs	50.4	49.9	50.0
Small public lakes	40.0	35.4	25.0
Warmwater rivers and streams	58.1	52.4	50.0
Public coldwater rivers and streams	31.3	42.3	31.0
Private lakes and ponds	37.2	33.6	20.0

Table 2.17. Preferred method of fishing, as reported by respondents to a statewide survey conducted in 2000. (Numbers represent the percent of anglers responding, N=2,056)

Methods of fishing	Value*					Mean
	1	2	3	4	5	
Fishing with bait	4.5	9.7	20.7	41.0	24.1	3.7
Flyfishing	59.5	15.1	13.8	8.7	2.9	1.8
Artificial lure/spin	4.4	6.2	21.9	47.1	20.3	3.7
Trot lines/set poles	79.8	9.4	7.2	2.6	1.0	1.4
Seining for bait	64.7	13.9	14.5	5.8	1.1	1.7

\* 1=Never, 2=Rarely, 3=Occasionally, 4=Often, 5=Always

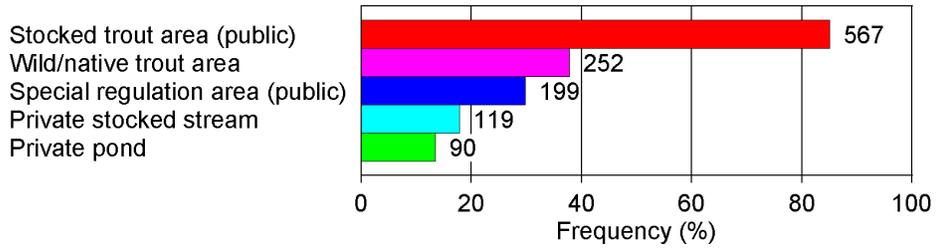
Table 2.18. Mode of fishing, as reported by respondents to a statewide survey conducted in 2000. (Numbers represent the percent of anglers responding, N=2,056)

Mode of fishing	Value*					Mean
	1	2	3	4	5	
From a boat or canoe with a gas motor	22.6	14.5	17.3	29.3	16.2	3.0
From a boat or canoe with an electric motor	31.9	15.3	20.8	22.8	9.2	2.6
From a boat or canoe without a motor	45.6	18.7	20.4	13.4	1.9	2.1
From the shore	8.6	14.1	27.1	38.2	11.9	3.3
From a pier or dock	26.7	25.6	27.5	17.6	2.5	2.4
By wading	36.1	14.4	20.0	24.5	4.9	2.5

\* 1=Never, 2=Rarely, 3=Occasionally, 4=Often, 5=Always

Table 2.19. Preference for species of fish sought and effort expended in pursuit of that species, as reported by respondents to a statewide survey of Virginia anglers conducted in 2000. N=2,056

<b>Species</b>	<b>Percent of anglers</b>	<b>Mean % of fishing effort</b>	<b>Median % of fishing effort</b>
Largemouth bass	56.9	39.6	30.0
Smallmouth bass	47.8	31.6	25.0
Panfish (bream, sunfish, rock bass)	40.7	24.2	15.0
Catfish and bullheads	36.4	25.2	20.0
Crappie	33.8	19.6	10.0
Trout (brook, brown, rainbow)	27.8	42.9	30.0
Striped bass	23.5	23.8	10.0
Any kind of fish (no preference)	11.7	76.1	100.0
Shad and Herring	4.7	14.7	10.0
Walleye and sauger	4.5	13.2	10.0
Muskie and northern pike	4.3	11.1	10.0



\* Note: Multiple answers can total over 100%.

Figure 2.6. Waters fished by Virginia trout anglers, as reported by respondents to a statewide survey of Virginia resident freshwater anglers in 2000.

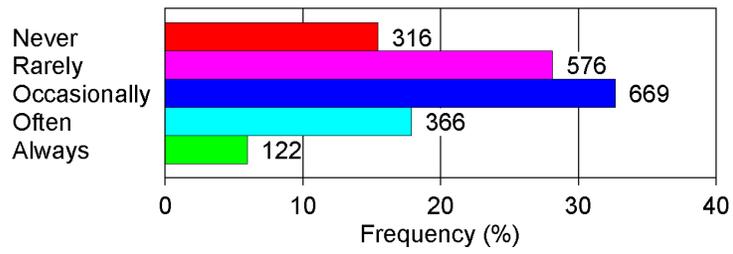


Figure 2.7. Frequency with which Virginia anglers keep the freshwater fish they catch, as reported by respondents to a statewide survey of Virginia resident freshwater anglers in 2000.

Table 2.20. Percent of Virginia anglers who fish in bodies of water with slot limits and their attitudes toward keeping fish below the slot limit, as reported by respondents to a statewide survey conducted in 2000. (Numbers represent the percent of anglers responding, N=2,056)

<b>Question</b>	<b>Yes</b>	<b>No</b>			
Do you fish in waters with a slot limit?	63.2	36.8			
	<b>Never</b>	<b>Rarely</b>	<b>Occasionally</b>	<b>Often</b>	<b>Always</b>
When you fish in waters with a slot limit, how often do you keep fish under the minimum slot limit?	76.7	15.3	6.0	1.2	0.7
If you do not keep fish under the minimum slot limit, why not?	<b>Reason</b>	<b>Percent of anglers</b>			
	I do not believe in keeping small fish	41.4			
	I release everything	34.0			
	Fish under the slot are too small to eat	15.3			
	Consumption advisory on water	5.4			
	Against the law	3.9			

Table 2.21. Importance of site characteristics to Virginia anglers when choosing a location to fish, as reported by respondents to a statewide survey conducted in 2000. (Numbers represent the percent of anglers responding, N=2,056)

Characteristics of fishing locations	Value*					Mean
	1	2	3	4	5	
If the area is clean	1.9	1.4	5.1	31.2	60.3	4.5
If the area is not crowded with jetskiers	3.8	2.6	9.7	17.3	66.6	4.4
If the area is not crowded with recreational boaters	3.1	2.3	8.6	27.2	58.8	4.4
The natural beauty of the area	2.0	3.2	10.9	39.7	44.3	4.2
Adequate parking at the area	3.9	4.5	11.7	32.6	47.3	4.2
If the area has many fish	2.1	3.5	12.5	43.2	38.7	4.1
Opportunities to view wildlife	2.4	3.9	14.1	41.5	38.2	4.1
The fish species present in the water body	3.4	4.1	14.7	41.5	36.2	4.0
If the area has many types of fish	2.6	4.8	17.0	42.3	33.3	4.0
Boat ramp/access area	7.5	6.1	16.2	27.7	42.4	3.9
Access for bank fishing	8.5	8.2	13.7	32.5	37.1	3.8
If the area has large fish	3.1	6.6	24.2	41.0	25.1	3.8
Not having to travel far	5.5	9.0	19.5	35.0	31.0	3.8
If the area is not crowded with other anglers	2.8	8.5	23.0	40.5	25.2	3.8
Familiarity with the area	2.9	7.3	22.9	43.6	23.3	3.8
If the area has a fish consumption advisory	6.9	8.3	28.7	22.7	33.4	3.7
Fish are stocked regularly	6.0	8.9	29.4	28.6	27.1	3.6
Having specific information about a location	5.1	9.2	27.8	39.7	18.2	3.6
Rest room facilities available	11.2	14.0	27.8	25.0	22.0	3.3
The opportunities for other recreation activities	9.9	11.9	30.1	32.7	15.4	3.3
If the area does not have restrictive regulations	8.1	10.4	41.3	25.9	14.3	3.3
If the area has restrictive regulations	6.2	11.3	44.3	25.5	12.6	3.3
Campground facilities available	14.9	16.8	32.7	23.0	12.7	3.0
Availability of boat/canoe rental at fishing site	16.9	16.7	33.7	21.9	10.8	2.9
Availability of guiding service	27.5	19.2	37.7	10.8	4.7	2.5

\* 1=Very Unimportant, 2=Somewhat Unimportant, 3=Neutral, 4=Somewhat Important, 5=Very Important

locations that were rated low in importance by anglers included “Availability of guiding service” and “Availability of boat/canoe rental at fishing site.”

Several factors affected how often respondents fished in freshwater (Table 2.22). “Having free time to fish” was the greatest constraint on the frequency of fishing, followed by “Having fishing areas with few jetskiers” and “Having fishing areas close to home.” “High cost of fishing equipment” and “Having enough money to go fishing” were the least important factors in determining frequency of fishing.

The freshwater fishing community in Virginia in 1999 was dominated by males and anglers between the ages of 30 and 49 (Table 2.23). Nearly half of the respondents indicated they resided in a rural area and 88% of anglers were white. Sixty percent of anglers have received formal education beyond high school and 45% of anglers had a household income >\$50,000.

#### *Angler Comments*

Over 700 anglers wrote additional comments on their questionnaires. I arranged the comments by topic (Appendix E). Many of the comments easily could be categorized as dealing with access to water, jetski and recreational boater conflicts, trash and pollution, and the trout fishing program. The remaining comments were classified as miscellaneous. Anglers indicated there is a need for more access to bodies of water, including boat and bank access. Anglers expressed frustration over the fact that many bodies of water are posted as private property. Many anglers indicated they have conflicts with jetskiers and recreational boaters. Comments ranged from suggestions of banning jetskiers from some bodies of water to setting regulations on the jetskiers. Pollution of waterbodies and litter left at fishing sites were two of the greatest concerns of anglers who added comments to the questionnaire. Regarding the trout fishing program, anglers indicated a desire to return to an opening day of trout season, to have unannounced stockings, and to stock more and larger fish.

#### Segmentation by License Type

Over 80% of the anglers who returned surveys purchased a fishing license in 1999. Eighty-six percent of respondents purchased a resident license, 8.9% purchased a

Table 2.22. Importance of factors determining how often Virginia anglers fished in freshwater, as reported by respondents to a statewide survey conducted in 2000.

(Numbers represent the percent of anglers responding, N=2,056)

Statement	Value*					Mean
	1	2	3	4	5	
Having free time to fish	2.4	2.4	7.6	27.8	59.8	4.4
Having fishing areas with few jetskiers	4.1	2.9	11.2	19.7	62.1	4.3
Having fishing areas close to home	3.5	5.5	10.0	42.1	39.0	4.1
Having fishing areas with few recreational boaters	3.3	4.2	17.2	35.1	40.3	4.1
Having fishing areas with many fish	2.3	4.7	16.1	46.5	30.5	4.0
Having fishing areas with several kinds of fish	3.1	5.3	16.6	43.3	31.7	4.0
If family or friends are available to go fishing with me	4.5	6.7	16.6	40.3	31.9	3.9
Having fishing areas with regulations that are not complex	3.5	4.6	23.9	40.9	27.1	3.8
Having fishing areas with large fish	3.2	6.9	24.4	42.2	23.3	3.8
Having fishing areas with few other anglers	2.4	8.3	31.0	41.6	16.6	3.6
Having enough money to go fishing	8.9	10.8	25.7	26.6	28.1	3.5
High cost of fishing equipment	9.1	14.9	38.4	23.7	13.9	3.2

\* 1=Very Unimportant, 2=Somewhat Unimportant, 3=Neutral, 4=Somewhat Important, 5=Very Important

Table 2.23. Demographic characteristics of freshwater anglers in Virginia, as reported by respondents to a statewide survey conducted in 2000. (Numbers represent the percent of anglers responding, N=2,056)

Question	A city of 1,000,000 or more	A city of 250,000 to 999,999 people	A city of 50,000 to 249,999 people	A city or town with less than 50,000	A rural area
Which of the following best describes the area where you now reside?	4.4	10.4	16.7	22.2	46.3
Which of the following best describes the area where you resided as a child?	5.1	7.6	15.0	22.9	49.4

What is your age?	16 to 17	1.0
	18 to 24	6.4
	25 to 29	8.3
	30 to 34	11.0
	35 to 39	13.2
	40 to 44	13.6
	45 to 49	11.7
	50 to 54	10.2
	55 to 59	7.7
	60 to 64	5.3
	65 to 69	5.2
	70 to 74	4.5
	75 and older	1.9

What is your gender?	Male	84.0
	Female	16.0

Table 2.23 Continued. Demographic characteristics of anglers in Virginia, as reported by respondents to a statewide survey conducted in 2000.

Which of the following do you consider yourself?	White	88.0
	Black	5.7
	Native American	4.2
	Asian	0.8
	Hispanic	0.2
	Other	1.2

What is the highest level of formal education you have completed?	Some high school	12.0
	High school degree	27.4
	Vocational or technical degree	8.8
	Some college	24.2
	College degree	18.0
	Post graduate study	9.6

What was your household's 1999 annual income before taxes?	Less than \$10,000	3.7
	\$10,000-19,999	8.0
	\$20,000-24,999	6.4
	\$25,000-29,999	7.8
	\$30,000-34,999	7.6
	\$35,000-39,999	7.7
	\$40,000-49,999	12.9
	\$50,000-74,999	25.5
	\$75,000-99,999	10.9
	\$100,000 or more	9.4

senior citizen license, 4.4% purchased a county/city license, and less than one percent purchased a five day license (Figure 2.8). Sample sizes for resident, senior citizen, and county/city licenses were adequate to conduct cross tabulations and Chi square tests to examine differences among these groups in characteristics, behaviors, motivations, attitudes and preferences. The sample size of five day licenses was too small and therefore was excluded from analysis.

Resident license holders fished more frequently than other license groups, averaging 34 days of fishing in 1999 (Table 2.24). Senior citizen license holders fished the least, averaging only 19 days; county/city license holders fished an average of 25 days. County/city license holders used bait 92% of the time, far more often than holders of other license types (Table 2.25). Resident license holders used artificial lures more often than holders of other license types. Nearly half of resident and senior citizen license holders fished from a gas-powered boat often or always whereas only 27% of county/city license holders did so. Resident license holders fished equally from shore and from boats. Senior citizen and county/city license holders fished more from shore than they did from boats.

The most-used source of information about fishing in Virginia for all groups was friends or other anglers (Table 2.26). All license holders frequently used sporting goods stores and bait dealers as sources of information about fishing in Virginia. Resident license holders were more likely than others to use the internet as a source of information about fishing in Virginia. Over one-quarter of senior citizen license holders use newspapers when obtaining information about fishing.

Motivations related to enjoyment of the natural environment were of great importance to all license holders (Table 2.27). “To be outdoors” and “For relaxation” were the most important reasons for fishing among all license types. The social and psychological reasons for fishing, “For family recreation”, “To get away from the demands of other people” and “To get away from the regular routine” were less important to senior citizen license holders than for Resident and County/City license holders. Obtaining fish for eating was less important and catching a trophy was more important to resident license holders than they were to other license types. Less than 40% of resident license holders indicated “To obtain fish for eating” was important to them compared

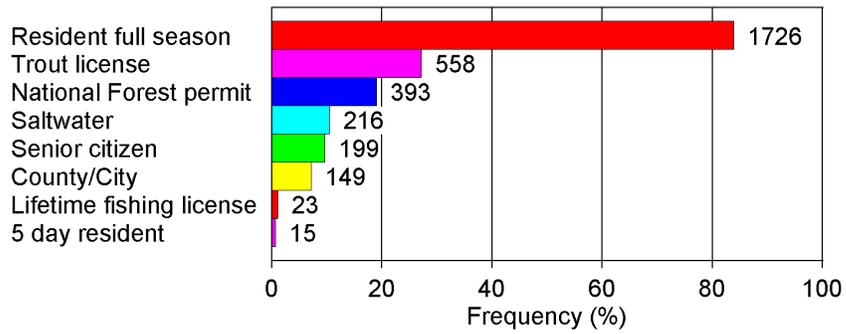


Figure 2.8. Percent and number of respondents to a statewide survey of Virginia anglers in 2000 who purchased various types of Virginia resident fishing licenses during the 1999 season.

Table 2.24. Mean days fished in 1999 by Virginia resident anglers by license type, as reported by anglers in a statewide survey in 2000.

QUESTION	License Type			Chi square	P value
	Resident (N=1726)	Senior (N=199)	County/ City (N=149)		
<b>Days fished</b>					
In 1999, how many days did you fish in freshwater in Virginia?	33.8	18.5	25.4	52.23	<.0001 *

\* Most likely to be managerially significant

Table 2.25. Preferred methods of fishing in 1999 by license type, as reported by Virginia resident anglers in a statewide survey in 2000. Numbers represent the percent of anglers indicating often or always.

Methods of fishing	License Type			Chi square	P value
	Resident (N=1726)	Senior (N=199)	County/ City (N=149)		
Fishing with bait	62.7	70.4	91.6	43.55	<.0001 *
Flyfishing	11.6	14.1	3.1	14.80	0.063
Artificial lure/spin	69.8	55.4	44.7	50.32	<.0001 *
Trot lines/set poles	3.1	7.6	9.2	36.28	<.0001
Seining for bait	6.7	5.2	10.6	10.48	0.233
From a boat or canoe with a gas motor	46.8	44.5	27.4	26.43	0.001
From a boat or canoe with an electric motor	33.0	28.2	25.3	15.09	0.058
From a boat or canoe without a motor	16.1	7.6	16.2	18.66	0.017
From the shore	48.2	60.6	62.3	47.42	<.0001
From a pier or dock	18.9	28.1	28.0	20.95	0.007
By wading	30.3	20.4	24.7	23.21	0.003

\* Most likely to be managerially significant

Table 2.26. Preferred sources of information by license type, as reported by Virginia resident anglers in a statewide survey in 2000. Numbers represent the percent of anglers indicating often or always.

Information sources	License Type			Chi square	P value
	Resident (N=1726)	Senior (N=199)	County/ City (N=149)		
VDGIF's Virginia Wildlife magazine	14.8	17.0	8.9	18.94	0.015
Other VDGIF publications, handouts and news releases	16.6	14.3	10.1	13.09	0.109
VDGIF worldwide web page (internet)	6.4	1.3	1.3	23.05	0.003
VDGIF staff	2.4	0.7	2.6	7.49	0.485
Newspapers	21.8	27.6	14.1	13.61	0.093
Commercial magazines or newsletters	17.6	13.8	9.1	19.82	0.011
Television	14.7	15.9	14.8	4.48	0.812
Radio	6.0	7.1	7.9	2.23	0.973
Friends or other anglers	61.9	45.4	50.0	31.35	0.0001
Sporting goods stores	33.1	20.1	32.5	20.89	0.008
Bait dealers	27.4	18.9	24.1	9.95	0.269
Fishing club	6.9	4.6	5.1	6.21	0.624

Table 2.27. Relationship between various reasons for fishing and license type, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent of anglers indicating “Somewhat Important” or “Very Important.”

Motives	License Type			Chi square	P value
	Resident (N=1726)	Senior (N=199)	County/ City (N=149)		
To be outdoors	92.5	86.0	90.5	19.61	0.012
For family recreation	75.6	66.9	78.8	26.75	0.001
To experience new and different things	55.8	47.3	52.6	27.70	0.001
For relaxation	90.8	86.2	86.9	12.55	0.129
To be close to the water	73.7	71.0	63.0	16.54	0.035
To obtain fish for eating	37.5	50.0	46.9	20.81	0.008
To get away from the demands of other people	69.4	45.3	67.5	44.49	<.0001 *
For the experience of the catch	82.1	74.3	76.6	17.95	0.022
To test my equipment	30.7	26.3	34.2	8.22	0.413
To be with friends	75.3	66.0	78.1	24.07	0.002
To experience natural surroundings	85.4	77.1	79.0	22.31	0.004
To develop my skills	58.8	46.7	55.0	19.18	0.014
To get away from the regular routine	83.7	68.0	79.8	49.40	<.0001
To catch a trophy fish	45.7	28.8	41.3	24.59	0.002
For the challenge/sport	71.0	57.6	66.7	19.09	0.014
To experience adventure and excitement	71.6	51.8	68.3	41.88	<.0001
To share my knowledge of fishing with others	41.6	35.6	37.5	18.15	0.020
For physical exercise	36.8	53.1	39.5	28.82	0.001

\* Most likely to be managerially significant

with one-half of senior citizen license holders. Over 45% of resident license holders indicated “To catch a trophy fish” was important to them while less than 30% of senior citizen license holders indicated catching a trophy fish was important. Greater than 40% of county/city license holders indicated that catching fish for eating and catching trophy fish were important to them.

All three types of license holders were satisfied with freshwater fishing in Virginia in 1999 (Table 2.28). However, approximately one-quarter to one-third of all anglers indicated the quality of fishing had declined over the past five years. County/city license holders were the most dissatisfied with fishing in the past five years, as 38% of them indicated the quality of fishing had declined. Resident (67%), senior citizen (64%) and county/city (83%) license holders all possessed little knowledge about the Fisheries Division of the VDGIF. Greater than 15% of resident license holders disagreed with the following statements: “The Fisheries Division of the VDGIF makes a good attempt to explain its fishing programs to the public” and “The Fisheries Division of the VDGIF provides adequate opportunities for public participation in decisions regarding fisheries related issues.” Fewer senior citizen and county/city license holders disagreed with these statements.

County/city license holders showed very little support for five of the six restrictive regulation alternatives (Table 2.29). Resident and senior citizen license holders expressed higher levels of support for regulations than county/city license holders, however, substantial percentages of all angler types expressed opposition to all proposed regulations. Resident license holders supported minimum size limits and moderately supported maximum size limits, slot limits, and catch and release. Senior citizen license holders indicated moderate amounts of support for minimum size limits, maximum size limits, and slot limits. Reduced creel limits received low levels of support and the prohibition of bait received very little support from all license types.

More County/city license holders than resident and senior citizen license holders were from rural areas (61%) and were female (26%) (Table 2.30). Less than 50% of anglers who purchased the other license types were from rural areas and <15% were female. County/city license holders tended to be younger than holders of other license types, with over 40% under the age of 35 compared to less than 30% of resident license

Table 2.28. Attitudes and opinions toward the VDGIF Fisheries Division by license type, as reported by Virginia resident anglers in a statewide survey in 2000.

QUESTIONS	License Type			Chi square	P value
	Resident (N=1726)	Senior (N=199)	County/ City (N=149)		
<b>Overall, how satisfied were you with freshwater fishing in Virginia in 1999?</b>					
Percent satisfied	64.7	61.0	60.0	16.67	0.1625
Percent unsatisfied	15.1	11.7	16.3		
<b>Over the past 5 years, the quality of freshwater fishing in Virginia has...</b>					
Percent "Declined"	31.1	26.9	38.1	25.30	0.0003 *
<b>Before receiving this survey, how much did you know about the Fisheries Division of the VDGIF?</b>					
Percent "Little or Nothing"	66.5	63.9	82.5	19.22	0.0038 *
<b>The Fisheries Division of the VDGIF does a good job of making anglers aware of current fishing regulations.</b>					
Percent "Agree or Strongly Agree"	61.9	67.9	57.5	9.39	0.3107
Percent "Disagree or Strongly Disagree"	7.9	3.0	7.5		
Percent "Neutral"	23.4	19.4	21.3		
Percent "Don't know"	6.8	9.7	13.8		
<b>The management policies of the Fisheries Division of the VDGIF are biologically sound.</b>					
Percent "Agree or Strongly Agree"	41.9	50.3	41.3	13.12	0.1078
Percent "Disagree or Strongly Disagree"	5.1	1.9	6.3		
Percent "Neutral"	32.8	24.2	26.3		
Percent "Don't know"	20.3	23.6	26.3		

\* Most likely to be managerially significant

Table 2.28 Continued. Attitudes and opinions toward the VDGIF Fisheries Division by license type, as reported by Virginia resident anglers in a statewide survey in 2000.

<b>QUESTIONS</b>	<b>Full Season</b>	<b>Senior Citizen</b>	<b>County/ City</b>	<b>Chi square</b>	<b>P value</b>
<b>The Fisheries Division of the VDGIF makes a good attempt to explain its fishing programs to the public.</b>					
Percent "Agree or Strongly Agree"	41.1	53.1	50.6	18.99	0.0149
Percent "Disagree or Strongly Disagree"	15.6	9.2	10.1		
Percent "Neutral"	31.6	25.0	20.3		
Percent "Don't know"	11.7	12.8	19.0		
<b>The staff of the Fisheries Division of the VDGIF provides knowledgeable service to their customers.</b>					
Percent "Agree or Strongly Agree"	39.2	48.8	50.0	25.82	0.0011
Percent "Disagree or Strongly Disagree"	8.7	1.9	8.8		
Percent "Neutral"	35.2	27.2	22.5		
Percent "Don't know"	17.0	22.2	18.8		
<b>The Fisheries Division of the VDGIF provides adequate opportunities for public participation in decisions regarding fisheries related issues.</b>					
Percent "Agree or Strongly Agree"	23.0	32.5	32.5	25.65	0.0012 *
Percent "Disagree or Strongly Disagree"	18.0	9.2	12.5		
Percent "Neutral"	37.6	25.8	26.3		
Percent "Don't know"	21.4	32.5	28.8		
<b>The Fisheries Division of the VDGIF provides good solutions to fisheries problems.</b>					
Percent "Agree or Strongly Agree"	29.1	33.5	37.5	15.30	0.0536
Percent "Disagree or Strongly Disagree"	8.6	7.5	6.3		
Percent "Neutral"	40.4	28.6	28.8		
Percent "Don't know"	21.9	30.4	27.5		
<b>How would you rate the overall performance of the Fisheries Division of the VDGIF in managing freshwater fisheries in Virginia?</b>					
Percent "Fair or Poor"	22.7	16.7	24.7	19.38	0.0130
Percent "Good, Very good, or Excellent"	56.0	57.1	55.6		
Percent "Don't know"	21.4	26.2	19.8		

\* Most likely to be managerially significant

Table 2.29. Support for regulations by license type, as reported by Virginia resident anglers in a statewide survey in 2000.

Regulation	License Type			Chi square	P value
	Resident (N=1726)	Senior (N=199)	County/ City (N=149)		
<b>Increased minimum size limits</b>					
Percent "Support or Strongly Support"	61.0	50.0	39.5	29.82	0.0002 *
Percent "Oppose or Strongly Oppose"	13.9	14.2	22.2		
Percent "Neutral"	21.5	27.8	32.1		
Percent "Don't know"	3.7	8.0	6.2		
<b>Maximum size limits</b>					
Percent "Support or Strongly Support"	39.5	42.9	18.5	43.79	<.0001 *
Percent "Oppose or Strongly Oppose"	28.9	22.7	44.4		
Percent "Neutral"	27.6	26.6	29.6		
Percent "Don't know"	3.9	7.8	7.4		
<b>Slot limits</b>					
Percent "Support or Strongly Support"	43.9	44.2	19.8	32.36	<.0001 *
Percent "Oppose or Strongly Oppose"	19.8	14.1	24.7		
Percent "Neutral"	31.0	28.2	43.2		
Percent "Don't know"	5.4	13.5	12.4		
<b>Reduced daily bag limits</b>					
Percent "Support or Strongly Support"	36.8	30.8	31.3	7.89	0.4444
Percent "Oppose or Strongly Oppose"	27.3	28.2	28.8		
Percent "Neutral"	30.8	30.8	30.0		
Percent "Don't know"	5.1	10.3	10.0		
<b>Prohibiting the use of bait</b>					
Percent "Support or Strongly Support"	8.3	9.0	4.9	12.07	0.1480
Percent "Oppose or Strongly Oppose"	73.9	70.5	81.5		
Percent "Neutral"	15.3	15.4	11.1		
Percent "Don't know"	2.5	5.1	2.5		
<b>Catch and release only areas</b>					
Percent "Support or Strongly Support"	41.4	28.0	23.8	28.48	0.0004
Percent "Oppose or Strongly Oppose"	31.6	31.9	46.3		
Percent "Neutral"	23.8	31.9	23.8		
Percent "Don't know"	3.3	8.3	6.3		

\* Most likely to be managerially significant

Table 2.30. Selected demographic characteristics by license type, as reported by Virginia resident anglers in a statewide survey in 2000.

QUESTIONS	License Type			Chi square	P value
	Resident (N=1726)	Senior (N=199)	County/ City (N=149)		
<b>Which of the following best describes the area where you now reside?</b>					
Percent "Rural"	46.5	47.5	60.8	23.39	0.0029
<b>Which of the following best describes the area where you resided as a child?</b>					
Percent "Rural"	47.5	58.3	62.7	16.983	0.0303
<b>What is your age?</b>					
Percent "16-34"	28.0	0.0	42.5	1337.758	<.0001 *
<b>What is your gender?</b>					
Percent "Male"	87.0	86.5	73.6	12.568	0.0019
<b>Which of the following do you consider yourself?</b>					
Percent "White"	89.6	80.7	86.2	36.176	0.0147
<b>What is the highest level of formal education you have completed?</b>					
Percent beyond high school	62.2	46.7	45.8	32.931	0.0003
<b>What was your household's 1999 annual income before taxes?</b>					
Percent \$75,000 or more	23.0	10.3	8.0	103.075	<.0001

\* Most likely to be managerially significant

holders. Resident license holders had a higher level of education and higher incomes than anglers who purchased other licenses. Over 60% of resident license holders had an education beyond high school and over 20% had a household income greater than \$75,000.

### Segmentation by Management Region

More than one-third of respondents resided in Region five, the most densely populated area of the Commonwealth (Table 2.31). Region one, which also is highly populated, had just 13.6% of respondents and only 11% of respondents were from Region four.

Respondents from Regions two and three were more avid anglers than those from other regions of the Commonwealth, fishing an average of 39 days and 35 days per year respectively (Table 2.32). Anglers in Region two spent most of their fishing effort on large lakes and reservoirs, while anglers from the other management regions spent more of their fishing effort on warmwater rivers and streams (Table 2.33). Anglers in Regions three and four indicated higher levels of fishing effort spent on coldwater rivers and streams than anglers in other regions. Anglers in all regions predominately used bait and artificial lures (Table 2.34). Anglers in Regions one, two, and five were most likely to fish from boats and anglers from Regions three, and four were most likely to fish from the shore and by wading.

Anglers from Regions one, two, and five were more satisfied with freshwater fishing in Virginia than were anglers from Regions three and four (Table 2.35). Over 70% of anglers from Regions one and five indicated they were satisfied with freshwater fishing in 1999. Only 49% of anglers from Region three were satisfied with fishing in 1999 and 23% were unsatisfied. Between 20% and 47% of anglers from each management region indicated the quality of fishing had declined from 1996 to 1999, with nearly half (47%) of all anglers from Region three indicating the quality of freshwater fishing had declined. Over 30% of anglers from Regions two and four also indicated the quality had declined.

Anglers from the five different management regions expressed similar attitudes toward regulation alternatives, although anglers from Region were more supportive of

Table 2.31. Number of respondents and percent of respondents residing in each management region who participated in a statewide survey of Virginia anglers in 2000.

Management Region	Number of Respondents	Percent of Respondents
Region 1	337	13.7
Region 2	569	23.1
Region 3	417	16.9
Region 4	267	10.8
Region 5	874	35.5
Total*	2464	100.0

\*Total not equal to total number of respondents because some anglers did not indicate where they resided

Table 2.32. Mean number of days fished in 1999 by management region, as reported by Virginia resident anglers in a statewide survey in 2000.

QUESTION	Region					Chi square	P value
	1 (N=337)	2 (N=569)	3 (N=417)	4 (N=267)	5 (N=874)		
<b>Days fished**</b>							
In 1999, how many days did you fish in freshwater in Virginia?	29.3	38.6	35.3	29.0	28.3	28.53	<.0001
**=Kruskal Wallis test for continuous data							

Table 2.33. Mean percent of fishing effort spent on types of water by management region, as reported by Virginia resident anglers in a statewide survey in 2000.

Types of Water**	Region					Chi square	P value
	1 (N=337)	2 (N=569)	3 (N=417)	4 (N=267)	5 (N=874)		
Large lakes or reservoirs	50.2	55.9	46.7	39.3	47.8	18.97	0.0008
Small public lakes	43.4	31.6	32.1	34.1	36.3	10.44	0.0336
Warmwater rivers and streams	59.8	42.4	52.3	54.5	54.4	30.60	<.0001
Public coldwater rivers and streams	37.8	36.7	47.4	45.7	40.7	13.03	0.0111
Private lakes and ponds	42.0	33.8	17.0	27.8	36.5	41.27	<.0001 *

\* Most likely to be managerially significant

\*\*=Kruskal Wallis test for continuous data

Table 2.34. Preferred methods of fishing used by anglers grouped by VDGIF Fisheries management region, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent of anglers who use each method often or always.

Methods of fishing	Region					Chi square	P value
	1 (N=337)	2 (N=569)	3 (N=417)	4 (N=267)	5 (N=874)		
Fishing with bait	64.3	66.7	72.7	70.2	58.7	34.60	0.0045
Flyfishing	8.0	10.2	11.1	10.2	14.6	20.22	0.2106
Artificial lure/spin	70.0	66.6	62.8	63.8	70.4	23.54	0.0999
Trot lines/set poles	0.0	5.6	3.6	1.9	3.7	60.11	<.0001
Seining for bait	1.8	10.4	13.3	5.5	2.9	141.61	<.0001
From a boat or canoe with a gas motor	61.8	49.7	37.8	23.6	46.5	104.46	<.0001 *
From a boat or canoe with an electric motor	50.0	30.2	23.0	25.1	32.7	73.36	<.0001 *
From a boat or canoe without a motor	8.8	15.7	11.4	12.8	20.2	49.45	<.0001
From the shore	33.8	50.7	59.6	64.3	46.6	74.27	<.0001 *
From a pier or dock	23.2	23.2	8.4	16.6	23.9	69.90	<.0001
By wading	10.5	27.9	48.7	43.2	23.0	198.56	<.0001 *

\* Most likely to be managerially significant

Table 2.35. Satisfaction with fishing, opinion of the quality of fishing over the past 5 years, and opinion of the performance of the Fisheries Division of the VDGIF by management region, as reported by Virginia resident anglers in a statewide survey in 2000.

QUESTION	Region					Chi square	P value
	1 (N=337)	2 (N=569)	3 (N=417)	4 (N=267)	5 (N=874)		
<b>Overall, how satisfied were you with freshwater fishing in Virginia in 1999? (1=Very Unsatisfied, 7=Very Satisfied)</b>							
Percent satisfied	70.9	62.3	49.4	57.3	71.9	87.64	<.0001 *
Percent unsatisfied	10.5	15.6	23.3	18.6	10.7		
<b>Over the past 5 years, the quality of freshwater fishing in Virginia has...</b>							
Percent "Declined"	20.2	35.4	46.8	38.0	22.8	99.56	<.0001 *
<b>How would you rate the overall performance of the Fisheries Division of the VDGIF in managing freshwater fisheries in Virginia?</b>							
Percent "Fair or Poor"	17.2	24.3	33.9	22.3	17.6	47.60	<.0001
Percent "Good, Very good, or Excellent"	56.4	57.0	51.2	58.3	55.4		
Percent "Don't know"	26.5	18.7	14.9	19.4	27.1		

\* Most likely to be managerially significant

them (Table 2.36). Region five anglers supported reduced bag limits and catch and release areas more so than anglers in other regions. Substantial levels of opposition were evident for all regulations in all regions, especially for the prohibition of the use of bait. The overwhelming majority of all anglers statewide opposed the prohibition of bait.

Motivations related to the natural environment and psychological aspects of fishing were of great importance to anglers from all management regions (Table 2.37). “To be outdoors” and “For relaxation” were the most important reasons for fishing among anglers from all management regions. Little variation existed among the motives of anglers from different management regions. “To obtain fish for eating” was slightly more important to anglers in Region one than it was to anglers from other regions. “To catch a trophy fish” was less important to anglers from Region five than it was to anglers from all other regions. The motive “For physical exercise” was more important to anglers from Region three than to anglers from other regions.

Anglers from the highly urbanized Regions one and five were less likely to live in a rural area than anglers from other management regions (Table 2.38). Nearly 70% of anglers from Region three indicated they resided in rural areas whereas only 33.7% and 29.4% of anglers from Regions one and five, respectively, were from rural areas. Anglers from Regions one, two and five were more likely to have a minority ethnic background than were anglers from Regions three and four. Anglers from Region five had the highest level of education and the highest incomes. Seventy percent of anglers from Region five had completed high school and over 30% earned annual incomes >\$75,000.

Table 2.36. Support and opposition for regulations by management region, as reported by Virginia resident anglers in a statewide survey in 2000.

Regulation	Region					Chi square	P value
	1 (N=337)	2 (N=569)	3 (N=417)	4 (N=267)	5 (N=874)		
<b>Increased minimum size limits</b>							
Percent "Support or Strongly Support"	58.6	58.2	61.9	54.0	60.2	31.36	0.0121
Percent "Oppose or Strongly Oppose"	15.6	16.5	15.2	17.3	10.9		
Percent "Neutral"	20.9	21.4	20.5	24.8	24.6		
Percent "Don't know"	4.9	3.9	2.4	4.0	4.3		
<b>Maximum size limits</b>							
Percent "Support or Strongly Support"	42.2	36.2	34.4	36.3	42.4	31.11	0.0130
Percent "Oppose or Strongly Oppose"	25.7	32.5	37.4	30.9	24.6		
Percent "Neutral"	26.8	26.8	25.5	27.9	28.5		
Percent "Don't know"	5.4	4.6	2.7	4.9	4.5		
<b>Slot limits</b>							
Percent "Support or Strongly Support"	36.3	42.6	35.2	44.6	47.6	55.28	<.0001
Percent "Oppose or Strongly Oppose"	19.7	20.6	30.4	19.1	14.9		
Percent "Neutral"	38.6	28.6	28.9	30.9	31.1		
Percent "Don't know"	5.4	8.2	5.4	5.4	6.3		
<b>Reduced daily bag limits</b>							
Percent "Support or Strongly Support"	36.8	31.9	32.0	29.9	42.2	72.96	<.0001
Percent "Oppose or Strongly Oppose"	25.6	31.2	38.1	38.7	18.5		
Percent "Neutral"	31.8	30.6	26.0	27.9	32.5		
Percent "Don't know"	5.8	6.3	3.9	3.4	6.8		
<b>Prohibiting the use of bait</b>							
Percent "Support or Strongly Support"	8.5	7.8	4.8	4.9	10.9	37.31	0.0019
Percent "Oppose or Strongly Oppose"	72.7	73.4	83.4	78.4	69.0		
Percent "Neutral"	16.5	16.2	9.9	15.2	16.5		
Percent "Don't know"	2.3	2.6	1.8	1.5	3.6		
<b>Catch and release only areas</b>							
Percent "Support or Strongly Support"	37.6	33.8	37.4	39.0	45.1	34.37	0.0048
Percent "Oppose or Strongly Oppose"	33.7	35.4	39.2	35.1	26.2		
Percent "Neutral"	24.1	26.7	19.8	22.9	24.9		
Percent "Don't know"	4.6	4.1	3.6	2.9	3.9		

Table 2.37. Importance of reasons for fishing by management region, as reported by Virginia resident anglers in a statewide survey in 2000. Numbers represent the percent of anglers indicating “Somewhat Important” or “Very Important.”

<b>Motive Statement</b>	<b>Region</b>					<b>Chi square</b>	<b>P value</b>
	<b>1</b> (N=337)	<b>2</b> (N=569)	<b>3</b> (N=417)	<b>4</b> (N=267)	<b>5</b> (N=874)		
To be outdoors	90.9	91.1	91.7	92.3	92.4	15.81	0.467
For family recreation	74.2	72.7	80.7	71.1	74.5	28.13	0.031
To experience new and different things	50.0	54.1	55.8	60.6	54.2	23.38	0.104
For relaxation	90.9	88.6	88.9	86.8	91.9	17.64	0.346
To be close to the water	74.6	73.3	67.4	71.3	75.0	21.33	0.166
To obtain fish for eating	46.9	39.3	41.6	42.7	33.5	36.19	0.003
To get away from the demands of other people	68.2	66.5	70.4	66.0	65.8	28.97	0.024
For the experience of the catch	80.3	81.2	81.9	78.4	81.5	12.59	0.702
To test my equipment	25.5	33.0	36.4	31.2	26.8	21.99	0.144
To be with friends	71.1	73.2	75.7	81.1	74.1	27.59	0.035
To experience natural surroundings	85.0	81.1	85.1	84.7	85.6	21.71	0.153
To develop my skills	56.9	56.9	63.0	61.4	55.1	17.42	0.359
To get away from the regular routine	83.1	80.6	86.1	80.3	82.1	26.35	0.049
To catch a trophy fish	44.5	46.9	49.4	48.5	38.2	39.45	0.001
For the challenge/sport	68.7	70.6	73.0	69.3	68.9	19.98	0.221
To experience adventure and excitement	71.4	70.4	71.9	71.9	67.7	14.07	0.594
To share my knowledge of fishing with others	42.2	41.7	43.8	42.1	38.4	10.24	0.854
For physical exercise	31.9	41.7	47.9	41.9	33.5	58.63	<.0001

Table 2.38. Selected demographic characteristics by management region, as reported by Virginia resident anglers in a statewide survey in 2000.

QUESTIONS	Region					Chi square	P value
	1 (N=337)	2 (N=569)	3 (N=417)	4 (N=267)	5 (N=874)		
<b>Which of the following best describes the area where you now reside?</b>							
Percent "Rural"	33.7	55.2	69.3	58.6	29.4	451.11	<.0001 *
<b>Which of the following best describes the area where you resided as a child?</b>							
Percent "Rural"	40.9	56.3	66.7	55.1	37.4	190.89	<.0001 *
<b>What is your age?</b>							
Percent "16-34"	19.1	26.1	33.7	34.2	24.5	86.73	0.0005
<b>What is your gender?</b>							
Percent "Male"	85.4	81.8	83.1	82.3	85.8	5.20	0.2672
<b>Which of the following do you consider yourself?</b>							
Percent "White"	83.9	85.6	94.2	94.0	86.9	111.24	<.0001
<b>What is the highest level of formal education you have completed?</b>							
Percent beyond high school	59.1	56.0	54.3	53.6	69.7	102.95	<.0001
<b>What was your household's 1999 annual income before taxes?</b>							
Percent \$75,000 or more	20.3	13.5	6.9	11.9	34.3	288.46	<.0001

\* Most likely to be managerially significant

## DISCUSSION

### Nonresponse Bias and Comparison to Past Studies of Virginia Anglers

Nonresponse bias may exist in mail surveys when overall response rate is <60% and anglers who are more serious about fishing respond at a rate greater than that of casual anglers (Pollock et al. 1994). Nonresponse bias may have affected my survey results in that respondents appear to be more avid and more interested in fishing than nonrespondents. Avidity bias may have influenced estimates of frequency of fishing and centrality of fishing to the angler's lifestyle. Also, gender bias may have influenced survey results. Other results do not appear to be affected by nonresponse bias and are representative of the population of Virginia anglers. Survey results are comparable with past studies of anglers in Virginia, further evidence that the results are representative (Table 2.39). Similar to the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation conducted by the US Fish and Wildlife Service every five years, I found most freshwater anglers in Virginia were white males between the ages of 35 and 54 (US Department of the Interior 1996). I also found similar results in terms of education and income of freshwater anglers. Comparisons to the recently conducted House Bill 38 angler survey indicated similar attitudes and concerns of anglers (McMullin et al. 2000). In both studies, a large percentage of anglers indicated the quality of fishing had declined, that there were user conflicts with jet skiers, and that the VDGIF should do more to protect water quality and restore and improve aquatic habitats.

### Angler Attitudes and Opinions

Despite relatively high levels of satisfaction with freshwater fishing, many Virginia freshwater anglers indicated the quality of fishing had declined since 1996. Furthermore, more than 20% of anglers rated the performance of the Fisheries Division as fair or poor. Perceptions of a decline in the quality of fishing may be related to increased user conflicts, consumption advisories, pollution, and the trout program. Dissatisfaction with fishing over the past five years was greatest in Regions two, three,

Table 2.39. Comparison of angler characteristics from the Statewide Survey of Virginia Anglers 2000 and the 1996 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation (U. S. Department of the Interior 1996).

<b>Angler characteristic</b>	<b>Statewide Survey of VA Anglers 2000</b>	<b>National Survey VA Anglers 1996</b>
<b>Average days fished</b>		
Mean	32	14
Median	20	
<b>Gender</b>		
Male	84%	74%
Female	16%	26%
<b>Age</b>		
% Between 35 and 54	48.7%	50%
<b>Ethnicity</b>		
White	88%	92%
Black	5.7%	7%
<b>Education</b>		
% Beyond high school	60.6%	55%
<b>Income</b>		
% \$75,000 or more	20.3%	22%

and four and for county/city license holders. The fact that >30% of all anglers statewide indicated the quality of freshwater fishing had declined in the past five years is alarming.

Potential problems are a lack of knowledge about the Fisheries Division on the part of anglers and a lack of communication between anglers and the Fisheries Division. Therefore, their expectations for fishing and the performance of the Fisheries Division may not be realistic. Opinions of anglers about the Fisheries Division are difficult to interpret given their lack of knowledge. However, the Fisheries Division could improve communication with its constituents. This can be seen in anglers' lack of knowledge and strong disagreement with statements such as "The Fisheries Division of the VDGIF makes a good attempt to explain its fishing programs to the public" and "The Fisheries Division of the VDGIF provides adequate opportunities for public participation in decisions regarding fisheries related issues."

