

PUBLIC AND PROFESSIONAL PERSPECTIVES OF VIRGINIA'S STREAM AND RIVER RESOURCES

by


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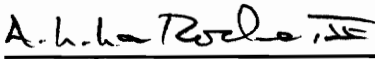
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ABSTRACT

A ten page questionnaire was mailed to 3,000 randomly selected Virginia residents. All 169 Virginia fisheries biologists and game wardens were sent a similar but shorter questionnaire. The survey was designed to: 1) determine the relative importance of selected stream and river characteristics to public and professional respondents; 2) identify the improvements the public felt were needed on streams and rivers; 3) determine how well natural resource professionals could predict public opinion; 4) determine the relative importance of several selected Virginia stream and river user groups to public respondents; 5) determine how well natural resource professionals could predict user group importance; and 6) describe the similarities and differences between user groups. Public and professional respondents valued characteristics of streams and rivers similarly with clean water being the most important characteristic of streams and rivers and "few other people use the area" being the least important. The public felt that water quality and litter clean-up were highly needed, whereas professionals predicted that fish population improvement would be highly desired by the public. The user groups with the highest importance values were fishing, hiking/sightseeing/birdwatching, and picnicking/camping. Professionals predicted that the most important activities would be fishing, motorboating/waterskiing, and canoeing/kayaking/sailing. User groups were different with respect to: 1) use frequency; 2) 7 of 11 reasons to visit streams and rivers; and 3) importance of 5 of 9 VDGIF programs.

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Table of Contents

ABSTRACT ii

ACKNOWLEDGEMENTS iii

List of Tables ix

List of Figures xiii

Overview: Introduction, Survey Methods, General Summary and Conclusions . 1

 INTRODUCTION 2

 SURVEY METHODS 6

 Survey Construction 7

 Survey Implementation 8

 SURVEY RESPONSE 9

 GENERAL SUMMARY 10

 Chapter 1 10

 Chapter 2 11

 Chapter 3 11

 GENERAL CONCLUSIONS 13

 LITERATURE CITED 15

Chapter 1

Relative Importance of Stream and River Characteristics to Virginia Residents
and Resource Professionals 19

 ABSTRACT 20

INTRODUCTION	20
METHODS	23
Survey Methodology	23
Data Analysis	23
Stream and River Characteristics	23
Satisfaction	26
Improvements on Streams and Rivers	27
Crowding	27
Importance of Stream and River Functions	28
Fish Edibility	28
Drinking Water Safety	29
RESULTS	29
Stream and River Characteristics	29
Satisfaction	30
Improvements Needed on Streams and Rivers	30
Crowding	31
Importance of Stream and River Functions	31
Fish Edibility	31
Drinking Water Safety	32
DISCUSSION	32
LITERATURE CITED	37

Chapter 2

Improvements Needed on Streams and Rivers	46
ABSTRACT	47
INTRODUCTION	47

METHODS	51
Improvements Needed on Streams and Rivers	51
Most Needed Stream and River Improvements	52
Barriers to Recreation	52
RESULTS	53
Improvements Needed on Streams and Rivers	53
Most Needed Stream and River Improvements	54
Barriers to Recreation	54
DISCUSSION	55
LITERATURE CITED	61

Chapter 3

User Groups in Virginia and Their Attitudes Towards Streams and Rivers	68
ABSTRACT	69
INTRODUCTION	69
METHODS	76
Data Analysis	76
User Group Importance	76
User Group Relationships	77
Use Frequency	78
Satisfaction	78
Improvements Needed on Streams and Rivers	79
Reasons to Visit Streams and Rivers	80
Stream and River Characteristics	81
Regulation of Stream and River Activities	82
Threats to Streams and Rivers	82

VDGIF Program Importance	83
RESULTS	83
User Group Importance	83
User Group Relationships	85
Use Frequency	85
Satisfaction	86
Improvements Needed on Streams and Rivers	87
Reasons to Visit Streams and Rivers	88
Stream and River Characteristics	90
Regulation of Stream and River Activity	91
Threats to Streams and Rivers	91
VDGIF Program Importance	92
User Group Summary	94
DISCUSSION	95
User Group Importance	95
User Group Relationships	99
Consumptive and Non-consumptive Constituents	108
LITERATURE CITED	111
Appendix A: Survey sent to Virginia residents	147
Appendix B: Survey sent to natural resource professionals	160
Appendix C: Correspondence with public respondents.	169
Appendix D: Correspondence with professional respondents	174

Appendix E. Public survey results	178
Appendix F. Professional survey results	205
VITA	221

List of Tables

Chapter 1:

Table 1. Grouped characteristics of streams and rivers and the percent of number-one rankings in each characteristic group by public and professional respondents. 39

Table 2. Improvements needed, the percent of public respondents indicating that a particular improvement was needed, and the percent who indicated that a particular improvement was most needed. 40

Table 3. Relative importance of ten functions of streams and rivers as assessed by public respondents. 41

Chapter 2:

Table 1. Comparison of public opinion on most needed stream and river improvement and professional prediction of public response. 62

Table 2. Barriers to recreation, the number of respondents who felt each was a barrier to them, and the percent of respondents who felt each was a barrier. 63

Chapter 3:

Table 1. Comparison of Rij's and tally of number one rankings: professional respondents only. 117

Table 2. Use frequency for all stream and river users, six Virginia user groups, and consumptive and non-consumptive users.	118
Table 3. Satisfaction for all stream and river users, six Virginia user groups, and consumptive and non-consumptive users.	119
Table 4. Improvements needed on streams and rivers	120
Table 5. Comparison of consumptive and non-consumptive opinion on the most needed improvements.	121
Table 6. Percent of Virginia stream and river users that felt each of the eleven reasons to visit streams and rivers was of low, moderate, and high importance.	122
Table 7. Percent of all stream and river users and six Virginia user groups indicating that "for family recreation" was of low, moderate, and high importance.	123
Table 8. Percent of all stream and river users and six Virginia user groups indicating that "to be with friends" was of low, moderate, and high importance.	124
Table 9. Percent of all stream and river users, six Virginia user groups, consumptive and non-consumptive users indicating that "to be alone" was of low, moderate, and high importance.	125
Table 10. Percent of all stream and river users and six Virginia user groups indicating that "to experience the scenery" was of low, moderate, and high importance.	126
Table 11. Percent of all stream and river users, six Virginia user groups, consumptive and non-consumptive users indicating that "to develop outdoor recreational skills" was of low, moderate, and high importance.	127

Table 12. Percent of all stream and river users, six Virginia user groups, consumptive and non-consumptive users indicating that "to fish or hunt" was of low, moderate, and high importance.	128
Table 13. Percentage of all stream and river user, six Virginia user groups, consumptive and non-consumptive users indicating that "to see wildlife" was of low, moderate, and high importance.	129
Table 14. Most important characteristics of streams and rivers to all stream and river users, six Virginia user groups, consumptive, and non-consumptive users.	130
Table 15. Percent of stream and river users that felt that several activities were regulated "not strictly enough", "about right", or "too strictly."	132
Table 16. Percent of all stream and river users that felt each of several threats to streams and rivers was of a low, moderate, and high threat.	133
Table 17. Percent of six Virginia user groups indicating that "forest removal" was of low, moderate and high threat.	134
Table 18. Percent of all stream and river users that felt that several VDGIF programs was of low, moderate, and high importance.	135
Table 19. Percent of all stream and river users, six Virginia user groups, consumptive, and non-consumptive users indicating that fish stocking" was of low, moderate and high importance.	136
Table 20. Percent of all stream and river users, six Virginia user groups, consumptive, and non-consumptive users indicating that "stream habitat management" was of low, moderate and high importance.	137

Table 21. Percent of six Virginia user groups indicating that "development of public access" was of low, moderate and high importance.	138
Table 22. Percent of all stream and river users and six Virginia user groups indicating that "non-game fish management" was of low, moderate and high importance.	139
Table 23. Percent of six Virginia user groups indicating that "environmental permit review" was of low, moderate and high importance.	140
Table 24. Percent of all stream and river users, consumptive and non-consumptive users indicating that "fish population monitoring" was of low, moderate and high importance.	141
Table 25. Percent of all stream and river users, consumptive and non-consumptive users indicating that "endangered species restoration" was of low, moderate, and high importance.	142

List of Figures

Chapter 1:

- Figure 1. Public and Professional RI_j's for eleven characteristics of streams and rivers 42
- Figure 2. RI_j's for groups of characteristics of streams and rivers (public only). 44

Chapter 2:

- Figure 1. Improvements needed on streams and rivers, the percent of public respondents indicating that each improvement was needed, and the percent of professionals predicting that the public would want each improvement. 64
- Figure 2. Improvements most needed on Virginia's streams and rivers, the percent of public respondents indicating that each improvement was most needed, and the percent of professionals predicting that the public would want each improvement most. 66

Chapter 3:

- Figure 1. Relative importance of user groups to the public and professionals predictions of user group importance as represented by RI_j. 143
- Figure 2. Use frequencies for anglers and picnickers/campers. 145

Overview: Introduction, Survey Methods, General Summary and Conclusions

INTRODUCTION

As the public uses more recreational facilities and becomes increasingly concerned about factors affecting the quality of the environment, like urban development and industry (Mason Dixon Inc. 1990), it becomes more crucial than ever before for natural resource managers to monitor public perspectives. Knowledge of public perspective is crucial in understanding the public's recreational tendencies and environmental concerns, and assessing the demand for each resource (Romsa and Hoffman 1980). It has been hypothesized that natural resource professionals often have little confidence in the ability of the public to contribute to the policy making process (Soden et al. 1988). Consequently, public values often are not seriously considered or studied. This attitude could be partially due to the assumption that the public lacks long-term consideration for resource needs (Loftus 1987), an assumption to be examined in this document. Objective information on public perspectives is necessary to identify their priorities and their level of concern for resource needs. Once available, this information can be used to enhance the lines of communication between the public and natural resource professionals. Natural resource professionals can use this information to direct educational programs, prevent conflict between public expectations and resource well-being (Hendee and Harris 1970), and guide natural resource policy. This information will improve the public involvement process as professionals will be able to anticipate public concerns and integrate those concerns into management plans.

Much information is available regarding the perspectives of the public on natural resources. Most of this information focuses on groups with certain activities in common (i.e., user groups). Perspectives of anglers (Bryan

1977, Graefe and Ditton 1986, Harris and Bergersen 1985, Loomis and Ditton 1987, Schoolmaster 1986), floaters (canoe, kayak, raft, and inner-tube) (Knopf et al. 1983), and hunters (Kennedy 1970, Thomas et al. 1984) have been examined, but rarely has the general public been the focus of an attitude study. Studies concentrating on specific user groups are inadequate to reveal the viewpoints of the residents of a region as socially and geographically diverse as Virginia. Motivations, attitudes, and attributes differ among user groups, thereby necessitating comprehensive studies of the general public (Moss 1985).

Knowledge of attitudes and values of Virginia residents can facilitate communication between this public and recreational managers (Schoolmaster 1986), thereby allowing managers to spend more time reaching objectives and less time planning them. Recreational managers can learn from the common sense (knowledge based on multiple observations without scientific or statistical support) held by the public (Loftus 1987) and the public can take advantage of programs (i.e., fish stocking, access enhancement, etc.) provided by resource professionals (Moss 1985). By learning constituent desires, management will have the opportunity either to alter their management practices to accommodate the public or to provide education about and justification for their current practices. An example of good communication between recreational managers and the public is the annual angler survey conducted by the Colorado Wildlife Commission, which is used to guide their policies and objectives (Harris and Bergersen 1985). To stress the importance of communication, Yarbrough (1987) strongly emphasized that "unless policy and laws are supported by the values, interests, and beliefs embedded in community structure, they will fail." This thesis introduces further information that

will benefit natural resource management by revealing public perspectives.

Predominant methods of communication between managers and the general public (e.g., public meetings and letters of concern), although useful, are marginal in meeting the needs of either group. Fishery management councils feel that time is wasted in this process and interest groups feel they are not being given sufficient opportunity to present their viewpoints (Lime 1971). What is needed is a medium by which the general public can indicate what is needed without the intimidation inherent to the public meeting forum. Public meetings are also undesirable because of their tendency to draw the extremes in opinion but leave the majority of the public at home (Cortner et al. 1984). According to Heywood (1981), public involvement is based on two premises. The first is that public managers are responsible for involving a broad segment of the public in planning and decision making. The second is that public input generated through systematic collection of opinions (survey research) is a legitimate means of including those who may not be heard at public meetings. Other sources also verify that public surveys, when properly implemented, are an excellent means of identifying or ascertaining change in public perspectives (Dillman 1978, Jones 1985, de Vaus 1986).

The advantages and disadvantages of a particular method of survey research (mailed questionnaire, telephone interview, or face-to-face interview) as outlined by Benson (1946), Dillman (1978), and Jones (1985) are highly dependent on the conditions under which the survey is to be conducted and the options with which the researcher is presented. My situation involved a single administrator, 3169 potential respondents, and a large geographic area. Mailed questionnaires were the best way to administer this survey because, under these circumstances, they are more cost effective (in use of

time and money) than the other types of surveys. They also feature lower interviewer bias (influence of the interviewer on the results of the survey) than telephone and face-to-face interviews.

Disadvantages associated with mailed questionnaires include: 1) representative samples are difficult to obtain because lists of the general public are inadequate; 2) response rates are expected to be lower than with similar face-to-face or telephone interviews; 3) question format needs to be simple because the interviewer cannot aid the respondent; and 4) data accumulation is slower than with other types of surveys.

Duttweiler (1974) surveyed the general public surrounding Owasco Lake, New York. He concluded that questionnaires can be used effectively to obtain angler preferences and are superior to "casual contacts with sportsmen organizations or individuals." Duttweiler's study, although not designed to describe the range of recreational uses of Owasco Lake, was a logical step in this direction. The public was first classified as "fishing" or "not fishing" and preferences of the fishing public were described. Moss (1985) conducted a survey designed to identify the attitudes of Virginia residents toward wildlife management practices. She studied the range of public user groups and attitudes they held without a *a priori* classification.

This document features three chapters that focus on different portions of the public. It compares public and professional responses in an attempt to see if professionals can predict public responses and if public and professional respondents have the same environmental concerns.

The first chapter examines the characteristics of streams and rivers that are important to the general public and natural resource professionals. The chapter identifies which characteristics are most valued by both

populations and compares public and professional values. The second chapter focuses on a narrower faction of the public, stream and river users, and identifies what improvements they feel are needed on the streams and rivers they use. These desires are then compared to predictions made about public desires by natural resource professionals. Lastly, the third chapter separates stream and river users into user groups. The relative importance of these user groups, based on the number of people who participate in them and how important each activity is to each respondent, is assessed and compared to natural resource professional predictions made about user group importance. Then, characteristics, motivations, and opinions of user groups are compared with respect to:

1. frequency of stream and river use,
2. satisfaction,
3. improvements needed on streams and rivers,
4. reasons to visit streams and rivers,
5. importance of stream and river characteristics,
6. threats to streams and rivers, and
7. importance of VDGIF programs.

SURVEY METHODS

A systematic random sampling process was used by Survey Sampling Incorporated to select 3,000 Virginia residents from telephone directories. A ten-page short-answer questionnaire was then mailed to each resident in the sample. A similar questionnaire was also sent to all (169) Virginia fisheries biologists and game wardens (resource professionals).

Survey Construction

The survey was constructed using Dillman's (1978) Total Design Method (TDM). The TDM provides guidelines for question formulation, word choice, questionnaire length, question order, and questionnaire appearance. The TDM also facilitates obtaining desired answers in a desired form, maximizing response rate and minimizing response bias. These concerns are important when conducting surveys (Wellman et al. 1980, Goodstadt et al. 1977).

The public questionnaire (Appendix A) consisted of four sections. The first section consisted of 16 questions that asked about individual recreational use of streams and rivers. The second section used six questions to inquire about individuals' feelings on public use of streams and rivers. The third section contained seven questions about current natural resource issues, and the last section asked seven demographic questions. The back of the questionnaire included space for comments by respondents and a thank-you message.

The professional questionnaire (Appendix B) consisted of four sections as well. In the first section, professionals were asked to predict public responses to recreational stream and river use questions. Seven of the nine questions in this section were comparable to public questions. The second section contained three questions about professionals' opinion on public use of streams and rivers (all of which paralleled public questions). The third section asked five questions related to natural resource issues (4 parallel), and the last section contained five demographic questions (4 parallel). The last page included space for comments and a thank-you message.

Survey Implementation

The implementation methodology for the public survey also followed Dillman's (1978) TDM, which consists of four mailing stages. The first stage included a questionnaire and cover letter mailed on 4 September, 1990 to the entire sample of 3,000. This date was chosen for two reasons: 1) most summer vacations were assumed to be completed; and 2) beginning the survey process soon after the peak of river use helped to reduce the possibility of recall error (error in memory associated with the passage of time; Harris and Bergersen 1985). The second stage was a postcard reminder sent one week later (11 September) to the entire sample thanking respondents if they had returned their questionnaire and reminding them to complete and return the questionnaire if they had not. The third stage was a second questionnaire and cover letter sent to non-respondents three weeks after the first mailing date (26 September). The cover letter with the second questionnaire also informed respondents of an improvement made to the survey (item omission was high for questions 17 and 18 in the first public survey; the improvement made it easier for the respondents to answer). Dillman's final stage consists of a third copy of the questionnaire and a cover letter sent to non-respondents seven weeks after the first mailing date. However, given the decreasing response with each mailing stage, consequent low expected return in the final 30 days (12% during this period) and the cost of mailing another round of surveys, I decided to send only a postcard reminder on October 3, one week after the second questionnaire was mailed.

A telephone survey of non-respondents to the public questionnaire was also attempted (again as described by Dillman [1978]). One hundred telephone

numbers were systematically selected from the list of non-respondents. Seventy different numbers were actually attempted before the telephone survey was aborted because of a lack of response. The telephone survey results were not included in any analytical procedures in this thesis.

The survey implementation process was simplified for the resource professionals, a presumably more captive audience requiring less intense follow-up procedures (Dillman 1978). Instead of using several follow-ups as a stimulus for response, supervisor cooperation was used. The resource professionals were informed that the questionnaire was forthcoming and advised by their supervisors to respond to it. The professionals were notified initially in November, 1990 and the questionnaire and cover letter were sent on December 3, 1990. A postcard reminder was sent one week later (December 10).

SURVEY RESPONSE

Of the 3,000 public questionnaires mailed, 353 (12%) were non-deliverable due to expiration of forwarding order, failure to leave a forwarding order, address not known, or death of the respondent. Removing these from the list of potential respondents leaves a target population of 2647. Of the 1147 questionnaires returned 36 were not useable due to large amounts of missing data, unreliable data, unidentifiable respondents, or because the questionnaire was not completed by the person on the mailing label. This leaves an effective response rate of 42% (1111 out of 2647).

Of the 169 professional questionnaires mailed, 144 (85%) were returned and used.

GENERAL SUMMARY

Below is a list of summarized findings presented on a chapter by chapter basis. Some findings are included in the text of more than one chapter but summarized only in the chapter in which they first appear.

Chapter 1

1. Clean water was ranked as the most important characteristic of streams and rivers by public respondents. It was seen as being far more important to respondents than ease of access, lack of crowds, and presence of large, catchable fish.

2. Public respondents and natural resource professionals valued the characteristics of streams and rivers similarly.

3. Most respondents felt that their water was safe to drink.

4. Many of the respondents were not sure if the fish in the stream or river closest to them were safe to eat.

5. Most respondents were satisfied with the recreational opportunities provided them by the streams and rivers of Virginia.

6. Public respondents felt that habitat for fish and wildlife, source of natural beauty, and public water supply were the most important stream or river functions.

7. Many stream and river users felt that water quality improvement was the most needed improvement on streams and rivers.

8. Many respondents (41%) felt the stream and river areas they used were crowded.

Chapter 2

1. Most stream and river users felt that water quality improvement and litter clean-up were needed at the streams and rivers they used.

2. Professionals predicted the public would want more/better access and fish population improvement more than water quality improvement and litter clean-up.

3. Access, facility, and crowding concerns were less significant barriers to recreation than time, money, and family responsibilities.

Chapter 3

1. Fishing, hiking/sightseeing/birdwatching, and picnicking/camping were the three most important sets of activities to Virginia stream and river users.

2. Professionals predicted that fishing, motorboat/waterskiing, and canoeing/kayaking/sailing would be the three most important activities to Virginia stream and river users.

3. The RI_j statistic is a better measure of importance than number one rankings for recreational activities.

4. User groups have different use frequency characteristics. Anglers use streams and rivers at all frequency levels, whereas picnickers/campers tend to use streams and rivers only infrequently.

5. Consumptive users were less satisfied than non-consumptive users.

6. "To relax", "to experience the scenery", and "to see wildlife" were three very important reasons for Virginians to visit streams and rivers.

7. Consumptive and non-consumptive users felt differently about the improvements needed on streams and rivers. Consumptive users were more concerned about improving fish populations and access than were non-consumptive users.

8. The importance of seven out of eleven reasons to visit streams and rivers was significantly related to the user group of the respondent.

9. Consumptive and non-consumptive users felt differently about the importance of five out of eleven reasons to visit streams and rivers.

10. Most stream and river users felt clean water was the most important characteristic of streams and rivers.

11. Stream and river users felt very strongly that urban development and industry were not strictly regulated enough.

12. Stream and river users consider human litter, industry, urban development, and forest removal to be highly threatening to the value of streams and rivers.

13. The opinion on only one of eleven threats to streams and rivers (forest removal) was related to the user group of the respondent.

14. Stream and river users considered all of the VDGIF programs to be important.

15. The importance of five out of nine VDGIF programs was related to the user group of the respondent.

16. The opinions of consumptive and non-consumptive users differed significantly for four out of nine VDGIF programs.

GENERAL CONCLUSIONS

1. Public and professional respondents valued stream and river characteristics similarly. Both populations valued characteristics that described a healthy river system more highly than characteristics that directly benefitted human use. The assumption that the public is selfish and short-sighted is unproven in this research, as is the assumption that public and professional concerns are different. Continued observance of these assumptions will only serve to widen the gap between natural resource professionals and the public they encounter. If natural resource professionals approach the public without making such assumptions, a trust can be formed that will allow more constructive interaction between both populations.

2. Natural resource professionals had difficulty in predicting the improvements wanted by the public and the activities the public participated in on streams and rivers. This is probably because natural resource professionals come in contact with vocal special interest groups and assume that these groups represent the public. In order for natural resource professionals to make decisions for the public, they need to be advised about public attitude and know public characteristics. Public surveys are far better than public meetings and letters of concern to describe the public and public desires.

3. Stream and river users were very concerned about the problems confronting natural resources. They feel that human interaction with natural resources threatens the value of streams and rivers and that increased regulation of urban development and industry is appropriate. It is not

evident what the public would be willing to sacrifice in order to live in a more environmentally responsible society. The public, however, was more interested in seeing improvements that benefitted streams and rivers more than improvements that benefitted humans. More strict regulation of factors affecting streams and rivers would be supported by the public. Public concerns need to be heavily solicited in the areas of urban development and industry to counteract the influence of politically and economically powerful organizations and individuals with vested interests in these areas.

4. Survey research is a tool of considerable value for ascertaining opinions from a broad segment of the public. This research can bring managers information not encountered in public meetings or personal contacts. Managers are too limited by time, access, and resources to be able to encounter a representative cross-section of the public. Survey research is not nearly as limited by those factors. Survey research should be conducted with clear concise goals and used to supplement professional expertise and information from public meetings. Mail or telephone surveys could be conducted prior to public meetings to give managers an idea of how representative of the general public the public meeting attendants are.

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Chapter 1

**Relative Importance of Stream and River Characteristics to
Virginia Residents and Resource Professionals**

ABSTRACT

Virginia stream and river users were surveyed to determine the relative importance of eleven stream and river characteristics (clean water, clean stream or river banks, presence of trees and shrubs along banks, many fish live there, many types of plants and animals live there, few other people use the area, ready access to the stream or river, presence of large, catchable fish, good natural scenery, the presence of rare or endangered plants and animals, and adequate water levels exist year round) to the respondents. Virginia stream and river users and resource professionals valued "clean water" much more than any other characteristic of streams and rivers included in the questionnaire. Both populations valued the characteristic "few other people used the stream or river" least. Chi-square analysis on grouped characteristics showed no significant differences in the way resource professionals and the public value stream and river characteristics.

INTRODUCTION

Little is known about the stream and river characteristics that are most important to the public or even natural resource professionals. The studies that have been done tend to focus on user groups and deal with topics like what kind of fish respondents like to catch or why people recreate (see Overview). These studies identify attributes of recreational experiences that benefit natural resource users. Yet people can have interests in streams and rivers even if they do not directly use them. People encounter streams and rivers while travelling to work or otherwise viewing them from a distance. The entire public, not just those who directly use streams and rivers, needs

to be able to express its opinion about what makes streams and rivers valuable. What the fisheries profession needs is information on what aspects of streams and rivers benefit people and what people think is important about the stream or river. Angermeier et al. (1991) surveyed aquatic resource professionals in a study designed to explore characteristics that make streams and rivers valuable. They found that professionals gauged ecological value of an aquatic resource by its importance to rare and endangered species and species richness, whereas fishery value of an aquatic resource was gauged by species composition, aesthetic quality, and fish size. Parallel information about public values of this nature is absent.

For many reasons, natural resource professionals need to understand how people value streams and rivers. Knowing public values gives insight into their priorities and level of environmental concern for resource needs. This information can then be used to guide policy or direct educational programs in what should be a give and take relationship between the public and natural resource managers. If the public and professionals agree on what characteristics of streams and rivers are valuable, then protecting those aspects of streams and rivers should be relatively simple. If the two populations do not concur then conflict between them is inevitable and would lead to planning and implementation delays. Gaining information on both populations allows insight into areas of potential conflict.

It has been well documented that resource professionals and the general public have different ecological concerns. Hendee and Harris (1970) found wilderness managers to be slightly more "purist" in their personal concepts of wilderness. Their results showed that even though managers could predict many user concepts and attitudes, they incorrectly predicted nearly one third of

the user responses. They also found that managers were not willing to recognize the level of environmental responsibility shown by users. Lastly, the authors suggested that misconceptions held by managers may be a result of overexposure to the vocal minority rather than an unbiased sample of users. Staudt and Harris (1985) compared attitudes of environmental managers (specifically, those that dealt with waste problems) to attitudes held by citizens in northern New York (who were expected to be affected by waste problems). The managers were more environmentally concerned than were the public respondents. The authors recommended that programs be developed to educate and involve the public to ensure its representation on environmental issues. Miranda and Frese (1991) compared fishery scientists and anglers and found that fishery scientists could predict just over half (54%) of the angler responses.

The studies previously cited compare narrow segments of the public (a user group or a specific community) to resource managers. For publicly owned resources, the next logical step is to broaden the comparison to include more of the public affected by resource management. This step will give professionals a representative view of the public body for whom they manage public resources. Only when communication has been improved to involve the public more completely will managers be able to address the public's needs effectively. The primary objectives for this research were to reveal the characteristics of streams and rivers most valued by public and professional respondents in Virginia and to highlight any similarities or differences that may exist between the two populations.

METHODS

Survey Methodology

Questionnaires were administered to public and professional respondents to provide data for the analysis. Questionnaires were mailed to the respondents, self-administered, and returned. Complete survey methodology is found in the Overview.

Data Analysis

Analysis for this chapter focuses on the relative importance of selected stream and river characteristics, and differences between public and professional respondents. Also included are results of selected questions used to provide evidence of response consistency. Satisfaction, possible improvements to streams and rivers, level of crowding experienced on streams and rivers, importance of stream and river functions, fish edibility, and drinking water safety are examined for that purpose.

Stream and River Characteristics

Both questionnaires contained a question regarding characteristics of streams and rivers (Appendix A, question 23 and Appendix B, question 13). Respondents were asked to select three characteristics of streams and rivers (out of twelve) that were most important, and to rank the characteristics from one (most important) to three (third most important). If respondents ranked

less than three characteristics or ranked more than one characteristic with a 1, 2, or 3, their response was omitted. The choices for stream and river characteristics were:

1. clean water,
2. clean stream or river banks,
3. presence of trees or shrubs along banks,
4. many fish live there,
5. many types of plants and animals live there,
6. few other people use the area,
7. ready access to the stream or river,
8. presence of large, catchable fish,
9. good natural scenery,
10. presence of rare and endangered plants and animals,
11. adequate water levels exist year round,
12. other (please specify)_____.

To compare the relative importance of all choices, an RI_j (Relative Importance of item j) similar to that of Leuschner et al. (1988) was calculated. This statistic integrates the number of 1's, 2's, and 3's assigned to each of the eleven characteristics (for all analyses characteristic 12 was omitted because the responses fit no definite pattern and response was low) into an index of relative importance. This statistic was designed for situations where the number of categories (11 characteristics in this case) is greater than the number of ranks (3 in this case) and incorporates the frequency of zeros in each category. RI_j 's range from zero to one; a relatively high RI_j indicates a higher priority for a given characteristic. The formula for the RI_j is as follows:

$$RI_j = \frac{\sum_{i=1}^n \sum_{k=1}^R W_{ijk}}{\sum_{i=1}^n \sum_{j=1}^n \sum_{k=1}^R W_{ijk}}$$

Where: w_{ijk} = weight for rank i assigned to item j by respondent k

= 0 if item j is unranked

= $m - i + 1$ if item j has rank i

m = number of ranks requested

n = number of items in the question

N = number of respondents to the question

As a second analysis the characteristics were collapsed into four groups. The first group was "Public use" and consisted of characteristics 6, 7, 8, and 11 above. The second group was "Aesthetics" and included characteristics 2, 3, and 9 from above. The third group, "Diversity", included characteristics 4, 5, and 10. Lastly, "Clean water" (characteristic 1) was the sole representative in its group. Once the groups were formed, RI_j 's were again calculated by adding all the RI_j 's for the characteristics in each respective group. For example, the RI_j for "public use" was calculated by adding the RI_j 's for "few other people use the area", "presence of large, catchable fish", "ready access to the stream or river", and "adequate water levels exist year round."