Anglers placed a great deal of importance on the Fisheries Division's function of "Informing the public about fishing" and, to a lesser extent, "Aquatic resource education" and "Sport fishing education." Anglers want to be provided with more information about fishing and they would like the opportunity to learn more about the resource, but, they believe that the Fisheries Division does not adequately provide these opportunities. Anglers in all management regions desired increased interaction with the agency. Both sides would benefit from increased interaction. Anglers could learn more about fishing and fishing programs and the Fisheries Division could develop a better relationship with anglers and gain a better understanding of its stakeholders.

Virginia's anglers want the VDGIF, and the Fisheries Division in particular, to take an active role in protecting and preserving the environment. Anglers indicated that "Habitat and water quality protection" and "Habitat improvement" were two of the most important functions of the Fisheries Division. Anglers from all management regions and all license types placed high levels of importance on these functions. It also was clear that when anglers choose a location to fish, they seek a natural area that is clean. Many anglers believed that trash found at fishing areas and the input of industrial waste into bodies of water negatively affects their fishing experience. The increase in pollution and industrial waste in bodies of water may be one explanation for the perceived decline in the quality of fishing among anglers.

Another issue that received a high level of attention from anglers, and may be responsible for the perceived decline in the quality of fishing, is conflict with other users, particularly jet skiers. Jet skiers affected where anglers fished, how often they fished and undoubtedly the fishing experience for anglers. Jet skiers were cited as a major problem in all management regions, but they appear to be especially troublesome in Region one. Many anglers felt so strongly about the issue that they added comments to the end of the survey. These comments ranged from how jet skiers ruin fishing for some families to suggestions of restricting or banning jet skis at particular lakes. Recreational anglers find it difficult to peacefully coexist with jet skiers on the same bodies of water. Unfortunately, this means anglers may limit their fishing to specific times of the day or year, or in the worst case, stop fishing altogether. Jet will continue to reduce angler satisfaction with fishing and the Fisheries Division if the issue is not resolved.

Fisheries managers often consider alternative regulations for specific fisheries. For example, managers may consider regulations such as bait prohibition to reduce mortality of released fish or reduce creel limits to equitably distribute catch among anglers. Virginia anglers generally opposed alternative fishing regulations on the body of water they fish the most often. Some support was shown for increased minimum size limits, and slot limits, but a large percentage of anglers opposed these regulations. The prohibition of bait was strongly opposed by anglers in all management regions, indicating that it is an unpopular regulation statewide. Anglers from Region five indicated higher levels of support for regulations such as reduced creel limits and catch and release only areas. These anglers appeared to be less consumptive than anglers from other regions, so it follows that they would express less opposition to regulations that affect the number of fish they can keep.

Opposition to regulations was especially strong among county/city license holders. They strongly opposed maximum size limits, prohibiting the use of bait, and catch and release areas. A possible reason for their strong opposition may be that fewer fishing opportunities exist for them. County/city license holders can fish only in one county or city, so they may oppose any regulation that would affect available fishing opportunities. For example, a county/city license holder may have one body of water in his or her county that supports trout fishing. More restrictive regulations, such as the

prohibition of bait and catch and release, could take that fishing opportunity away if that angler uses bait or likes to keep fish. The county/city license holder then would have no place to fish for trout, whereas a resident license holder could simply travel to the next county to fish a different body of water.

### Angler Motivations

The motivations of anglers in Virginia were similar to those identified in other studies (Moeller and Engelken 1972, Knopf et al. 1973, Ditton et al. 1978, Fedler and Ditton 1994). The most important motivations focused on the experience of fishing rather than the fish. Motivations related to the natural environment were most important to anglers, which suggests they will seek out opportunities to fish in a natural setting. Motivations related to psychological aspects of fishing also were important. Anglers want to escape and relax on a fishing trip more than catch fish. Jet skiers, recreational boaters, other anglers, and crowded conditions all negatively affect the psychological aspects of a fishing experience.

Motivations related to the fishery resource, which can have strong management implications, varied in importance. Similar to past studies (Fedler and Ditton 1994), the motive “For the experience of the catch” rated high among fishery resource motives. The chance to catch fish is an important aspect of fishing to most anglers and, although it may be most important to relax and enjoy nature, anglers still are dependent on the resource for at least some of the satisfaction they derive from the fishing experience. Anglers were split over the importance of other fishery resource motives. The motives “To obtain fish for eating” and “To catch a trophy fish” rated low overall. However, closer examination of the responses to these questions suggests there are two distinct segments of the angler market, a consumptive segment and a trophy segment. Managers should consider both of these motivations when developing management plans. The wide range of importance placed on motives related to the fishery resource may be a result of differences between segments of the angler population, such as residence location (management region) or license type. Past studies have suggested that the differences in motives may be explained by differences among anglers in species preference, specialization level, or other characteristics (Fedler and Ditton 1986; Loomis and Dittion

1987; Chipman and Helfrich 1988; Gigliotti and Peyton 1993). I will address differences by management region and license type here. Differences in motivations based on other market segmentation methods will be dealt with in Chapter 3.

Anglers from the five management regions generally fished for the same reasons. However, minor differences were observed for two of the fishery resource motives. “To obtain fish for eating” and “To catch a trophy fish” were least important to anglers in Region five. As with anglers statewide, anglers in Region five indicated it is very important to relax and enjoy nature, but they appeared to derive less satisfaction from the resource than other anglers. Anglers from Region five fished more for the experience of fishing (enjoying outdoors and relaxation) than for the product (the fish). Given the dense population present in Region five, it is no surprise that anglers in this region place such high importance on relaxing and enjoying the outdoors. Fishing gives them a chance to escape and catching fish, especially trophy fish or fish to eat, may be a secondary motive.

In general, motives for fishing reported by anglers did not differ across license types. However, some fishery resource and psychological motives did. Compared to the other license types, senior citizen license holders placed more importance on obtaining fish for eating and less importance on motives such as “To experience new and different things” and “To get away from the regular routine.” Catching trophy fish was important to resident and county/city license holders.

#### *Comparison of Balanced and Unbalanced Scales of Importance*

The balanced scale of importance I employed for motivation questions reliably measured the importance of the motives. Reliability analysis indicated that statements within four of the five motive categories consistently measured the same motivation. The Natural Environment, Psychological and Physiological, Fisheries Resource, and Skill and Equipment categories each had Cronbach Alpha values greater than 0.60, indicating the statements in each of these categories reliably measured the same concept. The reliability of the Fishery Resource category could be increased substantially by deleting the statement “To obtain fish for eating” from the analysis, as consumptive aspects were different from other aspects of the fishery resource and grouping them together may not

be appropriate. The Psychological and Physiological category only could be increased slightly by deleting an item and the Natural Environment category could not be increased by deleting any items. The Cronbach Alpha value of the Social category was  $-0.37$ , indicating it did not consistently measure the importance of the social aspect of fishing. In my study, the balanced scale was more reliable than the unbalanced scale used in past studies in measuring the natural environment, psychological, and fishery resource motive categories (K. Hunt, Texas A&M University, personal communication). The skill and equipment category was measured with about the same reliability by both scales and the social category was not measured reliably by either scale. Thus, I believe a balanced scale of importance is better than an unbalanced scale. A balanced scale presents respondents with a set of options centered on a mid-point between importance or unimportance, and is more reliable.

### Angler Characteristics and Behaviors

Anglers reported a wide range of days fished, from a minimum of 0 to a maximum of over 200. The distribution of days fished by respondents was highly skewed because several anglers fished  $>100$  days in 1999. Therefore, the median days fished (20) may be a better representation of average days fished by anglers in 1999.

Given the differences in geography of the management regions, I expected anglers from the five management regions to differ in the types of water bodies they fished. Anglers from Region two, where most of the large lakes are located, indicated they fished the most on large lakes and reservoirs. Similarly anglers from regions one, three, four, and five, where large rivers are located, indicated most of their fishing effort was spent on warmwater rivers and streams. Also, anglers from regions three and four, where the majority of the Commonwealth's trout streams are located, spent more time on coldwater rivers and streams. These results, plus the fact that  $>80\%$  of anglers indicated having fishing areas close to home was important and  $65\%$  of anglers indicated that not having to travel far was important indicates that anglers fish close to home and are not likely to travel long distances to fish. This confirms results from the Virginia House Bill 38 study in which a high percentage of anglers indicated they fish within two hours of home

(McMullin et al. 2000). Managers should invest in access in all regions of the Commonwealth to provide local recreation in all areas.

The most used source of information about freshwater fishing in Virginia for all groups was friends or other anglers. However, resident license holders used the internet and senior citizen license holders used newspapers more than other groups to obtain fishing information. Managers should consider this information as they seek to improve communication with the different segments of anglers. Understanding what methods reach a specific group will make communication more effective and efficient. Some agency efforts should focus on communicating through fishing club newsletters and department newsletters to avid and respected anglers, so word of mouth information is more likely to be accurate.

### Management Implications and Recommendations

Anglers know little about the Fisheries Division of the VDGIF. The Fisheries Division should attempt to increase the knowledge of its stakeholders and involve them more in the fisheries management process. Education programs designed to increase angler involvement and explain Fisheries Division functions to the public may increase interaction between the Division and its stakeholders as well as make the public more knowledgeable about the functions of the Fisheries Division. More should be done to make anglers aware of the opportunities to participate in the decision-making process. Many anglers indicated the Fisheries Division does not provide adequate opportunities for public participation, but even more anglers indicated they “Don’t know” if there are adequate opportunities. Based on the response to this survey, many anglers, if given the opportunity, would participate in decision making; most simply are not aware the opportunity exists.

It is likely that the perceived decline in the quality of fishing has nothing to do with the resource, but instead, anglers may attribute the decline in fishing to things that negatively have affected their fishing experiences. Trash, pollution, crowding, and jet skiers have been shown to negatively affect the fishing experience. Managers should confront these issues and seek ways to enhance fishing opportunities desired by anglers. A good approach may be to involve anglers in volunteer programs and education

workshops as well as working with other user groups (recreational boaters and jetskiers) and consulting with the boating industry. If educational approaches do not work, different user groups may need to be separated spatially or temporally through regulations or legislation.

Fisheries managers should consider motivations of anglers as they develop management plans. The primary motivations of all anglers were to relax and enjoy the outdoors. Catching fish to eat or catching trophy fish were less important overall, but, to certain segments of anglers, these were very important reasons for fishing. Developing fisheries in natural settings, reducing crowding, and reducing user conflict will help the Fisheries Division provide fishing opportunities in which anglers can enjoy the outdoors and relax. Subgroups of anglers do place a great deal of importance on the catch aspects of fishing. Recognition of those subgroups and providing the experiences that they desire (trophy fish and consuming fish) should help improve angler satisfaction.

The catch aspects of fishing were more important to some groups of anglers than they were to other groups. Particularly, obtaining fish for eating was more important to senior citizen anglers than it was to other groups. Using this information, along with information about the biology and habitat, the Fisheries Division can make informed management decisions that are likely to receive support. For example, when developing regulations for a body of water, restrictive regulations, such as reduced creel limits and catch and release should not be used if that body of water is fished by a high concentration of consumptive anglers. Given the importance of keeping fish to senior citizen anglers, liberal creel limits and size limits should be used on waters where senior citizens comprise a major portion of the angling population.

Using information about who buys each type of license, the Fisheries Division may be able to better market the different types of licenses to specific groups. For example, people who purchase county/city licenses are more likely to be female, have low incomes and come from rural areas. By marketing county/city licenses to these segments of the public, the Fisheries Division may increase license sales and participation in fishing. Similarly, the Fisheries Division can develop fisheries programs in each region that meet the desires of the anglers in that region. It is especially important to anglers in Region five to be able to escape, relax, and enjoy the outdoors on

a fishing trip. Angler satisfaction and participation may increase if fisheries managers place more emphasis on these aspects of the fishery in Region five. Management plans that emphasize the preservation of natural areas likely would be appreciated in Region five.

Overall, middle-aged, white, males, who lived predominantly in rural areas, dominated the angler market in Virginia. There is room for expansion into several different markets. For example, marketing the naturalistic values of fishing may increase fishing participation among residents of urban areas. Very few females and minorities participated in freshwater fishing in Virginia in 1999. Marketing of the social (family and friends) and relaxation aspects of the fishery may help increase participation among these groups as well. Demographic changes in society indicate that middle aged white males will be a declining market in the future (Murdock et al 1992). Management should reach out to women and minorities to increase participation and environmental awareness among these groups. Otherwise, overall participation and license sales will decrease in the coming years.

## Chapter 3: Single-level and Multi-level Segmentation of Virginia's Anglers

### INTRODUCTION

#### Angler Specialization

Degree of specialization describes recreationists based on their experience and commitment to an activity. Segmenting anglers based on degree of specialization helps managers to understand angler motivations, attitudes, and preferences, and, therefore, improves satisfaction with the fishery (Hahn 1991; Pollock et al. 1994). Bryan (1977) described a continuum of behavior from the general to the particular based on anglers' level of specialization. Based on the importance of fishing to the individuals and their behavior, Bryan (1977) divided trout anglers into four classes: occasional anglers, generalists, technique specialists, and technique-setting specialists. Occasional anglers fished infrequently and had not established fishing as a regular part of their leisure activity. Generalists had incorporated fishing as a regular part of their leisure activity and used a variety of methods. Technique specialists used one method of fishing to the exclusion of others. Finally, technique-setting specialists were highly committed anglers with strong preferences for methods of fishing and the setting in which it took place. Bryan (1977) suggested that angler specialization level is reflected in participation level, social setting, attitudes, and preferences. Bryan (1977) also made the following propositions:

1. Anglers tend to go through a predictable progression of angling experiences, usually moving to more specialized stages over time.
2. The most specialized anglers, in effect, joined a leisure social world--a group of fellow sportsmen holding similar attitudes, beliefs, and ideologies, engaging in similar behavior, and having a sense of group identification.
3. As level of angling specialization increases, attitudes and values about the sport change. Focus shifts from consumption of the fish to preservation and emphasis on the nature and setting of the activity.

4. The values attendant to specialization are inextricably linked to the properties of the resource on which the sport is practiced. As level of participation increases, resource dependency increases.

Ditton et al. (1992) tested several of these propositions with data obtained from a statewide survey of Texas saltwater anglers and found that anglers of different specialization levels differed in their resource dependency, and activity-specific and activity general motivations.

Using a sample of river anglers in Virginia, Chipman and Helfrich (1988) developed an index of angler specialization that quantitatively identified angler types. Their index included four dimensions of angler behavior: resource use, experience, investment, and centrality of fishing to lifestyle. The resource use dimension, similar to Bryan (1977), included equipment, water, and species preferences; frequency of fishing for preferred species; bait use; and harvest behavior. Angling experience and frequency of fishing were included in the experience dimension. The investment dimension included fishing equipment items owned by the angler and monetary investment in angling equipment. The centrality dimension included membership in fishing clubs, subscriptions to fishing magazines, distance traveled for fishing, duration of fishing vacations, and the role of fishing in the angler's lifestyle. Based on the four dimensions of angler behavior, six angler types were defined: occasional anglers, generalists, experienced generalists, committed generalists, specialists, and advanced specialists (Chipman and Helfrich 1988). Level of specialization was a useful way to segment anglers with different attitudes, motivations, and preferences (Chipman and Helfrich 1988).

Other researchers have used various indicators of specialization. A single dimension of specialization, level of participation, has been used with positive results (Graefe 1980). However, the study may have been biased as it included only a sample of licensed boat owners. Using four independent measures of angling specialization (past experience, skill level, angling investment, and centrality to lifestyle), a relationship was discovered between level of specialization and motivations for fishing (Hase 1996). Experience/participation, equipment/investment, and lifestyle were used to successfully segment a sample of Utah anglers into definable groups with distinct characteristics

(Andersen 1990). In another study, anglers were segmented into discrete groups instead of along a continuum, as other researchers have done (Fisher 1997). In this study, there were six measures of angler specialization: years of fishing experience, days fishing in last 12 months, importance of number of fish caught, importance of size of fish caught, catch disposition, and importance of catching something. Similar measures of specialization were used to segment nonresident Alaska anglers (Romberg 1999).

Throughout studies of specialization, the fundamental indicators of specialization used to segment anglers have been experience/participation (Bryan 1977; Graefe 1980; Chipman and Helfrich 1988; Andersen 1990; Hase 1996), investment (Chipman and Helfrich 1988; Andersen 1990; Hase 1996), and centrality (Bryan 1977; Chipman and Helfrich 1988; Andersen 1990; Hase 1996). Each of these domains may be a strong indicator of specialization when used alone. However, the results of single indicator specialization indices probably are not as reliable as those indices based on multiple dimensions of specialization. It has been recommended that future studies of specialization use multiple dimensions including experience/frequency of fishing, investment, and centrality (Chipman and Helfrich 1988; Hahn 1991; Pollock et al. 1994). Hahn (1991) also suggested that the extent of species specialization be used as an indicator of angler specialization. This may be useful in fisheries with several popular game fish species where anglers may be specialists for one or more species or generalists for many species.

#### Segmentation by Species Preference

Traditionally, angler segmentation based on species preference has been used to guide management decisions about specific groups of anglers. Segmentation by species usually involves grouping all anglers who indicate they fish for a particular species into one group. Anglers may indicate their species preference by writing the species name as a response to an open-ended question or they may choose the species from a list of fish species. Comparisons then are made among anglers who fish for different species. For management and marketing purposes, it is important for managers to understand the desires and satisfactions sought by different groups of anglers (Pollock et al. 1994). Management then can be tailored to the specific needs of particular groups of anglers and

angler satisfaction can be increased. Also, managers can better market the desired fishing experience once it is understood what a particular group of anglers desires from the fishery.

Many differences exist among anglers who fish for different species. Nationwide, the frequency of fishing varied among anglers who fished for different species (US Department of the Interior 1996). Black bass *Micropterus* spp. anglers and walleye *Stizostedion vitreum* and sauger *Stizostedion canadense* anglers averaged 15 days fished in 1996 while generalist anglers averaged just nine days fished and trout and salmon Salmonidae anglers averaged 10 days fished in 1996. In several states, angler satisfaction has been shown to differ among anglers who fished for different species (Duda and Young 1996; Responsive Management 1998; McMullin et al. 2000). In New Hampshire, black bass anglers exhibited very high levels of satisfaction while trout and salmon anglers exhibited less satisfaction with fishing (Duda and Young 1996). Additionally, a high percentage of trout, salmon and perch *Perca flavescens* anglers indicated they were dissatisfied with fishing. Among anglers in South Carolina, dissatisfaction with fishing was highest for smallmouth bass and trout anglers (Responsive Management 1998). Warmwater anglers in Virginia expressed high levels of satisfaction with their fishing experiences while trout anglers were less satisfied (McMullin et al. 2000).

Hale et al. (1992) found differences in the preferred type of catch among anglers who fished for different species. A high percentage of all angler types preferred to catch any size or number of fish. However, compared to other angler types, black bass and striped bass *Morone saxatilis* anglers were trophy oriented. A high percentage of crappie anglers, catfish anglers, and sunfish anglers preferred to catch a moderate number of medium sized fish. Crappie and catfish anglers were the most consumptive angler types, whereas taking fish home to eat was not important to a majority of black bass anglers.

Burlingame and Guy (1999) found differences in the days fished, boat use, preferences, and demographics among four types of anglers in Kansas. Largemouth bass, walleye, and crappie anglers fished more frequently than channel catfish anglers, with walleye anglers being the most avid group. Of the four types of anglers, walleye anglers fished from boats most frequently, followed by largemouth bass and crappie anglers. Given the choice between large fish and more fish, largemouth bass anglers preferred

large fish whereas other angler types preferred more fish. Several demographic characteristics differed among the angler types. A higher percentage of females fished for channel catfish and crappies. Also, channel catfish anglers had less education and lower incomes than other angler types. Largemouth bass anglers were younger than other angler types. Schramm et al. (1999) found similar results among catfish anglers, bass anglers, crappie anglers, and sunfish anglers in Mississippi.

After reviewing bass and trout fishing literature, Hummel and Foster (1986) suggested the two types of fishing represent polar opposites and the anglers differ in terms of value orientation, goals, means of fishing, standards of performance, and rewards sought. They proposed bass anglers sought the most and biggest fish while trout anglers sought the most difficult fish. Bass anglers used the latest technology to help them catch fish while trout anglers used the lightest tackle. The rewards of bass fishing were believed to be external (displayed skill and public esteem) while the rewards of trout fishing were believed to be internal (self-satisfaction).

### Multi-level Segmentation

Segmentation by species preference or by level of specialization are effective methods of segmenting anglers into groups who share some characteristics. However, they do little more than describe the average angler in each group. For example, when a sample of anglers are segmented by species preference, one assumes all anglers in each group are similar. This fails to address within group differences. Surely, all largemouth bass anglers are not the same. They may use different methods (boat, shore, bait, lures), fish different types of water (small ponds, large lakes) and seek different experiences while fishing (family outing, enjoy nature, competition). The same applies to all other angler groups.

When identifying differences among a sample of anglers, one should do more than simply describe the different species groups and make comparisons between the different groups. Differences within groups of anglers who fish for the same species may be more important to successful fishery management than differences between species preference groups. A multi-level segmentation approach that involves the combination of segmentation by species preference and segmentation by specialization level will help

managers identify differences within angler groups who fish for the same species. Instead of managing for each species preference group as a single unit, managers can provide the desired experiences for each segment within each species preference group.

## METHODS

### Single-Level Segmentation

#### *Segmentation by Specialization Level*

I used a multidimensional approach to identify specialization level. Level of specialization was identified by responses to seven survey questions from four dimensions: 1) experience (one question), 2) participation (one question), 3) investment (two questions), and 4) centrality (three questions) (Table 3.1). I standardized responses to these questions by calculating z-scores as follows:

$$\frac{((\text{observed value} - \text{mean value})/\text{standard deviation})}{1}$$

I performed a log+1 transformation on the participation variable (days fished) because the responses did not follow a Gaussian distribution (S. Clark, Statistics Department, Virginia Polytechnic Institute and State University, personal communication). I then used Ward's minimum variance cluster analysis to identify different groups of anglers. After reviewing the tree diagram produced by cluster analysis, I determined the appropriate number of clusters. I validated the cluster solution and the number of clusters by developing a descriptive profile of each angler segment in terms of the segmentation variables and other important characteristics. For the clusters to represent distinct market segments, there needed to be within group similarity and between group differences with regard to specialization variables and other managerially important variables. I cross-tabulated the clusters against angler characteristics, behaviors, motivations, attitudes, and preferences to identify differences in anglers of different specialization levels.

#### *Segmentation by Species Preference*

I segmented anglers based on their preference for fishing for a particular species of fish. Anglers were asked to indicate the percent of fishing effort devoted to 10 species of fish. Anglers also had the options of marking "Any kind of fish" if they had no preference for species or they could write in a species of fish under an "Other" category if they fished for a species not listed.

Table 3.1. Questionnaire items used to examine the specialization level of Virginia resident freshwater anglers who responded to a statewide survey in 2000.

<b>Dimension</b>	<b>Questions</b>
Experience (a, b, c)	Years of fishing experience
Participation (b)	Days fished in 1999
Investment (b, d)	Number of fishing items owned
	Dollar value of fishing equipment
Centrality (b)	Importance of fishing
	Magazine subscriptions
	Memberships in fishing organizations

(a) Bryan 1977

(b) Chipman and Helfrich 1988

(c) Romberg 1999

(d) Wellman et al. 1982

Anglers then were grouped according to species preference. I grouped anglers under a particular species if the angler indicated  $\geq 50\%$  of his or her fishing effort was directed at that one species. Anglers who indicated  $\geq 50\%$  of their fishing effort was directed at “Any kind of fish” and anglers who fished a small amount of effort ( $\leq 25\%$ ) for several species were considered species generalist. I used a table of random numbers to randomly assign anglers to a species if they indicated 50% of their fishing effort was devoted to each of two species. I excluded anglers who indicated their greatest fishing effort devoted to one species was  $>25\%$  but  $<50\%$ . For example, anglers who indicated 33% of their fishing effort was directed at three species were excluded because they exhibited a moderately strong preference for a few species instead of a strong preference for one species or no preference at all. Angler types were cross-tabulated against angler characteristics, behaviors, motivations, attitudes, and preferences to identify differences in anglers who fish for different species of fish.

### Multi-Level Segmentation

#### *Segmentation by Specialization Within Species Preference*

I used the species segmentation methods described for single-level segmentation and the specialization levels identified by cluster analysis to examine differences among anglers who fished for each preferred species. Using the specialization clusters formed from single-level segmentation, I compared anglers of each specialization cluster within each species preference group. I also compared several key characteristics of species preference groups within each specialization level. This was done to determine if anglers of the same specialization level are similar regardless of species preference.

### Data Analysis

I cross-tabulated each characteristic with species preference, specialization level, and specialization level within species preference. I used the Kruskal-Wallis test to compare species preference groups and specialization clusters when data were continuous. I used nonparametric statistical procedures because the distributions of continuous variables were highly skewed. I used the chi-square test for homogeneity to

test for differences among species preference groups and specialization clusters when cross tabulated against discrete data. A 0.05 level of statistical significance was used for all significance tests. However, large sample sizes used for tests were likely to result in statistically significant differences even if groups differed only slightly. Therefore, I used a conservative approach in which I considered results to be managerially significant if they were statistically significant ( $p < 0.05$ ) and if the relative difference in proportions was  $\geq 20\%$ . The term “managerially significant” is used to identify results that may be meaningful to the management agency, although the agency does not have the ability to affect all variables.

## RESULTS

### Angler Specialization

Of the seven variables examined in the four dimensions of specialization, five were used in subsequent analysis. I eliminated the number of fishing magazine subscriptions and the number of memberships in fishing organizations because an overwhelming number of anglers indicated they subscribe to no fishing magazines and belong to no fishing organizations.

Five angler specialization types were identified by the cluster analysis of the four specialization dimensions. Type one anglers could be characterized as occasional anglers (Figure 3.1). They had low levels of experience, participation, investment, and centrality. Type two anglers, or generalists had low levels of experience, participation, and centrality, but had a moderate amount of investment in fishing equipment. Type three anglers were similar to Type two anglers except they had high levels of experience in fishing, and therefore, were called experienced generalists. Type four anglers were considered avid because they exhibited very high levels of participation and centrality, but moderately low levels of investment. Type five anglers scored highly on all dimensions of specialization and therefore, were considered specialists. The largest group of anglers was Type five, or the specialists, with 525 individuals (Table 3.2). The smallest group was Type two, or the generalists, with 190 anglers.

Specialist anglers fished the most frequently of all the angler types, an average of 56.6 days in 1999 (Table 3.3). Avid anglers fished an average of 44.4 days in 1999, while the other three groups of anglers, occasional, generalists, and experienced generalists averaged <20 days fished in 1999. Thus, specialists expended nearly one-half of all resident angler-days in Virginia during 1999 (Table 3.4). Specialists and avid anglers combined to expend >80% of all resident effort.

Seventy-six percent of occasional anglers used bait, while only 52% of specialist anglers used bait (Table 3.5). A large proportion of both specialists and generalists used artificial lures very often. Also, specialists and generalists fished from boats much more often than other angler types. Nearly three-quarters of specialist anglers fished from gas

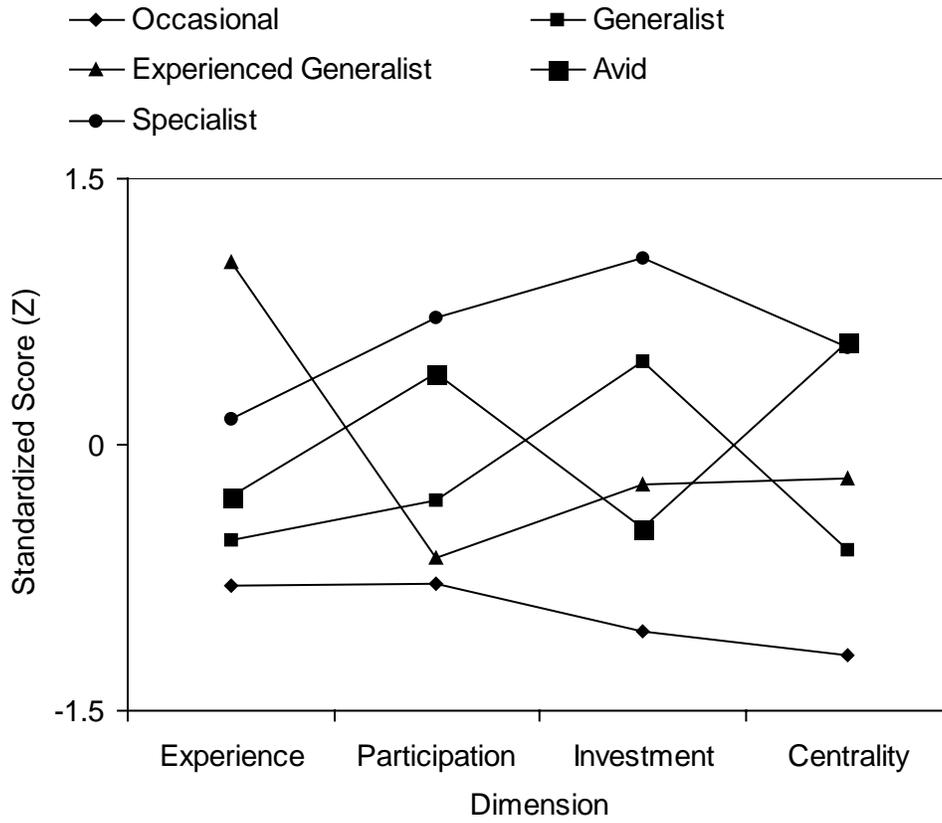


Figure 3.1. Standardized specialization dimension scores for each angler type, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Table 3.2. Number of Virginia resident freshwater anglers in each specialization cluster formed by Ward's minimum variance clustering method.

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<b>Specialization level</b>	<b>Number of anglers</b>
Occasional	316
Generalist	190
Experienced Generalist	404
Avid	466
Specialist	525

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Table 3.3. Mean number of days fished by anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

<b>Days fished</b>	<b>Specialization Level*</b>					<b>Chi square</b>	<b>P value</b>
	<b>1</b> (N=316)	<b>2</b> (N=190)	<b>3</b> (N=404)	<b>4</b> (N=466)	<b>5</b> (N=525)		
In 1999, how many days did you fish in freshwater in Virginia?	10.6	15.7	13.4	44.4	56.6	769.2	<.0001 **

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.4. Angler days and percent of total angler days expended by anglers in each specialization cluster, as reported by respondents to a statewide survey of Virginia anglers in 2000.

<b>Specialization Level</b>	<b>Angler Days</b>	<b>Percent of Total Angler Days</b>
Occasional	3,350	5.4
Generalist	5,414	8.7
Exp. Gen	2,983	4.8
Avid	20,690	33.3
Specialist	29,715	47.8
Total	62,152	100

Table 3.5. Preferred methods of fishing used by anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent of anglers indicating “Often” or “Always.”

<b>Methods of fishing</b>	<b>Specialization Level*</b>					<b>Chi square</b>	<b>P value</b>	
	<b>1</b> (N=316)	<b>2</b> (N=190)	<b>3</b> (N=404)	<b>4</b> (N=466)	<b>5</b> (N=525)			
Fishing with bait	75.5	58.0	66.8	71.3	52.1	113.4	<.0001	**
Flyfishing	5.4	6.4	17.8	10.5	14.0	90.6	<.0001	
Artificial lure/spin	53.7	74.0	62.6	66.6	81.0	135.2	<.0001	**
Trot lines/set poles	3.7	3.4	3.2	4.3	3.0	25.4	0.062	
Seining for bait	1.9	6.1	5.7	8.5	9.0	56.8	<.0001	
From a boat or canoe with a gas motor	20.6	59.8	36.5	29.4	74.5	353.6	<.0001	**
From a boat or canoe with an electric motor	14.9	39.8	27.2	25.8	47.7	146.5	<.0001	**
From a boat or canoe without a motor	10.7	17.0	18.6	13.9	17.0	35.7	0.003	
From the shore	65.1	37.6	52.9	65.9	27.4	227.9	<.0001	**
From a pier or dock	27.9	19.1	20.6	25.0	9.8	80.9	<.0001	
By wading	15.2	19.1	30.7	40.0	30.1	99.1	<.0001	**

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

powered boats often or always and 60% of generalists fished from gas powered boats often or always. Occasional anglers, experienced generalists, and avid anglers were more likely to fish from the shore than other angler types. Occasional and generalist anglers were not as likely to fish by wading as other angler types. Fifteen percent of specialists and 16% of generalists keep fish often or always, making them the least consumptive of the angler types (Table 3.6). Experienced generalists were the most consumptive group, with 34% keeping fish often or always.

Anglers of different specialization levels varied greatly in their preferred sources of information about fishing in Virginia (Table 3.7). Specialist anglers indicated they used every source of information about fishing in Virginia more often than other angler types. As was the case with all angler types, specialists received most of their information about fishing from friends or other anglers. However, unlike most other groups, VDGIF publications and handouts, commercial magazines, and fishing clubs were important sources of information to specialists. Thirteen percent of generalists and avid anglers and nearly 20% of experienced generalists and specialists used VDGIF's Virginia Wildlife magazine often or always. Specialists were three times more likely than avid anglers and more than five times as likely than the other specialization groups to obtain information about fishing from fishing clubs.

Motives related to the natural environment and relaxation were the most important reasons for fishing among all angler types, with nearly 90% of all anglers indicating these were somewhat or very important (Table 3.8). The motives "To test my equipment," "To develop my skills," "To catch a trophy fish," "For the challenge/sport," and "To share my knowledge of fishing with others" were more important to avid and specialist anglers than they were to other angler types. Seventy-six percent of avid anglers and 81% of specialist anglers indicated the challenge or sport of fishing was somewhat or very important to them and over 50% indicated catching a trophy fish was somewhat or very important. Catching trophy fish was not important to occasional and experienced generalist anglers. The motive, "To obtain fish for eating" was more important to experienced generalists than it was to other angler types.

Table 3.6. Frequency of keeping fish by anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent of anglers indicating “Often” or “Always.”

Question	Specialization Level*					Chi square	P value
	1 (N=316)	2 (N=190)	3 (N=404)	4 (N=466)	5 (N=525)		
<b>How often do you keep the freshwater fish that you catch?</b>							
Percent indicating "Often" or "Always"	22.9	16.3	34.4	24.5	14.9	80.5	<.0001

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.7. Sources of information used by anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent of anglers indicating “Often” or “Always.”

Sources of information	Specialization Level*					Chi square	P value
	1 (N=316)	2 (N=190)	3 (N=404)	4 (N=466)	5 (N=525)		
VDGIF's Virginia Wildlife magazine	4.2	13.2	19.1	13.2	19.1	148.0	<.0001
Other VDGIF publications, handouts and news releases	10.6	9.5	12.8	18.3	23.3	85.5	<.0001
VDGIF worldwide web page (internet)	1.6	4.7	3.3	6.7	9.5	64.1	<.0001
VDGIF staff	0.3	2.1	0.3	3.5	3.5	75.1	<.0001
Newspapers	13.8	16.9	23.4	22.7	27.2	57.5	<.0001
Commercial magazines or newsletters	5.8	12.2	14.3	18.0	25.8	149.7	<.0001 **
Television	7.4	12.7	12.9	15.5	21.2	66.7	<.0001
Radio	6.8	6.3	5.6	6.4	6.8	23.9	0.091
Friends or other anglers	43.8	60.6	43.7	70.6	73.9	184.9	<.0001 **
Sporting goods stores	20.8	29.8	19.1	39.0	44.8	143.5	<.0001 **
Bait dealers	17.0	28.0	15.2	32.2	35.5	100.1	<.0001 **
Fishing club	1.3	3.3	2.6	5.3	15.1	154.4	<.0001 **

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.8. Importance of reasons for fishing to anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent of anglers indicating “Somewhat Important” or “Very Important.”

Motive Statement	Specialization Level*					Chi square	P value
	1 (N=316)	2 (N=190)	3 (N=404)	4 (N=466)	5 (N=525)		
To be outdoors	91.6	91.0	89.9	93.1	93.1	53.1	<.0001
For family recreation	74.3	76.2	76.1	73.9	75.5	23.6	0.0977
To experience new and different things	47.8	49.2	48.2	58.0	64.5	67.2	<.0001
For relaxation	90.0	87.4	90.1	91.4	89.6	65.4	<.0001
To be close to the water	59.3	73.3	76.0	72.7	79.2	71.6	<.0001
To obtain fish for eating	34.1	28.7	44.9	39.9	36.8	41.7	0.0004
To get away from the demands of other people	60.1	70.7	61.8	74.6	70.0	65.7	<.0001
For the experience of the catch	76.3	73.1	78.7	84.1	86.5	90.3	<.0001
To test my equipment	17.7	20.5	25.7	30.7	44.4	119.8	<.0001 **
To be with friends	73.9	74.7	68.7	75.0	79.5	61.4	<.0001
To experience natural surroundings	82.2	78.7	85.3	86.0	86.9	49.9	<.0001
To develop my skills	41.2	47.6	49.2	64.1	70.0	137.5	<.0001 **
To get away from the regular routine	78.5	76.9	81.0	86.3	85.5	62.4	<.0001
To catch a trophy fish	21.5	43.8	30.8	52.9	59.8	215.2	<.0001 **
For the challenge/sport	53.6	61.6	66.4	76.2	80.8	177.9	<.0001 **
To experience adventure and excitement	59.0	62.4	60.0	78.8	79.5	145.0	<.0001 **
To share my knowledge of fishing with others	23.2	28.8	30.6	46.1	58.9	216.9	<.0001 **
For physical exercise	29.9	23.9	41.8	38.7	44.5	79.1	<.0001 **

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Overall satisfaction with fishing in 1999 was highest for avid and specialist anglers (Table 3.9). However, a larger proportion of avid and specialist anglers compared to other angler types indicated the quality of fishing had declined in the past five years (Table 3.10). Seventy-two percent of avid and specialist anglers indicated they were satisfied with fishing, but over one-third of avid and specialist anglers indicated the quality of fishing had declined in the past five years.

Occasional anglers had the least knowledge of the Fisheries Division, while specialist anglers knew the most about the Fisheries Division (Table 3.11). Only one-quarter of occasional anglers agreed that the management policies of the Fisheries Division are biologically sound, however, 72% of occasional anglers indicated “Neutral” or “Don’t know.” More specialist anglers than other angler types indicated the Fisheries Division does a good job of making anglers aware of current fishing regulations. However, specialists and avid anglers expressed higher levels of disagreement with several statements about the performance of the Fisheries Division of the VDGIF. Eighteen percent of avid and specialist anglers disagreed with the statement “The Fisheries Division of the VDGIF makes a good attempt to explain its fishing programs to the public” and over 20% disagreed with the statement “The Fisheries Division of the VDGIF provides adequate opportunities for public participation in decisions regarding fisheries related issues.” Between 16% and 26% of all angler types indicated the overall performance of the Fisheries Division was “Fair” or “Poor”. However, over 20% of occasional, generalist, and experienced generalist anglers indicated “Don’t know” as a response to this question.

Support for restrictive regulations was highest among specialist anglers (Table 3.12). Between 51% and 66% of all angler types supported increased minimum size limits as a possible regulation. Additionally,  $\geq 50\%$  of specialist anglers indicated support for slot limits and catch and release areas while no other angler groups indicated  $>50\%$  support for any regulation besides minimum size limits. Opposition to the prohibition of bait was high among all angler types. Over 25% of all angler types indicated they opposed maximum size limits and catch and release areas.

Thirty-five percent of occasional anglers and 38% of avid anglers were under the age of 35, making them the youngest groups of anglers (Table 3.13). Only three percent

Table 3.9. Satisfaction with freshwater fishing in Virginia in 1999 among anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Measured on a scale of 1=Very unsatisfied to 7=Very satisfied.

Question	Specialization Level*					Chi square	P value
	1 (N=316)	2 (N=190)	3 (N=404)	4 (N=466)	5 (N=525)		
<b>Overall, how satisfied were you with freshwater fishing in Virginia in 1999?</b>							
Percent satisfied	52.9	65.7	54.3	71.7	71.8	95.6	<.0001
Percent unsatisfied	16.7	13.8	19.2	13.8	11.7		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

Table 3.10. Percent of anglers in each specialization level who indicated the quality of freshwater fishing in Virginia declined in the past 5 years, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*					Chi square	P value
	1 (N=316)	2 (N=190)	3 (N=404)	4 (N=466)	5 (N=525)		
Over the past 5 years, the quality of freshwater fishing in Virginia has...							
Percent "Declined"	22.4	27.0	29.7	34.8	33.4	117.4	<.0001

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.11. Knowledge and opinion of the Fisheries Division of the VDGIF among anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*					Chi square	P value
	1 (N=316)	2 (N=190)	3 (N=404)	4 (N=466)	5 (N=525)		
<b>Before receiving this survey, how much did you know about the Fisheries Division of the VDGIF?</b>							
Percent "Little or Nothing"	86.1	72.4	68.8	69.4	50.6	208.8	<.0001 **
<b>The Fisheries Division of the VDGIF does a good job of making anglers aware of current fishing regulations.</b>							
Percent "Agree or Strongly Agree"	46.1	57.7	61.8	63.9	73.3	75.1	<.0001 **
Percent "Disagree or Strongly Disagree"	3.9	5.8	7.0	10.0	8.0		
Percent "Neutral"	32.8	29.6	23.4	20.2	16.0		
Percent "Don't know"	17.2	6.9	7.8	5.9	2.7		
<b>The management policies of the Fisheries Division of the VDGIF are biologically sound.</b>							
Percent "Agree or Strongly Agree"	25.5	41.5	45.1	46.0	49.4	60.4	<.0001 **
Percent "Disagree or Strongly Disagree"	2.3	2.7	3.3	5.0	6.7		
Percent "Neutral"	36.6	38.3	30.2	31.2	28.1		
Percent "Don't know"	35.6	17.6	21.4	17.8	15.8		
<b>The Fisheries Division of the VDGIF makes a good attempt to explain its fishing programs to the public.</b>							
Percent "Agree or Strongly Agree"	33.7	37.6	46.7	42.4	46.8	35.6	0.0033
Percent "Disagree or Strongly Disagree"	8.8	13.2	11.1	18.0	18.1		
Percent "Neutral"	32.4	38.1	27.6	30.7	28.6		
Percent "Don't know"	25.2	11.1	14.6	8.9	6.5		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.11 continued. Knowledge and opinion of the Fisheries Division of the VDGIF among anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*					Chi square	P value
	1	2	3	4	5		
<b>The staff of the Fisheries Division of the VDGIF provides knowledgeable service to their customers.</b>							
Percent "Agree or Strongly Agree"	29.9	38.1	41.3	40.7	46.7	39.3	0.001
Percent "Disagree or Strongly Disagree"	3.0	5.3	6.0	10.7	10.3		
Percent "Neutral"	36.2	39.7	32.8	34.8	31.2		
Percent "Don't know"	30.9	16.9	19.9	13.9	11.8		
<b>The Fisheries Division of the VDGIF provides adequate opportunities for public participation in decisions regarding fisheries related issues.</b>							
Percent "Agree or Strongly Agree"	18.0	21.3	24.4	25.2	29.2	47.1	<.0001
Percent "Disagree or Strongly Disagree"	7.8	18.1	11.6	21.2	22.1		
Percent "Neutral"	38.6	39.9	37.9	33.7	33.2		
Percent "Don't know"	35.6	20.7	26.1	19.9	15.5		
<b>The Fisheries Division of the VDGIF provides good solutions to fisheries problems.</b>							
Percent "Agree or Strongly Agree"	20.7	28.2	30.2	31.8	35.4	39.6	0.0009
Percent "Disagree or Strongly Disagree"	4.3	5.3	7.8	9.9	10.9		
Percent "Neutral"	39.7	45.2	35.8	38.4	37.9		
Percent "Don't know"	35.4	21.3	26.2	20.0	15.8		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.11 continued. Knowledge and opinion of the Fisheries Division of the VDGIF among anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*					Chi square	P value
	1	2	3	4	5		
<b>How would you rate the overall performance of the Fisheries Division of the VDGIF in managing freshwater fisheries in Virginia?</b>							
Percent "Fair or Poor"	16.5	23.2	17.2	26.0	24.9	39.5	0.0009
Percent "Good, Very good, or Excellent"	42.3	54.7	56.4	56.1	65.7		
Percent "Don't know"	41.3	22.1	26.4	17.9	9.4		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.12. Support and opposition for regulations among anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Regulation	Specialization Level*					Chi square	P value
	1 (N=316)	2 (N=190)	3 (N=404)	4 (N=466)	5 (N=525)		
<b>Increased minimum size limits</b>							
Percent "Support or Strongly Support"	51.3	58.2	57.8	60.9	66.2	48.6	<.0001
Percent "Oppose or Strongly Oppose"	13.4	13.0	14.4	13.8	13.8		
Percent "Neutral"	26.5	22.7	24.0	23.8	18.0		
Percent "Don't know"	8.8	3.5	3.8	4.2	2.1		
<b>Maximum size limits</b>							
Percent "Support or Strongly Support"	28.9	36.0	39.2	36.7	48.8	77.6	<.0001
Percent "Oppose or Strongly Oppose"	28.6	34.1	27.2	29.6	26.1		
Percent "Neutral"	32.5	26.0	29.0	29.6	22.8		
Percent "Don't know"	10.1	3.3	4.6	4.8	2.3		
<b>Slot limits</b>							
Percent "Support or Strongly Support"	35.2	40.4	40.9	42.6	52.7	54.1	<.0001
Percent "Oppose or Strongly Oppose"	16.3	23.1	19.3	18.1	19.3		
Percent "Neutral"	37.1	28.9	31.0	36.2	24.7		
Percent "Don't know"	11.4	5.4	8.9	5.3	3.3		
<b>Reduced daily bag limits</b>							
Percent "Support or Strongly Support"	33.5	40.4	34.6	31.7	42.3	73.3	<.0001
Percent "Oppose or Strongly Oppose"	21.0	32.4	27.7	18.1	29.2		
Percent "Neutral"	36.1	30.4	31.6	35.6	25.7		
Percent "Don't know"	9.5	5.4	6.1	5.9	2.9		
<b>Prohibiting the use of bait</b>							
Percent "Support or Strongly Support"	5.9	10.1	9.6	6.3	10.2	38.6	0.0013
Percent "Oppose or Strongly Oppose"	73.6	79.8	71.1	69.3	72.8		
Percent "Neutral"	15.6	12.6	15.7	14.8	16.0		
Percent "Don't know"	4.9	1.3	3.6	5.8	1.0		
<b>Catch and release only areas</b>							
Percent "Support or Strongly Support"	36.3	40.2	38.8	34.4	50.0	59.5	<.0001
Percent "Oppose or Strongly Oppose"	30.1	38.5	34.4	26.5	27.7		
Percent "Neutral"	26.5	23.9	23.0	28.0	21.0		
Percent "Don't know"	7.2	3.3	3.8	5.3	1.3		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

Table 3.13. Selected demographic characteristics of anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*					Chi square	P value
	1 (N=316)	2 (N=190)	3 (N=404)	4 (N=466)	5 (N=525)		
<b>Which of the following best describes the area where you now reside?</b>							
Percent "Rural"	43.7	50.0	48.7	45.0	47.6	17.5	0.3548
<b>Which of the following best describes the area where you resided as a child?</b>							
Percent "Rural"	47.6	43.3	51.3	52.7	48.4	29.7	0.0195
<b>What is your age?</b>							
Percent "16-34"	35.2	31.0	3.2	38.4	25.6	470.2	<.0001 **
<b>What is your gender?</b>							
Percent "Male"	76.5	79.9	91.3	85.3	92.3	57.6	<.0001
<b>Which of the following do you consider yourself?</b>							
Percent "White"	88.8	94.1	86.1	85.0	93.2	73.7	0.0009
<b>What is the highest level of formal education you have completed?</b>							
Percent beyond high school	63.9	66.5	61.6	50.9	64.6	79.9	<.0001
<b>What was your household's 1999 annual income before taxes?</b>							
Percent \$75,000 or more	23.9	24.4	24.3	13.2	25.0	97.0	<.0001

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

of experienced generalists were under the age of 35, but, this was expected because one of the segmentation variables was years of fishing experience. Over 20% of occasional and generalist anglers were female while under 10% of experienced generalists and specialists were female. Nearly 50% of all angler types indicated they resided in a rural area. Avid anglers completed less education and indicated they had lower incomes than other angler types. Between 62% and 67% of occasional, generalist, experienced generalist, and specialist anglers had completed an education beyond high school and nearly a quarter had household incomes >\$75,000. Fifty percent of avid anglers had an education beyond high school and 13% had a household income >\$75,000.

### Segmentation by Species Preference

Three-hundred-ninety-nine anglers indicated that  $\geq 50\%$  of their fishing effort was directed toward largemouth bass, the largest species preference group (Table 3.14). Two-hundred-fifty-nine anglers indicated they fished for several kinds of fish or had no preference for species, making species generalists the second largest group. Sample sizes were large enough to analyze responses of anglers who preferred six other species of fish: catfish, crappie, panfish, smallmouth bass, striped bass, and trout. Very few anglers indicated they fished for shad and herring Clupiedae, walleye and sauger, and muskie *Esox masquinongy* and northern pike *Esox lucius*. Therefore, I excluded these groups from analysis.

Largemouth bass and striped bass anglers fished more frequently than other angler groups (Table 3.15). Largemouth bass anglers averaged 40 days of fishing in 1999 and striped bass anglers averaged 37 days of fishing. Panfish anglers fished the least, with an average of 15 days fished in 1999. Largemouth bass and smallmouth bass anglers were the only groups in which less than one-half of the members used bait often or always (Table 3.16). However, between 67% and 96% of all other angler types used bait often or always. Catfish anglers used bait more often than other angler groups. Largemouth bass and smallmouth bass anglers preferred to use artificial lures, with 92% of largemouth bass and 83% of smallmouth bass anglers indicating they use artificial lures often or always. Nearly one-third of trout anglers indicated they flyfished while

Table 3.14. Number of anglers who indicated 50% or more of their fishing effort was directed at each species, as reported by respondents to a statewide survey of Virginia anglers in 2000.

<b>Species Type</b>	<b>Number of anglers</b>	<b>Percent of survey respondents</b>
Catfish	125	4.9
Crappie	64	2.5
Species Generalist	259	10.1
Largemouth bass	399	15.6
Panfish	103	4.0
Smallmouth bass	219	8.5
Striped bass	74	2.9
Trout	219	8.5

Table 3.15. Mean number of days fished by anglers who indicated 50% or more of their fishing effort was directed at each species, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Species Type*								Chi square	P value
	Cat	Cra	Sp. Gen	Lmb	Pan	Smb	Stb	Trt		
	(N=)	(N=)	(N=)	(N=)	(N=)	(N=)	(N=)	(N=)		
In 1999, how many days did you fish in freshwater in Virginia?	125)	64)	259)	399)	103)	219)	74)	219)	87.0	<.0001 **

In 1999, how many days did you fish in

freshwater in Virginia? 34.3 24.1 25.6 40.0 15.0 27.1 37.6 31.8 87.0 <.0001 \*\*

\*Cat=Catfish, Cra=Crappie, Sp. Gen=Species Generalist, Lmb=Largemouth bass, Pan=Panfish, Smb=Smallmouth bass, Stb=Striped bass, Trt=Trout

\*\* Most likely to be managerially significant

Table 3.16. Methods of fishing used by anglers who indicated 50% or more of their fishing effort was directed at each species, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent of anglers indicating “Often” or “Always.”

Methods of fishing	Species Type*								Chi square	P value
	Cat (N=125)	Cra (N=64)	Sp. Gen (N=259)	Lmb (N=399)	Pan (N=103)	Smb (N=219)	Stb (N=74)	Trt (N=219)		
Fishing with bait	96.0	75.0	83.9	32.2	83.3	39.5	80.0	66.8	381.1	<.0001 **
Flyfishing	2.4	8.0	5.4	7.3	11.1	13.1	6.0	32.4	148.3	<.0001 **
Artificial lure/spin	42.3	62.3	59.6	92.4	44.8	83.4	62.3	48.9	332.1	<.0001 **
Trot lines/set poles	8.3	0.0	4.4	1.8	3.6	2.0	8.0	1.4	35.4	0.158
Seining for bait	6.0	4.1	8.9	2.5	5.4	6.9	14.0	4.8	66.0	<.0001
From a boat or canoe with a gas motor	52.2	58.6	36.0	67.4	37.8	36.4	81.4	9.0	282.4	<.0001 **
From a boat or canoe with an electric motor	19.2	46.3	25.0	50.6	30.8	28.4	33.3	9.8	153.4	<.0001 **
From a boat or canoe without a motor	12.1	4.0	14.2	10.3	16.7	36.6	9.8	7.3	124.2	<.0001 **
From the shore	58.6	28.6	60.7	31.3	63.3	39.0	28.3	71.6	199.0	<.0001 **
From a pier or dock	30.7	13.5	31.1	13.2	28.6	10.2	17.5	16.7	87.2	<.0001 **
By wading	15.5	8.0	19.2	10.9	11.1	49.2	12.5	71.4	422.0	<.0001 **

\*Cat=Catfish, Cra=Crappie, Sp. Gen=Species Generalist, Lmb=Largemouth bass, Pan=Panfish, Smb=Smallmouth bass, Stb=Striped bass, Trt=Trout

\*\* Most likely to be managerially significant

very few anglers who targeted other species used this method of fishing. Striped bass and largemouth bass anglers fished from boats more often than other angler types. Eighty-one percent of striped bass anglers and 67% of largemouth bass anglers fished from gas powered boats often or always. A majority of catfish, species generalist, panfish, and trout anglers frequently fished from the shore. Wading was a popular method of fishing among smallmouth bass anglers and trout anglers.

The most used source of information about fishing in Virginia for all angler types was friends or other anglers, yet, the frequency of using friends or other anglers varied widely among angler types (Table 3.17). Sixteen percent of trout anglers used the internet as a source of information about fishing in Virginia while very few of the other angler types use it. Fishing clubs were an important source of information about fishing for largemouth bass anglers. Sporting goods stores were used more often as a source of information by largemouth bass anglers, smallmouth bass anglers, striped bass anglers, and trout anglers.

Angler types varied widely in the frequency with which they keep the fish they catch (Table 3.18). Largemouth bass and smallmouth bass anglers kept fish the least often while 49% of crappie anglers and 46% of panfish anglers kept fish often or always. Catfish, striped bass, and trout anglers also indicated they kept fish often.

All angler types indicated that motivations related to enjoyment of the natural environment and relaxation were of great importance (Table 3.19). “To be outdoors” and “For relaxation” were the most important reasons for fishing among all angler types. The motive “To experience natural surroundings” varied in importance, with crappie anglers placing the least importance on experiencing natural surroundings and smallmouth bass anglers placing the most importance on experiencing natural surroundings. Fishery resource motives showed some variation among angler types. Obtaining fish for eating was more important to crappie, panfish, and striped bass anglers than it was to other angler types. Catching a trophy fish, the challenge/sport of fishing, and developing skills were more important to largemouth bass and striped bass anglers than other angler groups. Only 27% of largemouth bass anglers indicated “To obtain fish for eating” was important to them while 61% indicated “To catch a trophy fish” was important. Over

Table 3.17. Sources of information used by anglers who indicated 50% or more of their fishing effort was directed at each species, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent of anglers indicating “Often” or “Always.”

Sources of information	Species Types*								Chi square	P value
	Cat (N=125)	Cra (N=64)	Sp. Gen (N=259)	Lmb (N=399)	Pan (N=103)	Smb (N=219)	Stb (N=74)	Trt (N=219)		
VDGIF's Virginia Wildlife magazine	13.0	9.5	10.3	12.5	14.1	17.9	13.7	22.3	47.1	0.0133
Other VDGIF publications, handouts and news releases	13.0	12.5	16.5	13.2	14.1	13.0	11.3	23.2	37.6	0.1055
VDGIF worldwide web page (internet)	4.2	1.6	4.4	6.1	2.0	3.7	5.6	15.7	64.0	0.0001
VDGIF staff	1.6	0.0	1.6	3.3	0.0	0.9	0.0	3.4	49.2	0.0080
Newspapers	21.8	22.6	16.2	24.7	21.0	18.1	30.6	20.4	32.5	0.2553
Commercial magazines or newsletters	13.2	15.9	10.8	20.7	14.1	15.7	26.4	15.5	47.5	0.0121
Television	12.1	13.1	14.5	16.7	11.9	11.1	18.3	10.7	39.5	0.0731
Radio	12.2	1.6	5.2	5.1	5.1	3.7	9.7	5.9	43.7	0.0298
Friends or other anglers	56.0	54.7	52.2	64.7	41.2	63.6	68.9	67.2	61.7	0.0002 **
Sporting goods stores	23.4	25.8	26.0	35.4	17.8	32.7	39.7	37.9	58.4	0.0007 **
Bait dealers	31.5	28.6	27.1	28.9	17.0	20.3	26.4	18.0	60.3	0.0004
Fishing club	3.2	0.0	1.6	14.9	1.0	5.2	5.6	5.9	101.1	<.0001

\*Cat=Catfish, Cra=Crappie, Sp. Gen=Species Generalist, Lmb=Largemouth bass, Pan=Panfish, Smb=Smallmouth bass, Stb=Striped bass, Trt=Trout

\*\* Most likely to be managerially significant

Table 3.18. Frequency of keeping fish by Virginia resident anglers who indicated 50% or more of their fishing effort was directed at each species, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent of anglers in each species preference group who keep fish often or always.

Question	Species Preference Type*								Chi square	P value
	Cat (N=125)	Cra (N=64)	Sp. Gen (N=259)	Lmb (N=399)	Pan (N=103)	Smb (N=219)	Stb (N=74)	Trt (N=219)		
How often do you keep the freshwater fish that you catch?	35.2	49.2	19.4	7.3	46.5	8.2	35.1	35.3	258.0	<.0001 **

\*Cat=Catfish, Cra=Crappie, Sp. Gen=Species Generalist, Lmb=Largemouth bass, Pan=Panfish, Smb=Smallmouth bass, Stb=Striped bass, Trt=Trout

\*\* Most likely to be managerially significant

Table 3.19. Importance of reasons for fishing to anglers who indicated 50% or more of their fishing effort was directed at each species, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent of anglers indicating “Somewhat Important” or “Very Important.”

Motive Statement	Species Type*								Chi square	P value
	Cat (N=125)	Cra (N=64)	Sp. Gen (N=259)	Lmb (N=399)	Pan (N=103)	Smb (N=219)	Stb (N=74)	Trt (N=219)		
To be outdoors	89.3	90.5	93.4	92.5	93.9	93.6	87.1	95.2	27.1	0.515
For family recreation	78.3	75.8	82.6	74.6	80.9	74.9	65.7	70.3	41.7	0.047
To experience new and different things	49.6	55.7	60.2	53.5	48.3	58.7	50.0	56.0	42.5	0.039
For relaxation	89.3	85.7	91.1	92.2	90.8	93.1	84.7	88.8	41.2	0.052
To be close to the water	66.4	72.1	74.8	77.0	72.8	77.7	73.9	66.8	44.9	0.023
To obtain fish for eating	44.6	54.0	38.2	27.4	50.0	22.1	53.4	42.9	131.2	<.0001 **
To get away from the demands of other people	67.8	68.3	69.4	70.2	67.0	63.5	58.0	70.3	33.2	0.228
For the experience of the catch	84.7	66.7	75.1	88.3	78.3	83.3	80.6	83.3	65.5	<.0001 **
To test my equipment	30.5	27.0	32.3	33.7	15.6	27.1	30.9	21.5	42.8	0.036
To be with friends	74.0	76.2	71.5	80.9	67.7	75.7	71.2	69.8	43.1	0.034
To experience natural surroundings	79.0	68.3	84.6	87.6	88.2	91.1	80.9	91.7	71.0	<.0001 **
To develop my skills	57.6	40.3	52.8	65.1	38.0	58.8	50.0	60.5	65.4	<.0001 **
To get away from the regular routine	86.7	82.5	81.6	83.6	84.0	83.2	78.6	82.9	30.0	0.364
To catch a trophy fish	41.5	31.7	30.9	60.9	24.2	43.8	57.4	38.1	131.0	<.0001 **
For the challenge/sport	66.1	52.4	59.4	80.5	61.1	74.7	71.4	76.0	85.7	<.0001 **
To experience adventure and excitement	64.7	55.6	64.7	78.9	54.3	72.9	72.1	74.8	53.4	0.003 **
To share my knowledge of fishing with others	39.8	33.3	33.1	50.4	30.7	42.4	45.6	39.6	65.0	<.0001 **
For physical exercise	29.1	39.7	35.7	33.2	32.3	38.9	29.4	50.7	45.5	0.020 **

\*Cat=Catfish, Cra=Crappie, Sp. Gen=Species Generalist, Lmb=Largemouth bass, Pan=Panfish, Smb=Smallmouth bass, Stb=Striped bass, Trt=Trout

\*\* Most likely to be managerially significant

half of all striped bass anglers indicated obtaining fish for eating and catching a trophy fish were important to them. Catfish and trout anglers placed a moderate amount of importance on obtaining fish for eating and catching a trophy fish. About 40% of catfish and trout anglers indicated each of these reasons for fishing was important to them. The motive “For the experience of the catch was most important to largemouth bass anglers and least important to crappie anglers. To experience adventure and excitement was most important to largemouth bass anglers and least important to panfish and crappie anglers. Fishing for physical exercise was more important to trout anglers than other angler groups.

Angler satisfaction with freshwater fishing in 1999 was lowest for striped bass and trout anglers (Table 3.20). Less than 60% of striped bass and trout anglers indicated they were very satisfied with fishing in 1999 while over 70% of smallmouth bass and largemouth bass anglers indicated they were very satisfied. Greater than 20% of trout anglers expressed dissatisfaction with freshwater fishing in Virginia during 1999. More than one-quarter of all angler types indicated the quality of freshwater fishing had declined in the past five years (Table 3.21). The perceived decline in the quality of fishing in the past five years was greatest among crappie and trout anglers.

Nearly 60% or more of all angler types indicated they knew little or nothing about the Fisheries Division of the VDGIF (Table 3.22). Over 30% of catfish anglers disagreed with the statement “The Fisheries Division of the VDGIF does a good job of making anglers aware of current fishing regulations,” while disagreement with this statement was low among all other angler types. Greater than 15% of catfish, crappie, largemouth bass, smallmouth bass, striped bass, and trout anglers disagreed with the statement “The Fisheries Division of the VDGIF provides adequate opportunities for public participation in decisions regarding fisheries related issues.” With the exception of panfish anglers, greater than 15% of all angler types indicated the overall performance of the Fisheries Division in managing freshwater fisheries was “Fair” or “Poor”. Catfish anglers, striped bass anglers, and trout anglers were most critical of the Fisheries Division.

Smallmouth bass anglers generally expressed higher levels of support for regulations than other angler types (Table 3.23). A majority of smallmouth bass anglers

Table 3.20. Satisfaction with freshwater fishing in 1999 among anglers who indicated 50% or more of their fishing effort was directed at each species, as reported by respondents to a statewide survey of Virginia anglers in 2000. Based on a scale of 1=Very unsatisfied to 7=Very satisfied.

Question	Species Type*								Chi square	P value
	Cat (N=)	Cra (N=)	Sp. Gen (N=)	Lmb (N=)	Pan (N=)	Smb (N=)	Stb (N=)	Trt (N=)		
<b>Overall, how satisfied were you with freshwater fishing in Virginia in 1999?</b>										
Percent satisfied	64.4	62.9	64.2	70.3	64.4	73.5	57.6	58.0	72.9	0.0022
Percent unsatisfied	11.9	16.1	14.2	14.0	16.7	11.4	15.2	21.8		

\*Cat=Catfish, Cra=Crappie, Sp. Gen=Species Generalist, Lmb=Largemouth bass, Pan=Panfish, Smb=Smallmouth bass, Stb=Striped bass, Trt=Trout

Table 3.21. Percent of anglers indicating the quality of fishing declined over the past 5 years among anglers who indicated 50% or more of their fishing effort was directed at each species, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Species Type*								Chi square	P value
	Cat (N=)	Cra (N=)	Sp. Gen (N=)	Lmb (N=)	Pan (N=)	Smb (N=)	Stb (N=)	Trt (N=)		
Over the past 5 years, the quality of freshwater fishing in Virginia has...										
Percent "Declined"	31.5	35.5	26.5	26.2	28.4	28.4	32.9	37.8	50.9	0.0003

\*Cat=Catfish, Cra=Crappie, Sp. Gen=Species Generalist, Lmb=Largemouth bass, Pan=Panfish, Smb=Smallmouth bass, Stb=Striped bass, Trt=Trout

Table 3.22. Knowledge and opinion of the Fisheries Division of the VDGIF among anglers who indicated 50% or more of their fishing effort was directed at each species, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Species Type*								Chi square	P value
	Cat	Cra	Sp. Gen	Lmb	Pan	Smb	Stb	Trt		
	(N=125)	(N=64)	(N=259)	(N=399)	(N=103)	(N=219)	(N=74)	(N=219)		
<b>Before receiving this survey, how much did you know about the Fisheries Division of the VDGIF?</b>										
Percent "Little or Nothing"	77.1	68.8	72.8	62.4	76.2	69.8	65.3	59.6	50.2	0.0003
<b>The Fisheries Division of the VDGIF does a good job of making anglers aware of current fishing regulations.</b>										
Percent "Agree or Strongly Agree"	61.8	66.7	58.2	62.0	52.0	63.0	65.3	72.5	37.9	0.1010
Percent "Disagree or Strongly Disagree"	10.6	3.2	4.7	6.8	6.9	9.3	5.6	7.2		
Percent "Neutral"	19.5	28.6	25.4	23.4	25.5	20.8	25.0	16.4		
Percent "Don't know"	8.1	1.6	11.7	7.8	15.7	6.9	4.2	3.9		
<b>The management policies of the Fisheries Division of the VDGIF are biologically sound.</b>										
Percent "Agree or Strongly Agree"	40.7	46.0	37.1	46.1	41.6	44.4	36.1	50.2	19.0	0.8986
Percent "Disagree or Strongly Disagree"	6.5	4.8	3.1	3.5	2.0	4.2	5.6	2.9		
Percent "Neutral"	31.7	30.2	32.4	31.1	27.7	28.7	47.2	30.9		
Percent "Don't know"	21.1	19.0	27.3	19.2	28.7	22.7	11.1	15.9		

\*Cat=Catfish, Cra=Crappie, Sp. Gen=Species Generalist, Lmb=Largemouth bass, Pan=Panfish, Smb=Smallmouth bass, Stb=Striped bass, Trt=Trout

Table 3.22 continued. Knowledge and opinion of the Fisheries Division of the VDGIF among anglers who indicated 50% or more of their fishing effort was directed at each species, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Species Type*								Chi square	P value
	Cat	Cra	Sp. Gen	Lmb	Pan	Smb	Stb	Trt		
<b>The Fisheries Division of the VDGIF makes a good attempt to explain its fishing programs to the public.</b>										
Percent "Agree or Strongly Agree"	38.7	47.6	41.2	40.0	42.2	39.5	34.7	51.7	29.7	0.3754
Percent "Disagree or Strongly Disagree"	15.3	15.9	10.2	16.2	7.8	14.0	25.0	13.5		
Percent "Neutral"	30.7	30.2	32.6	31.9	29.4	33.5	29.2	27.1		
Percent "Don't know"	15.3	6.3	16.1	11.9	20.6	13.0	11.1	7.7		
<b>The staff of the Fisheries Division of the VDGIF provides knowledgeable service to their customers.</b>										
Percent "Agree or Strongly Agree"	41.0	44.4	35.2	41.5	43.6	38.4	36.1	50.2	34.7	0.1788
Percent "Disagree or Strongly Disagree"	8.2	7.9	5.1	7.3	4.0	6.9	9.7	9.7		
Percent "Neutral"	29.5	34.9	35.9	35.7	27.7	34.3	41.7	28.0		
Percent "Don't know"	21.3	12.7	23.8	15.4	24.8	20.4	12.5	12.1		

\*Cat=Catfish, Cra=Crappie, Sp. Gen=Species Generalist, Lmb=Largemouth bass, Pan=Panfish, Smb=Smallmouth bass, Stb=Striped bass, Trt=Trout

Table 3.22 continued. Knowledge and opinion of the Fisheries Division of the VDGIF among anglers who indicated 50% or more of their fishing effort was directed at each species, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Species Type*								Chi square	P value
	Cat	Cra	Sp. Gen	Lmb	Pan	Smb	Stb	Trt		
<b>The Fisheries Division of the VDGIF provides adequate opportunities for public participation in decisions regarding fisheries related issues.</b>										
Percent "Agree or Strongly Agree"	27.9	20.6	20.4	22.1	16.8	24.2	21.9	32.4	36.0	0.1425
Percent "Disagree or Strongly Disagree"	18.9	15.9	9.8	16.3	9.9	16.3	19.2	22.2		
Percent "Neutral"	28.7	39.7	37.7	40.1	35.6	34.0	46.6	31.4		
Percent "Don't know"	24.6	23.8	32.2	21.6	37.6	25.6	12.3	14.0		
<b>The Fisheries Division of the VDGIF provides good solutions to fisheries problems.</b>										
Percent "Agree or Strongly Agree"	36.1	22.2	27.7	29.9	30.7	30.7	34.7	30.1	19.5	0.8810
Percent "Disagree or Strongly Disagree"	7.4	4.8	7.4	8.6	5.9	8.4	11.1	11.2		
Percent "Neutral"	32.0	49.2	34.0	40.6	31.7	37.7	43.1	40.3		
Percent "Don't know"	24.6	23.8	30.9	20.8	31.7	23.3	11.1	18.5		
<b>How would you rate the overall performance of the Fisheries Division of the VDGIF in managing freshwater fisheries in Virginia?</b>										
Percent "Fair or Poor"	25.0	17.5	18.2	19.7	12.7	18.5	25.7	26.4	20.3	0.8525
Percent "Good, Very good, or Excellent"	53.2	63.5	52.7	60.1	67.6	56.5	56.8	63.0		
Percent "Don't know"	21.8	19.0	29.1	20.2	19.6	25.0	17.6	10.6		

\*Cat=Catfish, Cra=Crappie, Sp. Gen=Species Generalist, Lmb=Largemouth bass, Pan=Panfish, Smb=Smallmouth bass, Stb=Striped bass, Trt=Trout

Table 3.23. Support and opposition for regulations among anglers who indicated 50% or more of their fishing effort was directed at each species, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Regulation	Species Type*								Chi square	P value	
	Cat	Cra	Sp. Gen	Lmb	Pan	Smb	Stb	Trt			
	(N= 125)	(N= 64)	(N= 259)	(N= 399)	(N= 103)	(N= 219)	(N= 74)	(N= 219)			
<b>Increased minimum size limits</b>											
Percent Support	46.8	65.6	52.3	65.6	52.0	71.6	53.5	65.1	80.1	<.0001	**
Percent Oppose	19.4	9.4	11.3	12.2	17.6	8.3	14.1	16.0			
Percent "Neutral"	29.0	21.9	30.1	18.7	24.5	17.4	32.4	16.0			
Percent "Don't know"	4.8	3.1	6.3	3.5	5.9	2.8	0.0	2.9			
<b>Maximum size limits</b>											
Percent Support	25.0	48.4	33.6	44.4	31.0	46.8	30.1	38.4	60.3	0.0004	**
Percent Oppose	36.3	22.6	25.4	27.7	31.0	21.6	37.0	34.5			
Percent "Neutral"	32.3	25.8	34.4	23.6	30.0	28.9	31.5	23.3			
Percent "Don't know"	6.5	3.2	6.6	4.3	8.0	2.8	1.4	3.9			
<b>Slot limits</b>											
Percent Support	36.3	50.8	35.8	48.1	39.0	55.1	50.7	39.8	66.7	<.0001	
Percent Oppose	18.6	11.1	16.1	21.4	17.0	16.5	21.9	26.2			
Percent "Neutral"	36.3	33.3	39.0	26.0	33.0	25.7	23.3	27.7			
Percent "Don't know"	8.9	4.8	9.1	4.6	11.0	2.8	4.1	6.3			
<b>Reduced daily bag limits</b>											
Percent Support	24.2	39.7	28.3	43.1	36.0	52.8	32.9	31.7	150.4	<.0001	**
Percent Oppose	34.7	22.2	23.1	23.5	20.0	17.6	37.0	45.9			
Percent "Neutral"	33.1	34.9	40.6	28.6	35.0	24.5	27.4	21.0			
Percent "Don't know"	8.1	3.2	8.0	4.9	9.0	5.1	2.7	1.5			
<b>Prohibiting the use of bait</b>											
Percent Support	2.4	4.8	2.7	11.5	6.0	9.6	5.5	17.6	126.6	<.0001	
Percent Oppose	87.9	84.1	81.6	63.9	77.0	64.2	86.3	66.8			
Percent "Neutral"	5.7	11.1	11.3	21.9	12.0	24.3	6.8	13.2			
Percent "Don't know"	4.0	0.0	4.3	2.8	5.0	1.8	1.4	2.4			
<b>Catch and release only areas</b>											
Percent Support	25.8	33.3	31.5	50.1	30.0	58.3	27.4	46.1	107.1	<.0001	**
Percent Oppose	45.2	46.0	34.7	22.9	37.0	20.6	28.8	33.5			
Percent "Neutral"	24.2	20.6	29.5	23.7	26.0	18.8	39.7	17.0			
Percent "Don't know"	4.8	0.0	4.3	3.3	7.0	2.3	4.1	3.4			

\*Cat=Catfish, Cra=Crappie, Sp. Gen=Species Generalist, Lmb=Largemouth bass, Pan=Panfish, Smb=Smallmouth bass, Stb=Striped bass, Trt=Trout

\*\* Most likely to be managerially significant

expressed support for minimum size limits, slot limits, reduced daily bag limits, and catch and release areas. No regulation was supported by a majority of catfish anglers. In fact, a greater percentage of catfish anglers opposed several regulations than supported the regulations. Largemouth bass and trout anglers indicated moderate levels of support for most regulations. However, there were high levels of opposition to all regulations among all angler types. The prohibition of bait received very little support from any of the angler groups.

Less than 20% of crappie, panfish, and striped bass anglers were under the age of 35 while 30% of catfish, species generalists, and trout anglers were under 35 (Table 3.24). Females made up nearly 30% of crappie and species generalist anglers, but less than 10% of largemouth bass and striped bass anglers. Over 65% of panfish and smallmouth bass anglers had completed beyond a high school education while only 45% of catfish anglers indicated they had beyond a high school education. Catfish anglers also had the lowest income of all angler types and more catfish anglers grew up in rural areas than other angler types. Only 8.5% of catfish anglers indicated they had a household income greater than \$75,000. Over 30% of striped bass anglers and more than 25% of largemouth bass and smallmouth bass anglers had a household income greater than \$75,000.

#### Multi-level Segmentation by Specialization Within Species Preference

Of the eight species groups examined, six had sample sizes large enough to be included in multi-level segmentation. Sample sizes for crappie and panfish anglers were insufficient to be included in multi-level segmentation. Catfish, species generalist, largemouth bass, and smallmouth bass angler groups had enough anglers to make comparisons across all specialization levels. Sample sizes of four of the five specialization levels of striped bass anglers were too small. Therefore, I combined the four specialization levels and made comparisons to the other specialization level. One specialization level within the trout angler group was too small to be included, therefore, I excluded it from the analysis.

Table 3.24. Selected demographic characteristics of anglers who indicated 50% or more of their fishing effort was directed at each species, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Species Type*								Chi square	P value
	Cat (N=125)	Cra (N=64)	Sp. Gen (N=259)	Lmb (N=399)	Pan (N=103)	Smb (N=219)	Stb (N=74)	Trt (N=219)		
<b>Which of the following best describes the area where you now reside?</b>										
Percent "Rural"	56.0	51.7	47.7	42.4	40.0	42.5	43.7	52.0	41.8	0.0448
<b>Which of the following best describes the area where you resided as a child?</b>										
Percent "Rural"	65.3	50.8	54.2	41.6	42.3	47.3	43.7	57.1	66.7	<.0001 **
<b>What is your age?</b>										
Percent "16-34"	29.8	14.3	29.6	26.7	10.8	23.4	17.6	30.1	153.0	<.0001
<b>What is your gender?</b>										
Percent "Male"	84.8	71.4	73.5	90.2	85.3	89.0	90.5	88.4	50.9	<.0001
<b>Which of the following do you consider yourself?</b>										
Percent "White"	91.9	90.2	85.5	92.3	85.3	93.1	87.8	92.2	78.3	0.0930
<b>What is the highest level of formal education you have completed?</b>										
Percent beyond high school	45.2	57.4	60.8	61.5	66.3	71.3	56.2	64.3	75.3	<.0001 **
<b>What was your household's 1999 annual income before taxes?</b>										
Percent \$75,000 or more	8.5	17.0	18.4	26.2	18.3	28.8	31.9	23.0	108.9	0.0003 **

\*Cat=Catfish, Cra=Crappie, Sp. Gen=Species Generalist, Lmb=Largemouth bass, Pan=Panfish, Smb=Smallmouth bass, Stb=Striped bass, Trt=Trout

\*\* Most likely to be managerially significant

### *Catfish Anglers*

Catfish anglers were well distributed among the five specialization levels (Figure 3.2). Nearly 30% of all catfish anglers were avid anglers, while only 10% were generalist anglers. Avid and specialist anglers fished two to three times more often than other angler types (Table 3.25). Bait fishing was the overwhelming choice of fishing method for all catfish angler types (Table 3.26). Over 35% of all angler types also indicated they used artificial lures “Often” or “Always”. Avid anglers were more likely to fish with trot lines or set poles than other angler types. Over 85% of specialists and generalists and over 70% of experienced generalists indicated they fished from a gas powered boat “Often” or “Always”. In contrast, over 75% of occasional and avid anglers indicated they fished from the shore often or always. Occasional and avid anglers were more likely to fish from a pier or dock than other angler types. Experienced generalist anglers were the most consumptive group of catfish anglers (Table 3.27). Fifty-seven percent of experienced generalists indicated they keep fish often or always while only 26% of occasional and specialist anglers indicated they keep fish often or always.

Catfish anglers in all specialization groups cited motives related to the natural environment and relaxation as being their most important reasons for fishing (Table 3.28). Specialist catfish anglers stood out because of the high importance they attached to experiencing the catch and the relatively low importance they attached to obtaining fish for eating (second only to physical exercise among the least important reasons for fishing for specialists). Experienced generalists were the only group of catfish anglers to rate family recreation among their most important reasons for fishing. Generalists placed more importance than other groups on being with friends and only occasional anglers rated experiencing natural surrounding among their most important reasons for fishing. Catching a trophy fish was among the least important reasons for fishing for avid and experienced generalist catfish anglers. From the perspective of VDGIF managers, the most important differences occurred in obtaining fish for eating (relatively unimportant to occasional anglers and specialists) and catching trophy fish (quite important to specialists, relatively unimportant to experienced generalists and avid anglers).

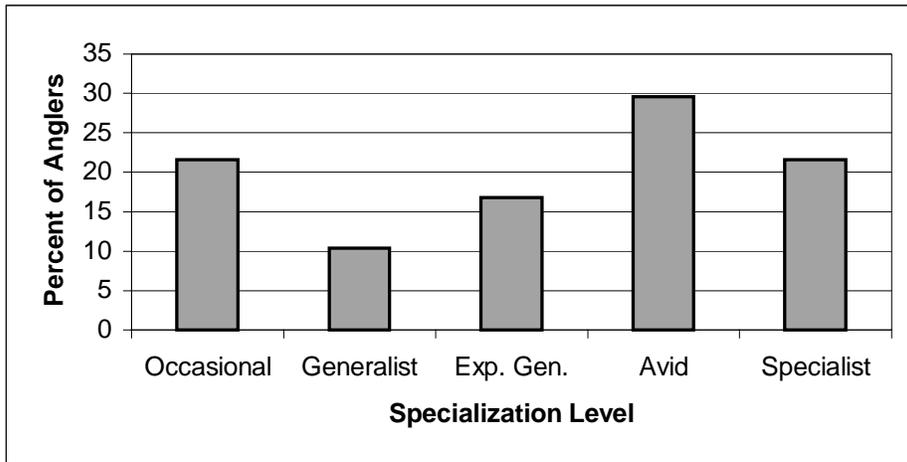


Figure 3.2. Percent of catfish anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. (N=125)

Table 3.25. Mean number of days fished by catfish anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

<b>Days fished</b>	<b>Specialization Level*</b>					<b>All</b> (N=125)	<b>Chi</b> <b>square</b>	<b>P value</b>
	<b>1</b> (N=27)	<b>2</b> (N=13)	<b>3</b> (N=21)	<b>4</b> (N=37)	<b>5</b> (N=27)			
In 1999, how many days did you fish in freshwater in Virginia?	17.4	19.3	23.2	43.6	54.2	34.3	23.8	<.0001 **

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.26. Preferred methods of fishing used by catfish anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent of anglers indicating “Often” or “Always.”

Methods of fishing	Specialization Level*					All (N=125)	Chi square	P value
	1 (N=27)	2 (N=13)	3 (N=21)	4 (N=37)	5 (N=27)			
Fishing with bait	96.3	92.3	95.2	100.0	92.6	96.0	12.3	0.425
Flyfishing	0.0	0.0	0.0	4.0	5.0	2.4	10.5	0.574
Artificial lure/spin	38.1	50.0	52.9	35.5	44.0	42.3	12.5	0.709
Trot lines/set poles	0.0	12.5	8.3	15.4	5.0	8.3	13.1	0.664
Seining for bait	0.0	0.0	0.0	12.0	9.5	6.0	14.1	0.592
From a boat or canoe with a gas motor	12.5	91.7	70.6	31.4	85.2	52.2	55.2	<.0001 **
From a boat or canoe with an electric motor	0.0	44.4	25.0	13.3	30.0	19.2	26.3	0.050 **
From a boat or canoe without a motor	4.8	0.0	23.1	12.9	16.7	12.1	21.3	0.166
From the shore	83.3	27.3	38.9	77.8	31.8	58.6	38.5	0.001 **
From a pier or dock	40.9	11.1	26.3	46.7	9.5	30.7	20.5	0.199
By wading	15.0	0.0	6.7	21.9	18.2	15.5	13.5	0.635

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.27. Frequency of keeping fish by catfish anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent of anglers indicating “Often” or “Always.”

Question	Specialization Level*						Chi square	P value
	1 (N=27)	2 (N=13)	3 (N=21)	4 (N=37)	5 (N=27)	All (N=125)		
<b>How often do you keep the freshwater fish that you catch?</b>								
Percent indicating "Often" or "Always"	25.9	30.8	57.2	37.8	25.9	35.2	22.4	0.1303

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

Table 3.28. Importance of reasons for fishing to catfish anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent indicating “Somewhat important” or “Very important.”

Motive Statement	Specialization Level*					All (N=125)	Chi square	P value
	1 (N=27)	2 (N=13)	3 (N=21)	4 (N=37)	5 (N=27)			
To be outdoors	84.6	84.6	90.0	89.2	96.2	89.3	30.9	0.014
For family recreation	76.9	66.7	85.0	81.1	76.0	78.3	17.1	0.380
To experience new and different things	30.8	36.4	47.4	57.6	65.4	49.6	14.4	0.569
For relaxation	88.5	84.6	90.0	89.2	92.3	89.3	21.4	0.162
To be close to the water	50.0	66.7	79.0	66.7	73.1	66.4	14.7	0.548
To obtain fish for eating	29.6	45.5	52.4	51.4	44.0	44.6	30.5	0.016 **
To get away from the demands of other people	53.8	75.0	60.0	73.0	76.9	67.8	19.1	0.266
For the experience of the catch	80.8	75.0	79.0	82.9	100.0	84.7	22.0	0.144
To test my equipment	15.4	9.1	21.1	33.3	57.7	30.5	24.6	0.078
To be with friends	70.4	90.9	52.6	80.6	76.9	74.0	31.0	0.014 **
To experience natural surroundings	80.8	58.3	84.2	77.8	84.6	79.0	15.3	0.500
To develop my skills	46.2	36.4	57.9	55.6	80.8	57.6	17.8	0.338
To get away from the regular routine	76.9	75.0	94.7	89.2	92.3	86.7	29.4	0.021
To catch a trophy fish	30.8	45.5	21.1	41.7	65.4	41.5	29.9	0.018 **
For the challenge/sport	53.9	63.6	68.4	66.7	76.9	66.1	15.6	0.479
To experience adventure and excitement	57.7	50.0	57.9	69.5	76.9	64.7	26.3	0.050 **
To share my knowledge of fishing with others	26.9	27.3	36.8	41.7	57.7	39.8	23.2	0.109
For physical exercise	26.9	18.2	38.9	30.6	26.9	29.1	6.7	0.979

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Generalist, avid, and specialist anglers expressed high levels of satisfaction with freshwater fishing in 1999, while occasional anglers and experienced generalist anglers appeared to be less satisfied (Table 3.29). Forty-six percent of avid anglers and 38% of occasional anglers indicated the quality of fishing had declined in the past five years while only 14% of experienced generalists and 15% of generalists indicated the quality had declined (Table 3.30). Experienced generalist anglers indicated they had the least amount of knowledge of the Fisheries Division, while specialist anglers were the most knowledgeable about the Fisheries Division (Table 3.31). In general, all catfish angler groups indicated similar opinions of the Fisheries Division of the VDGIF. Nearly 75% of specialists agreed with the statement “The Fisheries Division of the VDGIF does a good job of making anglers aware of current fishing regulations”. However, a large proportion of all angler groups disagreed with this statement. Over 61% of generalists agreed with the statement “The management policies of the Fisheries Division of the VDGIF are biologically sound”. Agreement with this statement was lower for other types of anglers, however, there was a high percentage of anglers in all specialization levels who indicated “Neutral” or “Don’t know.” Thirty percent or fewer of anglers in all catfish specialization groups agreed with the statement “The Fisheries Division of the VDGIF provides adequate opportunities for public participation in decisions regarding fisheries related issues”. Over 20% of generalists, avid anglers, and specialists disagreed that there are adequate opportunities for public participation. With the exception of experienced generalists, over 20% of all angler types indicated the overall performance of the Fisheries Division was “Fair” or “Poor.”

All types of catfish anglers indicated low levels of support and high levels of opposition for most regulations (Table 3.32). The five specialization groups did not differ significantly in their support or opposition to any of the regulations.

Specialization groups among catfish anglers showed no significant demographic differences. They tended to be older, rural, white males and few had incomes exceeding \$75,000 per year (Table 3.33).

Table 3.29. Satisfaction with freshwater fishing in 1999 among catfish anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Measured on a scale of 1=Very unsatisfied to 7=Very satisfied.