To compare public and professional perspectives, two tests were conducted. First, a Kendall's Tau (test for independence, Conover [1980]) was calculated as a comparison of public and professional responses to all eleven characteristics. Second, the frequency of 1's (number one rankings) was calculated for each of the four groups of characteristics, keeping public and professional frequencies separate. Individual characteristic counts were too low to allow valid chi-square tests (those where the expected cell count is

less than five for more than 25% of the cells). These frequencies provided distributions that could be compared with chi-square. This analysis compared the proportion of public respondents who ranked each of the four groups as most important to the proportion of resource professionals who did the same.

The next six sections describe questions asked in the public questionnaire. These questions were paralleled in the professional questionnaire but no comparisons between public and professional respondents were made in this chapter. These questions have been added to this chapter because they are related to the objectives and provide evidence of response consistency and support for results. Improvements needed on streams and rivers will be further examined in chapter 2.

Satisfaction

Respondents who used streams and rivers were asked to indicate how satisfied they were with the recreational opportunities provided them on the streams and rivers of Virginia (Appendix A, question 2). The response categories were:

1. very unsatisfied,
2. unsatisfied,
3. neither satisfied nor unsatisfied,
4. satisfied,
5. very satisfied.

Improvements on Streams and Rivers

Public question 6 asked if any of nine possible improvements were needed at streams and rivers visited by the respondent (Appendix A, question 6). The possible improvements were:

1. more/better access,
2. more/better recreational facilities,
3. litter clean-up,
4. water quality improvement,
5. natural beauty improvement,
6. improve daily water level stability,
7. flood control improvement,
8. improve yearly water level stability,
9. fish population improvement,
10. no changes needed,
11. other (please specify)_____.

Respondents were asked to circle the number beside each improvement needed in a stream or river they used. The respondents were also asked to indicate which one of the choices in question six was most needed (Appendix A, question 7). Both questions were asked only of those respondents who used streams and rivers.

Crowding

Respondents were asked how they felt about the number of people that use the stream and river areas that they do (Appendix A, question 13). This question gave the following options:

1. the areas are very crowded,
2. the areas are a little crowded,
3. the number of people is about right,
4. the areas are not at all crowded,
5. no one visits the same areas that I do,
6. no opinion.

Only stream and river users were asked to answer this question.

Importance of Stream and River Functions

Respondents were asked to assess ten stream and river functions on a scale of one (low importance) to five (high importance) or respond with a six if they did not know (Appendix A, question 17). The functions were as follows:

1. public water supply,
2. transport of commercial goods,
3. irrigation for crops,
4. industrial water supply,
5. recreation,
6. historical significance,
7. fishing for food,
8. source of natural beauty,
9. habitat for fish and wildlife,
10. habitat for rare and endangered plants and animals.

A mean importance score was calculated for each function by adding the 1's, 2's, 3's, 4's, and 5's, and dividing the sum by the number of respondents who answered the question. For this analysis, 6's (don't knows) were excluded.

Fish Edibility

Respondents were asked to indicate if the fish in the stream and river closest to them were safe to eat (Appendix A, question 20). The response categories were:

1. very unsafe,
2. unsafe,
3. I am not sure,
4. safe,
5. very safe.

Drinking Water Safety

Respondents were asked to indicate how safe they felt their public water source was to drink (Appendix A, question 21). The response categories were:

1. it is very unsafe to drink,
2. it is unsafe to drink,
3. I am not sure,
4. it is safe to drink,
5. it is very safe to drink.

RESULTS

Stream and River Characteristics

Of the 1111 public respondents, 20 did not attempt to answer the question and 163 attempting the question did not follow the appropriate answer format. Omitting these respondents left 928 in the analysis on stream and river characteristics. Of 144 professional respondents, 1 did not follow the appropriate answer format and was omitted, leaving 143 in the analysis.

Clean water was ranked as the most important characteristic of streams and rivers by nearly 76% (708) of the public respondents and had an RI_j of 0.411, nearly three times that of any other individual stream and river characteristic (Figure 1). The second highest RI_j (0.149) was associated with "clean stream or river banks". "Clean water" maintained its most valued status even when the eleven categories were collapsed into four groups (Figure 2). For the collapsed categories, the RI_j for "clean water" (0.411) was followed by RI_j 's for "aesthetics" (0.273), "diversity" (0.190), and "public use" (0.125).

Resource professionals also ranked "clean water" highest, as indicated by an RI_j of 0.421, which was over three times larger than RI_j 's associated with other individual stream and river characteristics (Figure 1). The second highest resource professional RI_j was again associated with "clean stream or river banks" (0.124). When the characteristics were placed into groups, natural resource professionals still valued clean water far more than the other groups. "Aesthetics" had the second highest RI_j (0.216), followed by "diversity" (0.190), and "public use" (0.172).

Based on the four groups of stream and river characteristics, chi-square analysis showed no significant difference ($0.10 < p < 0.25$) between public and professional responses (Table 1). The Kendall's Tau results also indicate that public and professional responses to the eleven individual characteristics are highly concordant (Tau = 0.709; $p < 0.005$).

Satisfaction

Over half (55%) of stream and river users were satisfied or very satisfied with the recreational opportunities provided by the streams and rivers of Virginia. Only 20% of the stream and river users were unsatisfied or very unsatisfied (Appendix E, question 2).

Improvements Needed on Streams and Rivers

Over one fourth of all respondents (27%) reported not using streams and rivers, and were excluded from this analysis leaving 809 respondents who answered this question. Nearly one third of all stream and river users (32%)

perceived water quality improvement as the most needed improvement. Fewer (24%) felt that litter clean-up was most needed (Table 2). Half (50%) of the stream and river users felt that water quality improvement was needed (but not necessarily most needed) at the streams and rivers they used. An even larger proportion (54%) felt that litter clean-up was needed (Table 2).

Crowding

Forty one percent of the stream and river users felt that the areas they used were very crowded or crowded, whereas 49% felt the areas were not crowded (Appendix E, question 13). Again, only stream and river users were included.

Importance of Stream and River Functions

Five of the ten river functions in question 17 had mean importance scores of ≥ 4 : "habitat for fish and wildlife" (4.67), "source of natural beauty" (4.54), "public water supply" (4.4), "habitat for rare and endangered plants and animals" (4.34) and "recreation" (4.27). Only one function ("transport of commercial goods") had a mean score less than 3 (Table 3).

Fish Edibility

Many respondents (48%) did not know if the fish in the stream or river closest to them were safe to eat (Appendix E, question 20). More respondents felt the fish were safe or very safe to eat (36%) than felt they were unsafe or very unsafe to eat (15%).

Drinking Water Safety

Most respondents (60%) felt their water was safe or very safe to drink. Most of the remainder were unsure of their drinking water safety (28%). Only 11% of the respondents felt their water was unsafe or very unsafe to drink (Appendix E, question 21).

DISCUSSION

That the public and resource professionals ranked "clean water" most important of the characteristics of streams and rivers indicates a knowledge, by both parties, of the basic requirements for a healthy river system. It is not surprising to see such interest and concern for such basic requirements. The professionals are expected to realize the importance of clean water because of their training and interest in the field. The public could be expected to acknowledge the importance of clean water because of the past two decades of increasing environmental awareness. The advent of the first "Earth Day" and its 20th anniversary in 1990 mark a period in which the public has been bombarded with ideas about improving and protecting the environment in which it lives. Global warming, acid rain, and ozone depletion have become highly threatening terms that remind the public to do their part (i.e., reduce, reuse, recycle). Aquatic environments have been one of the more obvious environmental concerns during this period and the public has been very supportive of legislation geared toward preventing water pollution. Specifically the Clean Water Act and its amendments, which have received widespread public support (Karr 1991), have posed progressively more specific

and restrictive regulations against water pollution.

Although not expected, it is not surprising to see such agreement between the public and their resource managers on certain issues. Hendee and Harris (1970) found such concurrence between wilderness managers and wilderness users with regard to management policies and behavioral norms. However, views of the public and professionals may often conflict. Staudt and Harris (1985) found that decision makers have different environmental concerns than the public. Miranda and Frese (1991) found that the resource professionals surveyed could predict roughly half of angler attitudes and suggested that angler attitudes be monitored periodically to increase the predictive power of resource professionals.

Even though environmental concerns have been increasing over the past 20 years it was still assumed that the public would heavily weight characteristics that would make resource use easier or more enjoyable. This assumption follows from the literature that indicates that resource professionals see the public as a fairly selfish entity (Loftus 1987). Thus, I expected public use categories (presence of large catchable fish, access, crowding concerns, and water levels) to be more important than characteristics associated with environmental concern. In fact, public use aspects were ranked lower than the three other groups of characteristics (aesthetics, diversity, and clean water). Also, because previous research (McClaskie et al. 1986) has shown that access limits recreational opportunity, it is surprising that ready access to streams and rivers was so unimportant (10th out of 11 RI_j's). This is at least partially due to the fact that many of the public respondents do not use streams and rivers (27%) and are consequently not concerned with ease of access. Also, since 41% of the public felt the

areas they used were crowded, I expected that respondents would value less crowded areas. They would have indicated this by selecting "few other people use the stream or river" as an important characteristic. However, this characteristic had the lowest RI_j. Level of crowding seems to have little effect on Virginia residents. Even though they feel crowded, they are generally satisfied and do not have an intense interest in selecting less crowded areas in which to recreate. From the public RI_j's, it appears that people value clean, healthy, aesthetically pleasing systems more than those with few people, many fish, or easily accessed.

The use of some inferential logic based on the results suggests an intriguing pattern. Although public water supply had a high mean rank in the question about river function importance, it had a lower mean rank than habitat for fish and wildlife (not statistically tested). Clean water did, however, rank highest by a large margin in the question about stream and river characteristics. The public is interested in improving the quality of water for fish and wildlife and for public water supplies. In fact, 23% of the public felt that habitat for fish and wildlife and habitat for rare and endangered plants and animals were in the worst condition (of all river functions) while only 19% felt that water supply was in the worst condition (Appendix E, question 18). The fact that these two proportions are comparable bodes well for the concern for the future of fish and wildlife resources and should indicate to management agencies that efforts to improve habitats are well expended and strongly supported by public opinion. High concern for wildlife was also found by Moss (1985) in her public survey about wildlife concerns. The concern was not limited to a specific group but was held by consumptive and non-consumptive respondents alike. She concluded that

wildlife managers should place the highest priority on maintaining the ecosystem, thereby producing more indirect benefits for all citizens. The same management strategy applies to stream and river resources.

It is possible that the choice order in the questionnaire caused "clean water" to rank so highly. Because "clean water" was the first item on the list in public question 23, it might have received more attention than subsequent choices. Also, those respondents who ranked characteristics one, two, and three, in order without making value judgments among those three choices would have given "clean water" the highest ranking and therefore contributed to the RI_j for that characteristic. However, I have no evidence that this happened. This ambiguity could have been avoided by making several questionnaire variations, each of which ordered characteristics of streams and rivers differently. Analysis could then be performed to determine the consistency of characteristic importance among variations. If the characteristics were valued similarly in all variations, I would be satisfied that the questionnaire did not bias the results.

Instead of using several questionnaire variations, a technique that increases the difficulties associated with survey implementation and data entry, other questions were used to test the reliability (the consistency with which respondents answer a series of questions) within the survey. For example, public water supply had the third most important of the ten choices in the question on stream and river functions. Water quality improvement was viewed as the most needed improvement on streams and rivers by 32% of the public respondents (the highest single percentage in that question). Responses to these questions support the idea that "clean water" was most important to public respondents.

In general, Virginia residents are satisfied with the recreational opportunities they have on streams and rivers and are fairly confident that, at least after treatment, their drinking water is clean. They are, however, concerned about the conditions in which fish and wildlife live as evidenced by the lack of knowledge about, and possibly confidence in, fish edibility. Efforts should be made by natural resource agencies to inform the public of existing environmental conditions, to learn which improvements the public feels are necessary, and to improve those degraded conditions.

LITERATURE CITED

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Table 1. Grouped characteristics of streams and rivers and the percent of number-one rankings in each characteristic group by public and professional respondents. Chi-square revealed no significant difference ($0.1 < p < 0.25$) between public and professional responses. Public and professional percents each total to 100 (+ 1 due to rounding error).

Characteristic	Public	Professional
Clean Water	76%	77%
Diversity	8%	8%
Aesthetics	10%	6%
Public Use	6%	9%

Table 2. Improvements needed, the percent of public respondents indicating that a particular improvement was needed, and the percent who indicated that a particular improvement was most needed. Percents do not total to 100 for needed improvements because respondents were allowed to answer that more than one improvement was needed. Percents do not total to 100 for most needed improvement because of the few respondents in the "other" category (3%) and those who did not answer the question (6%).

Improvement	Needed(%)	Most Needed (%)
Litter Clean-up	54	24
Water Quality Improvement	50	32
Fish Population Improvement	39	11
More/Better Access	33	10
More/Better Recreational Facilities	22	6
Natural Beauty Improvement	16	3
Flood Control Improvement	8	2
Improve Daily Water Level Stability	7	2
Improve Yearly Water Level Stability	6	1
No Changes Needed	6	<1

Table 3. Relative importance of ten functions of streams and rivers as assessed by public respondents. Mean importance scores are derived by averaging the public responses to a Likert scale that ranges from 1 (low importance) to 5 (high importance).

River Function	Mean Importance Score
Habitat for Fish and Wildlife	4.67
Source of Natural Beauty	4.54
Public Water Supply	4.40
Habitat for Rare and Endangered Plants and Animals	4.34
Recreation	4.27
Historical Significance	3.61
Irrigation for Crops	3.26
Fishing for Food	3.24
Industrial Water Supply	3.02
Transport of Commercial Goods	2.77

Figure 1. Public and Professional RI_j's for eleven characteristics of streams and rivers:

CW = clean water,

CSR = clean stream bed or river banks,

MPA = many plants and animals live there,

GNS = good natural scenery,

MF = many fish live there,

AWL = adequate water levels exist year round,

PTS = presence of trees and shrubs along banks,

PLCF = presence of large catchable fish,

PRE = presence of rare and endangered plants and animals,

RA = ready access,

FOP = few other people use the stream or river.

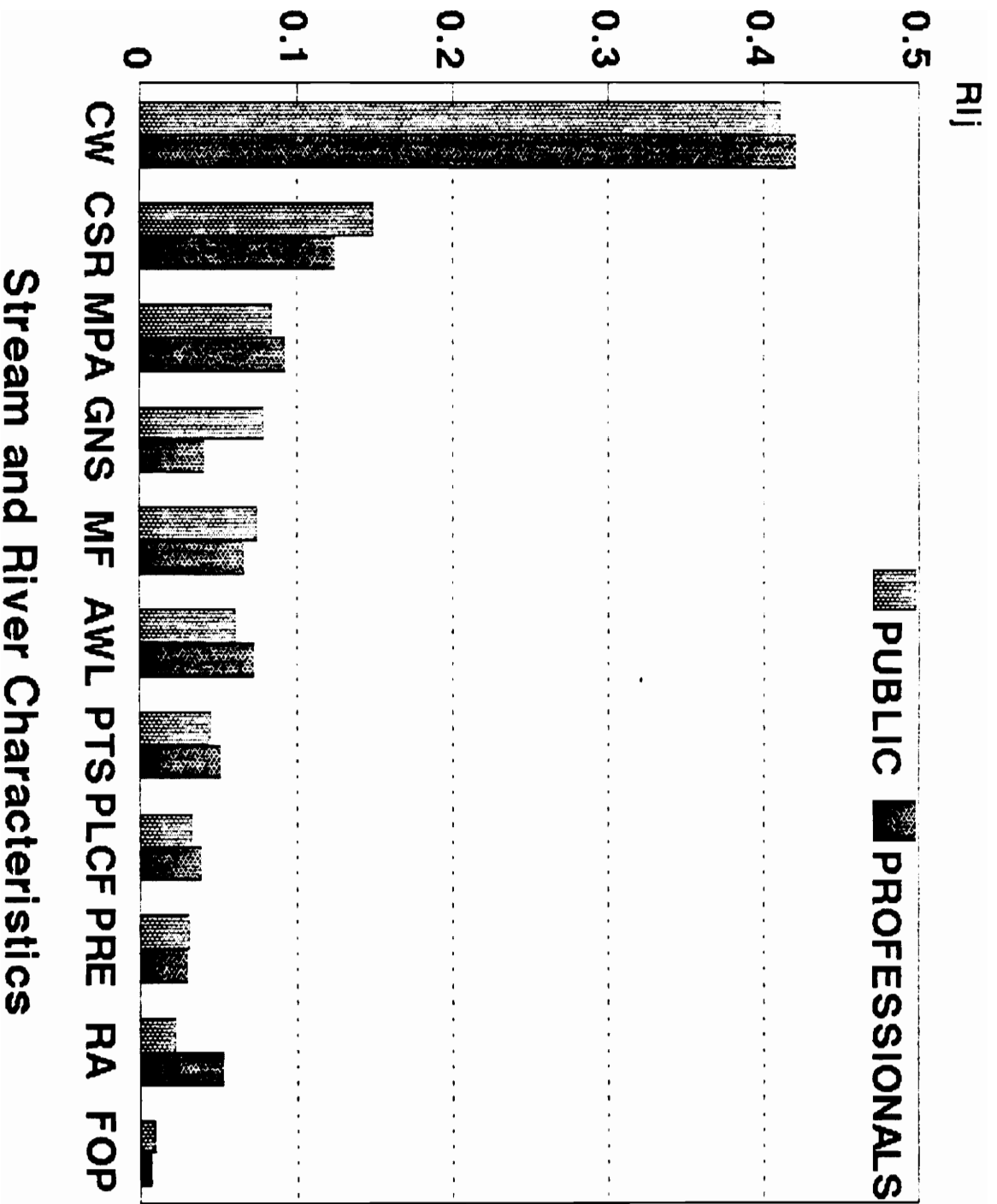
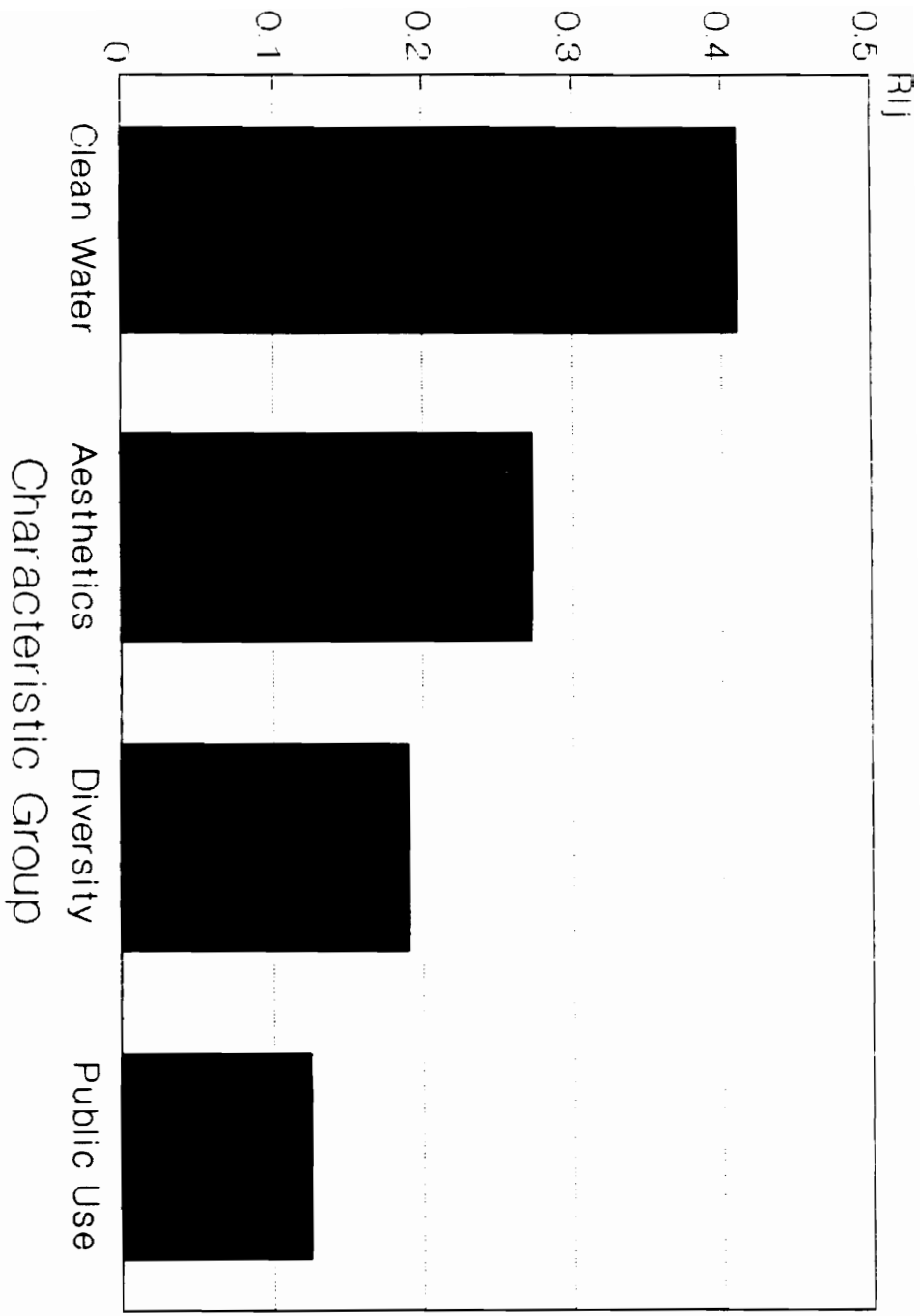


Figure 2. RI_j's for groups of characteristics of streams and rivers (public only).



Chapter 2
Improvements Needed on Streams and Rivers

ABSTRACT

Virginia residents were asked to indicate which improvements were needed on streams and rivers they use and which improvement was most needed. Natural resource professionals were asked to predict which improvements Virginia residents would want and which improvements Virginia residents would want most. Virginia residents felt that litter clean up, water quality improvement, fish population improvement, and access improvement were needed, in that order. Professionals predicted that access, fish population improvement, litter clean-up and water quality improvement would be desired, in that order. Professionals predicted that access and fish population improvement would be most needed, whereas the public felt that water quality improvement and litter clean-up, were most needed. Consumptive users were more interested in access and fish population improvement, whereas non-consumptive users were more concerned with water quality improvement and litter clean-up. Virginia's stream and river users are interested in promoting wise natural resource use and are ready to support efforts to improve environmental conditions on the state's waterways.

INTRODUCTION

In the first chapter, I examined values the general public held about streams and rivers. Now I will focus on stream and river users only and examine this group to reveal the changes, or improvements, they feel are needed on the streams and rivers they use. This input is necessary to adequately assess the demand for improvements needed on streams and rivers. Information on the desires of those who spend considerable time and money

enjoying our natural resources allows managers to find efficient ways to make public recreational experiences most enjoyable and at the same time, protect the resource.

The uses of public information and the inadequacies of certain facets of the current public involvement process are well documented (see Overview). The key to public involvement is to integrate information from as representative a segment of the relevant population as is possible. Public meetings and oral and written communications between the public and natural resource professionals are not sufficient to accomplish this task.

As in the previous chapter, I am interested in further exploring public needs and desires, and to compare the public to resource professionals. I will accomplish this by identifying which improvements the public wants on the streams and rivers they use and which improvements natural resource professionals think the public wants. This type of input gives the public a chance to indicate what changes to streams and rivers would make their use of streams and rivers more enjoyable. It also lets managers know if their constituents want improvements that benefit streams and rivers or those that benefit stream and river users. This type of information has been cited as being a crucial aspect of public involvement, as it gives potential stream and river users a significant role to play in the decision making process (Soden et al. 1986).

This information could possibly be applied to the allocation of funds aimed at overcoming such problems as pollution and stream degradation. For example, if the public wants improvements that benefit streams and rivers, then managers can focus on programs that accomplish this. If the public does not realize the necessity of certain improvements, managers can correct public

oversight through educational efforts. Resource professionals generally have a good idea of what problems exist on streams and rivers but they are not generally required to know how the public feels and if they agree with the public on natural resource issues. Professionals can learn about public attributes through public meetings, but public meetings may over-represent vocal minorities, exposing the professionals to a biased representation of the people with whom they interact. Survey information can be used effectively to expose professionals to a more representative public opinion than is currently available. Using information gathered from surveys like this is necessary because managers cannot assume that they know public perspective or that public and natural resource professional views coincide without such survey information (Staudt and Harris 1985). Public surveys provide information specific to survey issues, which is superior to contacts with special interest groups because of the broader public perspective taken into account.

In the first chapter, resident preferences were examined to determine which characteristics of streams and rivers were most important. From this information it is feasible that VDGIF management priorities could be altered to better benefit the public. The major limitation to the analysis is that no economic considerations were addressed. Willingness To Pay (WTP) estimates often differ from preference estimates in that preference is more susceptible to socially acceptable answers. Cole and Ward (1991) imply that the public would place less importance on clean water and more importance on access or facilities if asked to support the importance of characteristics with monetary values. Apparently, the mention of allocation of funds drives constituents to support programs that suit their personal needs and desires rather than those they feel would be best for the stream or river.

An investigation into the improvements needed on streams and rivers should address similar issues. Improvements needed can serve as a connection between preferences (most important characteristics) and WTP values because improvements require funds and therefore a monetary value judgement by respondents. Comparisons of characteristic preferences and improvements needed could be used as a comparison between social values (what society says I should be concerned about) and personal or monetary values (what I am willing to pay for). Consistency between the two values would provide evidence against the work of Cole and Ward (1991). This consistency would be caused by a preference for a characteristic coupled with a realization that the same characteristic is in need of enhancement or restoration. The responses to one question alone do not necessarily require natural resource managers to take drastic actions. Consistency of responses to several questions, however, allows managers to be more confident that their decisions are either supported or opposed by the public and allows them to prepare for either contingency.

The objectives of this chapter are to: 1) identify the improvements of streams and rivers the public feels are needed; 2) determine whether or not these improvements are consistent with the characteristics determined to be most important in chapter 1; and 3) determine the ability of natural resource professionals to predict what improvements the public feels are necessary. Barriers to recreation will be examined to provide support for analyses.

METHODS

Survey Methodology

Questionnaires were administered to public and professional respondents to provide data for the analysis. The questionnaires were mailed to the respondents, self-administered, and returned. Complete survey methodology is found in the Overview.

Improvements Needed on Streams and Rivers

Public respondents who used streams and rivers were asked to indicate which improvements were needed at the stream and river areas they used (Appendix A, question 6). Professional respondents to a separate questionnaire were asked to predict which improvements the public would like in their region. Both populations were instructed to circle all of the improvements that applied to their situation. The possible improvements were:

1. more/better access,
2. more/better recreational facilities,
3. litter clean-up,
4. water quality improvement,
5. natural beauty improvement,
6. improve daily water level stability,
7. flood control improvement,
8. improve yearly water level stability,
9. fish population improvement,
10. no changes needed,
11. other (please specify) _____.

For the analyses, choices 10 and 11 were omitted due to low cell counts.

Public and professional responses to this question were compared.

Kendall's Tau was used to test for a relationship between public responses and

professional predictions, the X_1 and Y_1 (paired data for the statistic) were determined by the percent of each population that indicated that each improvement was needed.

Most Needed Stream and River Improvements

Public respondents were asked to indicate which one of the improvements listed in the previous question was the most needed (Appendix A, question 7). They responded by entering the number of the appropriate improvement on the line provided. Professional respondents were asked to predict which improvement the public would want the most and to answer the question the same way.

Public and professional responses were compared with chi-square. This test compared the proportion of public respondents who felt each improvement was most needed to the proportion of professional respondents who predicted each improvement to be most wanted by the public. For this analysis, improvements 5, 6, 7, 8, and 10 were omitted due to low cell counts.

Barriers to Recreation

Public respondents were asked to circle the number corresponding to any of the items in a list of possible barriers to recreation that applied to them (Appendix A, question 11). The barriers were:

1. not enough leisure time,
2. not enough leisure money,
3. not enough river access,
4. too few facilities,
5. too crowded,
6. family responsibilities,

7. too little information available about activities,
8. other (please specify)_____,

RESULTS

302 respondents indicated that they do not use streams and rivers, leaving 809 respondents in the analysis.

Improvements Needed on Streams and Rivers

Seven respondents did not answer this question, leaving 802 in the analysis. More than half of the public respondents (54%) felt that litter clean-up was needed at the streams and rivers they used. Half of the public stream and river users (50%) felt that water quality improvement was needed (Figure 1). Fewer felt that fish population improvement and more/better access were needed (39% and 33%, respectively). Most professionals predicted that the public would want more/better access and fish population improvement (78% and 62%, respectively) (Figure 1). Half of the professionals (50% and 52%) predicted the public would want water quality improvement and litter clean-up, respectively. Public opinion and professional predictions for each of the 9 improvements included in the analysis were statistically independent (Kendall's Tau = 0.444; $p = 0.10$).

Most Needed Stream and River Improvements

The largest percentage of stream and river users (32%) indicated that water quality improvement was the most needed improvement, followed by litter clean-up (24%), fish population improvement (11%), and more/better access (10%) (Figure 2).

Over one-third (36%) of the professional respondents predicted that the public would most desire more/better access, followed by fish population improvement (23%), and water quality improvement (20%). Only 8% of the professional respondents predicted the public would most want litter clean-up (Figure 2).

Comparing only more/better access, more/better recreational facilities, litter clean-up, water quality improvement, and fish population improvement (the five improvements with the highest cell counts for both populations) omitted 137 public respondents and 15 professional respondents. Professional predictions of the most needed improvements were significantly different ($p < 0.001$) from the public opinions of the most needed improvements (Table 1). Professionals respondents overestimated the importance of more/better access and fish population improvement, and underestimated the importance of litter clean-up and water quality improvement to the public respondents.