Question	Specialization Level*					All (N=125)	Chi square	P value
	1 (N=27)	2 (N=13)	3 (N=21)	4 (N=37)	5 (N=27)			
<b>Overall, how satisfied were you with freshwater fishing in Virginia in 1999?</b>								
Percent satisfied	45.8	83.3	52.4	72.2	72.0	64.4	43.0	0.0101 **
Percent unsatisfied	20.8	8.3	4.8	13.9	8.0	11.9		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.30. Percent of catfish anglers in each specialization level who indicated a decline in the quality of fishing in the past 5 years, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*					All (N=125)	Chi square	P value
	1 (N=27)	2 (N=13)	3 (N=21)	4 (N=37)	5 (N=27)			
<b>Over the past 5 years, the quality of freshwater fishing in Virginia has...</b>								
Percent "Declined"	38.5	15.4	14.3	46.0	25.9	31.5	26.0	0.0108 **

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.31. Knowledge and opinion of the Fisheries Division of the VDGIF among catfish anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*						Chi square	P value
	1 (N=27)	2 (N=13)	3 (N=21)	4 (N=37)	5 (N=27)	All (N=125)		
<b>Before receiving this survey, how much did you know about the Fisheries Division of the VDGIF?</b>								
Percent "Little or Nothing"	84.0	76.9	90.5	78.4	57.7	77.1	22.6	0.0313 **
<b>The Fisheries Division of the VDGIF does a good job of making anglers aware of current fishing regulations.</b>								
Percent "Agree or Strongly Agree"	53.8	69.2	52.4	61.1	74.1	61.8	15.0	0.2437
Percent "Disagree or Strongly Disagree"	11.5	7.7	19.1	11.1	3.7	10.6		
Percent "Neutral"	26.9	23.1	14.3	16.7	18.5	19.5		
Percent "Don't know"	7.7	0.0	14.3	11.1	3.7	8.1		
<b>The management policies of the Fisheries Division of the VDGIF are biologically sound.</b>								
Percent "Agree or Strongly Agree"	38.5	61.5	38.1	32.4	46.2	40.7	18.6	0.2915
Percent "Disagree or Strongly Disagree"	3.9	15.4	4.8	5.4	7.7	6.5		
Percent "Neutral"	42.3	7.7	23.8	37.8	30.8	31.7		
Percent "Don't know"	15.4	15.4	33.3	24.3	15.4	21.1		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.31 continued. Knowledge and opinion of the Fisheries Division of the VDGIIF among catfish anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*					All	Chi square	P value
	1	2	3	4	5			
<b>The Fisheries Division of the VDGIIF makes a good attempt to explain its fishing programs to the public.</b>								
Percent "Agree or Strongly Agree"	34.6	46.2	38.1	40.5	37.0	38.7	12.4	0.7189
Percent "Disagree or Strongly Disagree"	7.7	15.4	9.5	18.9	22.2	15.3		
Percent "Neutral"	42.3	30.8	23.8	24.3	33.3	30.7		
Percent "Don't know"	15.4	7.7	28.6	16.2	7.4	15.3		
<b>The staff of the Fisheries Division of the VDGIIF provides knowledgeable service to their customers.</b>								
Percent "Agree or Strongly Agree"	34.6	53.8	40.0	38.9	44.4	41.0	21.8	0.1511
Percent "Disagree or Strongly Disagree"	3.9	7.7	0.0	13.9	11.1	8.2		
Percent "Neutral"	46.2	23.1	25.0	27.8	22.2	29.5		
Percent "Don't know"	15.4	15.4	35.0	19.4	22.2	21.3		
<b>The Fisheries Division of the VDGIIF provides adequate opportunities for public participation in decisions regarding fisheries related issues.</b>								
Percent "Agree or Strongly Agree"	30.8	30.8	23.8	27.8	26.9	27.9	12.3	0.7223
Percent "Disagree or Strongly Disagree"	11.5	30.8	9.5	22.2	23.1	18.9		
Percent "Neutral"	46.2	23.1	28.6	13.9	34.6	28.7		
Percent "Don't know"	11.5	15.4	38.1	36.1	15.4	24.6		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.31 continued. Knowledge and opinion of the Fisheries Division of the VDGIF among catfish anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*					All	Chi square	P value
	1	2	3	4	5			
<b>The Fisheries Division of the VDGIF provides good solutions to fisheries problems.</b>								
Percent "Agree or Strongly Agree"	26.9	38.5	42.9	37.1	37.0	36.1	21.2	0.1705
Percent "Disagree or Strongly Disagree"	7.7	7.7	0.0	11.4	7.4	7.4		
Percent "Neutral"	42.3	30.8	23.8	22.9	40.7	32.0		
Percent "Don't know"	23.1	23.1	33.3	28.6	14.8	24.6		
<b>How would you rate the overall performance of the Fisheries Division of the VDGIF in managing freshwater fisheries in Virginia?</b>								
Percent "Fair or Poor"	30.8	23.1	9.5	32.4	22.2	25.0	16.3	0.4331
Percent "Good, Very good, or Excellent"	42.3	69.2	42.9	46.0	74.1	53.2		
Percent "Don't know"	26.9	7.7	47.6	21.6	3.7	21.8		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.32. Support and opposition for regulations among catfish anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Regulation	Specialization Level*					All (N=125)	Chi square	P value
	1 (N=27)	2 (N=13)	3 (N=21)	4 (N=37)	5 (N=27)			
<b>Increased minimum size limits</b>								
Percent "Support or Strongly Support"	34.6	38.5	38.1	59.5	51.9	46.8	10.8	0.822
Percent "Oppose or Strongly Oppose"	23.1	23.1	23.8	13.5	18.5	19.4		
Percent "Neutral"	34.6	30.8	33.3	21.6	29.6	29.0		
Percent "Don't know"	7.7	7.7	4.8	5.4	0.0	4.8		
<b>Maximum size limits</b>								
Percent "Support or Strongly Support"	11.5	15.4	28.6	24.3	40.7	25.0	12.7	0.6964
Percent "Oppose or Strongly Oppose"	38.5	53.8	28.6	37.8	29.6	36.3		
Percent "Neutral"	42.3	23.1	33.3	29.7	29.6	32.3		
Percent "Don't know"	7.7	7.7	9.5	8.1	0.0	6.5		
<b>Slot limits</b>								
Percent "Support or Strongly Support"	15.4	30.8	33.3	48.7	44.4	36.3	15.7	0.4721
Percent "Oppose or Strongly Oppose"	30.8	23.1	14.3	13.5	14.8	18.6		
Percent "Neutral"	42.3	30.8	38.1	29.7	40.7	36.3		
Percent "Don't know"	11.5	15.4	14.3	8.1	0.0	8.9		
<b>Reduced daily bag limits</b>								
Percent "Support or Strongly Support"	23.1	23.1	23.8	18.9	33.3	24.2	8.0	0.9478
Percent "Oppose or Strongly Oppose"	26.9	38.5	38.1	32.4	40.7	34.7		
Percent "Neutral"	38.5	30.8	28.6	37.8	25.9	33.1		
Percent "Don't know"	11.5	7.7	9.5	10.8	0.0	8.1		
<b>Prohibiting the use of bait</b>								
Percent "Support or Strongly Support"	7.7	0.0	4.8	0.0	0.0	2.4	17.2	0.3702
Percent "Oppose or Strongly Oppose"	92.3	76.9	85.7	86.5	92.6	87.9		
Percent "Neutral"	0.0	7.7	4.8	8.1	7.4	5.7		
Percent "Don't know"	0.0	15.4	4.8	5.4	0.0	4.0		
<b>Catch and release only areas</b>								
Percent "Support or Strongly Support"	30.8	15.4	19.1	27.0	29.6	25.8	12.1	0.7359
Percent "Oppose or Strongly Oppose"	46.2	38.5	61.9	35.1	48.2	45.2		
Percent "Neutral"	19.2	38.5	14.3	29.7	22.2	24.2		
Percent "Don't know"	3.9	7.7	4.8	8.1	0.0	4.8		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

Table 3.33. Selected demographic characteristics of catfish anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*					All (N=125)	Chi square	P value
	1 (N=27)	2 (N=13)	3 (N=21)	4 (N=37)	5 (N=27)			
<b>Which of the following best describes the area where you now reside?</b>								
Percent "Rural"	65.4	81.8	45.0	50.0	52.0	56.0	13.8	0.6112
<b>Which of the following best describes the area where you resided as a child?</b>								
Percent "Rural"	73.1	61.5	70.0	61.1	61.5	65.3	12.9	0.6784
<b>What is your age?</b>								
Percent "16-34"	37.0	38.5	4.8	37.8	26.9	29.8	52.1	0.1867
<b>What is your gender?</b>								
Percent "Male"	81.5	92.3	90.5	78.4	88.9	84.8	2.9	0.5819
<b>Which of the following do you consider yourself?</b>								
Percent "White"	88.9	100.0	100.0	86.5	92.6	91.9	19.8	0.2306
<b>What is the highest level of formal education you have completed?</b>								
Percent beyond high school	44.4	46.2	30.0	46.0	55.6	45.2	23.9	0.2483
<b>What was your household's 1999 annual income before taxes?</b>								
Percent \$75,000 or more	11.1	0.0	20.0	3.0	8.0	8.5	38.2	0.3693

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

### *Largemouth Bass Anglers*

Largemouth bass anglers were predominantly specialist anglers (41%) and avid anglers (22%) (Figure 3.3). Avid and specialist largemouth bass anglers fished three to five times more often than other angler types (Table 3.34). Fishing with artificial lures was the most widely used method of fishing among all groups of largemouth bass anglers (Table 3.35). Over 90% of generalist, avid and specialist largemouth bass anglers used artificial lures often or always. Specialist anglers indicated they fished almost exclusively from boats while other angler types indicated they fished in a variety of ways. Occasional anglers and avid anglers were more likely to fish from shore often or always.

Specialist anglers were more likely than other angler types to receive information about freshwater fishing in Virginia from the internet, television, sporting goods stores, and fishing clubs (Table 3.36). Avid and specialist anglers were more likely to receive information from commercial magazines or newsletters, friends or other anglers, and bait dealers. VDGIF's *Virginia Wildlife* magazine was an important source of information to experienced generalist anglers.

Relaxation and enjoying the outdoors were important reasons for fishing for all types of largemouth bass anglers (Table 3.37). The motives "To experience new and different things," "To test my equipment," "To develop my skills," "To catch a trophy fish," "For the challenge/sport," "To experience adventure and excitement," "To share my knowledge of fishing with others," and "For physical exercise" were more important to specialist and avid anglers than they were to other angler types. The motive "To obtain fish for eating" was not important to most largemouth bass angler types, although over 40% of experienced generalists indicated it was important. The motive "To be with friends" was less important to generalist and experienced generalist anglers.

Over 75% of avid and specialist largemouth bass anglers indicated they were satisfied with freshwater fishing in 1999, while only one-half of occasional anglers were satisfied (Table 3.38). Despite the high levels of satisfaction, over 30% of specialists and approximately 25% of avid and occasional anglers felt that the quality of freshwater fishing had declined in the past five years (Table 3.39). Specialists generally gave more

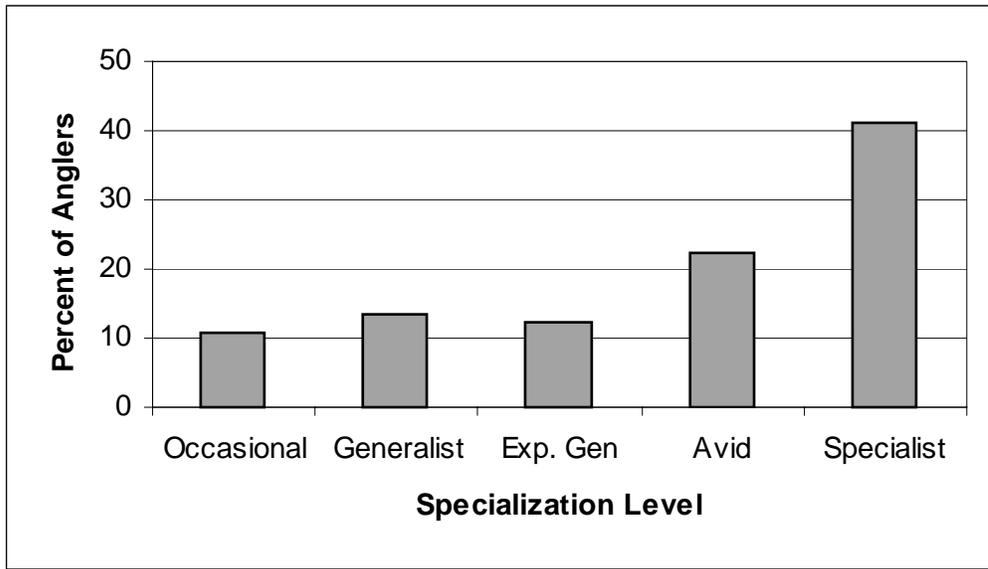


Figure 3.3. Percent of largemouth bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. (N=399)

Table 3.34. Mean number of days fished by largemouth bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*					All (N=399)	Chi square	P value
	1 (N=43)	2 (N=54)	3 (N=49)	4 (N=89)	5 (N=164)			
<b>Days fished</b>								
In 1999, how many days did you fish in freshwater in Virginia?	11.6	16.5	12.0	47.2	59.8	40.0	162.2	<.0001 **

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist  
 \*\* Most likely to be managerially significant

Table 3.35. Preferred methods of fishing used by largemouth bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent of anglers indicating “Often” or “Always.”

Methods of fishing	Specialization Level*					All (N=399)	Chi square	P value
	1 (N=43)	2 (N=54)	3 (N=49)	4 (N=89)	5 (N=164)			
Fishing with bait	42.5	34.7	40.0	33.7	25.5	32.2	26.0	0.054
Flyfishing	0.0	2.2	27.8	5.4	6.0	7.3	49.3	<.0001
Artificial lure/spin	85.0	90.6	79.6	94.3	97.6	92.4	51.9	<.0001
Trot lines/set poles	3.7	2.5	0.0	0.0	2.6	1.8	18.8	0.278
Seining for bait	3.7	2.5	0.0	4.4	1.7	2.5	9.3	0.675
From a boat or canoe with a gas motor	52.8	67.9	50.0	45.9	86.3	67.4	70.0	<.0001 **
From a boat or canoe with an electric motor	30.6	51.2	45.5	49.4	57.2	50.6	30.3	0.016 **
From a boat or canoe without a motor	6.7	13.2	24.3	9.3	6.9	10.3	19.7	0.232
From the shore	44.7	29.6	33.3	50.6	17.2	31.3	47.4	<.0001 **
From a pier or dock	22.9	22.5	16.2	16.7	5.1	13.2	36.8	0.002
By wading	9.1	4.9	13.5	20.3	7.2	10.9	21.4	0.163

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.36. Sources of information used by largemouth bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent of anglers indicating “Often” or “Always.”

Sources of information	Specialization Level*						Chi square	P value
	1 (N=43)	2 (N=54)	3 (N=49)	4 (N=89)	5 (N=164)	All (N=399)		
VDGIF's Virginia Wildlife magazine	0.0	9.4	20.4	9.2	15.9	12.5	49.2	<.0001 **
Other VDGIF publications, handouts and news releases	0.0	7.4	10.2	12.8	19.5	13.2	29.2	0.0224
VDGIF worldwide web page (internet)	2.5	5.6	0.0	2.3	11.0	6.1	34.2	0.0051
VDGIF staff	0.0	3.8	0.0	6.8	3.1	3.3	23.4	0.1047
Newspapers	12.5	20.4	22.5	29.2	27.4	24.7	32.1	0.0096
Commercial magazines or newsletters	5.0	16.7	14.3	25.8	25.0	20.7	60.6	<.0001 **
Television	5.0	9.3	10.2	16.9	23.8	16.7	38.3	0.0014
Radio	2.6	5.6	6.1	4.6	5.5	5.1	31.2	0.0127
Friends or other anglers	45.0	52.8	38.8	71.6	77.4	64.7	45.0	0.0001 **
Sporting goods stores	12.2	26.4	14.3	38.6	48.8	35.4	60.5	<.0001 **
Bait dealers	17.1	28.3	8.2	34.1	35.4	28.9	24.2	0.0848
Fishing club	2.4	4.0	4.1	12.5	25.9	14.9	54.4	<.0001 **

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.37. Importance of reasons for fishing to largemouth bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent indicating “Somewhat important” or “Very important.”

Motive Statement	Specialization Level*						Chi square	P value
	1 (N=43)	2 (N=54)	3 (N=49)	4 (N=89)	5 (N=164)	All (N=399)		
To be outdoors	90.7	84.9	87.8	96.6	94.5	92.5	28.7	0.0257
For family recreation	69.1	66.0	77.3	75.3	77.6	74.6	19.9	0.2225
To experience new and different things	31.7	40.0	34.8	59.8	65.4	53.5	49.4	<.0001 **
For relaxation	95.2	83.3	95.8	94.3	92.0	92.2	18.0	0.3232
To be close to the water	65.9	67.9	72.1	78.8	83.1	77.0	34.2	0.0052
To obtain fish for eating	25.0	20.8	41.3	23.6	28.3	27.4	20.0	0.2219
To get away from the demands of other people	65.9	69.8	61.7	76.4	70.4	70.2	15.5	0.4868
For the experience of the catch	92.9	78.9	81.3	95.5	88.4	88.3	40.9	0.0006
To test my equipment	23.1	17.3	27.7	34.8	42.8	33.7	24.7	0.0748
To be with friends	86.0	65.4	70.8	82.8	86.5	80.9	33.6	0.0062 **
To experience natural surroundings	87.8	79.3	87.2	88.8	89.6	87.6	23.2	0.1088
To develop my skills	54.8	48.1	42.6	73.0	75.5	65.1	52.8	<.0001 **
To get away from the regular routine	82.9	73.6	76.1	86.5	87.7	83.6	25.8	0.0564
To catch a trophy fish	39.0	53.9	39.1	69.7	70.2	60.9	62.3	<.0001 **
For the challenge/sport	73.8	66.0	66.0	89.9	85.9	80.5	42.8	0.0003 **
To experience adventure and excitement	75.0	69.2	63.1	87.6	82.6	78.9	42.8	0.0003 **
To share my knowledge of fishing with others	30.0	38.5	28.3	51.7	64.8	50.4	65.1	<.0001 **
For physical exercise	17.1	21.6	25.5	31.5	44.1	33.2	45.7	0.0001 **

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.38. Satisfaction with freshwater fishing in 1999 among largemouth bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Measured on a scale of 1=Very unsatisfied to 7=Very satisfied.

Question	Specialization Level*						Chi square	P value
	1 (N=43)	2 (N=54)	3 (N=49)	4 (N=89)	5 (N=164)	All (N=399)		
<b>Overall, how satisfied were you with freshwater fishing in Virginia in 1999?</b>								
Percent satisfied	50.0	68.6	59.6	75.9	76.1	70.3	35.6	0.0607
Percent unsatisfied	17.5	17.6	21.3	8.4	12.6	14.0		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

Table 3.39. Percent of largemouth bass anglers in each specialization level who indicated a decline in the quality of fishing in the past 5 years, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*						Chi square	P value
	1 (N=43)	2 (N=54)	3 (N=49)	4 (N=89)	5 (N=164)	All (N=399)		
Over the past 5 years, the quality of freshwater fishing in Virginia has...								
Percent "Declined"	25.6	22.6	18.4	24.7	30.7	26.2	48.2	<.0001

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

positive responses to statements about the performance of the Fisheries Division (Table 3.40). A majority of specialists agreed with the statements “The Fisheries Division of the VDGIF does a good job of making anglers aware of current fishing regulations”, “The management policies of the Fisheries Division of the VDGIF are biologically sound”, and “The staff of the Fisheries Division of the VDGIF provides knowledgeable service to their customers”. Less than one-third of all angler types agreed with the statement “The Fisheries Division of the VDGIF provides adequate opportunities for public participation in decisions regarding fisheries related issues”. Specialists were quite polarized on the issue of opportunities for public involvement as they had both the highest percentage of anglers agreeing and disagreeing with the statement. Specialists and generalists were most critical of the overall performance of the Fisheries Division, with both exceeding 20% fair or poor ratings.

Experienced generalist largemouth bass anglers indicated low levels of support and high levels of opposition for most regulations (Table 3.41). A majority of experienced generalist anglers supported only one regulation, increased minimum size limits. Occasional, generalist, and specialist anglers indicated high levels of support for most regulations, including minimum size limits and catch and release areas. Maximum size limits received greater than 20% opposition and the prohibition of bait received greater than 59% opposition from all angler types.

Demographically, all largemouth bass angler types were similar (Table 3.42). Anglers differed in age, but this was expected given that one of the clustering variables was years of experience. Occasional, generalist, and avid anglers were younger than experienced generalists and specialists. Over 33% of occasional, generalist, and avid anglers indicated they were between the ages of 16 and 34.

### *Smallmouth Bass Anglers*

Nearly 30% of smallmouth bass anglers were classified as specialists (Figure 3.4). Experienced generalists and avid anglers also made up large proportions of smallmouth bass anglers. Less than 10% of smallmouth bass anglers were generalists and less than 15% were occasional anglers. Avid and specialist smallmouth bass anglers fished two to five times more often than other angler types (Table 3.43).

Table 3.40. Knowledge and opinion of the Fisheries Division of the VDGIF among largemouth bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*						Chi square	P value
	1 (N=43)	2 (N=54)	3 (N=49)	4 (N=89)	5 (N=164)	All (N=399)		
<b>Before receiving this survey, how much did you know about the Fisheries Division of the VDGIF?</b>								
Percent "Little or Nothing"	83.7	76.5	69.4	68.6	46.9	62.4	57.7	<.0001 **
<b>The Fisheries Division of the VDGIF does a good job of making anglers aware of current fishing regulations.</b>								
Percent "Agree or Strongly Agree"	32.6	51.9	68.8	59.1	72.6	62.0	23.9	0.0918
Percent "Disagree or Strongly Disagree"	4.7	9.3	6.3	5.7	7.3	6.8		
Percent "Neutral"	34.9	29.6	22.9	25.0	17.7	23.4		
Percent "Don't know"	27.9	9.3	2.1	10.2	2.4	7.8		
<b>The management policies of the Fisheries Division of the VDGIF are biologically sound.</b>								
Percent "Agree or Strongly Agree"	24.4	38.9	41.7	45.5	55.5	46.1	21.0	0.1785
Percent "Disagree or Strongly Disagree"	0.0	0.0	2.1	3.4	6.1	3.5		
Percent "Neutral"	34.2	35.2	39.6	30.7	26.8	31.1		
Percent "Don't know"	41.5	25.9	16.7	20.5	11.6	19.2		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.40 continued. Knowledge and opinion of the Fisheries Division of the VDGIF among largemouth bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*						Chi square	P value
	1	2	3	4	5	All		
<b>The Fisheries Division of the VDGIF makes a good attempt to explain its fishing programs to the public.</b>								
Percent "Agree or Strongly Agree"	24.4	31.5	37.5	36.4	49.4	40.0	23.6	0.098
Percent "Disagree or Strongly Disagree"	14.6	13.0	14.6	17.1	17.7	16.2		
Percent "Neutral"	29.3	42.6	31.3	33.0	28.7	31.9		
Percent "Don't know"	31.7	13.0	16.7	13.6	4.3	11.9		
<b>The staff of the Fisheries Division of the VDGIF provides knowledgeable service to their customers.</b>								
Percent "Agree or Strongly Agree"	24.4	35.2	39.6	31.8	53.7	41.5	23.7	0.0954
Percent "Disagree or Strongly Disagree"	7.3	3.7	6.3	9.1	7.9	7.3		
Percent "Neutral"	29.3	42.6	33.3	43.2	31.7	35.7		
Percent "Don't know"	39.0	18.5	20.8	15.9	6.7	15.4		
<b>The Fisheries Division of the VDGIF provides adequate opportunities for public participation in decisions regarding fisheries related issues.</b>								
Percent "Agree or Strongly Agree"	12.2	22.2	16.7	10.3	32.3	22.1	39.5	0.0009 **
Percent "Disagree or Strongly Disagree"	9.8	7.4	2.1	18.4	23.8	16.3		
Percent "Neutral"	36.6	46.3	54.2	47.1	31.1	40.1		
Percent "Don't know"	41.5	24.1	27.1	24.1	12.8	21.6		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.40 continued. Knowledge and opinion of the Fisheries Division of the VDGIF among largemouth bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*					All	Chi square	P value
	1	2	3	4	5			
<b>The Fisheries Division of the VDGIF provides good solutions to fisheries problems.</b>								
Percent "Agree or Strongly Agree"	14.6	31.5	18.8	27.6	37.8	29.9	20.8	0.1864
Percent "Disagree or Strongly Disagree"	7.3	3.7	4.2	9.2	11.6	8.6		
Percent "Neutral"	36.6	44.4	50.0	40.2	37.8	40.6		
Percent "Don't know"	41.5	20.4	27.1	23.0	12.8	20.8		
<b>How would you rate the overall performance of the Fisheries Division of the VDGIF in managing freshwater fisheries in Virginia?</b>								
Percent "Fair or Poor"	16.7	25.9	12.5	19.3	20.7	19.7	22.1	0.1412
Percent "Good, Very good, or Excellent"	38.1	48.2	66.7	55.7	70.1	60.1		
Percent "Don't know"	45.2	25.9	20.8	25.0	9.2	20.2		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.41. Support and opposition for regulations among largemouth bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Regulation	Specialization Level*						Chi square	P value
	1 (N=43)	2 (N=54)	3 (N=49)	4 (N=89)	5 (N=164)	All (N=399)		
<b>Increased minimum size limits</b>								
Percent "Support or Strongly Support"	68.3	68.5	52.1	66.3	67.5	65.6	33.4	0.0065
Percent "Oppose or Strongly Oppose"	9.8	14.8	16.7	11.2	11.0	12.2		
Percent "Neutral"	12.2	11.1	29.2	20.2	19.0	18.7		
Percent "Don't know"	9.8	5.6	2.1	2.3	2.5	3.5		
<b>Maximum size limits</b>								
Percent "Support or Strongly Support"	41.5	40.8	33.3	42.7	50.6	44.4	28.7	0.0264
Percent "Oppose or Strongly Oppose"	26.8	33.3	31.3	30.3	23.5	27.7		
Percent "Neutral"	19.5	20.4	33.3	23.6	22.8	23.6		
Percent "Don't know"	12.2	5.6	2.1	3.4	3.1	4.3		
<b>Slot limits</b>								
Percent "Support or Strongly Support"	43.9	42.6	40.4	46.6	54.0	48.1	18.6	0.2902
Percent "Oppose or Strongly Oppose"	19.5	24.1	21.3	25.0	19.0	21.4		
Percent "Neutral"	24.4	25.9	38.3	22.7	24.5	26.0		
Percent "Don't know"	12.2	7.4	0.0	5.7	2.5	4.6		
<b>Reduced daily bag limits</b>								
Percent "Support or Strongly Support"	48.8	48.2	31.3	41.6	44.4	43.1	19.1	0.2655
Percent "Oppose or Strongly Oppose"	19.5	18.5	31.3	22.5	24.4	23.5		
Percent "Neutral"	22.0	25.9	37.5	29.2	28.1	28.6		
Percent "Don't know"	9.8	7.4	0.0	6.7	3.1	4.9		
<b>Prohibiting the use of bait</b>								
Percent "Support or Strongly Support"	12.2	14.8	8.3	9.0	12.4	11.5	12.7	0.6952
Percent "Oppose or Strongly Oppose"	65.9	59.3	66.7	69.7	60.9	63.9		
Percent "Neutral"	17.1	16.7	25.0	19.1	25.5	21.9		
Percent "Don't know"	4.9	9.3	0.0	2.3	1.2	2.8		
<b>Catch and release only areas</b>								
Percent "Support or Strongly Support"	56.1	51.9	37.0	40.9	56.7	50.1	30.1	0.0174
Percent "Oppose or Strongly Oppose"	12.2	27.8	39.1	25.0	18.3	22.9		
Percent "Neutral"	26.8	13.0	21.7	28.4	24.4	23.7		
Percent "Don't know"	4.9	7.4	2.2	5.7	0.6	3.3		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

Table 3.42. Selected demographic characteristics of largemouth bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*					All (N=399)	Chi square	P value
	1 (N=43)	2 (N=54)	3 (N=49)	4 (N=89)	5 (N=164)			
<b>Which of the following best describes the area where you now reside?</b>								
Percent "Rural"	34.2	38.5	41.3	45.1	44.9	42.4	15.9	0.459
<b>Which of the following best describes the area where you resided as a child?</b>								
Percent "Rural"	32.6	37.0	40.8	46.5	43.1	41.6	25.0	0.0697
<b>What is your age?</b>								
Percent "16-34"	39.5	34.0	6.1	36.4	22.0	26.7	129.2	<.0001 **
<b>What is your gender?</b>								
Percent "Male"	86.1	85.2	87.8	90.8	93.3	90.2	4.5	0.3417
<b>Which of the following do you consider yourself?</b>								
Percent "White"	87.8	98.1	91.8	87.5	94.4	92.3	39.6	0.0713
<b>What is the highest level of formal education you have completed?</b>								
Percent beyond high school	69.8	57.4	65.3	61.4	59.5	61.5	36.4	0.0137
<b>What was your household's 1999 annual income before taxes?</b>								
Percent \$75,000 or more	29.7	28.6	22.7	21.2	28.4	26.2	40.0	0.2989

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

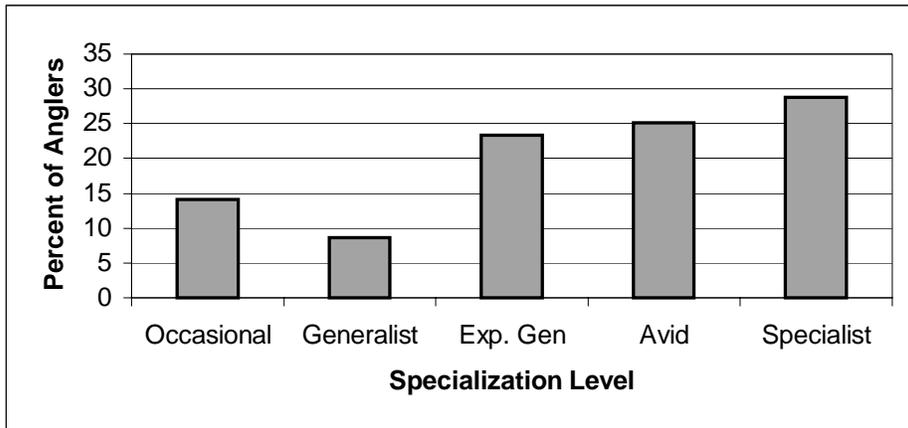


Figure 3.4. Percent of smallmouth bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. (N=219)

Table 3.43. Mean number of days fished by smallmouth bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

	Specialization Level*						Chi square	P value
	1 (N=31)	2 (N=19)	3 (N=51)	4 (N=55)	5 (N=63)	All (N=219)		
<b>Days fished</b>								
In 1999, how many days did you fish in freshwater in Virginia?	8.0	17.7	11.6	37.1	43.0	27.1	93.5	<.0001 **

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

For all smallmouth bass angler types, the most popular method of fishing was with artificial lures (Table 3.44). Although most specialization groups used bait often or always, specialists were least likely to do so. The five types of smallmouth bass anglers differed significantly in the ways in which they fish. A majority of generalists and specialists fished from gas powered boats often or always. Experienced generalists were most likely to fish from a boat or canoe without a motor. Large proportions of occasional and avid anglers indicated they fish from the shore. Nearly 70% of avid anglers indicated they fish by wading often or always.

Most motives related to the natural environment and psychological aspects of fishing were very important to all types of smallmouth bass anglers (Table 3.45). Over 90% of all angler types indicated “To be outdoors” and “For relaxation” were important reasons for fishing. However, the motive “To be close to the water,” was less important to occasional anglers than other angler types. Avid and specialist anglers were more likely to fish for the following reasons: “To experience new and different things,” “To develop my skills,” “To catch a trophy fish,” “For the challenge/sport,” “To experience adventure and excitement,” and “To share my knowledge of fishing with others.” The motive “To obtain fish for eating” was among the least important reasons for fishing for all groups. Nevertheless, it was important to small, but significant percentages of all angler types. All anglers placed a high level of importance on the motive “To be with friends” but it was especially important for occasional anglers. Family recreation was a more important reason for fishing to generalist anglers than other angler types.

Overall satisfaction with freshwater fishing in 1999 was high among all smallmouth bass angler types (Table 3.46). However, 17% of occasional and experienced generalist anglers were dissatisfied. Over 25% of all angler types indicated the quality of fishing had declined in the past five years (Table 3.47). A majority of all angler types indicated they knew little or nothing about the Fisheries Division of the VDGIF (Table 3.48). Angler knowledge of the Fisheries Division was lowest among occasional anglers, as nearly 97% of occasional anglers indicated they knew little or nothing about the Fisheries Division. More specialists tended to agree that the Fisheries Division of the VDGIF does a good job of making anglers aware of current fishing

Table 3.44. Preferred methods of fishing used by smallmouth bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent of anglers indicating “Often” or “Always.”

Methods of fishing	Specialization Level*					All (N=219)	Chi square	P value
	1 (N=31)	2 (N=19)	3 (N=51)	4 (N=55)	5 (N=63)			
Fishing with bait	42.3	52.6	36.6	48.2	28.3	39.5	19.0	0.268
Flyfishing	5.6	5.9	11.8	16.3	16.3	13.1	20.4	0.203
Artificial lure/spin	76.7	88.9	90.0	70.6	90.3	83.4	21.0	0.179
Trot lines/set poles	0.0	0.0	3.1	2.3	2.2	2.0	5.3	0.948
Seining for bait	0.0	11.1	0.0	4.7	14.3	6.9	22.0	0.143
From a boat or canoe with a gas motor	20.0	55.6	31.7	19.2	55.4	36.4	46.4	<.0001 **
From a boat or canoe with an electric motor	9.1	36.9	35.9	18.0	37.7	28.4	30.6	0.015 **
From a boat or canoe without a motor	29.6	5.6	55.8	29.8	41.2	36.6	27.2	0.040 **
From the shore	55.6	22.2	42.2	52.9	20.4	39.0	28.7	0.026 **
From a pier or dock	13.6	0.0	9.1	15.2	8.5	10.2	14.3	0.574
By wading	28.0	33.3	45.2	68.6	49.2	49.2	34.5	0.005 **

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.45. Importance of reasons for fishing to smallmouth bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent indicating “Somewhat important” or “Very important.”

<b>Motive Statement</b>	<b>Specialization Level*</b>					<b>All (N=219)</b>	<b>Chi square</b>	<b>P value</b>
	<b>1 (N=31)</b>	<b>2 (N=19)</b>	<b>3 (N=51)</b>	<b>4 (N=55)</b>	<b>5 (N=63)</b>			
To be outdoors	93.6	100.0	90.2	92.7	95.2	93.6	18.3	0.3060
For family recreation	75.9	94.7	73.9	60.0	81.4	74.9	18.0	0.3233
To experience new and different things	39.3	47.4	50.0	71.2	67.2	58.7	26.5	0.0472 **
For relaxation	96.7	94.7	92.0	92.7	92.1	93.1	21.2	0.1705
To be close to the water	60.0	94.7	79.2	78.9	79.0	77.7	30.7	0.0148 **
To obtain fish for eating	20.7	27.8	22.0	25.9	17.8	22.1	21.7	0.1534
To get away from the demands of other people	62.1	68.4	50.0	69.8	67.8	63.5	22.5	0.1272
For the experience of the catch	82.8	77.8	82.0	82.7	86.9	83.3	30.7	0.0146
To test my equipment	17.2	21.1	18.8	30.8	37.1	27.1	19.3	0.2515
To be with friends	90.0	84.2	70.0	73.6	72.6	75.7	36.1	0.0028 **
To experience natural surroundings	96.7	84.2	90.0	90.6	91.9	91.1	11.3	0.7926
To develop my skills	46.7	36.9	53.1	68.6	67.8	58.8	31.5	0.0116 **
To get away from the regular routine	83.3	73.7	73.5	92.6	85.5	83.2	28.3	0.0295
To catch a trophy fish	17.2	47.4	27.1	55.8	58.1	43.8	41.6	0.0005 **
For the challenge/sport	70.0	47.4	67.4	84.6	82.5	74.7	41.7	0.0004 **
To experience adventure and excitement	48.3	63.2	66.7	84.6	82.3	72.9	42.3	0.0004 **
To share my knowledge of fishing with others	31.0	21.1	29.2	46.2	61.3	42.4	35.3	0.0036 **
For physical exercise	31.0	31.6	31.3	37.7	51.6	38.9	25.6	0.0607

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.46. Satisfaction with freshwater fishing in 1999 among smallmouth bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Measured on a scale of 1=Very unsatisfied to 7=Very satisfied.

Question	Specialization Level*					All (N=219)	Chi square	P value
	1 (N=31)	2 (N=19)	3 (N=51)	4 (N=55)	5 (N=63)			
<b>Overall, how satisfied were you with freshwater fishing in Virginia in 1999?</b>								
Percent satisfied	66.7	68.4	70.2	74.1	80.3	73.5	21.4	0.6153
Percent unsatisfied	16.7	0.0	17.0	11.1	8.2	11.4		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

Table 3.47. Percent of smallmouth bass anglers in each specialization level who indicated a decline in the quality of fishing in the past 5 years, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*					All (N=219)	Chi square	P value
	1 (N=31)	2 (N=19)	3 (N=51)	4 (N=55)	5 (N=63)			
<b>Over the past 5 years, the quality of freshwater fishing in Virginia has...</b>								
Percent "Declined"	25.8	26.3	32.0	30.9	25.4	28.4	9.5	0.6621

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

Table 3.48. Knowledge and opinion of the Fisheries Division of the VDGIF among smallmouth bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*						Chi square	P value
	1 (N=31)	2 (N=19)	3 (N=51)	4 (N=55)	5 (N=63)	All (N=219)		
<b>Before receiving this survey, how much did you know about the Fisheries Division of the VDGIF?</b>								
Percent "Little or Nothing"	96.6	73.7	70.6	72.2	53.2	69.8	37.1	0.0002 **
<b>The Fisheries Division of the VDGIF does a good job of making anglers aware of current fishing regulations.</b>								
Percent "Agree or Strongly Agree"	37.9	68.4	60.8	55.6	81.0	63.0	22.8	0.1179
Percent "Disagree or Strongly Disagree"	3.5	0.0	13.7	16.7	4.8	9.3		
Percent "Neutral"	31.0	26.3	19.6	25.9	11.1	20.8		
Percent "Don't know"	27.6	5.3	5.9	1.9	3.2	6.9		
<b>The management policies of the Fisheries Division of the VDGIF are biologically sound.</b>								
Percent "Agree or Strongly Agree"	17.2	52.6	52.9	40.7	50.8	44.4	14.1	0.5888
Percent "Disagree or Strongly Disagree"	0.0	0.0	5.9	5.6	4.8	4.2		
Percent "Neutral"	34.5	31.6	21.6	35.2	25.4	28.7		
Percent "Don't know"	48.3	15.8	19.6	18.5	19.1	22.7		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.48 continued. Knowledge and opinion of the Fisheries Division of the VDGIF among smallmouth bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*						Chi square	P value
	1	2	3	4	5	All		
<b>The Fisheries Division of the VDGIF makes a good attempt to explain its fishing programs to the public.</b>								
Percent "Agree or Strongly Agree"	13.8	36.8	47.1	33.3	51.6	39.5	27.6	0.0349 **
Percent "Disagree or Strongly Disagree"	6.9	5.3	21.6	22.2	6.5	14.0		
Percent "Neutral"	41.4	52.6	21.6	33.3	33.9	33.5		
Percent "Don't know"	37.9	5.3	9.8	11.1	8.1	13.0		
<b>The staff of the Fisheries Division of the VDGIF provides knowledgeable service to their customers.</b>								
Percent "Agree or Strongly Agree"	20.7	31.6	37.3	42.6	46.0	38.4	18.4	0.3
Percent "Disagree or Strongly Disagree"	0.0	10.5	5.9	7.4	9.5	6.9		
Percent "Neutral"	34.5	42.1	39.2	31.5	30.2	34.3		
Percent "Don't know"	44.8	15.8	17.7	18.5	14.3	20.4		
<b>The Fisheries Division of the VDGIF provides adequate opportunities for public participation in decisions regarding fisheries related issues.</b>								
Percent "Agree or Strongly Agree"	10.4	21.1	21.6	24.5	33.3	24.2	15.3	0.5014
Percent "Disagree or Strongly Disagree"	6.9	26.3	19.6	15.1	15.9	16.3		
Percent "Neutral"	34.5	31.6	39.2	35.9	28.6	34.0		
Percent "Don't know"	48.3	21.1	19.6	24.5	22.2	25.6		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.48 continued. Knowledge and opinion of the Fisheries Division of the VDGIF among smallmouth bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*					All	Chi square	P value
	1	2	3	4	5			
<b>The Fisheries Division of the VDGIF provides good solutions to fisheries problems.</b>								
Percent "Agree or Strongly Agree"	17.2	42.1	33.3	26.4	34.9	30.7	16.7	0.4033
Percent "Disagree or Strongly Disagree"	3.5	5.3	13.7	7.6	7.9	8.4		
Percent "Neutral"	27.6	36.8	35.3	45.3	38.1	37.7		
Percent "Don't know"	51.7	15.8	17.7	20.8	19.1	23.3		
<b>How would you rate the overall performance of the Fisheries Division of the VDGIF in managing freshwater fisheries in Virginia?</b>								
Percent "Fair or Poor"	17.2	5.3	23.5	20.0	17.7	18.5	21.2	0.1716
Percent "Good, Very good, or Excellent"	27.6	79.0	51.0	52.7	71.0	56.5		
Percent "Don't know"	55.2	15.8	25.5	27.3	11.3	25.0		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

regulations, explains its programs to the public, provides knowledgeable service, and provides adequate opportunities for public involvement. Over 20% of experienced generalist and avid anglers disagreed with the statement “The Fisheries Division of the VDGIF makes a good attempt to explain its fishing programs to the public”. One-third or less of all smallmouth bass angler types agreed with the statement “The Fisheries Division of the VDGIF provides adequate opportunities for public participation in decisions regarding fisheries related issues”. Percentages of angler groups (except occasional anglers) disagreeing that opportunities for public involvement are adequate were at levels that should cause concern for VDGIF managers. Experienced generalists and avid anglers were more likely to rate the overall performance of the Fisheries Division fair or poor, while generalists were more likely to rate the overall performance as good, very good, or excellent.

Restrictive regulations such as reduced creel limits and catch and release areas received high levels of support from occasional, experienced generalist, and specialist anglers, however, generalists, experienced generalists, and avid anglers demonstrated substantial opposition to these regulations (Table 3.49). A majority of specialists supported all regulations with the exception of the prohibition of bait. Support for regulations was lowest among generalist and avid anglers. Less than 50% of generalist and avid anglers supported all regulations except increased minimum size limits.

The level of education differed significantly among smallmouth bass angler types (Table 3.50). Over 75% of generalists, experienced generalists, and specialists indicated they had completed an education beyond high school. Fewer occasional and avid anglers had completed an education beyond high school. Over 36% of avid anglers indicated they were between the ages of 16 and 34, making them the youngest type of smallmouth bass anglers.

### *Striped Bass Anglers*

Forty-five percent of striped bass anglers were specialists (Figure 3.5). The remaining anglers were evenly distributed among the other four specialization levels, with none of the groups exceeding 20% of striped bass anglers. Sample sizes of all but specialist anglers were too small to be included in the analysis. Therefore, I combined

Table 3.49. Support and opposition for regulations among smallmouth bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Regulation	Specialization Level*					All (N=219)	Chi square	P value
	1 (N=31)	2 (N=19)	3 (N=51)	4 (N=55)	5 (N=63)			
<b>Increased minimum size limits</b>								
Percent "Support or Strongly Support"	76.7	63.2	72.6	67.3	74.6	71.6	15.9	0.4833
Percent "Oppose or Strongly Oppose"	3.3	15.8	7.8	7.3	9.5	8.3		
Percent "Neutral"	16.7	15.8	17.7	21.8	14.3	17.4		
Percent "Don't know"	3.3	5.3	2.0	3.6	1.6	2.8		
<b>Maximum size limits</b>								
Percent "Support or Strongly Support"	40.0	36.8	49.0	36.4	60.3	46.8	18.6	0.2898
Percent "Oppose or Strongly Oppose"	20.0	31.6	15.7	25.5	20.6	21.6		
Percent "Neutral"	30.0	26.3	35.3	36.4	17.5	28.9		
Percent "Don't know"	10.0	5.3	0.0	1.8	1.6	2.8		
<b>Slot limits</b>								
Percent "Support or Strongly Support"	50.0	42.1	54.9	45.5	69.8	55.1	19.8	0.2276
Percent "Oppose or Strongly Oppose"	13.3	21.1	13.7	20.0	15.9	16.5		
Percent "Neutral"	30.0	31.6	29.4	32.7	12.7	25.7		
Percent "Don't know"	6.7	5.3	2.0	1.8	1.6	2.8		
<b>Reduced daily bag limits</b>								
Percent "Support or Strongly Support"	66.7	26.3	56.9	34.0	66.7	52.8	37.3	0.0019 **
Percent "Oppose or Strongly Oppose"	13.3	26.3	17.7	20.8	14.3	17.6		
Percent "Neutral"	13.3	36.8	23.5	37.7	15.9	24.5		
Percent "Don't know"	6.7	10.5	2.0	7.6	3.2	5.1		
<b>Prohibiting the use of bait</b>								
Percent "Support or Strongly Support"	3.3	5.3	15.7	5.5	12.7	9.6	14.6	0.5564
Percent "Oppose or Strongly Oppose"	70.0	57.9	58.8	65.5	66.7	64.2		
Percent "Neutral"	20.0	31.6	23.5	29.1	20.6	24.3		
Percent "Don't know"	6.7	5.3	2.0	0.0	0.0	1.8		
<b>Catch and release only areas</b>								
Percent "Support or Strongly Support"	70.0	31.6	62.7	43.6	69.8	58.3	38.3	0.0014 **
Percent "Oppose or Strongly Oppose"	13.3	36.9	23.5	23.6	14.3	20.6		
Percent "Neutral"	6.7	26.3	11.8	32.7	15.9	18.8		
Percent "Don't know"	10.0	5.3	2.0	0.0	0.0	2.3		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.50. Selected demographic characteristics of smallmouth bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*						Chi square	P value
	1 (N=31)	2 (N=19)	3 (N=51)	4 (N=55)	5 (N=63)	All (N=219)		
<b>Which of the following best describes the area where you now reside?</b>								
Percent "Rural"	53.3	47.1	42.0	39.6	38.7	42.5	16.3	0.4328
<b>Which of the following best describes the area where you resided as a child?</b>								
Percent "Rural"	43.3	52.6	43.1	54.6	44.4	47.3	27.6	0.0356
<b>What is your age?</b>								
Percent "16-34"	29.0	31.6	6.0	36.4	20.6	23.4	75.1	0.0024 **
<b>What is your gender?</b>								
Percent "Male"	80.7	84.2	92.2	87.3	93.7	89.0	4.7	0.314
<b>Which of the following do you consider yourself?</b>								
Percent "White"	93.6	100.0	92.0	87.3	96.8	93.1	16.9	0.6625
<b>What is the highest level of formal education you have completed?</b>								
Percent beyond high school	66.7	79.0	77.6	58.2	77.8	71.3	31.5	0.049 **
<b>What was your household's 1999 annual income before taxes?</b>								
Percent \$75,000 or more	35.7	15.8	31.9	17.3	37.3	28.8	46.1	0.1211

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

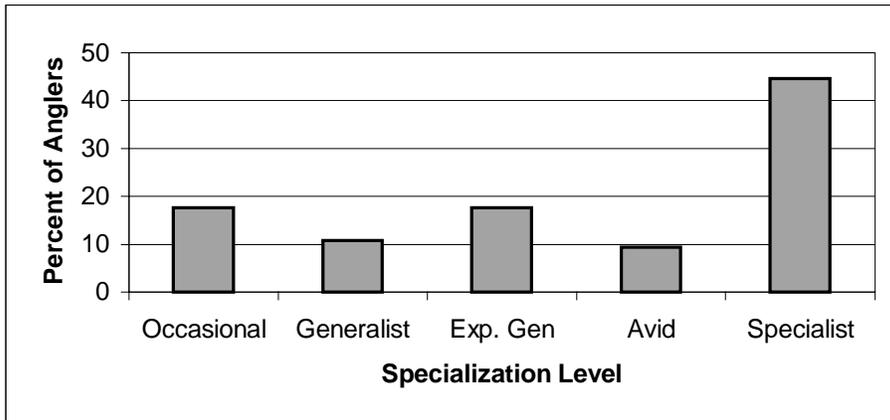


Figure 3.5. Percent of striped bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. (N=74)

occasional, generalist, experienced generalist, and avid anglers into one group to make comparisons between specialists and other striped bass anglers. Specialists fished three times more often than other angler types (Table 3.51). All angler types fished frequently with both bait and artificial lures (Table 3.52). Specialist anglers fished almost exclusively from boats while other anglers fished very often from boats, but also fished from the shore.

“To be outdoors”, and “For relaxation” were important reasons for fishing among all striped bass angler types (Table 3.53). The challenge or sport of fishing was more important to specialists than it was to other angler types. A majority of specialists and other angler types indicated catching a trophy fish was important, however, obtaining fish for eating also was important to both types of striped bass anglers.

Specialists and other striped bass anglers shared very similar levels of overall satisfaction with fishing in 1999, with over 57% of all angler types indicating they were satisfied with freshwater fishing in 1999 (Table 3.54). However, over two times as many specialists indicated the quality of fishing had declined in the past five years (Table 3.55). The different types of striped bass anglers also expressed similar opinions of the Fisheries Division of the VDGIF (Table 3.56). Thirty percent of specialists and over 20% of other anglers disagreed with the statement “The Fisheries Division of the VDGIF makes a good attempt to explain its fishing programs to the public”. One-third of specialists and nearly 20% of other anglers indicated the overall performance of the Fisheries Division was fair or poor.

All striped bass angler types expressed low levels of support and high levels of opposition for most regulations (Table 3.57). This was especially true for specialists. Over 40% of specialists opposed maximum size limits, and the prohibition of bait. The prohibition of bait was strongly opposed by all striped bass angler types. About 50% of specialists and other angler types supported increased minimum size limits but over 18% of specialists opposed this regulation.

Striped bass anglers did not differ significantly in any demographic characteristics. However, all striped bass specialists indicated they were white, while

Table 3.51. Mean number of days fished by striped bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

<b>Days fished</b>	<b>Specialization Level*</b>			<b>Chi square</b>	<b>P value</b>
	<b>1 to 4</b> (N=41)	<b>5</b> (N=33)	<b>All</b> (N=74)		
In 1999, how many days did you fish in freshwater in Virginia?	19.1	60.5	37.6	31.9	<.0001 **

\*1 to 4=Occasional, Generalist, Experienced Generalist, and Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.52. Preferred methods of fishing used by striped bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent of anglers indicating “Often” or “Always.”

Methods of fishing	Specialization Level*			Chi square	P value
	1 to 4 (N=41)	5 (N=33)	All (N=74)		
Fishing with bait	82.4	77.4	80.0	1.3	0.733
Flyfishing	3.9	8.3	6.0	1.2	0.882
Artificial lure/spin	59.5	65.6	62.3	3.1	0.541
Trot lines/set poles	14.8	0.0	8.0	8.4	0.079
Seining for bait	12.0	16.0	14.0	2.9	0.570
From a boat or canoe with a gas motor	73.7	90.6	81.4	6.5	0.165
From a boat or canoe with an electric motor	20.0	46.7	33.3	5.2	0.270
From a boat or canoe without a motor	10.7	8.7	9.8	3.2	0.366
From the shore	42.4	11.1	28.3	12.6	0.013 **
From a pier or dock	22.6	11.5	17.5	5.7	0.221
By wading	10.0	15.4	12.5	2.0	0.577

\*1=Occasional, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.53. Importance of reasons for fishing to striped bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent indicating “Somewhat important” or “Very important.”

<b>Motive Statement</b>	<b>Specialization Level*</b>			<b>Chi square</b>	<b>P value</b>
	<b>1 to 4 (N=41)</b>	<b>5 (N=33)</b>	<b>All (N=74)</b>		
To be outdoors	84.2	90.6	87.1	1.9	0.763
For family recreation	65.7	65.6	65.7	1.8	0.781
To experience new and different things	51.4	48.4	50.0	0.7	0.947
For relaxation	84.6	84.8	84.7	1.5	0.821
To be close to the water	70.3	78.1	73.9	1.6	0.801
To obtain fish for eating	57.5	48.5	53.4	4.4	0.353
To get away from the demands of other people	56.8	59.4	58.0	3.9	0.416
For the experience of the catch	82.9	78.1	80.6	3.0	0.562
To test my equipment	30.6	31.3	30.9	1.8	0.780
To be with friends	70.0	72.7	71.2	4.2	0.382
To experience natural surroundings	75.7	87.1	80.9	3.1	0.542
To develop my skills	41.7	59.4	50.0	3.9	0.415
To get away from the regular routine	81.6	75.0	78.6	2.4	0.664
To catch a trophy fish	52.8	62.5	57.4	2.2	0.708
For the challenge/sport	62.2	81.8	71.4	11.8	0.019
To experience adventure and excitement	66.7	78.1	72.1	2.0	0.742
To share my knowledge of fishing with others	38.9	53.1	45.6	3.1	0.543
For physical exercise	27.8	31.3	29.4	0.8	0.937

\*1=Occasional, 3=Experienced Generalist, 4=Avid, 5=Specialist

Table 3.54. Satisfaction with freshwater fishing in 1999 among striped bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Measured on a scale of 1=Very unsatisfied to 7=Very satisfied.

Question	Specialization Level*			Chi square	P value
	1 to 4 (N=41)	5 (N=33)	All (N=74)		
<b>Overall, how satisfied were you with freshwater fishing in Virginia in 1999?</b>					
Percent satisfied	57.9	57.2	57.6	2.5	0.8662
Percent unsatisfied	15.8	14.3	15.2		

\*1=Occasional, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.55. Percent of striped bass anglers in each specialization level who indicated a decline in the quality of fishing in the past 5 years, as reported by respondents to a statewide survey of Virginia anglers in 2000.

<b>Question</b>	<b>Specialization Level*</b>			<b>Chi square</b>	<b>P value</b>
	<b>1 to 4</b> (N=41)	<b>5</b> (N=33)	<b>All</b> (N=74)		
<b>Over the past 5 years, the quality of freshwater fishing in Virginia has...</b>					
Percent "Declined"	22.0	46.9	32.9	5.4	0.1462

\*1=Occasional, 3=Experienced Generalist, 4=Avid, 5=Specialist

Table 3.56. Knowledge and opinion of the Fisheries Division of the VDGIF among striped bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*			Chi square	P value
	1 to 4 (N=41)	5 (N=33)	All (N=74)		
<b>Before receiving this survey, how much did you know about the Fisheries Division of the VDGIF?</b>					
Percent "Little or Nothing"	73.2	54.8	65.3	3.8	0.2834
<b>The Fisheries Division of the VDGIF does a good job of making anglers aware of current fishing regulations.</b>					
Percent "Agree or Strongly Agree"	59.0	72.7	65.3	15.4	0.4941
Percent "Disagree or Strongly Disagree"	5.1	6.1	5.6		
Percent "Neutral"	28.2	21.2	25.0		
Percent "Don't know"	7.7	0.0	4.2		
<b>The management policies of the Fisheries Division of the VDGIF are biologically sound.</b>					
Percent "Agree or Strongly Agree"	33.3	39.4	36.1	8.7	0.9244
Percent "Disagree or Strongly Disagree"	5.1	6.1	5.6		
Percent "Neutral"	46.2	48.5	47.2		
Percent "Don't know"	15.4	6.1	11.1		

\*1=Occasional, 3=Experienced Generalist, 4=Avid, 5=Specialist

Table 3.56 continued. Knowledge and opinion of the Fisheries Division of the VDGIF among striped bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*			Chi square	P value
	1 to 4	5	All		
<b>The Fisheries Division of the VDGIF makes a good attempt to explain its fishing programs to the public.</b>					
Percent "Agree or Strongly Agree"	41.0	27.3	34.7	14.2	0.5848
Percent "Disagree or Strongly Disagree"	20.5	30.3	25.0		
Percent "Neutral"	25.6	33.3	29.2		
Percent "Don't know"	12.8	9.1	11.1		
<b>The staff of the Fisheries Division of the VDGIF provides knowledgeable service to their customers.</b>					
Percent "Agree or Strongly Agree"	30.8	42.4	36.1	11.8	0.7577
Percent "Disagree or Strongly Disagree"	7.7	12.1	9.7		
Percent "Neutral"	43.6	39.4	41.7		
Percent "Don't know"	18.0	6.1	12.5		
<b>The Fisheries Division of the VDGIF provides adequate opportunities for public participation in decisions regarding fisheries related issues.</b>					
Percent "Agree or Strongly Agree"	27.5	15.2	21.9	9.5	0.8902
Percent "Disagree or Strongly Disagree"	17.5	21.2	19.2		
Percent "Neutral"	40.0	54.6	46.6		
Percent "Don't know"	15.0	9.1	12.3		

\*1=Occasional, 3=Experienced Generalist, 4=Avid, 5=Specialist

Table 3.56 continued. Knowledge and opinion of the Fisheries Division of the VDGIF among striped bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*			Chi square	P value
	1 to 4	5	All		
<b>The Fisheries Division of the VDGIF provides good solutions to fisheries problems.</b>					
Percent "Agree or Strongly Agree"	33.3	36.4	34.7	17.4	0.3624
Percent "Disagree or Strongly Disagree"	7.7	15.2	11.1		
Percent "Neutral"	43.6	42.4	43.1		
Percent "Don't know"	15.4	6.1	11.1		
<b>How would you rate the overall performance of the Fisheries Division of the VDGIF in managing freshwater fisheries in Virginia?</b>					
Percent "Fair or Poor"	19.5	33.3	25.7	16.8	0.4007
Percent "Good, Very good, or Excellent"	51.2	63.6	56.8		
Percent "Don't know"	29.3	3.0	17.6		

\*1=Occasional, 3=Experienced Generalist, 4=Avid, 5=Specialist

Table 3.57. Support and opposition for regulations among striped bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Regulation	Specialization Level*			Chi square	P value
	1 to 4 (N=41)	5 (N=33)	All (N=74)		
<b>Increased minimum size limits</b>					
Percent "Support or Strongly Support"	50.0	57.6	53.5	13.2	0.6613
Percent "Oppose or Strongly Oppose"	10.5	18.2	14.1		
Percent "Neutral"	39.5	24.2	32.4		
Percent "Don't know"	0.0	0.0	0.0		
<b>Maximum size limits</b>					
Percent "Support or Strongly Support"	27.5	33.3	30.1	22.5	0.127
Percent "Oppose or Strongly Oppose"	32.5	42.4	37.0		
Percent "Neutral"	37.5	24.2	31.5		
Percent "Don't know"	2.5	0.0	1.4		
<b>Slot limits</b>					
Percent "Support or Strongly Support"	52.5	48.5	50.7	12.2	0.7273
Percent "Oppose or Strongly Oppose"	15.0	30.3	21.9		
Percent "Neutral"	27.5	18.2	23.3		
Percent "Don't know"	5.0	3.0	4.1		
<b>Reduced daily bag limits</b>					
Percent "Support or Strongly Support"	40.0	24.2	32.9	27.9	0.0328
Percent "Oppose or Strongly Oppose"	27.5	48.5	37.0		
Percent "Neutral"	30.0	24.2	27.4		
Percent "Don't know"	2.5	3.0	2.7		
<b>Prohibiting the use of bait</b>					
Percent "Support or Strongly Support"	5.0	6.1	5.5	10.8	0.8206
Percent "Oppose or Strongly Oppose"	82.5	90.9	86.3		
Percent "Neutral"	10.0	3.0	6.8		
Percent "Don't know"	2.5	0.0	1.4		
<b>Catch and release only areas</b>					
Percent "Support or Strongly Support"	27.5	27.3	27.4	10.9	0.8186
Percent "Oppose or Strongly Oppose"	30.0	27.3	28.8		
Percent "Neutral"	35.0	45.5	39.7		
Percent "Don't know"	7.5	0.0	4.1		

\*1=Occasional, 3=Experienced Generalist, 4=Avid, 5=Specialist

over 20% of other angler types indicated they were of a different ethnic origin (Table 3.58).

### *Trout Anglers*

Avid and experienced generalist anglers comprised 61% of all trout anglers (Figure 3.6). Only five percent of trout anglers were generalists, too few to be included in the analysis. Avid and specialist anglers fished four to five times more often than occasional and experienced generalist anglers (Table 3.59). A majority of all angler types used bait often (Table 3.60). Artificial lures were used often by a majority of avid and specialist anglers. Experienced generalists and specialists were more likely to be flyfishers. A majority of all angler types indicated they fished from the shore often or always, but specialists fished from shore the least. Specialists were more likely than other anglers to fish from a boat. Over 70% of experienced generalist, avid, and specialist anglers indicated they often fished by wading while less than 40% of occasional anglers waded. Specialists appeared to be the least consumptive of trout anglers, although the difference was not statistically significant (Table 3.61).

Several sources of information made available by the VDGIF were important to avid and specialist anglers, while they were not important to occasional and experienced generalists (Table 3.62). Over 30% of specialists indicated they often used the VDGIF's *Virginia Wildlife* magazine as a source of information, compared to less than eight percent of occasional anglers. Other VDGIF publications and handouts were often used by over one-third of avid and specialist anglers. Also, over 20% of avid and specialist anglers often used the VDGIF worldwide web page as a source of information about fishing in Virginia. Experienced generalists were less likely than other angler types to use friends or other anglers or sporting goods stores as sources of information about fishing in Virginia.

Motives related to the outdoors and natural surroundings were the most important reasons for fishing for all types of trout anglers (Table 3.63). The importance of fishery resource motives differed among the angler types. To obtain fish for eating was important to 50% of avid anglers, but to only slightly more than one-third of specialists and experienced generalists. Over 50% of specialists and 47% of avid anglers indicated

Table 3.58. Selected demographic characteristics of striped bass anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*			Chi square	P value
	1 to 4 (N=41)	5 (N=33)	All (N=74)		
<b>Which of the following best describes the area where you now reside?</b>					
Percent "Rural"	37.5	51.6	43.7	6.2	0.1881
<b>Which of the following best describes the area where you resided as a child?</b>					
Percent "Rural"	46.2	40.6	43.7	3.0	0.5614
<b>What is your age?</b>					
Percent "16-34"	17.1	18.2	17.6	6.8	0.7414
<b>What is your gender?</b>					
Percent "Male"	90.2	90.9	90.5	0.0	0.9226
<b>Which of the following do you consider yourself?</b>					
Percent "White"	78.1	100.0	87.8	8.2	0.0829
<b>What is the highest level of formal education you have completed?</b>					
Percent beyond high school	55.0	57.6	56.2	1.1	0.9499
<b>What was your household's 1999 annual income before taxes?</b>					
Percent \$75,000 or more	30.8	33.3	31.9	3.6	0.9348

\*1=Occasional, 3=Experienced Generalist, 4=Avid, 5=Specialist

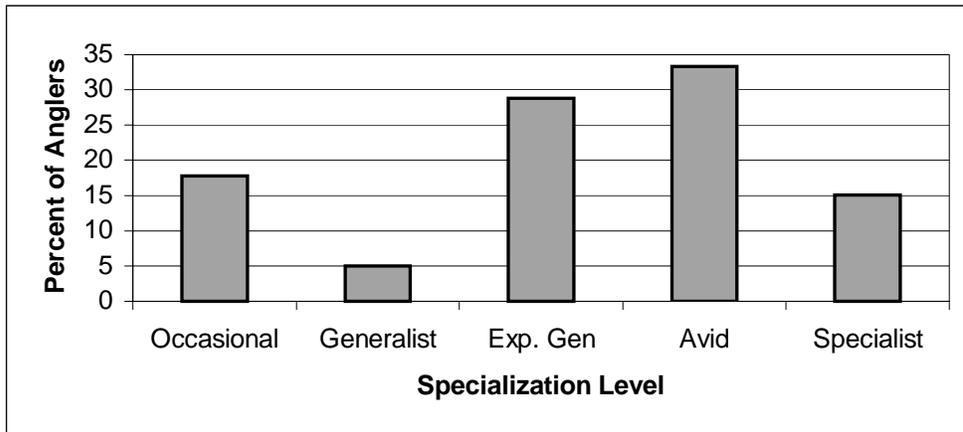


Figure 3.6. Percent of trout anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. (N=219)

Table 3.59. Mean number of days fished by trout anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

<b>Days fished</b>	<b>Specialization Level*</b>					<b>Chi square</b>	<b>P value</b>
	<b>1</b> (N=39)	<b>3</b> (N=63)	<b>4</b> (N=73)	<b>5</b> (N=33)	<b>All</b> (N=219)		
In 1999, how many days did you fish in freshwater in Virginia?	10.2	12.2	47.7	59.4	31.8	85.8	<.0001 **

\*1=Occasional, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.60. Preferred methods of fishing used by trout anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent of anglers indicating “Often” or “Always.”

<b>Methods of fishing</b>	<b>Specialization Level*</b>					<b>Chi square</b>	<b>P value</b>
	<b>1</b> (N=39)	<b>3</b> (N=63)	<b>4</b> (N=73)	<b>5</b> (N=33)	<b>All</b> (N=219)		
Fishing with bait	68.4	66.1	72.1	53.6	66.8	21.5	0.044
Flyfishing	16.1	42.3	23.7	48.4	32.4	25.4	0.013 **
Artificial lure/spin	50.0	39.3	53.7	55.2	48.9	17.5	0.131
Trot lines/set poles	3.6	0.0	2.0	0.0	1.4	15.3	0.225
Seining for bait	3.5	4.7	4.0	8.0	4.8	20.8	0.014
From a boat or canoe with a gas motor	5.7	7.0	6.2	22.6	9.0	24.3	0.019
From a boat or canoe with an electric motor	2.9	7.2	9.5	24.1	9.8	24.0	0.021 **
From a boat or canoe without a motor	6.1	8.9	4.9	11.1	7.3	10.2	0.602
From the shore	79.5	68.3	77.9	53.3	71.6	14.9	0.246
From a pier or dock	18.8	14.0	15.0	23.1	16.7	13.5	0.332
By wading	38.9	73.8	78.3	87.9	71.4	40.1	<.0001 **

\*1=Occasional, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.61. Frequency of keeping fish by trout anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent of anglers indicating “Often” or “Always.”

Question	Specialization Level*					Chi square	P value
	1 (N=39)	3 (N=63)	4 (N=73)	5 (N=33)	All (N=219)		
<b>How often do you keep the freshwater fish that you catch?</b>							
Percent indicating "Often" or "Always"	42.1	36.5	37.0	21.2	35.3	16.2	0.1827

\*1=Occasional, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.62. Sources of information used by trout anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent of anglers indicating “Often” or “Always.”

Sources of information	Specialization Level*					Chi square	P value	
	1 (N=39)	3 (N=63)	4 (N=73)	5 (N=33)	All (N=219)			
VDGIF's Virginia Wildlife magazine	7.7	22.2	26.8	30.3	22.3	21.1	0.0493	**
Other VDGIF publications, handouts and news releases	18.0	7.9	34.3	35.5	23.2	31.6	0.0016	**
VDGIF worldwide web page (internet)	5.1	9.5	22.9	25.0	15.7	22.5	0.0324	
VDGIF staff	2.6	0.0	4.2	9.4	3.4	29.1	0.0006	
Newspapers	18.0	17.5	21.1	27.3	20.4	5.8	0.9271	
Commercial magazines or newsletters	7.7	15.9	14.1	27.3	15.5	15.5	0.2128	
Television	5.1	12.7	9.9	15.6	10.7	7.0	0.8588	
Radio	2.6	7.9	4.2	9.4	5.9	5.1	0.9536	
Friends or other anglers	64.1	47.6	77.8	84.9	67.2	35.9	0.0003	**
Sporting goods stores	43.6	23.8	43.7	45.5	37.9	21.2	0.0472	**
Bait dealers	10.3	9.5	25.4	27.3	18.0	14.8	0.2512	
Fishing club	0.0	4.8	5.7	15.6	5.9	16.1	0.1865	

\*1=Occasional, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.63. Importance of reasons for fishing to trout anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent indicating “Somewhat important” or “Very important.”

Motive Statement	Specialization Level*					Chi square	P value
	1 (N=39)	3 (N=63)	4 (N=73)	5 (N=33)	All (N=219)		
To be outdoors	94.7	93.6	97.3	93.9	95.2	15.7	0.205
For family recreation	76.3	62.3	70.0	78.8	70.3	6.1	0.909
To experience new and different things	64.9	57.4	48.6	59.4	56.0	15.8	0.200
For relaxation	86.8	87.3	88.9	93.9	88.8	10.0	0.351
To be close to the water	54.1	71.7	64.3	78.1	66.8	8.7	0.726
To obtain fish for eating	44.7	37.1	50.0	36.4	42.9	21.6	0.042
To get away from the demands of other people	65.8	67.2	71.4	78.8	70.3	12.1	0.437
For the experience of the catch	81.6	80.7	84.5	87.9	83.3	25.6	0.012
To test my equipment	10.8	21.7	22.9	30.3	21.5	9.1	0.698
To be with friends	62.2	67.2	71.8	78.8	69.8	6.8	0.872
To experience natural surroundings	89.5	93.5	91.6	90.9	91.7	7.2	0.844
To develop my skills	47.4	60.0	67.1	62.5	60.5	12.6	0.395
To get away from the regular routine	81.6	91.9	79.2	75.8	82.9	9.8	0.634
To catch a trophy fish	21.6	30.0	47.2	51.5	38.1	23.5	0.024 **
For the challenge/sport	60.5	78.3	80.8	78.8	76.0	15.6	0.212
To experience adventure and excitement	71.1	68.9	81.4	75.8	74.8	23.4	0.025
To share my knowledge of fishing with others	23.7	24.6	54.3	54.5	39.6	40.0	<.0001 **
For physical exercise	50.0	55.6	47.9	48.5	50.7	21.3	0.046

\*1=Occasional, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

catching a trophy fish was an important reason for fishing while catching a trophy fish was important to only 22% and 30% of occasional and experienced generalist anglers, respectively. The motive “To share my knowledge of fishing with others” also was much more important to avid and specialist anglers than it was to occasional and experienced generalist anglers.

Overall satisfaction with freshwater fishing in 1999 was highest among avid and specialist anglers, however, substantial proportions of all angler groups indicated dissatisfaction (Table 3.64). More than one-third of all trout angler types indicated the quality of freshwater fishing had declined in the past five years (Table 3.65). A majority of occasional, experienced generalist, and avid anglers indicated they know little or nothing about the Fisheries Division of the VDGIF (Table 3.66). All angler types indicated the Fisheries Division does a good job of making anglers aware of current fishing regulations. Although over 60% of specialists agreed that the Fisheries Division makes a good attempt to explain its fishing programs to the public, nearly one quarter of specialists disagreed. Over 30% of avid and specialist anglers disagreed with the statement “The Fisheries Division of the VDGIF provides adequate opportunities for public participation in decisions regarding fisheries related issues”. Similarly, over 30% of avid and specialist anglers indicated the overall performance of the Fisheries Division was “Fair” or “Poor”.

A majority of all types of trout anglers supported increased minimum size limits (Table 3.67). Opposition to regulations was generally highest among occasional and avid anglers. Reduced bag limits received more support among specialists than other types of anglers, however, there were very high levels of opposition to reduced bag limits among all angler types. Avid anglers expressed the greatest opposition to reduced bag limits, with over one-half indicating opposition. Catch and release areas received the greatest amount of support from experienced generalists and specialists, but again there were high levels of opposition among all angler types.

Nearly one-half of occasional anglers indicated they were between the ages of 16 and 34, making them the youngest group of trout anglers (Table 3.68). A large proportion of avid and specialist anglers also indicated they were young. Over 20% of occasional anglers were female, while less than seven percent of experienced generalists

Table 3.64. Satisfaction with freshwater fishing in 1999 among trout anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Measured on a scale of 1=Very unsatisfied to 7=Very satisfied.

Question	Specialization Level*					Chi square	P value
	1 (N=39)	3 (N=63)	4 (N=73)	5 (N=33)	All (N=219)		
<b>Overall, how satisfied were you with freshwater fishing in Virginia in 1999?</b>							
Percent satisfied	51.4	49.1	64.7	67.7	58.0	26.8	0.0829
Percent unsatisfied	18.9	22.8	23.5	19.4	21.8		

\*1=Occasional, 3=Experienced Generalist, 4=Avid, 5=Specialist

Table 3.65. Percent of trout anglers in each specialization level who indicated a decline in the quality of fishing in the past 5 years, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*					Chi square	P value
	1 (N=39)	3 (N=63)	4 (N=73)	5 (N=33)	All (N=219)		
Over the past 5 years, the quality of freshwater fishing in Virginia has...							
Percent "Declined"	36.8	34.4	40.3	39.4	37.8	13.3	0.1497

\*1=Occasional, 3=Experienced Generalist, 4=Avid, 5=Specialist

Table 3.66. Knowledge and opinion of the Fisheries Division of the VDGIF among trout anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*					Chi square	P value
	1 (N=39)	3 (N=63)	4 (N=73)	5 (N=33)	All (N=219)		
<b>Before receiving this survey, how much did you know about the Fisheries Division of the VDGIF?</b>							
Percent "Little or Nothing"	82.1	57.1	57.5	42.4	59.6	29.0	0.0007 **
<b>The Fisheries Division of the VDGIF does a good job of making anglers aware of current fishing regulations.</b>							
Percent "Agree or Strongly Agree"	71.8	74.6	66.7	81.8	72.5	16.7	0.1622
Percent "Disagree or Strongly Disagree"	2.6	3.2	11.1	12.1	7.2		
Percent "Neutral"	18.0	19.1	18.1	6.1	16.4		
Percent "Don't know"	7.7	3.2	4.2	0.0	3.9		
<b>The management policies of the Fisheries Division of the VDGIF are biologically sound.</b>							
Percent "Agree or Strongly Agree"	38.5	46.0	61.1	48.5	50.2	20.8	0.054
Percent "Disagree or Strongly Disagree"	0.0	1.6	2.8	9.1	2.9		
Percent "Neutral"	35.9	41.3	20.8	27.3	30.9		
Percent "Don't know"	25.6	11.1	15.3	15.2	15.9		

\*1=Occasional, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.66 continued. Knowledge and opinion of the Fisheries Division of the VDGIF among trout anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*					Chi square	P value
	1	3	4	5	All		
<b>The Fisheries Division of the VDGIF makes a good attempt to explain its fishing programs to the public.</b>							
Percent "Agree or Strongly Agree"	56.4	49.2	47.2	60.6	51.7	21.3	0.0468
Percent "Disagree or Strongly Disagree"	5.1	4.8	20.8	24.2	13.5		
Percent "Neutral"	20.5	36.5	29.2	12.1	27.1		
Percent "Don't know"	18.0	9.5	2.8	3.0	7.7		
<b>The staff of the Fisheries Division of the VDGIF provides knowledgeable service to their customers.</b>							
Percent "Agree or Strongly Agree"	56.4	54.0	43.1	51.5	50.2	20.6	0.0566
Percent "Disagree or Strongly Disagree"	2.6	1.6	13.9	24.2	9.7		
Percent "Neutral"	25.6	30.2	33.3	15.2	28.0		
Percent "Don't know"	15.4	14.3	9.7	9.1	12.1		
<b>The Fisheries Division of the VDGIF provides adequate opportunities for public participation in decisions regarding fisheries related issues.</b>							
Percent "Agree or Strongly Agree"	28.2	39.7	29.2	30.3	32.4	21.6	0.0424
Percent "Disagree or Strongly Disagree"	17.9	7.9	30.6	36.4	22.2		
Percent "Neutral"	28.2	38.1	30.6	24.2	31.4		
Percent "Don't know"	25.6	14.3	9.7	9.1	14.0		

\*1=Occasional, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.66 continued. Knowledge and opinion of the Fisheries Division of the VDGIF among trout anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*					Chi square	P value
	1	3	4	5	All		
<b>The Fisheries Division of the VDGIF provides good solutions to fisheries problems.</b>							
Percent "Agree or Strongly Agree"	35.9	38.7	20.8	27.3	30.1	26.1	0.0104
Percent "Disagree or Strongly Disagree"	5.1	3.2	15.3	24.2	11.2		
Percent "Neutral"	35.9	38.7	45.8	36.4	40.3		
Percent "Don't know"	23.1	19.4	18.1	12.1	18.5		
<b>How would you rate the overall performance of the Fisheries Division of the VDGIF in managing freshwater fisheries in Virginia?</b>							
Percent "Fair or Poor"	15.4	20.6	32.9	36.4	26.4	16.4	0.1728
Percent "Good, Very good, or Excellent"	56.4	69.9	63.0	57.6	63.0		
Percent "Don't know"	28.2	9.5	4.1	6.1	10.6		

\*1=Occasional, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.67. Support and opposition for regulations among trout anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Regulation	Specialization Level*					Chi square	P value
	1 (N=39)	3 (N=63)	4 (N=73)	5 (N=33)	All (N=219)		
<b>Increased minimum size limits</b>							
Percent "Support or Strongly Support"	56.4	66.1	68.1	66.7	65.1	10.3	0.5935
Percent "Oppose or Strongly Oppose"	18.0	12.9	16.7	18.2	16.0		
Percent "Neutral"	18.0	19.4	13.9	12.1	16.0		
Percent "Don't know"	7.7	1.6	1.4	3.0	2.9		
<b>Maximum size limits</b>							
Percent "Support or Strongly Support"	38.5	38.1	36.6	42.4	38.4	18.4	0.1035
Percent "Oppose or Strongly Oppose"	33.3	25.4	43.7	33.3	34.5		
Percent "Neutral"	18.0	33.3	18.3	21.2	23.3		
Percent "Don't know"	10.3	3.2	1.4	3.0	3.9		
<b>Slot limits</b>							
Percent "Support or Strongly Support"	33.3	41.3	39.4	45.5	39.8	15.8	0.2004
Percent "Oppose or Strongly Oppose"	23.1	23.8	32.4	21.2	26.2		
Percent "Neutral"	33.3	28.6	25.4	24.2	27.7		
Percent "Don't know"	10.3	6.4	2.8	9.1	6.3		
<b>Reduced daily bag limits</b>							
Percent "Support or Strongly Support"	29.7	27.0	30.6	45.5	31.7	23.4	0.0249
Percent "Oppose or Strongly Oppose"	40.5	42.9	54.2	39.4	45.9		
Percent "Neutral"	29.7	28.6	15.3	9.1	21.0		
Percent "Don't know"	0.0	1.6	0.0	6.1	1.5		
<b>Prohibiting the use of bait</b>							
Percent "Support or Strongly Support"	10.3	19.0	14.3	30.3	17.6	26.1	0.0103
Percent "Oppose or Strongly Oppose"	76.9	60.3	71.4	57.6	66.8		
Percent "Neutral"	10.3	17.5	12.9	9.1	13.2		
Percent "Don't know"	2.6	3.2	1.4	3.0	2.4		
<b>Catch and release only areas</b>							
Percent "Support or Strongly Support"	28.2	50.8	43.7	63.6	46.1	33.1	0.0009 **
Percent "Oppose or Strongly Oppose"	48.7	28.6	36.6	18.2	33.5		
Percent "Neutral"	18.0	19.1	16.9	12.1	17.0		
Percent "Don't know"	5.1	1.6	2.8	6.1	3.4		

\*1=Occasional, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.68. Selected demographic characteristics of trout anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*					Chi square	P value
	1 (N=39)	3 (N=63)	4 (N=73)	5 (N=33)	All (N=219)		
<b>Which of the following best describes the area where you now reside?</b>							
Percent "Rural"	47.4	55.7	48.6	58.1	52.0	15.1	0.2356
<b>Which of the following best describes the area where you resided as a child?</b>							
Percent "Rural"	47.4	61.9	57.8	57.6	57.1	10.6	0.564
<b>What is your age?</b>							
Percent "16-34"	46.2	3.2	41.7	36.4	30.1	71.8	0.0004 **
<b>What is your gender?</b>							
Percent "Male"	76.9	93.7	87.5	93.9	88.4	7.8	0.0514
<b>Which of the following do you consider yourself?</b>							
Percent "White"	92.1	87.3	94.4	97.0	92.2	25.1	0.1209
<b>What is the highest level of formal education you have completed?</b>							
Percent beyond high school	71.8	66.7	55.6	69.7	64.3	11.6	0.7069
<b>What was your household's 1999 annual income before taxes?</b>							
Percent \$75,000 or more	20.0	29.8	15.2	30.3	23.0	28.9	0.3682

\*1=Occasional, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

and specialists were female. Close to half of the anglers in each specialization level indicated they resided in a rural area.

### *Species Generalists Anglers*

Anglers who indicated no strong preference for species (species generalists) were evenly distributed among the different specialization levels (Figure 3.7). Specialist and avid anglers fished many more days than other angler types (Table 3.69). A majority of all angler types indicated they fished with bait often or always (Table 3.70). However, occasional and avid anglers were most likely, and generalists and specialists were least likely to use bait often or always. Seventy-five percent of specialists used artificial lures often or always. Fifty percent or more of generalists and specialists indicated they fished from gas powered boats often or always while only 11% of occasional anglers fished from gas powered boats often or always. Nearly 70% of occasional and avid anglers indicated they fished from the shore often or always. Generalists were the least consumptive type of angler (Table 3.71). Less than six percent indicated they often or always keep the fish they catch. Over 30% of experienced generalists indicated they keep the fish they catch often or always.

“To be outdoors” and “For relaxation” and “For family recreation” were the most important reasons for fishing for all types of species generalists (Table 3.72). Of all angler types, avid anglers tended to place the greatest importance on motives related to the natural environment. Over 90% of avid anglers indicated “To be outdoors”, “To be close to the water”, and “To experience natural surroundings” were important reasons for fishing to them. A majority of experienced generalists indicated catching fish for eating was an important reason for fishing while less than 30% of occasional and generalist anglers indicated catching fish for eating was important. Catching a trophy fish, testing equipment, and the challenge or sport of fishing were most important to specialists. Very few occasional anglers placed importance on catching a trophy fish or the challenge or sport of fishing. The motives “To experience new and different things,” “To develop my skills,” “To experience adventure and excitement,” and “To share my knowledge of fishing with others” were more important to avid and specialist anglers than they were to other angler types. Getting away from the demands of other people and getting away

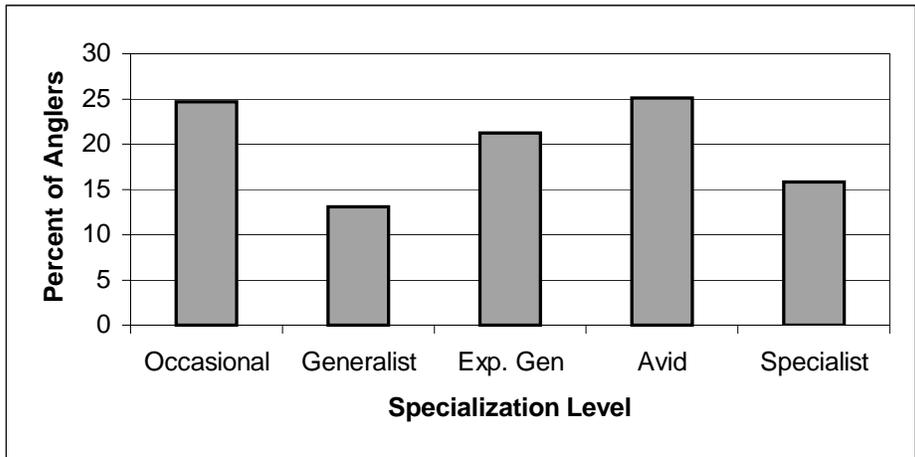


Figure 3.7. Percent of species generalist anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. (N=259)

Table 3.69. Mean number of days fished by species generalist anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Days fished	Specialization Level*					All (N=259)	Chi square	P value
	1 (N=64)	2 (N=34)	3 (N=55)	4 (N=65)	5 (N=41)			
In 1999, how many days did you fish in freshwater in Virginia?	8.0	14.7	16.3	39.3	52.9	25.6	95.4	<.0001 **

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.70. Preferred methods of fishing used by species generalist anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent of anglers indicating “Often” or “Always.”

Methods of fishing	Specialization Level*						Chi square	P value	
	1 (N=64)	2 (N=34)	3 (N=55)	4 (N=65)	5 (N=41)	All (N=259)			
Fishing with bait	93.4	70.6	81.8	90.6	73.2	83.9	30.0	0.0178	**
Flyfishing	6.0	3.6	2.9	3.5	11.1	5.4	26.4	0.0492	
Artificial lure/spin	47.5	60.6	58.7	61.3	75.0	59.6	29.3	0.0219	**
Trot lines/set poles	6.3	3.6	6.1	5.4	0.0	4.4	13.1	0.6622	
Seining for bait	2.1	6.9	12.9	10.7	13.2	8.9	18.4	0.3003	
From a boat or canoe with a gas motor	10.9	50.0	41.3	26.2	67.5	36.0	54.5	<.0001	**
From a boat or canoe with an electric motor	14.3	19.4	32.6	19.4	45.0	25.0	21.3	0.1671	
From a boat or canoe without a motor	7.1	29.0	9.8	14.8	16.7	14.2	20.6	0.1932	
From the shore	69.0	52.9	58.8	69.4	43.6	60.7	29.5	0.0208	**
From a pier or dock	42.9	25.0	27.3	37.9	13.2	31.1	19.1	0.2654	
By wading	7.3	25.0	12.2	28.1	25.6	19.2	45.1	0.0001	**

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.71. Frequency of keeping fish by species generalist anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent of anglers indicating “Often” or “Always.”

Question	Specialization Level*					All (N=259)	Chi square	P value
	1 (N=64)	2 (N=34)	3 (N=55)	4 (N=65)	5 (N=41)			
<b>How often do you keep the freshwater fish that you catch?</b>								
Percent indicating "Often" or "Always"	18.8	5.9	32.7	15.4	20.0	19.4	29.4	0.0212 **

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.72. Importance of reasons for fishing to species generalist anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Numbers represent the percent indicating “Somewhat important” or “Very important.”

Motive Statement	Specialization Level*					All (N=259)	Chi square	P value
	1 (N=64)	2 (N=34)	3 (N=55)	4 (N=65)	5 (N=41)			
To be outdoors	88.9	97.1	89.1	98.5	95.1	93.4	28.0	0.0316
For family recreation	76.2	87.9	79.3	93.7	75.6	82.6	33.3	0.0067
To experience new and different things	55.7	57.6	46.0	72.1	68.3	60.2	31.4	0.0120 **
For relaxation	85.9	91.2	90.9	96.9	90.3	91.1	37.1	0.0020
To be close to the water	56.5	73.5	78.4	90.3	75.6	74.8	31.9	0.0103 **
To obtain fish for eating	26.6	29.4	51.9	37.5	47.5	38.2	31.0	0.0134 **
To get away from the demands of other people	55.6	73.5	59.6	81.5	80.5	69.4	40.1	0.0008 **
For the experience of the catch	58.7	84.4	68.6	83.9	87.8	75.1	34.3	0.0050 **
To test my equipment	14.3	24.2	32.0	37.7	58.5	32.3	52.5	<.0001 **
To be with friends	60.9	79.4	70.4	76.2	75.6	71.5	18.7	0.2840
To experience natural surroundings	76.6	82.4	80.4	95.2	87.8	84.6	24.0	0.0892
To develop my skills	39.1	57.6	42.0	62.9	68.3	52.8	27.7	0.0345 **
To get away from the regular routine	71.9	81.8	72.2	96.9	85.4	81.6	34.8	0.0043 **
To catch a trophy fish	12.7	39.4	26.0	40.3	43.9	30.9	50.1	<.0001 **
For the challenge/sport	32.8	66.7	60.8	67.7	80.5	59.4	45.3	0.0001 **
To experience adventure and excitement	46.0	64.7	59.6	80.6	75.6	64.7	31.4	0.0121 **
To share my knowledge of fishing with others	9.5	34.4	32.0	43.6	53.7	33.1	51.3	<.0001 **
For physical exercise	22.2	27.3	39.6	41.9	48.8	35.7	26.6	0.0461 **

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

from the regular routine were less important to occasional and experienced generalist anglers than to other angler types. Fishing for physical exercise was most important to specialist anglers.

Over 70% of avid and specialist anglers indicated they were satisfied with freshwater fishing in 1999 (Table 3.73). Generalists indicated the highest level of dissatisfaction with fishing. Over 30% of generalist, avid, and specialist anglers indicated the quality of freshwater fishing had declined in the past five years (Table 3.74).

A high proportion of all angler types indicated they had little knowledge of the Fisheries Division (Table 3.75). Over 91% of occasional anglers and nearly three-quarters of avid anglers indicated they knew little or nothing about the Fisheries Division of the VDGIF. More avid and specialist anglers agreed that the Fisheries Division makes anglers aware of current fishing regulations, has biologically sound policies, provides adequate opportunities for public participation, and provides good solutions to fisheries problems. Less than 20% of occasional anglers agreed that the Fisheries Division provides knowledgeable service to their customers, however, over 80% of occasional anglers indicated “Neutral” or “Don’t know.” Twenty percent or more of generalist, avid, and specialist anglers rated the overall performance of the Fisheries Division as fair or poor.

A majority of experienced generalist, avid, and specialist anglers indicated they supported minimum size limits (Table 3.76). No other regulation received a majority of support from any angler type. Generalists expressed the least amount of opposition to several regulations, including catch and release areas. Only 12% of generalists opposed catch and release areas, while over 53% of avid anglers opposed catch and release areas.

Nearly 40% of occasional species generalist anglers were females, a much higher percentage than any other group of species specialists (Table 3.77). A large proportion of avid anglers also were female, but other species generalist angler types were over 75% males. A majority of generalists and experienced generalists indicated they resided in rural areas, however, few generalist anglers resided in rural areas during their youth. Avid and specialist anglers were the youngest types of anglers. Over 43% of avid and specialist anglers indicated they were between the ages of 16 and 34. Less than one-half

Table 3.73. Satisfaction with freshwater fishing in 1999 among species generalist anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000. Measured on a scale of 1=Very unsatisfied to 7=Very satisfied.