Barriers to Recreation

Most stream and river users (58%) indicated that not having enough leisure time prevented them from enjoying streams and rivers as much as they would like (Appendix E, question 11). All other barriers were selected by far

fewer respondents. Not enough leisure money and family responsibilities were seen as barriers to 15% and 14% of the respondents, respectively. Not enough river access was a barrier to 11% of the respondents. Only 10% of the respondents felt that crowding was a barrier to recreation and only 7% indicated that too few facilities posed a barrier to recreation.

DISCUSSION

The results of improvements needed again emphasize that stream and river users have unselfish stream and river concerns. In this instance, I define unselfish improvements as those that focus on improving the health of the stream or river rather than directly providing users with better recreational opportunities. All public respondents in this part of the analysis are individuals who use streams and rivers and consequently need some type of access (visual or physical), yet 3 other improvements were seen as needed by more respondents than access. Public responses for most needed improvement were consistent with answers for needed improvements with only one exception. Litter clean-up was seen as being needed by more respondents than water quality improvement, but the opposite was true for most needed improvement.

This is not the first time that the public has been cited as having such unselfish desires. Loftus (1987) rejected the common assumption by natural resource professionals that the public does not consider the long-term needs of resources. Spitler (1988) identified the public as being strongly concerned about environmental degradation, interested in seeing the government do more to control serious pollution problems, appreciative of natural surroundings, and concerned about other forms of life. Mine is the first

study that I am aware of, however, that used this form of questioning to demonstrate priority of environmental needs over human benefits. I submit that the public is ready to support even stricter environmental legislation protecting our natural resources and contribute more to the budgets of agencies charged with protecting the environment. Currently, most stream and river users have very few avenues available for contribution to organizations that protect our natural resources. Only those that must buy hunting or fishing licenses or those who register motorboats are significantly contributing to the coffers of the Virginia Department of Game and Inland Fisheries. The total 1991 fiscal year revenues were nearly 27 million dollars for the VDGIF with only \$400,000 coming from the voluntary tax check-off. The bulk (88%) of VDGIF revenues comes from license sales and federal funds (A. L. LaRoche, personal communication). Environmentally concerned individuals need a more effective way to contribute.

The findings in this chapter are consistent and correspond well to findings in other chapters. First, Virginia residents and Virginia stream and river users felt that clean water was the most important characteristic of streams and rivers, far more important than access. In fact 76% of both the general public (Chapter 1) and stream and river users (Chapter 3) felt that clean water was most important. Furthermore, more/better access was seen as the most needed improvement by only 12% of stream and river users (Appendix E, question 7), similar to the percent that felt development of public access was a very important VDGIF program (Appendix E, question 28). Also consistent are the Chapter 3 results that 1) 87% of stream and river users felt that human litter was highly threatening to the value of streams and rivers (the highest percentage for any threat to streams and rivers), and 2) development of public

access was seen as a highly important VDGIF program by only 37% of stream and river users (the lowest percentage for any program).

In this chapter, the question on barriers to recreation provides further evidence of response consistency. Time, money, and family responsibility barriers affected far more individuals than access and facility barriers. Also, even though 41% of respondents felt crowded to some extent at the stream and river areas they used (Appendix E, question 13), only 10% said that crowding was a barrier to recreation and 26% of all public respondents felt that "few other people use the stream or river" (Appendix E, question 24) was the least important characteristic of streams and rivers (the highest percent for any stream or river characteristic). Besides providing evidence of response consistency for the results of this chapter, these responses suggest that intense crowding may be a local phenomenon, experienced by only a small fraction of the public, but not a statewide problem. Family responsibility barriers are a somewhat special concern. In the next chapter I will note that "for family recreation" is an important reason for Virginia residents to visit streams and rivers. These results suggest that potential users are limited by the lack of family opportunities provided by streams and rivers. Increasing opportunities for family recreation would make streams and rivers more pleasurable to those who use them and reduce a barrier to recreation faced by many.

Some research (Hendee and Harris 1970) indicates that professionals are skeptical about public motives and are not quick to give credit to the public for being environmentally concerned. It is apparent that in Virginia this skepticism exists. If the public was uninterested in natural resources, I would expect it to desire improvements that would benefit people (users)

directly (access, more fish) rather than improvements that would benefit the stream or river directly and people indirectly (clean water, litter clean-up). Professionals did not anticipate that Virginians would be more interested in clean water and litter clean-up than they are in access and fish population improvement. As mentioned in the Overview, this misunderstanding arises partially because of the general distrust the public and professionals have in each other. Most professionals felt that access would be the most wanted improvement, and that fish population improvement would be second. This illustrates that professionals believe the public to be generally selfish and to want improvements that make using streams and rivers easier. This impression is probably an artifact of the people they meet, as in "the squeaky wheel gets the grease." The information in this chapter should give the professionals the confidence to manage for the integrity of streams and rivers, and address the needs of vocal special interest groups less. Resource professionals can not be expected to know their constituents through intuition, but must obtain accurate information about the public they serve so they can see the larger picture and consider the proper audience for each issue. Survey research is an excellent means of obtaining such information.

This is not an economic study, but my results parallel some of those in economic analyses. Economic analyses like the Travel Cost Method (TCM) reveal consumer surplus, a monetary value that allows economic comparison of items in a survey. Asking people to indicate which improvements are needed is similar to, but not as complex as, asking them to make out a budget in which they prioritize the improvements. This lack of complexity makes this data form easy to use in long surveys or other surveys where complexity should be kept to a minimum. A specific monetary value is not possible with this line of

questioning. However, even without respondents' willingness to pay, results of such surveys can still be helpful in defining acceptable laws and regulations (Spitler 1988).

Here the respondents saw an opportunity to make an immediate difference by circling the improvements they would most like to see, implying that action needed to be taken if these improvements were to occur. Improvements require funds and consequently a personal value judgment measured in dollars (the cost of the improvement) rather than existence value (what is it worth just because it is there). The question on characteristics of streams and rivers, although useful, is biased by the ease with which respondents could make socially acceptable answers. Knowing which improvements the public wants is certainly valuable to resource managers and since the information from both questions coincide well (clean water was the most important characteristic of streams and rivers and water quality and litter clean-up were most needed improvements), it seems that the public wants improvements (monetary value) to take place on the same aspects of streams and river they feel have the most long-term value.

Another consideration that separates important characteristics and needed improvements is the state of the resource. It is possible that public perception of characteristic importance may depend on the current condition of those characteristics. For example, would clean water be more important in a region where water quality was good or where water quality was poor? It is not possible to tell with this data, but it is clear that Virginia residents are not happy with the conditions of the state's waterways and feel that they are in need of aesthetic and biological enhancement or restoration.

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Table 1. Comparison of public opinion on most needed stream and river improvement and professional prediction of public response. Chi-square revealed a significant difference ($p < 0.001$) between public and professional responses.

Improvement	Public(%)	Professional(%)
More/better access	12	40
More/better recreational facilities	7	5
Litter clean-up	28	8
Water quality improvement	39	22
Fish population improvement	14	25
Total	100	100

Table 2. Barriers to recreation, the number of respondents who felt each was a barrier to them, and the percent of respondents who felt each was a barrier.

Barrier	Frequency	Percent
Not enough leisure time	469	58.0
Not enough leisure money	119	14.7
Not enough river access	89	11.0
Too few facilities	53	6.6
Too crowded	77	9.5
Family responsibilities	117	14.5
Too little information available about activities	77	9.5
Other	62	7.7

Figure 1. Improvements needed on streams and rivers, the percent of public respondents indicating that each improvement was needed, and the percent of professionals predicting that the public would want each improvement.

Percents do not total 100 because respondents were allowed to circle as many improvements as they felt were necessary. The improvements are:

MA = More/better Access,

MRF = More/better Recreational Facilities,

LCU = Litter Clean-Up,

WQI = Water Quality Improvement,

NBI = Natural Beauty Improvement,

DWS = Improve Daily Water Level Stability,

FCI = Flood Control Improvement,

YWS = Improve Yearly Water Level Stability,

FPI = Fish Population Improvement, and

NCN = No Changes Needed (NCN).

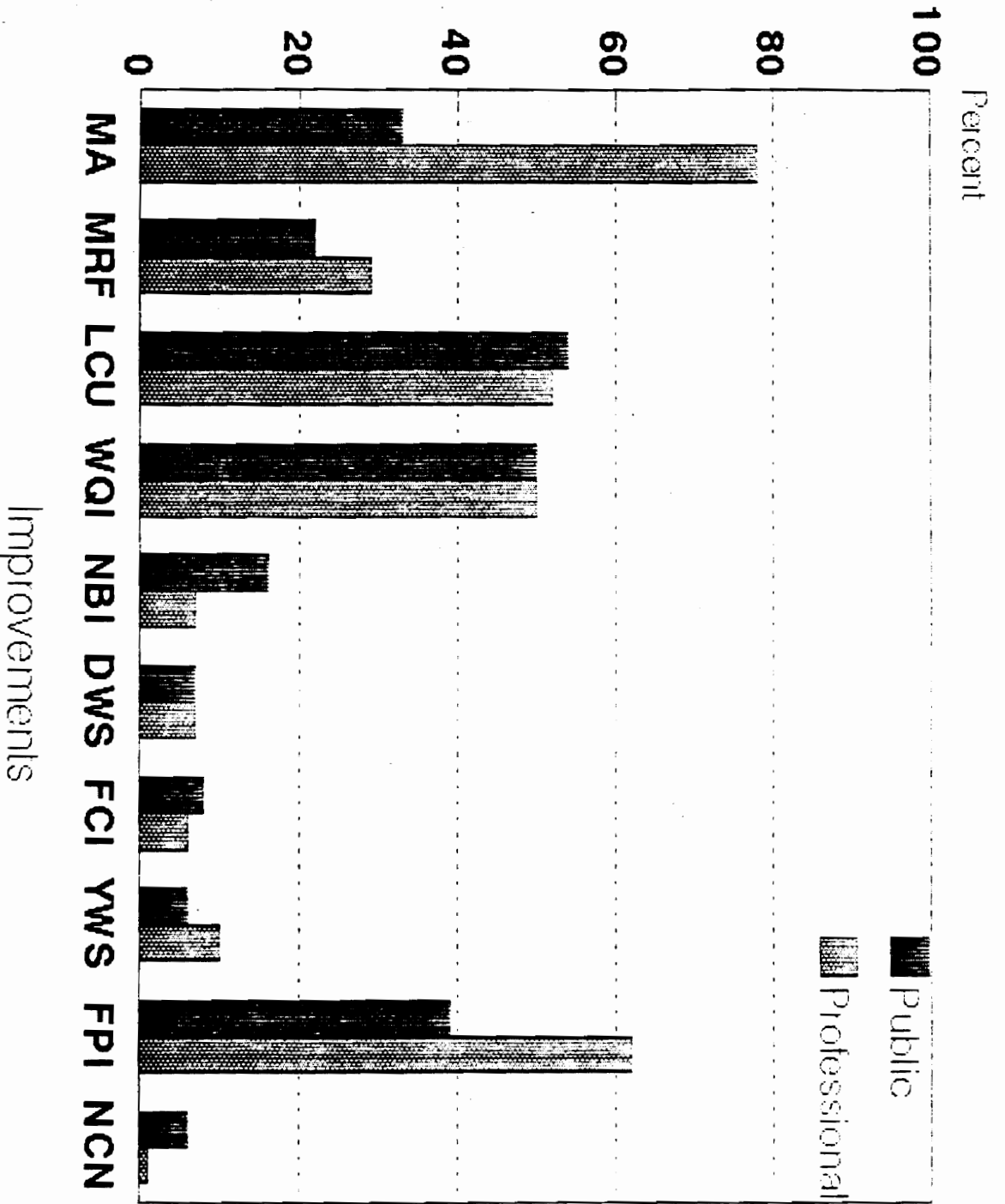


Figure 2. Improvements most needed on Virginia's streams and rivers, the percent of public respondents indicating that each improvement was most needed, and the percent of professionals predicting that the public would want each improvement most. The improvements are:

MA = More/better Access,

MRF = More/better Recreational Facilities,

LCU = Litter Clean-Up,

WQI = Water Quality Improvement,

NBI = Natural Beauty Improvement,

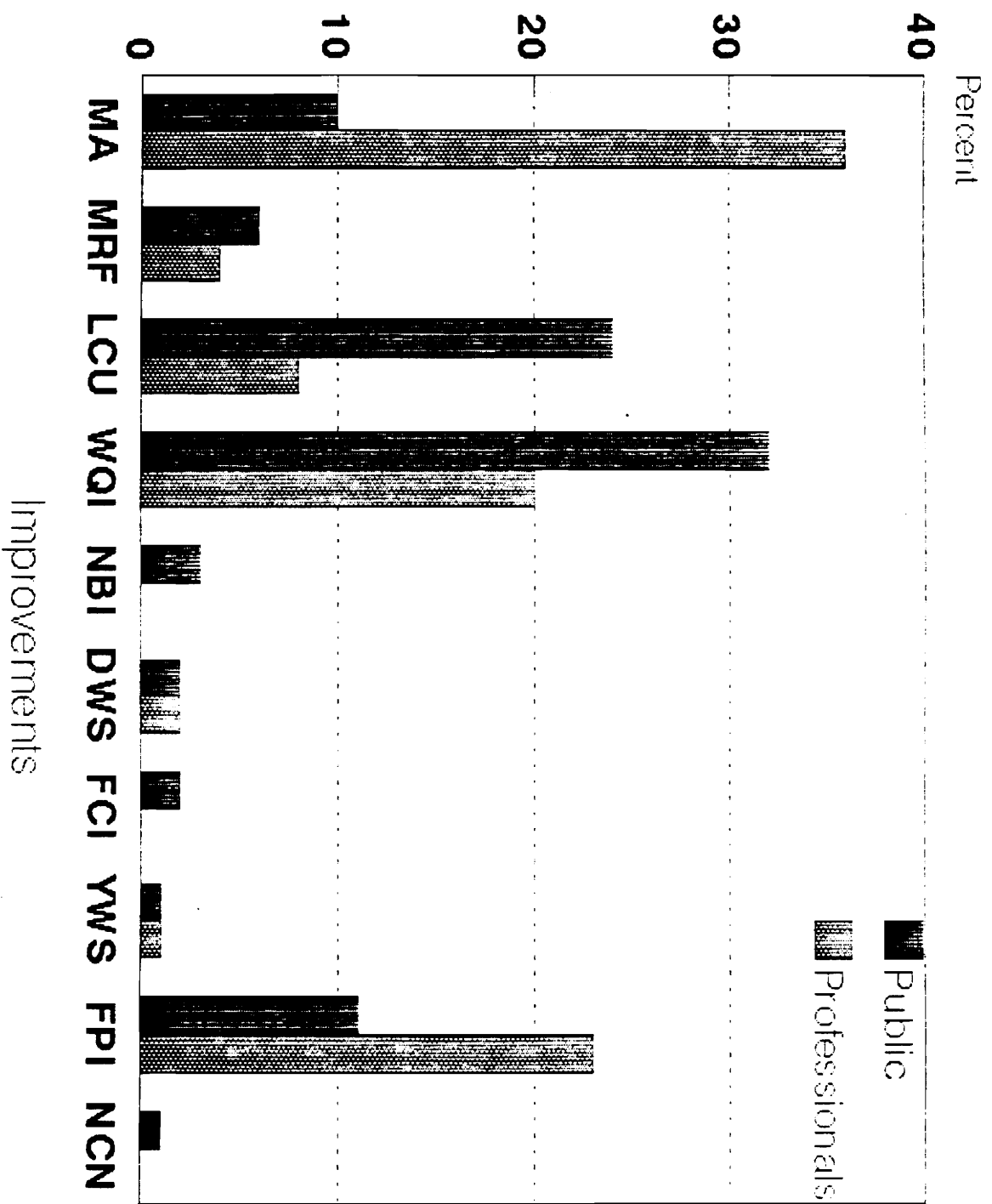
DWS = Improve Daily Water Level Stability,

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NCN = No Changes Needed (NCN).



Chapter 3

User Groups in Virginia and Their Attitudes Towards Streams and Rivers

ABSTRACT

Virginia stream and river users were surveyed to: 1) assess the relative importance of several user groups based on the number of people who are in each user group and how important each activity is to them; 2) see if professionals could predict user group importance; and 3) find out if use frequency, satisfaction, opinion on improvements needed on streams and rivers, importance of reasons to visit streams and rivers, opinion on importance of stream and river characteristics, opinion on importance of threats to streams and rivers, and opinion on importance of VDGIF programs were related to user group. Angling, hiking/sightseeing/birdwatching, and picnicking/camping were the three most important activity groups to Virginia residents. Professionals predicted that angling, motorboating/waterskiing, canoeing/kayaking/sailing would be the most important activities to Virginia residents. User groups differed in use frequency, 7 of 11 reasons to visit streams and rivers, and opinions on 5 of 9 VDGIF programs. Consumptive and non-consumptive users differed on use frequency, 5 of 11 reasons to visit streams and rivers, and 4 of 9 VDGIF programs.

INTRODUCTION

In the first chapter I examined as broad a segment of the public as the sample parameters allowed, and described the characteristics of streams and rivers the general public felt were important. The second chapter focused on a subset of the public, stream and river users, and revealed the improvements that subset felt were needed on the streams and rivers they used. Finally, this chapter narrows the focus even further by dividing stream and river users

into user groups and describing the similarities and differences among them.

Resource management agencies often categorize the public into user groups that consist of people with similar motivations, attitudes and attributes (Moss 1985). Commonly identified user groups include anglers, hunters, wilderness users, campers, and landowners. The common interests of people within a user group are of interest to those who manage the resources because a better understanding of user groups can help managers meet user group needs where necessary.

Managers can apply user group information in several ways. Graefe and Ditton (1986) propose that user group information be used to decide which fisheries to develop, how to attract certain types of anglers, and to reconcile allocation questions. Knopf et al. (1983) indicate that motives for participation in certain outdoor recreational activities give insight into human nature and can help resolve crowding problems. Information about motives for participation also help managers understand potential activity substitutes, set management objectives, and determine planning priorities. This information also benefits natural resource administrators (Schreyer 1980) and can help resolve such problems as visitor conflict (Grammann and Burdge 1981). Loomis and Ditton (1987) state that user group information, if taken periodically, will assess changes in the user groups. The authors were interested in seeing if the presence of tournament angling would change the nature of angling. They found that saltwater sport anglers and tournament anglers had different motivational concerns. They felt that ascertaining user group differences has important management implications for protecting declining game species. This information enables managers to predict angler reactions to proposed angling restrictions. McClaskie et al. (1986) indicated

that user group information should be used to allow the users to have a significant say in the decision-making process regarding what recreational opportunities should be provided. Thomas et al. (1984) stated that user group information should be heeded because user group evaluations of their activities provide insights into the quality of their experiences. Their evaluations reflect their actions, and their actions affect the resource. Hendee and Harris (1970) stressed that the ability of managers to perceive the preferences of users determines their ability to satisfy them or, when appropriate, to explain why they cannot, or should not, meet their preferences. It is also important for managers to review their perceptions of user opinions so that the lines of communication can be improved, and sources of bias corrected.

User groups can be accessed by several methods. The most common method is to obtain a list of the individuals in a user group and solicit information from them (Graefe and Ditton 1986, Thomas et al. 1984, Miranda and Frese 1989). A second way is to survey users at places where they are easily identified, such as access sites (e.g., boat ramp surveys) or during resource use (e.g., roving creel surveys) (Bryan 1977, Hendee and Catton 1968, Knopf et al. 1983, Schoolmaster 1986, Vaske et al. 1982,). Some studies even use a combination of the first two methods (Schreyer and Beaulieu 1986). A third method is to solicit information from a large heterogenous group, like the general public, and ask them which activity they participate in most often. The first two methods allow a more comprehensive look at a user group than the third. Every angler or hiker, regardless of avidity, can be represented. Unfortunately this comprehensive look at participants fogs the distinction between user groups because individuals carry the perceptions of several user

groups with them. The third method allows a clearer comparison between user groups and less diversity within groups because a person usually has only one activity that they participate in most often. This method produces user groups that are made up of avid individuals that may be less comparable to user groups derived from other studies. By letting respondents identify their most frequent activity and using these responses to identify user groups, I will focus on differences between user groups and reduce within-group heterogeneity.

User groups can also be classified and compared as consumptive and non-consumptive users and thereby provide important information to natural resource managers. Consumptive users were defined by Vaske et al. (1982) as those whose activity is dominated by one clear and specific goal (e.g., catching fish or shooting game) over which the user has very little control. That is, the users may not be able to reach their goal due to lack of skill, fish or game, or luck. Consumptive uses provide users with physical products that they can take home. Goals of non-consumptive users are more diffuse, less central to a specific activity, and generally more easily attained. Non-consumptive users (hikers, campers) do not return from an excursion with goods, but with experiences. Differences in these groups have been previously described. Moss (1985) found that non-game fund contributors valued wildlife less for utilitarian purposes than did hunters. Vaske et al. (1982) found that consumptive users were less satisfied than non-consumptive users and attributed this to the level of control that both groups had over reaching their use-specific goals.

Although several studies of single user groups exist, studies comparing several user groups are lacking. Comparisons of user groups across studies is

problematic due to differences in survey characteristics and administration (Manfredo 1984, Williams et al. 1988). Comparisons are more valid when all user groups are contacted through the same medium, at the same time, and with the same questions (Dillman 1978).

Those studies that do compare user groups concentrate on different types of anglers. Schoolmaster (1986) found that bank anglers perceived a higher level of river use than did float anglers. Graefe and Ditton (1986) found bay and offshore anglers in the Galveston bay area had different trip characteristics, resulting in different economic impacts for the two types of angling. Loomis and Ditton (1987) found motive and participation differences between saltwater sport and tournament anglers. If such differences can be found within one user group (anglers), then differences between user groups should be even more profound.

In an effort to explore differences among user groups, I related user groups to use frequency, satisfaction, opinion on improvements needed on streams and rivers, importance of reasons to visit streams and rivers, opinion on threats to streams and rivers, opinion on important stream and river characteristics, and opinion on importance of VDGIF programs. These variables were selected for several reasons. User satisfaction has been studied by Vaske et al. (1982) and others but, no information was available regarding differential satisfaction among groups that use streams and rivers. Stream and river characteristics were included in an attempt to discover how stream and river users prioritize them. Reasons to visit streams and rivers are indicators of motivation for participation and can lend insight into how to improve recreational experiences in a cost effective manner. According to Loomis and Ditton (1987), some of the more important non-catch motives for

angling are relaxation, escape from routine, family recreation, to be outdoors, to enjoy the natural surroundings, and to be with friends. Kennedy (1970) found social companionship to be an important non-shooting motive for hunting. Discovering if these motives are also important to other stream and river users or how their importance varies among user groups is the next logical step. These variables can be important managerial tools for natural resource professionals who are involved with an understudied population such as the Virginia public.

Supportive evidence that these variables will be differentially important to user groups comes from several studies cited in Shreyer and Beaulieu (1986). McLaughlin et al. (1982) found that varying characteristics of the Flathead River were sought by recreationists for different experiences. McLaughlin and Paradice (1980) found that cross-country skiers and snowmobilers valued attributes of recreational settings differently. McDonough (1982) concluded that attributes of recreational settings like importance of solitude, and size of the recreational place are important to recreationists and that the attributes favored were related to the activity of the user. For example, solitude was more important to campers than to power boaters.

Understanding differences among user groups is important if natural resource managers are to anticipate accurately the demands placed on the resource. If, as proposed by Hendee and Harris (1970) and Miranda and Frese (1991), natural resource professionals more often hear vocal users or those readily available (i.e., at access sites), they are not being exposed to an adequate representation of the public. If continually exposed to narrow, unrepresentative factions of the public, they will over-estimate the

importance of those special interests or user groups. Their are serious implications of this overestimation. According to Staudt and Harris (1985), management needs to keep in touch with public perspectives or they will misrepresent the public. The authors also concluded that managers cannot rely on their own preferences in planning for the public. Managers who do not know their constituents cannot know in what areas public education is needed, causing the poor transfer of scientific information described by Loftus (1987). Lastly, Cortner (1984) states that resource planners need to know how familiar citizens are with existing programs and issues, the level of public support for these programs, areas where public acceptance may be an obstacle to plan or program implementation, the characteristics of groups who support or oppose particular plans or programs, and the potential trade-offs groups are willing to make. Not knowing the opinion of a representative sample of constituents would give incorrect answers to these important questions.

The primary objectives for this research were to: 1) find out how important several selected user groups are to the Virginia public; 2) find out if natural resource professionals could correctly predict user group importance; 3) describe user group relationships to seven survey variables (frequency of stream and river use, satisfaction, importance of reasons to visit streams and rivers, opinions on most important stream and river characteristics, opinions on threats to streams and rivers, and opinion on importance of several VDGIF programs); and 4) compare consumptive and non-consumptive users with respect to which improvements they felt were needed on the streams and rivers they use.

METHODS

Survey Methodology

Questionnaires were administered to public and professional respondents to provide the data for analysis. The questionnaires were mailed to the respondents, self-administered, and returned. Complete survey methodology is found in the Overview.

Data Analysis

Respondents who reported not using streams and rivers were omitted from the analysis.

User Group Importance

All questionnaires (both public and professional) contained a question regarding user group affiliation. Public respondents were asked to indicate which three activities in the following list they did most often (Appendix A, question 10):

1. fishing,
2. bait collecting,
3. canoeing, kayaking, sailing,
4. motorboating, waterskiing,
5. swimming, tubing, scuba diving,
6. hiking, sightseeing, birdwatching,
7. picnicking, camping,
8. hunting, trapping, and
9. other (please specify)_____.

Respondents were asked to rank their activities from 1 (most often) to 3

(third most often) and rank only three activities. Only the top three activities were requested because questions that ask respondents to rank all items in a list can be confusing and limit response. For the following analyses, the "other" user group was omitted because no particular pattern was apparent and sample size was small. Also omitted were any responses that did not follow the answer format correctly (e.g., more than one item with a "1").

Professional respondents were asked to predict which three activities were done most often by the public in their region (Appendix B, question 9). They were asked to rank the activities in the same manner as the public.

An RI_j similar to that of Leuschner et al. (1988) (Chapter 1) was calculated for public responses and professional predictions of public responses. An RI_j is a measure of the relative importance of items in a series and is based on the number of first, second, and third place rankings. These RI_j 's were used to compare the relative importance of user groups to the public and to compared public and professional responses.

User Group Relationships

Chi-square analysis was used to test if public user group affiliation was related to use frequency, satisfaction levels, reasons to visit streams and rivers, opinions on important characteristics of streams and rivers, opinions on selected threats to streams and rivers, and attitudes about selected VDGIF programs. For these analyses the respondents were assigned to a user group on the basis of the activity they ranked as "1". Due to low sample size, the bait collecting and hunt/trap user groups were excluded from chi-square analyses. Opinion of stream and river users on regulation of

stream and river activities was also be examined, but not included in user group analysis.

Lastly, user groups were classified as consumptive users (user groups 1, 2, and 8 from above) or non-consumptive users (3, 4, 5, 6, and 7 from above) based on the work of Vaske et al. (1982). User groups were considered to be consumptive if taking natural resource products (fish or game) was their primary goal, and non-consumptive if it was not. Then, chi-square analyses were run again. Consumptive and non-consumptive users were also compared (with chi-square) with respect to opinion on improvements needed on streams and rivers. User groups were not examined individually in the last comparison due to sample size limitations.

Use Frequency

Stream and river users were asked to indicate how many days each year they were on or near streams or rivers for recreation or pleasure (Appendix A, question 1). The use frequency categories were:

1. none,
2. 1-10 days each year,
3. 11-20 days each year,
4. 21-40 days each year,
5. 41-60 days each year,
6. > 60 days each year.

Satisfaction

Public respondents were asked how satisfied they were with the recreational opportunities provided by the streams and rivers of Virginia (Appendix A, question 2). They were asked to circle the number next to the

most appropriate of the following choices: 1) very unsatisfied; 2) unsatisfied; 3) neither satisfied nor unsatisfied; 4) satisfied; and 5) very satisfied. For the analysis, responses were categorized as unsatisfied (1 or 2), neither satisfied nor unsatisfied (3), or satisfied (4 or 5).

Improvements Needed on Streams and Rivers

Public respondents who used streams and rivers were asked to indicate which improvements were needed at the stream and river areas they used (Appendix A, question 6). Professional respondents to a separate questionnaire were asked to predict which improvements the public would like in their region (Appendix B, question 2). Both populations were instructed to circle all of the improvements that applied to their situation. The possible improvements were:

1. more/better access,
2. more/better recreational facilities,
3. litter clean-up,
4. water quality improvement,
5. natural beauty improvement,
6. improve daily water level stability,
7. flood control improvement,
8. improve yearly water level stability,
9. fish population improvement,
10. no changes needed, and
11. other (please specify) _____.

For the analyses, choices 10 and 11 were omitted due to low cell counts.

Users were compared with chi-square by separating the public into two groups, consumptive and non-consumptive. Anglers, bait collectors, and hunters/trappers were classified as consumptive users. Public respondents in the other user groups were considered non-consumptive users. A 2 X 2 contingency table was created for each improvement that compared the number of

consumptive and non-consumptive users that indicated that an improvement was needed or not.

In a related question, public respondents were asked to indicate which improvement they felt was most needed on the streams and rivers they used (Appendix A, question 7). Professional respondents were asked to predict which improvement the public would want most (Appendix B, question 3). Consumptive and non-consumptive responses were compared with chi-square. This test compared the proportion of consumptive and non-consumptive respondents who felt each improvement was most needed. For this analysis, only improvements 1, 2, 3, 4, and 9 had sufficient cell counts to be included in the analysis. Finally, to test if professionals could better predict consumptive or non-consumptive needs, chi-square was used to compare professional responses to consumptive and non-consumptive needs separately.

Reasons to Visit Streams and Rivers

Public respondents were given a list of eleven reasons to visit streams and rivers, and asked to indicate how important each reason was to them (Appendix A, question 16). Importance ranged from 1 (low importance) to 5 (high importance), the reasons were:

1. to be outdoors,
2. for family recreation,
3. to be with friends,
4. to be close to water,
5. to relax,
6. to be alone,
7. to experience the scenery,
8. for adventure and excitement,
9. to develop outdoor recreational skills,
10. to fish or hunt, and
11. to see wildlife.