Question	Specialization Level*					All (N=259)	Chi square	P value
	1 (N=64)	2 (N=34)	3 (N=55)	4 (N=65)	5 (N=41)			
<b>Overall, how satisfied were you with freshwater fishing in Virginia in 1999?</b>								
Percent satisfied	57.4	62.5	51.9	77.0	72.5	64.2	32.3	0.1187
Percent unsatisfied	14.8	21.9	15.4	14.8	5.0	14.2		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

Table 3.74. Percent of species generalist anglers in each specialization level who indicated a decline in the quality of fishing in the past 5 years, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*						Chi square	P value
	1 (N=64)	2 (N=34)	3 (N=55)	4 (N=65)	5 (N=41)	All (N=259)		
<b>Over the past 5 years, the quality of freshwater fishing in Virginia has...</b>								
Percent "Declined"	12.7	32.4	22.2	36.9	31.7	26.5	26.2	0.0102 **

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.75. Knowledge and opinion of the Fisheries Division of the VDGIF among species generalist anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*					All (N=259)	Chi square	P value
	1 (N=64)	2 (N=34)	3 (N=55)	4 (N=65)	5 (N=41)			
<b>Before receiving this survey, how much did you know about the Fisheries Division of the VDGIF?</b>								
Percent "Little or Nothing"	91.9	69.7	66.7	73.4	53.7	72.8	42.9	<.0001 **
<b>The Fisheries Division of the VDGIF does a good job of making anglers aware of current fishing regulations.</b>								
Percent "Agree or Strongly Agree"	36.5	60.6	54.6	76.6	65.9	58.2	40.5	0.0007 **
Percent "Disagree or Strongly Disagree"	0.0	3.0	5.5	6.3	9.8	4.7		
Percent "Neutral"	41.3	30.3	25.5	12.5	17.1	25.4		
Percent "Don't know"	22.2	6.1	14.6	4.7	7.3	11.7		
<b>The management policies of the Fisheries Division of the VDGIF are biologically sound.</b>								
Percent "Agree or Strongly Agree"	14.3	36.4	36.4	51.6	51.2	37.1	29.2	0.0228 **
Percent "Disagree or Strongly Disagree"	1.6	0.0	3.6	4.7	4.9	3.1		
Percent "Neutral"	39.7	48.5	27.3	29.7	19.5	32.4		
Percent "Don't know"	44.4	15.2	32.7	14.1	24.4	27.3		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.75 continued. Knowledge and opinion of the Fisheries Division of the VDGIF among species generalist anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*					All	Chi square	P value
	1	2	3	4	5			
<b>The Fisheries Division of the VDGIF makes a good attempt to explain its fishing programs to the public.</b>								
Percent "Agree or Strongly Agree"	31.8	39.4	47.3	46.0	41.5	41.2	21.3	0.1671
Percent "Disagree or Strongly Disagree"	3.2	15.2	16.4	9.5	9.8	10.2		
Percent "Neutral"	39.7	36.4	18.2	33.3	36.6	32.6		
Percent "Don't know"	25.4	9.1	18.2	11.1	12.2	16.1		
<b>The staff of the Fisheries Division of the VDGIF provides knowledgeable service to their customers.</b>								
Percent "Agree or Strongly Agree"	19.0	39.4	40.0	42.2	39.0	35.2	23.5	0.1006
Percent "Disagree or Strongly Disagree"	0.0	3.0	9.1	7.8	4.9	5.1		
Percent "Neutral"	47.6	39.4	23.6	34.4	34.2	35.9		
Percent "Don't know"	33.3	18.2	27.3	15.6	22.0	23.8		
<b>The Fisheries Division of the VDGIF provides adequate opportunities for public participation in decisions regarding fisheries related issues.</b>								
Percent "Agree or Strongly Agree"	9.5	15.2	20.4	29.7	26.8	20.4	28.6	0.0268 **
Percent "Disagree or Strongly Disagree"	0.0	18.2	14.8	12.5	7.3	9.8		
Percent "Neutral"	46.0	42.4	27.8	34.4	39.0	37.7		
Percent "Don't know"	44.4	24.2	37.0	23.4	26.8	32.2		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.75 continued. Knowledge and opinion of the Fisheries Division of the VDGIF among species generalist anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*					All	Chi square	P value
	1	2	3	4	5			
<b>The Fisheries Division of the VDGIF provides good solutions to fisheries problems.</b>								
Percent "Agree or Strongly Agree"	12.7	24.2	30.9	39.1	31.7	27.7	31.1	0.0133 **
Percent "Disagree or Strongly Disagree"	1.6	9.1	14.6	7.8	4.9	7.4		
Percent "Neutral"	44.4	39.4	18.2	32.8	36.6	34.0		
Percent "Don't know"	41.3	27.3	36.4	20.3	26.8	30.9		
<b>How would you rate the overall performance of the Fisheries Division of the VDGIF in managing freshwater fisheries in Virginia?</b>								
Percent "Fair or Poor"	9.5	29.4	14.6	20.0	24.4	18.2	14.6	0.5542
Percent "Good, Very good, or Excellent"	41.3	52.9	49.1	58.5	65.9	52.7		
Percent "Don't know"	49.2	17.7	36.4	21.5	9.8	29.1		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.76. Support and opposition for regulations among species generalist anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Regulation	Specialization Level*						Chi square	P value
	1 (N=64)	2 (N=34)	3 (N=55)	4 (N=65)	5 (N=41)	All (N=259)		
<b>Increased minimum size limits</b>								
Percent "Support or Strongly Support"	42.9	44.1	56.6	56.9	61.0	52.3	15.5	0.4909
Percent "Oppose or Strongly Oppose"	11.1	11.8	13.2	7.7	14.6	11.3		
Percent "Neutral"	33.3	41.2	20.8	32.3	24.4	30.1		
Percent "Don't know"	12.7	2.9	9.4	3.1	0.0	6.3		
<b>Maximum size limits</b>								
Percent "Support or Strongly Support"	23.8	38.2	41.5	30.8	39.0	33.6	26.7	0.0446
Percent "Oppose or Strongly Oppose"	25.4	11.8	32.1	26.2	26.8	25.4		
Percent "Neutral"	38.1	47.1	17.0	38.5	34.2	34.4		
Percent "Don't know"	12.7	2.9	9.4	4.6	0.0	6.6		
<b>Slot limits</b>								
Percent "Support or Strongly Support"	31.8	33.3	46.2	30.8	39.0	35.8	17.5	0.3537
Percent "Oppose or Strongly Oppose"	9.5	9.1	11.5	27.7	19.5	16.1		
Percent "Neutral"	46.0	54.6	26.9	33.9	39.0	39.0		
Percent "Don't know"	12.7	3.0	15.4	7.7	2.4	9.1		
<b>Reduced daily bag limits</b>								
Percent "Support or Strongly Support"	25.8	39.4	28.9	21.9	32.5	28.3	18.9	0.2736
Percent "Oppose or Strongly Oppose"	14.5	9.1	26.9	35.9	22.5	23.1		
Percent "Neutral"	46.8	48.5	32.7	35.9	42.5	40.6		
Percent "Don't know"	12.9	3.0	11.5	6.3	2.5	8.0		
<b>Prohibiting the use of bait</b>								
Percent "Support or Strongly Support"	4.8	8.8	1.9	0.0	0.0	2.7	30.8	0.0145
Percent "Oppose or Strongly Oppose"	66.7	70.6	83.0	95.4	90.3	81.6		
Percent "Neutral"	19.1	17.7	7.6	4.6	9.8	11.3		
Percent "Don't know"	9.5	2.9	7.6	0.0	0.0	4.3		
<b>Catch and release only areas</b>								
Percent "Support or Strongly Support"	32.3	32.4	30.2	28.1	36.6	31.5	32.1	0.0097
Percent "Oppose or Strongly Oppose"	25.8	11.8	39.6	53.1	31.7	34.7		
Percent "Neutral"	32.3	52.9	26.4	15.6	31.7	29.5		
Percent "Don't know"	9.7	2.9	3.8	3.1	0.0	4.3		

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

Table 3.77. Selected demographic characteristics of species generalist anglers in each specialization level, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Question	Specialization Level*						Chi square	P value
	1 (N=64)	2 (N=34)	3 (N=55)	4 (N=65)	5 (N=41)	All (N=259)		
<b>Which of the following best describes the area where you now reside?</b>								
Percent "Rural"	40.7	58.1	53.7	46.7	43.6	47.7	19.7	0.236
<b>Which of the following best describes the area where you resided as a child?</b>								
Percent "Rural"	52.5	39.4	55.6	61.9	55.0	54.2	19.8	0.2279
<b>What is your age?</b>								
Percent "16-34"	31.8	30.3	0.0	43.1	43.9	29.6	137.2	<.0001 **
<b>What is your gender?</b>								
Percent "Male"	61.9	78.8	85.5	69.2	78.1	73.5	9.9	0.0419 **
<b>Which of the following do you consider yourself?</b>								
Percent "White"	87.3	81.8	83.0	83.1	92.7	85.5	20.7	0.6537
<b>What is the highest level of formal education you have completed?</b>								
Percent beyond high school	66.7	81.8	61.1	45.3	58.5	60.8	34.0	0.0263 **
<b>What was your household's 1999 annual income before taxes?</b>								
Percent \$75,000 or more	21.1	28.6	27.1	3.4	19.5	18.4	47.5	0.0954

\*1=Occasional, 2=Generalist, 3=Experienced Generalist, 4=Avid, 5=Specialist

\*\* Most likely to be managerially significant

of avid anglers completed an education beyond high school while a majority of other angler types indicated they had completed an education beyond high school. In addition to having the least amount of education, avid anglers also had the lowest income.

### Summary Comparison of Specialization Level by Species Preference

#### *Occasional Anglers*

Occasional catfish, species generalist, and trout anglers were more likely to use bait, while occasional largemouth bass and smallmouth bass anglers were more likely to use artificial lures (Table 3.78). Trout anglers were the only group of occasional anglers to be consumptive oriented. Largemouth bass anglers were the only group of occasional anglers to fish most frequently from boats. Occasional catfish and trout anglers were the most critical of the quality of fishing over the past five years, with over one-third indicating a decline. Catfish anglers also were the most critical of the Fisheries Division, with over 30% indicating the overall performance of the Fisheries Division was fair or poor. While a majority of catfish and species generalist anglers supported no regulations, a majority of smallmouth bass anglers supported four out of the six regulations alternatives.

#### *Generalist Anglers*

Generalist catfish anglers used bait most frequently while largemouth bass and smallmouth bass generalist used artificial lures (Table 3.79). Generalist largemouth bass and smallmouth bass anglers were trophy oriented and showed some support for regulations while catfish generalists were consumptive oriented and supported no regulations. Generalist catfish anglers were the most satisfied with freshwater fishing in 1999 and catfish anglers also were less likely than other angler groups to indicate the quality of fishing had declined in the past five years. Over 20% of catfish anglers, species generalist anglers, and largemouth bass anglers indicated the overall performance of the Fisheries Division was fair or poor, while only five percent of smallmouth bass anglers indicated the performance was fair or poor.

Table 3.78. Characteristics, methods of fishing, and attitudes of each type of occasional angler, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Characteristic	Species Preference Type*				
	CAT	Sp. Gen.	LMB	SMB	TRT
<b>Methods of fishing used most often</b>	Bait	Bait	Artificial lures	Artificial lures	Bait
	From shore	From shore	From a boat	From shore	From shore
<b>Orientation (Trophy or Consumptive)</b>	Neither	Neither	Neither	Neither	Consumptive
<b>Overall satisfaction with fishing</b>					
Percent satisfied	45.8	57.4	50.0	66.7	51.4
<b>Opinion of the quality of fishing over the past 5 years</b>					
Percent indicating "Declined"	38.5	12.7	25.6	25.8	36.8
<b>Opinion of the overall performance of the Fisheries Division</b>					
Percent indicating "Fair" or "Poor"	30.8	9.5	16.7	17.2	15.4
<b>Support for regulations</b>					
Regulations receiving a majority of support	None	None	Min. size Catch and release	Min. size Slot limits  Creel limits Catch and release	Min. size

\* CAT=catfish, Sp. Gen.=species generalist, LMB=largemouth bass, SMB=smallmouth bass, TRT=trout

Table 3.79. Characteristics, orientation, and attitudes of each type of generalist angler, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Characteristic	Species Preference Type			
	CAT	Sp. Gen.	LMB	SMB
<b>Methods of fishing used most often</b>	Bait From a boat	Bait and artificial lures From shore and a boat	Artificial lures From a boat	Artificial lures From a boat
<b>Orientation</b>	Trophy and Consumptive	Neither	Trophy	Trophy
<b>Overall satisfaction with fishing</b>				
Percent satisfied	83.3	62.5	68.2	68.4
<b>Opinion of the quality of fishing over the past 5 years</b>				
Percent indicating "Declined"	15.4	32.4	22.6	26.3
<b>Opinion of the overall performance of the Fisheries Division</b>				
Percent indicating "Fair" or "Poor"	23.1	29.4	25.9	5.3
<b>Support for regulations</b>				
Regulations receiving a majority of support	None	None	Min. size Catch and release	Min. size

\* CAT=catfish, Sp. Gen.=species generalist, LMB=largemouth bass, SMB=smallmouth bass

### *Experienced Generalist Anglers*

Catfish and trout experienced generalist anglers used bait most frequently, while smallmouth bass and largemouth bass anglers used artificial lures (Table 3.80). Species generalist anglers frequently used both bait and artificial lures. With the exception of smallmouth bass anglers, all types of experienced generalists were consumptive oriented. Smallmouth bass anglers expressed the highest levels of satisfaction among experienced generalist anglers. Large proportions of both smallmouth bass and trout experienced generalist anglers indicated the quality of fishing had declined in the past five years. The same two groups were the most likely to indicate that the performance of the Fisheries Division was fair or poor. Smallmouth bass anglers expressed more support for regulations than any other group of experienced generalist anglers.

### *Avid Anglers*

Largemouth bass and smallmouth bass avid anglers used artificial lures most frequently, while catfish anglers fished with bait (Table 3.81). Trout and species generalist anglers both frequently used a combination of bait and artificial lures. Species generalist, largemouth bass, and smallmouth bass anglers were trophy oriented, while catfish and trout anglers were both trophy and consumptive oriented. While a large percentage of all groups of avid anglers indicated a decline in the quality of fishing in the last five years, the perception of a decline was greatest among catfish and trout anglers. Catfish and trout anglers also were the most critical of the performance of the Fisheries Division. A majority of types of avid anglers supported minimum size limits.

### *Specialist Anglers*

Largemouth bass and smallmouth bass specialist anglers used artificial lures most frequently while catfish anglers used bait (Table 3.82). Species generalist anglers, striped bass anglers, and trout anglers frequently used a combination of methods. Largemouth bass, smallmouth bass, and trout anglers were trophy oriented, while catfish, species generalist, and striped bass anglers were both trophy and consumptive oriented. More

Table 3.80. Characteristics, orientation, and attitudes of each type of experienced generalist angler, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Characteristic	Species Preference Type				
	CAT	Sp. Gen.	LMB	SMB	TRT
<b>Methods of fishing used most often</b>	Bait	Bait and artificial lures	Artificial lures	Artificial lures	Bait
	From a boat	From shore	From a boat	From a boat	From shore
<b>Orientation</b>	Consumptive	Consumptive	Consumptive	Neither	Consumptive
<b>Overall satisfaction with fishing</b>					
Percent satisfied	52.4	51.9	59.6	70.2	49.1
<b>Opinion of the quality of fishing over the past 5 years</b>					
Percent indicating "Declined"	14.3	22.2	18.4	32.0	34.4
<b>Opinion of the overall performance of the Fisheries Division</b>					
Percent indicating "Fair" or "Poor"	9.5	14.6	12.5	23.5	20.6
<b>Support for regulations</b>					
Regulations receiving a majority of support	None	Min. size	Min. size	Min. size Slot limits Creel limits Catch and release	Min. size Catch and release

\* CAT=catfish, Sp. Gen.=species generalist, LMB=largemouth bass, SMB=smallmouth bass, TRT=trout

Table 3.81. Characteristics, orientation, and attitudes of each type of avid angler, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Characteristic	Species Preference Type				
	CAT	Sp. Gen.	LMB	SMB	TRT
<b>Methods of fishing used most often</b>	Bait From shore	Bait and artificial lures From shore	Artificial lures From shore and a boat	Artificial lures From shore and wading	Bait and artificial lures From shore and wading
<b>Orientation</b>	Consumptive and trophy	Trophy	Trophy	Trophy	Consumptive and trophy
<b>Overall satisfaction with fishing</b>					
Percent satisfied	72.2	77.0	75.9	74.1	64.7
<b>Opinion of the quality of fishing over the past 5 years</b>					
Percent indicating "Declined"	46.0	36.9	24.7	30.9	40.3
<b>Opinion of the overall performance of the Fisheries Division</b>					
Percent indicating "Fair" or "Poor"	32.4	20.0	19.3	20.0	32.9
<b>Support for regulations</b>					
Regulations receiving a majority of support	Min. size	Min. size	Min. size	Min. size	Min. size

\* CAT=catfish, Sp. Gen.=species generalist, LMB=largemouth bass, SMB=smallmouth bass, TRT=trout

Table 3.82. Characteristics, orientation, and attitudes of each type of specialist angler, as reported by respondents to a statewide survey of Virginia anglers in 2000.

Characteristic	Species Preference Type					
	CAT	Sp. Gen.	LMB	SMB	STRB	TRT
<b>Methods of fishing used most often</b>	Bait	Bait and artificial lures	Artificial lures	Artificial lures Boat and wading	Bait and artificial lures	Bait, artificial lures, and flyfishing Shore and wading
<b>Orientation</b>	From a boat Consumptive and trophy	From a boat Consumptive and trophy	From a boat Trophy	From a boat Trophy	From a boat Consumptive and trophy	From a boat Trophy
<b>Overall satisfaction with fishing</b>						
Percent satisfied	72.0	72.5	76.1	80.3	57.2	67.7
<b>Opinion of the quality of fishing over the past 5 years</b>						
Percent indicating "Declined"	25.9	31.7	30.7	25.4	46.9	39.4
<b>Opinion of the overall performance of the Fisheries Division</b>						
Percent indicating "Fair" or "Poor"	22.2	24.4	20.7	17.7	33.3	36.4
<b>Support for regulations</b>						
Regulations receiving a majority of support	Min. size	Min. size	Min. size	Min. size	Min. size	Min. size
			Max. size	Max. size		Catch and release
			Slot limits	Slot limits		
			Catch and release	Catch and release		
				Creel limits		

\* CAT=catfish, Sp. Gen.=species generalist, LMB=largemouth bass, SMB=smallmouth bass, STRB=striped bass, TRT=trout

than 25% of all specialist anglers felt that the quality of fishing had declined over the past five years. Striped bass and trout specialist anglers were most critical of both the quality of fishing over the past five years and the performance of the Fisheries Division. Largemouth bass and smallmouth bass specialist anglers expressed the most support for regulations.

## DISCUSSION

### Segmentation by Specialization Level

The results of my study are consistent with previous research of recreational specialization that demonstrate the value of segmenting anglers into subgroups who seek different fishing experiences (Bryan 1977; Chipman and Helfrich 1988; McGurrian 1988; Fisher 1997; Romberg 1999). Angler responses to five survey questions were used to divide the Virginia resident angler sample into five segments. The five segments represent a range of specialization from less specialized to more specialized.

The segments differ in terms of experience, participation, centrality, investment, motivations, attitudes, and preferences. Previous work by Chipman and Helfrich (1988), Fisher (1997), and Romberg (1999) identified highly specialized angler segments with many years of experience, and high levels of avidity, much like the specialist anglers identified in this study. Chipman and Helfrich (1988) found a group of anglers with many years of experience, but low scores on other specialization dimensions, very much like the experienced generalists identified here. They also found groups of anglers who scored low on all dimensions of specialization, similar to the occasional anglers of this study.

Similar to Graefe (1980) and Chipman and Helfrich (1988), my study showed segmentation by specialization is useful in identifying anglers with different motivations. All angler types placed a great deal of importance on enjoying nature and relaxing while fishing. However, anglers differed in the importance of some catch related and fishery resource motives. When dealing with these different groups of anglers, managers must understand the different orientations of each segment. Specialized anglers were trophy/challenge oriented, experienced generalists were consumptive oriented, and less specialized anglers were neither trophy nor consumptive oriented, but instead tended to fish for activity-general reasons.

The differences in reasons for fishing expressed by the different groups of anglers suggest reasons for differences in attitudes toward management options among the groups. Fisher (1997) found specialist anglers to be more supportive of regulations than

anglers who were consumptive oriented. In my study, specialist anglers, the most trophy oriented type of anglers, supported regulations such as reduced creel limits and catch and release areas; anglers who were more consumptive oriented did not. However, opposition to these regulations was high among all specialization levels. Specialist anglers may have shown more support for regulations because their fishing experience will likely be enhanced by restrictive regulations. The fishing experience of less specialized anglers may be affected negatively by more restrictive regulations. They would not be able to keep as many fish, an important aspect of fishing to consumptive groups of anglers, especially experienced generalists. Therefore, consumptive anglers opposed regulations that may reduce the harvest of fish. This information will help guide managers when deciding on regulation changes. With an understanding of the types of anglers who fish on a particular body of water, managers can identify regulations that are likely to be supported and those that are likely to be opposed.

The fact that specialized anglers, the most avid types of anglers, believed the quality of fishing had declined in the past five years is of concern. Specialized anglers have many years of experience and fish very frequently. Specialized anglers also are the most knowledgeable about the Fisheries Division. A high percentage of specialized anglers indicated the Fisheries Division does not provide enough opportunities for public participation and that the Fisheries Division does not explain its programs to the public. These should be two areas of concern for the Fisheries Division because specialized anglers are more likely to be involved in the decision making process (Bryan 1977). Although these two functions were identified as problems when all anglers were examined (Chapter 2), their identification as problems by the most avid and knowledgeable anglers suggests increased urgency for the Fisheries Division. Increased public involvement and education through public meetings, workshops, or volunteer programs may help keep anglers informed and improve their opinions of the Fisheries Division.

Segmentation by specialization level helped to identify different groups of anglers, but it will be more useful to management if put in the context of a particular species preference. All anglers of a particular specialization level were not the same. Anglers who were members of the same specialization level, but fish for different species

differed in their methods of fishing, reasons for fishing, and their attitudes toward management.

All groups of occasional anglers fished infrequently and had few years of experience, yet they differed in other ways. Although most occasional anglers were not consumptive oriented, it was important to trout anglers to keep fish. Among generalist anglers, two segments (largemouth bass and smallmouth bass) were trophy oriented whereas another segment (catfish) was both trophy and consumptive oriented. In general, experienced generalists supported few restrictive regulations, whereas experienced generalist smallmouth bass anglers were supportive of these regulations. All avid anglers were similar in that they fished frequently and were not supportive of regulations, but they differed in their reasons for fishing related to the fishery resource. Avid species generalist, largemouth bass, and smallmouth bass anglers sought trophy fish while avid catfish and trout anglers sought fish for eating as well as trophy fish. Past studies have described specialist anglers as being supportive of restrictive regulations (Bryan 1977; McGurrin 1988; Chipman and Helfrich 1988). I found specialist largemouth bass and smallmouth bass anglers supported many regulations, but other groups of specialist anglers were less supportive of regulations and, in several cases, strongly opposed regulations. Because differences exist among anglers of the same specialization level who fish for different species segmentation by specialization level alone is not sufficient and does not provide managers with information they can use to guide management.

#### Segmentation by Species Preference

Single-level segmentation by species preference identified differences among groups of anglers who fished for each species. Anglers who preferred to fish for different species differed in their frequency of fishing, methods used, information sources, motivations for fishing, attitudes, and demographics. However, because these differences take only the average angler of each group into account, they may not be very useful to fishery managers.

For all species preference groups, enjoying the outdoors and relaxation were important reasons for fishing. However, the importance of reasons for fishing related to the fishery resource varied greatly among anglers who fished for different species.

Panfish, crappie, catfish, and trout anglers were more consumptive oriented than other angler types, whereas largemouth bass anglers were more trophy oriented than other angler types. This finding is consistent with studies of anglers in Kansas (Burlingame and Guy 1999). Striped bass anglers were different from all other groups in that they placed a great deal of importance on both obtaining fish for eating and catching trophy fish. However, these results mask details that may be important to management because not all anglers who target a species of fish have the same reasons for fishing. Diversity exists within each group of anglers in terms of their reasons for fishing. Single-level segmentation by species preference does not identify these differences.

Segmentation by species preference alone did little more than describe the “average” angler in each group. In general, differences within a species preference group may be more important to effective management than differences between species preference groups. A single-level approach does not identify differences within a group of anglers who fish for the same species; instead, it treats all anglers who fish for the same species as a single unit and ignores many managerially important differences among anglers. Management would be better served by further segmenting anglers beyond species preference into distinct segments within each species preference group.

### Multi-level Segmentation

#### *Catfish Anglers*

Multi-level segmentation of catfish anglers identified segments of the catfish angler population that were not apparent under single-level segmentation. When segmented by species alone, catfish anglers appeared to be a consumptive oriented group that fished from boats and from shore and opposed most restrictive regulations. The multi-level approach to segmentation yielded several distinct segments of catfish anglers that will be important to effective management of catfish fisheries. First, there was a consumptive segment, experienced generalists, who were very consumptive oriented, primarily fished from boats, and opposed regulations. There also was a group of trophy oriented anglers, specialists, who fished from boats and moderately supported some regulations. One segment, avid anglers, appeared to be both consumptive and trophy

oriented. They fished from shore, used trot lines and set poles, and supported for some regulations. Occasional catfish anglers fished from shore and were not particularly concerned with trophy fish or obtaining fish for eating. The final group of catfish anglers, generalists, fished from boats and were moderately consumptive and trophy oriented.

### *Implications of Multi-level Segmentation of Catfish Anglers*

Catfish anglers should not be managed as a single group. Enough variation exists within catfish anglers to make managing for the average catfish angler ineffective and inefficient. Different segments of catfish anglers derive different satisfactions from fishing and they desire different outcomes from a fishing trip. Management should address the desires of each segment of catfish anglers, provide opportunities for each segment, and market those opportunities to the anglers.

Management of catfish fisheries for the desires of the average catfish angler will satisfy no one. Anglers' opinions of the quality of fishing and the Fisheries Division may be low because fishing does not now meet their expectations or desires. Specialists comprise over 20% of catfish anglers, but, unlike other segments of catfish anglers, specialists are not consumptive oriented, and instead seek trophy fish. Management of some bodies of water for trophy catfish likely will increase satisfaction among specialist catfish anglers. Effective marketing of trophy areas to specialists will help them find their desired fishing experiences and may increase satisfaction. One problem may be that catfish anglers do not support reduced bag limits, which may be critical to developing trophy fisheries. Therefore, education programs delivered through bait dealers and sporting goods stores to convey the importance of the regulations may help in gaining acceptance.

One area of concern for catfish management may be that the avid segment of anglers had unrealistic expectations for the fishery. A very high percentage of avid anglers indicated the quality of fishing has declined and they were critical of the performance of the Fisheries Division, possibly because fishing did not meet their expectations. Avid anglers sought fish for eating and trophy fish when they were fishing. A fishery is unlikely to produce both of these in a sustainable manner. Management

efforts could be directed at educating avid anglers to the fact that they should not expect both experiences from a fishery over the long term.

Management of catfish fishing areas should focus on more than the fish. All segments of catfish anglers placed high levels of importance on relaxation and being outdoors. Occasional anglers comprised over 20% of catfish anglers and, while it was important to them to catch something, they wanted neither trophy fish nor fish for eating. This segment of catfish anglers had the lowest levels of satisfaction with fishing, possibly because the fishery did not provide their desired fishing experiences (relaxation, natural surroundings).

### *Largemouth Bass Anglers*

When segmented by species alone, largemouth bass anglers appeared to be a trophy oriented group of anglers who fished from boats and supported most regulations. However, the multi-level approach to segmentation identified several segments that differed in ways that will be important to management. The two largest segments of largemouth bass anglers (avid and specialists) were trophy oriented, yet they differed in the ways in which they fished. Specialists fished from boats whereas avid anglers fished from boats and from shore. Experienced generalists were the most consumptive oriented segment of largemouth bass anglers. They fished from boats and generally did not support restrictive regulations. Occasional largemouth bass anglers fished from shore and from boats and represented a nonconsumptive and nontrophy oriented segment of anglers. The final segment, generalist, anglers fished from boats and were moderately trophy oriented.

### *Implications of Multi-level Segmentation of Largemouth Bass Anglers*

Multi-level segmentation indicates that all largemouth bass anglers are not the same. There is no such thing as an “average” largemouth bass angler, therefore, managing them as a single group would be ineffective and inefficient. Different segments of largemouth bass anglers seek different experiences from the fishery. Understanding these differences and managing for each segment will lead to improved management and will allow for marketing to specific segments of anglers.

The two largest segments of largemouth bass anglers, avid (23%) and specialist (41%) anglers, were extremely trophy oriented. Catching trophy fish and the challenge of fishing were very important to these anglers. With the use of restrictive regulations, which specialized anglers are likely to support, managers can develop areas for trophy fish and market the trophy and challenge aspects of the areas to specialized anglers. This should increase satisfaction because anglers will be guided to areas where they will find their desired experiences. Conversely, less specialized anglers represent a segment of anglers not interested in trophy fishing. Although fewer in number, less specialized anglers represent a distinct market segment. Designating some areas where more, smaller fish may be caught and some may be harvested could provide a less challenging, but more rewarding, experience for less specialized anglers. Slot limits, which were moderately supported by largemouth bass anglers, may achieve both of these experiences. However, education programs may be needed and the size range of the slot should be raised to provide larger fish under the slot to be kept as well as larger trophy fish above the slot. Marketing these areas as such would ensure that anglers understood what experiences would be provided. This could increase participation and satisfaction among less specialized segments of largemouth bass anglers.

Not only will understanding the differences lead to better management, but it also will lead to more effective communication with each segment of anglers. Managers must use different methods when attempting to deliver information to or receive input from each segment. Specialized anglers are the easiest group to communicate with. They can be reached through almost any means of communication, including other anglers, fishing clubs, sporting goods stores, television, the internet, and VDGIF publications. Less specialized anglers receive their information primarily from other anglers, newspapers, bait dealers, and sporting goods stores. Managers must realize that one means of communication may not reach all segments of largemouth bass anglers. Managers should recognize that when they receive input from fishing clubs, they are dealing primarily with highly specialized anglers and when they release information in publications, it is primarily the most specialized anglers who receive that information. Other segments of anglers have different attitudes and preferences than specialized anglers do, but they may not be heard, and hence their desires may not be incorporated into the fishery. Managers

should make an attempt to communicate with each segment and provide the desired opportunities for each.

### *Smallmouth Bass Anglers*

Understanding the different segments of smallmouth bass anglers will lead to improved management. Instead of managing smallmouth bass anglers as a single group of trophy oriented anglers who support most restrictive regulations, and fish from boats, shore, and by wading, managers should consider the finer segmentation of this group of anglers. Multi-level segmentation identified several groups who differed in ways that may be important to management. First, trophy oriented anglers fished from boats (specialists) and by wading (avid). Although both segments were trophy oriented, they differed in their support for regulations, with specialists being more supportive than avid anglers. Although no segments of smallmouth bass anglers were consumptive oriented, generalist anglers, who fished from boats, expressed the least amount of support for regulations that would limit harvest. Occasional anglers fished from the shore and were neither trophy nor consumptive oriented, but instead placed a great deal of importance on the social aspects of fishing. Experienced generalist anglers represented a segment of anglers who fished from boats or canoes without a motor as well as from shore and placed little importance on consumptive or trophy aspects of fishing.

### *Implications of Multi-level Segmentation of Smallmouth Bass Anglers*

Managers should provide sufficient fishing opportunities for each segment of smallmouth bass anglers. In terms of methods of fishing, this means providing areas accessible by boat, shore, and wading. The two most numerous and most trophy oriented segments of smallmouth bass anglers fished in very different ways. Avid anglers frequently fished from shore and by wading, whereas specialists fished primarily from boats. When developing management plans, managers should take into account that segments of both boat and shore/wading anglers seek trophy fish. Also, strong perceptions of a decline in the quality of fishing among shore/wading anglers may be a result of restricted access to bodies of water because of land postings. Efforts to increase

access to large rivers for fishing from shore/wading and floating likely will result in improved satisfaction and a better impression of the quality of fishing, especially among the avid segment of anglers.

For less specialized smallmouth bass anglers, the social aspects of fishing were very important. The Fisheries Division may increase satisfaction and participation among less specialized anglers by providing areas where they can enjoy the social aspects of fishing and marketing them as such. Areas for other recreational activities, such as camping and picnic areas may help provide the desired social experiences sought by less specialized anglers.

Although no segments of smallmouth bass anglers were consumptive oriented, regulations that limit consumption were not supported by all segments of these anglers. Avid and generalist anglers expressed little support and strong opposition to most regulations even though one would expect the trophy oriented, avid anglers to support such restrictions. Education programs designed to explain the benefits of such regulations, especially in developing trophy fisheries, might increase support for and reduce opposition to these regulations.

### *Striped Bass Anglers*

Nearly half of all striped bass anglers were specialist anglers, but there were few significant differences between specialists and other angler types. A larger sample size of anglers was needed to determine the extent of differences in the types of striped bass anglers. All segments of striped bass anglers were both trophy and consumptive oriented and opposed to most regulations. For years, reservoir striped bass fisheries throughout the Commonwealth of Virginia have come under fire from unhappy anglers. On Claytor Lake and Smith Mountain Lake, desires for more and bigger fish, and lack of communication between anglers and the Fisheries Division have led to an overall distrust for the management agency. To improve relationships with striped bass anglers, managers should increase communication with anglers and examine the desires of the anglers. When possible, managers should attempt to provide the desired experiences. In cases when providing desired experiences is not possible, educational programs may be needed to explain why.

### *Implications of Multi-level Segmentation of Striped Bass Anglers*

Multi-level segmentation indicated that segments of striped bass anglers generally were similar. Different segments of striped bass anglers used different methods of fishing (boat and shore), but they had similar attitudes and preferences. Both segments of striped bass anglers, specialists and less specialized anglers, desired similar experiences from the fishery. The trophy and consumptive aspects of fishing were important to all striped bass anglers, although specialists were slightly more trophy oriented than other anglers. The expectations of striped bass anglers are unrealistic and managers will find it difficult to manage fisheries to satisfy striped bass anglers. This is especially true given the fact that striped bass anglers opposed most regulations. Programs designed to educate striped bass anglers about the fisheries may help to change their expectations, increase satisfaction, and improve their opinion of the Fisheries Division. Although this has not been effective thus far, the Fisheries Division should continue to educate striped bass anglers that more fish and bigger fish is unrealistic.

All segments of striped bass anglers indicated a decline in the quality of fishing over the past five years. However, specialists, who comprised nearly one-half of striped bass anglers and are likely to be vocal, were very critical of the quality of fishing. This helps explain why the VDGIF hears so many complaints from striped bass anglers. Nearly one-half of specialists indicated a decline in the quality of fishing over the past five years. Given the fact that specialists fished an average of 61 days in 1999, they should be well aware of the quality of fishing. This may be an indication that the fishery is not fulfilling the expectations (trophy fish and fish for eating) of the anglers.

Striped bass anglers also were critical of the Fisheries Division. This may be because striped bass anglers have not yet realized their desired fishing experience. They also cited a lack of public involvement and poor communication of fishing programs to the public as problems with the Fisheries Division. Workshops, public meetings, and volunteer programs directed at anglers in striped bass fishing clubs would give the Fisheries Division an opportunity to educate anglers about the fisheries as well as receive input from anglers about their desires. These efforts most likely would be appreciated by anglers and may improve satisfaction among striped bass anglers, as well as improve the

strained relationship between the Fisheries Division and one of its most avid and vocal stakeholder groups.

### *Trout Anglers*

Similar to Bryan's (1977) original work on the topic of specialization, I found segments of trout anglers who differed in their methods of fishing and their preferences for management. Segmenting trout anglers by species preference alone ignored these differences and placed all trout anglers into a single group that was consumptive oriented, fished using a variety of methods, and opposed to most restrictive regulations. The multi-level approach to segmentation identified several segments that differed in ways that will be important to management. Specialist anglers represented a segment that was trophy oriented, as well as moderately consumptive. They used many different methods of fishing, including flyfishing, and supported catch and release areas. Avid anglers represented a segment that was both trophy and consumptive oriented. They fished primarily with bait and strongly opposed most regulations. Experienced generalists and occasional anglers both represented consumptive oriented segments of trout anglers. Experienced generalists fished with several different methods, including flyfishing, and they strongly opposed most regulations. Occasional anglers fished with bait and artificial lures and strongly opposed regulations. Understanding each segment may lead to improved management and should allow for better marketing to specific segments of trout anglers. Most likely, specialist anglers primarily fished wild/native trout streams and special regulation areas while other trout angler types fished stocked trout waters. However, the format used for this question severely limits interpretation of where trout anglers fished.

### *Implications of Multi-level Segmentation of Trout Anglers*

The consumptive aspects of fishing were important to all segments of trout anglers, therefore, managers should continue to provide fishing opportunities where anglers can harvest fish. However, among specialized segments, both consumptive and trophy aspects of fishing were important. This represents unrealistic expectations for a

fishery and may have contributed to the high levels of dissatisfaction among specialized anglers. Managers should recognize that different segments desire different experiences from the fishery, but they also may need to educate anglers that a particular fishery is unlikely to satisfy all desires.

Management may improve by designating more areas where anglers may catch large trout. Fishery managers have attempted to do this through special regulation areas. However, it appears that trout anglers, especially specialists and avid anglers, are frustrated over the lack of opportunities to catch large fish. This may have contributed to the high level of dissatisfaction and strong opinion of a decline in the quality of fishing among trout anglers. Comments added to surveys also point to a problem with the size of stocked trout, although the specialization level of anglers who added comments is not known. If more trout fishing areas are to be managed for larger fish, the methods of fishing used by anglers and the preferred regulations need to be reviewed. Special regulation areas managed with very restrictive regulations, such as flyfishing only or restriction of bait, will benefit only one small segment of anglers, specialists. Avid anglers, the largest segment of trout anglers also seek large fish, but primarily fish with bait and do not support restrictive regulations, except minimum size limits. Managers may be able to satisfy the desires of avid anglers by designating additional special regulation areas to be managed with restrictive minimum size limits. Another option would be to increase the number of areas stocked with larger fish or designate more areas for stocking of fewer, but larger fish and then market these areas to avid anglers as places to catch large fish. Use of the trout stocking program to provide a variety of opportunities may increase angler satisfaction. Managers also may need to invest in education programs in cases when restrictive regulations are necessary, such as protection of wild/native fish.

One area where multi-level segmentation was not necessary was in identifying groups of trout anglers with different satisfaction levels. All types of trout anglers indicated the quality of fishing had declined in the past five years and all types had a high percentage of anglers who were unsatisfied with fishing in 1999. Most likely, the root of problems with the trout fishery in Virginia is the trout stocking program. Based on comments added to questionnaires, many anglers want an opening day, and want more

trout stocked more often. The Fisheries Division recently dealt with the issue of an opening day by creating a Trout Heritage Day that designates several bodies of water for an opening day type of experience. The issue of stocking more trout should be dealt with as well. It is unknown whether or not anglers would support the increase in license fees likely to result from stocking more trout. Additional surveys, such as the trout angler survey done on a periodic basis, as well as workshops and public meetings may help guide the Fisheries Division in making changes to the trout stocking program.

### *Species Generalist Anglers*

When segmented by species preference alone, species generalist anglers appeared to be a moderately consumptive oriented group of anglers who fished with bait from shore. However, the multi-level approach to segmentation provides managers with information about several segments of species generalist anglers. Specialists represented a segment of anglers who were both trophy and consumptive oriented, used artificial lures and bait, and fished from boats. Avid anglers also were trophy and consumptive oriented, but they fished with bait and fished from the shore. Experienced generalists represented the most consumptive oriented segment of species generalist anglers. Generalists were a moderately trophy oriented segment who fished from the shore as well as from boats. Occasional anglers represented a segment of anglers who do not fish often and are neither trophy nor consumptive oriented.

### *Implications of Multi-level Segmentation of Species Generalist Anglers*

Different segments of species generalist anglers seek different experiences from the fishery. Because of this diversity, species generalist anglers should not be managed as a single group. Understanding differences among anglers and managing for each segment may lead to improved management and will allow for marketing to specific segments of anglers.

As the second largest group of anglers (N=259), species generalists represent an important segment of Virginia anglers, but their management may be difficult given they

lack a species preference. Therefore, managers should focus on providing a variety of fishing opportunities for the different segments of species generalist anglers.

Multi-level segmentation identified highly specialized segments of species generalists who fish very frequently, but have no preference for the species of fish they fish for. Specialized anglers placed importance on both catching fish for eating and catching a trophy fish. Although these segments were satisfied with fishing in 1999, they indicated a decline in fishing in the past five years. The other trophy oriented segment, generalists, believed fishing quality had declined as well. This may be an indication of a lack of fishing opportunities for species generalist anglers, especially trophy fishing opportunities. The experienced generalist segment was consumptive oriented, so opportunities to keep fish should be provided as well. Managers likely will increase satisfaction among species generalist anglers by managing bodies of water for a variety of fish species, while providing trophy fishing opportunities for some and opportunities to keep fish for others.

Managers also should realize that there were segments of species generalist anglers for whom neither trophy fish nor fish for eating was important. For occasional anglers, being outdoors and relaxing were important. Managers should provide this segment of species generalist anglers with areas to fish where they can relax and enjoy the outdoors, and have an opportunity to catch a variety of fish. Providing these opportunities and marketing them may increase participation among occasional anglers.

#### Benefits of Multi-level Segmentation

Segments of anglers exist within the population of anglers in Virginia, and managing for the “average” angler is of little use. Identification of different segments of anglers allows for improved management. Although differences were evident among anglers who fish for different species and anglers of different specialization levels, segmentation by specialization within species preference groups was the most managerially relevant segmentation method. Different segments of anglers exist within each species preference group and managers should be aware of the desires and needs of each segment when developing management plans. Managers should attempt to provide

opportunities for each segment. In doing so, fisheries management should be more effective and efficient and angler satisfaction and participation may increase.

Multi-level segmentation should be applied to specific bodies of water for more effective management. With an understanding of the anglers who fish a particular body of water, managers can increase satisfaction by managing for the preferences and desires of those anglers. For example, if surveys indicate that a high percentage of specialist catfish anglers fish in a particular area, then the area could be managed for trophy fish. Whole bodies of water can be managed for specific segments of anglers or sections of water can be managed for the different segments of anglers.

Multi-level segmentation will help managers when conflicts arise among anglers. Segmenting of anglers will allow managers to better understand and perhaps to resolve angler conflicts both within species preference groups and between species preference groups as well as between a segment of anglers and other users. Multi-level segmentation also will be useful to managers because it identifies effective ways to communicate with different segments of anglers. Managers will need to use more than one communication method to reach all anglers. Also, when receiving input from anglers, managers will know what segments the input is coming from. For example, input from bass clubs typically represents only specialist largemouth bass anglers.

In conclusion, anglers do not constitute a homogenous group and different types of anglers seek different experiences. Statewide, differences were discovered among anglers who fish for different species and anglers of different specialization levels. However, the managerial significance of these differences is questionable. In many cases, the within group differences are more important to management than the between group differences. Multi-level segmentation is useful for identifying the within group differences. Successful management of fisheries requires an understanding of the diverse angler groups. With an understanding of the differences among and within angler groups in terms of characteristics, behaviors, motivations, attitudes, and preferences, managers can provide a more satisfying experience for each of the angler groups.

## **Chapter 4: Conclusion and Recommendations for Management and Future Surveys**

### CONCLUSION

My study demonstrates that Virginia's resident anglers are very diverse. The angler market is made up of many different segments, each with distinct characteristics, behaviors, motivations, attitudes, and preferences. Summarizing the characteristics of all anglers to describe the average angler is of little use to effective fisheries management. The segmentation methods employed in my study provide an effective way of examining specific groups of anglers. This study also provides the Fisheries Division of the VDGIF with data that can be used to evaluate the potential effects of management actions at statewide and regional levels, as well as for groups of anglers who target specific species of fish. Combined with biological information about fish populations and information about fish habitat, the data provided by my study will help the agency evaluate current and future management actions, and assist in formulating the agency's planning and policy decisions. The Fisheries Division of the VDGIF will benefit from managing freshwater fisheries in the Commonwealth of Virginia in ways that are desired by anglers. A marketing approach to management may help to improve angler satisfaction and maintain license sales by providing the desired experiences of the different segments of anglers. The Fisheries Division can be more effective in its management. A marketing approach will lead to more efficient allocation of the agency resources and more effective management.

### RECOMMENDATIONS FOR MANAGEMENT

1. Increase angler knowledge of the Fisheries Division and angler participation in the decision making process

Angler knowledge of the Fisheries Division was very low. Education programs designed to increase angler involvement and explain Fisheries Division functions and programs to the public may increase the interaction between the Division and its stakeholders as well as make the public more knowledgeable about the functions of the

Fisheries Division. Anglers appeared willing to participate in the decision making process, but most were not aware the opportunity exists. More should be done to make anglers aware of the opportunities to participate in the decision-making process.

2. Address the issue of angler conflict with jetskiers and recreational boaters.

Jetskiers and recreational boaters negatively affected the fishing experience of many anglers and are a problem statewide. Managers should confront the issue and seek ways to enhance fishing opportunities desired by anglers. A good approach may be to involve anglers in volunteer programs and education workshops as well as working with other user groups (recreational boaters and jetskiers) and consulting with the boating industry. If educational approaches do not work, different user groups may need to be separated spatially or temporally through regulations or legislation.

3. Consider the motivations of anglers when developing management plans.

The primary reasons for fishing for all anglers were to relax and enjoy the outdoors. Catching fish to eat or catching trophy fish were less important overall, but, to certain segments of anglers, these were very important reasons for fishing. Developing fisheries in natural settings, reducing crowding, and reducing user conflict will help the Fisheries Division provide fishing opportunities in which anglers can enjoy the outdoors and relax. Subgroups of anglers do place a great deal of importance on the catch aspects of fishing. Recognition of those subgroups and providing the experiences that they desire (trophy fish and consuming fish) should help improve angler satisfaction.

4. Reach out to new markets and increase participation in fishing.

Currently, the angler market in Virginia is dominated by middle-aged, white, males, who lived predominantly in rural areas. There is room for expansion into several different markets. For example, marketing the naturalistic values of fishing may increase fishing participation among residents of urban areas. Very few females and minorities participated in freshwater fishing in Virginia in 1999. Marketing of the social (family and friends) and relaxation aspects of the fishery may help increase participation among these groups as well. In the future, middle aged white males will be a declining market.

Management should reach out to women and minorities to increase participation and environmental awareness among these groups. Otherwise, overall participation and license sales will decrease in the coming years.

5. Manage for the different segments of anglers within each species preference group, not the “average” angler of each group.

Segments of anglers exist within each species preference group, and managing for the “average” angler is of little use. Identification of different segments of anglers allows for improved management. Managers should address the desires and needs of each segment when developing management plans. By providing opportunities for each segment, fisheries management should be more effective and efficient and angler satisfaction and participation may increase. However managers should be aware that providing the desired experiences of one segment may come at the expense of other segments. If possible, managers should find a balance of opportunities for each segment and be careful not to exclude segments of anglers.

#### RECOMMENDATIONS FOR FUTURE SURVEYS

1. Conduct similar surveys every two or four years, prior to initiation of changes in fishing regulations.

Rapidly changing demographics combined with the high turnover rate among anglers who purchase licenses each year make it necessary to collect information frequently about the stakeholders. Conducting the survey every two or four years will allow sufficient time to analyze the results, plan ways to use the results, and implement changes in management. Currently, fishing regulations are reviewed every two years. With an understanding of the desires of the different market segments of anglers, managers will be able to change regulations based on angler input and develop regulations that have a greater likelihood of being accepted. However, changes in angler attitudes as a result of changes in management are likely to take longer than two years to become evident. Therefore, assessment of the effectiveness of new programs or changes in programs should be made only after the program has been in place for some time (4 to 5 years).

## 2. Increase the sample size.

A sample size of 5,000 was sufficient to describe the average characteristics of Virginia anglers. However, it was insufficient to accomplish all intended segmentation methods. Sample size was not large enough to examine all types of anglers, especially trout, striped bass, panfish, and crappie anglers. Increasing sample size to about 7,500 most likely would result in a large enough sample to complete all segmentation methods. The increased sample size should be worth the extra costs in personnel, printing, and postage.

Seven individual bodies of water had a sample size large enough (>50 anglers) to yield useful information, but once segmentation procedures are performed on a group of anglers that fish the same body of water, sample sizes may be too small to yield meaningful results. If managers wish to use future statewide angler surveys to better understand anglers on a particular body of water, then overall sample size must be increased. Another option would be to direct survey efforts specifically at anglers who fish a particular body of water.

Five-day license holders should be excluded from future surveys because of their low numbers and response rate. The effort used to sample and contact five-day license holders could have been better spent increasing the sample size and number of responses from other license types.

## 3. Shorten the questionnaire.

Streamlining the questionnaire will benefit future surveys in several ways. First, it will increase response rates. Second, it will lower the costs of the survey, both printing and mailing. Lastly, it will reduce the effort needed for data entry and analysis. Specifically, questions about magazine subscriptions, residence size during youth, and marital status were of little use and need not be included in future questionnaires. Also, several anglers commented that some questions were repeated. Anglers may be less frustrated with a shorter questionnaire and response rates may increase if future surveys condense some of the longer questions down to fewer statements.

The question about the functions of the Fisheries Division (#32) could be cut down to a few essential items, including “Developing access,” “Habitat improvement,” “Fish stocking,” “Education programs,” “Angler recognition programs,” and “Youth programs.” Similarly, questions about the importance of items when choosing a location to fish (#33) and determining frequency of fishing (#34) could be combined and reduced to a few key statements. These should include, having areas close to home, having areas with few recreational boaters, jetskiers and other anglers, having areas with many and large fish, having areas with good access, and having clean areas.

Questions about methods of fishing, species sought, demographics (except marital status and residence size during youth), motivations, and attitudes about the Fisheries Division and regulations were critical to the survey and should be included in future questionnaires. Asking these questions in a consistent manner in future surveys will allow for tracking of changes in angler characteristics and attitudes over time. It also may indicate where progress has been made and where more work is needed.

#### 4. Consider alternative methods for asking some questions.

Different question formats for some questions will result in less confusion for the angler and facilitate data entry and analysis, but may result in lower quality data. Specifically, questions about amount of effort spent fishing on different types of water and fishing for different species appeared to confuse about five percent of anglers and as a result, they were left blank or filled out incorrectly. Asking anglers to rank types of water and species of fish or multiple choice questions that ask the amount of effort spent may reduce confusion and result in less wasted data. However, in asking anglers to rank species or types of water, managers will lose detailed information about the amount of effort spent fishing for each species or on each type of water. If the present format is kept, managers should be aware that some data will be lost at the expense of finer detail.

The question about the type of trout waters fished should be asked in a way that it will identify the type of trout water fished most often. As the question currently is asked, if an angler indicated he or she fished for stocked and wild/native trout, there is no way of knowing how much effort the angler spent fishing on each. The angler may have spent 90% of his or her effort fishing for stocked trout and 10% for wild/native trout, but all

that is known is the angler fished for both. An alternative would be to ask what type of trout water the angler primarily fished.

There also was confusion over questions about city and county of residence. Some anglers live in cities and therefore have no county, whereas others live only in a county. The question should be simplified to “What is your city or county of residence?”

#### 5. Update the license database system.

A computerized license database, although a large initial investment, will make several aspects of conducting the survey easier and more efficient. Updating the system will benefit this survey as well as other surveys, such as the trout angler survey or any others as they are needed. Drawing the sample of anglers to take part in the survey will be much easier and less costly. Anglers will be entered into the database immediately, making it possible to conduct surveys during the fishing season or immediately following the season. The time lag for my survey was about two years (1998 license receipts used for the 2000 survey). If the database was updated, future surveys will have no time lag. Also, anglers could be segmented by when they purchased their license. A computerized system also would allow for some potentially useful information to be collected at the point of sale and be entered directly into a database. Collection of information such as gender, residence location, and age will help in monitoring the demographics of the angler population, even in years when a survey is not completed. Also, this information will help to validate the sample of anglers who take part in a survey. Because the information will be known for all license holders, survey respondents and nonrespondents can be compared as a check for nonresponse bias.

#### 6. Continue the segmentation methods described in Chapters 2 and 3.

The segmentation methods described in Chapters 2 and 3 were effective in identifying segments of the angler market in Virginia and should prove useful in management and marketing. Of the methods employed, multi-level segmentation by specialization level within species proved most useful. It identified managerially useful segments of anglers within each species preference group. This method of segmentation will help managers to understand the desired experiences of anglers and it will provide a

basis for understanding angler conflicts and angler communication methods.  
Furthermore, it can be applied to specific bodies of water to help guide management.

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**Appendix A: Letter sent to state agencies requesting statewide angler surveys**

«Title» «FirstName» «LastName»

June 21, 1999

«JobTitle»

«Company»

«Address1»

«Address2»

«City», «State» «PostalCode»

Dear «Title» «LastName»,

My name is Brendan O'Neill and I am a graduate student in the department of Fisheries and Wildlife at Virginia Tech. I am writing this letter in hopes that you will forward it to the person who supervises your statewide angler survey. My thesis project is the Development of a Statewide Survey of Virginia Anglers. The Virginia Department of Game and Inland Fisheries asked me and my advisor (Dr. Steve McMullin) to develop this survey to incorporate human dimensions information into their biennial regulation-setting process. The VDGIF would like to use the survey to identify segments of the angler market, angler attitudes and angler opinions on fisheries issues

If your agency conducts a statewide angler survey, could you please send me a copy of the survey instrument and your most recent report. I would be happy to send you a copy of the survey we develop. Thank you.

Sincerely,

Brendan O'Neill  
Department of Fisheries and Wildlife Sciences  
Virginia Tech  
Blacksburg, VA 24061-0321  
[boneill@vt.edu](mailto:boneill@vt.edu)

## **Appendix B. Mail questionnaire**

# Virginia Statewide Angler Survey 2000



VIRGINIA POLYTECHNIC INSTITUTE  
AND STATE UNIVERSITY

Yes No

1) Did you buy a Virginia freshwater fishing license in 1999?  Yes  No

If yes, go to question 3

2) If no, why did you not buy a fishing license? Please check one answer and then go to question 39 on page 12.

- No time to fish
- License was too expensive
- Too far to travel to go fishing
- I had no interest in fishing
- Other: (Please list) \_\_\_\_\_
- No place to fish
- Poor fishing
- I only fished where a license is not required

3) What type of fishing license did you buy? (check all that you purchased in 1999)

- Resident full season
- Senior citizen
- County/City
- 5 day resident
- Trout license
- National Forest permit
- Lifetime fishing license
- Saltwater

4) Overall, are the costs of freshwater fishing licenses in Virginia  Too low  About right  Too high

5) In 1999, how many days did you fish in freshwater in Virginia? \_\_\_\_\_

6) In 1999, what percent (%) of your total freshwater fishing time did you spend on each of the following types of water in Virginia?

- (a) Large lakes or reservoirs (over 500 acres) ..... %
- (b) Small public lakes (less than 500 acres) ..... %
- (c) Warmwater rivers and streams (bass, panfish, catfish) ... %
- (d) Public coldwater rivers and streams (trout) ..... %
- (e) Private lakes and ponds ..... %

7) What percent (%) of your total fishing in 1999 was spent on waters in National Forests? ..... %

8) In 1999, did you fish at any fee fishing areas in Virginia?  Yes  No

If no, please go to question 9 on page 2.

If yes, please answer questions (a) and (b).

(a) How many days did you fish public fee fishing areas in Virginia? \_\_\_\_\_

(b) How many days did you fish private fee fishing areas in Virginia? \_\_\_\_\_



9) What is the name of the body of freshwater you fished most frequently in Virginia in 1999? (Include the county where the water is located)

Name of water \_\_\_\_\_ County \_\_\_\_\_

10) What body of freshwater did you fish second most frequently in Virginia in 1999? (Include the county where the water is located)

Name of water \_\_\_\_\_ County \_\_\_\_\_

11) How frequently do you use the following methods of fishing when freshwater fishing in Virginia?

	Never	Rarely	Occasionally	Often	Always
(a) Fishing with bait .....	<input type="checkbox"/>				
(b) Flyfishing .....	<input type="checkbox"/>				
(c) Artificial lure/spin .....	<input type="checkbox"/>				
(d) Trot lines/set poles .....	<input type="checkbox"/>				
(e) Seining for bait .....	<input type="checkbox"/>				
(f) Other (please list)					
_____	<input type="checkbox"/>				
_____	<input type="checkbox"/>				



12) Please indicate how frequently you fish in the following ways.

	Never	Rarely	Occasionally	Often	Always
(a) From a boat or canoe with a gas motor .....	<input type="checkbox"/>				
(b) From a boat or canoe with an electric motor .....	<input type="checkbox"/>				
(c) From a boat or canoe without a motor .....	<input type="checkbox"/>				
(d) From the shore .....	<input type="checkbox"/>				
(e) From a pier or dock .....	<input type="checkbox"/>				
(f) By wading .....	<input type="checkbox"/>				

**13) Please indicate the percentage (%) of your total Virginia freshwater fishing effort in 1999 that you spent fishing for each type of fish.**

- (a) Smallmouth bass ..... %
- (b) Largemouth bass ..... %
- (c) Striped bass ..... %
- (d) Panfish (bream, sunfish, rock bass) ..... %
- (e) Shad and Herring ..... %
- (f) Crappie ..... %
- (g) Catfish and bullheads ..... %
- (h) Walleye and sauger ..... %
- (i) Trout (brook, brown, rainbow) ..... %
- (j) Muskie and northern pike ..... %
- (k) Other (please list) ..... %  
 \_\_\_\_\_ %  
 \_\_\_\_\_ %
- (l) Any kind of fish (no preference) ... %

**14) Did you fish for trout in Virginia in 1999?**     Yes     No (If no, go to question 15)

**(a) If yes, what types of trout waters did you fish?**  
**(Check all that you fished in 1999)**

- Stocked trout area (public)                       Private pond
- Special regulation area (public)                 Private stocked stream
- Wild/native trout area



**15) Please check any of the following freshwater fishing equipment items that you own.**  
**(Check all that apply)**

- rod/reel                       fish stringer                       trolling motor                       fishing books
- tackle box                       fish basket                       boat trailer                       temperature gauge
- bait bucket                       hip boots                       canoe                       fishing vest
- minnow trap or net               chest waders                       fishing glasses                       lure-making kit
- landing net                       boat                       fishing glasses                       fly-tying kit
- creel                       boat motor                       depth finder
- Other: (Please list) \_\_\_\_\_

**16) Please estimate your total investment in freshwater fishing equipment at the present time. (Including any equipment items from question 15)**

- \$200 or less                       \$501-1000                       \$5,001-15,000
- \$201-500                       \$1,001-5,000                       Over \$15,000

17) Below is a list of reasons why people fish.  
Please check the box that indicates how important  
each item is to you as a reason for fishing.

	Very Unimportant	Somewhat Unimportant	Neutral	Somewhat Important	Very Important
(a) To be outdoors . . . . .	<input type="checkbox"/>				
(b) For family recreation . .	<input type="checkbox"/>				
(c) To experience new and different things . . . . .	<input type="checkbox"/>				
(d) For relaxation . . . . .	<input type="checkbox"/>				
(e) To be close to the water	<input type="checkbox"/>				
(f) To obtain fish for eating	<input type="checkbox"/>				
(g) To get away from the demands of other people . .	<input type="checkbox"/>				
(h) For the experience of the catch . . . . .	<input type="checkbox"/>				
(i) To test my equipment . .	<input type="checkbox"/>				
(j) To be with friends . . . .	<input type="checkbox"/>				
(k) To experience natural surroundings . . . . .	<input type="checkbox"/>				
(l) To develop my skills . .	<input type="checkbox"/>				
(m) To get away from the regular routine . . . . .	<input type="checkbox"/>				
(n) To catch a trophy fish . .	<input type="checkbox"/>				
(o) For the challenge/sport	<input type="checkbox"/>				
(p) To experience adventure and excitement . . . . .	<input type="checkbox"/>				
(q) To share my knowledge of fishing with others . . . .	<input type="checkbox"/>				
(r) For physical exercise . .	<input type="checkbox"/>				
(s) Other (please list)	<input type="checkbox"/>				
_____	<input type="checkbox"/>				
_____	<input type="checkbox"/>				

18) Please indicate the extent to which you agree or disagree with the following statements.

			Strongly Disagree				Disagree			Neutral			Agree			Strongly Agree
(a) A successful fishing trip is one in which I catch many fish (number of fish)	<input type="checkbox"/>															
(b) Keeping the fish I catch is more enjoyable than releasing them . . . . .	<input type="checkbox"/>															
(c) Catching a trophy fish is the biggest reward to me . . . . .	<input type="checkbox"/>															
(d) A fishing trip can be successful even if I catch no fish . . . . .	<input type="checkbox"/>															
(e) A full stringer is the best indication of a good fishing trip . . . . .	<input type="checkbox"/>															
(f) When I go fishing, I am not satisfied unless I catch something . . . . .	<input type="checkbox"/>															
(g) Bringing fish home to the table is an important outcome of fishing . . . . .	<input type="checkbox"/>															
(h) The more fish I catch, the happier I am (number of fish) . . . . .	<input type="checkbox"/>															
(i) I am just as happy if I don't keep the fish I catch . . . . .	<input type="checkbox"/>															
(j) The bigger the fish I catch, the better the fishing trip . . . . .	<input type="checkbox"/>															
(k) When I go fishing, I'm just as happy if I don't catch a fish . . . . .	<input type="checkbox"/>															
(l) I am happiest with the fishing trip if I catch a challenging game fish . . . . .	<input type="checkbox"/>															
(m) I like to fish where there are several kinds of fish to catch . . . . .	<input type="checkbox"/>															



19) Overall, how satisfied were you with freshwater fishing in Virginia in 1999? Please circle one number from the scale of 1 to 7 where 1 is very unsatisfied and 7 is very satisfied. . . . .

	Very Unsatisfied								Very Satisfied
	1	2	3	4	5	6	7		

20) How would you rate your individual freshwater fishing success in Virginia in 1999? (Please circle one number) . . . . .

	Poor						Excellent
	1	2	3	4	5	6	7

21) Over the past 5 years, the quality of freshwater fishing in Virginia has...

- Declined
- Stayed the same
- Improved
- Don't know

22) How often do you keep the freshwater fish that you catch?

- Never
- Rarely
- Occasionally
- Often
- Always

23) Do you fish in waters with a slot limit? (A slot limit is when fish within a certain size range must be released, but fish above and below the range may be kept) . . . . .

	Yes	No
	<input type="checkbox"/>	<input type="checkbox"/>

If no, go to question 24.

If yes, please answer questions (a) and (b).

(a) When you fish in waters with a slot limit, how often do you keep fish under the minimum slot limit?

- Never
- Rarely
- Occasionally
- Often
- Always

(b) If you do not keep fish under the minimum slot limit, why not? (check one)

- I release everything
- Fish under the slot are too small to eat
- I do not believe in keeping small fish
- Consumption advisory on water
- Other (Please list) \_\_\_\_\_

24) On average, how many meals of fish that you caught from freshwater in Virginia do you eat annually?

- none
- 1-5
- 6-10
- 11-20
- 21-30
- 31 or more

25) Do you fish on waters with fish consumption advisories?

- Yes
- No
- Don't know

If no or don't know, go to question 26 on page 7.

(a) If yes, do you consume fish from these waters?  Yes  No

If no, go to question 26 on page 7.

(b) If yes, approximately how many meals of fish from these waters did you eat in 1999? . . . . . \_\_\_\_\_

**26) The Fisheries Division of the Virginia Department of Game and Inland Fisheries (VDGIF) is responsible for managing freshwater fisheries in Virginia. Before receiving this survey, how much did you know about the Fisheries Division of the VDGIF?**

- A great deal
- A moderate amount
- A little
- Nothing



**27) Please indicate your opinion of the Fisheries Division of the VDGIF.**

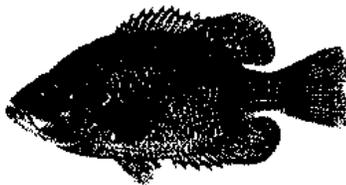
	<i>Strongly Disagree</i>	<i>Disagree</i>	<i>Neutral</i>	<i>Agree</i>	<i>Strongly Agree</i>	<i>Don't know</i>
(a) The Fisheries Division of the VDGIF does a good job of making anglers aware of current fishing regulations. ....	<input type="checkbox"/>					
(b) The management policies of the Fisheries Division of the VDGIF are biologically sound.	<input type="checkbox"/>					
(c) The Fisheries Division of the VDGIF makes a good attempt to explain its fishing programs to the public. ....	<input type="checkbox"/>					
(d) The staff of the Fisheries Division of the VDGIF provides knowledgeable service to their customers. ....	<input type="checkbox"/>					
(e) The Fisheries Division of the VDGIF provides adequate opportunities for public participation in decisions regarding fisheries related issues. ....	<input type="checkbox"/>					
(f) The Fisheries Division of the VDGIF provides good solutions to fisheries problems.	<input type="checkbox"/>					

28) How would you rate the overall performance of the Fisheries Division of the VDGIF in managing freshwater fisheries in Virginia?

- Excellent
- Very Good
- Good
- Fair
- Poor
- Don't know

29) If more restrictive regulations were required on the water that you fish the most often (see question 9), to what extent would you oppose or support the following regulations?

	Strongly Oppose	Oppose	Neutral	Support	Strongly Support	Don't know
(a) Increased minimum size limits (releasing fish below a certain length)	<input type="checkbox"/>					
(b) Maximum size limits (releasing fish above a certain length)	<input type="checkbox"/>					
(c) Slot limits (releasing fish within a certain range, but keeping fish below and above this range)	<input type="checkbox"/>					
(d) Reduced daily bag limits (creel limits)	<input type="checkbox"/>					
(e) Prohibiting the use of bait	<input type="checkbox"/>					
(f) Catch and release only areas	<input type="checkbox"/>					



30) Please indicate how strongly you agree or disagree with the following statement:

Freshwater fishing regulations in Virginia are easy to understand.

- Strongly Disagree    Disagree    Neutral    Agree    Strongly Agree

31) Did you have personal contact with a VDGIF game warden while fishing in 1999?

- Yes   No

**32) In your opinion, how important are each of the following functions of the Fisheries Division of the VDGIF?**

	Very Unimportant	Somewhat Unimportant	Neutral	Somewhat Important	Very Important
(a) Developing more access to bodies of water .....	<input type="checkbox"/>				
(b) Coldwater river and stream management (wild and native trout) .....	<input type="checkbox"/>				
(c) Warmwater river and stream management (bass, panfish, catfish) .....	<input type="checkbox"/>				
(d) Lake and pond management .....	<input type="checkbox"/>				
(e) Habitat improvement ..	<input type="checkbox"/>				
(f) Habitat and water quality protection .....	<input type="checkbox"/>				
(g) Management of fee fishing areas .....	<input type="checkbox"/>				
(h) Private pond management assistance ...	<input type="checkbox"/>				
(i) Warmwater fish stocking programs .....	<input type="checkbox"/>				
(j) Coldwater fish (trout) stocking programs .....	<input type="checkbox"/>				
(k) Aquatic resource education .....	<input type="checkbox"/>				
(l) Sport fishing education	<input type="checkbox"/>				
(m) Citation/Angler recognition program .....	<input type="checkbox"/>				
(n) Informing the public about fishing .....	<input type="checkbox"/>				
(o) Encouraging private land owners to open access to their waters for more fishing use .....	<input type="checkbox"/>				
(p) Encouraging fishing among youth .....	<input type="checkbox"/>				

**33) How important are each of the following items to you when choosing a location to fish?**

	Very Unimportant	Somewhat Unimportant	Neutral	Somewhat Important	Very Import
(a) Access for bank fishing . . . . .	<input type="checkbox"/>				
(b) Boat ramp/access area . . . . .	<input type="checkbox"/>				
(c) Adequate parking at the area . . .	<input type="checkbox"/>				
(d) Not having to travel far . . . . .	<input type="checkbox"/>				
(e) If the area does <u>not</u> have restrictive regulations . . . . .	<input type="checkbox"/>				
(f) If the area has a fish consumption advisory . . . . .	<input type="checkbox"/>				
(g) The fish species present in the water body . . . . .	<input type="checkbox"/>				
(h) If the area is not crowded with recreational boaters (excluding jetskiers) . . . . .	<input type="checkbox"/>				
(i) If the area has many fish (number of fish) . . . . .	<input type="checkbox"/>				
(j) Availability of guiding service . .	<input type="checkbox"/>				
(k) If the area is not crowded with other anglers . . . . .	<input type="checkbox"/>				
(l) If the area has restrictive regulations . . . . .	<input type="checkbox"/>				
(m) If the area has large fish . . . . .	<input type="checkbox"/>				
(n) The natural beauty of the area . .	<input type="checkbox"/>				
(o) Opportunities to view wildlife . .	<input type="checkbox"/>				
(p) Familiarity with the area . . . . .	<input type="checkbox"/>				
(q) Fish are stocked regularly . . . . .	<input type="checkbox"/>				
(r) Rest room facilities available . .	<input type="checkbox"/>				
(s) Campground facilities available .	<input type="checkbox"/>				
(t) If the area is not crowded with jetskiers . . . . .	<input type="checkbox"/>				
(u) The opportunities for other recreation activities (picnic area, playground, trails) . . . . .	<input type="checkbox"/>				
(v) Availability of boat/canoe rental at fishing site . . . . .	<input type="checkbox"/>				
(w) Having specific information about a particular location . . . . .	<input type="checkbox"/>				
(x) If the area is clean (litter free) . .	<input type="checkbox"/>				
(y) If the area has many types of fish	<input type="checkbox"/>				

34) How important are each of the following items in determining how often you fish in freshwater in Virginia?

	Very Unimportant	Somewhat Unimportant	Neutral	Somewhat Important	Very Important
(a) Having fishing areas close to home .....	<input type="checkbox"/>				
(b) Having fishing areas with many fish (number of fish) ....	<input type="checkbox"/>				
(c) Having fishing areas with few recreational boaters (excluding jetskiers) .....	<input type="checkbox"/>				
(d) If family or friends are available to go fishing with me .	<input type="checkbox"/>				
(e) Having fishing areas with large fish .....	<input type="checkbox"/>				
(f) Having fishing areas with few other anglers .....	<input type="checkbox"/>				
(g) Having free time to fish ...	<input type="checkbox"/>				
(h) High cost of fishing equipment .....	<input type="checkbox"/>				
(i) Having fishing areas with few jetskiers .....	<input type="checkbox"/>				
(j) Having fishing areas with regulations that are not complex	<input type="checkbox"/>				
(k) Having enough money to go fishing .....	<input type="checkbox"/>				
(l) Having fishing areas with several kinds of fish .....	<input type="checkbox"/>				



35) Did you pay to go freshwater fishing with a guide in Virginia in 1999?

No  Yes, if yes how many days? \_\_\_\_\_

36) Did you compete in freshwater fishing tournaments in Virginia in 1999?

No  Yes, if yes how many? \_\_\_\_\_

37) In 1999, did you introduce anyone to the sport of fishing?

No  Yes, if yes, how many adults? \_\_\_\_\_  
how many children (under 16)? \_\_\_\_\_

38) How frequently do you use each of the following sources to obtain information about fishing in Virginia?

	Never	Rarely	Occasionally	Often	Always
(a) VDGIF's <i>Virginia Wildlife</i> magazine . . . . .	<input type="checkbox"/>				
(b) Other VDGIF publications, handouts and news releases . . . . .	<input type="checkbox"/>				
(c) VDGIF worldwide web page (internet) . . . . .	<input type="checkbox"/>				
(d) VDGIF staff . . . . .	<input type="checkbox"/>				
(e) Newspapers . . . . .	<input type="checkbox"/>				
(f) Commercial magazines or newsletters . . . . .	<input type="checkbox"/>				
(g) Television . . . . .	<input type="checkbox"/>				
(h) Radio . . . . .	<input type="checkbox"/>				
(i) Friends or other anglers . . . . .	<input type="checkbox"/>				
(j) Sporting goods stores . . . . .	<input type="checkbox"/>				
(k) Bait dealers . . . . .	<input type="checkbox"/>				
(l) Fishing club . . . . .	<input type="checkbox"/>				
(m) Other (please list) _____	<input type="checkbox"/>				



39) How many years of fishing experience do you have? \_\_\_\_\_ years

40) On a scale of 1 to 10, how important is freshwater fishing as a source of satisfaction in your life? (please circle one number) . . . . .

	Not Important At All										Extremely Important
	1	2	3	4	5	6	7	8	9	10	

41) Please check all the fishing or related conservation groups you are currently a member of.

<input type="checkbox"/> B.A.S.S.	<input type="checkbox"/> Federation of Fly Fishers	<input type="checkbox"/> North American Fishing Club
<input type="checkbox"/> Trout Unlimited	<input type="checkbox"/> American Bass Association	<input type="checkbox"/> Local fishing club
<input type="checkbox"/> Izaak Walton League		
<input type="checkbox"/> Other: (Please list) _____		

42) How many fishing related magazines do you subscribe to? \_\_\_\_\_

**43) Who was most responsible for teaching you how to fish? (Check only one)**

- |                                      |  |  |
|--------------------------------------|--|--|
| <input type="checkbox"/> Father      | <input type="checkbox"/> Brother             | <input type="checkbox"/> I taught myself     |
| <input type="checkbox"/> Mother      | <input type="checkbox"/> Sister              | <input type="checkbox"/> Guide or instructor |
| <input type="checkbox"/> Grandparent | <input type="checkbox"/> Other family member | <input type="checkbox"/> Other (Please list) |
| <input type="checkbox"/> Spouse      | <input type="checkbox"/> Friend              | _____  |

**44) What is your city or town of residence?** \_\_\_\_\_

**45) What is your county of residence?** \_\_\_\_\_

**46) Which of the following best describes the area where you now reside?**

- |  |  |
|--|--|
| <input type="checkbox"/> A city of 1,000,000 or more people  | <input type="checkbox"/> A city or town with less than 50,000 people |
| <input type="checkbox"/> A city of 250,000 to 999,999 people | <input type="checkbox"/> A rural area                                |
| <input type="checkbox"/> A city of 50,000 to 249,999 people  |  |

**47) Which of the following best describes the area where you resided as a child?**

- |  |  |
|--|--|
| <input type="checkbox"/> A city of 1,000,000 or more people  | <input type="checkbox"/> A city or town with less than 50,000 people |
| <input type="checkbox"/> A city of 250,000 to 999,999 people | <input type="checkbox"/> A rural area                                |
| <input type="checkbox"/> A city of 50,000 to 249,999 people  |  |

**48) What is your age?**

- |                                   |                                   |                                   |                                   |                                   |                                   |                                       |
|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|---------------------------------------|
| <input type="checkbox"/> 16 to 17 | <input type="checkbox"/> 25 to 29 | <input type="checkbox"/> 35 to 39 | <input type="checkbox"/> 45 to 49 | <input type="checkbox"/> 55 to 59 | <input type="checkbox"/> 65 to 69 | <input type="checkbox"/> 75 and older |
| <input type="checkbox"/> 18 to 24 | <input type="checkbox"/> 30 to 34 | <input type="checkbox"/> 40 to 44 | <input type="checkbox"/> 50 to 54 | <input type="checkbox"/> 60 to 64 | <input type="checkbox"/> 70 to 74 |                                       |

**49) At what age did you begin fishing?** \_\_\_\_\_

**50) What is your gender?**  Male  Female

**51) What is your marital status?**

- Single  Married  Divorced  Widowed  Separated

**52) How many children under the age of 16 live in your household?** .....

**(a) If you have children under the age of 16, how many fished in freshwater in Virginia in 1999?** .....

**53) Which of the following do you consider yourself? (Check one or more)**

- |  |   |
|--|---|
| <input type="checkbox"/> White, not of Hispanic origin | <input type="checkbox"/> Native American  |
| <input type="checkbox"/> Black, not of Hispanic origin | <input type="checkbox"/> Asian            |
| <input type="checkbox"/> Hispanic                      | <input type="checkbox"/> Pacific Islander |
| <input type="checkbox"/> Other: (Please list)          | _____                                     |

**54) What is the highest level of formal education you have completed?**

- |   |  |
|---|--|
| <input type="checkbox"/> Some high school               | <input type="checkbox"/> Some college        |
| <input type="checkbox"/> High school degree             | <input type="checkbox"/> College degree      |
| <input type="checkbox"/> Vocational or technical degree | <input type="checkbox"/> Post graduate study |

**55) What was your household's 1999 annual income before taxes?**

- |   |  |  |  |
|---|--|--|--|
| <input type="checkbox"/> Less than \$10,000 | <input type="checkbox"/> \$25,000-29,999 | <input type="checkbox"/> \$40,000-49,999 | <input type="checkbox"/> \$100,000 or more |
| <input type="checkbox"/> \$10,000-19,999    | <input type="checkbox"/> \$30,000-34,999 | <input type="checkbox"/> \$50,000-74,999 |  |
| <input type="checkbox"/> \$20,000-24,999    | <input type="checkbox"/> \$35,000-39,999 | <input type="checkbox"/> \$75,000-99,999 |  |

**Is there anything else about freshwater fishing in Virginia that you would like to share with us?**

**Thank you for completing the questionnaire. Please fold the questionnaire in half lengthwise and return it in the postage-paid envelope to:**

**Dr. Steve McMullin and Brendan O'Neill  
Dept. of Fisheries and Wildlife Sciences  
Virginia Tech  
Blacksburg, VA 24061-0321**

**Results of this study will be available in July 2000 at regional VDGIF offices (see regulation book for locations) and on the VDGIF webpage ([www.dgif.state.va.us](http://www.dgif.state.va.us))**

**If you are interested in learning more about this project, you can view the projects' webpage at <http://fbox.vt.edu:10021/org/vtafs/oneill/oneill.htm>**

**Appendix C: Cover letters, return envelope, and postcard reminder**



## COMMONWEALTH of VIRGINIA

James S. Gilmore, III  
Governor  
John Paul Woodley, Jr.  
Secretary of Natural Resources

Department of Game and Inland Fisheries

William L. Woodfin, Jr.  
Director

January 18, 2000

Dear Virginia Angler:

Fishing is a very popular activity in Virginia, with nearly 500,000 people fishing in fresh water each year. The Virginia Department of Game and Inland Fisheries would like to gain a better understanding of the Commonwealth's anglers to improve management of fisheries and to increase fishing benefits for all anglers. Consequently, we have contracted with Virginia Tech's Department of Fisheries and Wildlife Sciences to conduct a survey of Virginia's anglers and how they feel about issues related to fisheries.

You have been randomly selected from a list of all 1998 fishing license holders to participate in this statewide survey. We have asked only about one percent of Virginia anglers to take part in this survey so it is very important for you to respond, even if you fished very little or not at all in 1999. Our pretests indicate that you should be able to complete the questionnaire in about 20 minutes. The attitudes and opinions you express in this survey will provide the Department of Game and Inland Fisheries with information needed to develop future fishery management goals.

Your responses will be strictly confidential. The number on your questionnaire is for survey administration purposes only. The number enables the Virginia Tech personnel to remove your name from the mailing list as soon as your questionnaire is returned so that you will not receive reminders and additional mailings. Your name will never be associated with your responses on the questionnaire.

I hope you will take the few minutes required to complete this questionnaire to assist us in managing Virginia's fresh water fisheries. If you have any questions, please contact Brendan O'Neill at Virginia Tech by phone (540) 231-5320 or e-mail ([boneill@vt.edu](mailto:boneill@vt.edu)). Thank you for your cooperation and assistance.

Sincerely,

A handwritten signature in cursive script that reads 'Gary F. Martel'.

Gary Martel, Director  
Fisheries Division

\\Gary\Coord\Va Angler Let

4010 WEST BROAD STREET, P.O. BOX 11104, RICHMOND, VA 23230-1104  
(804) 367-1000 (V/TDD) Equal Opportunity Employment, Programs and Facilities FAX (804) 367-9147

Second cover letter



## COMMONWEALTH of VIRGINIA

James S. Gilmore, III  
Governor  
John Paul Woodley, Jr.  
Secretary of Natural Resources

Department of Game and Inland Fisheries

William L. Woodfin, Jr.  
Director

February 8, 2000

Dear Virginia Angler,

About three weeks ago our associates at Virginia Tech contacted you seeking your preferences and opinions of fishing in Virginia. As of today we have not received your completed questionnaire. If you have recently completed and returned it to us, please accept our sincere thanks.

We have undertaken this study because of the belief that citizen opinions should be taken into account in the formation of goals and objectives that will guide future management of Virginia's inland fisheries.

I am writing you again because of the significance each questionnaire has to the study. Your name was drawn in a random sample of all licensed fresh water fishermen in Virginia. Only about one percent of all fresh water fishermen are being asked to complete this questionnaire. In order for the results of this study to be representative of the opinions of all Virginia anglers it is essential that each person in the sample return his or her questionnaire, even if you fished very little or not at all in 1999. In the event that your questionnaire has been misplaced, a replacement is enclosed.

I hope that you will take the few minutes required to complete this questionnaire to assist us in managing Virginia's fresh water fisheries. If you have any questions, please contact Brendan O'Neill at Virginia Tech by phone (540) 231-5320 or e-mail ([boneill@vt.edu](mailto:boneill@vt.edu)). Your cooperation is greatly appreciated.

Sincerely,

A handwritten signature in cursive script that reads "Gary F. Martel".

Gary Martel, Director  
Fisheries Division

GFM/BO/fha

4010 WEST BROAD STREET, P.O. BOX 11104, RICHMOND, VA 23230-1104  
(804) 367-1000 (V/TDD) Equal Opportunity Employment, Programs and Facilities FAX (804) 367-9147

Third cover letter



## COMMONWEALTH of VIRGINIA

**James S. Gilmore, III**  
*Governor*  
**John Paul Woodley, Jr.**  
*Secretary of Natural Resources*

*Department of Game and Inland Fisheries*

**William L. Woodfin, Jr.**  
*Director*

March 7, 2000

Dear Virginia Angler:

In January, our associates at Virginia Tech contacted you seeking your preferences and opinions of fishing in Virginia. However, as of today we have not received your completed questionnaire. If you have recently completed and returned it to us, please accept our sincere thanks.

If not, I have enclosed another copy of the questionnaire and would encourage you to respond. Your name was drawn in a random sample of all licensed fresh water fishermen in Virginia. Only about one percent of all fresh water fishermen are being asked to complete this questionnaire. In order for the results of this study to be representative of the opinions of all Virginia anglers it is essential that each person in the sample return his or her questionnaire, even if you fished very little or not at all in 1999.

This is the last reminder that we will send to you. Please take a few minutes to help us better understand what is important to Virginia anglers. If you have any questions, please contact Brendan O'Neill at Virginia Tech by phone (540) 231-5320 or e-mail ([boneill@vt.edu](mailto:boneill@vt.edu)). Your cooperation is greatly appreciated.

Sincerely,

A handwritten signature in cursive script that reads "Gary T. Martel".

Gary Martel, Director  
Fisheries Division

GFM/BO/fha

4010 WEST BROAD STREET, P.O. BOX 11104, RICHMOND, VA 23230-1104  
(804) 367-1000 (V/TDD) *Equal Opportunity Employment, Programs and Facilities* FAX (804) 367-9147

Return envelope



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UNITED STATES



**BUSINESS REPLY MAIL**  
FIRST-CLASS MAIL PERMIT NO. 10 BLACKSBURG, VA

POSTAGE WILL BE PAID BY ADDRESSEE

VIRGINIA TECH  
DEPARTMENT OF FISHERIES AND WILDLIFE SCIENCES (0321)  
ATTN: BRENDAN O'NEILL  
PO BOX 850  
BLACKSBURG VA 24063-9959



Postcard reminder

January 25, 2000

Dear Virginia Angler,

Last week we sent a questionnaire about freshwater fishing in Virginia to you. Your name was drawn in a random sample of freshwater fishermen in Virginia.

If you have already completed and returned the questionnaire, please accept our sincere thanks. If not, please take a few minutes to complete it today. We sent the questionnaire to only a small, but representative, sample of Virginia fishermen. For the results to accurately represent the opinions and preferences of Virginia anglers, it is extremely important that your questionnaire be included in the study even if you rarely fished in the last year.

If by some chance you did not receive the questionnaire, or it was misplaced, please call collect (540) 231-8847 and we will get another questionnaire in the mail to you today.

Thank you for your time and help.



Brendan O'Neill



Steve L. McMullin

Department of Fisheries and Wildlife Sciences  
Virginia Tech

**Appendix D: Follow-up questionnaire (phone)**

1. 1) Did you buy a Virginia freshwater fishing license in 1999?  
If no, ask #2 then go to #9  
If yes, go to #3
2. 2) Why did you not buy a fishing license?
3. 3) What type of fishing license did you buy?
4. 5) How many days did you fish in freshwater in Virginia in 1999?
5. 6) What percent of your fishing effort did you spend on each of the following types of water in Virginia?  
Large lakes or reservoirs?  
Small public lakes?  
Warmwater rivers and streams?  
Public coldwater rivers and streams?  
Private lakes and ponds?
6. 17) How important are the following items to you as reasons for fishing? (Scale of 1=Very unimportant to 5=Very important)  
To be outdoors  
For relaxation  
To obtain fish for eating  
To be with friends  
To develop my skills
7. 19) Overall, how satisfied were you with freshwater fishing in Virginia in 1999?  
(Scale of 1 to 7)

8. 28) How would you rate the overall performance of the Fisheries Division of the VDGIF in managing freshwater fisheries in Virginia? (Excellent, Very good, Good, Fair, Poor, Don't know)
9. 39) How many years of fishing experience do you have?
10. 40) On a scale of 1 to 10, how important is freshwater fishing as a source of satisfaction in your life?
11. 48) What is your age?
12. 50) Gender?

**Appendix E: Angler comments added to questionnaires**

**Access comments** (40 anglers added comments about access)

There should be a footage limit of 6-10 feet from the edge of a river that a person could legally fish from provided he or she got there by boat/canoe and not cross through a property owner land. This should not be considered trespassing.

Really no place to fish off the bank without getting permission because of “No trespassing” signs.

Please try to make more of the Shenandoah River in Rockingham and Page Co. accessible to bank fishing and canoe fishing. Try to work something out with private land owners.

Need more local places to go – more access to local (private) rivers. (3)

I would like to see more access to rivers like the James and Chickahominy etc. Some places you almost need a helicopter or you might be trespassing. The few access places now are not adequate.

Need more access to trout water.

Please try and get more private landowners in Sterling and Loudoun Co. to open their lakes to public fishing.

Need more boating access (ramps).(8)

Better boat access to Lake Moomaw.

Improve public access to Jackson River and other streams which run through private land.

Provide boat access on Delton side of New River.

Better access to the water edge.

Not enough access to our rivers. (6)

Reward land owners for opening up their land for fishing.

State should do more to open up private land to fishing.

Need easy access to fishing areas with bank or shore fishing and areas on lakes or ponds that hold a large number and variety of species.

The lake communities should be easier to access, like an entrance for fisherpeople only, at low or no cost.

I think there should be more public access for the price you pay for license. Most places charge you extra to fish there stream, plus you have to have your state license, so there is a great expense to fish the streams you grew up fishing for free.

I would like to see more private pond owners let more fishermen fish in them.

More places to fish without posted land.

When fishing mountain streams what is the regulation on trespassing—does the stream bed belong to the landowner?

It was my understanding that the government helped build watersheds with the taxpayers money. About 90% of watersheds in Charlotte Co. are locked up by landowners or clubs that are leasing land around them. We buy fishing licenses but don't have access to these watersheds. This seems very unfair.

I live in Fishersville and love to fish but there is no where to fish close except private ponds. I don't know who owns the ponds but they probably wouldn't let you fish anyway.

I believe the biggest problem we have today in freshwater fishing is private landowners posting property. I don't feel they have the right to disallow anyone fishing on or through their property unless they are damaging it in some way.

Better access and more boat ramps would help a lot for recreational and sport fishermen.

Not enough of public access to sizeable lakes like Swift Creek Reservoir. Need public boat ramps.

The county of Prince George needs a state owned boat ramp on the James River.

I would like to see public boat ramps along various creeks such as Hunting Creek that could be used by canoes or small boats at high tide to have access to the Potomac River.

I enjoy the new access areas to the James River at Mt. Athos Rd. and at the James River State Park.

For those of us who don't own a boat, there needs to be more places to fish at Smith Mountain Lake, besides the state park.

Solve the Lake Manassas problem. Need access to ramp and boat ramp.

Access to Lake Manassas in Prince William Co. should be addressed.

Provide public access to Lake Manassas.

We need more public access to the Potomac River outside the DC area!

**Jet skier and recreational boater comments** (39 anglers added comments about jet skis and boaters)

Jet skis should only be allowed in non-fishing areas.

Please restrict jetskiers to one part of lake. They should be restricted or forbidden to come within 100 ft of someone fishing.

All jet skis need to be prohibited from freshwater lakes.

Too many jet skis.

Please do something about the jet skis. They are really dangerous.

Get rid of jet skis.

Restrict jet skis.

Educate jet skiers.

Far too many jet skiers are permitted in fishing areas.

I would like to see some restrictions on jet skis—minimum age.

Jet skis on Claytor Lake disturb fishing and are dangerous.

Wish that some areas in Front Royal, Warren Co. were strictly fishing only, no jet skis or gasoline motor boats.

More quiet restricted areas to fish, no motors or jet skis!

Would like to see regulations or restrictions on jet skis. They have become a major source of danger, annoyance, rudeness, noise and scenery pollution.

Jet skis are extremely annoying to anyone who is at a lake or river to fish. There should be a restriction on skiers in areas where there is a pier or fishing facility.

Need more regulations on jet skiers.

Limit areas of lakes and rivers to jet skiers. (2)

Would like jet skiers to be restricted to certain areas and prohibited on small lakes like Byllesby and for bigger lakes to have areas for them and areas for the fishermen, like Philpott Lake, or laws to stop them from bothering the ones fishing.

I love fishing in Virginia. I wish, however, there was a separate area for jetskiers so that fishing is not disturbed.

Concerned about the increasing number of reckless jet ski operators on our waters interfering with fishing.

In freshwater areas, I'd like to see jet skis in limited areas only with speed restrictions, also more emphasis on civility and common courtesy. Too many boaters still think they are on the D.C. Beltway.

When educating new boat or jet ski owners, they need to be aware of the fishermen in the area their using and have respect as to not interfere with the activities of the fishermen.

Imprison jet skiers.

Ban jet skis from all waters. (2)

Exclude jetskiers from VA waters.

Ban jet skis. I cannot tell you how many times I have come close to being swamped in a canoe. Many larger boats are just as guilty but jet skis are the worst. As a boat owner, I would support mandatory licenses for boat drivers just like a car. 12 year olds don't belong on a jet ski!!! If nothing else tighten the laws and up the fines!

Total ban on jet skis on the Rappahanock River!

The area where I fish (Shenandoah River, Page Co.) is particularly crowded with recreational boaters and jet skiers, impacting the fishing during the summer and making it difficult and uncomfortable for small electric powered boats, canoes, etc. Many of us "quiet" boaters would like to see 1 or 2 days per week during the spring and summer months when gasoline powered craft would be banned from using smaller bodies of water such as these.

Too many jet skiers who don't respect Virginia waterway operating safety guidelines.

Jet ski operators are disrespectful as well as most recreational ski boats and pleasure boaters. As a result, in the late spring and all summer I only fish at night. In fall and winter anytime is pleasant.

I enjoy fishing and jet skiing. Most people that fish can't stand the jet skis. Is there a way to remind jet skiers to keep away from people while they are fishing? I think a little common sense would help, but maybe game wardens can be a little more visible.

More Virginia wardens needed to monitor recreational boats and skis on public waters!

The things that detracted from my fishing pleasure were rude boaters and unsafe boaters, also boats that were excessively noisy. Many of the people operating jet skis were inconsiderate to say the least and many times downright dangerous.

Jet skiers ruin fishing for our family. Boaters are allowed to operate boats at speeds that pose a risk to people on small boats.

Get rid of all jet skiers please. Do something with those assinine "bass" boats and all of their behaviors!!!!

Fewer high horsepower bass boats.

Need for boaters to slow down when people are fishing under bridges. Terrible at Lake Anna.

### **Trash and Pollution Comments** (81 anglers added comments about trash/pollution)

Virginia has some beautiful fishing but I would like to see stricter littering laws around water and land.

Need to clean up the rivers, crack down on laws of pollution. Something needs to be done. Have some kind of gathering for a big group of people to clean the trash out. I sure would help.

My major concern for the James River is there is such a disregard for the river itself. People are not keeping the river clean. I don't think there is enough educating our young people to leave the river, islands and surrounding land the way they found it.

There is too much trash left by people who fish and visit. Also there are too many geese on Rural Retreat Lake in Wythe Co. which leave droppings along the shore line which makes it very unsanitary and takes the pleasure out of fishing.

Fishing here is good, but people are very, very disrespectful of the environment. Very trashy fishermen, trashy streams, polluted banks. You need to enforce trash or litter laws badly!

Rewards program for not littering. Thinking about animal habitat that count on clean streams and rivers. More water clean up, get the debris out so the fish are eatible.

Trash in VA is a disaster. Many beautiful fishing areas are made ugly and no one seems to care.

People caught littering should be fined more severely.

I believe there should be higher limits on fines for litter that is left on shore or thrown in the water.

Some places have a lot of trash. I don't like trash in the environment.

Cleaner water.

Stop people from polluting the water.

Stop the pollution in the New River.

Too much litter!!!

Concerned about the amount of unchecked pollution of our freshwaters.