Stream and River Characteristics

Public respondents were asked to rank the three characteristics of streams and rivers (out of twelve) that they felt were most important (Appendix A, question 23). Ranks ranged from 1 (most important) to 3 (third most important). Any respondent deviating from the directed answer format was deleted. Choices for stream and river characteristics were as follows:

1. clean water,
2. clean stream bed or river banks,
3. presence of trees or shrubs along banks,
4. many fish live there,
5. many types of plants and animals live there,
6. few other people use the area,
7. ready access to the stream or river,
8. presence of large, catchable fish,
9. good natural scenery,
10. presence of rare and endangered plants and animals,
11. adequate water levels exist year round, and
12. other (please specify)_____.

For this analysis, the characteristics were collapsed into four groups: 1) "Public use" included characteristics 6, 7, 8, and 11; 2) "Aesthetics" included characteristics 2, 3, and 9; 3) "Diversity" included characteristics 4, 5, and 10; and 4) "Clean water" (characteristic number 1). The "other" category was deleted due to low sample size.

The chi-square cell counts correspond to the frequency of "1" rankings given to each characteristic group by each user group. For example, for each user group, those who ranked "few other people use the area", "ready access to the stream or river", "presence of large, catchable fish", or "adequate water levels exist year round" as the most important characteristic of streams and rivers were aggregated to form the "public use" sub-group. This analysis compared, across user groups, the distribution of "1" rankings in each of the

four sub-groups of stream and river characteristics.

Sample sizes were too small to give valid chi-square results for all user groups. For this analysis, only anglers, hikers/sightseers/birdwatchers, and picnickers/campers were compared.

Regulation of Stream and River Activities

Respondents were asked how strictly a series of items was regulated. All items were introduced as factors that had the potential to affect streams and rivers (Appendix A, question 25). The answer categories for each item were: 1) too strictly, 2) about right, 3) not strictly enough, and 4) don't know. For this analysis, don't know responses were omitted. The items were:

1. urban development,
2. agricultural practices,
3. industry, and
4. forestry practices.

Threats to Streams and Rivers

For a list of eleven possible threats, public respondents were asked to indicate how serious each threat was to the value of streams and rivers in Virginia (Appendix A, question 26). They responded on a five point Likert scale from 1 (low threat) to 5 (high threat) and responded with a 6 if they did not know how serious a particular threat was. The threats were as follows:

1. excessive boat traffic,
2. overfishing,
3. agriculture,
4. human litter,
5. urban development,

6. water withdrawal,
7. dam construction,
8. channel alteration,
9. forest removal,
10. overhunting, and
11. industry.

Those people responding with a 6 (don't know) were excluded from the chi-square analysis.

VDGIF Program Importance

For a list of nine current VDGIF programs, public respondents asked how important they felt each program should be (Appendix A, question 28).

Importance ratings ranged from 1 (low importance) to 5 (high importance) and 6 for "don't know". The programs were as follows:

1. fish stocking,
2. endangered species restoration,
3. stream habitat improvement,
4. development of public access,
5. non-game fish management,
6. environmental permit review,
7. environmental education,
8. fish population monitoring, and
9. enforcement of regulations.

Again, "don't know" responses were deleted.

RESULTS

User Group Importance

Of all respondents, 302 were omitted as non-users. Respondents further omitted from the analysis totaled 183 and included those who did not mark three different activities with three different numbers. This left 626

respondents in the analysis on user group importance.

Fishing had the largest percentage of first, second and third place public rankings and consequently had the largest RI_j (0.290), followed by hiking/sightseeing/birdwatching (0.181) and picnicking/camping (0.177). Bait collecting had the lowest RI_j (0.014) (Figure 1).

Professionals predicted that fishing would be the most frequent activity on the streams of Virginia ($RI_j = .475$), followed by motorboating/waterskiing (0.192) and canoeing/kayaking/sailing (0.186). They predicted picnicking/camping (0.024) and hiking/sightseeing/birdwatching (0.006) to be sixth and seventh, respectively. Bait collecting (0.004) was predicted to be least important (Figure 1).

Professionals were asked to predict the three most frequent activities in their region. They accurately predicted the most frequent activity (fishing), but not the second and third. The activities that the professionals predicted to be second and third were selected sixth and seventh by the public. Professionals over-estimated the importance of fishing to the public and under-estimated the importance of hiking/sightseeing/birdwatching and picnicking/camping to the public.

RI_j 's were more informative measures of user group importance than counts of number one ranks. The second and third place rankings, which are incorporated into the equation, added useful information, especially for resource professionals' predictions. Five different user groups, as ranked by the professionals, had zero first place rankings but were still predicted to have some importance. If only first place rankings had been used (Table 1), only three user groups would have been deemed "important" and the importance of the five other user groups would have been assessed as equal and zero.

Since the RI_j 's for those five user groups had a twenty fold range (0.004 to 0.08), it is obvious that information would have been lost if only number one ranks had been used, especially for relatively infrequent activities.

User Group Relationships

The hunting/trapping and bait collecting user groups were omitted from user group analysis (26 respondents), leaving 600 respondents in the analysis on use frequency, satisfaction, reasons to visit streams and rivers, important stream and river characteristics, threats to streams and rivers, and importance of VDGIF programs. These two user groups were not omitted from the consumptive/non-consumptive comparisons, however, leaving 626 respondents for analysis on use frequency, satisfaction, improvements needed on streams and rivers, reasons to visit streams and rivers, important stream and river characteristics, threats to streams and rivers, and importance of VDGIF programs.

Use Frequency

Many stream and river users (42%) visited streams and rivers 1-10 times each year, twice the percentage of any other category. The percentage of respondents in each frequency category decreased with increasing use frequency for all but one frequency category. For all user groups but one (picnic/camp), the percentage of respondents in the "> 60 days" category was larger than the percent in the "41-60 days" category. There was a significant relationship between use frequency and user group ($p < 0.001$; Table 2). The

widest discrepancy between user groups was between anglers and picnickers/campers. Anglers were more evenly distributed throughout the frequency categories than picnickers/campers (Figure 2).

Consumptive and non-consumptive users also exhibited significantly different use frequency distributions ($p < 0.001$; Table 2). Consumptive users were more evenly distributed through the range of use frequencies than non-consumptive users. Nearly half (49%) of all non-consumptive users were in the "1-10 days each year" category, compared to only 33% of consumptive users.

Satisfaction

Most (58%) stream and river users indicated they were either satisfied or very satisfied. Only 18% reported feeling unsatisfied or very unsatisfied. No significant relationship was found between level of satisfaction and user group affiliation ($p = 0.103$). Although non-significant, certain trends were apparent that may deserve further exploration. For example, the canoe/kayak/sail and swim/tube/scuba dive user groups exhibited the highest percentages in the satisfied or very satisfied categories (70% and 67%, respectively) and the lowest percentages in the unsatisfied or very unsatisfied categories (12% and 6%, respectively; Table 3). Consumptive and non-consumptive users were barely significantly different ($p = 0.040$). Non-consumptive users were satisfied or very satisfied more often than consumptive users (Table 3).

Improvements Needed on Streams and Rivers

Consumptive and non-consumptive responses differed significantly for a number of the improvements (Table 4). Consumptive users, more than non-consumptive users, wanted more/better access ($p = 0.003$), improvement of daily water level stability ($p = 0.013$), and fish population improvement ($p < 0.001$). Non-consumptive users, more than consumptive users, wanted litter clean-up ($p = 0.048$), water quality improvement ($p = 0.001$), and natural beauty improvement ($p = 0.011$). More/better recreational facilities ($p = 0.278$), flood control improvement ($p = 0.660$), and improvement of yearly water level stability ($p = 0.212$) were not significantly related to consumptive or non-consumptive affiliation.

Comparing only more/better access, more/better recreational facilities, litter clean-up, water quality improvement, and fish population improvement (the five improvements with the highest cell counts for both populations), consumptive and non-consumptive opinions on the most needed improvement on streams and rivers were significantly different ($p < 0.001$) (Table 5). More consumptive users than non-consumptive users felt that access and fish population improvement were most needed. More non-consumptive users than consumptive users felt that litter clean-up and water quality improvement were most needed. Although these differences exist, both groups felt that water quality improvement and litter clean-up were the two most needed improvements. Professionals responses were significantly different ($p < 0.001$) than both consumptive and non-consumptive responses (Table 5), indicating that professionals did not predict either population well.

Reasons to Visit Streams and Rivers

Most of the reasons to visit streams and rivers were very important to stream and river users (Table 6). For example, "to be outdoors", "to relax", "to experience the scenery", and "to see wildlife" were the four most important reasons to visit streams and rivers, with 88%, 85%, 78%, and 73% of the stream and river users indicating these reasons were of high importance, respectively. Two notable exceptions to this trend were the rankings of "to develop outdoor recreational skills" and "to be alone" which were seen as very important by only 29% and 31%, respectively.

Seven of the eleven reasons to visit streams and rivers showed significant chi-square relationships to user group affiliation. "For family recreation" ($p < 0.001$, Table 7) was most important to the picnic/camp user group, with 81% feeling it was of high importance and only 4% feeling it was of low importance. Motorboaters/waterskiers had a nearly identical distribution (80% high, 6% low). This item was least important to the hike/sightsee/birdwatch user group (54% high importance, 24% low importance).

"To be with friends" ($p = 0.001$, Table 8) was most important to motorboaters/waterskiers, with 82% and 14% indicating it was of high and low importance, respectively. At the opposite end of the spectrum was the hike/sightsee/birdwatch user group with only 43% feeling this item was of high importance and 23% feeling it was of low importance.

"To be alone" ($p = 0.003$, Table 9) was most important to anglers (35% high importance, 43% low importance) and hikers/sightseers/birdwatchers (30% high, 34% low). It was least important to motorboaters/waterskiers (16% high, 68% low). All user groups had more low importance responses than high

importance responses for this reason to visit streams and rivers.

Most (94%) of the canoe/kayak/sail user group reported a high importance for "to experience the scenery" ($p = 0.002$, Table 10), but none of them felt it was of low importance. "To experience the scenery" was least important to the motorboaters/waterskiers (64% high, 6% low).

"To develop outdoor recreational skills" ($p = 0.001$, Table 11) was most important to the swimmers/tubers/scuba divers and least important to hikers/sightseers/birdwatchers and picnickers/campers. A larger proportion of the swimmers/tubers/scuba divers (44%) felt that this item was of high importance compared to only 19% of the hikers/sightseers/birdwatchers and 17% of the picnickers/campers.

"To fish or hunt" ($p < 0.001$, Table 12) was most important to anglers with 97% feeling that this item was of high importance. "To fish or hunt" was of substantially lower importance to hikers/sightseers/birdwatchers with only 19% feeling it was of high importance and 62% feeling it was of low importance.

"To see wildlife" ($p < 0.001$, Table 13) was also most important to anglers with 82% feeling it was of high importance and 7% feeling it was of low importance. It was also highly important to hikers/sightseers/birdwatchers (81% high, 9% low). This reason was of least importance to swimmers/tubers/scuba divers (41% high and 18% low).

Consumptive and non-consumptive responses were significantly different for five of the eleven reasons to visit streams and rivers. "To be alone" ($p = 0.012$, Table 9), "to develop outdoor recreational skills" ($p = 0.001$, Table 11), "to fish or hunt" ($p < 0.001$, Table 12), and "to see wildlife" ($p < 0.001$, Table 13) were reasons to visit streams and rivers that were more

important to consumptive users. Non-consumptive users ranked "to experience the scenery" ($p = 0.009$, Table 10) more highly than consumptive users. The other five reasons in the questionnaire ["to be outdoors" ($p = 0.517$), "for family recreation" ($p = 0.779$), "to be with friends" ($p = 0.321$), "to be close to water" ($p = 0.259$), and "to relax" ($p = 0.494$)] showed no significant relationship to consumptive vs. non-consumptive affiliation.

Stream and River Characteristics

Respondents answering the question on characteristics of streams and rivers incorrectly totaled 29, leaving 571 respondents.

Most (76%) stream and river users felt that clean water was the most important characteristic of streams and rivers (Table 14). Chi-square analysis showed a significant relationship ($0.001 < p < .005$, Table 14) between the most important characteristics of streams and rivers and the three user groups compared (fishing, hiking/sightseeing/birdwatching, and picnicking/camping).

Clean water was equally important to all three groups with 74% of each ranking it as the most important characteristic of streams and rivers. Public use characteristics were selected as most important by more anglers (9%) than the other two user groups. Aesthetic characteristics were most often ranked as most important by picnickers/campers (18%) compared to hikers/sightseers/birdwatchers (8%), and anglers (7%). Lastly, more hikers/sightseers/birdwatchers (16%) than anglers (10%) and picnickers/campers (3%) felt diversity characteristics were most important.

Chi-square analysis showed a significant difference ($0.01 < p < 0.025$,

Table 14) between the collapsed table of stream and river characteristics and consumptive vs. non-consumptive activities. Differences were, however, minor. Consumptive users, more often than non-consumptive users, ranked public use and diversity characteristics as most important. Non-consumptive users, more often than consumptive users, ranked clean water and aesthetic characteristics as most important.

Regulation of Stream and River Activity

Urban development and industry were seen by most respondents as being regulated "not strictly enough" (74% and 85%, respectively) by all stream and river users. Agricultural practices were seen as being regulated "not strictly enough" by fewer, but still over half (53%), of the stream and river users. Only forestry practices were seen by more respondents as being regulated "about right" (57%) than "not strictly enough" (42%). Less than 2% of the respondents for each item felt the regulations were "too strict" (Table 15).

Threats to Streams and Rivers

Human litter, industry, urban development, and forest removal were seen as highly threatening by 86%, 82%, 78%, and 72% of the respondents, respectively (Table 16). Other threats (e.g., channel alteration, overhunting) were fairly evenly divided among categories of high, moderate and low threat. Only dam construction was considered by more respondents to be of a low threat (43%) than a high threat (28%). Opinion on only one of the

eleven threats listed in the questionnaire, "forest removal", was related significantly to user group ($p = 0.029$, Table 17). The hikers/sightseers/birdwatchers, more than other user groups, felt this activity threatened the value of streams and rivers. However, several of the chi-square tests had low cell counts and should be regarded with caution.

Consumptive and non-consumptive users were not significantly different (all chi-square p -values > 0.1) with respect to any of the eleven threats to streams and rivers included in the survey.

VDGIF Program Importance

All nine VDGIF programs had more respondents in the high importance category than in the low importance category. Some programs (e.g., stream habitat improvement, environmental education, enforcement of regulations) were believed to be of high importance by a large majority (greater than 80% of the responses for each program reflected high importance). Other programs (development of public access and non-game fish management) had far fewer high importance respondents (Table 18). Opinions on five of nine VDGIF programs included in the questionnaire were significantly related to user group affiliation. "Endangered species restoration" ($p = 0.222$), "environmental education" ($p = 0.063$), "fish population monitoring" ($p = 0.106$), and "enforcement of regulations" ($p = 0.099$) were not related significantly to user group.

Fish stocking ($p < 0.001$) was especially important to anglers, with 80% feeling this program should be of high importance, and only 3% feeling it should be of low importance. All other user groups were much less concerned

about the stocking program (Table 19).

Stream habitat management ($p = 0.010$, Table 20) was most important to hikers/sightseers/birdwatchers (92% high, 7% moderate, 2% low) and least important to swimmers/tubers/scuba divers (76% high, 12% moderate, 12% low). Unfortunately cell counts were very low for this particular test, making the results tenuous.

Development of public access ($p = 0.007$, Table 21) was of most concern to anglers (45% high importance, 22% low importance). Swimmers/tubers/scuba divers were least concerned with this program (18% high and 39% low).

Canoers/kayakers/sailors and hikers/sightseers/birdwatchers ranked non-game fish management ($p = 0.003$, Table 22) highest of all user groups. More than half of either group felt this program was of high importance (52% and 51%, respectively). Motorboaters/waterskiers felt this program was of lower importance than the other user groups (22% high importance, 27% low importance).

Environmental permit review ($p = 0.003$, Table 23) was of highest importance to the hike/sightsee/birdwatch user group (87% high importance and only 3% low importance). Motorboaters/waterskiers reported the lowest importance for this program with just over half (51%) in the high importance category.

Consumptive and non-consumptive opinions were significantly related to four of the nine of the VDGIIF programs in the survey. Consumptive users placed more importance on fish stocking ($p < 0.001$, Table 19), development of public access ($p = 0.010$, Table 21), and fish population monitoring ($p < 0.001$, Table 24) than did non-consumptive users. Consumptive users placed less importance on endangered species restoration ($p = 0.013$, Table 25) than

did non-consumptive users. Stream habitat improvement ($p = 0.732$), non-game fish management ($p = 0.091$), environmental permit review ($p = 0.497$), environmental education ($p = 0.470$), and enforcement of regulations ($p = 0.410$) were not significantly related to consumption or non-consumption.

User Group Summary

Although the statistical analyses were designed to call attention to differences among user groups and not describe each user group separately, certain patterns are apparent. Below, I will compare each user group to other user groups.

Anglers were:

1. less satisfied,
2. more interested in solitude, seeing wildlife, fishing and hunting, having fish stocked, and seeing public access developed.

Canoers/kayakers/sailors were:

1. more satisfied,
2. more interested in experiencing the scenery, and
3. less interested in fishing and hunting.

Motorboaters/waterskiers were:

1. more interested in family recreation, being with friends, fishing and hunting,
2. less concerned with non-game fish management and environmental permit review.

Swimmers/tubers/scuba divers were:

1. more satisfied,
2. more interested in developing outdoor recreational skills,
3. less interested in seeing wildlife, and
4. less concerned about stream habitat management, and development of public access.

Hikers/sightseers/birdwatchers were:

1. less interested in family recreation, being with friends, developing outdoor recreational skills, fishing and hunting,
2. more concerned about forest removal, stream habitat management, non-game fish management, and environmental permit review.

Picnickers/campers were:

1. more interested in family recreation,
2. less interested in developing outdoor recreational skills.

DISCUSSION

User Group Importance

This study found that angling was the single most important stream and river activity based on user priority rankings. An equally important finding was that angling was not the only important activity.

Comparing this study to others is difficult because of differences in sampling schemes and study objectives. Although single user group numbers and attitudes have been assessed, relative abundances of user groups have not been. Setting aside methodological differences between studies, certain comparisons can be made. The 1985 National Survey of Fishing, Hunting, and Wildlife Associated Recreation indicated that roughly 26% of Americans over 16 years old went fishing in the last year. One fourth of Virginia residents over 16 fished according to the 1980 Virginia supplement to this survey. In my sample, roughly 40% of all public respondents (447 out of 1111) indicated that fishing was one of their top three activities. It is possible that sampling differences or user group classification account for estimation differences. It is also possible anglers responded to the survey more readily

than others. Based on the evidence from the Virginia supplement, it seems that the latter possibility is more likely. In closer agreement with my estimation, Moss (1985) found that over 43% of respondents to her survey in Virginia had fished in the last year. Other than these limited, single activity comparisons, I have not found significant literature that compared the relative importance of public user groups.

The study findings indicate that there are many stream and river users that use resources for aesthetic reasons rather than as a medium for a particular activity. Large numbers of stream and river users participated in activities that do not require streams and rivers (e.g., picnicking and camping) even more than activities that do require some body of water (e.g., canoeing or motorboating). Picnickers do not need streams and rivers to conduct their activities, but use them to enhance their activities. The lack of direct use means that they do not directly interfere with more intensive uses like boating and fishing and are therefore compatible with them. Of course, some picnickers, campers, and birdwatchers are also likely to fish or boat, therefore increasing the demand on the resource.

There seem to be some differences between what the public says they do on streams and rivers and what professionals believe the public does. Although the professionals correctly predicted that fishing was the most frequented activity, they did not predict the importance of the second and third most important activities (i.e., picnicking/camping and hiking/sightseeing/birdwatching). There are at least two possible explanations for these findings. First, the difference may have been caused by misinterpretation of survey questions by the public. Communicating with the public through survey research is difficult. In dealing with such a wide

range of education and experience, presenting information that all respondents can understand without condescending to others is challenging. The possibility exists that public respondents ignored the numerous reminders that the questions dealt only with stream and river use. If they responded as if the survey was designed to address all recreation, results of the survey would apply to recreation in general rather than to stream and river use specifically. There is no evidence that this occurred, but survey research is by no means an exact science. Because the public was repeatedly reminded that questions were to be answered with regard to stream and river use only, this explanation for discrepancy between public responses and professional predictions seems unlikely.

The second possibility is that professionals are unaware of the importance of the hike/sightsee/birdwatch and picnic/camp user groups to the Virginia public. The lack of awareness could stem from a lack of contact between natural resource professionals and the people involved in those activities. Anglers and boaters are more easily located at access points like boat ramps or known fishing areas that are patrolled by enforcement personnel and may be more vocal than picnickers or hikers (Hendee and Harris 1970). Furthermore, the professionals surveyed (game wardens and fishery biologists) are paid with funds provided primarily by anglers and hunters and are likely to have an interest in providing for their needs first. As stated by Hendee and Harris (1970), managers may suffer a form of bias called selective perception in which they look for and observe what they expect to see. For these reasons, professionals perceive certain recreational uses to be more important to the general public than they are, a result predicted by Hendee and Harris (1970) and Miranda and Frese (1991). Public surveys can be

effective in dispelling such misconceptions (Cortner 1984, Loftus 1987) but are often ignored in resource management and allocation. Natural resource professionals that influence policy need to have a better understanding of the demands placed on the resources by the public in order to adequately manage and protect the resources. According to Swihart and Petrich (1988), public input, even in limited forms, is necessary to validate expert opinion. Expert opinion should not replace public input. Instead, public and professional information should complement each other. This is not intended as a criticism of natural resource professionals, whose budgets have decreased and work loads have increased. This research indicates that their management efforts could be easily enhanced and simplified by providing a more complete picture of the constituents they serve and the demands those constituents place on natural resources. Management efforts would be enhanced by a better understanding of the constituency and the mere acknowledgment of certain user groups (picnickers and campers) as a large constituency. Management efforts would be simplified as proper acknowledgment of user groups would reduce the conflict between managers and the public.

If the public responded correctly, then it is apparent that there is a large constituency, unrecognized by the VDGIF, placing demands on Virginia's streams and rivers and the facilities required to satisfy users. Since only certain, easily identifiable user groups provide funding (i.e., anglers, hunters, and registered motorboaters), it is also apparent that to maintain a satisfactory level of management and to enhance management practices that address the needs of the unrecognized constituency, a broader funding base would be beneficial. A broader funding base will allow the VDGIF to address more environmental issues and become more involved in natural resource

stewardship. Considering the apparent decline of certain budget contributors (hunters), searching for other viable funding sources is warranted.

Moss (1985) suggests that the large, unidentified constituency, specifically the non-consumptive faction of the public should receive more attention from the VDGIF, at least as much as the consumptive faction. If these non-consumptive programs are to become a more prominent part the VDGIF agenda I believe they should necessarily become a more significant contributor to that department's budget. The VDGIF receives funding from license and boat registration fees, and federal matching funds (LaRoche 1991). Hence, many stream and river users (e.g., hikers/sightseers/birdwatchers) have no mandatory mechanisms for contributing to the management of resources important to them. The voluntary mechanisms available (e.g., tax check off) are insufficient to reflect the value of streams and rivers to the users. Providing more appropriate mechanisms (e.g., user fees or voluntary river conservation stamps), if well advertised and readily available, would increase revenues for stream and river management. Those revenues would not only benefit streams and rivers but feed back to those who contributed via improved recreational opportunities. Mechanisms other than increased license fees could be developed by the VDGIF to reach other potential contributors and help compensate for the increased burden placed on the Department by broader conservational concerns like environmental quality.

User Group Relationships

Previous literature has not defined user groups in the same fashion that I have, making comparisons to other works cautious. I used the respondents'

most frequented activity to classify them into a user group. This implies a relatively high level of avidity when compared, for example, to anglers whose names have been drawn from license lists. Bryan (1977) in a study on trout anglers found that the more an individual participated in an activity, the more specialized they became. Increased specialization in trout anglers was related to the type of equipment used, preference for a particular type of experience, management concerns and other variables. One problem with my methodology is that my user groups probably express this specialization to some degree and are not completely representative of all anglers or all campers. An advantage to my methodology is that user groups do not overlap, allowing clearer comparisons between them.

User group relationships provided information useful to characterizing different user groups and identifying priorities held by different groups of people with different recreational goals. For example, most stream and river users were satisfied with the opportunity provided them by the streams and rivers of Virginia. Assuming that poorer recreational opportunities and conditions would have resulted in less satisfaction, the results indicate that Virginia's stream and river resources are well managed for the users surveyed. Consistent with other research (Vaske et al. 1982, Moss 1985), consumptive users were less satisfied than non-consumptive users. This is probably because of the difficulty often encountered in attaining consumptive goals (e.g., catching fish or taking game) (Vaske et al. 1982). It also may be due to the lack of tolerance of certain groups for encounters with other resource users in multiple-use situations. Schoolmaster (1986) found that bank-anglers were more intolerant than float anglers to perceived crowding and their experience was considerably diminished by the interference of other stream and

river users. Although satisfaction did not vary among more specific user groups, certain trends are apparent. For example, three times as many motorboaters/waterskiers than swimmers/tubers/scuba divers were dissatisfied. Apparently, even though the two variables were not significantly related, some user group differences deserve further exploration. Acknowledging differences between consumptive and non-consumptive users, or the difference between specific user groups is the first step to understanding the differences. The next step is to identify the reasons for differential satisfaction in an attempt to improve the opportunities on Virginia's streams and rivers.

One factor influencing satisfaction might be how well constituents' reasons to visit streams and rivers are reinforced. Motivational information, such as reasons the public visits streams and rivers, is crucial in understanding and resolving problems like visitor conflict (Knopf et al. 1983). Some of the reasons that were most important to all stream and river users, "to see wildlife" and "to experience the scenery", can be controlled or improved by management agencies. If people visit streams and rivers to see wildlife, and they see more of it, that reason would not only be reinforced, but the overall satisfaction of the user would be increased. Even if programs are not initiated to enforce these reasons, the attitudes of the public can be taken into consideration in all management plans. Management areas on or near streams and rivers could be enhanced for viewing opportunities, and aesthetic qualities (litter clean-up, water quality improvement) could be improved. The results indicate that many users visit streams and rivers for reasons that could be improved by the VDGIIF. Other important reasons like "to be outdoors", and "to relax", however, are not necessarily controlled by natural resource managers. The reasons to visit streams and rivers that were most

important to Virginia stream and river users were also found to be important motivations to anglers in other studies. Relaxation, family recreation, to be outdoors, to enjoy the scenery, and to be with friends were reasons reported by Loomis and Ditton (1987) as being important to sport-fishermen. "To be with friends" was also cited by Knopf et al. (1983) as one of the most important motivational factors to recreationists. Increasing opportunities for family recreation, placing more facilities near water, and enhancing hunting and fishing opportunities would reinforce the reasons that many respondents use streams and rivers.

It is apparent that user groups have different reasons for using streams and rivers. Some are looking for family experiences, some enjoy the solitude more than others. Focusing on these differences will allow managers to provide specific programs and attack specific needs. For example, picnickers/campers and motorboaters/waterskiers, more than other user groups, would benefit from enhanced facilities that would address family recreational needs. To most efficiently improve family recreational opportunities, an important reason to visit streams and rivers, the needs of picnickers/campers and motorboaters/waterskiers should be addressed. This information can be used to propose improvements that will most efficiently improve stream and river experiences. Since 7 out of 11 reasons to visit streams and rivers were related to user group, it appears that motivational differences between the groups are, in general, different and therefore an important management issue. Although consumptive/non-consumptive comparisons also showed differences, they were not so pronounced.

The large variation in reasons to visit streams and rivers presents a problem for those in charge of managing the resource. With such diversity, it

is difficult to address the needs of several groups and the biological needs of the resource at the same time. Recognizing the different needs of groups can provide insight into which uses and users are most compatible with each other and which ones affect the resource least. For example, picnickers/campers and hikers/sightseers/birdwatchers, activities not necessarily carried out in the water, would not interfere with more traditional activities like fishing and boating and would therefore be relatively compatible with them. Angling and boating, however, would not be as compatible because anglers, more than other user groups, enjoy solitude. In areas of high user conflict, solutions like boating or fishing restrictions during certain times of day, year, or certain areas may be designed to best address the needs of all users. This information helps managers make multiple use decisions and allows them to accommodate users that a particular resource can best satisfy. According to Lime (1976) managers should specifically design the kind or kinds of recreational opportunities an area is to provide, a task made easier by proper anticipation of user motives and desires.

Directly important to the VDGIF is input on program importance. This information can help managers prioritize programs both biologically and on public merit. If a program is both ecologically unfounded and unsupported by public opinion, then the continuation of that program should be in question. A program with relatively little public interest (e.g., development of public access) can be evaluated solely on its ecological or biological merit while a program with little ecological merit (fish stocking) can be evaluated on its value to Virginia residents. Overall, the public's widespread support for all programs included in the survey indicates that they are pleased with the array of actions being taken by the VDGIF. Only development of public access and

non-game fish management were seen as being of low importance by more than 20% of all Virginia stream and river users. As with reasons to visit streams and rivers, there was considerable variation in the VDGIF programs that were most important to user groups. Anglers most highly valued stocking, access, and fish population monitoring - programs that directly benefitted their use. On the other hand, many programs that did not benefit only specific user groups, like environmental education and enforcement of regulations, showed no significant relationships. This illustrates that some programs are equally important to and benefit all users, but not all users contribute significantly to the VDGIF budget. A broader funding base is warranted that accounts for the demand that picnickers and campers, hikers, sightseers and birdwatchers place on the VDGIF and the cost of this demand. Program importance is very important in terms of allocation efficiency. As previously mentioned, development of public access was relatively unimportant to the conglomerate of stream and river users but somewhat more important than average to anglers and less important than average to canoers/kayakers/sailors and swimmers/tubers/scuba divers. The implication of this finding is that money spent on enhancing access for anglers specifically would be a more efficient allocation of funds than trying to provide generic access for all user groups. Information specific to user groups can go a long way in stretching limited funds into effective management.

Perhaps more directly connected to management implications is the question of what aspects of streams and rivers constituents feel are most important. In Virginia, stream and river users want clean water, not access or big fish. This desire comes partly from a recognition of the environmental neglect and an increased environmental awareness that lead to the anti-

pollution legislation of the past few decades (Klessig and Bouwes 1984). There is some evidence that different user groups feel different characteristics of streams and rivers are important, but differences are minor. Just like the importance of VDGIF programs, the importance of stream and river characteristics seems to be tied to those characteristics that make use of streams and rivers most enjoyable to a particular user group. Accordingly, all user groups indicated a high importance for clean water (especially picnickers/campers), anglers were more interested in access, and hikers/sightseers/birdwatchers were more concerned about aesthetics and visual characteristics of streams and rivers.

User groups also exhibited different use frequency distributions. Anglers, much more than picnickers/campers, were diverse in their use frequencies. The only explanation I have for this is that as recreational specialization increases, so does use frequency. In angling, the drive to specialize has been shown to be very strong (Bryan 1977). Perhaps no such drive occurs in the picnic/camp user group. Whatever the reason, anglers spend more days fishing than picnickers/campers spend doing their respective activities.

In most aspects of use of streams and rivers and concern for them, the overriding pattern is that user groups have unique needs, desires, and opinions. Considering the differences among user groups, it is obvious that specific management strategies need to address individual user groups needs. Generic management plans designed to benefit the public will be misguided because of the lack of understanding of the "general public", a misunderstanding that surveys like this one strive to overcome. In the other extreme, programs targeted toward vocal special interest groups will not

efficiently or equitably allocate resources to Virginia's stream and river users. User group alliance, as determined by public input, will give managers a relatively unbiased picture of their constituents and allow more appropriate allocation of resources. For this reason alone, public perspectives are important to resource professionals. Knowing public perspectives removes one variable from the complex equation of successful resource management. People management has become a necessary part of this equation because of the increasing public scrutiny that management receives (Tipple and Wellman 1989). Knowing public perspectives allows anticipation of public concern and preparation of management plans that minimize conflict, thereby reducing the time needed for planning and increasing the time and money available for implementation of management plans. All of the variables examined here provide information to managers about the public and the feelings of the public towards natural resource issues. It is not assumed that these are the key variables that distinguish user groups. Instead, these variables have been used to explore possible differences between user groups. All of these variables do, however, deal with issues facing Virginia's streams and rivers and provide information that can be applied to current and future management decisions.

Even though user group affiliation was significantly related to the characteristics of streams and rivers that were viewed as most important, I will point out two cautions. First only a few user groups were examined. Second, the statistical significance in this instance might not reflect practical importance. Nearly 75% of the members of all three user groups (only three were examined for this analysis) felt that clean water was the most important characteristic of streams and rivers. This indicates that

although statistical difference exists, similarities between the populations are also strong.

Although user groups exhibit different characteristics, there are several similarities worth discussing. The first statistical similarity is satisfaction, which was not significantly related to user group. The only caution here is that my measure of satisfaction was dictated by only one question with five answer categories. Although other studies have successfully used similar methods (Vaske et al. [1982] used one question with a nine-point scale), more in-depth questioning aimed at uncovering both expectations of recreational experiences and realization of those experiences, as found in Shelby et al. (1983) may be needed to bring out differences in the population.

The second similarity can be found in the perception of certain activities as threats to streams and rivers. Only 1 of 11 threats was significantly related to user group. There is no clear pattern based on user groups concerning the threats that face Virginia's streams and rivers. Threats to streams and rivers need to be considered during any proposed project along streams and rivers. Finding out how the public feels about several threats will help managers anticipate public anxieties and allow them to prepare plans which consider these anxieties. It is apparent that if a proposed project involves urban development, industry, or could effect the amount of human litter entering the system, water resource managers need to explain what is being done to minimize or alleviate these threats. The concern for industrial threats probably stems from a history in Virginia of industrial impacts to streams and rivers. The Shenandoah, James, and Clinch Rivers have all suffered from industrial pollution ranging from dioxins to

mercury (Angermeier, 1991). Concern over urban development comes from a nearly uncontrolled urban sprawl occurring in northern Virginia with an expected statewide population increase of 32% (1.5 million people) by the year 2020 (Roanoke Times and World News, 1991). The concern over litter is understandable, but relatively unaccountable, and assessing responsibility is nearly impossible. The state's many impoundments concentrate litter from the rivers that feed them. The result makes the accumulated litter grossly visible in areas of high recreational use resulting in a heightened public awareness, and possibly magnification of the problem.

Environmental concerns are not only common in Virginia, but are becoming more of an issue across the country. Thomas et al. (1984) found licensed Texas hunters to be concerned about the condition of natural resources and believed the environment was getting worse. Identifying the concerns of stream and river users before going public with management plans can smooth the public involvement process considerably and allow managers to move on to implementation. Knowing that the VDGIF and other natural resource agencies are genuinely concerned about these threats will strengthen public relations and accordingly, the power of these agencies to act.

Consumptive and Non-consumptive Constituents

I was initially interested in testing for differences between consumptive and non-consumptive users because of an agreement in the literature that the populations would indeed be distinct (Vaske et al. 1982, Moss 1985). Although I did find that satisfaction was related to consumptive or non-consumptive orientation, I see more similarity between consumptive and

non-consumptive users than between user groups.

As with user group relationships, setting aside those variables that are intuitively related to consumption or non-consumption (importance of fish stocking) illustrates a fundamental similarity between consumptive and non-consumptive users. The two populations show overriding concerns for clean water, similar regard for most VDGIF programs, and share many reasons for visiting streams and rivers. Although consumptive users showed more concern for access and fish population improvement than non-consumptive users, this is not very surprising. Most of the consumptive users are anglers, many of whom need good access for boat launching and all of whom would presumably be happier with more fish in their creels or live wells. What is surprising is that, even in the consumptive user group, water quality improvement and litter clean-up were seen as most needed more often than fish population improvement, access improvement and facility improvement. Consumptive users do show a higher priority for improvements that would benefit people than non-consumptive users but still feel that improvements that directly benefit streams and rivers are even more urgently needed. I feel that user group relationships provide more detailed and useful information than most consumptive/non-consumptive comparisons. Aggregating several user groups causes differences to cancel, making differences between consumptive and non-consumptive users difficult to see.

Whether or not professionals can better predict the desires of consumptive or non-consumptive users is statistically unproven in this instance. Comparisons of professionals to both consumptive and non-consumptive users showed very significant differences for both populations. I can only infer that because more consumptive users than non-consumptive users

wanted access and fish population improvement and professionals over-estimated the need for those two improvements, that professional predictions are based more on the needs of consumptive users. Understanding of either group by the resource professionals is rather limited. These findings imply that the professionals may be receiving input from a very vocal and active minority, perhaps a more vocal and extreme faction of the consumptive users, and may be accepting their opinions as representative of a larger constituency.

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Table 1. Comparison of R_{ij} 's and tally of number one rankings: professional respondents only.

Activity	R_{ij}	#1 Rankings
Fishing	0.475	121
Motorboat/Waterski	0.192	13
Canoe/Kayak/Sail	0.186	6
Swim/Tube Scuba	0.080	0
Hunt/Trap	0.034	0
Picnic/Camp	0.024	0
Hike/Sightsee/Birdwatch	0.006	0
Bait Collect	0.004	0

Table 2. Use frequency for all stream and river users, six Virginia user groups, and consumptive and non-consumptive users. Percents total 100 (+- 1 due to rounding error) for each user group. Chi-square revealed significant difference between user groups ($p < 0.001$) and consumptive and non-consumptive users ($p = 0.001$). Use frequency categories are 1-10 days (1), 11-20 days (2), 21-40 days (3), 41-60 days (4), and greater than 60 days (5).

Group (Sample size)	Use Frequency (%)				
	1	2	3	4	5
All Users (809)	45	19	16	5	14
Fishing (265)	33	26	21	5	15
Canoe/Kayak/Sail (35)	46	26	9	9	11
Motorboat/Waterski (53)	36	13	26	4	21
Swim/Tube/Scuba (34)	47	21	12	3	18
Hike/Sightsee/Birdwatch (119)	43	17	17	5	18
Picnic/Camp (77)	71	16	6	4	3
Consumptive (291)	33	25	21	5	15
Non-consumptive (318)	49	17	14	5	14

Table 3. Satisfaction for all stream and river users, six Virginia user groups, and consumptive and non-consumptive users. Satisfaction categories were: 1) very unsatisfied and unsatisfied (US); 2) neither satisfied nor unsatisfied (Neither); and 3) very satisfied and satisfied (S). Percents total 100 (+1 due to rounding error) for each user group. Chi-square revealed no significant difference ($p = 0.103$) between user groups but a significant difference between consumptive and non-consumptive users ($p = 0.040$).

User Group (Sample size)	US(%)	Neither(%)	S(%)
All Users Combined (797)	19	24	56
Fishing (264)	24	23	53
Canoeing/Kayaking/Sailing (34)	12	18	70
Motorboating/Waterskiing (53)	19	23	58
Swimming/Tubing/Scuba Diving (34)	6	26	68
Hike/Sightsee/Birdwatch (117)	15	21	63
Picnicking/Camping (77)	13	32	55
Consumptive (290)	23	24	53
Non-consumptive (315)	14	24	62

Table 4. Improvements needed on streams and rivers, the percent of consumptive and non-consumptive respondents that felt each improvement was needed and the chi-square p-value for each comparison.

Improvement	Consumptive(%)	Non-consumptive(%)	p-value
More/better access	46	34	0.003
Improvement of daily water level stability	7	3	0.013
Fish population improvement	59	31	0.001
Litter clean-up	56	64	0.048
Water quality improvement	49	63	0.001
Natural beauty improvement	14	22	0.011

Table 5. Comparison of consumptive and non-consumptive opinion on the most needed improvements. Groups are natural resource professionals (NRP), consumptive users (CU), and non-consumptive users (NCU). Chi-square revealed a significant difference between consumptive and non-consumptive responses ($p < 0.001$), professional and consumptive responses ($p < 0.001$), and professional and non-consumptive responses ($p < 0.001$). Percents total 100 (+-1 due to rounding error) for each group.

Improvement	NRP	CU	NCU
More/better access	40	16	10
More/better recreational facilities	5	6	9
Litter clean-up	8	23	33
Water quality improvement	22	38	44
Fish population improvement	26	18	4
Total	100	100	100

Table 6. Percent of Virginia stream and river users that felt each of the following reasons to visit streams and rivers was of low, moderate, and high importance. Percents total 100 (+- 1 due to rounding error) for each reason.

Reason	Low	Moderate	High
To be Outdoors	4	8	88
For family recreation	13	20	67
To be with friends	19	28	53
To be close to water	11	22	67
To relax	4	12	85
To be alone	46	23	31
To experience the scenery	7	15	78
For adventure and excitement	25	32	45
To develop recreational skills	39	32	29
To fish or hunt	29	12	58
To see wildlife	12	15	73

Table 7. Percent of all stream and river users and six Virginia user groups indicating that "for family recreation" was of low, moderate, and high importance. Percents total 100 (+- 1 due to rounding error) for each user group. Chi-square revealed a significant difference ($p < 0.001$) between user groups for "for family recreation." Bait collect and hunt/trap user groups were omitted from the user group analysis because of low sample sizes.

User Group (Sample size)	Low	Moderate	High
All Users (726)	13	20	67
Fishing (243)	15	21	65
Canoe/Kayak/Sail (35)	11	14	74
Motorboat/Waterski (51)	6	14	80
Swim/Tube/Scuba (34)	0	29	71
Hike/Sightsee/Birdwatch (114)	24	23	54
Picnic/Camp (74)	4	15	81

Table 8. Percent of all stream and river users and six Virginia user groups indicating that "to be with friends" was of low, moderate, and high importance. Percents total 100 (+- 1 due to rounding error) for each user group. Chi-square revealed a significant difference ($p = 0.001$) between user groups for "to be with friends." Bait collect and hunt/trap user groups were omitted from user group analysis because of low sample sizes.

User Group (Sample size)	Low	Moderate	High
All Users (727)	19	28	53
Fishing (248)	16	32	52
Canoe/Kayak/Sail (35)	11	29	60
Motorboat/Waterski (51)	14	4	82
Swim/Tube/Scuba (34)	21	32	47
Hike/Sightsee/Birdwatch (115)	23	34	43
Picnic/Camp (73)	18	34	49

Table 9. Percent of all stream and river users, six Virginia user groups, consumptive and non-consumptive users indicating that "to be alone" was of low, moderate, and high importance. Percents total 100 (+- 1 due to rounding error) for each user group. Chi-square revealed a significant difference between user groups ($p = 0.003$) and consumptive and non-consumptive users ($p = 0.012$). Bait collect and hunt/trap user groups were omitted from user group analysis, but not consumptive/non-consumptive comparisons, because of low sample sizes.

User Group (Sample size)	Low	Moderate	High
All Users (700)	46	23	31
Fishing (240)	43	22	35
Canoe/Kayak/Sail (35)	60	14	26
Motorboat/Waterski (50)	68	16	16
Swim/Tube/Scuba (34)	53	26	21
Hike/Sightsee/Birdwatch (116)	34	35	30
Picnic/Camp (73)	49	28	25
Consumptive (261)	44	21	35
Non-consumptive (308)	48	27	25

Table 10. Percent of all stream and river users and six Virginia user groups indicating that "to experience the scenery" was of low, moderate, and high importance. Percents total 100 (+- 1 due to rounding error) for each user group. Chi-square revealed a significant difference between user groups ($p = 0.002$) and consumptive and non-consumptive users ($p = 0.048$). Bait collect and hunt/trap user groups were omitted from user group analysis, but not consumptive/non-consumptive comparisons, because of low sample sizes.

User Group (Sample size)	Low	Moderate	High
All Users (751)	7	15	78
Fishing (251)	9	18	73
Canoe/Kayak/Sail (35)	0	6	94
Motorboat/Waterski (53)	6	30	64
Swim/Tube/Scuba (34)	6	18	76
Hike/Sightsee/Birdwatch (119)	2	10	88
Picnic/Camp (76)	7	12	82
Consumptive (273)	8	19	73
Non-consumptive (317)	4	14	82

Table 11. Percent of all stream and river users, six Virginia user groups, consumptive and non-consumptive users indicating that "to develop outdoor recreational skills" was of low, moderate, and high importance. Percents total 100 (+- 1 due to rounding error) for each user group. Chi-square revealed a significant difference between user groups ($p = 0.001$) and consumptive and non-consumptive users ($p = 0.001$). Bait collect and hunt/trap user groups were omitted from user group analysis, but not consumptive/non-consumptive comparisons, because of low sample sizes.

User Group (Sample size)	Low	Moderate	High
All Users (704)	39	32	29
Fishing (239)	38	28	36
Canoe/Kayak/Sail (35)	31	34	34
Motorboat/Waterski (50)	24	42	34
Swim/Tube/Scuba (34)	21	35	44
Hike/Sightsee/Birdwatch (117)	48	33	19
Picnic/Camp (71)	41	42	17
Consumptive (259)	36	27	36
Non-consumptive (307)	37	37	25

Table 12. Percent of all stream and river users, six Virginia user groups, consumptive and non-consumptive users indicating that "to fish or hunt" was of low, moderate, and high importance. Percents total 100 (+- 1 due to rounding error) for each user group. Chi-square revealed a significant difference between user groups ($p < 0.001$) and consumptive and non-consumptive users ($p < 0.001$). Bait collect and hunt/trap user groups were omitted from user group analysis, but not consumptive/non-consumptive comparisons, because of low sample sizes.

User Group (Sample size)	Low	Moderate	High
All Users (763)	29	12	58
Fishing (263)	1	2	97
Canoe/Kayak/Sail (35)	54	31	14
Motorboat/Waterski (50)	26	24	50
Swim/Tube/Scuba (34)	38	41	21
Hike/Sightsee/Birdwatch (118)	62	19	19
Picnic/Camp (75)	53	13	33
Consumptive (289)	5	2	96
Non-consumptive (312)	51	22	27

Table 13. Percentage of all stream and river user, six Virginia user groups, consumptive and non-consumptive users indicating that "to see wildlife" was of low, moderate, and high importance. Percents total 100 (+- 1 due to rounding error) for each user group. Chi-square revealed a significant difference between user groups ($p < 0.001$) and consumptive and non-consumptive users ($p < 0.001$). Bait collect and hunt/trap user groups were omitted from user group analysis, but not consumptive/non-consumptive comparisons, because of low sample sizes.

User Group (Sample size)	Low	Moderate	High
All Users (727)	12	15	73
Fishing (247)	7	11	82
Canoe/Kayak/Sail (35)	9	20	71
Motorboat/Waterski (52)	19	25	56
Swim/Tube/Scuba (34)	18	41	41
Hike/Sightsee/Birdwatch (117)	9	9	81
Picnic/Camp (73)	15	16	68
Consumptive (267)	7	10	83
Non-consumptive (311)	13	18	68

Table 14. Most important characteristics of streams and rivers to all stream and river users, six Virginia user groups, consumptive, and non-consumptive users. Percents total 100 (+- 1 due to rounding error) for each user group. Only anglers, hikers/sightseers/birdwatchers, and picnickers/campers (asterisks) were included in the chi-square user group analysis because other user groups were too small to be separately included in the analysis. All user groups were included in the consumptive/non-consumptive comparison. Chi-square revealed a significant difference between user groups (p approx. 0.025) and consumptive and non-consumptive users ($0.01 < p < 0.025$). Numbers represent percentages of each user group that felt that clean water (CW), public use (PU), aesthetic (AE) and diversity (DIV) characteristics were most important.

User Group (Sample size)	CW(%)	PU(%)	AE(%)	DIV(%)
All User Groups (571)	76	6	10	9
*Fishing (242)	74	9	7	10
Canoe/Kayak/Sail (33)	82	0	9	9
Motorboat/Waterski (48)	75	6	13	6
Swim/Tube/Scuba (34)	74	6	9	12
*Hike/Sight/Bird (118)	74	2	8	16
*Picnic/Camp (73)	74	4	18	4
Hunt/Trap (23)	69	4	13	13
Consumptive (265)	73	8	8	11
Non-consumptive (306)	78	3	11	7

Table 15. Percent of stream and river users that felt the following activities were regulated "not strictly enough", "about right", or "too strictly."

Activity	Not Strictly Enough	About Right	Too Strictly
	Urban Development	74	24
Agricultural Practices	53	46	1
Industry	85	14	1
Forestry Practices	42	57	1

Table 16. Percent of all stream and river users that felt each of the following threats to streams and rivers was of low, moderate, and high threat. Percents total 100 (+- 1 due to rounding error) for each threat.

Threat	Low	Moderate	High
Excessive boat traffic	24	29	46
Overfishing	28	34	38
Agriculture	27	33	40
Human litter	4	9	86
Urban development	5	16	78
Water withdrawal	20	32	49
Dam construction	43	30	28
Channel alteration	38	28	34
Forest removal	12	16	72
Overhunting	37	28	34
Industry	6	11	82

Table 17. Percent of six Virginia user groups indicating that "forest removal" was of low, moderate and high threat. Percents total 100 (+- 1 due to rounding error) for each user group. Chi-square revealed a significant difference ($p = 0.029$) between user group and "forest removal." Bait collect and hunt/trap user groups were omitted because of low sample sizes.

User Group (Sample size)	Low	Moderate	High
All Users (659)	12	16	72
Fishing (226)	13	17	70
Canoe/Kayak/Sail (30)	10	27	63
Motorboat/Waterski (44)	14	14	73
Swim/Tube/Scuba (31)	10	29	61
Hike/Sightsee/Birdwatch (106)	11	4	84
Picnic/Camp (63)	8	22	70

Table 18. Percent of all stream and river users that felt each of the following VDGIF programs was of low, moderate, and high importance. Percents total 100 (+- 1 due to rounding error) for each program.

Program	Low	Moderate	High
Fish stocking	10	25	66
Endangered species restoration	12	20	68
Stream habitat management	3	12	84
Development of public access	28	35	37
Non-game fish management	19	40	39
Environmental permit review	8	22	70
Environmental education	3	15	82
Fish population monitoring	7	27	66
Enforcement of regulations	1	8	91

Table 19. Percent of all stream and river users, six Virginia user groups, consumptive, and non-consumptive users indicating that fish stocking" was of low, moderate and high importance. Percents total 100 (+- 1 due to rounding error) for each user group. Chi-square revealed a significant difference between user groups ($p < 0.001$) and consumptive and non-consumptive users ($p < 0.001$). Bait collect and hunt/trap user groups were omitted from user group analysis, but nor consumptive/non-consumptive comparisons, because of low sample sizes.

User Group (Sample size)	Low	Moderate	High
All Users (742)	10	25	66
Fishing (256)	3	17	80
Canoe/Kayak/Sail (33)	21	27	52
Motorboat/Waterski (51)	6	35	59
Swim/Tube/Scuba (31)	10	42	48
Hike/Sightsee/Birdwatch (116)	17	35	47
Picnic/Camp (71)	6	35	59
Consumptive (281)	4	16	81
Non-consumptive (302)	12	35	53

Table 20. Percent of all stream and river users, six Virginia user groups, consumptive, and non-consumptive users indicating that "stream habitat management" was of low, moderate and high importance. Percents total 100 (+- 1 due to rounding error) for each user group. Chi-square revealed a significant difference ($p = 0.010$) between user groups and "stream habitat improvement." Bait collect and hunt/trap user groups were omitted from user group analysis because of low sample sizes.

User Group (Sample size)	Low	Moderate	High
All Users (741)	3	12	84
Fishing (250)	2	13	86
Canoe/Kayak/Sail (33)	6	6	88
Motorboat/Waterski (51)	0	20	80
Swim/Tube/Scuba (34)	12	12	76
Hike/Sightsee/Birdwatch (120)	2	7	92
Picnic/Camp (75)	4	13	83

Table 21. Percent of six Virginia user groups indicating that "development of public access" was of low, moderate and high importance. Percents total 100 (+- 1 due to sampling error) for each user group. Chi-square revealed a significant difference between user groups ($p = 0.007$) and consumptive and non-consumptive users ($p = 0.010$). Bait collect and hunt/trap user groups were omitted from user group analysis, but not consumptive/non-consumptive comparisons, because of low sample sizes.

User Group (Sample size)	Low	Moderate	High
All Users (733)	28	35	37
Fishing (251)	22	32	45
Canoe/Kayak/Sail (32)	44	28	28
Motorboat/Waterski (51)	20	49	31
Swim/Tube/Scuba (33)	39	42	18
Hike/Sightsee/Birdwatch (118)	33	37	30
Picnic/Camp (75)	25	37	37
Consumptive (275)	23	34	43
Non-consumptive (309)	31	39	30

Table 22. Percent of all stream and river users and six Virginia user groups indicating that "non-game fish management" was of low, moderate and high importance. Percents total 100 (+- 1 due to rounding error) for each user group. Chi-square revealed a significant difference between ($p = 0.003$) user groups for "non-game management." Bait collect and hunt/trap user groups were omitted from user group analysis because of low sample sizes.

User Group (Sample size)	Low	Moderate	High
All Users (654)	19	40	39
Fishing (227)	25	37	38
Canoe/Kayak/Sail (31)	23	26	52
Motorboat/Waterski (45)	27	51	22
Swim/Tube/Scuba (33)	24	45	30
Hike/Sightsee/Birdwatch (108)	16	33	51
Picnic/Camp (64)	8	55	38

Table 23. Percent of six Virginia user groups indicating that "environmental permit review" was of low, moderate and high importance. Percents total 100 (+ 1 due to rounding error) for each user group. Chi-square revealed a significant difference ($p = 0.003$) between user groups for "environmental permit review." Bait collect and hunt/trap user groups were omitted because of low sample sizes.

User Group (Sample size)	Low	Moderate	High
All Users (633)	8	22	70
Fishing (224)	8	24	68
Canoe/Kayak/Sail (29)	3	21	76
Motorboat/Waterski (45)	7	42	51
Swim/Tube/Scuba (27)	11	26	63
Hike/Sightsee/Birdwatch (107)	3	10	87
Picnic/Camp (60)	7	23	70

Table 24. Percent of all stream and river users, consumptive and non-consumptive users indicating that "fish population monitoring" was of low, moderate and high importance. Percents total 100 (+- 1 due to rounding error) for each group. Chi-square revealed a significant difference ($p < 0.001$) between these groups for "fish population monitoring."

Group (Sample size)	Low	Moderate	High
All Users (747)	7	27	66
Consumptive (273)	4	22	74
Non-consumptive (305)	7	30	63

Table 25. Percent of all stream and river users, consumptive and non-consumptive users indicating that "endangered species restoration" was of low, moderate, and high importance. Percents total 100 (+- 1 due to rounding error) for each group. Chi-square revealed a significant difference ($p = 0.013$) between these groups for "endangered species restoration."

Group (Sample size)	Low	Moderate	High
All Users (721)	12	20	68
Consumptive (271)	15	22	63
Non-consumptive (302)	8	19	73

Figure 1. Relative importance of user groups to the public and professionals predictions of user group importance as represented by RI_j. The user groups are Fishing (F), Hike / Sightsee / Birdwatching (HSB), Picnicking / Camping (PC), Swimming / Tubing / Scuba Diving (STS), Motorboating / Waterskiing (MW), Canoeing / Kayaking / Sailing (CKS), Hunting / Trapping (HT), and Bait Collecting (BC).