Come down hard on companies that dump waste into waters. (2)

I would like to see the people who trash our rivers and lakes prosecuted to the full extent of the law.

Need stiff penalties for littering along streams in National Forest areas.

I wish people would clean up their trash when leaving.

Improved litter control including discarding of line and lead shot through education and prosecution.

I am not pleased with the pollution caused by industry.

Please do all possible to cleanup our rivers and the PCB contamination. This is critical to our welfare.

Extreme interest in keeping our rivers clean. Free of trash and chemicals.

We should do anything we can to keep VA clean.

My main concern is about litter that is left behind by anglers. It seems as if they carried it in they should carry it out. I think this needs more enforcement.

I think pollution and trash around parking areas needs to be dealt with. Also, people throwing fishing line in the body of water.

Wish people would take care of our lakes and ponds—no littering!

Would like water to be a lot cleaner for fishermen and fish.

Clean the rivers up and keep the license so that my kids will be able to enjoy fishing!

Clean up the water and stop killing and contaminating the fish.

Clean up the streams!

I would like to see the rivers and lakes a little bit more cleaner and more fish to be caught.

Contaminated rivers—not fit to fish in.

We have a problem with people littering (leaving bait containers, wrappers, cans, etc.)

You need to concentrate on cleaning up the rivers and keeping them that way. Make high fines for littering.

Clean up the rivers and streams. Punish the polluters, having them pay for their effects. We are willing to pay higher fees if there is a return on this investment.

Need better quality of water.

I feel that all together the quality of the waters around where I live are getting polluted more and more every year. This is a shame not only for me but also for my son.

Make sure you do all you can to keep the rivers clean!

I think the rivers and creeks are very important and we should try very hard to manage and to keep them clean.

We need to stress keeping streams and banks clean of trash.

Please be more vocal about cleaning the upper Potomac and the North Fork of the Shenandoah.

Homeowners along lakes and rivers should keep junk and debris at least 50-100 feet away from the water to keep the water way cleaner when they flood.

Please, help keep our water clean!

I hope someone can get our rivers and streams cleaned up.

Clean up the Staunton River! (2)

Clean up the Dan and Staunton Rivers and Kerr Lake of the PCB contamination.

Concerned about Shenandoah River pollution clean up and control.

Concerned about PCB's in Shenandoah River.

Rapidan River has been neglected and is full of trash.

Clean up more lakes and rivers.

Need to take a strong role in protecting water quality and quality in freshwater rivers. Need to push DEQ to do more, more stringent environmental regulations on sources of pollution. It is horrible fish consumption advisories are necessary at all. Fishing among my family members has fallen significantly due to degradation of river commonly fished (Shenandoah).

Urban pollution on the Potomac River—DC area needs to be addressed. Public awareness of pollution problems needs to be strengthened.

The pollution levels in some rivers and streams are too high.

I have seen changes to our air and water quality which translates to diminished opportunities for our youth.

If a fish can not survive in the water that a company or household discharges, then that company or household is responsible for treatment of the water. Enforce that and VA fish will do very well.

Scared to eat fish out of rivers because of all the pollutants and chemicals that are in the water.

I'm concerned about the pollution of the water in the past few years. Warnings have been issued about eating the fish (catfish esp.).

I'm concerned about the bacteria in the water due to fertilizer. I would gladly pay more for my license for your added efforts in this area.

I mostly worry about water quality related issues. Farm runoff etc. combined with chemicals poisoning our streams, rivers, bay, ocean.

P.C.B.'s

I think it is most important to keep all the states rivers clean and free of contaminates for future generations of fishermen to enjoy.

Would like to see the James River cleaned up from Richmond on down to Newport News shipyard. If we are caught putting trash in the river we would be fined but the chemicals plants can dump toxic waste in it.

Wish there wouldn't be such hasey water conditions at times. That algae wouldn't grow around the edges of the body of water if it can be helped.

Water quality is the one issue that I feel could jeopardize the future of fishing in the James River.

Would fish more if I knew the quality of the water in the Dan River. I have seen so many reports, good and bad, I really don't know what to believe. I enjoy keeping a few fish for the frying pan and I don't care to fish in poor water.

Please help clean up the North Holston River. Some how make it safe for us to eat the fish.

Make the big companies along the Lury River stop dumping junk in the water so that we can bring the fish home. That is why I did not buy a license.

When the river got too polluted to eat out of it took most of the fun out of fishing in it. I'd like to know if anything will ever be done about pollution in the Shenandoah South Fork River. If you can't eat the fish out of the river, you should not have to pay for fishing licenses.

Have a water testing kit made available to anglers to help the state monitor water quality of our lakes and streams.

We need to preserve our beauty, the natural resources and use citizen involvement to keep our land and water clean.

I think the most important thing is water quality evaluation. People should know how polluted lakes, rivers and ponds are and fish should be tested for contaminants. If they are already doing that then the public needs to have access to the info.

We need more info on PCB contamination in our rivers before I will buy another fishing license.

It is essential that any department involved with fish and game make any and all pollution the major concern of that department.

Save the streams. It is a hideous reflection on all of Virginia that the state government allowed a plant in Front Royal to poison the Shenandoah and Potomac Rivers and

continues to do so. The VDGIF's charter is to conserve and manage the resource. The VDGIF cannot claim to have been successful until it has risen above politics and fought for the best environment for fish, wildlife, and Virginians.

The Back Bay area of Virginia was let go, deteriorate, and die. I do not know the exact reason or who to blame but I know for sure that it was one of the worst blows to VA's freshwater fishing spots. When the millfole grass was in Back Bay it was the best largemouth bass fishery on the East coast. To let this happen is inconcievable to me and a total disgrace to VA's Wildlife and Inland Fisheries Dept. I personally would like to see a truly concentrated effort to bring this beautiful area back to life before I die.

Am concerned with trash dumped in parking areas and ramps. Glass in particular, people will recycle cans but glass causes a lot of vehicle tire damage.

I am concerned about physteria outbreaks in freshwater streams.

Concerned about lower half of Smith River. Sometimes the water is blue, red, or even yellow below the water filtration plant.

### **Trout Comments** (139 anglers added comments about trout)

*(Opening day)*

Liked trout season opening instead of year round.

Go back to the old way, no one fished until a certain day.

Go back to opening day for trout. (5)

I don't like the all season stocking of trout, because they don't put as many fish in the water and the fish are not as big. And opening day of trout season was fun. Personally I would like to see year round trout fishing leave. I've also heard other anglers say this as well.

I would like to see the first day of trout season reinstated. (2)

I think they ought to go back to opening day in March and all of that stuff, a lot of people miss it.

Would buy trout license if season was closed for short time then have an opening day.

Close trout streams from Jan. 1<sup>st</sup> to 3<sup>rd</sup> Saturday in March for stocking recovery of streams and the greatest day in Virginia, opening day of trout season. Try to recover this special day from politicians and money.

Bring back opening day for trout season.

I lost all my interest in fishing when the opening day for trout was eliminated. It was the only day I could take a child fishing and be assured they would catch at least one fish.

A few years ago VDGIF decided to have a continuous trout season. I don't like this because it allows non-working people the opportunity to catch all fish stocked. I would like to see a return to opening day of trout season so working people could enjoy with their kids a day to fish.

I used to trout fish all of the time when they closed the season for stocking and had an opening day of 12:00 noon on the first Sat. of April. Many of my friends and myself used to look forward to this day. It was like a tradition to many of us. I know myself and most of my friends have not bought a trout license since the change.

*(Truck chasers/don't announce)*

I don't agree with posting the stocking schedule every time you have truck followers. Should have unannounced for those who fish on days off just to find out they stocked 4 days ago and can't get a bite after that area had been zoned in on by truck followers. The trout fishing has gotten so bad I am considering not buying a trout stamp this year (my first time).

Find a better way to level the playing field in stocked trout streams—the truck chasers strip all of the stocked trout from the streams in a matter of a day or less. Don't announce the stockings! (2)

It seems that certain people know of the very day that trout are stocked. When I call about it, it's the end of the week and its too late. When I get to the stream on Saturday all of the fish are gone. I will not buy trout licenses again.

Retired people and ones that don't work catch all of the trout.

It is not right that a person who works and has little time to go trout fishing and they have caught out by those that make regular trips to a location, catch limit, go to another, catch limit. Then later return the same day to these locations again and again. Used to be CB kept them informed where the wardens were. Now these damned cell phones.

In my area we have people that set along the roads waiting for the stock truck, call all their retired friends and by the time us people that have to work can go fishing all the stocked fish are gone.

Trout fishing has been taken over by a group of people that have nothing better to do than follow your stocking trucks around.

Retires, shift workers, and the unemployed are the only ones assured of catching enough for a meal nowadays!!!

Stocking trout is never a benefit to the working man where I am from. The disabled, who are disabled not to work, but can find the strength to follow the game tanks down the road always fish out the best waters before the working man can get a chance. Please stock on Thursday or Friday. PS. We are the ones paying their fees!

People who don't have to work or deadbeats catch all the trout out, they line up and follow the truck. If this means raising license fees to have more wardens or better control then so be it.

Please keep the stocking confidential. People who work during the day have no chance get down to the river before all the social security people and truck chasers beat them to it.

I think there are too many fish taken from our streams and wasted. In our area there are several guys who brag about following the stocking trucks.

I think that you should not tell when an area is stocked that way everyone can get a chance to catch trout that are stocked. As it is now, people who do not have to work catch most of the trout before anyone else gets a chance. I may not even buy a trout license this year because of this.

Could anything be done to stock in late evenings to prevent those that are retired or do not work from stock truck chasing? Or could the streams be shut down and stocked?

The current trout stocking policy is a joke. The locals must have a network to alert them about stockings. That and the truck followers have made me fish less for trout in recent years.

Trout stocking is very poor. They are small and if you are a working person and they stock the streams the older retired follow the trucks and wipe them out.

I think the streams should be stocked and no one should be told when or how many fish are stocked. I think they should do away with the phone number you can call to find out this info.

Most of the same anglers know when the stock truck is coming and catch most of the trout. The stocking should be random, the public should not be informed.

It would be nice if you could stock trout without telling the world. Secret stockings.

Do not tell the public until a day or two after trout streams are stocked.

By the time we get to trout streams there is nothing left.

*(Stock more)*

The more trout you stock the more I'll go fishing.

Stock more trout at Lake Moomaw.

I would like to see more stocking and better fish turned loose in Scott Co.

More trout waters. (4)

Need to improve the stocking program of trout with more stockings. I would pay more for better fishing.

I would like to see more streams in southwest Virginia stocked with trout.

I would like to see streams stocked more often. (4)

Stock more and be consistent about doing it.

The trout stocking program in Tazewell County is nearly non-existent. Several trout streams in the county are rarely stocked if at all.

I used to trout fish a lot but the trout stockings became too few, the people too many.

I've noticed a big difference in the amount of times mountain streams were stocked.

Would like to see the streams stocked more often. (2)

Would like to see more of Cripple Creek stocked with trout.

Stock Waller Mill and Little Creek more often.

Stock Hunting Creek (Bedford Co) again!

No fish after the first couple days, streams need to be stocked more often.

Stock waters in Western Virginia more often.

Certain lakes in Virginia should be stocked with trout weekly or bi-weekly.

*(Larger trout)*

Would like to have bigger trout stocked in National Forest streams.

Trout in stocking water are too small.

When stocking trout, please put trout in that are more than 7-8 inches long. When you pay \$25 for a license you should be able to catch that are pretty big.

The quality of trout sucks. Try stocking trout big enough to keep.

Stock larger trout. (16)

Would like to see the average trout stocked be larger.

The trout that are stocked in this area are barely over the size limit. As much as license costs it looks like VDGIF could stock bigger fish.

During the last several years it seems the fish that are being stocked are getting smaller. Almost to the point that they're not legal to keep.

I think that bigger trout need to be stocked. Many fishermen I know have stopped buying a trout fishing license. They say that it is not worth the time or money to catch such small trout.

Trout streams are stocked with trout ranging from 5 to 11 inches, if the cost of license continues to rise, and the size of trout continues to decrease people will stop buying them.

The fish size in Virginia is pathetic. I don't even bother to catch trout anymore. If I catch one trout, by the time I cut off the head and tail, I have a fish nugget.

I am disappointed with the size of trout.

Stock larger trout, an average of 12 inches or so.

Need to stock larger trout. If the fee fishing (private) businesses can do it, so can the state.

The fish in pay streams need to be larger. Have to pay to large a fee to fish for the small size of fish stocked.

*(Misc.)*

I think the stocking of the Smith River is very poor. Stocking is done mostly off of bridges and fish get caught very quickly. Fishing was better when fish were put all up and down the river.

A spreading out of the fish stocked should be done, instead of just stocking where the truck can stop. (6)

Stop stocking urban fishing areas (Accotink and Cook Lake) because they are highly polluted from street runoff and a waste of resources.

I feel that the urban trout stocking program is a waste of the states money and resources.

Easy access to trout stocking schedules. (4)

Better stocking of streams! (3)

I would like to see the golden trout introduced to VA streams.

Since they began the year round season, the freshwater stocking has become very poor.

Why not announce trout stocking schedule to give us travelers the same advantage that the locals have.

I would like t have specific directions to locate trout streams in Virginia.

There should be a special publication that shows the native trout fishing areas and the rules just for them on each body of water.

The trout fishing guide in VA Wildlife is very confusing. There are too many designated, restricted water with distinctions between them not real clear.

Need accurate information on trout streams that have been recently stocked. I don't have time to follow the trucks around like some people do.

Announce days trout streams are to be stocked and close them that day. (2)

Don't allow fishing for 6 hours after a trout stream has been stocked.

Close streams that are being stocked that day. Give the fish a chance and more challenging to catch. (2)

Close stream for 48 hours after stocking so fish can adjust and adults can take kids fishing.

Please close the stream for a week after stocking or something to let the fish adjust.

Rivers that are stocked should be stocked on Friday evenings so that men and women that work will have the same chance of fishing as people that are on checks.

Stock more in cold season than in warm.

I would like to see the larger, colder streams stocked with trout throughout the summer.

I would like to see a minimum length of 14 or 15 inches to keep stocked trout.

I have given up trout fishing because the locals fish all the good streams out.

Decrease creel limit from 6 to 4 to give more people a chance to catch fish

Interested in any state managed fee trout fishing area in Giles or Montgomery Counties.

I think more should be done to protect Virginia's native trout streams. (2)

I dislike the emphasis on the trout stocking program. I believe the VDGIF's budget would be far better spent on habitat and access to programs, and especially on promoting wild trout.

Increase the creel limits by one or two fish (trout) due to the costs of license.

Our current year round stocking program is very lacking with regard to the quality of fish and the decline of Brook trout.

More catch and release areas. (2)

More special regulation areas.

More artificial single hook only areas.

Possibly more fly fishing only areas with only catch and release.

More catch and release areas would mean better experiences for more anglers.

Lack of special reg. trout waters. Put and take trout waters are fished out within hours of stocking so special reg. areas are the logical choice.

Would like to see more enforcement of laws on special regulation streams. (3)

I would pay more for a trout license if more special reg/urban fishing areas were opened and the Jackson and Bullpasture Rivers received 2-3 stockings a month from October to May.

Trout fishing is not as good as the Rocky Mountains but it seems to be getting a little better.

One should be able to buy a one day permit to fish for trout.

Wild trout limits in park areas should be lowered to 3 or 4 fish a day.

Too much fishing being done after obtaining creel limit in stocked areas (Jackson River).

I believe the cost of a trout license should be lowered.

Manage your stocked trout streams (Laurel and Straight Branch) better. Fishing was better when I was a teenager 25 years ago. Close the streams and let fishing get better or it will soon be worthless.

Stock more remote areas with trout that allow the outdoorsman to hike to get to the fish instead of being able to park right next to the fishing hole. (2)

Hope the department of fisheries will look into changes in stocking or whatever because we feel we did not get our money worth.

Too many streams in Smyth County are closed to bait fishing. You mark the best fishing for flyfishing. You are squeezing the bait fisherman into town. That makes me want to quit trout fishing.

There is too many regulations, some parts of the water you have to use a certain kind of bait. That is where I used to fish.

The regulated area of the Smith River is too long! A lot of stocked rainbows go upstream and we non fly fishing anglers can't pursue them. That is a big stretch of beautiful water dedicated to only a handful of fishermen.

The VA Game Commission has done a cop out job of following through with the promise of developing the tailwater fishery below the Gathwright Dam. It was their promise that this would be the best trout fishery in the East and now it's a zero.

It appears that the Jackson River below the Gathwright Dam should be one of the outstanding trout streams. However, if trout are not to be stocked in this stream then the temperature should be raised to support warm water species. At present, this stream is virtually barren.

Please, please, please restore the Jackson River below the Gathwright Dam to a trophy trout water.

Would like to see something done to get the trout fishing going on the Upper Jackson River.

I love fishing for wild brook trout in the mountains of Virginia. I am concerned about impacts from flood, drought, and acid rain. Please deliver a "State of the Streams" report annually to update the conditions.

There is no sense in me fishing in Virginia when West Virginia stocks every week and the trout are much bigger.

Trout are not being stocked right in North Middle Jennings and Roaring Run.

We do very little fishing anymore because there are no trout in Douthat State Park.

I feel attention to stocked trout streams is very important. I don't mind paying license fees regardless of price as long as the outdoorsman get to see this money at work.

I really enjoy the year round trout stocking and fishing season. (2)

I do like the year round open season but the summer seems to be written off.

The trout stocking program in Northwest River is a class operation.

### **Miscellaneous Comments** (423 anglers added miscellaneous comments)

I would like to see more stocking of crappie and better habitat such as brush piles and ways to know or locate such brush piles.

Catch and prosecute people illegally harvesting fish for monetary profit.

Freshwater fishing in this area is very poor, that's why I quit.

I have seen the game warden one time in three years, I fish Bear Creek most of the time and have seen people taking well over the limit of bass. The restocking won't do the lake any good if the law is not enforced.

Watch for violations. More patrols and wardens would be good. (2)

Larger slot limits.

Access to better information.

I believe fishing programs that teach young people to fish as well as areas set aside and responsibly managed for fishing are a great asset to any community.

VDGIF programs geared to youth are the best investment in VA fishing future. Bream fishing is one of the best starts for youth. Open more free fishing days in the state. Designate more free fishing areas around the state for adults who take their kid fishing,

I would like to see the VDGIF introduce youth programs, activities and get together.

I think we should do whatever is necessary to get more youths involved in fishing and outdoor life. More programs for them with family involvement.

There should be at least one day a year set aside for kids 12 years and younger.

It would be great to encourage a fishing club in the 4H programs at school. Also would like to see some local clubs mentor and provide fishing expeditions to the underprivileged children of VA.

Fishing clinics should be offered at public schools.

They need more areas for kids to fish. The only place in my area is a stream below Douthat Dam. It is very difficult to teach my kids fundamentals in this area. The water is rapid and the bottom contains giant rocks. The result is more hangups than fish. Kids need things to grab their attention.

Have more events where young children could fish and catch fish. Fishing just for kids, no adults.

Would like to see seminars geared toward children on fishing, catch and release, respecting the outdoors, and litter.

I would like to have a place to take my kids fish that is easy to get to and safe.

We need more available places to fish that are suitable for kids. (2)

The department should inform the public more. Every city and county has a local paper, several times a year or when a change in regulations or major conditions change, place an article in the papers. Direct letters to people who purchase licenses would be even better. The hunting and fishing public should not only be informed about changes, but why.

Need more starter programs for young and old.

Speed has taken over the lakes and water.

Tournament bass fishermen are dangerous and reckless in the way in which they handle their boats. More attention by game wardens needs to be paid to this.

There are no lakes in Richmond area for bass and crappie fishing from a jon boat with electric or small gas motor.

Make a mandatory boat operation safety course.

The bluegill seem to be gone from the Holston River Northfork.

Make bigger and more fish.

No bluegills.

I feel that the money spent by the department is unfair because the eastern section has so much more opportunities, more places to fish, better lakes, better stocking. I think the money from licenses should be spent evenly over the whole state.

I think there should be more restrictions on the number and size of fish that you can keep.

I wish there was more areas to rent a canoe or small boat for to fish for cheaper.

Don't close the existing marina at Lake Manassas. The current management is doing an excellent job.

Need more public fishing areas in Lunenburg Co.

We need more small piers in the Dutch Gap area. There are no well lit piers in this area. It is dangerous to night fish.

The only problem I have is that there are no docks whatsoever that I am aware of where I fish on the Upper Potomac.

In public fee lakes I would like to see a lower cost to anglers, yearly boat launch fees reduced.

Launch fees should be reduced. (2)

Promote taking pictures of trophy fish and making mounts from molds and let the fish live.

Not enough handicapped toilets.

I would like to see more done to increase the striped bass stocking. Maybe with a volunteer donation.

More lakes can be made. (2)

More lakes.

Raise throw net size.

Raise striper limit to 24 inches.

Alcoholic beverages should be banned from all waters.

Fishing is allowed all night but some public landings close at dusk.

Need to stop trying to change the natural flow and temperature of our streams and rivers.

Why did VDGIF allow a certain type of carp clean up the hydrilla out of Lake Anna. It provided cover for fish and food for ducks.

Striper season should be closed in the Roanoke River during spawning season, also the Dan River.

I think it would be nice to have a longer season on striped bass. There are a lot more bass in the river than they are letting the public know.

Striper season needs to become more liberal—6 per day per person.

How about opening up the striped bass season a little longer and increase the bag limit.

Need to rethink limits on striped bass, they are thick in the rivers.

Yearly stocking of striped bass needs to be at the same level to maintain a constant supply of available fish.

It would be great to fish where more brush, trees, etc. were cut back for more productive fishing.

Stress catch and release.

Breed trophy bass.

The bass fishing on Claytor Lake this year was terrible.

Fishing laws are complicated, would like to see more standardization in size and slot limits.

Trophy fish water, one citation fish per day, encourage catch and release.

Stocking and wildlife protection are important concerns.

Keep control of alcohol drinking on water.

I don't do much fishing because the lakes around here never seem to have fish and the restrictions are too severe, I have seen fish big enough to feed a family thrown back and die because of size restrictions.

Where is all the water in Philpott going. There is no fishing there at all. (2)

Philpott Reservoir is very unsafe to fish or boat because the water is being pulled 15-20 feet below normal for generation.

Stock the ponds and reservoirs more often.

Would like to see more restrictions on canoes and tubers. They throw out beer cans and trash and block boat docks.

Experiment with stocking fish other than the natural fish of a lake or stream.

More stocking in Smith Mountain Lake.

Please change the citation length on largemouth bass. Go back to 8 pounds.

It is great to encourage adults to take a kid fishing. However, it would be nice of them to take a senior citizen fishing, they may find it rewarding themselves.

I think there should be more visibility of wardens at fishing locations. (4)

It would be nice to see fishing areas policed better, so there would be less trash and people would only keep their limit.

Bathroom facilities could be maintained and opened for public use.

Control the algae problem in lakes and ponds.  
More emphasis should be put on catch and release areas and education stressing the importance of today's release is tomorrow's catch.

I don't see the need for a 20 inch size limit in Washington Co.

VDGIF should use TV more to inform the public.

Reliable information on National Forest gate open/close dates should be available.

Keep working to get shad in Rivanna River up to Charlottesville dam.

Fishing is good but could use a little more attention in Southwest VA., stocking, habitat, etc.

We are willing to pay more for the chance to catch trophies (Cripple Creek). If higher fees mean bigger fish (citation size) great!!

Increase citation size largemouth bass to 24 inches because too many fish are being kept.

To get more people hooked on fishing proper management is essential. Hence if more people got interested in fishing by catching more fish, the revenues from fishing license sales would increase and allow for more money to be invested in quality fish management. To begin the cycle the state must make the initial investment.

I believe VDGIF's focus has strayed too far from quality fishing! Emphasis and spending is directed toward land and facilities, i.e. boat ramps, picnic areas, campgrounds, small impoundments with limited access; while sacrificing the stocking or providing for quality fishing on major rivers or lakes. I am excited to know that we have more ramps, recreational boaters and camps while the fishermen and women who pay for them catch nothing. Great system!

Most places are overfished along the New River in Giles Co. I think they should restrict fishing for one year to let fish produce more fish and let the sizes get bigger.

The fish population in Claytor Lake and the New River seems to have dwindled in the past few years. I believe that more restocking of these areas is a must. Use older and larger fish so they survive.

Less tournament pressure on bass during the spawn.

Eliminate all bass tournaments.

Lake Orange in Orange Co is very poorly run. The fishing has fallen way off. There are no trash cans. I also don't think it should be open 24 hrs. From the messes that are left it is obvious very little fishing is going on.

Need to do more to protect the Potomac and Northern VA from development.

Would like to see some habitat improvements and stocking for species other than trout. Bass and catfish. Branch out and include these species in VDGIF stocking and habitat improvement program.

I would like to see more walleye stocked in the warmwater rivers and streams.

More species of fish stocked in VA waters (walleye, striped bass).

Do not stock any more muskie in the Clinch River. I fished this river for 40 years and have never seen a muskie until VDGIF stocked them. Stock more crappie, bass, catfish, and walleye.

I would like to see a good stocking program for musky in Kerr Lake.

The fishing in Lake Gaston has dropped off severely in the last few years.

The fresh/saltwater fishing license should be good on the complete length of the Potomac River, all the way upstream to the DC tidal basin.

Need to limit the number of tournaments allowed. They are overfished.

I wish that more tournaments were held in local areas near my residence. Less fee's.  
More information.

Need more information about local fishing tournaments.

Rules and regulations are way too complicated. (2)

Set a slower speed limit for night boaters and fishermen.

Encourage fishing shops to give seminars by VDGIF personnel.

Both the quantity of fish and size of fish have declined in the James River.

I understand consumption advisories but I ran into a lot of people who were misinformed and actually afraid to fish. Isn't there a better way to help folks understand these things.

State money should not be used to stock areas closed to the public.

I would like to see more attention paid to fish other than trout.

Not enough public fishing areas.

Would like to see a publication by the department on the ethics and courtesy of fellow anglers.

Publish more information on safe consumption of fish from the lower James River, acceptable amounts for consumption.

More restrictions on canoers. They litter and get tangled in fishing line.

Commercials on local cable TV would help people about where to go fishing in that area.

Our streams in lower part of VA could use some help.

Allow more bank or shore fishing.

The release of muskie and pike in the Clinch River accompanied by people keeping fish (large and small) has made catching quality and quantity of sport fish (bass, bluegill, and rockbass) quite difficult. Need catch and release of all species except muskies and pike.

Concerned about pickeral/muskie type of fish in upper James, Jackson, and Cowpasture Rivers Because their numbers have increased in recent years and the size of smallmouth bass and panfish have diminished.

Biggest problem is the reluctance of people to release fish. Should be able to apply for a mounted copy of a trophy fish so it can be released.

Need to do a better job with the smaller lakes. Too many fish are being kept. Enforce the regulations.

I don't think we should have to pay at public lakes.

Why do you pay to fish at Shendo Lake after March.

When you pay the taxes that we do there should be no fee areas to fish.

Stock bass in Levisa River.

Stock other species besides trout.

Stocking of Northern Pike in cold water lakes in Western VA was a great move.

Slot limit needs to be changed—12 inch bass are the best eating.

Better reciprocal licenses. (5)

I feel too many types of licenses are required if in VA. It gets expensive and ridiculous.

VA should change their fishing license, whatever month they are purchased they should not expire until a year from that date. More people would purchase license. (3)

Why does a senior citizen have to pay for a license.

Lower the price of fishing licenses. (5)

Freshwater and saltwater fishing licenses should be very inexpensive to get more people to fish.

Why does a senior citizen pay so much to fish? I am 79, I have a free WV and TN license and can't afford a VA license.

The average person spends \$30 and a lot of times you drive 2-3 hours to find a good place to fish. I feel that the state should stock smallmouth in the streams to get more people to fish.

I am originally from the west and something that struck me negatively was the requirement in VA of all the stamps. The cost of the license is okay, however all the stamps I was forced to purchase to fish for trout in a NF was ridiculous!

Fishing is relaxing and wholesome but the licenses are too expensive.

Too many licenses needed. (3)

It costs too much to launch and fish in Northern VA (Pale City, Woodbridge).

Over 65 should not have to buy a license.

Make it possible for the casual fisherman to fish without the high cost of license and permits to fish on certain waters.

Need a special license for little or no cost to make it possible for disabled to fish with their caregiver.

Would like to have a boat license for all people on board to fish. (2)

I would like to see boat license sales so someone who wants to fish to see if they like it could go on my boat license without buying a personal license. They do it for salt water fishermen. I would buy one if it was available. (2)

Raise the fishing license cost.

Repeal the saltwater license.

Sportsman like myself would be willing to volunteer if programs were available.

Put pictures of citation fish on the web page. Let qualified candidates send pictures via email.

Stock more gamefish and baitfish to increase the population and produce more trophy fish.

All efforts should be made to open up the Jackson River below Lake Moomaw for public fishing.

The introduction of muskies has greatly damaged our fishing for bass, rock bass, bream, and catfish. I see these species greatly reducing each year due to the large muskies attacking our lines while we're fighting bass to the boats, several times cutting the fish in half.

Would like to see the VDGIF become very active in improving the fishing in South Holston Lake. Need slot/length limits, creel limits and need them enforced. More promotion of catch and release. Stock South Holston Lake with bass, walleye and pike.

Encourage catch and release. I would pay more to better educate people about conservation and the benefits of catch and release.

Simplify boating regulations.

I eat all of my catches that are satisfactory

I've seen a lot of people with cast nets larger than 6 foot radius.

I feel there is a need for more game law enforcement, especially creel limits and litter control.

More conservation and creation of lakes between 20 and 40 acres.

I really enjoy the freshwater fishing guides that come out every year with all the areas you can fish in VA and tell you how to get to them this is helpful when you want to get away for a day and you're just not sure where to go.

I think all people who have a VA fishing license should be on a mailing list or e-mail list with updated information. Increase license fees to accomplish this.

If you own a fishing license, I would like to see a newsletter sent to you updating all the important changes and regulations.

Should be more free info available when I get my license. Also signs at landings explaining the consequences of keeping certain sized fish.

All who purchase a license should be sent notices of stockings and of decisions that will affect our fishing and limits. (2)

Needs to be easier way to get a map to a lake.

I need more information, newsletters, handouts, and magazines.

Inform the public better about policies, programs and problems.

We need more info on wadeable stretches of rivers.

Catfishing in SW VA has declined and there is nowhere to do serious catfishing.

Stock more fish everywhere.

We need more piers.

I think there should be more maps and guides to lakes and rivers when you buy your license or maybe a telephone to where the fish are plentiful. (2)

I would like to see VDGIF sponsor more seminars specific to a particular area, perhaps have local guilds or tackle shops people as speakers.

I would like to have more public fishing lakes that have boat rentals. Allow more bait shops to sell fishing licenses.

More boat rentals or sales of old boats from recreational parks.

There are lots of lily pads taking over farm ponds in this area most landowners and farmers need information on how to control them.

River fishing has decreased.

Creel limits on panfish in small rivers and stock them.

I think that places for more shore fishing are needed because it is very difficult to take small children out in a boat. To me this is a family recreation that is inexpensive and allows the family to spend time together.

I really enjoy public lakes and ponds with pic-nic, and boat rental for family events.

Keep stocking stripers in Lake Anna.

We need more stripers stocked in Smith Mountain Lake. (2)

Increase stocking of stripers. I would pay more for this (like the trout license).

Stock more stripers.

I would like to see Claytor Lake striper fishing (stocking) increase.

More information on stocking of striped and hybrid striped bass in SW VA.

Striped bass should have a minimum and maximum size limit in order to repopulate the areas with larger fish to breed a better and larger fish population.

Stock often.

The creeks and rivers need more attention. Need to be stocked with fish. Very low fish populations where I live.

Too many hillbillies hotrodding on Smith Mountain Lake.

Concerned about water level and debris in Kerr Lake.

Without water there will be no fishing or fish. Watch the water levels.

Stock more challenging fish such as large and smallmouth bass and catfish of all species and less stocking of fish such as muskie or pike and make more places for children to fish.

Better stream management needed.

Public freshwater is too crowded.

It is aggravating to get a 5 day license for a 1 day trip. So many days of unlicensed fishing should be allowed for those of us who fish so infrequently.

I think the fines for no license is too high.

Need more catfish (blues and channel) in Claytor Lake.

Improve striper fishery in Kerr Lake.

Need to make the striper a game fish so that we can eliminate the useless slaughter of thousands of fish in nets.

Do not try to make our waters too tourist friendly as it brings people who don't appreciate and don't respect or natural resource. It is fine to add concession stands, toilets, etc. in parks such as Burke Lake but our natural waterways/rivers should be kept as wild as possible.

Need handicapped areas on small streams so these people could fish.

Fifteen or twenty years ago we fished the Rivanna River in Fluvanna Co. We used to see large schools of minnows. We could catch all we needed for bait. We never see them now.

I would pay more in license fees to have fish ladders built on all the dams on the rivers around here (Meherrin and Nottoway Rivers).

I would like to see more patrols on the water, catching people that abuse alcohol on the water! This is a big problem on the Rappahannock River and Lake Anna.

I wish that there were more game wardens available so those people who won't follow creel limit rules would get caught. (2)

I am very discouraged when I hear about people catching and keeping over their limit. I also frequently hear about people following the stock truck to get easy pickings at stocked waters. I have resorted to fishing private land. We need more game warden coverage.

Would like to see your officers be a little nicer to the law abiding boaters on the water. We respect the officers that keep us safe on the water, we would like the same in return.

The game wardens in our area (Mecklenburg) are such a nuisance that all the locals are complaining. They should not be allowed to even speak with you if no recklessness is evident.

My biggest problem with freshwater fishing has been my contact with some of the game wardens, they need some instruction on dealing with people.

Need game wardens with better attitudes.

Most license holder have to work for a living, I think Game Wardens should too.

VA game wardens are some of the most strict and unfriendly law enforcement officers I have ever been in contact with. I believe they should have a sensitivity course.

The introduction of the new game warden in Patrick Co. is causing a lot of fishermen to quit fishing.

Game wardens seem only to be after the violations. They never help or even have literature. If you ask them they only want to see your stringer for violations.

Fish and Game Commission agents are unreasonably harsh and non-flexible.

In our public lake in Nelson Co, we experienced catching fish with sores on their body or lying dead around the edges of the lake.

I'm concerned about the fish I catch with diseases. I see more frequently every year.

Fishing could be better where I live (Botetourt Co).

I realize public opinion plays a large role in the decision making process concerning regulations for the VDGIF. I suggest that the good of wildlife play the major role in establishing regulations.

I think you should enforce catch and release more.

Addition of man made lakes and ponds in public parks (northern VA) by VDGIF would be important.

Instead of stocking striped bass in Claytor Lake and muskie in the New River, more should be done for the white bass population in Claytor Lake and the game fish population in the New River. Everyone agrees that we need to get children more involved in fishing, but it is harder to keep a child interested when there is few game fish to catch.

Virginia needs better reciprocal agreements with WV and MD.

A need for people to be more responsible, safe, and polite.

The public should do more in helping management of the waters.

Catch and release only in New River from NC line to WV line.

If more regulations equals fish, then so be it, just keep us informed.

Less government is better government although we do need regulations and enforcement.

The lack of stripers, white bass, and walleyes in Kerr Res. is very disappointing .

The bass fishing at Gaston is terrible.

I am very pleased with Smith Mountain Lake, the fishing is great.

Offer a basic statewide fishing/hunting license at a discount to those purchase separately.  
Split the revenue evenly between both programs.

Stock Little Reed Island Creek with bass of any kind.

Need more public lakes in Greene Co.

Keep up with the striper stocking in VA, it is a wonderful program.

I like to fish but the last 2 years there has not been enough water.

Need more programs for kids and safety.

Would like to see improvement in stripers Kerr Lake.

I would like to see stripers or hybrids stocked in Occaquan Reservoir.

The most enjoyable fishing trip you will ever have is where you take a kid fishing.

Would like to have waterproof licenses/holders provided even if it increases the costs.

Trot lines should be more regulated. I have seen people with truckloads of catfish and big bass. Should be outlawed for a year or two to help the population of fish in rivers grow.

Virginia has great fishing! (11)

Virginia is a very nice state to fish in.

I have very positive perception of fishing in VA. There are endless opportunities and for that I am grateful.

Virginia's fishing and wildlife areas are well managed and cared for.

Virginia has done a good job throughout my years of fishing in providing a wide range of locations and species to catch.

*(Thanks)*

Thank you for helping to protect our natural environment.

Keep up the good work. (10)

I appreciate the work Virginia is doing to preserve the natural resources.

I think VDGIF is doing a fine job overall!

Keep up the good job you are doing. (3)

Thanks for all you do. (3)

Thank you for providing me with the opportunity! Stride to keep God's country clean!

Thanks for letting us participate.

Thank you for considering me for your questionnaire.

Thanks for asking for my input.

VDGIF does an excellent job. I feel comfortable each time I am on Virginia waterways knowing the water and natural resources are as important to the VDGIF as they are to me.

The finest lakes I fish are VDGIF. You can tell a department lake before you even get out of the car.

I enjoy the fishing show on TV, also appreciate everything VDGIF does for the Virginia fisherman. I thank you VDGIF for your management programs and am glad VA has a program like yours.

The VDGIF did a great job with their publications. I know all the regulations and where the public launch sites are. The website is very informative.

The VDGIF staff I have met are friendly and helpful in their knowledge and do a great job.

Thank you for giving me the areas in which I can fish.

In recent years VDGIF in general has done a commendable job in attempting to improve fish and game populations in VA.

Good luck and thanks.

Glad to help, thanks.

(Misc.)

I would like to own a fish farm and I plan on doing more fishing in the future.

I hope to fish more in 2000. (7)

I do not get to fish as often as I like. (4)

I wish I had more time to fish. (7)

Never enough time to fish.

Very excited for spring to arrive so I can go out.

I would like to fish more but I am uneasy in the woods without a fishing partner.

I would like information on where to fish around Roanoke.

Can disabled veterans get a free lifetime license.

I did not fish last year because wife and I had a baby. (2)

I find fishing very relaxing and can't wait to go this year.

Fishing is one of the most relaxing things that a person can do whether they catch fish or not.

Fishing is one of the most relaxing and satisfying experiences a person can enjoy. I strongly advise everyone to try it and get hooked on it.

I only fish for relaxation. (5)

Fishing is more relaxing without my 4 year old and six year old boys.

The thing I enjoy most about freshwater fishing is just to be outdoors and enjoying nature.

My enjoyment with fishing centers around a safe and aesthetically pleasing location within 50 miles of home.

In my opinion there is nothing better than night fishing for catfish. No drugs or beer, just a few friends catfishing.

What happened to the New River fishing in the mouth of Wilson area.

Last year was the first in past 20 years that I did not buy a fishing license.

Besides my son, fishing is the most important thing in my life.

Fishing is time for our family to be together and away from other pressures of life.

I only go fishing to spend time with my husband. (2)

I am not an avid fisherman, I only go with my father who has fished for many years.

I only fish for fish to eat.

I just like to fish because I enjoy it.

Fishing has fallen off in Lake Gaston because of the hydrilla problem.

1999 was a poor year for me, low water in rivers and lakes where I usually fish.

1999 was an atypical year for me. Rarely do I not purchase a Virginia license.

Most private ponds are underfished. Need to advise landowners on pond management.

We own a bass boat with a new environmentally safe motor, but we can't run it in Lake Frederick which is only 8 miles from home.

Briery Creek and Lee Lake have excessive timber that is good for fishing but dangerous for boat traffic.

The James River State Park is beautiful.

I am from the old school, still use cane poles and redworms. Catch a lot of suckers and redhorse.

The water was too low to fish last year.

I fish the Nottoway River in Sussex Co. The logging road used to be open and made it easier to fish but now it is closed.

Floating the Shenandoah, Rappahannock, Rapidan, Potomac, and James Rivers in a canoe is one of life's great joys.

Would like for the forests, rivers, and streams to be there for our younger generation.

I hope it will always be there.

Please help to keep fishing alive. (2)

Publications should be proofed a little more since the recent one had an 800 number that connected to a sex hotline.

Mattaponi River needs regular stocking of panfish and shad. We are overwhelmed by small rockfish.

Large bodies of water are not fertile enough to support large numbers of fish. Need more weeds.

Would like to see more cover and foliage put into lakes.

Someone should check the number of fish in the creeks around Pearisburg. There are less now than when I was younger.

Stock more baitfish to increase the size and number of gamefish.

Why are trees and other natural debris removed from streams and rivers, they provide fish habitat.

I would like to see the Newport News Park become catch and release.

Crappie are good for the table and all crappie caught should be removed from the lakes I fish. We need fewer, but larger crappies.

I only fish for stripers and only buy freshwater license in case I troll above the line in the James River.

I don't eat any largemouth bass but if someone decides they want to fry some legal bass they should not feel ashamed of doing so.

I like fishing but it is not a priority for me.

My health limits my fishing.

I fished very little in 1999 due to illness.

Work kept me from fishing more in 1999.

I like to fish in quiet areas and go when time is available.

My family and I enjoy boating and fishing.

Fishing is a great sport.

Freshwater fishing is the most exhilarating type of fishing in my life.

Fishing is the most wonderful leisure activity.

Private ponds offer so much more over public lakes.

Should have a state holiday for fishing!

Why doesn't the general assembly give money to the Game Commission instead of being totally funded by the sale of licenses.

Fishing is one of the greatest pleasures in my life.

Fishing is fun. (2)

I love fishing. (3)

I would stay on the river banks 24 hours a day if I could. It's great family fun, very relaxing.

The only reason I work is to support my fishing habit.

As our children grow older, we can do more fishing. We want natural areas preserved and habitats protected for the future.

It would be wonderful for fishing to continue in my family through the generations.

Beavers are overpopulating and building dams that cause the water to sit still and get a brown film on top.

I am not a sportsman that measures success by the size of the take. I love the outdoors and teaching youngsters to fish and hunt.

Small streams are not stocked because of low water, maybe this needs a study.

I used to receive a calendar from your organization. I no longer do but wish I did.

Saltwater fishing is good too.

Most of my fishing is saltwater.

I mainly saltwater fish because of the amount of stripers and bluefish.

Is there a saltwater survey.

I have filled out this survey, now send one on saltwater, this is the one that really needs to be looked at seriously.

Why limit it to freshwater?

I like to hear that the dams have been busted and a fish ladder put in for saltwater fish to have a chance to come to freshwater to spawn.

Keep up the good work on shad restoration, breaching dams on the James.

I enjoy fishing in most of the local lakes. But my wife and I find great satisfaction in driving 2 hours to Lake Gaston to fish all through the night.

I enjoy fishing very much. I enjoy eating and cooking fish and taking the kids to fish.

At age 76 I have difficulty wading and have no one to go fishing with.

As a member of a bass club, I believe clubs have helped regulate and educate fishing and fishermen in this state and are an excellent source of information.

Maybe it is just a tough place to fish but I have no luck at Lake Frederick.

Concerned about overcrowding in Northern VA areas. Our population growth is putting a lot of pressure on available waters.

I am 81 years old and retired from the ministry. I am a true believer in the saying "The Lord doesn't count the time against you that you spend fishing." I thoroughly enjoy the sport.

*(Survey)*

Overall freshwater fishing in my area is fantastic, but this is a terrible survey I expect you will have a dismal return due to its length and the way questions about keeping fish were worded.

Excellent survey!

I enjoyed this survey.

You will catch more surveys with fewer questions.

Too long. (4)

This survey was too long and redundant!

Next time if the questionnaire will be this long, provide some kind of incentive to fill it out (money, discounts on supplies or licenses, etc.)

With all do respect, some of the questions in this survey sound like they were made by people who have their degrees but have never gotton their feet wet, much less gotten a pole in the water.

Put the survey on the internet, make it easier on yourself.

I don't care for all these nosey surveys that take up my time.

Glad I could be a part of your survey.

If this questionnaire was your idea why do we have to pay the postage. I didn't ask to get this.

This is an extremely poorly worded survey. Very unprofessional.

I enjoyed your survey but you could have got by with less duplication of questions.

Surveys are important, however, the repeating questions are annoying. Some questions need clarification or explanation.

I thank you for the questions, I understand more what fish mean to me.

Thank you for asking my opinion on the fishing around here and I hope my answers will help keep the area beautiful and bountiful.

Thank you for sending me this questionnaire.

Thanks for caring enough to send surveys!

Question 33 was confusing.

Question 55 is none of your dam business, you are a bunch of nosey people.

This appears to be a poorly disguised effort to “survey” a favorable impression of the VDGIF. I hope not. Are you truly interested in our input.

Conducting this survey is a step in the right direction and I commend you for it.

1% of VA anglers to take part in the survey is quite a large number. Nonetheless, you underlined the importance in the letter. That was a good step to increase the success rate of the program.

## **Vita**

Brendan M. O'Neill was born on December 30, 1976 in Newport, Rhode Island. He grew up in Portsmouth, Rhode Island, graduating from Portsmouth High School in 1995. He attended the University of Rhode Island and graduated with a Bachelor of Arts degree in Biology in 1999. While attending the University of Rhode Island, he worked for the Rhode Island Department of Environmental Management. In June of 1999, he began studying the human dimensions of fisheries management in Virginia as a Master of Science candidate in the Department of Fisheries and Wildlife Sciences at Virginia Polytechnic Institute and State University.