Rij

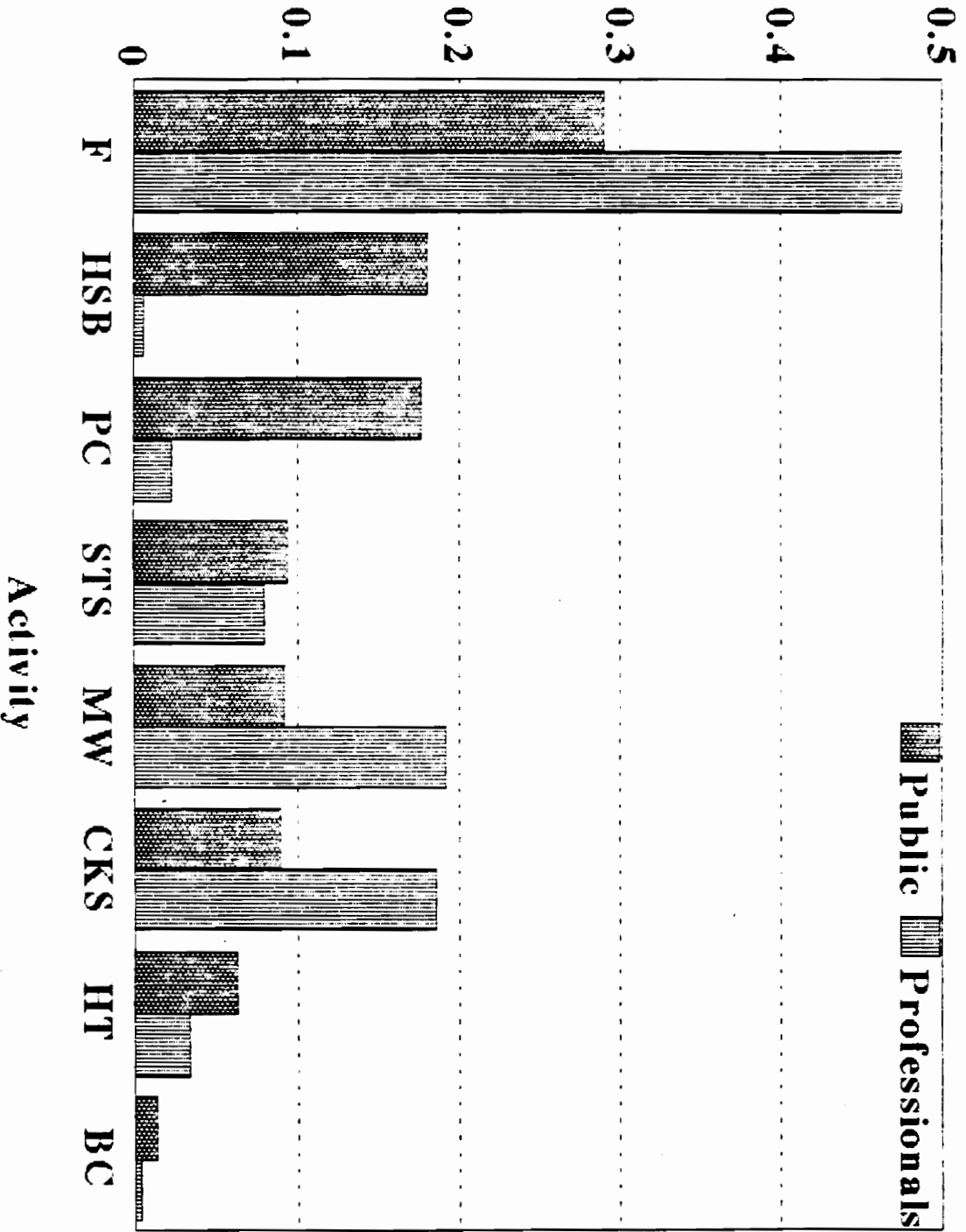
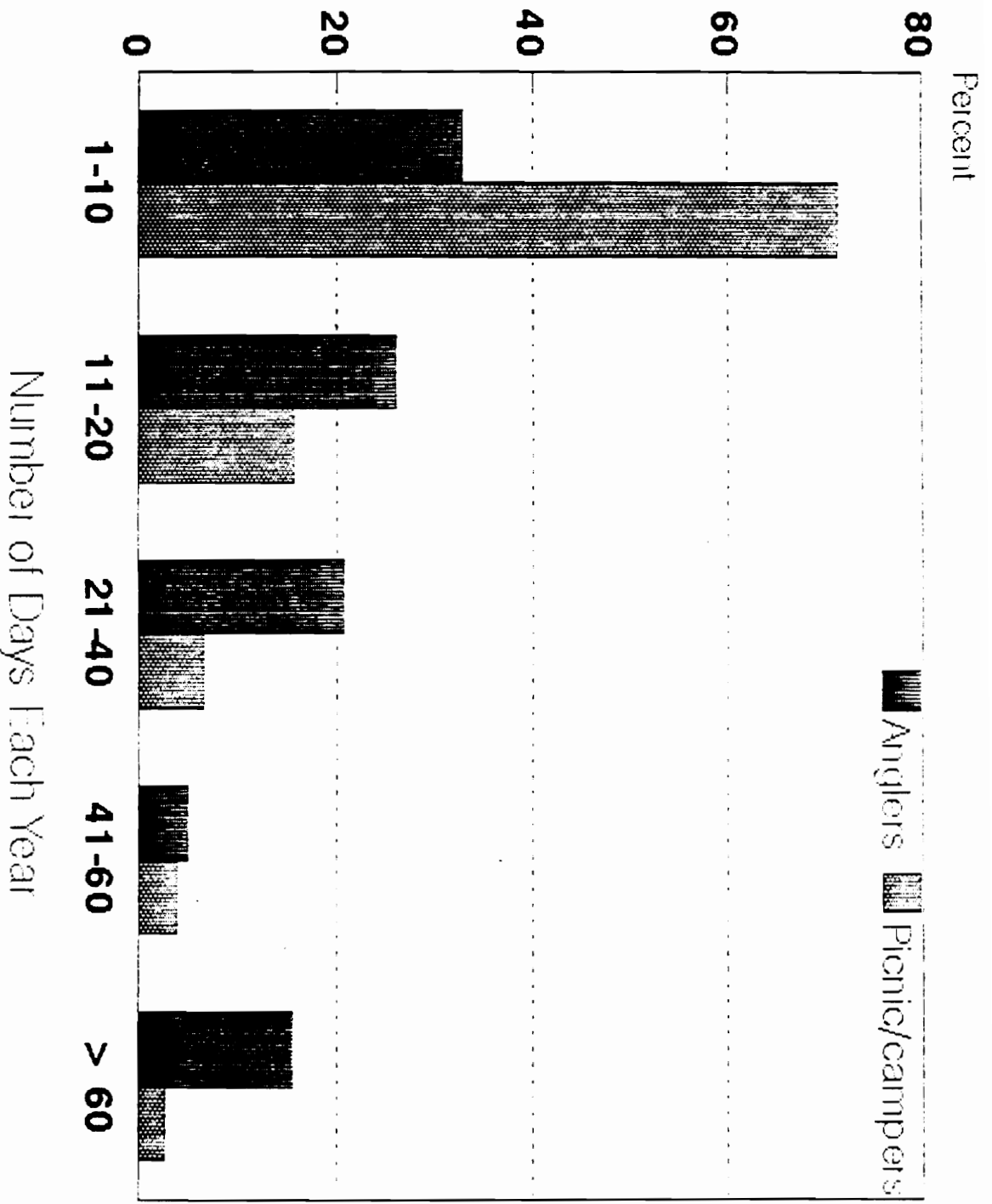


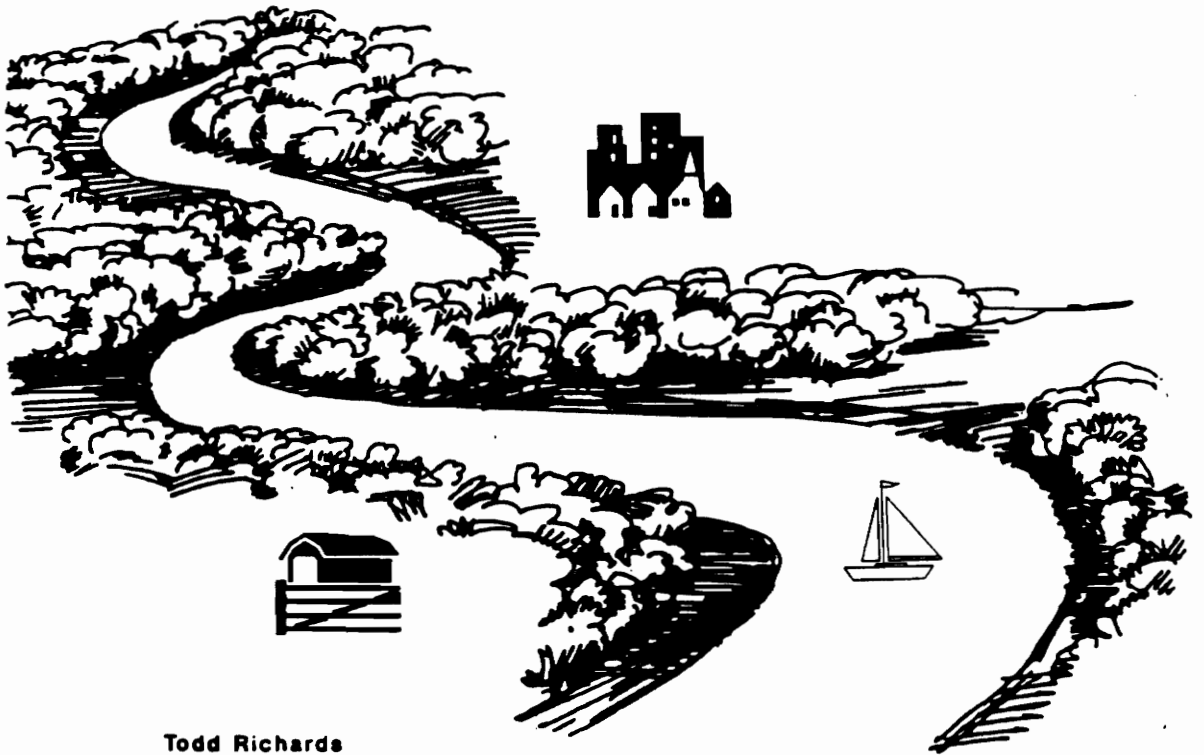
Figure 2. Use frequencies for anglers and picnickers/campers.



Appendix A: Survey sent to Virginia residents

USING AND IMPROVING VIRGINIA'S STREAMS AND RIVERS

WHAT DO YOU THINK IS IMPORTANT?



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Please answer the following questions about your recreational stream and river use.

Q-1. On average, roughly how many days each year are you on or near the streams and rivers of Virginia for recreation or pleasure? (Circle number)

- 1 NONE-----Please go to Q-17
- 2 ONE TO TEN DAYS EACH YEAR on page five
- 3 ELEVEN TO TWENTY DAYS EACH YEAR
- 4 TWENTY-ONE TO FORTY DAYS EACH YEAR
- 5 FORTY-ONE TO SIXTY DAYS EACH YEAR
- 6 MORE THAN SIXTY DAYS EACH YEAR

Q-2. In general, how satisfied are you with the recreational opportunities provided by the streams and rivers of Virginia? (Circle number)

- 1 VERY UNSATISFIED
- 2 UNSATISFIED
- 3 NEITHER SATISFIED NOR UNSATISFIED
- 4 SATISFIED
- 5 VERY SATISFIED

Q-3. How many different streams and rivers have you used for recreation in the past twelve months? (Please circle the number.)

- 1 NONE
- 2 ONE
- 3 TWO TO FIVE
- 4 GREATER THAN FIVE

Q-4. Roughly how far do you live from the stream or river that you used most often in the past twelve months? (Enter the number on the line.)

_____ MILES

Q-5. With whom do you MOST often use the streams and rivers of Virginia for recreation? (Circle only one number.)

- 1 MY FAMILY
- 2 MY FRIENDS
- 3 I VISIT THEM ALONE
- 4 OTHER (please specify)_____

Q-6. What improvements do you feel are needed at the rivers and streams you use? (Circle all that apply.)

- 1 MORE/BETTER ACCESS
- 2 MORE/BETTER RECREATIONAL FACILITIES
- 3 LITTER CLEAN-UP
- 4 WATER QUALITY IMPROVEMENT
- 5 NATURAL BEAUTY IMPROVEMENT
- 6 IMPROVE DAILY WATER LEVEL STABILITY
- 7 FLOOD CONTROL IMPROVEMENT
- 8 IMPROVE YEARLY WATER LEVEL STABILITY
- 9 FISH POPULATION IMPROVEMENT
- 10 NO CHANGES NEEDED
- 11 OTHER (Please specify)_____

Q-7. Which of the improvements circled in Q-6 do you consider the MOST needed? (Enter number from item above)

_____ IMPROVEMENT

We would like to know which recreational activities are your favorites. We would also like to know which activities you do most often. The next four questions deal with these issues.

Q-8. Of the recreational activities available on the streams and rivers of Virginia, which three activities do you MOST PREFER (which are your favorite activities)? Please rank the following categories from one (1), your MOST PREFERRED category, to three (3), your THIRD MOST PREFERRED category. (Please mark only three lines.)

- _____ FISHING
- _____ BAIT COLLECTING
- _____ CANOEING, KAYAKING, SAILING
- _____ MOTORBOATING, WATERSKIING
- _____ SWIMMING, TUBING, SCUBA DIVING
- _____ HIKING, SIGHTSEEING, BIRDWATCHING
- _____ PICNICKING, CAMPING
- _____ HUNTING, TRAPPING
- _____ OTHER (Please specify)_____

Q-9. How would you rate the quality of the activity you ranked as MOST PREFERRED in Q-8? (Circle number)

- 1 VERY POOR
- 2 POOR
- 3 FAIR
- 4 GOOD
- 5 VERY GOOD

Q-10. Which of the following do you **MOST OFTEN** do on the streams and rivers of Virginia? (Which do you spend the most time doing) Please rank the following categories from one (1), MOST OFTEN, to three (3), THIRD MOST OFTEN. (Please mark only three lines.)

- _____ FISHING
- _____ BAIT COLLECTING
- _____ CANOEING, KAYAKING, SAILING
- _____ MOTORBOATING, WATERSKIING
- _____ SWIMMING, TUBING, SCUBA DIVING
- _____ HIKING, SIGHTSEEING, BIRDPWATCHING
- _____ PICNICKING, CAMPING
- _____ HUNTING, TRAPPING
- _____ OTHER (Please specify)_____

Q-11. What prevents you from enjoying the streams and rivers as much as you would like? (Circle number)

- 1 NOT ENOUGH LEISURE TIME
- 2 NOT ENOUGH LEISURE MONEY
- 3 NOT ENOUGH RIVER ACCESS
- 4 TOO FEW FACILITIES
- 5 TOO CROWDED
- 6 FAMILY RESPONSIBILITIES
- 7 TOO LITTLE INFORMATION AVAILABLE ABOUT ACTIVITIES
- 8 OTHER (please specify)_____

Q-12. What is the size of the river or stream you visit most often for recreation?

- 1 SMALL (LESS THAN TWENTY FEET WIDE)
- 2 MEDIUM (TWENTY TO FIFTY FEET WIDE)
- 3 LARGE (GREATER THAN FIFTY FEET WIDE)

Q-13. How do you feel about the number of people that use the same stream and river areas that you do? (Circle number)

- 1 THE AREAS ARE VERY CROWDED
- 2 THE AREAS ARE A LITTLE CROWDED
- 3 THE NUMBER OF PEOPLE IS ABOUT RIGHT
- 4 THE AREAS ARE NOT AT ALL CROWDED
- 5 NO ONE VISITS THE SAME AREAS THAT I DO
- 6 NO OPINION

Q-14. How many people do you see on an average trip to the stream or river you visit most often for recreation?

_____ PEOPLE

Q-15. When do you MOST often use the streams and rivers of Virginia? (Circle number)

- 1 WEEKDAYS MOSTLY
- 2 WEEKENDS MOSTLY
- 3 HOLIDAYS
- 4 NO PREFERENCE

Q-16. Below is a list of some of the reasons why people visit streams and rivers. Please indicate how important each possible reason is to you. On this scale one (1) means "very LOW importance" and five (5) means "very HIGH importance" (Please circle the proper number for each reason.)

REASON:	IMPORTANCE				
	LOW				HIGH
TO BE OUTDOORS	1	2	3	4	5
FOR FAMILY RECREATION	1	2	3	4	5
TO BE WITH FRIENDS	1	2	3	4	5
TO BE CLOSE TO WATER	1	2	3	4	5
TO RELAX	1	2	3	4	5
TO BE ALONE	1	2	3	4	5
TO EXPERIENCE THE SCENERY	1	2	3	4	5
FOR ADVENTURE AND EXCITEMENT	1	2	3	4	5
TO DEVELOP OUTDOOR RECREATIONAL SKILLS	1	2	3	4	5
TO FISH OR HUNT	1	2	3	4	5
TO SEE WILDLIFE	1	2	3	4	5

Please answer the following questions about public use of Virginia's rivers and streams.

Q-17. Rivers and streams serve many functions in Virginia. How important are the following functions to you? On this scale, one (1) means "very LOW importance" and five (5) means "very high importance". (Please circle the proper number for each function.)

RIVER FUNCTION:	IMPORTANCE					DON'T KNOW
	LOW			HIGH		
A) PUBLIC WATER SUPPLY	1	2	3	4	5	6
B) TRANSPORT OF COMMERCIAL GOODS	1	2	3	4	5	6
C) IRRIGATION FOR CROPS	1	2	3	4	5	6
D) INDUSTRIAL WATER SUPPLY	1	2	3	4	5	6
E) RECREATION	1	2	3	4	5	6
F) HISTORICAL SIGNIFICANCE	1	2	3	4	5	6
H) FISHING FOR FOOD	1	2	3	4	5	6
I) SOURCE OF NATURAL BEAUTY	1	2	3	4	5	6
J) HABITAT FOR FISH AND WILDLIFE	1	2	3	4	5	6
K) HABITAT FOR RARE OR ENDANGERED PLANTS AND ANIMALS	1	2	3	4	5	6

Q-18. Of the functions listed in Q-17, which one do you feel is in the worst condition? (Please enter the letter of the river use.)

_____ RIVER FUNCTION

Q-19. Again, of those listed in Q-17, which function do you feel the Department of Game and Inland Fisheries should be protecting most? (Please enter the letter of the river use.)

_____ RIVER FUNCTION

Q-20. Are the fish in the stream or river closest to you safe to eat? (Please circle the number.)

- 1 VERY UNSAFE
- 2 UNSAFE
- 3 I'M NOT SURE
- 4 SAFE
- 5 VERY SAFE

Q-21. Do you feel that your public water source (well, river, lake etc.) is safe to drink? (Please circle number.)

- 1 IT IS VERY UNSAFE TO DRINK
- 2 IT IS UNSAFE TO DRINK
- 3 I AM NOT SURE
- 4 IT IS SAFE TO DRINK
- 5 IT IS VERY SAFE TO DRINK

Q-22. If you feel your water is UNSAFE to drink, what is the cause? (Please circle the number.)

- 1 I FEEL IT IS SAFE TO DRINK OR I'M NOT SURE
- 2 AGRICULTURAL POLLUTION
- 3 INDUSTRIAL POLLUTION
- 4 PRIVATE DUMPING OR LANDFILLS
- 5 I AM NOT SURE
- 6 OTHER (please specify)_____

Please answer the following questions related to current natural resource issues.

Q-23. Please rank three characteristics of streams and rivers which you feel are most important. Rank them from one (1), MOST IMPORTANT, to three (3), THIRD MOST IMPORTANT. (Please fill only three lines.)

- _____ A) CLEAN WATER
- _____ B) CLEAN STREAM BED OR RIVER BANKS
- _____ C) PRESENCE OF TREES AND SHRUBS ALONG BANKS
- _____ D) MANY FISH LIVE THERE
- _____ E) MANY TYPES OF PLANTS AND ANIMALS LIVE THERE
- _____ F) FEW OTHER PEOPLE USE THE AREA
- _____ G) READY ACCESS TO THE STREAM OR RIVER
- _____ H) PRESENCE OF LARGE, CATCHABLE FISH
- _____ I) GOOD NATURAL SCENERY
- _____ J) THE PRESENCE OF RARE OR ENDANGERED PLANTS AND ANIMALS
- _____ K) ADEQUATE WATER LEVELS EXIST YEAR ROUND
- _____ L) OTHER (Please specify)_____

Q-24. Of all the choices listed in Q-23, which ONE do you feel is the LEAST important? (Enter the letter of the choice)

#_____

Q-25. Each of the following items has the potential to affect streams and rivers. How strictly do you feel each item is regulated? (Please circle the appropriate number for each item.)

	TOO STRICTLY	ABOUT RIGHT ENOUGH	NOT STRICTLY	DON'T KNOW
URBAN DEVELOPMENT	1	2	3	4
AGRICULTURAL PRACTICES	1	2	3	4
INDUSTRY	1	2	3	4
FORESTRY PRACTICES	1	2	3	4

Q-26. In your opinion, to what extent do the following conditions or activities currently threaten the value of streams and rivers in Virginia? On this scale, a one (1) means "very LOW threat" and a five (5) means "very HIGH threat". (Please circle the proper number for each potential threat.)

POTENTIAL THREATS:	DEGREE OF THREAT					DON'T KNOW
	LOW			HIGH		
A) EXCESSIVE BOAT TRAFFIC	1	2	3	4	5	6
B) OVERFISHING	1	2	3	4	5	6
C) AGRICULTURE	1	2	3	4	5	6
D) HUMAN LITTER	1	2	3	4	5	6
E) URBAN DEVELOPMENT	1	2	3	4	5	6
F) WATER WITHDRAWAL	1	2	3	4	5	6
G) DAM CONSTRUCTION	1	2	3	4	5	6
H) CHANNEL ALTERATION	1	2	3	4	5	6
I) FOREST REMOVAL	1	2	3	4	5	6
J) OVERHUNTING	1	2	3	4	5	6
K) INDUSTRY	1	2	3	4	5	6

Q-27. Are you a member of any sporting, environmental or conservation organizations? (Please circle the number.)

- 1 YES
- 2 NO

Q-27a. If so, which ones? (Please list)

Q-28. How important do you feel the following programs SHOULD be? (Please circle the appropriate number for each program.)

PROGRAM:	IMPORTANCE					DON'T KNOW
	LOW				HIGH	
FISH STOCKING	1	2	3	4	5	6
ENDANGERED SPECIES RESTORATION	1	2	3	4	5	6
STREAM HABITAT IMPROVEMENT	1	2	3	4	5	6
DEVELOPMENT OF PUBLIC ACCESS	1	2	3	4	5	6
NON-GAME FISH MANAGEMENT	1	2	3	4	5	6
ENVIRONMENTAL PERMIT REVIEW	1	2	3	4	5	6
ENVIRONMENTAL EDUCATION	1	2	3	4	5	6
FISH POPULATION MONITORING	1	2	3	4	5	6
ENFORCEMENT OF REGULATIONS	1	2	3	4	5	6

Q-29. To what extent do you agree or disagree with the following statements? (Please circle the appropriate number for each statement.)

A) Courses focusing on the conservation of natural resources should be taught in public schools.

- 1 STRONGLY AGREE
- 2 AGREE
- 3 NO OPINION
- 4 DISAGREE
- 5 STRONGLY DISAGREE

B) Plants and animals exist primarily to be used by humans.

- 1 STRONGLY AGREE
- 2 AGREE
- 3 NO OPINION
- 4 DISAGREE
- 5 STRONGLY DISAGREE

C) Humans do not need to worry about changes in the natural environment because they can change the natural environment to suit their needs.

- 1 STRONGLY AGREE
- 2 AGREE
- 3 NO OPINION
- 4 DISAGREE
- 5 STRONGLY DISAGREE

D) Rivers and streams are valuable for their scenic qualities.

- 1 STRONGLY AGREE
- 2 AGREE
- 3 NO OPINION
- 4 DISAGREE
- 5 STRONGLY DISAGREE

E) Non-tidal water levels that change daily are harmful to the plants and animals living in and around the rivers and streams.

- 1 STRONGLY AGREE
- 2 AGREE
- 3 NO OPINION
- 4 DISAGREE
- 5 STRONGLY DISAGREE

F) The Department of Game and Inland Fisheries is doing its best to promote wise natural resource use.

- 1 STRONGLY AGREE
- 2 AGREE
- 3 NO OPINION
- 4 DISAGREE
- 5 STRONGLY DISAGREE

Finally, please answer these last questions which we ask for statistical purposes only, all information will be strictly confidential.

Q-30. What is your sex? (Please circle the number.)

- 1 MALE
- 2 FEMALE

Q-31. How long have you lived in Virginia?

_____ YEARS

Q-32. What is the last year of education that you have completed? (Circle only one number)

<u>Grade School</u>								<u>High School</u>				<u>College</u>				<u>Post-graduate</u>				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21+

Q-33. Which category best describes your total household income before taxes during the previous twelve months. If you are uncertain, what is your best guess? (Circle the letter)

- A) LESS THAN 10,000
- B) 10,000 TO 29,000
- C) 30,000 TO 49,000
- D) 50,000 TO 69,000
- E) 70,000 OR GREATER

Q-34. What is your present age? (Please circle the letter.)

- A) LESS THAN 18
- B) 18 TO 25
- C) 26 TO 40
- D) 41 TO 55
- E) 56 TO 65
- F) GREATER THAN 65

Q-36. In what county do you live?

_____ COUNTY

Q-37. Are you presently: (Please circle the number.)

- 1 EMPLOYED (Please specify job.) _____
- 2 UNEMPLOYED
- 3 RETIRED
- 4 OTHER (Please specify) _____

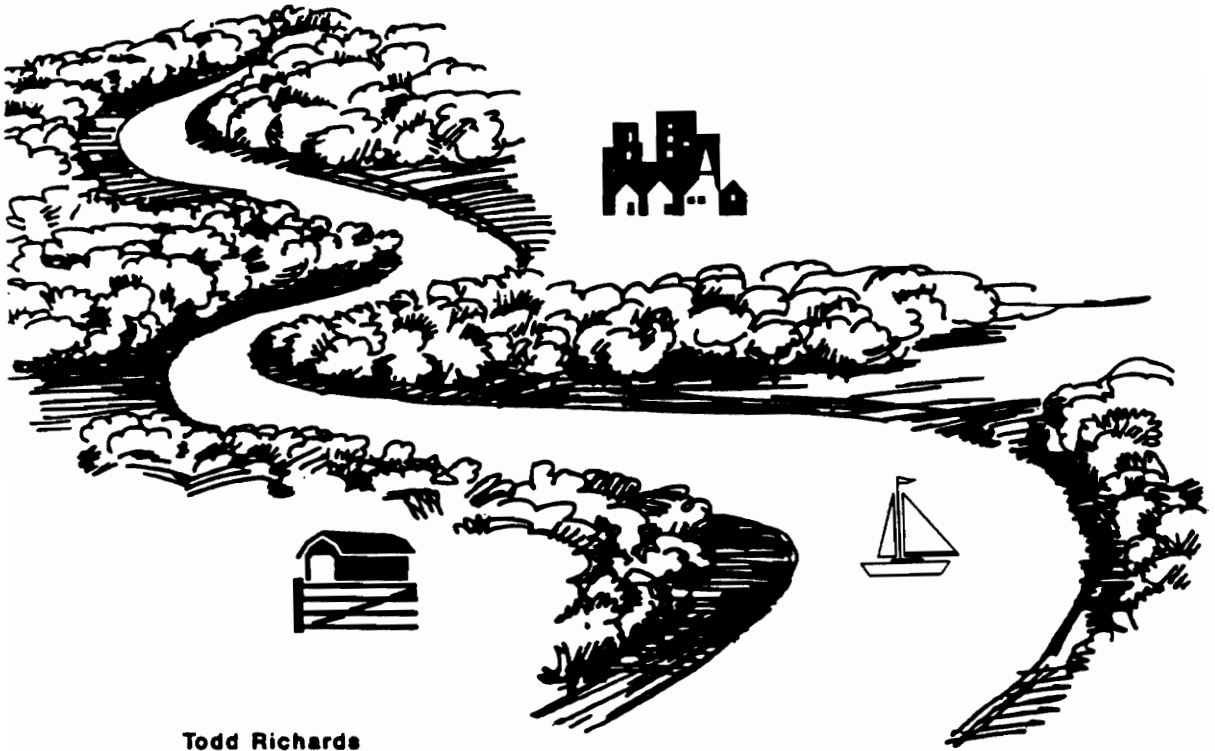
If you have any other statements, suggestions or questions please feel free to comment below. Your comments will be taken into consideration.

We sincerely appreciate your cooperation and input. Thanks again for taking the time to supply us with this information. If you would like a copy of the summarized results from this survey, write "copy of results requested" on the back of the return envelope (not on the survey itself.)

Appendix B: Survey sent to natural resource professionals

USING AND IMPROVING VIRGINIA'S STREAMS AND RIVERS

WHAT DO YOU THINK IS IMPORTANT?



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Blacksburg, Va 24061

Please answer the following questions about the public's recreational stream and river use in your REGION.

Q-1. In general, how satisfied do you believe the public is with the recreational opportunities provided by the streams and rivers in your REGION? (Circle number)

- 1 VERY UNSATISFIED
- 2 UNSATISFIED
- 3 NEITHER SATISFIED NOR UNSATISFIED
- 4 SATISFIED
- 5 VERY SATISFIED

Q-2. What improvements do you believe the public wants at the rivers and streams in your REGION? (Circle all that apply.)

- 1 MORE/BETTER ACCESS
- 2 MORE/BETTER RECREATIONAL FACILITIES
- 3 LITTER CLEAN-UP
- 4 WATER QUALITY IMPROVEMENT
- 5 NATURAL BEAUTY IMPROVEMENT
- 6 IMPROVE DAILY WATER LEVEL STABILITY
- 7 FLOOD CONTROL IMPROVEMENT
- 8 IMPROVE YEARLY WATER LEVEL STABILITY
- 9 FISH POPULATION IMPROVEMENT
- 10 NO CHANGES NEEDED
- 11 OTHER (Please specify)_____

Q-3. Which of the improvements in Q-2 do you feel the public wants MOST? (Circle the number of the most wanted improvement)

- 1 2 3 4 5 6 7 8 9 10 11

Q-4. When do Virginia residents MOST often use the streams and rivers in your REGION? (Circle number)

- 1 WEEKDAYS MOSTLY
- 2 WEEKENDS MOSTLY
- 3 HOLIDAYS
- 4 NO PREFERENCE

We would like to know which recreational activities are most important to the public in your region. The next few questions deal with the public's favorite activities and activities they spend the most time doing.

Q-5. Of the recreational activities available on the streams and rivers of Virginia, what are the three activities **MOST PREFERRED** by people in your region (which are their favorites)? Please rank the following categories from one (1), their **MOST PREFERRED** category, to three (3), their **THIRD MOST PREFERRED** category. (Please mark only three lines.)

- _____ A) FISHING
- _____ B) BAIT COLLECTING
- _____ C) CANOEING, KAYAKING, SAILING
- _____ D) MOTORBOATING, WATERSKIING
- _____ E) SWIMMING, TUBING, SCUBA DIVING
- _____ F) HIKING, SIGHTSEEING, BIRDWATCHING
- _____ G) PICNICKING, CAMPING
- _____ H) HUNTING, TRAPPING
- _____ I) OTHER (Please specify)_____

Q-6. How would you rate the quality of the activity you ranked as **MOST PREFERRED** in Q-5? (Circle number)

- 1 VERY POOR
- 2 POOR
- 3 FAIR
- 4 GOOD
- 5 VERY GOOD

Q-7. Which of the following statements most closely resembles your opinion on crowding at the streams and rivers in your **REGION**? (Circle number)

- 1 CROWDING IS NOT A PROBLEM
- 2 CROWDING IS A SLIGHT PROBLEM
- 3 CROWDING IS A MODERATE PROBLEM
- 4 CROWDING IS A SEVERE PROBLEM
- 5 I DO NOT KNOW

Q-8. With which activity listed in Q-5 do you associate the highest level of crowding? (Please circle the letter of the activity.)

A B C D E F G H I

Q-9. Which of the following do you feel Virginia residents spend the most TIME doing on the streams and rivers of Virginia? (Which do they do MOST OFTEN) Please rank THREE of the following categories from one (1), MOST OFTEN, to three (3), THIRD MOST OFTEN. (Please mark only three lines.)

- _____ A) FISHING
- _____ B) BAIT COLLECTING
- _____ C) CANOING, KAYAKING, SAILING
- _____ D) MOTORBOATING, WATERSKIING
- _____ E) SWIMMING, TUBING, SCUBA DIVING
- _____ F) HIKING, SIGHTSEEING, BIRDWATCHING
- _____ G) PICNICKING, CAMPING
- _____ H) HUNTING, TRAPPING
- _____ I) OTHER (Please specify)_____

Please answer the following questions about use of Virginia's rivers and streams. Please note: these questions ask for YOUR opinion, not your views on public opinion.

Q-10. Rivers and streams serve many functions in Virginia. How important are the following functions to YOU? On this scale, one (1) means "very LOW importance" and five (5) means "very HIGH importance". (Please circle the proper number for each function.)

RIVER FUNCTION:	IMPORTANCE					DON'T KNOW
	LOW				HIGH	
A) PUBLIC WATER SUPPLY	1	2	3	4	5	6
B) TRANSPORT OF COMMERCIAL GOODS	1	2	3	4	5	6
C) IRRIGATION FOR CROPS	1	2	3	4	5	6
D) INDUSTRIAL WATER SUPPLY	1	2	3	4	5	6
E) RECREATION	1	2	3	4	5	6
F) HISTORICAL SIGNIFICANCE	1	2	3	4	5	6
G) FISHING FOR FOOD	1	2	3	4	5	6
H) SOURCE OF NATURAL BEAUTY	1	2	3	4	5	6
I) HABITAT FOR FISH AND WILDLIFE	1	2	3	4	5	6
J) HABITAT FOR RARE OR ENDANGERED PLANTS AND ANIMALS	1	2	3	4	5	6

Q-11. Of the functions listed in Q-10, which one do you feel is in the WORST condition? (Please circle the letter of the river use.)

A B C D E F G H I J

Q-12. Again, of those listed in Q-10, which function do you feel the Department of Game and Inland Fisheries should be protecting most? (Please circle the letter of the river use.)

A B C D E F G H I J

Please answer the following questions related to current natural resource issues.

Q-13. Please rank THREE characteristics of streams and rivers which YOU feel are most important. Rank them from one (1), MOST IMPORTANT, to three (3), THIRD MOST IMPORTANT. (Please fill only three lines.)

- _____ A) CLEAN WATER
- _____ B) CLEAN STREAM BED OR RIVER BANKS
- _____ C) PRESENCE OF TREES AND SHRUBS ALONG BANKS
- _____ D) MANY FISH LIVE THERE
- _____ E) MANY TYPES OF PLANTS AND ANIMALS LIVE THERE
- _____ F) FEW OTHER PEOPLE USE THE AREA
- _____ G) READY ACCESS TO THE STREAM OR RIVER
- _____ H) PRESENCE OF LARGE, CATCHABLE FISH
- _____ I) GOOD NATURAL SCENERY
- _____ J) THE PRESENCE OF RARE OR ENDANGERED PLANTS AND ANIMALS
- _____ K) ADEQUATE WATER LEVELS EXIST YEAR ROUND
- _____ L) OTHER (Please specify)_____

Q-14. Of choices "A" through "K" listed in Q-13, which ONE do you feel is the LEAST important? (Circle the letter of least important choice)

A B C D E F G H I J K

Q-15. Each of the following items has the potential to affect streams and rivers. How strictly do you feel each item is regulated? (Please circle the appropriate number for each item.)

	TOO STRICTLY	ABOUT RIGHT	NOT STRICTLY ENOUGH	DON'T KNOW
URBAN DEVELOPMENT	1	2	3	4
AGRICULTURAL PRACTICES	1	2	3	4
INDUSTRY	1	2	3	4
FORESTRY PRACTICES	1	2	3	4

Q-16. In your opinion, to what extent do the following conditions or activities currently threaten the value of streams and rivers in Virginia? On this scale, a one (1) means "very LOW threat" and a five (5) means "very HIGH threat". (Please circle the proper number for each potential threat.)

POTENTIAL THREATS:	DEGREE OF THREAT					DON'T KNOW
	LOW				HIGH	
A) EXCESSIVE BOAT TRAFFIC	1	2	3	4	5	6
B) OVERFISHING	1	2	3	4	5	6
C) AGRICULTURE	1	2	3	4	5	6
D) HUMAN LITTER	1	2	3	4	5	6
E) URBAN DEVELOPMENT	1	2	3	4	5	6
F) WATER WITHDRAWAL	1	2	3	4	5	6
G) DAM CONSTRUCTION	1	2	3	4	5	6
H) CHANNEL ALTERATION	1	2	3	4	5	6
I) FOREST REMOVAL	1	2	3	4	5	6
J) OVERHUNTING	1	2	3	4	5	6
K) INDUSTRY	1	2	3	4	5	6

Q-17. What is the most influential sporting, environmental or conservation organization in your REGION? (Please write the name of the organization on the line.)

_____ ORGANIZATION

Finally, please answer these last questions which we ask for statistical purposes only, all information will be strictly confidential.

Q-18. How long have you lived in Virginia? (Enter the number of years on the line.)

_____ YEARS

Q-19. What is the last year of education that you have completed? (Circle only one number)

<u>High School</u>				<u>College</u>				<u>Post-graduate</u>				
1	2	3	4	1	2	3	4	1	2	3	4	5

Q-20. Which category best describes your total HOUSEHOLD income before taxes during the previous twelve months. If you are uncertain, what is your best guess? (Circle the letter)

- A) LESS THAN 10,000
- B) 10,000 TO 29,000
- C) 30,000 TO 49,000
- D) 50,000 TO 69,000
- E) 70,000 OR GREATER

Q-21. What is your present age? (Please circle the letter.)

- A) LESS THAN 18
- B) 18 TO 25
- C) 26 TO 40
- D) 41 TO 55
- E) 56 TO 65
- F) GREATER THAN 65

Q-22. In what REGION do you work? (Enter the region number on the line.)

REGION NUMBER _____

If you have any other statements, suggestions or questions please feel free to comment below. Your comments will be taken into consideration.

We sincerely appreciate your cooperation and input. Thanks again for taking the time to supply us with this information. If you would like a copy of the summarized results from this survey, write "copy of results requested" on the back of the return envelope (not on the survey itself.)

Appendix C: Correspondence with public respondents.

1. Letter included with first survey
2. First postcard reminder
3. Letter included with second survey
4. Second postcard reminder

Letter Included With First Survey

**VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY**

Fisheries and Wildlife Sciences

Blacksburg, Virginia 24061

September 4, 1990

As a citizen of Virginia, you are part owner of a rich variety of natural resources, including over 50,000 miles of streams and rivers. Your concerns and opinions regarding how natural resources are managed are important to the Department of Game and Inland Fisheries (VDGIF), an agency partly responsible for stream and river management. The VDGIF needs information from all Virginians to provide direction for their management efforts.

To get this information for the VDGIF, we are asking a series of questions to find out what Virginians think about how streams and rivers are used, regulated, and protected. You were chosen at random from a statewide list of citizens. This survey provides you with a unique opportunity to express your views and affect natural resource policies. Because you are part of our selected sample, your responses are very important to our overall conclusions from the survey. Please take the time to complete the questionnaire and return it in the enclosed, post-paid envelope.

You may be assured of complete confidentiality. Your name or address will not be given to any other state agency or private firm. You will be identified only by the number on your questionnaire. When you return the completed questionnaire, your number will be removed from our list and you will not receive further mailings.

The results of this study will be made available to officials and representatives in our state's government and all interested citizens. You may receive a summary of results by writing "copy of results requested" on the back of the return envelope and printing your name and address below it. Please do not put this information on the questionnaire itself.

We will happily answer any questions you might have. Please feel free to write or call collect.

Thank you for your assistance.

Sincerely,

Paul L. Angermeier
Assistant Professor
(703)231-4501

Todd Richards
Graduate Research Assistant
(703)231-4458

First Postcard Reminder

September, 12 1990

Last week a questionnaire seeking your opinions about using and improving Virginia's streams and rivers was mailed to you. Your name was drawn in a random sample of Virginia residents.

If you have already completed and returned it to us please accept our sincere thanks. If not, please do so today. It is important that your results be included if the results are to truly represent the opinions of the residents of Virginia.

If for some reason you did not receive the questionnaire please call me collect at (703) 231-4501 and I will get another one in the mail to you today.

Sincerely,

Todd A. Richards
Department of Fisheries and Wildlife
School of Forestry and Wildlife
Virginia Polytechnic Institute
Blacksburg, Virginia 24061-0321

Letter Included With Second Survey

VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY

Fisheries and Wildlife Sciences

Blacksburg, Virginia 24061

September 26, 1990

About three weeks ago I wrote to you seeking your opinions on using and improving Virginia's streams and rivers. As of today, I have not yet received your completed questionnaire.

I have undertaken this study because of the belief that citizens' opinions should be taken into account in recreational and natural resource policy-making. Each person should have a say in the future and be able to make a difference.

I am writing to you again because of the significance each questionnaire has to the usefulness of this study. Your name was drawn through a random process in which most Virginia residents had an equal chance of being selected. This means that for the study to represent the opinions of all Virginians it is important that each person in the sample return their completed questionnaire.

In the event that your questionnaire has been misplaced, a replacement is enclosed.

Your cooperation is greatly appreciated.

Sincerely,

Todd A. Richards
Department of Fisheries and Wildlife
(703)231-4501

P.S. The "RIVER FUNCTIONS" LISTED IN Q-17 should have been lettered "A" through "J" to make answering Q-18 and Q-19 possible. Please make it clear which "FUNCTIONS" you are referring to when answering Q-18 and Q-19. I apologize for the inconvenience.

Second Postcard Reminder

October 10, 1990

Several weeks ago, I wrote to you about a survey which dealt with using and improving Virginia's streams and rivers. I would like to thank the hundreds who chose to help out.

If you have not returned your completed questionnaire, please do so immediately. No matter what your age or how often you use streams and rivers, your input is crucial to the success of this project. It is important that each person return their completed survey so the results will truly reflect the opinions of all Virginians.

If you have any questions, feel free to write or call collect. The number is (703)231-4501.

Sincerely,

Todd A. Richards

- Appendix D: Correspondence with professional respondents
1. Letter from Colonel Simmons
 2. Cover Letter sent with survey
 3. Postcard reminder

Letter From Colonel Simmons

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF GAME AND INLAND FISHERIES

MEMORANDUM

TO : Law Enforcement Personnel

DATE: November 9, 1990

FROM: Colonel Gerald Simmons

SUBJECT: Survey

The Virginia Tech Department of Fisheries and Wildlife Sciences is currently cooperating with the Department in a survey to assess the general public's attitudes about and values of Virginia's riverine resources. As a part of this survey, Virginia Tech is interested in surveying the staffs from both the Fish Division and the Law Enforcement Division with many of the same types of questions that were used in the general public survey. What they are trying to find out is how well we know our constituents attitudes and values.

I believe that the survey will provide the Department with valuable information regarding public attitudes and give us insight into how well we know our constituents.

Each of you will receive the survey form in the mail from V.P.I. shortly.

You are to complete the survey and return it to your Captain no later than the date you file your current cycle report.

Thank you!

CC: Mr. Todd A. Richards ✓

Cover Letter Sent With Survey

VIRGINIA POLYTECHNIC INSTITUTE
AND STATE UNIVERSITY

Fisheries and Wildlife Sciences

Blacksburg, Virginia 24061

November 27, 1990

As a professional working closely with the natural resources of Virginia, your concerns and opinions regarding natural resource management are important to the Department of Game and Inland Fisheries. The VDGIIF needs information from all involved parties to provide direction for their management efforts.

To get this information for the VDGIIF, we are asking a series of questions to find out what natural resource professionals feel about the current use, regulation and protection of Virginia's streams and rivers. This survey provides you with a unique opportunity to express your views and affect natural resource policies.

Because you are part of our selected sample, your responses are very important to our overall conclusions from the survey. Please take the time to complete the questionnaire and return it in the enclosed, post-paid envelope.

You may be assured of complete confidentiality. You will be identified only by the number on your questionnaire. When you return the completed questionnaire, your number will be removed from our list and you will not receive further mailings.

You may receive a summary of results of this survey by writing "copy of results requested" on the back of the return envelope and printing your name and address below it. Please do not put this information on the questionnaire itself.

We will happily answer any questions you might have. Please feel free to write or call collect.

Thank you for your assistance.

Sincerely,

Paul L. Angermeier
Assistant Professor
(703)231-4501

Todd Richards
Graduate Research Assistant
(703)231-4458

Postcard Reminder

September, 12 1990

Last week a questionnaire seeking your opinions about using and improving Virginia's streams and rivers was mailed to you.

If you have already completed and returned it to us please accept our sincere thanks. If not, please do so today. It is important that your results be included if the results are to truly represent the opinions of the VDGIF.

If for some reason you did not receive the questionnaire please call me collect at (703) 231-4501 and I will get another one in the mail to you today.

Sincerely,

Todd A. Richards
Department of Fisheries and Wildlife
School of Forestry and Wildlife
Virginia Polytechnic Institute
Blacksburg, Virginia 24061-0321

Appendix E. Public survey results: responses to all questions and the number and percent of respondents in each answer category.

Question 1. The number of days Virginia residents spent on streams and rivers each year, the number and percent of respondents in each category.

Days	Frequency	Percent
Zero	302	27.2
1-10	362	32.6
11-20	153	13.8
21-40	134	12.1
41-60	41	3.7
GT 60	116	10.4
Omitted	3	0.3

Question 2. Satisfaction levels felt by Virginia residents, the number and percent of respondents in each category.

Satisfaction	Frequency	Percent
Very unsatisfied	51	6.3
Unsatisfied	108	13.3
Neither	193	23.9
Satisfied	395	48.8
Very satisfied	53	6.6
Omitted	9	1.1

Question 3. The number of different streams and rivers used by Virginia residents in the past twelve months, the number and percent of respondents in each category.

# Streams	Frequency	Percent
None	43	5.3
1	193	23.9
2 TO 5	506	62.5
> 5	65	8.0
OMITTED	2	0.2

Question 4. Distance (in miles) from the stream or river most often used for recreation or pleasure in the past twelve months, the number and percent of respondents in each category. Percents may not add to 100 due to rounding error.

Distance	Frequency	Percent
<1	81	10.0
1-10	372	46.0
11-20	131	16.2
21-30	46	5.7
31-40	26	3.2

41-50	31	3.8
51-60	20	2.5
61-70	14	1.7
71-80	13	1.6
81-90	10	1.2
91-100	10	1.2
> 100	36	4.4
Omitted	19	2.3

Question 5. People with whom Virginia residents visit streams and rivers, the number and percent of respondents in each category.

Person(s)	Frequency	Percent
Family	457	56.5
Friends	231	28.6
Alone	61	7.5
Other	55	6.8
Omitted	5	0.6

Question 6. Improvements needed on the streams and rivers of Virginia, the number of respondents who felt the each improvement was needed, and the percent of respondents who felt the each improvement was needed. Note: percents will total substantially more than 100 because respondents were allowed to circle more than one improvement for this question. The improvements are: More/Better Access (MBA), More/Better Recreational Facilities (MBRF), Litter Clean-Up (LCU), Water Quality Improvement (WQI), Natural Beauty Improvement (NBI), Improve Daily Water Level Stability (IDWLS), Flood Control Improvement (FCI), Improve Yearly Water Level Stability (IYWLS), Fish Population Improvement (FPI), No Changes Needed (NCN), and other.

Improvement	Frequency	Percent
MBA	268	33.1
MBRF	178	22.0
LCU	441	54.5
WQI	402	49.7
NBI	128	15.8
IDWLS	53	6.6
FCI	64	7.9
IYWLS	51	6.3
FPI	312	38.6
NCN	49	6.0
Other	52	6.4

Question 7. Most needed improvements, the number of respondents who felt that each improvement was most needed, and the percent of respondents who felt that each improvement was most needed.

Improvement	Frequency	Percent
MBA	80	9.9
MBRF	47	5.8
LCU	190	23.5
WQI	263	32.5
NBI	23	2.8
IDWLS	12	1.5
FCI	17	2.1
IYWLS	8	1.0
FPI	92	11.4
NCN	4	0.5
OTHER	26	3.2
OMITTED	47	5.8

Question 8. User group preference rankings. The number of first, second, and third place ranks given to each of the user groups, the frequency of respondents giving each ranking and the percent of respondents in each category. The number and percent of respondents who did not rank each activity in the top three is also given along with the number and percent of respondents who did not answer the question or answered it incorrectly (omitted). The activities are: Fishing, Bait Collecting (BC), Canoeing / Kayaking / Sailing (CKS), Motorboating / Waterskiing (MW), Swimming / Tubing Scuba diving (STS), Hiking / Sightseeing / Birdwatching (HSB), Picnicking / Camping (PC), Hunting / Trapping (HT), and other.

Fishing	Frequency	Percent
First	346	42.8
Second	112	13.8
Third	82	10.1
Not ranked	266	32.9
Omitted	3	0.4

BC	Frequency	Percent
First	6	0.7
Second	21	2.6
Third	18	2.2
Not ranked	761	94.1
Omitted	3	0.4

CKS	Frequency	Percent
First	77	9.5
Second	63	7.8
Third	95	11.7
Not ranked	571	70.6
Omitted	3	0.4

MW	Frequency	Percent
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First	76	9.4
Second	73	9.0
Third	48	5.9
Not ranked	609	75.3
Omitted	3	0.4

STS	Frequency	Percent
First	60	7.4
Second	78	9.6
Third	114	14.1
Not ranked	554	68.5
Omitted	3	0.4

HSB	Frequency	Percent
First	163	20.1
Second	106	13.1
Third	106	13.1
Not ranked	431	53.3
Omitted	3	0.4

PC	Frequency	Percent
First	129	15.9
Second	166	20.5
Third	155	19.2
Not ranked	355	43.9
Omitted	4	0.5

HT	Frequency	Percent
First	51	6.3
Second	65	8.0
Third	36	4.4
Not ranked	653	80.7
Omitted	4	0.5

Other	Frequency	Percent
First	22	2.7
Second	8	1.0
Third	14	1.7
Not ranked	761	94.1
Omitted	4	0.5

Question 9. Quality ratings for most preferred activities, the number and percent of respondents giving each rating..

Rating	Frequency	Percent
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Very poor	26	3.2
Poor	50	6.2
Neither	287	35.5
Good	338	41.8
Very good	92	11.4
Omitted	16	2.0

Question 10. Rankings for activity done most often. The number and percent of first, second, and third place rankings each user group received. The number and percent of respondents who did not rank each activity in the top three is also given along with the number and percent of respondents who did not answer the question or answered it incorrectly (omitted). The user groups are the same as in Question 8.

Fishing	Frequency	Percent
First	329	40.7
Second	98	12.1
Third	97	12.0
Not ranked	271	33.5
Omitted	14	1.7

BC	Frequency	Percent
First	7	0.9
Second	17	2.1
Third	20	2.5
Not ranked	751	92.8
Omitted	14	1.7

CKS	Frequency	Percent
First	43	5.3
Second	70	8.7
Third	103	12.7
Not ranked	579	71.6
Omitted	14	1.7

MW	Frequency	Percent
First	71	8.8
Second	70	8.7
Third	50	6.2
Not ranked	604	74.7
Omitted	14	1.7

STS	Frequency	Percent
First	55	6.8
Second	68	8.4

Third	119	14.7
Not ranked	553	68.4
Omitted	14	1.7

HSB	Frequency	Percent
First	174	21.5
Second	125	15.5
Third	86	10.6
Not ranked	410	50.7
Omitted	14	1.7

PC	Frequency	Percent
First	129	15.9
Second	174	21.5
Third	125	15.5
Not ranked	367	45.4
Omitted	14	1.7

HT	Frequency	Percent
First	36	4.4
Second	61	7.5
Third	41	5.1
Not ranked	657	81.2
Omitted	14	1.7

Other	Frequency	Percent
First	22	2.7
Second	9	1.1
Third	7	0.9
Not ranked	757	93.6
Omitted	14	1.7

Question 11. Barriers to recreation, the number of respondents who felt each was a barrier to them and the percent of respondents who felt each was a barrier. The barriers are: Not Enough Leisure Time (NELT), Not Enough Leisure Money (NELM), Not Enough River Access (NERA), Too Few Facilities (TFF), Too Crowded (TC), Family Responsibilities (FR), Too Little Information Available About Activities (TLIAAA), and other. The percents total to more than 100 because respondents were allowed to circle more than one answer.

Barrier	Frequency	Percent
NELT	469	58.0
NELM	119	14.7
NERA	89	11.0
TFF	53	6.6
TC	77	9.5

FR	117	14.5
TLIAAA	77	9.5
Other	62	7.7

Question 12. Size of the stream or river most often used for recreation, the number and percent of respondents using each size of river. Stream and river sizes were small (less than 20 feet wide), medium (20-50 feet wide), and large (greater than 50 feet wide).

Width	Frequency	Percent
Small	104	12.9
Medium	242	29.9
Large	446	55.1
Omitted	17	2.1

Question 13. Crowding condition, the number of people that felt each condition applied to the stream and river areas they used and the percent in each category.

Condition	Frequency	Percent
Very crowded	101	12.5
Crowded	231	28.6
About right	247	30.5
Not crowded	137	16.9
No other people	15	1.9
No opinion	65	8.0
Omitted	13	1.6

Question 14. Number of people seen on an average trip to the stream or river visited most often, the number of respondents reporting seeing each amount, and the percent of respondents reporting each amount. A "highly varied" category was included for respondents that reported seeing an extremely large range of people (e.g., 2 to 200).

# seen	Frequency	Percent
0-10	265	32.8
11-20	140	17.3
21-30	81	10.0
31-40	21	2.6
41-50	74	9.1
51-100	22	2.7
> 100	108	13.3
Highly Varied	17	2.1
Omitted	81	10.0

Question 15. Most frequent days of stream and river use, the frequency of respondents in each category, and the percent in each category.

Days	Frequency	Percent
Weekdays Mostly	101	12.5
Weekdays and Holidays	2	0.2
Weekends	470	58.1
Weekends and Holidays	28	3.5
Holidays	36	4.4
No Preference	161	19.9
Omitted	10	1.2

Question 16. The importance of reasons to visit streams and rivers, the number and percent of respondents reporting each category of importance. On this scale one (1) means "very low importance" and five (5) means "very high importance." The reasons are: To Be Outdoors (TBO), For Family Recreation (FFR), To Be With Friends (TBWF), To Be Close To Water (TBCW), To Relax (TR), To Be Alone (TBA), To Experience The Scenery (TETS), For Adventure And Excitement (FAAE), To Develop Outdoor Recreational Skills (TDORS), To Fish Or Hunt (TFOH), and To See Wildlife (TSW).

TBO	Frequency	Percent
1	12	1.5
2	15	1.9
3	63	7.8
4	170	21.0
5	505	62.4
Omitted	43	5.3

FFR	Frequency	Percent
1	43	5.3
2	52	6.4
3	142	17.6
4	196	24.2
5	293	36.2
Omitted	83	10.3

TBWF	Frequency	Percent
1	42	5.2
2	93	11.5
3	204	25.2
4	187	23.1
5	201	24.8
Omitted	82	10.1

TBCW	Frequency	Percent
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1	31	3.8
2	48	5.7
3	162	20.0
4	209	25.8
5	285	35.2
Omitted	76	9.4

TR	Frequency	Percent
1	8	1.0
2	18	2.2
3	91	11.2
4	206	25.5
5	439	54.3
Omitted	47	5.8

TBA	Frequency	Percent
1	207	25.6
2	116	14.3
3	160	19.8
4	106	13.1
5	111	13.7
Omitted	109	13.5

TKTS	Frequency	Percent
1	17	2.1
2	37	4.6
3	114	14.1
4	216	26.7
5	368	45.5
Omitted	57	7.0

FAAE	Frequency	Percent
1	71	8.8
2	107	13.2
3	232	28.7
4	160	19.8
5	146	18.0
Omitted	93	11.5

TDORS	Frequency	Percent
1	127	15.7
2	147	18.2
3	226	27.9
4	103	12.7
5	101	12.5
Omitted	105	13.0

TFOH	Frequency	Percent
1	174	21.5
2	50	6.2
3	94	11.6
4	111	13.7
5	335	41.4
Omitted	45	5.6

TSW	Frequency	Percent
1	36	4.4
2	52	6.4
3	111	13.7
4	204	25.2
5	325	40.2
Omitted	81	10.0

Question 17. The importance of stream and river functions, the frequency of respondents reporting each level of importance, and the percent in each category. The functions are: Public Water Supply (PWS), Transport of Commercial Goods (TCG), Irrigation For Crops (IFC), Industrial Water Supply (IWS), Recreation (R), Historical Significance (HS), Fishing For Food (FFF), Source of Natural Beauty (SNB), Habitat For Fish And Wildlife (HFFW), and Habitat For Rare and Endangered Plants and Animals (HREPA).

PWS	Frequency	Percent
1	55	5.0
2	26	2.3
3	87	7.8
4	118	10.6
5	696	62.6
Do not know	92	8.3
Omitted	37	3.3

TCG	Frequency	Percent
1	240	21.6
2	156	14.0
3	229	20.6
4	117	10.5
5	158	14.2
Do not know	123	11.1
Omitted	88	7.9

IFC	Frequency	Percent
1	148	13.3
2	105	9.5
3	243	21.9

4	190	17.1
5	224	20.2
Do not know	114	10.3
Omitted	87	7.8

IWS	Frequency	Percent
1	198	17.8
2	131	11.8
3	227	20.4
4	137	12.3
5	206	18.5
Do not know	123	11.1
Omitted	89	8.0

R	Frequency	Percent
1	44	4.0
2	28	2.5
3	123	11.1
4	241	21.7
5	590	53.1
Do not know	24	2.2
Omitted	61	5.5

HS	Frequency	Percent
1	84	7.6
2	109	9.8
3	223	20.1
4	250	22.5
5	313	28.2
Do not know	45	4.1
Omitted	87	7.8

FFF	Frequency	Percent
1	189	17.0
2	128	11.5
3	213	19.2
4	179	16.1
5	283	25.5
Do not know	42	3.8
Omitted	77	6.9

SNB	Frequency	Percent
1	7	0.6
2	19	1.7
3	79	7.1
4	229	20.6
5	691	62.2

Do not know	20	1.8
Omitted	66	5.9

HFFW	Frequency	Percent
1	14	1.3
2	11	1.0
3	52	4.7
4	153	13.8
5	817	73.5
Do not know	28	2.5
Omitted	36	3.2

HREPA	Frequency	Percent
1	40	3.6
2	43	3.9
3	104	9.4
4	150	13.5
5	645	58.1
Do not know	61	5.5
Omitted	68	6.1

Question 18. Stream and River functions, the number of respondents who felt each function was in the worst condition, and percent in each category. Function labels are the same as in question 17.

Function	Frequency	Percent
PWS	208	18.7
TCG	25	2.3
IFC	6	0.5
IWS	59	5.3
REC	55	5.0
HS	27	2.4
FFF	90	8.1
SNB	47	4.2
HFFW	168	15.1
HREPA	91	8.2
OTHER	5	0.5
OMITTED	330	29.7

Question 19. Stream and river functions, the number of respondents who felt each function should be protected by the VDGIF, and the percent in each category. Function labels are the same as in question 17.

Function	Frequency	Percent
PWS	151	13.6
TCG	1	0.1

IFC	5	0.5
IWS	8	0.7
REC	49	4.4
HS	8	0.7
FFF	67	6.0
SNB	50	4.5
HFFW	347	31.2
HFRPA	101	9.1
OTHER	13	1.2
OMITTED	311	28.0

Question 20. Opinion on safety of consumption of fish from the stream or river closest to the respondent, the number of respondents reporting each safety level, and the percent in each category.

Safety	Frequency	Percent
Very unsafe	53	4.8
Unsafe	114	10.3
Not sure	528	47.5
Safe	329	29.6
Very safe	62	5.6
Omitted	25	2.3

Question 21. Opinion on safety of the public water supply, the number of respondents reporting each safety level, and the percent in each category.

Safety	Frequency	Percent
Very unsafe	32	2.9
Unsafe	88	7.9
Not sure	310	27.9
Safe	542	48.8
Very safe	121	10.9
Omitted	18	1.6

Question 22. Cause of unsafe water, frequency of respondents believing each category to be the cause of unsafe water, and the percent in each category.

Cause	Frequency	Percent
Safe/not sure	752	67.7
Agriculture	24	2.2
Industry	90	8.1
Dumping/Landfills	33	3.0
Not sure	93	8.4
Other	98	8.8
Omitted	21	1.9

Question 23. Ranking of stream and river characteristics. The number of first, second, and third place ranks given to each characteristic of streams and rivers, the frequency of respondents giving each ranking and the percent of respondents in each category. The characteristics are: Clean Water (CW), Clean Stream Bed or River Banks (CSBRB), Presence of Trees or Shrubs Along Banks (PTSAB), Many Fish Live There (MFLT), Many Types of Plants and Animals Live There (MTPALT), Few Other People Use the Area (FOPUA), Ready Access to the Stream or River (RASR), Presence of Large, Catchable Fish (PLCF), Good Natural Scenery (GNS), the Presence of Rare and Endangered Plants and Animals (PREPA), Adequate Water Levels Exist Year Round (AWLEYR), and Other.

CW	Frequency	Percent
First	831	74.8
Second	70	6.3
Third	72	6.5
Not ranked	118	10.6
Omitted	20	1.8

CSBRB	Frequency	Percent
First	132	11.9
Second	309	27.8
Third	102	9.2
Not ranked	548	49.3
Omitted	20	1.8

PTSAB	Frequency	Percent
First	54	4.9
Second	62	5.6
Third	88	7.9
Not ranked	887	79.8
Omitted	20	1.8

MFLT	Frequency	Percent
First	85	7.7
Second	130	11.7
Third	120	10.8
Not ranked	756	68.0
Omitted	20	1.8

MTPALT	Frequency	Percent
First	71	6.4
Second	136	12.3
Third	156	14.1
Not ranked	727	65.4
Omitted	20	1.8

FOPUA	Frequency	Percent
First	26	2.3
Second	25	2.3
Third	43	3.9
Not ranked	997	89.7
Omitted	20	1.8

RASR	Frequency	Percent
First	34	3.1
Second	37	3.3
Third	80	7.2
Not ranked	940	84.6
Omitted	20	1.8

PLCF	Frequency	Percent
First	57	5.1
Second	51	4.6
Third	67	6.0
Not ranked	916	82.4
Omitted	20	1.8

GNS	Frequency	Percent
First	76	6.8
Second	108	9.7
Third	179	16.1
Not ranked	727	65.4
Omitted	21	1.9

PREPA	Frequency	Percent
First	37	3.3
Second	45	4.1
Third	90	8.1
Not ranked	919	82.7
Omitted	20	1.8

AWLEYR	Frequency	Percent
First	69	6.2
Second	97	8.7
Third	107	9.6
Not ranked	818	73.6
Omitted	20	1.8

Other	Frequency	Percent
First	5	0.5
Second	1	0.1

Third	3	0.3
Not ranked	1083	97.5
Omitted	20	1.8

Question 24. Characteristics of streams and rivers, the number of respondents who felt that each characteristic was least important, and the percent in each category. Characteristic labels are the same as in question 23.

Characteristic	Frequency	Percent
CSRFB	3	0.3
PTS	53	4.8
MFLT	8	0.7
MTPA	7	0.6
FOP	294	26.5
RA	160	14.4
PLCF	141	12.7
GNS	25	2.3
PREPA	99	8.9
AWL	88	7.9
OTHER	2	0.2
OMITTED	231	20.8

Question 25. Opinion on the degree to which Urban Development (UD), Agricultural Practices (AP), Industry (I), and Forestry Practices (FP) are regulated, the frequency of respondents that felt each degree of regulation was appropriate for each item, and the percent in each category.

UD	Frequency	Percent
Too strictly	17	1.5
About right	215	19.4
Not strictly enough	679	61.1
Do not know	158	14.2
Omitted	42	3.8

AP	Frequency	Percent
Too strictly	13	1.2
About right	385	34.7
Not strictly enough	436	39.2
Do not know	222	20.0
Omitted	55	5.0

I	Frequency	Percent
Too strictly	13	1.2
About right	125	11.3
Not strictly enough	779	70.1
Do not know	152	13.7

Omitted	42	3.8
FP	Frequency	Percent

Too strictly	12	1.1
About right	436	39.2
Not strictly enough	312	28.1
Do not know	294	26.5
Omitted	57	5.1

Question 26. The degree of threats to streams and rivers, the number of respondents in each category and the percent in each category for each threat. On this scale one (1) means "very high threat" and five (5) means "very high threat." The threats are: Excessive Boat Traffic (EBT), Overfishing, Agriculture, Human Litter (HL), Urban Development (UD), Water Withdrawal (WW), Dam Construction (DC), Channel Alteration (CA), Forest Removal (FR), Overhunting, and Industry.

EBT	Frequency	Percent

1	116	10.4
2	121	10.9
3	260	23.4
4	223	20.1
5	203	18.3
Do not know	115	10.4
Omitted	73	6.6

Overfishing	Frequency	Percent

1	112	10.1
2	146	13.1
3	289	26.0
4	167	15.0
5	161	14.5
Do not know	153	13.8
Omitted	83	7.5

Agriculture	Frequency	Percent

1	94	8.5
2	148	13.3
3	288	25.9
4	202	18.2
5	124	11.2
Do not know	171	15.4
Omitted	84	7.6

HL	Frequency	Percent

1	15	1.4

2	24	2.2
3	95	8.6
4	248	22.3
5	634	57.1
Do not know	45	4.1
Omitted	50	4.5

UD	Frequency	Percent
1	21	1.9
2	32	2.9
3	155	14.0
4	274	24.7
5	471	42.4
Do not know	91	8.2
Omitted	67	6.0

WW	Frequency	Percent
1	65	5.9
2	92	8.3
3	246	22.1
4	203	18.3
5	188	16.9
Do not know	230	20.7
Omitted	87	7.8

DC	Frequency	Percent
1	160	14.4
2	142	12.8
3	212	19.1
4	101	9.1
5	76	6.8
Do not know	337	30.3
Omitted	83	7.5

CA	Frequency	Percent
1	128	11.5
2	127	11.4
3	188	16.9
4	117	10.5
5	105	9.5
Do not know	357	32.1
Omitted	89	8.0

FR	Frequency	Percent
1	51	4.6
2	56	5.0
3	129	11.6

4	231	20.8
5	396	35.6
Do not know	179	16.1
Omitted	69	6.2

Overhunting	Frequency	Percent
1	169	15.2
2	131	11.8
3	232	20.9
4	119	10.7
5	158	14.2
Do not know	211	19.0
Omitted	91	8.2

Industry	Frequency	Percent
1	35	3.2
2	27	2.4
3	99	8.9
4	191	17.2
5	576	51.8
Do not know	115	10.4
Omitted	68	6.1

Question 27. Frequency and percent of respondents in or not in any sporting, environmental, or conservation organizations.

Member?	Frequency	Percent
Yes	232	20.9
No	851	76.6
Omitted	28	2.5

Question 28. Importance of nine VDGIF programs, the frequency of respondents and percentage of respondents in each category for each program. On this scale one (1) means "very low importance" and five (5) means "very high importance." The programs are: Fish Stocking (FS), Endangered Species Restoration (ESR), Stream Habitat Improvement (SHI), Development of Public Access (DPA), Non-game Fish Management (NFM), Environmental Permit Review (EPR), Environmental Education (EE), Fish Population Monitoring (FPM), and Enforcement of Regulations (ER).

FS	Frequency	Percent
1	34	3.1
2	66	5.9
3	267	24.0
4	240	21.6
5	366	32.9

Do not know	69	6.2
Omitted	69	6.2

ESR	Frequency	Percent
1	47	4.2
2	72	6.5
3	205	18.5
4	219	19.7
5	403	36.3
Do not know	73	6.6
Omitted	92	8.3

SHI	Frequency	Percent
1	8	0.7
2	29	2.6
3	134	12.1
4	289	26.0
5	511	46.0
Do not know	56	5.0
Omitted	84	7.6

DPA	Frequency	Percent
1	113	10.2
2	182	16.4
3	334	30.1
4	176	15.8
5	155	14.0
Do not know	73	6.6
Omitted	78	7.0

NFM	Frequency	Percent
1	79	7.1
2	116	10.4
3	335	30.2
4	191	17.2
5	126	11.3
Do not know	162	14.6
OMITTED	102	9.2

EPR	Frequency	Percent
1	33	3.0
2	41	3.7
3	178	16.0
4	217	19.5
5	360	32.4
Do not know	181	16.3
Omitted	101	9.1

EE	Frequency	Percent
1	13	1.2
2	22	2.0
3	143	12.9
4	249	22.4
5	549	49.4
Do not know	59	5.3
Omitted	76	6.8

FPM	Frequency	Percent
1	24	2.2
2	48	4.3
3	267	24.0
4	301	27.1
5	302	27.2
Do not know	86	7.7
Omitted	83	7.5

ER	Frequency	Percent
1	5	0.5
2	9	0.8
3	69	6.2
4	187	16.8
5	714	64.3
Do not know	56	5.0
Omitted	71	6.4

Question 29. Degree of agreement with six statements, the number of respondents expressing each level of agreement, and the percent of respondents in each category.

Statement 1: Courses focusing on the conservation of natural resources should be taught in public schools.

Agreement	Frequency	Percent
Strongly agree	574	51.7
Agree	448	40.3
No opinion	40	3.6
Disagree	16	1.4
Strongly disagree	3	0.3
Omitted	30	2.7

Statement 2: Plants and animals exist primarily to be used by humans.

Agreement	Frequency	Percent
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Strongly agree	63	5.7
Agree	213	19.2
No opinion	124	11.2
Disagree	459	41.3
Strongly disagree	217	19.5
Omitted	35	3.2

Statement 3: Humans do not need to worry about changes in their environment because they can change the natural environment to suit their needs.

Agreement	Frequency	Percent
Strongly agree	21	1.9
Agree	24	2.2
No opinion	49	4.4
Disagree	347	31.2
Strongly disagree	640	57.6
Omitted	30	2.7

Statement 4: Rivers and streams are valuable for their scenic qualities.

Agreement	Frequency	Percent
Strongly agree	448	40.3
Agree	563	50.7
No opinion	40	3.6
Disagree	27	2.4
Strongly disagree	11	1.0
Omitted	22	2.0

Statement 5: Non-tidal water levels that change daily are harmful to the plants and animals living in and around rivers and streams.

Agreement	Frequency	Percent
Strongly agree	105	9.5
Agree	369	33.2
No opinion	452	40.7
Disagree	137	12.3
Strongly disagree	21	1.9
Omitted	27	2.4

Statement 6: The Department of Game and Inland Fisheries is doing its best to promote wise natural resource use.

Agreement	Frequency	Percent
Strongly agree	61	5.5
Agree	406	36.5
No opinion	462	41.6
Disagree	141	12.7
Strongly disagree	21	1.9

Omitted	20	1.8
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Question 30. Respondent sex distribution, the number and percent of respondents in each category.

Sex	Frequency	Percent
Male	804	72.4
Female	290	26.1
Omitted	17	1.5

Question 31. Length of Virginia residency, the number and percent of respondents in each category.

Years	Frequency	Percent
<5	79	7.1
5-10	82	7.4
11-15	87	7.8
16-20	85	7.6
21-25	83	7.5
26-30	103	9.3
31-35	92	8.3
36-40	99	8.9
41-45	70	6.3
46-50	80	7.2
51-55	51	4.6
56-60	52	4.7
61-65	43	3.9
66-70	46	4.1
71-75	16	1.4
76-80	18	1.6
> 80	8	0.1
Omitted	17	1.5

Question 32. Education levels, the number and percent of respondents in each category.

Level	Frequency	Percent
GRADE	59	5.3
HIGH	339	30.5
COLLEGE	449	40.4
POST G	244	22.0
OMITTED	20	1.8

Question 33. Income distribution (K = thousand), and the number and percent of respondents in each category.

Income	Frequency	Percent
UNDER 10K	69	6.2
10K TO 29K	273	24.6
30K TO 49K	302	27.2
50K TO 69K	199	17.9
ABOVE 70K	201	18.1
OMITTED	67	6.0

Question 34. Age distribution, the number and percent of respondents in each category.

Age	Frequency	Percent
UNDER 18 YRS	3	0.3
18 TO 25 YRS	32	2.9
26 TO 40 YRS	343	30.9
41 TO 55 YRS	343	30.9
56 TO 65 YRS	197	17.7
OVER 65 YRS	173	15.6
OMITTED	20	1.8

Question 36. County of Residence, the number and percent of respondents in each category.

County	Frequency	Percent
Accomack	5	0.5
Albemarle	14	1.3
Alleghany	1	0.1
Amelia	2	0.2
Amherst	5	0.5
Appomattox	1	0.1
Arlington	34	3.1
Augusta	22	2.0
Bath	2	0.2
Bedford	10	0.9
Bland	2	0.2
Botetourt	6	0.5
Brunswick	2	0.2
Buchanon	4	0.4
Buckingham	5	0.5
Campbell	9	0.8
Caroline	3	0.3
Carroll	4	0.4
Charles City	2	0.2

Charlotte	3	0.3
Chesterfield	34	3.1
Clarke	3	0.3
Craig	1	0.1
Culpeper	5	0.5
Cumberland	2	0.2
Dickenson	4	0.4
Dinwiddie	2	0.2
Essex	1	0.1
Fairfax	173	15.6
Fauquier	4	0.4
Floyd	4	0.4
Fluvanna	4	0.4
Franklin	7	0.6
Frederick	12	1.1
Giles	1	0.1
Gloucester	4	0.4
Goochland	4	0.4
Grayson	3	0.3
Greene	1	0.1
Greensville	5	0.5
Hanover	8	0.7
Henrico	51	4.6
Henry	9	0.8
Highland	1	0.1
Isle of Wight	3	0.3
James City	7	0.6
King and Queen	4	0.4
King William	1	0.1
Lancaster	4	0.4
Lee	3	0.3
Loudoun	20	1.8
Louisa	1	0.1
Lunenburg	1	0.1
Madison	5	0.5
Mathews	2	0.2
Mecklenburg	6	0.5
Middlesex	2	0.2
Montgomery	13	1.2
Nelson	2	0.2
New Kent	1	0.1
Northampton	4	0.4
Northumberland	3	0.3
Nottoway	5	0.5
Orange	2	0.2
Page	3	0.3
Pittsylvania	15	1.4
Powhatan	1	0.1
Prince Edward	3	0.3
Prince George	9	0.8
Prince William	35	3.2
Pulaski	4	0.4

Richmond	7	0.6
Roanoke	42	3.8
Rockbridge	5	0.5
Rockingham	11	1.0
Russell	9	0.8
Scott	4	0.4
Shenandoah	6	0.5
Smyth	6	0.5
Southampton	7	0.6
Spotsylvania	2	0.2
Stafford	12	1.1
Surry	2	0.2
Tazewell	10	0.9
Warren	1	0.1
Washington	18	1.6
Westmoreland	1	0.1
Wise	6	0.5
Wythe	5	0.5
York	11	1.0
Independent Cities	235	21.2
Omitted	63	5.7

Question 37. Employment status, the number and percent of respondents in each category.

Status	Frequency	Percent
Employed	785	70.7
Unemployed	22	2.0
Retired	241	21.7
Other	44	4.0
Omitted	19	1.7

Appendix F. Professional survey results: responses to all questions and the number and percent of respondents in each answer category.

Question 1. Predictions of public satisfaction, the number of professional respondents predicting each level of satisfaction and the percent in each category.

Satisfaction	Frequency	Percent
Very unsatisfied	7	4.9
Unsatisfied	37	25.7
Neither	23	16.0
Satisfied	71	49.3
Very satisfied	4	2.8
Omitted	2	1.4

Question 2. Improvements predicted to be wanted by the public, the number of professional respondents predicting each improvement to be wanted by the public, and percent in each category. The Improvements are More/Better Access (MBA), More/Better Recreational Facilities (MBRF), Litter Clean-up (LCU), Water Quality Improvement (WQI), Natural Beauty Improvement (NBI), Improve Daily Water Level Stability (IDWLS), Flood Control Improvement (FCI), Improve Yearly Water Level Stability (IYWLS), Fish Population Improvement (FPI), No Changes Needed (NCN), and other. Percents do not total 100 because professionals were allowed to select as many improvements as they felt the public would want.

Improvement	Frequency	Percent
MBA	112	77.8
MBRF	42	29.2
LCU	75	52.1
WQI	72	50.0
NBI	10	6.9
IDWLS	11	7.6
FCI	9	6.3
IYWLS	15	10.4
FPI	89	61.8
NCN	1	0.7
Other	10	6.9

Question 3. Prediction of the improvement most wanted by the public, the number of professional respondents who predicted that each improvement would be most wanted, and the percent in each category. The improvement labels are the same as in question 2.

Improvement	Frequency	Percent
MBA	51	36.2

MBRF	6	4.3
LCU	11	7.8
WQI	28	19.9
IDWLS	3	2.1
IYWLS	1	0.7
FPI	33	23.4
Other	4	2.8
Omitted	4	2.8

Question 4. The days predicted to be most used by the public, the number of professionals predicting that each category would be most used by the public, and the percent in each category.

Days	Frequency	Percent
Weekdays	2	1.4
Weekends	130	90.3
Holidays	2	1.4
No preference	10	6.9

Question 5. Activities predicted by professionals to be most preferred by Virginia residents, the number of first, second, and third place rankings for each user group, and the percent of professional respondents in each category. The user groups are Fishing, Bait Collecting (BC), Canoeing / Kayaking / Sailing (CKS), Motorboat / Waterskiing (MW), Swimming / Tubing / Scuba Diving (STS), Hiking / Sightseeing / Birdwatching (HSB), Picnicking / Camping (PC), Hunting / Trapping (HT), and Other.

Fishing	Frequency	Percent
First	114	79.2
Second	23	16.0
Third	6	4.2
Not ranked	1	0.7

BC	Frequency	Percent
First	1	0.7
Second	2	1.4
Third	6	4.2
Not ranked	135	93.8

CKS	Frequency	Percent
First	11	7.6
Second	54	37.5
Third	29	20.1
Not ranked	50	34.7

MW	Frequency	Percent
First	13	9.0
Second	40	27.8
Third	19	13.2
Not ranked	72	50.0

STS	Frequency	Percent
First	1	0.7
Second	13	9.0
Third	41	28.5
Not ranked	89	61.8

HSB	Frequency	Percent
First	0	0.0
Second	1	0.7
Third	4	2.8
Not ranked	139	96.5

PC	Frequency	Percent
First	1	0.7
Second	1	0.7
Third	13	9.0
Not ranked	129	89.6

HT	Frequency	Percent
First	6	4.2
Second	9	6.3
Third	26	18.1
Not ranked	103	71.5

Other	Frequency	Percent
First	0	0.0
Second	2	1.4
Third	0	0.0
Not ranked	142	98.6

Question 6. Professional rating of the quality of the activity predicted by professionals to be preferred by Virginia residents.

Rating	Frequency	Percent
Very poor	3	2.1
Poor	6	4.2
Neither	43	29.9
Good	72	50.0

Very good	19	13.2
Omitted	1	0.7

Question 7. Opinion on crowding on the streams and rivers in the professionals' respective regions, the number of respondents who believe each level of crowding to apply in their region, and the percent in each category.

Crowding	Frequency	Percent
Not a problem	38	26.4
Slight problem	45	31.2
Moderate problem	45	31.2
Severe problem	13	9.0
Do not know	3	2.1

Question 8. Activity professionals indicated was associated with the highest level of crowding, the number of respondents that felt that each activity was most crowded and the percent in each category. Activity labels are the same as in question 5.

Activity	Frequency	Percent
F	54	37.8
BC	1	0.7
CKS	23	16.1
MW	49	34.3
STS	9	6.3
PC	3	2.1
HT	3	2.1
Other	1	0.7

Question 9. Activities predicted by professionals to be participated in most often by Virginia residents, the number of first, second, and third place rankings for each user group, and the percent of professional respondents in each category. The user groups are fishing, Bait Collecting (BC), Canoeing / Kayaking / Sailing (CKS), Motorboat / Waterskiing (MW), Swimming / Tubing / Scuba Diving (STS), Hiking / Sightseeing / Birdwatching (HSB), Picnicking / Camping (PC), Hunting / Trapping (HT), and other.

Fishing	Frequency	Percent
First	124	86.1
Second	17	11.8
Third	2	1.4
Not ranked	1	0.7

BC	Frequency	Percent
First	0	0.0

Second	1	0.7
Third	3	2.1
Not ranked	140	97.2

CKS	Frequency	Percent
First	7	4.9
Second	54	37.5
Third	33	22.9
Not ranked	50	34.7

MW	Frequency	Percent
First	15	10.4
Second	53	36.8
Third	17	11.8
Not ranked	59	41.0

STS	Frequency	Percent
First	1	0.7
Second	10	6.9
Third	47	32.6
Not ranked	86	59.7

HSB	Frequency	Percent
First	0	0.0
Second	1	0.7
Third	6	4.2
Not ranked	137	95.1

PC	Frequency	Percent
First	0	0.0
Second	4	2.8
Third	14	9.7
Not ranked	126	87.5

HT	Frequency	Percent
First	0	0.0
Second	4	2.8
Third	23	16.0
Not ranked	117	81.3

Other	Frequency	Percent
Not ranked	144	100.0

Question 10. Functions of streams and rivers. Importance of each function as

indicated by professional respondents, the number of respondents in each importance category and the percent in each category. On this scale, one (1) means "very low importance", and five (5) means "very high importance." The functions are Public Water Supply (PWS), Transport of Commercial Goods (TCG), Irrigation For Crops (IFC), Industrial Water Supply (IWS), Recreation (R), Historical Significance (HS), Fishing For Food (FFF), Source of Natural Beauty (SNB), Habitat For Fish and Wildlife (HFFW), and Habitat for Rare and Endangered Plants and Animals (HREPA).

PWS	Frequency	Percent
1	18	12.5
2	13	9.0
3	27	18.7
4	22	15.3
5	59	41.0
Do not know	4	2.8
Omitted	1	0.7

TCG	Frequency	Percent
1	72	50.0
2	27	18.7
3	26	18.1
4	6	4.2
5	6	4.2
Do not know	6	4.2
Omitted	1	0.7

IFC	Frequency	Percent
1	38	26.4
2	35	24.3
3	34	23.6
4	26	18.1
5	7	4.9
Do not know	2	1.4
Omitted	2	1.4

IWS	Frequency	Percent
1	33	22.9
2	36	25.0
3	45	31.2
4	15	10.4
5	10	6.9
Do not know	3	2.1
Omitted	2	1.4

R	Frequency	Percent
1	0	0.0

2	0	0.0
3	8	5.6
4	32	22.2
5	102	70.8
Do not know	1	0.7
Omitted	1	0.7

HS	Frequency	Percent
1	7	4.9
2	21	14.6
3	33	22.9
4	45	31.2
5	32	22.2
Do not know	2	1.4
Omitted	4	2.8

FFF	Frequency	Percent
1	19	13.2
2	20	13.9
3	46	31.9
4	33	22.9
5	22	15.3
Do not know	1	0.7
Omitted	3	2.1

SNB	Frequency	Percent
1	1	0.7
2	2	1.4
3	19	13.2
4	37	25.7
5	83	57.6
Do not know	1	0.7
Omitted	1	0.7

HFFW	Frequency	Percent
1	0	0.0
2	0	0.0
3	4	2.8
4	14	9.7
5	125	86.8
Do not know	1	0.7

HREPA	Frequency	Percent
1	3	2.1
2	7	4.9
3	18	12.5
4	19	13.2

5	93	64.6
Do not know	3	2.1
Omitted	1	0.7

Question 11. Function felt to be in the worst condition, the number of professional respondents indicating that each function was in the worst condition, and the percent in each category. Function labels are the same as in question 10.

Function	Frequency	Percent
PWS	18	12.5
TCG	8	5.6
IFC	1	0.7
IWS	11	7.6
REC	10	6.9
HS	2	1.4
FFF	21	14.6
SNB	15	10.4
HFFW	42	29.2
HREPA	11	7.6
Omitted	5	3.5

Question 12. Function that professionals felt should be most protected by the VDGIF, the number of professional respondents indicating that each function should be most protected and the percent in each category. Function labels are the same as in question 10.

Function	Frequency	Percent
PWS	4	2.8
REC	19	13.2
FFF	6	4.2
HFFW	103	71.5
HREPA	9	6.3
Omitted	3	2.1

Question 13. Characteristics of streams and rivers felt to be most important, the number of first, second, and third place rankings given to each characteristic and the percent of professional respondents in each category. The number and percent of respondents who did not rank each activity in the top three is also given. The characteristics are Clean Water (CW), Clean Stream Bed or River Banks (CSBRB), Presence of Trees and Shrubs Along Banks (PTSAB), Many Fish Live There (MFLT), Many Types of Plants and Animals Live There (MTPALT), Few Other People Use the Area (FOPUA), Ready Access to the Stream or River (RASR), Presence of Large, Catchable Fish (PLCF), Good Natural Scenery (GNS), the Presence of Rare or Endangered Plants and Animals (PREPA), Adequate Water Levels Exist Year Round (AWLEYR), and other.

CW	Frequency	Percent
First	111	77.1
Second	11	7.6
Third	5	3.5
Not ranked	17	11.8

CSBRB	Frequency	Percent
First	2	1.4
Second	41	28.5
Third	19	13.2
Not ranked	82	56.9

PTSAB	Frequency	Percent
First	4	2.8
Second	9	6.3
Third	15	10.4
Not ranked	116	80.6

MFLT	Frequency	Percent
First	6	4.2
Second	15	10.4
Third	11	7.6
Not ranked	112	77.8

MTPALT	Frequency	Percent
First	2	1.4
Second	23	16.0
Third	29	20.1
Not ranked	90	62.5

FOPUA	Frequency	Percent
First	0	0.0
Second	4	2.8
Third	0	0.0
Not ranked	140	97.2

RASR	Frequency	Percent
First	3	2.1
Second	11	7.6
Third	17	11.8
Not ranked	113	78.5

PLCF	Frequency	Percent
First	5	3.5

Second	6	4.2
Third	8	5.6
Not ranked	125	86.8

GNS	Frequency	Percent
First	3	2.1
Second	7	4.9
Third	15	10.4
Not ranked	119	82.6

PREPA	Frequency	Percent
First	3	2.1
Second	6	4.2
Third	6	4.2
Not ranked	129	89.6

AWLEYR	Frequency	Percent
First	7	4.9
Second	17	11.8
Third	16	11.1
Not ranked	104	72.2

Question 14. Characteristics rated as least important to professionals, the number of professionals feeling each characteristic was least important and the percent in each category. Characteristic labels are the same as in question 13.

Characteristic	Frequency	Percent
CW	1	0.7
CSBRB	4	2.8
PTSAB	7	4.9
MFLT	2	1.4
MTPALT	4	2.8
FOPUA	55	38.2
RASR	19	13.2
PLCF	19	13.2
GNS	2	1.4
PREPA	17	11.8
AWLEYR	13	9.0
Omitted	1	0.7

Question 15. Opinion on regulation of Urban Development (UD), Agricultural Practices (AP), industry, and Forestry Practices (FP), the number of resource professionals feeling that each item is regulated too strictly, about right, or not strictly enough, and the percent in each category.

UD	Frequency	Percent
Too strictly	3	2.1
About right	29	20.1
Not strictly enough	106	73.6
Do not know	6	4.2

AP	Frequency	Percent
Too strictly	2	1.4
About right	46	31.9
Not strictly enough	94	65.3
Do not know	2	1.4

Industry	Frequency	Percent
Too Strictly	0	0.0
About right	13	9.0
Not strictly enough	127	88.2
Do not know	4	2.8

FP	Frequency	Percent
Too strictly	1	0.7
About right	58	40.3
Not strictly enough	74	51.4
Do not know	9	6.3
Omitted	2	1.4

Question 16. Threats to streams and rivers, professionals' opinion of the degree of threat posed by each of the following conditions and the percent in each category. On this scale, one (1) means "very low threat" and five (5) means "very high threat." The threats are Excessive Boat Traffic (EBT), overfishing, agriculture, Human Litter (HL), Urban Development (UD), Water Withdrawal (WW), Dam Construction (DC), Channel Alteration (CA), Forest Removal (FR), overhunting, and industry.

EBT	Frequency	Percent
1	27	18.7
2	25	17.4
3	36	25.0
4	28	19.4
5	27	18.7
Do not know	1	0.7

Overfishing	Frequency	Percent
1	13	9.0
2	39	27.1
3	50	34.7

4	24	16.7
5	17	11.8
Do not know	1	0.7

Agriculture	Frequency	Percent
1	10	6.9
2	25	17.4
3	37	25.7
4	33	22.9
5	35	24.3
Do not know	4	2.8

HL	Frequency	Percent
1	2	1.4
2	6	4.2
3	22	15.3
4	45	31.2
5	67	46.5
Do not know	1	0.7
Omitted	1	0.7

UD	Frequency	Percent
1	1	0.7
2	8	5.6
3	23	16.0
4	41	28.5
5	69	47.9
Do not know	2	1.4

WW	Frequency	Percent
1	7	4.9
2	20	13.9
3	38	26.4
4	36	25.0
5	35	24.3
Do not know	7	4.9
Omitted	1	0.7

DC	Frequency	Percent
1	23	16.0
2	32	22.2
3	42	29.2
4	15	10.4
5	23	16.0
Do not know	8	5.6
Omitted	1	0.7

CA	Frequency	Percent
1	18	12.5
2	25	17.4
3	40	27.8
4	24	16.7
5	28	19.4
Do not know	8	5.6
Omitted	1	0.7

FR	Frequency	Percent
1	3	2.1
2	11	7.6
3	27	18.7
4	39	27.1
5	59	41.0
Do not know	5	3.5

Overhunting	Frequency	Percent
1	62	43.1
2	31	21.5
3	28	19.4
4	12	8.3
5	5	3.5
Do not know	4	2.8
Omitted	2	1.4

Industry	Frequency	Percent
1	5	3.5
2	2	1.4
3	15	10.4
4	33	22.9
5	83	57.6
Do not know	3	2.1
Omitted	3	2.1

Question 17. The most influential environmental, sporting, or conservation organizations, the number of resource professionals indicating that each organization was the most influential in their region, and the percent in each category.

Organization	Frequency	Percent
Omitted	24	16.4
B.A.S.S.	5	3.4
Chesapeake bay orgs.	6	4.1
Cumberland Mt.	1	0.7
Ducks Unlimited	16	11.0

Deer Hunters Assoc.	1	0.7
Don't know	3	2.0
Environmental Defense	1	0.7
FORVA	1	0.7
"Friends of River" Orgs.	4	2.7
Gray Lumber Corporation	1	0.7
Izaak Walton	17	11.6
Nature Conservancy	3	2.0
National Wildlife Fed.	2	1.4
National Wild Turkey Fed.	3	2.0
New R. Wildlife Club	2	1.4
None	7	4.8
NRA	3	2.0
Old Dominion Sports	2	1.4
Piedmont Environmental	4	2.7
PRIIDE	1	0.7
Quail Unlimited	1	0.7
Raccoon Hunters Assoc.	1	0.7
Roanoke R. Basin Assoc.	1	0.7
Rockbridge Conservation	1	0.7
Shenandoah Nat. Park	1	0.7
Sierra Club	1	0.7
Smith R. Wildlife	1	0.7
Sports Writer's Assoc.	1	0.7
Trout Unlimited	10	6.8
Triangle Sports	1	0.7
Virginia Wildlife Fed.	11	7.5
VDGIF	6	4.1
Woodmen of the World	1	0.7

Question 18. Years of Virginia residency, the number and percent of professionals in each category.

Years	Frequency	Percent
< 6	9	6.2
5-10	3	2.1
11-15	12	8.3
16 -20	11	7.6
21-25	18	12.5
26-30	27	18.8
31-35	21	14.6
36-40	20	13.9
41-45	10	6.9
46-50	3	2.1
51-55	8	5.6
> 55	2	1.4

Question 19. Education level, the number and percent of professionals in each level.

Education	Frequency	Percent
High school	32	22.2
College	94	65.3
Post graduate	18	12.5

Question 20. Household income, the number and percent of professionals in each category. K = 1,000.

Income	Frequency	Percent
10K TO 29K	49	34.0
30K TO 49K	65	45.1
50K TO 69K	24	16.7
ABOVE 70K	4	2.8
Omitted	2	1.4

Question 21. Age, the number and percent of professionals in each age group.

Age	Frequency	Percent
18 TO 25 YRS	16	11.1
26 TO 40 YRS	91	63.2
41 TO 55 YRS	33	22.9
56 TO 65 YRS	3	2.1
OVER 65 YRS	1	0.7

Question 22. Region of employment, the number and percent of professionals in each region.

Region	Frequency	Percent
1	33	22.9
2	39	27.1
3	25	17.4
4	16	11.1
5	28	19.4
Omitted	3	1.4

VITA

Todd Allan Richards was born on May 31, 1967 in Sunderland, Massachusetts. He was born with a fish in his hand. Consequently his future was planned and confirmed when he entered the University of Maine in September of 1985 majoring in fish and wildlife management (fisheries concentration). After graduating from Maine with a heightened interest in fisheries, fishing, and hunting, he moved to Virginia in the summer of 1989 with his future wife leading the way. He completed his Masters degree in fisheries in January of 1992 at VPI & SU. The future holds a position for him in Massachusetts (the homeland) working for the Massachusetts Department of Fish, Wildlife, and Law Enforcement.